

Food Fraud: A Primer

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ABSTRACT

Food fraud is a major problem with all food and drink businesses. It has become a global problem of increasing importance. Fraud may be regarded as the intentional misrepresentation of fact by one person or an organization. Food fraud is the deliberate alteration of food. It is widely accepted in the food industry as illegal deception for economic gain using food. The most common types of food fraud include deliberate substitution, misrepresentation or mislabeling, adulteration, stolen goods, tampering, diversion, smuggling, and concealment. All these types of fraud have the potential to seriously endanger food quality and safety. They can also cause direct or indirect threats to public health. This provides a primer on food fraud.

KEYWORDS: food fraud, fake food, food fraud prevention, fraud food vulnerability, food integrity, food crime

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INTRODUCTION

Food is indispensable for human survival. The food corporations have a tremendous effect in determining our health and nutrition. The increasing industrialization and globalization of our food supply chains (from farm to fork) have posed new challenges for the safety and quality of the food products. Due to globalization of production and distribution, food fraud incidents could be massive and have regional or global impact.

Food fraud has become a major concern for consumers all over the world. Ethical products are becoming more demanded by consumers and reciprocally provided by food businesses. Consumers need to have confidence in food products for many reasons. First, it requires consumer trust for any food business to grow and offer high-quality food products. That trust is lost when there is food fraud. Second, it takes a few cases of food fraud to damage the reputation of an entire food industry.

FOOD FRAUD CONCEPT

Food fraud (FF) is not a new phenomenon. It has been around for more than 2,000 years and is everywhere. FF incidents date as far back as the Roman empire. The Melamine incidents in 2007/2008 and the horsemeat scandal in 2013 have drawn great attention of both the media and consumer [1].

Food fraud is the intentional, deceptive misrepresentation of foods for economic gain. It is the act of purposely altering, misrepresenting, mislabeling, substituting or tampering with any food product at any point in the food supply chain. It is a

fraudulent practice that is driven by economic gain and embraces the deliberate substitution, addition, or misrepresentation of food, food ingredients or food packaging. It differs from other food safety and integrity issues, as it is a deliberate, economically-motivated, activity. Food fraud experts define the fraud opportunity using three legs of a triangle (victim, fraudster, absence of a capable guardian). The area within the triangle determines the fraud opportunity [2].

Seven types of food fraud have been identified as shown in Figure 1 [3] and explained as follows [4,5]:

- 1. Adulteration:** A component of the finished product is fraudulent. Food fraud includes economically motivated adulteration (EMA). As shown in Figure 2, the adulteration may intentional or unintentional [6].
- 2. Tampering:** Legitimate product and packaging are used in a fraudulent way.
- 3. Over-run:** Legitimate product is made in excess of production agreements.
- 4. Theft:** Legitimate product is stolen and passed off as legitimately procured, e.g., cargo theft, shoplifting, employee theft, etc.
- 5. Diversion:** The sale or distribution of legitimate products outside of intended markets; e.g. illegal gray market, parallel trade, smuggling, illegal import, etc.
- 6. Simulation:** Illegitimate product is designed to look like, but not exactly copy, the legitimate product.
- 7. Counterfeit:** All aspects of the fraudulent product and packaging are fully replicated. This is also known as misrepresentation.

Other types of food fraud include tax avoidance, smuggling, concealment, mislabeling, and intellectual property rights counterfeiting. Food fraud can take any of these forms. It could also be the mislabeling of organic, kosher, halal, or other kinds of products. Fraudulent food labels may also be instruments of deception. An authentic finished food product must comply with labelling regulations. Food mislabelling has now become an issue in the modern society. The veracity of food labels are the major concern for consumers, regulators, and the food industry at all levels [7].

In addition to understanding the food fraud types, learning about the types of foods involved can be helpful in understanding the nature of fraudulent activities. Food types that are vulnerable to food fraud include meat products, cereals, fish, seafood, liquids, spices, fruits, fruit juices, and vegetables. Food fraud incidents can negatively affect sales, food company reputation, and market capitalization. It can harm human health and erode consumer trust. For these reasons, it is imperative that food fraud is detected at an early stage.

WHY FOOD FRAUD?

Why is food fraud common? We will provide five main reasons for food fraud. First, the motive behind food fraud is economic gain. Food Fraud can be a lucrative act. There is much money to be made by unscrupulous producers. Food fraud occurs where the temptation of food fraud are high and the risk of getting caught are low. Second, food fraud can be due to cost cutting as the food industry is under constant pressure to keep prices down. A food company may be tempted to substitute, sometimes at the cost of safety and integrity. Third, product value and marketability can be reasons consumers experience food fraud. Food fraud is deceptive since consumers generally would not purposefully choose to purchase a counterfeit food. Most counterfeited products are purchased by unwitting consumers. Fourth, according to the Global Food Safety Initiative, most cases of food fraud are not harmful so that the effects on the human body usually go unnoticed. Criminal intent is the most difficult thing to prove when it comes to food fraud. Fifth, food fraud continues to thrive due to globalization and an increasingly complex supply chain of today. This has posed new challenges for the safety and quality of the food products.

CONSEQUENCES OF FOOD FRAUD

What are the consequences of food fraud? Fraud can affect the food and drink industry in many ways [8]. First, food fraud incidents can cause direct or indirect threats to public health, e.g. people can suffer from food allergy. Second, Food fraud can have impacts on the economy and on the beliefs and ethics of people. Third, food fraud jeopardizes consumer interest and deceives the consumer about the quality of the food. Fourth incidents of food fraud can cause public relations problems for a food company. Fifth, government agencies spend considerable money to combat food fraud.

FOOD FRAUD PREVENTION

The countermeasures against food fraud include mitigation and prevention. While mitigation is intended to reduce the consequence of the event, prevention is intended to reduce or eliminate the likelihood of the event occurring. The most efficient way to deal with food fraud is prevention, not intervention and response [9]. The focus of food fraud

prevention has moved from assessing the danger /risk toward assessing the possibility of the risk (vulnerability). Food fraud prevention and fraud vulnerability reduction are the first steps to combat food fraud. Fraud vulnerability may be regarded as a weakness or flaw that creates opportunities for undesirable events related to the food system. Food fraud vulnerability (susceptibility) threats may originate from the external or internal environment of a business [10]. As shown in Figure 3, today, economically motivated fraudulent act results from a combination of opportunities, motivations, and inadequate control measures [11].

Prevention of food fraud is a complex task. Everyone has a role to play to prevent food fraud: consumers, industry, government, academia, and non-governmental organizations, technologies, etc.

1. Consumers: The number of lawsuits brought on food business by consumers has increased drastically in recent years. Unfortunately, there are not foolproof steps consumer can take to protect themselves from all food fraud. If given the opportunity, consumers will want to self-authenticate food products in stores. The idea of giving consumers a device for fraud detection in food stores has been of recent interest. Many different prototypes have been developed so consumers can test the origins and ingredients in food products at any food store. Consumers should become more educated about food frauds that can take place. Customers can use technology to validate food labels and countries of origin. However, undesirable results in food stores could be damaging to reputations and sales [12].

2. Governments: Local and national governments play a major role in preventing food fraud. It is the duty of the governments to provide leadership, set direction, develop national policy, introduce legislation, ensure compliance, and punish offenders. Concerns about deception, fraud, and confusion have led to increased government regulation on traceability. Remedial programs have been created by passing laws and regulations by the federal, state, and local governments.. Local and state lawmakers are taking steps to combat food fraud and fine supermarkets and restaurants that mislabel food. Food fraud policy should be developed to prevent or reduce food fraud and improve the integrity of the food system. The policy should be implemented in compliance with the local regulations. In the USA, the Department of Homeland Security (DHS) considers the food supply chain a "National Critical Infrastructure." Over the years, Congress has introduced a number of bills intended to address food fraud issues. The Food and Drug Administration (FDA) has several hundred agents deployed around the world to investigate food fraud.

3. Industry: Food Industry has responsibility for the integrity of the food they produce. Food companies at all levels of the supply chain are responding to food fraud to protect their brand and reputation. One way to prevent food fraud is for food industry employees to speak up when they see wrong-doing. In other words, fraud has been reported by whistle-blowing. This has been shown a powerful tool in the uncovering of food fraudulent practices. Food fraud prevention is most efficiently addressed by domestic and international cooperation between government and industry. While government operates within domestic borders and have the most control of the food supply chain

at border crossings, food industry has the most control at the sale to consumers [13].

4. Technologies: In order to protect consumer interests and combat food fraud, scientific expertise and technologies are constantly being developed to test the authenticity of foods. Today we have technologies allowing us to detect fraudulent behavior. Technology will play a major role in deterring and combating food fraud. This may include the use of block chain technology, smartphone diagnostics, DNA fingerprinting techniques, and mass spectrometry. The use of technologies to support the tracing and tracking of food products across food supply chains will likely grow over time. As mentioned earlier, there has been an increasing demand for giving consumers a device that can detect fraud in food stores [14].

In spite of these preventive measures, incidents do still occur.

FOOD DEFENSE

Food defense refers to activities associated with protecting the nation's food supply from intentional acts of contamination or tampering. Food defense is not motivated by economic gain like food fraud. Its intent is to cause harm to consumers [15]. It is a countermeasures against food fraud. Food defense strategies can be implemented at national and local levels.

CHALLENGES

To address the root cause of food fraud and safeguard food supply, food research should expand to include social and behavioral sciences, criminology, and business decision-making. There is an increased regulatory focus on food fraud. Emerging regulations and industry standards are beginning to specifically identify food frauds as posing health hazards [16].

The ability to detect fraud is the most technically challenging aspect of combating food fraud. The complexity of the food supply chains, involving multiple national boundaries, makes fraud harder to trace. Another challenge in preventing food fraud is that fraudsters are clever, resilient, creative, and actively seek to avoid detection. They take advantage of the complex and fast moving food supply chains [17]. While governments are bound by national borders, food fraudsters often operate in multi-national markets. Food fraud has never been a major priority for legislation and enforcement in some countries. In countries with a high level of corruption, food companies often use food fraud to gain profit.

CONCLUSION

Food fraud is an emerging area of concern for the food industry, government, and consumers. It is a significant and growing global problem. It is related to food safety, food adulteration, food origin, food quality, food defense, food control, and food risk. Food fraud can occur in all stages of the supply chain and in any country. Although it is economically motivated, it may result in serious health and environmental consequences. The most efficient countermeasure against food fraud is a focus on prevention. With time, humans may not get rid of food fraud, but their technology will. Technology would allow consumers to validate information on a food label. More information about

food fraud can be found in the books in [18-20] and related journals: *Food Control* and *Food Review*.

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Figure 1 Types of food fraud [3].

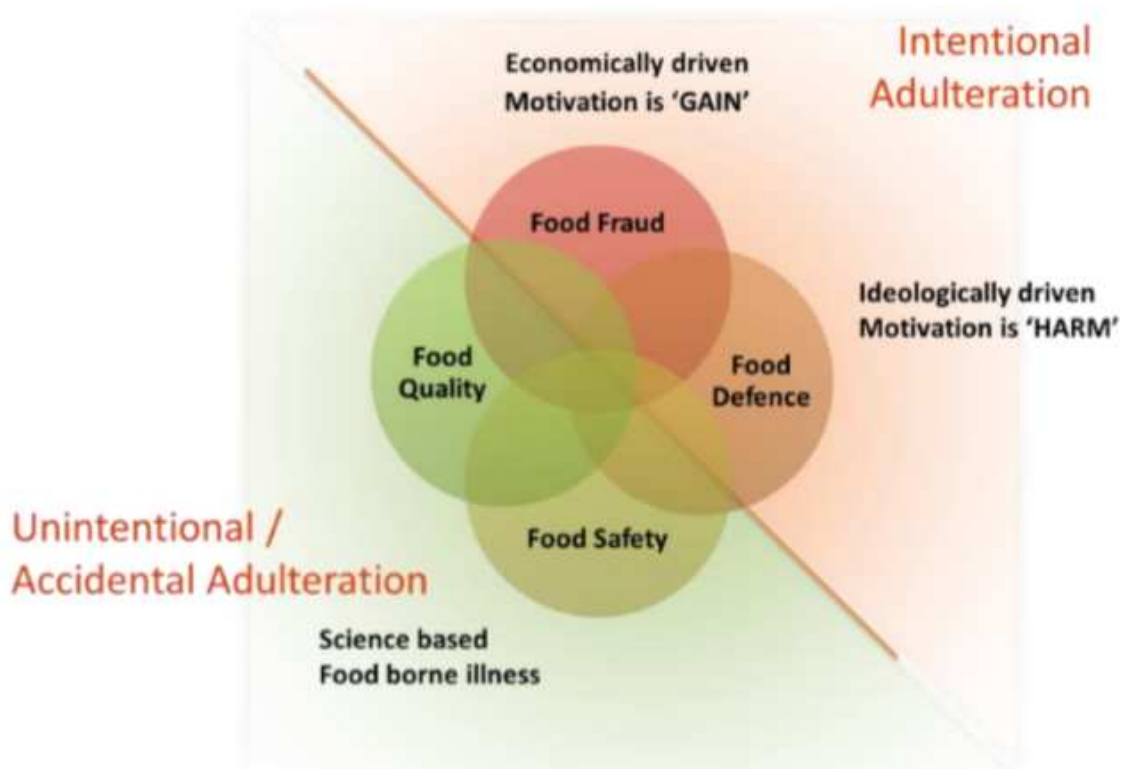


Figure 2 Intentional versus unintentional adulteration [6].

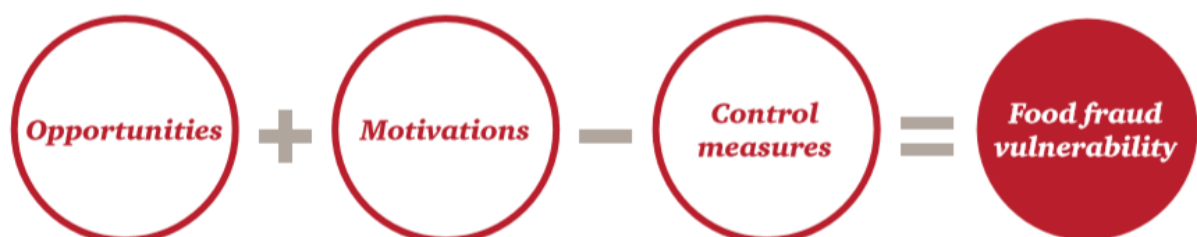


Figure 3 Food fraud vulnerability concept [11].