The scope of food fraud revisited

K. E. Gussow[1,2] · A. Mariët[3]

Abstract
Food fraud is an emerging field of study in academic literature. The aim of this paper is to evaluate whether current understanding of food fraud in literature is in congruence with incidents of food fraud in the Netherlands. The discussion that follows is based on an analysis of 53 empirical cases on food fraud investigations conducted at the Netherlands Food and Consumer Product Safety Authority (NVWA), the nationwide enforcement body tasked with investigating food fraud. The findings elucidate the differences between food fraud and other (food) crime and highlight the discrepancies with academic definitions to date, most notably with respect to incidents of 'food laundering' and by emphasizing the existence of intentional facilitators. We thus suggest adjusting the scope of what type of behavior can be considered as food fraud by conceptualizing three forms of food fraud: food laundering, fraudulent food enhancement, and facilitative food fraud. Food laundering encompasses the use of illegal material as food, whereas fraudulent food enhancement describes a situation where legal food is value-enhanced through deceitful cost-cutting measures. Facilitative food fraud captures the role of facilitative actors that operate illegally and intentionally for economic advantage. Based on these concepts, we suggest a modified definition as follows: food fraud is committed by any actor who is intentionally involved in illegal acts for economic advantage, thus causing or facilitating illegal food to be laundered into the supply chain or for food to be fraudulently value-enhanced. Future research should focus on testing these concepts and this definition with empirical studies from different regions and regulatory settings, and introduce additional data sources outside of enforcement, such as employee or victim surveys.

Keywords Food fraud · Food crime · Definition · Food fraud types · EMA · Food adulteration

Extended author information available on the last page of the article

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Introduction

Academic interest in food fraud has been growing over the recent decade, punctuated by the several notable cases occurring throughout the world; the addition of melamine to dairy products in China (2008), the substitution of beef for horsemeat (2013) and the pesticide fipronil in eggs (2017) all constitute high-profile cases of fraudulent food practices. Such incidents have demonstrated that food fraud can create unexpected food safety risks that threaten public health, and by raising public concern over confidence in food quality, have also led to large economic damages through product recalls, loss of revenue, and import bans. Although food related fraud is by no means a new phenomenon, nowadays there is increased concern and attention in the area that is noticeably different than before.

Food fraud had been relatively underexplored in academic literature (Kailemia, 2016), but following the European horsemeat affair in 2013, the subject has attracted growing scholarly interest and a fast-evolving literature has emerged as a consequence (Manning & Soon, 2016). A simple search for articles about food fraud via Web of Science shows this vast growth, as is illustrated in Fig. 1. Before 2013, few articles were annually published on food fraud, with this number rising significantly from 2013 onwards.

Current literature addresses three main areas in the field of food fraud. First, there are those studies that interpret, explain, quantify, and define the phenomenon of food fraud from various perspectives (e.g. Croall, 2013; Everstine et al., 2013; Kailemia, 2016; Lord et al., 2017; Manning & Soon, 2016; Spink & Moyer, 2011; Spink et al., 2019). Second, there is research that has been conducted with respect to responses to and prevention of food fraud, including regulatory, legal and industry responses, such as investigations into the benefits of improved traceability and opportunity reduction (e.g. Creydt & Fischer, 2019; Fassam & Dani, 2017; Jack, 2018; Manning, 2016; Pearson et al., 2019; Spink et al., 2016; Van Ruth et al., 2017). Finally, there is a burgeoning amount of scientific studies focusing on the analytical detection methods that are used to test the authenticity of food that can be helpful in exposing fraudulent practices (for reviews see e.g., Downey, 2016; Hong et al., 2017) (Gussow, 2020, pp. 22–23).

Fig. 1 Publications (articles) per year, 2001–2021, according to Web of Science search topic "food fraud", March 2022
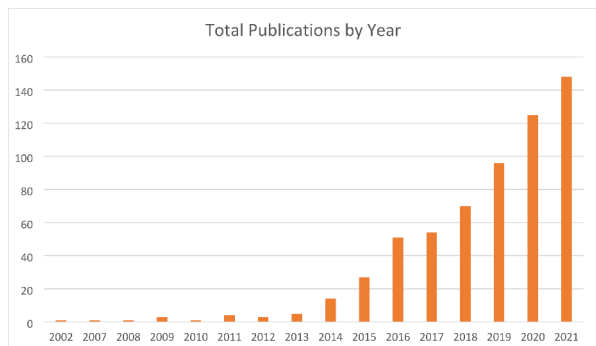
This article adds to the first set of literature. The aim of the paper is to empirically evaluate whether the understanding of food fraud in literature to date corresponds with food fraud incidents occurring in the enforcement practice. This is important, since the academic literature on defining and understanding food fraud is still limited; literature on food fraud particularly lacks contributions that are informed by empirical data as well as data gathered through food fraud enforcement and prosecution efforts, whereas this is a key component of criminological research (Lanier et al., 2015). The leading definition of food fraud in the literature to date has been adapted from product fraud types (Spink & Moyer, 2011). This influential study that has shaped global understanding of the (public health) threat of food fraud is largely based on media sources and scholarly journals (see also Moore et al., 2012), but without a clear empirical evidence base. This offers a narrow perspective, as many scholarly journals discuss analytical detection methodologies of hypothetical inauthenticity without a link to verifiable actual cases (Moore et al., 2012, p. 120) and media sources only contain those incidents that have received media attention. Furthermore, Moore et al. (2012, p. 120) used search terms such as 'fake' and 'counterfeit' that were derived from product fraud types. It is questionable whether these yield the full spectrum of food frauds. As a result, public health risks caused by food fraud are assessed based on a limited or perhaps even skewed image of food fraud.

The question this article therefore seeks to answer is to what extent leading definitions of food fraud found in literature to date correspond with the incidents of food fraud found in the enforcement practice in the Netherlands. To answer this question, the article first discusses the understanding of food fraud in (academic) literature. Second, this understanding is contrasted with insights that are based on empirical research of 53 cases of food fraud investigations conducted at the Netherlands Food and Consumer Product Safety Authority (NVWA), the nationwide enforcement body tasked with investigating food fraud. This comparison revealed that the most cited academic food fraud definition of Spink and Moyer (2011), together with most other (academic) definitions and typologies of food fraud are unsatisfactory to comprehensively analyze the phenomenon as it has been found to occur in the Netherlands. These findings indicate that the scope of what type of behavior can be considered as food fraud may need adjustment. We suggest a modified definition to be tested in future research.

This research is important both for academic and practical purposes. Criminological research and theory building to explain the phenomenon of food fraud is still a developing field. The vast majority of the relevant literature on food fraud is published in food journals rather than criminological journals, with only a handful of exceptions (e.g. Croall, 2009; Lord et al., 2017; Leon & Ken, 2019). As a result, the notion of what exactly is food fraud has largely emerged from a non-criminological perspective. Studies to which criminological authors have contributed using crime theory have focused on reducing opportunities and vulnerabilities in specific supply chains (e.g. Yang et al., 2019). This study attempts to contribute foundational knowledge on the nature of food fraud by offering inductively derived insights from extensive documentation on and interviews about over 50 criminal investigations related to food, which to our knowledge has not yet been done in criminological contributions. Though the use of enforcement data has its own limitations, it is a key source

of empirical data to use when studying the nature of crime. Finally, such research has methodological relevance as it assists sensitizing concepts, and as such facilitates further criminological theory building; theory needs to be meaningfully connected to the empirical world and concepts are the means to establish such a connection (Blumer, 1970, p. 87; Bowen, 2006).

In terms of its practical relevance, there is still an ongoing societal debate occurring amongst scholars, regulators, legal advisors, and industrial organizations on what exactly is food fraud (Cruse, 2019; Spink et al., 2019; Wisniewski & Buschulte, 2019), which obfuscates the battle against food fraud. As presented in this article, an elaboration on the current debate on food fraud contributes to a better understanding of the nature of the threat. This understanding, in turn, could become vital knowledge for regulators and businesses to draw upon when attempting to detect and prevent fraudulent food activities, as they need to know what it is they are fighting against in order to take appropriate measures. In addition to the above, the Codex Alimentarius Commission[1] - a set of coherent international food standards, guidelines, and codes of practice that inform lawmakers, regulators and the industry – established an Electronic Working Group (eWG) on food fraud in 2019. The aim of this eWG is to review current texts of the Codex Alimentarius to identify overlaps and gaps in respect to the topic of food fraud (Codex Alimentarius, 2020a, b). Empirical research about what type of behavior can be considered food fraud is therefore imperative to support such work.

After first clarifying the research method, this paper will discuss the current understandings of food fraud found in (academic) literature, highlighting some inconsistencies in definition and typology. Using empirical data, the paper will then move on to illustrate how such definitions fail to account for cases of food fraud that have been investigated in the Netherlands. After providing further insight with regards to food fraud offenders and associated criminal acts, an answer to the research question is formulated and an adjusted definition is offered. Finally, the paper will offer a consideration of the limitations of the research and suggest future research proposals that can serve to validate and build upon the findings elaborated here.

Method

The insights presented in this paper are derived from empirical data on food fraud criminal investigations that have been collected at the NVWA. It has a specialized intelligence and criminal investigations unit (NVWA-IOD) with powers that are equal to the police and works under the authority of the Public Prosecution Service (PPS). The Dutch setting makes the Netherlands an interesting national case, as it has well-developed apparatus for investigating food fraud in respect to powers, historical experience and priority for food fraud. This is not standard in other countries; the regulatory setting to investigate food fraud varies by country, for example with respect to the geographical centralization of agencies, their mandate in the food supply chain,

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[1] The Codex Alimentarius Commission is a United Nations body, which is established by the Food and Agriculture Organizations (FAO) and the World Health Organization (WHO).

and whether they possess intrusive powers. Often, the task is divided among multiple agencies. For example, Germany and Australia have federal structures with decentralized enforcement authorities (Federal Ministry of Food and Agriculture, 2014; Curll, 2015). In the US, the enforcement of food regulation in the supply chain is divided between the US Department of Agriculture (USDA, which focuses on meat, poultry, and eggs) and the Food and Drug Administration (FDA, which focuses on food processing and food supplements) and many state and local authorities; criminal investigations can be executed by each of these agencies and the Federal Bureau of Investigation (FBI; FDA, 2019).

Models similar to the Dutch situation include food fraud enforcement as part of police tasks, thus enabling the intrusive powers, but in a specialized and dedicated department of police. This increases specialization and priority. However, it does so at arm's length of the food regulator. Italy, for example, has adopted such a model with a large, dedicated police department - the Carabinieri NAS - which is responsible for health enforcement (including medicine and food and sanitary inspections; Carabinieri, n.d.). In the UK, food law enforcement is primarily executed by decentralized local inspection authorities with oversight from the Food Standards Agency (FSA) and, following the horsemeat affair, a national food crime unit (FSA, 2021). This unit however does not have police powers, and struggles to receive priority for the topic from the police (White, 2021). The Dutch configuration of specialization, centralization, and intrusive capacities serves as an instructive example in the EU (General secretariat of the Council, 2014; Whittle, 2016). The Netherlands can thus be expected to have investigated relatively more incidents of food fraud in a more thorough fashion than other countries may have done, which offers a solid empirical basis to explore.

The empirical data analyzed in this paper was collected during a doctoral research project by Gussow (2020), which examined the detection process of the NVWA-IOD in detail, taking into account both the detection methods employed by the enforcement agency, the nature of the fraud detected, and the agency's decision-making throughout the process. The findings presented here are an elaboration of the dissertation findings on the nature of the fraud. The specific dataset used in this paper is composed of 53 cases of food fraud that have been considered for criminal investigation by the NVWA. It includes all 33 cases of food fraud that the agency transferred to the PPS for prosecution in the period 2010–2017 and contains all 20 cases of alleged food fraud whose investigation process was terminated during the period 2014–2017. These were terminated for various reasons, usually due to a lack of resources and priority, or because the fraud had ceased when the investigation started. Even though these have not led to prosecution, the empirical material clearly indicates and documents that an actual food fraud incident had been discovered. As such, it proved sufficiently rich to use for this paper, as the most important aspect in the context of this paper is the (alleged) modus operandi in order to judge the type of food fraud. Cases that turned out to be a false discovery ($n = 8$), have been eliminated from the dataset. The result of the prosecution stage has not been a selection criterion for two reasons. First, these are lengthy procedures that would damage the timeliness of the research. Second, when a prosecution does not lead to a conviction, this can be due to reasons other than that the fraud has not happened. For example, resource issues at the PPS

or formal errors. However, where available, the verdict was used as a data source to triangulate information about the fraud and the offender.

The full list of these cases with a brief description of the fraud can be found in the Appendix. In the empirical section of this article, the code names of the cases (e.g., 'Meat1') are used to refer to the cases on which the argument is built.

The data about each case has been collated based on a structured topic list. This list contained questions regarding the modus operandi, the motive for the fraud, the illegal profits, the type of offender in terms of size (such as turnover, employees, and business structure), level of international trade, and overall role in the supply chain. The data was retrieved from a range of documents around the investigation, both formal criminal reports and verdicts, as well as journal data and various internal reports on the criminal investigation both at the start and the end of the investigation. Such documents are interpretations of the agency of the information of a certain case to facilitate decision-making and feedback loops to their principals. The criminal proceedings report typically highlighted information about financial gain and, when applicable, further information about turnover and business structure. Following familiarization with each case through such document study, respondents at the NVWA were specifically interviewed (in person or by phone) about those aspects of the case that were not yet clear or detailed enough. Respondents were usually comprised of the criminal or financial investigator involved with each case, and also the inspectors, intelligence officers and analysts. In total, 112 interviews were held with respect to the nature of the crime and its discovery, with 61 different respondents. Data relating to the terminated cases was somewhat more limited in comparison to those that were investigated to the point of prosecution.

The data analysis with respect to the type of food fraud was initially deductive. The topic list contained the most prominent categories that were retrieved in the literature. Based on the modus operandi of a case, it was attempted to classify the cases in one of those categories (substitution/dilution, addition, false statements of various kinds and counterfeit foods). However, during this process it became apparent that the existing categories could not account for the food frauds that had been investigated in the Netherlands. An inductive approach was then used instead to develop the alternative conceptualizations of food fraud that are introduced in this article.

Current understanding of food fraud in (academic) literature

Spink and Moyer (2011) offered the first academic definition of food fraud which is still the most widely cited. They define food fraud as a deliberate and intentional act for economic gain, encompassing various acts such as tampering or misrepresentation of food, and false statements about food (Spink & Moyer, 2011, p. 158). The debate around food fraud definitions is however ongoing, having been explored from the perspectives of motive and gain, from positions more industrially relative, and through more descriptive analyses, resulting in differing viewpoints on, for example, offenders and whether the scope should cover the full food supply chain. Some academic authors have previously discussed food fraud in relation to food crime or proposed different categorizations of food fraud and other definitions (e.g. Croall,

2013; Everstine et al., 2013; Kailemia, 2016; Lord et al., 2017; Manning & Soon, 2016; Leon & Ken, 2019). We first position the term food fraud in relation to food crime and justify the focus of this paper on food fraud before discussing the current understanding of food fraud in literature.

Focus on food fraud, not food crime

This paper will focus on food fraud rather than food crime. The difference between these two concepts is diffuse and often interpreted differently by various authors (e.g. Manning & Soon, 2016; Leon & Ken, 2019, see also Rizzuti, 2020), and therefore warrants some consideration.

Some authors use the two concepts to distinguish between different offender structures. For example, in the cases of regular commercial food businesses and organized crime groups operating in the food industry for profitable trade, the latter is more likely to be associated with food crime and the first with food fraud (Lord et al., 2017, p. 3). The definition of food crime afforded by the Elliot Review provides a suitable example of this distinction: "Food fraud becomes food crime when it no longer involves random acts by 'rogues' within the food industry but becomes an organised activity by groups which knowingly set out to deceive, and or injure, those purchasing food" (HM Government 2014, p. 6). Elsewhere, food fraud is defined as a subset of food crime in varying respects. Some authors see food crime as consisting of both food fraud and a 'food defense' or 'food terrorism' (Cruse, 2019). Food terrorism includes malicious (food) poisoning, bioterrorism and sabotage, both by individual employees or 'terrorist' groups. One example is the deliberate contamination of strawberries and other fruit with needles that occurred in Australia in 2018 (The Guardian, 2018). This area of crime can be distinguished from food fraud, as the aim of the offender is to cause harm rather than to gain an economic advantage (HM Government, 2014; Manning & Soon, 2016; Spink & Moyer, 2011).

Guided by the green criminological perspective, however, most academic authors use a social harm approach to clarify instances of food crime as opposed to relying on socio-legal frameworks. These authors include behaviors that are harmful or immoral, but not necessarily illegal, within food crime definitions. Passas (2005) describes such behavior as 'lawful but awful', and Croall (2007) describes the wide range of offences that occur in the full food supply chain of producing, distributing and selling foodstuffs that "involve economic and physical harms, issues of personal safety and health, and many different kinds of frauds, from the evasion of subsidies and quotas and the avoidance of revenue, to food adulteration and misrepresentation through written and pictorial indications, the quality and contents of food" (p. 207). Gray (2019) further elaborates on a food crime perspective in which harms and crimes are combined: "Some food crimes and harms are criminally defined illegal events (…), some are defined as directly or indirectly harmful (…), and some are defined as unethical, immoral or unjust (…). Many are a mixture of all of such constructions: food harm events are both directly illegal and indirectly harmful, food crimes are also socially harmful or unjust, and unethical food practices ought to be criminalised" (p. 20). Examples include aggressive trading practices (e.g., power pressures on farmers by supermarkets), food pricing (misleading offers), the seduc-

tive marketing of unhealthy foods that are high in fat and sugar, exploitation of labor, cruelty to animals during food production and financial crimes such as tax evasion (Cheng, 2012; Croall, 2013, pp. 168–172). Conversely, other authors have argued to broaden the concept of food fraud by using a spectrum-based theory that ranges from illegitimate established criminal violations to other wrongdoings (Leon & Ken, 2019).

With this brief consideration of food crime and food fraud in tow, we can justify this paper's focus on food fraud by underlining the nature of the data that informs its findings; the data used is enforcement data and as such explicitly confined to illegal behavior (that can be directly or indirectly harmful), rather than harmful behavior as an intended outcome or which is not illegal. We thus agree with the view that sees food fraud as a subset of food crime, whether this is a spectrum or a matrix. It makes sense to discuss food fraud that is aimed at obtaining an economic gain separate from other immoral or harmful behaviors because the motive and opportunity structures that cause these types of wrongdoings are often radically different and thus require different approaches for control.

Food fraud

Spink and Moyer (2011) first coined the term 'food fraud' with the following definition: *"Food fraud is a collective term used to encompass the deliberate and intentional substitution, addition, tampering, or misrepresentation of food, food ingredients, or food packaging; or false or misleading statements made about a product, for economic gain"* (p. 158). Their contribution departed from and scrutinized the term 'economically motivated adulteration' (EMA), which was generated by the American Food and Drug Administration (FDA) in 2009 as a working definition. EMA is defined as "the fraudulent, intentional substitution or addition of a substance in a product for the purpose of increasing the apparent value of the product or reducing the cost of its production, i.e., for economic gain" (FDA, 2009). EMA includes dilution of products with increased quantities of an already-present substance (e.g., watering down of juice) though only "to the extent that such dilution poses a known or possible health risk to consumers" (FDA, 2009). Typical examples of adulteration are substituting higher value ingredients for cheaper ingredients, such as the substitution of beef for horsemeat in the European horsemeat fraud and adding (illegal) coloring substances to make food appear to be fresher or of better quality. EMA also includes the addition or substitution of substances that mask dilution (FDA, 2009). The addition of the chemical melamine to baby formula, which led to a high number of illnesses and the death of six children in China, is the classic example of a lethal addition to food (Everstine et al., 2013, p. 725). The term 'adulteration' emphasizes physical interferences with the food. EMA further ties adulteration to gaining economic advantage and therefore implicitly considers it as a deliberate act. EMA further concentrates on the adulteration of (food) *products*, implying the exclusion of the agricultural stages of food production (e.g., growing crops, farming cattle).

According to Spink and Moyer (2011), EMA should be seen as a subset of food fraud, emphasizing the existence of other types of frauds that could not be considered as a physical act of 'adulteration'. For example, the misrepresentation of the country

of origin on food documentation or more generic 'tampering' with packaging such as changing best-before dates (Spink & Moyer, 2011, p. 159). The authors situate such acts as tax-evasion and smuggling within the broader food fraud paradigm. In line with these wider considerations, their definition later evolved into a shorter, more concise encapsulation: "illegal deception for economic gain using food" (Spink et al., 2019, pp. 2706-07). Comparing this iteration to their longer definition of food fraud highlights the fact that the previous does not make emphasis to anything 'illegal'.

Alongside this early definition of food fraud, seven food fraud "incident types" are outlined: adulteration, tampering, over-run, theft, diversion, simulation, and counterfeiting (Spink & Moyer, 2011). The Global Food Safety Initiative (GFSI), a private standard-setting organization which guides many industry self-regulatory schemes, also uses the definition of Spink and Moyer (2011), though only partially adopts their food fraud types (GFSI, 2018; Gussow, 2020, p. 23). The GFSI instead created seven different categories: dilution, concealment, substitution, mislabeling, counterfeit, gray market/theft/diversion and unapproved enhancements (GFSI, 2018). Other scholars have made similar categorizations while using different terminology, such as replacement, referring to both substitution and dilution (Esteki et al., 2019), or by adding misleading indications (words/pictures) and packaging size as a category of food fraud while omitting 'mislabeling' as a category (Manning & Soon, 2016).

A more recent contribution by Lord et al. (2017) defines food fraud as a concept that is inherently attached to legitimate food businesses and one that always interferes with legitimate processes. In the view of these authors, food fraud relates to "the abuse or misuse of an otherwise legitimate business transaction and an otherwise legitimate social/economic relationship in the food system in which one or more actors undertake acts or omissions of deception or dishonesty to avoid legally prescribed procedures (process) with the intent to gain personal or organizational advantage or cause loss/harm (outcome)" (Lord et al., 2017, p. 7). This definition positions food fraud as part of, and endogenous to, the food industry. This latter definition is more closely aligned with those related to corporate crime that generally describe illegal acts committed by otherwise legitimate businesses (Braithwaite, 1984; Simpson, 2013).

Reflections on current understanding of food fraud in (academic) literature

There are some distinct discrepancies between these various definitions and typologies of food fraud. For example, theft of food is described by some as food 'crime' (e.g. FSA, 2021; Manning & Soon, 2016) and by others as food 'fraud' (GFSI, 2018; Spink & Moyer, 2011). The definition afforded by Spink and Moyer (2011) is also very specific in describing food fraud categories such as addition, substitution, misrepresentation, tampering and false/misleading statements, but they also move on to define seven types of food fraud that are inspired by product crimes but are not included in their original definition (theft, diversion, over-runs etc.).

In briefly alluding to the perpetrators of food fraud, Spink and Moyer (2011, p. 160) predominantly point to organized crime groups and "criminals that are organized", ignoring the role of regular food businesses. In contrast, the definition of food fraud proposed by Lord et al. (2017) positions food fraud as endogenous to the food

industry and entangled with legitimate business structures and transactions. This is an important insight that contradicts the suggestions of Spink and Moyer (2011) and the Elliot Review (HM Government, 2014) that food fraud is some external threat from organized crime groups. Lord et al. (2017) therefore suggest that the food industry should not consider food fraud as an external threat by organized crime groups, and rather the industry needs to examine the potentially criminal opportunities presented by its own habitual business practices (Gussow, 2020, pp. 23–24). The definition of Lord et al. (2017) is however not very distinctive, as the abuse of legitimate structures applies to other forms of corporate crime as well. Lord et al. (2017) also state the aim to cause harm in their definition of food fraud, which is inconsistent with the view of most other authors.

Another observation relates to the ambiguity of the food fraud types that have been developed in both the scientific literature and non-academic sources. These typologies are generally introduced to further clarify the phenomenon of food fraud or to facilitate data collection on food fraud incidents, for example in various commercial databases such as Decernis, HorizonScan, EMA and so on. There are many of these classifications that also present their own distinct categorizations that are often ambiguous and differ in specificity. The choice of classifications creates a lack of data 'harmony' and prevents effective comparisons of results. In short, this hampers the quality of information collected about food fraud (Bouzembrak et al., 2018), which thus impairs theory building as well as obstructs accurate insights on the shape of the threat.

To illustrate this ambiguity, we can consider the various types of food fraud that are used most often by different scholars and industrial organizations. For instance, the addition of water in meat could be classified as 'an addition' (of water, possibly combined with a binding agent) or as 'a substitution' (of e.g. chicken meat content with water). This substitution and addition could also only be considered illegal when it is not declared on the packaging of a food product, and if this is the case, it could also be possible to classify the substitution or addition of a certain ingredient as 'mislabeling', 'document fraud', or more generally as a false statement. Multiple types of food fraud could therefore apply to a specific case, or more simply put, the presented categories of food fraud are not mutually exclusive.

Several food fraud categories are also not equally specific or of the same level, which makes them difficult to equate. To illustrate, the GFSI (2018) mentions dilution, substitution and concealment – rather than 'addition' – as three different categories of food fraud. Dilution is however a form of substitution, though it applies to liquid foodstuffs as opposed to solids, such as the watering down of milk. The difference between these two categories is therefore minimal, explaining why some view it as constituting one category (e.g. Esteki et al., 2019; Everstine, 2018). The omission or removal of ingredients in food products is also included by some (Everstine, 2018) and neglected by others (GFSI, 2018; Manning & Soon, 2016; Spink & Moyer, 2011), and would then perhaps be classified as 'substitution by nothing'. Furthermore, both dilution and substitution are in fact techniques that conceal the true nature of a food product, so it would be more adequate to consider these techniques as a subcategory of 'concealment'. Concealment on its own is a non-descriptive and more generalized category, which takes a different approach than those classifications

that specifically include smaller categories such as "mislabeling of nutritional value" (Everstine, 2018).

The essence of this reflection is to point out that the definition as formulated by Spink and Moyer (2011) seems unsatisfactory to fully grasp the concept of food fraud. This is demonstrated by the difficulties in its operationalization, yet it is still the most often cited definition that is rarely challenged with an alternative. With the debate ongoing and against this background of conceptual complexity, this paper will now move on to examine the empirical cases of food fraud.

Empirical findings at Netherlands Food and Consumer Product Safety Authority

The empirical portion of this study (see also the Methods section) is based on a selection of 53 alleged cases of food fraud that have been considered for criminal investigation at the NVWA-IOD. The full list of these cases with a brief fraud description is included in the Appendix, with the code name of the case expressing the food category concerned, e.g., 'Meat1'.

The study of this empirical material resulted in three main findings on the nature of food fraud that contribute to our current understanding of the phenomenon, which are discussed below. The findings concern the concept of food laundering, the difference between food fraud and other crimes, and the role of facilitators and the broader food supply chain. Also, the analysis demonstrates some limitations in academic definitions to date.

Food laundering versus food enhancement

An immediate observation is that 22 cases that were investigated by the NVWA are different than any of the food fraud types known to date. These concern the sales of illegal food into the supply chain, such as 'food' that is not fit for human consumption and in such case does not qualify as food at all. Examples of illegal foodstuffs are animal byproducts that include all parts of an animal that are not fit for human consumption yet are illegally sold as such. For instance, cases concerned are the sales of incubated eggs and of certain animal fat [Egg1, OilFat1]. Another kind of illegal food are former foodstuffs that should be depreciated because they contain overly high levels of chemical substances or have become (near) rotten. These are illegal to sell for human consumption. Case examples are the sales of pistachio nuts with too high levels of aflatoxin, rotten perishable cheese and supplements with too much mercury [Nuts1, Dairy1, Supplement1]. Yet another form of illegal food is illegally produced food such as bootlegged-produced beer [Alcohol1] or meat from illegally slaughtered calves, sheep, and horses [for all cases, see the Appendix, Table 1 'food laundering']. By keeping, bringing, or re-introducing such products into the supply chain and

(eventually) to consumers, illegal products are passed off as legal and safe for human consumption. In other words, products or materials are illegally laundered.[2]

The definitions of food fraud to date do not express this intended outcome; there is an emphasis on physical or administrative techniques such as substitution, addition, or misrepresentation that increase the apparent value of a (legitimate) food product, either by making it look more expensive, by lowering the production cost, or both. The empirical cases contained 19 incidents of this kind, where products are falsely presented as a higher-quality product for which customers pay a premium. Case examples are shellfish that supposedly had a private sustainability label [Fish2], infant formula that was passed off as if it were a certain hypo-allergenic type [Infantformula1], and meat that was falsely claimed to be produced by organic or religious methods [Meat26, Meat1]. This often goes together with lowering the production cost; secretly substituting part of the ingredients for cheaper alternatives, such as various cases where beef was partly substituted with horsemeat [Meat1, Meat11, Meat14] or using low quality meat with illegal coloring additives to make it look fresher, such as tuna [Fish 3] or minced meat [Meat26] [for all cases, see Table 2 'Fraudulent food enhancement' in the Appendix]. The empirical data additionally demonstrates that lowering production costs can also be done by lowering the cost of production inputs instead of the food ingredients itself. Some case examples in the empirical material are the use of cheap, illegal, and counterfeit pesticides on vegetables such as potatoes and Brussels sprouts, as well as the use of illegal antibiotics in poultry [FruitVeg 2, FruitVeg3; Meat5; Meat19; Meat35].

In effect, there are two processes that can be distinguished from this initial critical observation. The first is the process by which 'food' that is illegal is somehow made to look legal. In other words, turning materials that have a negative value as food into a positive value. For example, this can be achieved by saving the costs of depreciating the foodstuff and preventing the cost for the processing of waste to the effect of generating revenue with the associated products. We conceptualize this food fraud type as 'food laundering'. The second process is the enhancement of food value that is already legal by unlawfully increasing its apparent value and/or illegally lowering the production costs, or both. We conceive of this as 'fraudulent food enhancement'. Both of these outcomes can be accomplished by physical adulteration techniques as well as by false statements and false documentation about the product, and therefore without any physical interference. For example, the fraud with infant formula merely required changing the labels of the cans with a fake alternative, whereas coloring of tuna and minced meat is a physical technique; laundering the incubated eggs required document fraud, but illegal slaughter and processing of the meat needs physical techniques.

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[2] The term laundering is inspired by 'money laundering', which refers to the act of making illegally acquired proceeds seem as though they were acquired legitimately through a range of fraudulent techniques. A difference is that for money laundering a predicate criminal activity is necessary to obtain illegal revenue, whereas a predicate offence is not always needed to obtain materials that are illegal to sell as food. Animal byproducts for instance are normal and legal byproducts from the slaughter process that may be legally (though restricted) traded, though not as food.

Food fraud occurs when the fraud impacts the food

The second observation sheds light on a number of crimes that are related to food products or the food industry. For example, some of the suspects in the empirical cases were involved in drug smuggling, using food as a cover load. It is known from media sources that food is often used to conceal illegal substances such as drugs (Den Held, 2019). Following the short definition of food fraud by Spink et al. (2019) – illegal deception for economic gain using food – this could qualify as food fraud. In this view, human trafficking in food transports should also be considered food fraud. In the Dutch regulatory practice, the main distinction whether an illegal deception for economic gain is food fraud or another crime or fraud type is whether it has an impact on the safety or honesty of the food. This is the difference between the scope of the police and the NVWA criminal investigation unit. In other words, too little focus on the role of food in a definition of food fraud does not adequately distinguish food fraud from other crimes. Drug smuggling and other forms of criminality could, in the examples above, be classified as a food-adjacent crime. Case description #1 illustrates this point.

Case description #1 - The difference between food fraud and food-adjacent crime: infant formula theft Due to the melamine-adulterated milk scandal in 2008, there was a great demand in China for Dutch quality infant formula. This caused an increase in small export businesses and private persons exporting ready cans of infant formula to China. These exporters hired people who bought infant formula for them legally in stores throughout the Netherlands. This was necessary because the stores held a quota of a maximum of two cans of infant formula per customer to ensure national supply. However, the shortage in supply caused the theft of store supplies of infant formula, as exporters were looking to obtain larger quantities faster. In most of those cases, it was merely food theft - the thieves did not actually change anything about the product. These thus concerned a food-adjacent crime and the cases were handled by the Dutch National Police. In one of the food fraud cases of the Dutch food authority, infant formula was appropriated from pharmacies and drug stores using different deceitful tactics to obtain as many cans of the formula as possible. Next, the labels of more expensive infant formula, those that are suitable for lactose-intolerant babies, were copied using a print shop, and the original labels were then replaced by the false ones on the cans. If these products actually would have been sold, customers would be deceived, and infants would be exposed to serious health risks. This kind of food fraud is classified as the fraudulent food enhancement type [Infantformula1].

Offenders: facilitators, the full supply chain and insiders versus outsiders

The third observation is twofold and relates to actual food fraud offenders. Firstly, the offenders in the empirical dataset appeared to be scattered throughout the supply chain. They included trade businesses, retailers, food manufacturers, importing and exporting businesses as well as primary food production such as fisheries and farms. The offenders also included businesses that were not directly food related, but sub-

suppliers that delivered legal or illegal production inputs, or provided logistical or other services. Their role was to facilitate the commission of one of the two types of food fraud outlined above [see Table 3 'Facilitative food fraud' in the Appendix]. Empirical examples include a logistics business altering trade documents for a commissioning food company, a laboratory altering analytical results on behalf of a food business, and the trade in illegal veterinary medicines which farmers then administered to their cattle [Meat17, OilFat2, Meat24]. As this group of suspects act intentionally for economic advantage and their actions (eventually) impact food products, this classifies as food fraud. However, their role is of a supporting, facilitative agent when compared to the two main types described above. Case description #2 illustrates this further.

Case description #2: How facilitative food fraud is connected to the two main types of food fraud The prime suspect in an investigation concerning eggs was a breeding company of 'laying' hens for egg production. This breeding company facilitated the overpopulation of stables by selling egg production farms, at their request, a concealed surplus of hens. The offender therefore committed facilitative food fraud. Some of the largest buyers of surplus hens (of the approximately 150 in total) were also investigated as suspects. These farms engaged in fraudulent food enhancement, as they sold their eggs at a higher price than the housing system justifies based on legal requirements [Egg1].

Second, the findings on offender characteristics demonstrate that such offenders can be regular businesses in the food industry operating in more or less opportunistic and organized structures. It also demonstrated that offenders can be irregular and unregistered businesses or even outsiders to the industry. Some case examples of such regular businesses are approved slaughterhouses that complement their legal activities with illegal slaughter outside inspection hours, an egg-processing company that deceptively used an unsafe source of supply, or a fish processing business that changed the origin of some of their products [Meat2, Meat4, Meat13, Egg2, Fish2]. The cases also included examples of businesses that were set up in a seemingly legitimate, organized structure, yet engaged fully in pre-planned fraudulent activity. For instance, a meat trading business that used a variety of methods to fraudulently enhance all of the meat it sold, or a veterinarian running a trade network in illegal antibiotics [Meat1, Meat5]. Empirical examples of irregular businesses concern various traders in meat products or in animal feed. Other examples concern an importer of illegal food products from China operating from unregistered premises (e.g., cutting meat at home in a shed) [Meat 2, Meat12, Meat19]. Some final examples of outsiders to the food industry are two men who were known to the police for common crimes that engaged in fraudulently enhancing the value of infant formula [Infantformula1], and an owner of event locations that set up an illegal production site of cheap bootlegged beer using the premises of a nearby carwash [Alcohol1]. These cases show that there is no simple dichotomous answer to the question as to whether the food industry is targeted by criminal gangs or whether food fraud is typically a concern of the food industry itself, which is a question debated by some (Lord et al., 2017). Both variants do occur.

In conclusion, then, the role of facilitators was critical in the cases that were researched. Therefore, we argue these should not be overlooked by scholars nor by investigative and regulatory bodies in their attempts to control food fraud. However, this is currently not highlighted in any definition of food fraud. For enforcement agencies, it seems an efficient point of intervention as one facilitator can support multiple food fraudsters [e.g. Meat5, Egg1]. The findings also highlight how food fraud is not limited to the point of food processing only but extends into the risks of illegal behavior occurring during other stages in agri-food production. They also demonstrate that potential offenders can come both from inside and outside the food industry. Food fraud definitions to date do not explicitly take these points into account.

Conclusion and discussion: refinement of the scope of food fraud

Returning to the main question of this study – to what extent do leading definitions of food fraud found in literature to date correspond with the incidents of food fraud found in the enforcement practice in the Netherlands – the study of the empirical material highlighted some notable discrepancies. Firstly, food fraud in the Netherlands does not only concern incidents where food is fraudulently value-enhanced, but around the same number of cases where illegal 'food' is laundered into the food supply chain. Furthermore, the role of facilitators that were intentionally involved in illegal acts with an impact on food was identified. Both of these points are not included in food fraud definitions or classifications to date, as these often focus on a range of administrative and physical food fraud techniques or are of a more generic nature. Additionally, the case material sheds some light on the position of offenders within (or outside of) the food industry and demonstrates the difference and the relationship between food fraud and other crimes such as theft.

We thus propose to refine the scope of food fraud and distinguish three conceptualizations of food fraud to this end. The first is that of food laundering, the fraudulent sale of illegal food[3] that involves turning ingredients or materials of 'negative' food value into 'positive' valued food products through methods of physical or administrative concealment. For example, an offender could provide his customer with false analytical certificates in order to sell material that fails to meet acceptable regulatory levels for particular foods. Such fraudulent practices can cause food safety issues throughout the supply chain as contaminated goods need to be recalled. These food safety issues have generally been associated with unintentional behavior (Spink & Moyer, 2011). However, it is argued here that such deliberate acts of deceit and concealment should indeed be classed as food fraud. Though the concept of laundering has been alluded to in previous studies (Croall, 2009; Manning et al., 2016), it has not been explored and emphasized in a way that has been done here. Approaching the crime of food fraud in terms of food laundering invites researchers to compare this crime with that of money laundering and investigate how the phenomenon can ben-

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[3] This is referred to as 'illegal food' for reasons of parsimony, to capture the various shapes of illegalities of the product that is laundered and presented as food, including products that technically do not qualify as food.

efit from criminological insights in that area (see e.g. Lord et al., 2019). For example, it would be interesting in terms of prevention to research whether laboratories could function as gatekeepers, analogous to banks that fulfill such a role with respect to money laundering.

The second conceptualization is that of fraudulent food enhancement, which involves fraudulently increasing the value of food that already maintains a 'positive' value. This captures the main understanding of food fraud globally, both in academic contributions as well as in society. The vast body of literature on analytical detection methods concentrates on additions and substitutions which renders food inauthentic. Literature on food fraud that mostly relies on the Spink and Moyer definition (2011) and subsequent typologies has a strong focus on deceitful adulteration, tampering, additions and substitution of foods. An additional insight from this study is how there are fraudulent cost-cutting methods other than substitution with cheap ingredients, such as the use of illegal production inputs.

The third conceptualization of food fraud that acts as secondary supporter of the two prior is facilitative food fraud, which refers to the activities that enable and facilitate food laundering and fraudulent food enhancement. As previously argued, food fraud often requires multiple actors and may be committed by businesses that are not organized around food. This is relevant for both the prevention and detection of food fraud. Such an observation has yet to be acknowledged by other authors (Cheng, 2012; Croall, 2013; Esteki et al., 2019; Everstine et al., 2013; Manning & Soon, 2016; Spink & Moyer, 2011). This ties in with the argument, in line with Cheng (2012) and Croall (2013), that food fraud occurs throughout the supply chain of food production, including farming, fishing, and the growing of crops to the sale of food products via retail channels. This differs from the idea of food fraud generally occurring at the points of processing and labeling to consumers (e.g., Jack, 2018; Spink & Moyer, 2011). The full food supply chain not only covers various food businesses but includes sub-suppliers and service businesses, such as logistical operators and suppliers of essential operating materials, such as animal feed.

By consequence, we can formulate an adjusted definition of food fraud, which we subsequently discuss. The definition of food fraud to be proposed is as follows:

"Food fraud is committed by any actor who is intentionally involved in illegal acts for economic advantage, thus causing or facilitating illegal food to be laundered into the supply chain or for food to be fraudulently value-enhanced." (Gussow, 2020, p. 113).

This definition serves to express what food fraud actually is, rather than elaborate on how it may be committed. It is therefore better positioned to capture the phenomenon in its entirety whilst equally articulating the eventual effect on food itself. Such a definition has more accurate, analytical capacity compared to such short and generic definitions as "illegal deception for economic gain using food" (Spink et al., 2019, p. 2706). Furthermore, in emphasizing economic advantage over indeterminate 'gain', the definition encapsulates how direct material gain is not always visible, and that customer retention or a competitive advantage were also motivations for the fraudulent food activities analyzed in the case studies.

The definition afforded here further reduces ambiguity, which can assist future research. It highlights how food laundering and fraudulent food enhancement are

mutually exclusive. Food cannot be both illegal/unfit and legal/fit for human consumption, however, both types of food fraud can cause food to become harmful or unsafe. The food fraud concepts complement each other. Existing categorizations of food fraud (e.g., Everstine, 2018; Everstine et al., 2013; GFSI, 2018; Manning & Soon, 2016; Spink & Moyer, 2011; Esteki et al., 2019) fail to observe this reality, but in the augmentation with the types of food fraud, we propose some of these become far more analytically potent. These provide depth as to what techniques were used for the fraudulent value enhancement of the food, such as short weighting, illegal coloration and false declarations about the origins of foodstuffs. It also provides clarity on how exactly food may have been laundered, for example by substituting meat with byproducts from slaughter processes that are not fit for human consumption, or by obscuring the purchase of these byproducts in the associated administrative documentation. Future research should build on the observations and definitions elaborated here to devise more robust classifications of food fraud and its subtypes, assist in the global information collection processes, and aid both industrial and governmental detection agencies.

The definition outlined here further provides guidance as to when an illegal activity should be classified as food fraud. For example, theft of food is not food fraud. It concerns legal food to begin with, which rules out food laundering, and it does not involve any value-enhancing activities concerning the food production. This view diverts from other scholars who do include theft as a type of food fraud (e.g., Manning & Soon, 2016; Spink & Moyer, 2011). Similarly, tax avoidance by a food business is, following this definition and argumentation, not food fraud. The definition here therefore serves to clearly demarcate between food fraud and food-adjacent crimes, as these require different approaches for control. Nevertheless, food adjacent crimes are an important area to be aware of. For industry, these crimes are important to take into account in their threat assessments and mitigation plans. In other words, businesses should defend or protect themselves not only from threats that are harmful for public health, such as bioterrorism, but also from criminals who may attempt to steal their products or use their products as a cover for the smuggling of drugs or human trafficking, and so on.

Limitations and research suggestions

The arguments made in this paper are informed by empirical data collected from the NVWA, specifically from its specialized criminal investigation unit tasked with overseeing the full agri-food supply chain on a national level. The data used was also from a broad temporal sample, rather than an isolated case. Despite these strengths, there are some salient limitations to consider, the most pertinent being that the data is limited to cases only in the Netherlands. A second limitation is that this contribution is based on enforcement data of criminal cases. This has the inherent disadvantage that it is built on cases of food fraud that have come to light through this legal framework and as such may represent a skewed reality of food fraud, as it neglects those cases of food fraud that remain uncovered or have been dealt with in administrative or civil proceedings. In terms of future research, we therefore suggest testing the proposed definition here in other countries with different regulatory and cultural con-

texts. In addition, we encourage research into food fraud using other methods, such as industry food fraud assessments (see e.g. Silvis et al., 2017) and victim or employee inquiries into the nature and prevalence of food fraud.

Appendix – list of empirical cases for each type of food fraud

Table 1 Food laundering

Case	Year	Fraud description	Count
Alcohol1	2016	Illegal production and sales of beer	1
Dairy1	2012	Sales of rotten perishable chilled cheese products with falsified use-by date	1
Egg2	2012	Sales of incubated eggs (cat 3) as food	1
Egg3	2015	Sales of eggs past their use-by date	1
Fish4	2014	Illegal catch and sales of fish subjected to quota	1
Meat12	2014	Illegal import and sales of dim sum products containing (illegal/unsafe) meat from China.	1
Meat13	2014	Illegal slaughter of beef cattle	1
Meat15	2015	Sales of meat obtained through illegal slaughter of various species to restaurants	1
Meat16	2015	Illegal slaughter of horses	1
Meat2	2011	Illegal slaughterhouse and cutting plant for horses/horsemeat	1
Meat21	2016	Illegal import and sales of dim sum products containing (illegal/unsafe) meat from China.	1
Meat22	2016	Sales of unsafe meat from feed business to food business	1
Meat27	2017	Illegal slaughter of lambs	1
Meat3	2011	Illegal slaughter of sheep and lambs	1
Meat33	2017	Sales of unsafe/rotten meat through social media	1
Meat4	2012	Illegal slaughter of horses	1
Meat6	2012	Illegal slaughter of sheep and calves	1
Meat8	2014	Processing of unsafe meat for human consumption	1
Nuts1	2017	Sales of pistachio nuts with too high levels of aflatoxin	1
Nuts2	2017	Falsifying origin of pistachio nuts with too high levels of aflatoxin to circumvent import controls	1
OilFat1	2017	Fat classified as animal byproduct (cat3) sold as fit for human consumption	1
Supplement1	2015	Sales of unsafe food supplement with too high levels of mercury	1
Subtotal			**22**

Table 2 Fraudulent food enhancement

Case	Year	Fraud description	Count
Fish1	2010	Concealed substitution of plaice with cheaper Asian species	1
Fish2	2014	Sales of mussels with falsified origin and sustainability label	1
Fish3	2014	Illegal coloring of tuna fish	1
Infantformula1	2016	Sales of infant formula with false labels indicating more expensive type suitable for babies with lactose intolerance	1
Meat1	2010	Falsifying origin (EU) and production method (halal) of meat; concealed substitution of beef with horsemeat	1
Meat11	2014	Concealed substitution of beef with horsemeat	1
Meat14	2015	Concealed substitution of beef with horsemeat	1
Meat17	2015	Fraudulent circumvention of trade ban for meat	1
Meat18	2015	Concealed use of offal chicken meat in beef minced meat	1
Meat20	2016	Batch of horsemeat falsely sold as beef	1
Meat23	2016	Processing and sales of chicken meat with concealed high levels of water	1
Meat25	2017	Concealed addition of water to bacon to increase the weight	1
Meat26	2017	Sales of regular meat as organic meat	1
Meat28	2017	Fraudulent circumvention of trade ban for meat	1
Meat32	2017	Addition of illegal colorant sulphite to minced meat	1
Meat34	2017	Fraudulent circumvention of trade ban for meat	1
Meat7	2013	Concealed substitution of beef with horsemeat	1
Plant4	2016	Sales of regular grains as organic grains	1
Supplement3	2017	Sales of food supplements with pharmacological substances	1
Subtotal			**19**

Table 3 Facilitative food fraud

Case	Year	Fraud description	Count
Egg1	2012	Concealed over-delivery of chicks to laying hen farms which facilitates the sales of eggs falsely claiming a certain animal welfare standard	1
Feed1	2011	Illegal export of processed animal protein with ruminant material, which facilitates unauthorized use in animal feed.	1
FruitVeg2	2016	Illegal import and trade of counterfeit pesticides for use on food crops	1
FruitVeg3	2016	Illegal import and trade of counterfeit pesticides for use on food crops	1
Meat10	2014	Illegal import and trade of growth hormone for use in beef cattle	1
Meat19	2016	Sales of animal feed containing illegal antibiotic	1
Meat24	2016	Treatment of beef cattle on behalf of owner with illegal growth hormones	1
Meat29	2017	Facilitating origin fraud of meat	1
Meat31	2017	Illegal trade in growth hormones for use in beef cattle	1
Meat35	2017	Trade in illegal antibiotics which facilitates use in cattle	1
Meat5	2012	Trade in illegal antibiotics for poultry, which facilitates use in poultry.	1
OilFat2	2017	Falsification of analytical results of foodstuffs by laboratory, which facilitates the sales of unsafe food	1
Subtotal			**12**
Total number of cases			**53**

Declarations

Conflicts of interest/Competing interests The first author is currently head of department at the Criminal Investigations Unit of the Netherlands Food and Consumer Product Safety Authority and conducted the PhD research part-time during her previous position as coordinating inspector.

References

Blumer, H. (1970). What is wrong with social theory? In N. K. Denzin (Ed.), *Sociological methods: A sourcebook* (1st ed.). Routledge.

Bouzembrak, Y., Steen, B., Neslo, R., Linge, J., Mojtahed, V., & Marvin, H. J. P. (2018). Development of food fraud media monitoring system based on text mining. *Food Control*, *93*, 283–296.

Bowen, G. A. (2006). Grounded theory and sensitizing concepts. *International Journal of Qualitative Methods*, 12–23. https://doi.org/10.1177/160940690600500304

Braithwaite, J. (1984). *Corporate crime in the pharmaceutical industry*. Routledge and Kegan Paul.

Carabinieri (n.d.). Comando Carabinieri per la Tutela della Salute [Carabinieri Command for the Protection of Health]. Retrieved April 10, 2019, from http://www.carabinieri.it/cittadino/tutela/salute/introduzione

Cheng, H. (2012). Cheap capitalism: A sociological study of food crime in China. *The British Journal of Criminology*, *52*(2), 254–273.

Codex Alimentarius (2020a). *About Codex Alimentarius*. Retrieved August 11, 2020, from http://www.fao.org/fao-who-codexalimentarius/about-codex/en/

Codex Alimentarius (2020b). *CCFICS Food Fraud - CCFICS 24: e-Working group*. Retrieved August 11, 2020, from http://www.fao.org/fao-who-codexalimentarius/committees/ewg/detail/en/c/1181131/

Creydt, M., & Fischer, M. (2019). Blockchain and more-Algorithm driven food traceability. *Food Control*, *105*, 45–51.

Croall, H. (2007). Food Crime: A green criminology perspective. In P. Beirne & N. South (Eds.), *Issues in green criminology: Confronting harms against environments, humanity and other animals* (pp. 206–229). Willan Publishing.

Croall, H. (2009). White collar crime, consumers and victimization. *Crime Law and Social Change*, *51*(1), 127–146.

Croall, H. (2013). Food crime: A green criminology perspective. In N. South & A. Brisman (Eds.), *Routledge international handbook of green criminology* (pp. 183–199). Routledge.

Cruse, C. (2019). Food fraud and the food, drug, and cosmetic act: Bridging disconnect. *Food and Drug Law Journal*, *74*(2), 322.

Curll, J. (2015). The significance of food fraud in Australia. *Australian Business Law Review*, *43*(4), 270–302.

Den Held, D. (2019, October 17). Cocaine hidden in fruit feeds european pipeline. *InSight Crime.*https://www.insightcrime.org/news/brief/cocaine-hidden-in-fruit-feeds-european-pipeline/

Downey, G. (Ed.). (2016). *Advances in food authenticity testing*. Woodhead Publishing.

Esteki, M., Regueiro, J., & Simal-Gándara, J. (2019). Tackling fraudsters with global strategies to expose fraud in the food chain. *Comprehensive Reviews in Food Science and Food Safety*, *18*(2), 425–440.

Everstine, K. (2018, September 27). A look at fraudulent labeling practices. *Food Safety Tech.*https://foodsafetytech.com/column/food-fraud-quick-bites-a-look-at-fraudulent-labeling-practices/

Everstine, K., Spink, J., & Kennedy, S. (2013). Economically motivated adulteration (EMA) of food: Common characteristics of EMA incidents. *Journal of Food Protection*, *76*(4), 723–735.

Fassam, L., & Dani, S. (2017). A conceptual understanding of criminality and integrity challenges in food supply chains. *British Food Journal*, *119*(1), 67–83.

Federal Ministry of Food and Agriculture (2014, July 22). Food control and inspection in Germany. *BMEL.*https://www.bmel.de/EN/Food/Safe-Food/_Texte/Lebensmittelueberwachung.html;nn=522306

Food and Drug Administration (2009). Economically motivated adulteration; public meeting; request for comment. Retrieved August 11, 2020, from https://www.federalregister.gov/documents/2009/04/06/E9-7843/economically-motivated-adulteration-public-meeting-request-for-comment

Food and Drug Administration (2019). 2019 investigations operations manual. Retrieved from https://www.fda.gov/ICECI/Inspections/IOM/default.htm

Food Standards Agency (2021). National food crime unit. Retrieved from https://www.food.gov.uk/about-us/national-food-crime-unit

General secretariat of the Council (2014). *Draft Council Conclusions on the role of law enforcement cooperation in combating food crime.* ST 15623 2014 INIT. Retrieved from https://data.consilium.europa.eu/doc/document/ST-15623-2014-INIT/en/pdf

Global Food Safety Initiative (2018). *Tackling food fraud through food safety management systems.* Retrieved August 3, 2020, from https://mygfsi.com/wp-content/uploads/2019/09/Food-Fraud-GFSI-Technical-Document.pdf

Gray, A. D. (2019). A food crime perspective. In: Gray, A., & Hinch, R. (Eds.). (2019). *A handbook of food crime: Immoral and illegal practices in the food industry and what to do about them.* Policy Press.

Gussow, K. E. (2020). *Finding food fraud: Explaining the detection of food fraud in the Netherlands* [Doctoral dissertation]. Vrije Universiteit Amsterdam. Retrieved August 11, 2020, from https://research.vu.nl/en/publications/finding-food-fraud-explaining-the-detection-of-food-fraud-in-the-

HM Government (2014). Elliot review into the integrity and assurance of food supply networks – final report. A national food crime prevention framework. Retrieved August 11, 2020, from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/350726/elliot-review-final-report-july2014.pdf

Hong, E., Lee, S. Y., Jeong, J. Y., Park, J. M., Kim, B. H., Kwon, K., & Chun, H. S. (2017). Modern analytical methods for the detection of food fraud and adulteration by food category. *Journal of the Science of Food and Agriculture*, *97*(12), 3877–3896.

Jack, B. (2018). Food fraud: Protecting european consumers through effective deterrence. *European Public Law*, *24*(1), 147–168.

Kailemia, M. W. (2016). 'Peeling back the mask': Sociopathy and the rhizomes of the EU food industry. *European Journal of Crime Criminal Law and Criminal Justice*, *24*(2–3), 176–195.

Lanier, M. M., Henry, S., & Anastasia, D. J. M. (2015). Essential criminology (4th ed.). Routledge. https://doi.org/10.4324/9780429493881

Leon, K. S., & Ken, I. (2019). Legitimized fraud and the state-corporate criminology of food – a Spectrum-based theory. *Crime Law and Social Change*, *71*(1), 25–46.

Lord, N., Campbell, L. J., & Van Wingerde, K. (2019). Other people's dirty money: Professional intermediaries, market dynamics and the finances of white-collar, corporate and organized crimes. *The British Journal of Criminology*, *59*(5), 1217–1236. https://doi.org/10.1093/bjc/azz004

Lord, N., Elizondo, F., C. J., & Spencer, J. (2017). The dynamics of food fraud: The interactions between criminal opportunity and market (dys)functionality in legitimate business. *Criminology & Criminal Justice*, *17*(5), 605–623.

Manning, L. (2016). Food fraud: Policy and food chain. *Current Opinion in Food Science*, *10*, 16–21.

Manning, L., Smith, R., & Soon, J. M. (2016). Developing an organizational typology of criminals in the meat supply chain. *Food Policy*, *59*, 44–54.

Manning, L., & Soon, J. M. (2016). Food safety, food fraud, and food defense: A fast evolving literature. *Journal of food science*, *81*(4), 823–834.

Moore, J. C., Spink, J., & Lipp, M. (2012). Development and application of a database of food ingredient fraud and economically motivated adulteration from 1980 to 2010. *Journal of Food Science*, *77*(4), 118–126.

Passas, N. (2005). Lawful but awful: 'Legal corporate crimes'. *The Journal of Socio-Economics*, *34*(6), 771–786.

Pearson, S., May, D., Leontidis, G., Swainson, M., Brewer, S., Bidaut, L., & Zisman, A. (2019). Are distributed ledger technologies the panacea for food traceability? *Global Food Security*, *20*, 145–149.

Rizzuti, A. (2020). Food crime: A review of the UK institutional perception of illicit practices in the food sector. *Social Sciences*, *9*(7), 112.

Silvis, I. C. J., Van Ruth, S. M., Van der Fels-Klerx, H. J., & Luning, P. A. (2017). Assessment of food fraud vulnerability in the spices chain: An explorative study. *Food Control*, *81*, 80–87.

Simpson, S. (2013). White-collar crime: A review of recent developments and promising directions for future research. *Annual Review Sociology*, *39*, 309–331.

Spink, J., Bedard, B., Keogh, J., Moyer, D. C., Scimeca, J., & Vasan, A. (2019). International survey of food fraud and related terminology: Preliminary results and discussion. *Journal of Food Science*, *84*(10), 2705–2718.

Spink, J., & Moyer, D. C. (2011). Defining the public health threat of food fraud. *Journal of Food Science*, *76*(9), 157–163.

Spink, J., Moyer, D. C., & Speier-Pero, C. (2016). Introducing the food fraud initial screening model (FFIS). *Food Control*, *69*, 306–314.

The Guardian (2018, September 2018). Strawberry needle sabotage scare spreads to all six Australian states. *The Guardian*. Retrieved August 6, 2020, from https://www.theguardian.com/australia-news/2018/sep/17/australian-police-say-needle-found-in-banana-as-strawberry-sabotage-spreads

Van Ruth, S. M., Huisman, W., & Luning, P. A. (2017). Food fraud vulnerability and its key factors. *Trends in Food Science & Technology*, *67*, 70–75.

White, K. (2021, July 2). What future for the FSA's National Food Crime Unit? *The Grocer*. https://www.thegrocer.co.uk/food-safety/what-future-for-the-fsas-national-food-crime-unit/657622.article

Whittle, N. (2016, March 24). The fight against food fraud. *The Financial Times*. https://www.ft.com/content/42985f40-f148-11e5-aff5-19b4e253664a

Wisniewski, A., & Buschulte, A. (2019). How to tackle food fraud in official food control authorities in Germany. *Journal of Consumer Protection and Food Safety*, *14*(4), 319–328.

Yang, Y., Huisman, W., Hettinga, K. A., Liu, N., Heck, J., Schrijver, G. H., & Van Ruth, S. M. (2019). Fraud vulnerability in the Dutch milk supply chain: Assessments of farmers, processors and retailers. *Food Control*, *95*, 308–317.

Authors and Affiliations

K. E. Gussow[1,2] · A. Mariët[3]

✉ K. E. Gussow
k.e.gussow@vu.nl

A. Mariët
anne.mariet@outlook.com

[1] VU University Amsterdam, Amsterdam, The Netherlands

[2] Netherlands Food and Consumer Product Safety Authority, Utrecht, The Netherlands

[3] Utrecht University, Utrecht, The Netherlands