The ‘new’ phenomenon of criminal fraud in the food supply chain

The rapid rise of food fraud and the collective responses to the global threat

4 September 2014
1. Introduction

What’s new about criminal fraud in the food supply chain? In itself, nothing. Criminal fraud has been around for thousands of years in the form of adulteration, substitution, tampering or misrepresentation, wherever the opportunity and incentive for profit has arisen. The current high profile of fraud in the global food supply chain is mainly due to the 2013 horsemeat scandal in Europe as well as a UK government-commissioned review by Professor Chris Elliott into the *Integrity and Assurance of Food Supply Networks*. However, there have been several other well publicised incidents that have hit the international headlines and in recent years, a number of factors have come together to make food fraud a significant global threat for the food industry. Although the exact scale and penetration are unknown, regulators, law enforcement agencies and industry are recognising that its potential for public health and economic damage is far greater than that of food safety, which has been the main focus in recent decades.

The food and drink industry is just starting to realise that food safety and food crime cannot be put in separate boxes and as such we need to find new ways of approaching the problem and developing effective solutions. No longer can food safety sit squarely in the remit of technical and quality functions. It is a board level, company-wide and global issue.
2. Background - The growth and current status of criminal fraud

- Food fraud - the deliberate substitution, addition, tampering or misrepresentation of food, ingredients or packaging - is a significant problem which has been in existence for a long time but which has developed rapidly in scale and gravity in the last 50 years owing to the changing structure of the legitimate food supply chain.

- Contributing factors include:
  - the growing length and complexity of today’s supply networks
  - the concentration of buying groups and retailers into very few multinational chains with a great deal of buying power forcing downwards pressures on prices
  - the advent of refrigerated transport and warehouse systems enabling the shifting and long term storage of large quantities of perishable goods
  - the rapid development of technology, internet and mobile communications, providing tools for criminals to covertly transact illegitimate deals and easily set up communications networks.

- The economic crisis has provided the right conditions to foster growth in organised food crime and the development of organised criminal groups, which in many ways operate like legitimate businesses.

- The scale of food fraud is not known as there are no precise figures available. However it is estimated that it costs the world economy $49 billion annually and is growing.\(^{(6)}\) The University of Minnesota National Center for Food Protection and Defense (NCFPD) has estimated that about 10 percent of US food could be adulterated.

- Europol has estimated that there are 3,600 organised crime groups active in the EU. In its *Serious and Organised Crime Threat Assessment (SOCTA) report 2013*, it found that international drug trafficking remains the most active organised crime activity in the EU but counterfeit goods with an impact on health and safety are numbered in its top seven priorities.

- Fraud is a cross-border issue which exists globally and cannot be dealt with inside national borders. International cooperation and concerted action is required.
Much can be learnt from the experiences of counterfeiting in the branded fashion goods and pharmaceutical sectors.

The horsemeat scandal has had the beneficial effect of drawing a close focus on this issue from national governments, the EU, international law enforcement agencies including Europol and Interpol, and industry.

It should be stressed that much fraudulent activity is occurring outside of and in parallel to legitimate supply and distribution networks. Nevertheless, the industry must be vigilant for crossover and infiltration at vulnerable points in their networks.

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**Case Study 1: Anatomy of a production fraud – July 2014**

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A processing factory supplying to major food companies was spectacularly caught perpetrating a well organised and company-wide fraud to supply substandard and out-of-date meat. This was revealed by an undercover reporter who covertly filmed their operations.

**Methods:**

- Mixing expired meat with fresh meat
- Mixing chicken skin with breast meat
- Putting out of date chicken breasts back into the fridge
- extending expiration dates
- Concealing suspect stock from quality inspectors
- Dual sets of records kept – one for the inspectors and one for real.

**Characteristics:**

- Highly organised methodology with ‘acceptable’ mix ratios which an employee claimed was set out in a manual.
- Deliberate intent by senior management to deceive customers. This drove employee behaviour despite knowledge and indeed recognition of their wrong doing and of the consequences, even to the extent of shifting suspect stock around while inspectors were on the premises.
- In a complete subversion of a ‘good’ company culture, the quality control department mandated fraudulent practices, and for at least one individual employee, this level of cunning was a source of pride.

Source: 2014-07-21 08:11 Shanghai Daily Web Editor
3. Conclusions and recommendations

3.1 The problem of food fraud is huge and growing and requires a new and more radical approach to fraud identification and prevention than is in the case currently. Companies that do not address this issue as a matter of priority are leaving their customers and their brands seriously exposed.

3.2 Food fraud is a serious and potentially fatal crime which requires attention at the board level and engagement across all functions of the organisation to tackle it effectively. There must be more coordination between the technical, operational, procurement, sales and marketing departments.

3.3 The horsemeat scandal has thrown sharply into relief that international and national regulators across Europe and indeed the rest of the world have been outpaced by the changing methods of buying and sourcing foods. Retailers and manufacturers themselves have been caught out by the speed of change in their own systems. The situation has caused a paradigm shift from detection and mitigation to prediction and prevention. Transparency, traceability and data sharing among government, industry, and third-party organisations worldwide will become major themes in addressing global food fraud threats.

3.4 Much work is being done to improve existing techniques for controlling and testing product and supply integrity. These include:

- the new standards and controls for agents and brokers which have previously represented unregulated gaps in the supply chain
- additional clauses to detect fraud included in the Global Food Safety Initiative (GFSI) certified standards
- specific training for technical, buying and operational departments, as well as regulators to raise fraud awareness
- recognition and encouragement of whistle blowing by staff as an important way of detecting fraud
- above all, the recognition of the need for strong leadership and a sound corporate culture to lower the risk of acceptance of fraud.

3.5 The advent of new analytical and computational abilities or ‘big data’ solutions have enabled the development of prediction and identification techniques that will assist businesses to better manage their risks through horizon scanning and reference to shared regional, national and international databases. The UK and other governments are also funding a number of important analytical and research projects to identify new and more reliable predictive methods for industry and regulators to assess fraud risk, an example of which is NSF International’s own predictive fraud model. (See pg. 7)
3.6 An in-depth understanding of the culture, employee awareness and attitudes and internal relationships is vital in order to provide the leadership required to instil a strong anti-fraud ethic and set up specific cross-functional training and education programmes to make employees more fraud aware.

3.7 Knowing the supply chain end-to-end is the single most important recommendation. The development of a stable, trusted and engaged, and technically competent supplier base is key to generating an effective and secure supply chain. Companies must work with their supplier base to develop sustainable trusted relationships which goes way beyond GFSI-benchmarked audit standards.

3.8 An increased level of risk-based testing to verify specification compliance and for speciation and authenticity is recommended to validate suppliers’ own testing programmes and cross reference the results. This should embrace integrity and traceability audits that include mass balancing of input and output materials.

3.9 Whistle blowing mechanisms and monitoring of customer complaints provide valuable information and feedback that can highlight important areas of concern. These should always be followed up.

3.10 Preparation for the eventuality of a product recall or other crisis is of paramount importance to minimise the damaging effects to human health and brand reputation. The development of emergency protocols and emergency exercise programmes are significant elements of a risk management programme.

3.11 As a final point, consumer education will be key to helping stamp out fraud by creating a greater awareness of origin and labelling. Often fraud is regarded as a victimless crime and consumer memories tend to be short, while their demand continues to be driven primarily by price. The industry will continue to accede to demands for lower prices until and unless consumer demand drives change in their sourcing priorities.
In summary, NSF International recommends a holistic approach for businesses to minimise the opportunity for food fraud in their supply chain. It has developed the comprehensive 7-step programme illustrated below.
4. Industry responses to food fraud since the horsemeat scandal

The Elliott Review into the Integrity and Assurance of Food Supply Networks Interim Report 2013 set the tone for the current responses, providing a comprehensive and coherent raft of recommendations across all sectors, public and private.

The stated aims of his recommendations are to:

- Create a culture within food businesses that focuses on depriving those who seek to deceive consumers [of the opportunity and incentives for fraud]
- Develop a food supply system that is much more difficult for criminals to operate in
- Make more robust the role that Government and specifically the FSA play in partnering industry efforts in these areas.

Professor Elliott takes a holistic approach to tackle the problem on all fronts: market and industry intelligence, business culture, tighter regulation and sanctions, improved governance and regulation and more communication cooperation and transparency between Government and industry.

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4.1 Continuity of oversight and certification

There is opportunity for fraudulent product to enter at every point of the supply chain. Currently, there are gaps in supply chain controls. A 2013 report by the EU’s Committee on the Environment, Public Health and Food Safety recommends regulation of the missing parts:

‘All commercial operators which process, trade or store raw materials, food ingredients or food products in the human food chain, including traders and owners of cold stores, should be registered as food business operators and be subject to controls.’

Certification to global food safety standards remains a key tool in conducting due diligence and protecting business. Many of the world’s largest food retailers already mandate supplier certification to Global Food Safety Initiative (GFSI)-benchmarked schemes, which emphasise food security and defence. These include Safe Quality Foods (SQF), British Retail Consortium (BRC), International Featured Standard (IFS), Food Safety System Certification (FSSC) 22000, Global Red Meat Standard (GRMS), GLOBALG.A.P., Best Aquaculture Practices (BAP) and CanadaGAP.

The BRC has reviewed its food certification scheme to take account of issues raised by the horsemeat scandal and will be publishing additional clauses in version seven (v7) of its global food standard, which is due to be active from mid 2015. It already offers unannounced audits and has plugged the gap in the global supply chain by establishing a new standard in the BRC suite of global food standards for agents and brokers.

Case Study 2: Anatomy of a multiple distribution fraud

A Chinese manufacturer of glycerine as an ingredient for cough syrups, toothpaste and other foodstuffs in fact substituted a less expensive and highly toxic antifreeze additive, diethylene glycol, for glycerine. Diethylene glycol has been implicated in eight mass poisonings in the last 25 years.

- The product was mislabelled 99.5% pure glycerine.
- The distribution route was initially from China though Spain and then to Panama into an importing broker’s warehouse.
- The shipping documents were altered at each stop to conceal the manufacturer name and source of the product.
- The certificate of analysis was translated and the name of the manufacturer changed at each stop.
- The broker held the product for two years, did not test it and changed the expiration date, then sold it to a US cough syrup manufacturer (a Government entity).
- The syrup manufacturer was a Government entity who distributed the product through clinics and hospitals.
- This resulted in 365 deaths.
- The importer was held responsible for the fraud.
- The Chinese authorities found that no law had been broken because the producer and exporter were not certified in pharmaceuticals and therefore it had no jurisdiction to prosecute as no law had been broken.

Source: GMA/Inmar
Compliance with the U.S. Food Safety Modernization Act (FSMA) also provides protection for food suppliers in the international supply chain. FSMA provides a science- and risk-based approach for verifying ingredient suppliers, including processes to detect economic adulteration and demonstrate compliance of effective due diligence.

Proprietary third-party standards also play an important role. For example, NSF International, a global organisation with more than 70 years’ food safety and integrity experience, has developed an audit specifically to address product authenticity. The NSF Integrity and Traceability audit is a detailed deep dive into the traceability and integrity of the products manufactured. Mass balance exercises are used to determine volume in/volume out, ensuring that there are no discrepancies or areas of concern. This audit is available to companies globally as part of NSF’s risk based supplier assurance services.

### 4.2 People Management

A report published by The Committee of Sponsoring Organizations of the Treadway Commission (COSO) on Fraudulent Financial Reporting shows clearly that minimising fraud is about better leadership, motivation, management and oversight of people, reporting internal fraud enablers as:

- 66% Inadequate internal controls or compliance programmes
- 47% Management override of internal controls
- 44% Inadequate oversight by directors over management
- 43% Collusion between employees and third parties
- 32% Collusion between management and third parties
- 27% Collusion between employees and management
- 4% Other factors

To balance the equation, a tip off or ‘whistle blowing’ is the most frequent source of detecting fraud in an organisation.

Providing individuals with the means to report suspicious activity is recognised as an important part of an anti-fraud programme, for example hotlines, which guarantee the whistleblower anonymity and confidentiality. Managers, employees and auditors can be educated on the recognised behavioural patterns often shown by fraudsters, such as living beyond their means or exhibiting excessive control issues in their area.

However, incentives and rewards have to be looked at in the context of the whole organisational culture or there is a danger of driving fraudulent behaviour deeper underground.

NSF International has carried out important research and development work in behavioural psychology with their strategic partner, Cognisco, a specialist in assessing, monitoring and developing workforce competence, the identification and mitigation of People Risk. This has demonstrated that adherence by staff to desired behaviours depends on a number of environmental and personality factors, including strong leadership, the right tools to do the job, a proper understanding of what they are doing and the confidence to carry it out correctly. For example, simply putting in place confidential whistle blowing facilities will not in isolation change the
culture of the organisation relative to food safety. Pressures on time, unrealistic targets, poor role models etc can all play a part in preventing honesty and transparency.

4.3 Training and education

Employees responsible for purchasing are often driven by objectives and targets which contradict those of the technical teams. Buyers may not understand some of the issues involved in food fraud or the signs to look out for. For example, very cheap product in vulnerable product categories must always be suspect. The growth in the use of outsourced procurement groups in order to secure better prices also leads to a further removal of this function from the core business. Companies need to put in place more cross functional liaison and coordination so that all parties gain a clear understanding of the issues and develop integrated approaches to avoiding problems.

One issue that has been highlighted recently is that food fraud is a financial crime. NSF International, together with Portsmouth University, has developed a raft of comprehensive fraud awareness training programmes for management and staff that incorporate elements of forensic accounting.

The new Institute of Food Safety, Integrity and Protection (IFSIP,) backed by The Chartered Institute of Environmental Health (CIEH), has been set up in order to provide trading standards and environmental health officers with the skills needed to tackle food fraud and protect consumers. The aim is to provide a more coordinated approach between professionals, trade bodies, and academia, research and other interest groups and develop a clear and harmonised framework for professional development in this area.

4.4 Tracking movements and creating security through the supply chain

Kevin Zwolinski, an expert in supply chain logistics and distribution, points out that supply networks are not homogenous and joined up chains. Often no single entity or organisation has control of the network and the different parties involved – retailers, manufacturers, warehouse and distribution have different priorities and expertise. There are still blind spots, for example, in long term storage where documentation can be falsified with little chance that the fraud will be detected.

Simple security measures such as employee background checks, use of video cameras, secure entries and locked external waste containers all have their place. New technologies ensure greater security. Identification techniques now go beyond the use of watermarks, symbols and holograms to include RFID (radio-frequency identification) technology, coded track and trace systems, Taggart fingerprinting and DNA tracking.

Web-based information management systems are increasingly being used to provide flexible and detailed reporting of product specifications, supplier performance and compliance at all points throughout the supply chain. NSF’s own supplier assurance web-portal, NSF Online, is available to companies and provides dashboard-style instant reporting and management information on their
supply chain at whatever level of detail or scope required. This has now been enhanced with fraud metrics provided by the NSF food fraud risk assessment model (see section 5.2).

5. New Developments in fraud detection

5.1 Database sharing and analysis

It is recognised that data and intelligence sharing – particularly cross border – will be a major factor in tackling food fraud. There are already national and international databases which capture the frequency, scale and nature of past incidents, for example the NCFPD (National Centre for Food Protection database.

One of the key steps forward has been provided by the advent of ‘big data,’ giving us analytical abilities that a few years ago were not possible. An example of this is the Rapid Alert System for Food and Feed (RASFF) database.

Set up in 1997, the RASFF database was designed to protect consumers with the principal aim of alerting countries to immediate hazards. It also provides a useful database for studying historical trends in food safety issues along with the potential to predict future risks. With the rapid improvement in computational power, network analysis has become a useful tool to analyse complex information for underlying structure or patterns that would otherwise be undetectable with descriptive analyses. Previously, to complete such an analysis could have taken up to six months.

Work carried out in a study by Tamás Nepusz, Andrea Petróczi and Declan P. Naughton at Kingston University in the UK analysed the patterns in risk reporting within and between countries to identify the principal hazard generators and gatekeepers of food safety between the 117 countries reported over an 11-month period. The study concluded that of the 117 countries studied, ten countries were responsible for 60 percent of all faulty products marketed with the top five countries having received between 100 and 281 reports. Further analysis of the dominant core revealed that out of the top five transgressors, three made no reports (China, Turkey, Iran). The top detector countries were mainly in the EU and ten detectors accounted for three quarters of reports; Italy, Germany and the United Kingdom being the top three.

The graph below shows the complex network of hazard-generating countries and those reporting them, which network analysis is able to unpick.
Graph representation of countries involved in the food alert/recall between January and November, 2007

Figure 1a depicts all 117 countries involved in food alerts either as detector or transgressor (or both), connected by 574 links. Two countries are linked if one of them reported on the other at least once during the examined time period where the direction of the arrow reflects the roles of the countries: arrows originate from detectors and are oriented towards transgressors. Mutual arrows are present between two countries if they both reported on each other. The detail in 1b indicates where countries such as the UK (GBR) reported on themselves as shown by the loops.
5.2 Fraud prediction modelling

NSF International were commissioned by the FSA to develop a diagnostic model to identify and risk rate the commercial opportunity for fraud across product categories, thereby providing business with an evidenced and risk-based management tool. Drawing from the two key fraud databases, the model has been designed to work from dynamic database feeds that allow the user to feed in relevant data in order to plot a relative risk score for a point in time based on the product or ingredient type, the nature of the potential fraud, its difficulty, profit incentive and likelihood of detection.

The model focuses on three key areas:

- The potential profit a fraudster can make
- The potential difficulty/cost for the fraudster of making a viable substitution
- The likelihood of detection by a reputable food business, customer or regulators.
Food categories can be mapped onto a four quadrant Boston Consulting Group-style matrix to provide a visual representation of relative and timely product risk (e.g. high and low risk categories). This enables easier and consistent mapping of surveillance measures, supply network controls and preventative solutions to advance detection methods and address evolving market needs.

The ESRC (Economic and Social Research Council) and the FSA have also funded a project by the University of Manchester to develop a predictive computational approach to modelling supply chains and identify points of vulnerability to fraud. It will involve a multidisciplinary team from the analytical sciences, predictive modelling, criminology, law and business studies and focus initially on the pig meat supply chain.

5.3 Product authenticity and traceability – isotope testing

It is now possible to identify the precise origins of food products through stable isotope radio analysis. Country and region of origin testing can also reveal whether, for example, an animal has been fed organic or conventional feedstuff and other methods of production. It is even possible to determine the precise origin of bottled water. A study carried out by DEFRA and the FSA earlier this year to assess the usefulness of stable isotope ratio analysis (SIRA) to regulators concluded that SIRA has real potential to be used to verify country of origin labelling claims to support food law enforcement when used in combination with traceability and other evidence for confirmation. However, the technology relies on having samples and mapping of all the specific locations involved to provide and identification matrix. Both public and private sector organisations with an international footprint and the ability to collect samples, for example those with large inspection bodies, are best placed to carry out such mapping.

5.4 Role of social media

‘Big data’ now also enables analysis of social media communications, such as tweets, blogs and discussion groups to pinpoint the sources and track the escalation of food positioning outbreaks or other food related consumer issues in real time. Work to analyse how previous incidents have developed can be used to provide predictive indicators for future incidents, identifying problems before they are officially reported through traditional channels such as General Practitioner and hospital alerts.

Cardiff University’s Collaborative Online Social Media Observatory (COSMOS) has recently been awarded a grant by the Economic and Social Research Council. Working with other universities, it will examine three billion tweets to understand how consumer scares, misinformation and information spread. It is hoped that this will help in the management and containment of damaging rumours in any future issues.
As a final point, consumer education will be key to helping stamp out fraud by creating a greater awareness of origin and labelling. Often fraud is regarded as a victimless crime and consumer memories tend to be short, while their demand continues to be driven primarily by price. The industry will continue to accede to demands for lower prices until and unless consumer demand drives change in their sourcing priorities.

As of now, businesses need to consider food fraud in the context of their broader risk management framework. It should be an important business priority for companies operating in the international food supply chain to undertake a top down, company-wide review of their policies, systems, operating practices and controls relating to their product and supply integrity.

If you would like more information about the content of this report or about the supply chain risk management solutions NSF International provides, please contact Chris Slack, Senior Marketing Manager, at cslack@nsf.org or +44 (0) 1993 885684.

Sources

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