

The problem of food fraud and its impact on food safety

Food fraudsters simply want to make money, but there are three main consequences:

- The degradation of the brand, company or country's reputation.
- The 'short changing' of the buyer and consumer.
- A threat to the safety of the food.

In 2011 Jim Morehouse, of A. T. Kearney, said that in recent years, more than 150 instances of food and consumer product fraud have cost the food industry an estimated \$10-15 billion per year, (£6.2-9.3 billion) plus human pain and suffering, and loss of consumer confidence.

Food fraud is not new. The Greeks and Romans had laws against adulterating wine. Fake 'olive oil' was produced from wood, leaves and berries. The European governments of the Middle Ages legislated against chalk in flour and bread, and set standards for beer and in the 19th century there were scientific advances in the detection of adulteration which supported advances in the legislation to enforce food purity.

Yet, even today there are examples of food fraud that would cap the horrific imagination of the ancients.

Marinated in goat urine

In his introduction at the 2011 Food Authenticity Conference, Richard Werran of FoodChain Europe described modern cases of duck meat marinated in goat urine then sold as lamb, steamed buns adulterated with sulphur to improve appearance and soy sauce made from human hair.

For the food producer considering the sourcing of raw materials Richard reminded his audience of the saying attributed severally to King Arthur, Benjamin Franklin and, perhaps more appropriately, to the gothic fiction writer Edgar Allan Poe – 'believe nothing you hear and half of what you see'.

As the marketing of food and the technology of production has developed to satisfy the changing social needs and economic pressures and opportunities, so too the fraudster has been there to take advantage.

When unbranded products were the norm some bakers and some dairymen could be tempted to use cheaper low grade

or non-food ingredients to imitate the 'real' thing.

This was especially prevalent in times of shortage when raw material costs were soaring, driving up the retail price, and with the temptation of even higher profits, chalk and chemicals were used in the making of bread and milk.

Merits of branding

Shoppers seeking food and drink they could trust responded positively to the advent of branded products. A recognised name or symbol built and carried a reputation for safe products.

The fraudsters then discovered that if they could reproduce well known branded foods by copying the label/packaging and producing cheaper, poor quality imitation products they could make a profit.

Examples of these practices are the cases of baby milk in China in the 1990s and the production of imitation vodka in the UK in the early 2000s. Those carrying out the fraud seemed unconcerned at the harm they were causing, of the babies that were made ill or the drinkers that were poisoned.

As the food industry has become more complex, with an extensive supply network, the cases of suppliers of fraudulent ingredients has spiralled.

The fraudulent supply of varieties of meat was very prevalent in the 1990s when cheaper varieties were substituted for the more expensive, or low quality meat was substituted for that of the more expensive, better cuts and types.

The melamine story

The doctoring of low quality spices with chemical dyes to imitate fresher, better spices and the use of melamine to fool the quality/price checking systems of dairy processors are just a couple of recent examples.

These types of fraud have stimulated the development of ever more sophisticated tests and checks that have been the industry's means of ensuring the quality of the ingredients in order to protect the integrity

of their products and the safety of their customers.

Fraud and food safety are closely entwined. The history of food fraud is full of examples where the cheaper fraudulent ingredient is also a danger to the consumer.

The mindset of food fraudsters is such that they have no care of the consequences of their actions other than the making of money, so fraudulent and dangerous food or drink are synonymous characteristics.

Food fraud categories

Dr Theresa Ekong from the UK government department Defra (Department of Environment Food And Rural Affairs) categorises some types of food fraud as follows:

- False declaration of product/species – Whiting/pollock/basa for cod; labelling cheaper potatoes as 'King Edwards'.
- Adulteration with a different ingredient – Water/water retention agents in chicken; hazelnut in olive oil; water/sugar/colouring in fruit juices; sugar in honey.
- False declaration of treatment – Previously frozen poultry as fresh.
- False declaration of method of production – 'farmed' for wild fish; 'organic' for conventional product.
- False declaration of origin – South American beef as British beef.

These frauds can affect buyers at both an industrial level and at the point of sale.

Protecting the chain

The creation and enforcement of food regulations that apply to ingredients and finished products is not only a political necessity but an economic essential. As much as the consumers will stop buying unsafe products, so national and international traders will stop buying from countries with no guarantee or protection for the buyers of finished foods or food ingredients.

A major food safety threat, as experienced by the UK in the 1990s with Bovine spongiform encephalopathy (BSE), can have a significant impact on the nation's food economy. In the same way, the fraudulent

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melamine contamination of ingredients and milk had an impact on the world's view of Chinese ingredients.

The first was caused by feeding practices that were discovered to be dangerous, and the second was a deliberate attempt to defraud. The results were the same.

The UK's Food Standards Agency (FSA) takes the threat of food fraud seriously. Cathy Alexander, Head of Food Fraud and Emergency Planning at the FSA recently told the Food Authenticity Conference of the establishment of systems to prevent or quickly stop the fraudsters.

She explained that the Agency's 2010-2015 Strategic Plan provides a commitment to protecting consumers from fraud. An Incidents Unit that provides rapid response and emergency planning against food fraud has been established with a dedicated team that provides multi agency response and co-ordination to provide resources to assist local authorities in their investigations.

The FSA has established a Food Fraud Database (FFDB) as a national resource that uses a special intelligence system to collate and analyse intelligence on food fraud. A central database of information on known or suspected food fraud is built on data from local authorities, members of the public, industry, police, other government departments, and international contacts.

Food industry protection

The property market's legal doctrine of 'caveat emptor' or 'Let the buyer beware' is a worthy watchword for food processors seeking sources of ingredients. There are several important safeguards they can apply from one end of the chain to the other.

Essentially, the further the point of control is from the source, and the more 'hands' the product passes through from harvest to delivery the greater the risks.

To buy from a wholesaler or import agent can be a high risk that is only reduced if you know the checks and tests and sourcing care that is carried out. To buy products from a given country is a risk that can be assessed when you know the country's effectiveness in applying appropriate regulations and controls to ensure safe food and ingredients.

The work of protecting the supply chain can be a time and labour consuming process.

It is a continuous process that can be managed in a number of different ways.

Both food processors and retailers will go to the farm sources of ingredients and establish control through their contracts to purchase. There is an increasing reliance on suppliers with certificates from recognised accredited bodies that indicate those suppliers' adherence to food safety standards.

Fraud/food safety defence systems require the use of six senses. To the basic five of vision, hearing, smell, taste, and touch we should add the good sense of testing.

Society took a major step forward in fighting food fraud with the establishment of Government laboratory services that are able to test and identify fraudulent foods.

The services that are now available to businesses offer a wide range of tests to authenticate food and ingredients. As each new threat appears a new test is developed.

Theresa Ekong told the Food Authenticity Conference of a number of Government funded development programs for fraud tests that include:

- Identifying the addition of vegetable fat to chocolate.
- Determination of theobromine conversion factor.
- Adulteration of buffalo milk with cow's milk.
- Adulteration of fruit juice with cellulase, sugar and water.
- Adulteration of maize oil with rapeseed oil.
- Origin, variety and quantitation of Basmati rice.
- Meat and fish speciation.
- Detection of offal.
- Determination of origin.
- Production methods (for example organic, wild or farmed).

This research has, for example, resulted in tests to identify the regions in which beef cattle have been reared to validate regional claims such as 'Scottish beef' or 'British beef'. It is now possible to identify wild salmon from farmed salmon, and to differentiate the varieties of white fish so that sellers of expensive varieties that are, in fact, selling the less expensive variety can be caught and prosecuted.

The application of the developed tests in the field is crucial to protecting the food economy from the consequences of fraud.

Availability of rapid tests

Dr Konstantin Rizos from Genetic ID Europe explained to the Conference how there was an increasing number of rapid tests available to identify dishonest products. The expansion of PCR based testing not only identifies micro contamination but is able to identify genetically modified products, allergens and animal species.

He gave a number of recent examples of food frauds that could be identified:

- Minced meat made from '100% beef' containing pork.
- Goat cheese made from cow's milk.
- Pork in Halal or Kosher food products.
- More expensive haddock, cod and flounder fraudulently replaced with cheaper pangasius or tilapia.

The cost of protecting the food chain can be large. The cost of not defending the brand and the company can be catastrophic. Jim Morehouse described examples of the consequences of fraud.

Sanlu lost \$5 billion (£3.1 billion) in sales and went bankrupt when the suppliers defrauded them with melamine contami-

nated milk, and the company then tried to hide the faulty product.

General Mills destroyed over 50 million boxes of cereals when a contractor used unapproved pesticide because it was cheaper. The company's failure to monitor the supply is estimated to have lost them over \$140 million (£86.8 million).

The research report from A. T. Kearney, 'Consumer Product Fraud: Deterrence and Detection' explains, in its analysis of recent major incidents, that pockets of intelligence often existed but that there was no process to connect the dots to raise a clear warning.

The FSA has obviously taken this into account. The study also uncovers motivational drivers for economic adulteration and structural weaknesses at both the industry and government levels that have inadvertently created opportunities for economic adulteration to thrive.

Collaboration essential

Detection and deterrence requires companies to collaborate with each other, their supply chain partners, retailers, government agencies, and trade associations.

The study offers specific directions for industry, companies, suppliers, retailers, and governments on how these organisations can better work together to address the issue of food and consumer product fraud:

- Industry, including retailers and suppliers, must take collaboration to the next level in safety and quality by implementing a clearing house model and developing a shared library of ingredient reference samples.
- Companies should continue to 'raise the bar' on their product safety and quality programs by further integrating anti-fraud strategies.
- Suppliers should implement similar strategies as manufacturers, while also considering ways to facilitate appropriate testing procedures, provide increased transparency, and partner with manufacturers in their effort to reduce fraud.
- Retailers should partner with reputable suppliers and manufacturers that employ the highest standards in deterrence and detection programs, while verifying the authenticity of the products they receive.
- Governments can be facilitators in establishing global standards and sharing intelligence on emerging threats and can protect legitimate businesses through the enforcement of property rights. ■

References

- Jim Morehouse: A.T. Kearney.
- Dr Theresa Ekong: DEFRA.
- Richard Werran: FoodChain Europe.
- Cathy Alexander: Food Standards Agency.
- Dr Konstantin Rizos: Genetic ID Europe.