



Food & Seafood: Authenticity and Integrity

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Reference: PAS 96:2017 Guide to protecting and defending food and drink from deliberate attack

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Learning outcomes

Upon successful completion of this course, participants should be able to:

- Understand the principles of food authenticity and integrity
- Understand & Recognise the different types of threats and their potential source
- Prepare for developing further systems for integrity and authenticity

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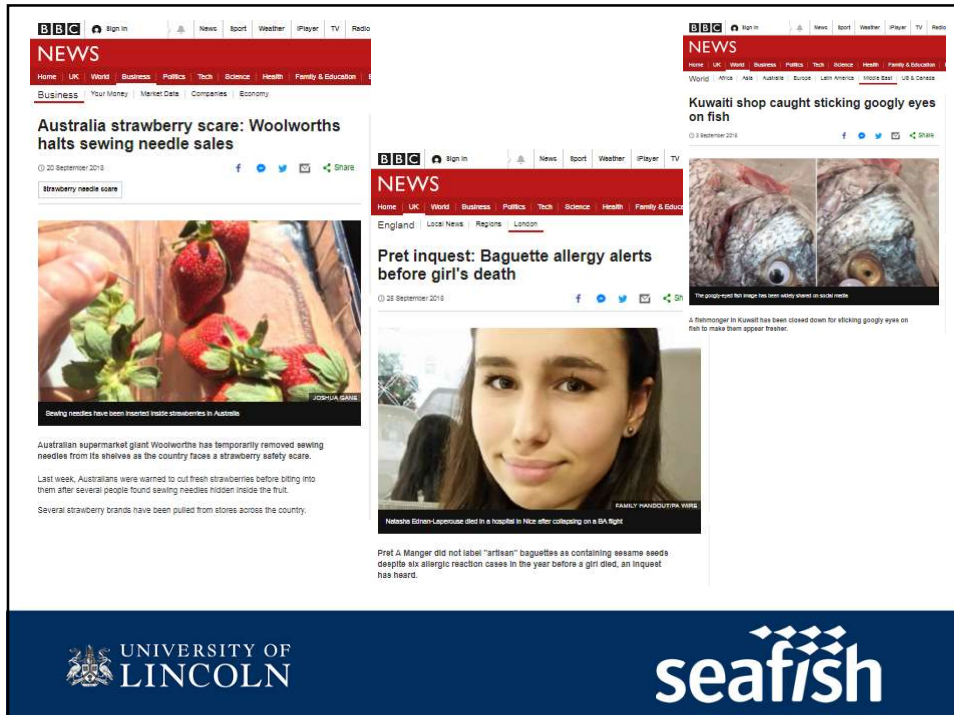
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Course Objectives

- Understand the background, terminology and responsibilities for food defence, authenticity and integrity
- Understand the causes and prevention of food crime
- Understand the capacity and capability required by business operators to combat food crime
- Understand the responsibilities for food authenticity and integrity
- Understand how to operate food control and quality systems to prevent food crime
- Outline strategies for developing and maintaining product authenticity and integrity

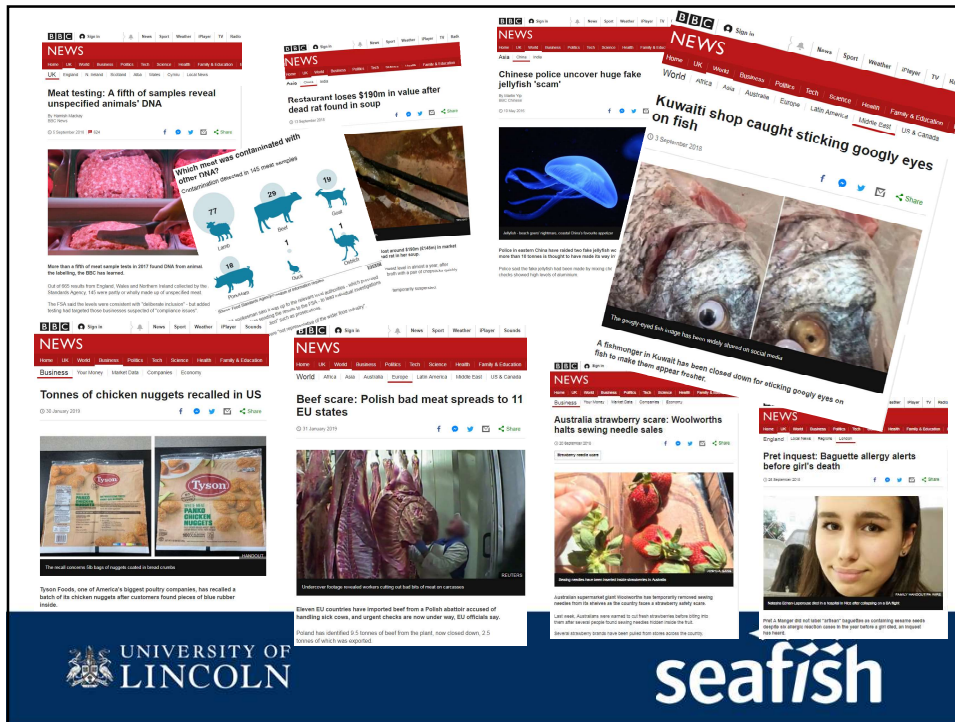
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The screenshot shows the BBC News website interface. The top navigation bar includes 'NEWS' and various category links. The main content area features three news stories:

- Australia strawberry scare: Woolworths halts sewing needle sales** (20 September 2014): An image shows strawberries with sewing needles inserted into them. The text states that Woolworths has temporarily removed sewing needles from its shelves due to a safety scare.
- Kuwaiti shop caught sticking googly eyes on fish** (3 September 2014): An image shows a fish with a googly eye. The text reports that a shop in Kuwait has been closed for this practice.
- Pret inquest: Baguette allergy alerts before girl's death** (28 September 2014): An image shows a young girl. The text mentions an inquest into a girl's death, with a link to a related article about a girl who died after eating a baguette.

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Trends Impacting the Food & Drink Sector

Pressures on Margins

Sustainability

Technology

Origin and Provenance

Customer Landscape

Nutrition

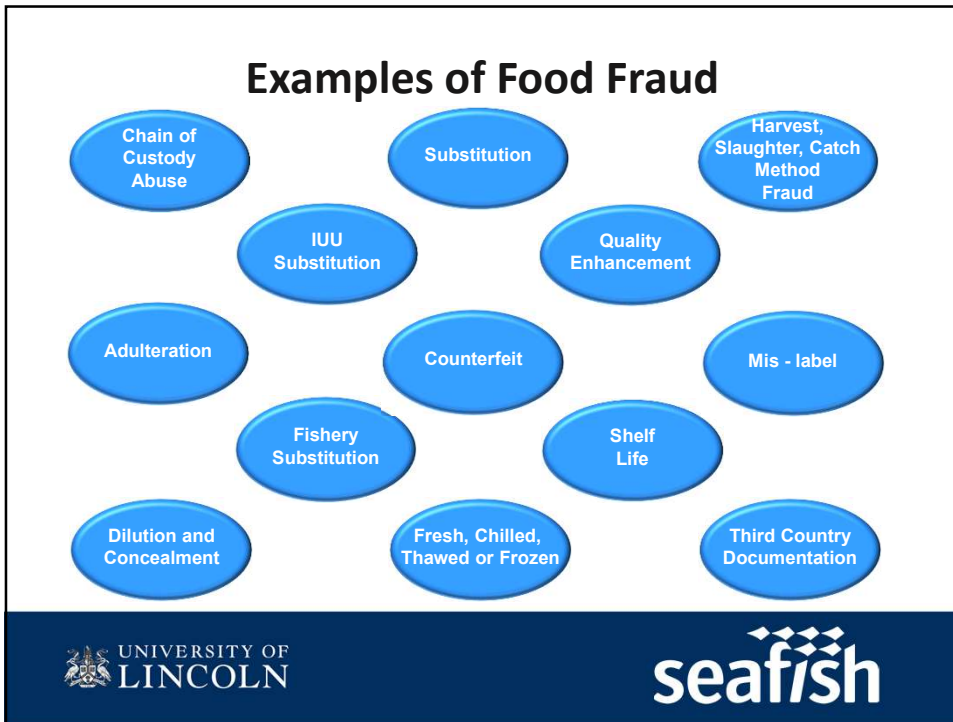
Brexit or No Brexit?

Epidemic / Pandemic

Businesses who adapt to change will find success....

Reference to: IFST Conference, Birmingham May 2018

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Consumers expect...

- Food Safety & Quality
- Healthy Food
- Fair Trade
- Provenance
- Animal Welfare
- Sustainability
- Social Responsibility
- Food security
- Protection against bio-terrorism

"Our consumers are becoming more aware and responsible for themselves and the food chain. They are food citizens."

Reference to: IFST Conference, Birmingham May 2018

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There are many challenges for responsible Food Supply Chains



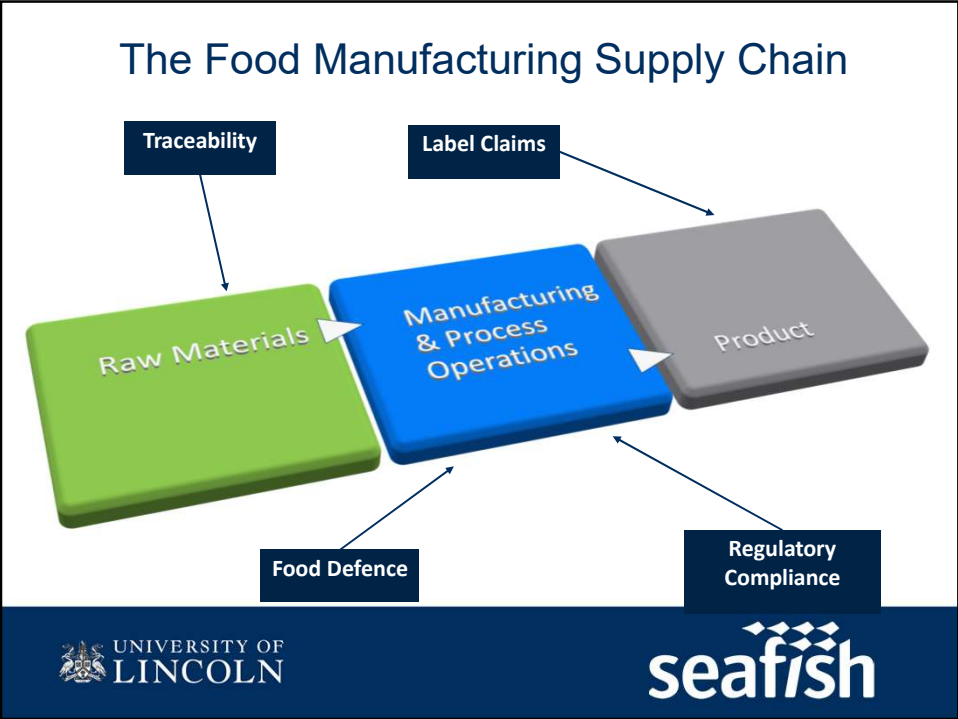
Cyber-crime Criminals Insiders Espionage Terrorism

Reference to: IFST Conference, Birmingham May 2018

Sustainability and Chain of Custody abuse

The substitution or addition of a product from an uncertified source into a product that carries an independent third party certification, threatens the integrity of not just the retailer or brand owner selling the finished goods, but of the sustainability certification scheme itself.





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What is TACCP....

When there is a targeted, malicious nature of threats which requires creative thinking to anticipate modes of attack and identify deterrent precautions

Is a preventative tool. It may be managed within business continuity procedures.

A real attack may cause illness and even death as well as these psychological and economic consequences.

Any supply chain can present risks that need to be controlled

'Insiders' are employees or contractors who have legitimate access to an organisation's assets, but malicious intentions.

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Fact...

Food Manufacturers across the globe are more at risk of THREAT from MALICIOUS ATTACK, risk of ADULTERATION, SUBSTITUTION and FRAUD than ever before.

Does your business understand these threats?

Have you implemented stringent procedures to ensure that your supply chain and product threat is minimised and do they work?



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Fact...

The common factor behind all such deliberate acts is people.

People may be:

- **Within the business**
- **Employees of a supplier**
- **Complete outsiders with no connection to the food business**

It is in the interests of the food business to protect itself from such attacks!!

Key issue is their motivation; they may aim to:

- **Cause harm to human health or business reputation**

OR

- **To make financial gains at expense of the business**



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Responsibility & Authority

Technical Manager	HR Assistant
Compliance Officer	Training Supervisor
Planning Manager	NPD Controller
Coldstore Manager	Commercial Accountant
Supply Administration (Planning)	Security
Engineering Supervisor	Raw Materials Manager
Head of New Product Development	Shift Manager

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Benefits

- Consumer Confidence
- Structured Approach
- Enhance Strategic
- Demonstrate Due Diligence
- Dynamic Management
- Supply Chain Compliance

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Session 1:
An Introduction to Authenticity and Integrity

Learning Outcome:

The background, terminology and responsibilities for food authenticity and integrity



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Read All About It.... Food Scandals

Objective

Raise the profile and increase your awareness of food safety scandals/frauds that have impacted the food industry and consumers

Task

In your groups think about and list as many different food safety scandals / incidents that have made the news. Remember to make a note of all of these cases that you recall.



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Examples of Incidents Threats and malicious intent

- OCEANA Seafood Fraud Campaign
http://oceana.org/our-campaigns/seafood_fraud/campaign
- <http://www.dailymail.co.uk/news/article-1380164/Mislabelled-fish-products-Asda-Tesco-Sainsburys-Morrisons-Waitrose-Lidl.html>
- <http://www.telegraph.co.uk/food-and-drink/news/fish-fraud-seafood-mislabelled-in-one-in-five-samples-worldwide/>
- <http://edition.cnn.com/2017/04/06/health/best-fish-to-eat-mercury-omega-3-partner/>
- <http://blogs.discovermagazine.com/scienceandfood/2017/03/27/the-secret-in-your-sushi/#.WOZskE11qM8>

And more occur each day....

Examples of Incidents Threats and malicious intent

- Sudan Dye – Adulteration of spices (chilli powder) with Sudan dye
- Melamine added to milk to enhance the milk protein
- 1982 Johnson & Johnson – best selling headache remedy Tylenol with cyanide. Seven people died as a result in taking contaminated capsules.
- 2005 Major British bakery reported that several customers had found glass fragments and sewing needles inside the wrappers of loaves.
- Lamb Takeaways - Reference: Which Magazine (Feb 2015)
- Lamb Takeaways - Reference: Which Magazine (Apr 2014)
- Indian Restaurant - Reference: <http://www.yorkshireeveningpost.co.uk/news/latest-news/topstories/takeaway-in-dock-for-food-fraud-1-7089473>
- And there are more...
...slug pellets, mercury, diethylene glycol (anti-freeze)

Sudan 1 Dye

- In February and March 2005 more than 500 food products were withdrawn from sale in the UK because of contamination with an illegal dye, Sudan 1
- The pigment was present in chilli powder sourced from overseas and had been used directly as an ingredient in other products such as Worcestershire Sauce which were themselves used as ingredients in other products
- While there has been no suggestion of malicious intent, disposal cost the industry several hundreds of millions of pounds.

Malicious intent....Maybe...

- 1990 a former police officer convicted for contaminating baby food with glass and demanded money from the manufacturer.
- 1984 a sect in Oregon attempted to affect the results of a local election by contaminating food in ten different salad bars, resulting in 751 people being affected with salmonella
- 2007 a bakery found piles of peanuts in the factory. It withdrew product and closed for a week long deep clean and to review its nut-free status
- 2013 a major softs drink supplier was forced to withdraw product after a bottle had its contents replaced with mineral acid. The attacker included a note indicating that more would be distributed to the public if their demands were not met

Definitions for 'Glossary of Terms'

Food Fraud*

A collective term encompassing the deliberate and intentional substitution, addition, tampering or misrepresentation of food, food ingredients or food packaging, labelling, product information or false or misleading statements made about a product for economic gain that could impact consumer health.

Vulnerability

Susceptibility or exposure to a food fraud risk, which is regarded as a gap or deficiency that could place consumer health at risk if not addressed.



* Source: J. Spink & D.C. Moyer, (2011) *Journal of Food Science*, 76(9), 157-163



Approach to Food Fraud Prevention



<http://foodfraud.msu.edu/2014/05/08/gfsi-direction-on-food-fraud-and-vulnerability-assessment-vaccp/>

Definitions (PAS 96)

Reference:

<https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Threat

May be something that can cause loss or harm which arises from the ill-intent of people

***NOTE** Threat is not used in the sense of threatening behaviour or promise of unpleasant consequence of a failure to comply with a malicious demand.*

Personnel security

The procedures used to confirm an individual's identity, qualifications, experience and right to work, and to monitor conduct as an employee or contractor

***NOTE 1** Not to be confused with 'personal security'.*

***NOTE 2** Personnel security principles are used to assure the trustworthiness of staff inside an organization, but may be applied to the staff of suppliers within processes for vendor accreditation.*



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Definitions (PAS 96)

Reference:

<https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Insider

An individual within or associated with an organization and with access to its assets but who may misuse that access and present a threat to its operations.

Food protection

The procedures adopted to deter and detect fraudulent attacks on food.

Food supply

The elements of what is commonly called a food supply chain.

Hazard

Is something that can cause loss or harm which arises from a naturally occurring or accidental event or results from incompetence or ignorance of the people involved.

Hazard Analysis Critical Control Point (HACCP)

An approach and system which identifies, evaluates, and controls hazards which are significant for food safety



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Definitions (PAS 96)

Reference:

<https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Cyber security

The procedures used to protect electronic systems from sources of threat.

NOTE *Examples of these threats are from malware and hackers intent on misusing IT systems, corrupting them or putting them out of use.*

Food defence

The procedures adopted to assure the security of food and drink and their supply chains from malicious and ideologically motivated attack leading to contamination or supply disruption.

NOTE *The term food security refers to the confidence with which communities see food being available to them in the future. Except in the limited sense that a successful attack may affect the availability of food, food security is not used and is outside the scope of the PAS document.*



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Definitions (PAS 96)

Reference:

<https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Food fraud

Is committed when food is intentionally or deliberately placed on the market, for financial gain, with the intention of deceiving the consumer.

NOTE 1 *Although there are many kinds of food fraud the two main types are:*

1. *The sale of food which is unfit and potentially harmful, such as:*
 - *recycling of animal by-products back into the food chain;*
 - *packing and selling of beef and poultry with an unknown origin;*
 - *knowingly selling goods which are past their 'use by' date.*
2. *the deliberate mis-description of food, such as:*
 - *products substituted with a cheaper alternative, for example, farmed salmon sold as wild, and Basmati rice adulterated with cheaper varieties;*
 - *making false statements about the source of ingredients, i.e. their geographic, plant or animal origin.*



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Definitions (PAS 96)

Reference:

<https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Threat Assessment Critical Control Point (TACCP)

The systematic management of risk through the evaluation of threats, identification of vulnerabilities, and implementation of controls to materials and products, purchasing, processes, premises, distribution networks and business systems by a knowledgeable and trusted team with the authority to implement changes to procedures.

What is Food Defence?

- The efforts to **prevent intentional contamination** of food products by biological, chemical, physical, or radiological agents that are not reasonably likely to occur in the food supply

Different From...

- Food Safety – the efforts to prevent *unintentional contamination* of food products by agents reasonably likely to occur in the food supply (e.g. *E. coli*, *Salmonella*, *Listeria*) The **natural / environmental source of contamination**
- Food Security – the reliable availability of a *sufficient quantity* and quality of nutritious food for a population

HACCP, TACCP & VACCP

HACCP used and accepted globally as a system to prevent accidental contamination of food

TACCP takes a business into the mind set of an attacker, anticipating their motivation & capability

Vulnerability Assessment takes into account the aspects of the business they may be affected through adulteration, for example.

VACCP / TACCP – Threat or Temptation

Think like a criminal!

Consider Temptation to...

...make an addition or change

Consider the **Economic** Temptation to...

...add value to the product

These may be YOUR Vulnerabilities or Threats!

Threat, Vulnerability or Temptation

Three generic threats:

1. Contamination with toxic material
2. Sabotage of the supply chain
3. Misuse for terrorist or criminal activity. Threats could be carried out by individuals or groups with no connection to the organisation, no contractual relationships or by alienated or disaffected staff

Business Response Levels (Threat Levels):

- Normal
- Heightened
- Exceptional

Defending & Protecting

Raw Materials, Ingredients, Finished Products, Customers, Staff and Consumers

Assets - Equipment, Building, Vehicles,

People - Employees, Visitors, Contractors,

Brand - How much is this worth?

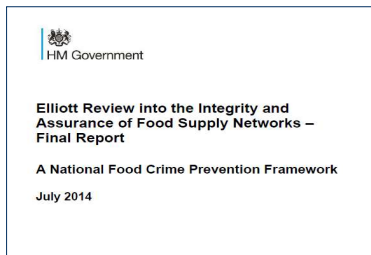
Food Fraud Risk Management

- Large businesses have skills and resources to combat food fraud on-board, they also have access to trade federation memberships where additional resource and intel' is made available
- Risk exposure is perhaps greatest in the SME sector where these are cost prohibitive
- New resources are required to upskill businesses of all sizes, to help them identify and mitigate against their upstream risk exposures:
 - Advice and information
 - Training and education

Horsemeat Scandal 2013

- The horsemeat incident in 2013 involved the substitution of horsemeat for beef in the meat supply chain adulterating both private label and branded products across several European countries.
- Investigations established that the motive was primarily for financial gain, arising from the lower value of horsemeat compared to beef.
- This had a massive impact on customer confidence, loss of brand image and loss of business

The Elliott Report July 2014



- Professor Chris Elliott of Queens University Belfast led the UK government post-horsemeat review of the food system vulnerability to fraud
- Subsequent to publishing the report, Professor Elliott has published academic articles on food fraud and seafood supply chains
- Report highlights how susceptible the supply chain is to attack...

BRC response to “horsegate”

New requirements were introduced into BRC GSFS v.7

- Section 1.1.6 - ‘new risks to authenticity’ has been included in the horizon scanning requirement
- Section 5.4 - this almost all new section includes five new clauses to ensure that systems are in place to minimise risk of fraudulent or adulterated food raw materials entering the food chain
- The type of information used to inform risk assessments will have to be considered
- A documented vulnerability assessment of raw materials must be made
- Risk based testing (or assurance measures) must be in place to mitigate against identified risk

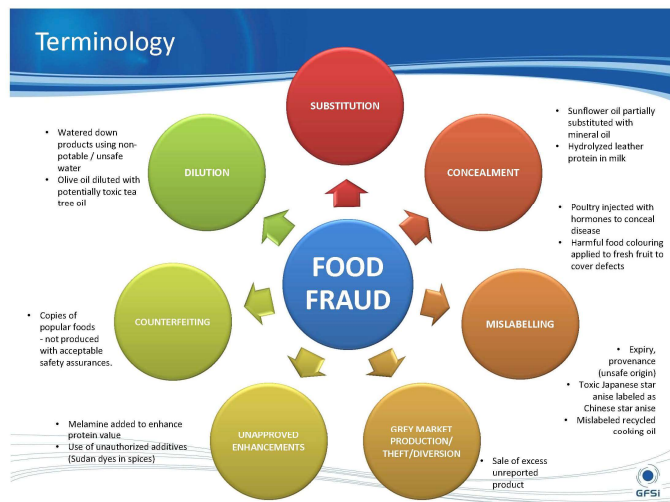
Also links to Allergy Risks

Trading standards officers in Cumbria, took part in a sampling exercise in 2011. The officers bought chicken tikka masala from two restaurants and were assured that peanuts had not been used in either dish. Tests proved both meals contained peanuts. The investigation led back to one of the country's biggest Indian food suppliers, which was fined £18,000 including legal costs after being found guilty of food adulteration by substituting peanuts for the more expensive almonds when they supplied the catering trade.

In October 2012, 12-year-old Connor Donaldson died from an anaphylactic reaction to peanuts. At an inquest in March this year, an environmental health officer reported that an almond powder bought in by the takeaway and used in dishes such as kormas was found to contain 50% peanut.

A common problem in fatal and near fatal reactions to such dishes is that customers are often regulars at a restaurant or takeaway, where their allergy is well known to staff. Sudden, unexpected reactions in respected and reputable businesses suggest fraud in supply chain.

Reference: <http://www.theguardian.com/sustainable-business/food-fraud-dangerous-allergens-allergies-peanuts-eggs>



<http://foodfraud.msu.edu/2014/05/08/gfsi-direction-on-food-fraud-and-vulnerability-assessment-vaccp/>

Food Safety vs. Food Defence Contaminants / Agents

Contaminant type	Unintentional	Intentional Agro-terrorism
Biological	<i>Escherichia coli</i> , <i>Salmonella</i> , <i>Listeria</i> <i>montcytongenes</i>	Heat Resistant: <i>Bacillus anthracis</i> (Anthrax), <i>Clostridium botulinum</i> Heat Sensitive: <i>Yersina pestis</i> (Plague), <i>Vibrio cholerae</i> (Cholera)
Chemical	Pesticide residues	Heat Resistant: Arsenic, Rat Poison; Heat Sensitive
Physical	Metal, bone, rodent droppings	
Radiological		Plutonium-238, cesium-137

A bit of history...

.....Once upon a Time...

During the 19th century it is documented that food, particularly that consumed by the working classes, was often 'adulterated' for example:

- powdered glass in sugar
- white lead in flour
- red lead in tea
- mahogany shavings in tea
- chicory in coffee

A Great British Tradition?

Those in the 19th-century who were active campaigners against adulteration were worried by the long chain between producer and consumer, which enabled food to become compromised even when most people in the chain were innocent. Much like today.

In about 1810, Mr J. R. Wright from Cambridge became hideously ill after eating some toasted Gloucester cheese at an inn.



The lady who kept the inn swore she had bought the cheese from a respectable London dealer,



The dealer swore he had bought it from a respectable farmer.



The farmer claimed he had bought harmless annatto to colour his cheese from a trustworthy merchant.



It transpired that the annatto had somehow got mixed up with vermilion. This is usually a nontoxic substance, but the druggist who made it had assumed it was for painting houses, not dying cheese, and had mixed in some deadly red lead.



A Great British Tradition?

In the 1850's, the newly formed Lancet medical journal published a series of devastating reports on the true extent of the way British food was adulterated. This eventually led to the Food and Drugs Act of 1860.

Not a single shop in London was selling mustard in an unadulterated form, children's sweets were dyed with a rainbow of lead and copper-based colours, and bread was routinely whitened with alum.

<http://www.telegraph.co.uk/news/uknews/1484479/Food-scares-are-one-of-the-great-British-traditions.html>

History.....

These incidents and many more, led to the passage of various pieces of legislation in 1872 and 1875, with others in the 1900s (including emergency powers during the World Wars); eventually culminating in the Food and Drugs Act 1938, (consolidated in 1955)



History timeline (continued)

- The 1955 act remained largely unchanged, until it was replaced by the Food Act of 1984 which added nothing substantially new
- And then came one of the key drivers for the introduction of the Food Safety Act 1990.....

Timeline... 2000's

- 178/2002
- 852/2004
- 853/2004

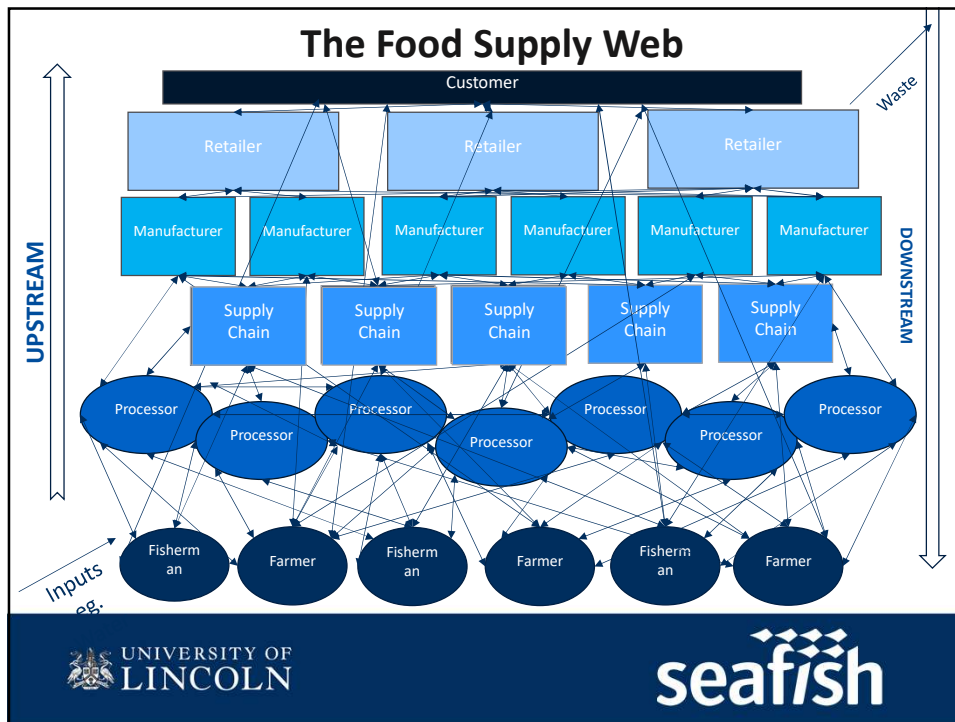
- And more recently:
Food Information Regulations: 1169/2011

But it does not stop... the requirements keep growing

Timeline... 0178/2002 Key themes

- Establish the European Food Safety Authority
- **Traceability**
 - The notion of farm to fork traceability throughout the food production chain
- **Precautionary principle**
 - Guides risk analysis when scientific uncertainty exists

- Rapid Alert system and procedures for Crisis Management and Emergencies, recalls etc...



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The Elliott Report - Eight Pillars of Food Integrity

- Consumer first** – the government to recognize the needs of the consumer are of foremost priority in combatting food crime
- Zero tolerance** – even minor dishonesty must be discouraged and the response to major dishonesty deliberately punitive
- Intelligence gathering** – a shared responsibility between government and industry on intelligence gathering and sharing
- Laboratory services** – those involved with audit, inspection and enforcement must have access to resilient, sustainable laboratory services using standardized methodologies
- Audit** – government and industry to develop more robust, focused and expert audit options
- Government support** – a coordinated approach to food law delivery and oversight by the Authenticity Assurance Network role of the National Food Safety and Food Crime Unit
- Leadership** – through active government coordination of effective prosecutions
- Crisis management** – all food integrity issues to be regarded as a risk to public health until there is evidence to the contrary

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Introducing BRC v7 – 5.4.2

A documented Vulnerability Assessment shall be carried out of all raw materials to assess the potential risk of adulteration or substitution. This shall take into account:

- Historical evidence of substitution or adulteration
- Economic factors
- Ease of access to raw materials through the supply chain
- Sophistication of routine testing to identify adulterants
- Nature of the raw material

BRC Interpretation....

“A vulnerability assessment is a search for potential weaknesses in the supply chain in order to prevent food fraud i.e. to prevent the adulteration or substitution of raw materials before they arrive at the site.

*The aim of the assessment is not to assess the potential for fraud at the site, but to examine the **supply chain** for potential concerns or weaknesses to identify those raw materials which are of particular risk of adulteration or substitution, such that appropriate controls need to be put in place.”*

BRC Guideline Interpretation....

Output from the vulnerability assessment Where raw materials are identified as being of particular risk then appropriate assurance controls need to be in place to ensure that only genuine materials are purchased. Depending on the perceived risk assurance controls may include:

- *Certificates of analysis from raw material suppliers*
- *Raw material testing*
- *Supply chain audits*
- *Use of tamper evidence or seals on incoming raw materials*
- *Enhanced supplier approval checks*
- *Mass balance exercises at the raw material supplier*
- *Changes to the supply chain*
eg a change of supplier or a move to a shorter supply chain

It could be you...

Food Manufacturers and their products, are at a higher risk from the **THREAT** from **MALICIOUS ATTACK**, risk of **ADULTERATION, SUBSTITUTION** and **FRAUD** than ever before.

- Does your business understand these threats? Has it been affected?
- Have you implemented stringent procedures to ensure that your supply chain and product threat is minimised?

If not ... start now ... it's here to stay!

Recap

PAS 96

“systematic management of risk through the evaluation of **threats**, identification of **vulnerabilities**, and **implementation** of controls to materials and products, purchasing, processes, premises, distribution networks and business systems by a knowledgeable and trusted team with the authority to implement changes to procedures”.

For the purposes of this course, we will be looking at the TACCP tool as a framework which can be applied to assess both threats from:

1. Ideologically motivated individuals (TACCP) or
2. Economically motivated individuals (VACCP), food fraud (vulnerability of raw materials)

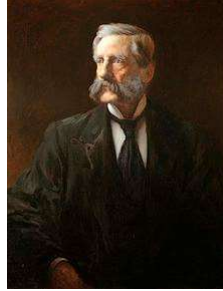
As TACCP and VACCP focus on different aspects, they should ideally be kept as separate studies. If the two are merged so does the focus and therefore control can be lost.

Session 2: Influences and Behaviours associated with Food Crime Activity

Learning Outcome:

- The causes and prevention of food crime
- The capacity and capability required by business operators to combat food crime

Countering Adulteration of Foods The Pioneers - Wakley, Hassall-Hill and Accum



<http://www.rsc.org/Education/EiC/issues/2005Mar/Thefightagainstfoodadulteration.as>

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"If you please, Sir,
Mother says, will
you let her have a
quarter of a pound
of your best tea to
kill the rats with,
and a ounce of
chocolate as would
get rid of the black
beetles?"

(Punch, 14 August 1855)



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What is Food Fraud?

Food Fraud is executed when food is deliberately sold for financial reward with the objective of deceiving the customer.

The main categories:

1. Sale of food which is unfit and potentially harmful to health such as:

- Recycling of animal by-products back into the food chain
- Packaging and selling of meat and poultry with unknown origin
- Selling products past their 'use-by' date

2. Deliberate and false description of food for example:

- Products substituted with cheaper alternatives e.g. farmed salmon as wild salmon, basmati rice substituted with cheaper rice varieties
- False statements regarding ingredients geographical location, plant or origin

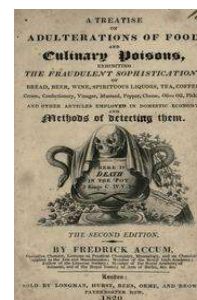
Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Food Fraud – not a new problem

“To such perfection of ingenuity has the system of counterfeiting and adulterating various commodities of life arrived in this country, that spurious articles are everywhere to be found in the market, made up so skilfully, as to elude the discrimination of the most experienced judges...

The eager and insatiable thirst for gain, is proof against prohibitions and penalties; and the possible sacrifice of a fellow creature's life, is a secondary consideration among unprincipled dealers.”

Fredrick Accum, 1820



Food Fraud – an ever-present risk

- NGO focus in North America and Europe, including Greenpeace and Oceana
- Widespread reporting of seafood fraud in the media – typically species substitution
- Food system vulnerability exposed by horsemeat crisis in 2013
- Academic studies reporting food chain vulnerability
- Retailer and brand owner concern about upstream supply chain integrity



So, A Great British Tradition?

As Arthur Hassall commented in 1855,

"It is curious to notice how constantly the adulterating shopkeeper endeavours to shelter himself, and to excuse his dishonest practices, under the assertion that the public...

.....'LIKE IT' and 'WILL HAVE IT'."

<http://www.telegraph.co.uk/news/uknews/1484479/Food-scares-are-one-of-the-great-British-traditions.html>

Potential Disasters

The First World faces new threats



- Contamination of the food chain is an easy target which traceability systems cannot prevent but will be a vital tool to reduce consequences.
- Nov 2001 US sets up “Dept. of Home Defense”.
- US recognises the need for food and feed trace-ability so that food may be traced back to source in the event of a bio-terrorist attack.



Article 34 of 178/2002

Identification of emerging risks

1. The Authority shall establish monitoring procedures for systematically searching for, collecting, collating and analysing information and data with a view to the identification of emerging risks in the fields within its mission.
2. Where the Authority has information leading it to suspect an emerging serious risk, it shall request additional information from the Member States, other Community agencies and the Commission. The Member States, the Community agencies concerned and the Commission shall reply as a matter of urgency and forward any relevant information in their possession.
3. The Authority shall use all the information it receives in the performance of its mission to identify an emerging risk.
4. The Authority shall forward the evaluation and information collected on emerging risks to the European Parliament, the Commission and the Member States.

Session 3: Combatting Food Crime

Company Capability and selecting appropriate Industry Solutions

Learning Outcome:

The responsibilities for food authenticity and integrity

How to operate food control and quality systems to prevent food crime



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Objectives

- Identify individuals or groups who may be a threat or where areas of vulnerability occur
- Assess the likelihood of contamination of raw materials and products
- Collect evidence to make a decision on the reality of malicious product contamination causing acute harm
- Reach agreement on key weaknesses in your supply chain from farm to fork for a specific product
- Assess the impact of processing, packaging and storage on typical contaminants
- Implement control measures to prevent attacks.

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>



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Identifying Individuals or groups

Are there any specific people, individual or groups who would want to cause malicious damage by attack to your business?

- know your workforce?
- have any disaffected workers?
- employ casual workers?
- have a large workforce made up of agency staff?
- your raw materials?
- Could they be easily adulterated, substituted or contaminated?
your product and process?
- any ethical or religious reason for malicious attack?

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>



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Assess the likelihood of contamination of the product

- suppliers aware of potential threats to raw materials they supply?
- procedures in place to minimise risk with supplier?
- are raw materials in tamper evident packaging?
- are bulk raw materials delivered in tankers or containers? Do these help prevent malicious attack, substitution and adulteration from taking place?
- do you have procedures in place to prevent and detect incidents?

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>



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Assemble a body of evidence to inform judgments on the reality of malicious product contamination causing acute harm

- Examine historical and current data, information and evidence from customers and suppliers, from reputable internet sources, news and useful publications and the teams own judgement and experiences
- Where are the most likely sources of malicious attack likely to come from?
- Can systems be implemented to eradicate such attacks?

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Reach consensus on key vulnerabilities in the supply chain for the specific food product

- Agree where key vulnerable areas are within your supply chain
- Raw materials and packaging coming from overseas, do you know how they are being distributed and where storage and holding may occur?
- Are raw materials and packaging being held in terminals where potential malicious attack may take place?
- How good are security measures at all stages of the supply chain?

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Estimate the impact of processing, packaging and storage on typical contaminants

- Will storage, processing or packaging have an impact on the contaminant (i.e. reduce its potential for harm by being denatured during storage, processing or packaging)
- Highlight the vulnerable stages in your operation where malicious attack could take place without being detected
- What impact would such an attack have on your process?
- Would you be able to salvage your product or process?
- What would your contingency be to get your business up and running again?

Implement control measures to prevent attacks

- Are controls throughout the supply chain to aid in preventing malicious attack?
- Do current controls take into account the potential for malicious attack, contamination and adulteration?
- Are critical controls monitored and audited for compliance to procedures?
- Are all employees who need to understand the procedures under TACCP trained and reviewed?

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Food Defence

Rationale

- Intentional tampering or adulteration of food can lead to widespread food-borne illness, product recalls and economic loss
- Developing a system that prevents and/or manages this risk can significantly decrease or eliminate any potential damage to the company and prevent potentially injurious products from entering the food chain

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Why the Food Supply Chain?

Deliberate contamination could cause:

- significant public health consequences
- widespread public fear
- devastating economic impacts
- loss of public confidence in the safety of food and effectiveness of government
- disruption of trade
- Increased food insecurity



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Documentation

In order to accomplish a secure and effective system it is a fundamental requirement to have a controlled document system which should sit within the business's Food Safety Management System (FSMS)

Documents would include:

- Supplier Approval records
- Agents and Brokers records
- Transport and storage records
- Specifications
- Certificates of Analysis
- Microbiological results
- Intake records
- Process control records
- Dispatch and transport records
- Mock incidents
- Audit reports
- HR records
- Training records
- Validation records

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Audit and Review

- Reviewed to confirm it is controlling the processes within your study and should be reviewed:
- At least annually
- New threats
- When there are any alerts in your supply chain
- Change of supplier or new supplier
- Unrest in areas across the globe where agents or brokers or the business purchases raw materials
- Alerts from other businesses
- Media, etc.

Session 4: Strategies and Capabilities for your Company System

Designing effective systems and selecting the teams

Learning Outcome:

Outline strategies for developing and maintaining product authenticity and integrity

Contingency and Business Planning

- It may be more appropriate to position your plan within the Emergency and Crisis Management and Business Contingency framework of your Food Safety Management System
- The use of Business Continuity Management principles will give good flexibility to react to and recover from malicious attack
- Emergency and Crisis Management procedures should be developed and reviewed in case of malicious attack
- All staff should be trained
- An effective traceability system for upstream and downstream materials and finished product should be established to minimise the effects of such an attack
- Annual trials should be undertaken to confirm the procedure is effective

Food Control and Food Security



Rationale

- Food tampering is the intentional contamination of a food product, with the intent to cause harm to the consumer or a company
- Food tampering may affect any part of the food product, such as the product itself, or it can affect the packaging and the label
- Tampering with food is a serious matter and is a punishable criminal offence in USA, EU and many countries across the world.

Food Defence

Causes of food tampering

A person or persons may tamper with food for a variety of reasons, such as:

- trying to draw attention to a "cause" by getting free publicity
- extortion for personal gain
- mischief or prank
- terrorism
- revenge, by causing financial loss or ruining a company's reputation
- reasons known only to the perpetrator

Food Defence

Signs that food has been tampered

It is can be hard to tell if a food has been tampered with or if has been accidentally damaged.

Signs of tampering may include:

- packaging that has been opened and resealed,
- products that have damaged or missing safety seals or tamper-evident seals,
- products or packaging that is cut, torn, punctured or discolored,
- products with strange odor or flavor,
- containers with signs of leakage, spillage or corrosion,
- vacuum-packed products with no vacuum seal,
- packaging that has been altered, including labels, product lot codes, and other identifying information,
- the presence of a foreign object or non-food item in the product.

Understand the Attacker

The success of a deliberate attack on food or food supply depends on several things:

a) Does the attacker have the motivation and drive to overcome the obvious, and less obvious blocks to their actions? If the blocks seem massive and success seems unlikely, many would-be attackers would seek an easier target.

b) Does the attacker have the capability to carry out the attack? A group is more likely to find the resources and learn the skills needed.

c) Does the attacker have the opportunity to carry out the attack? A physical attack needs physical access to the target, but a cyber-attack may only need access to a computer.

d) Would the attacker be deterred by the chance of detection and/or any potential penalties?

- **The extortionist**
- **The opportunist**
- **The extremist**
- **The irrational individual**
- **The disgruntled individual**

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Food Defence

- Authorised access to production and storage areas
- Based on risk assessment restricted areas **must** be identified
- Clear signage, monitoring and control of risk areas
- Control Access to the site by employees, contractors and visitors
- Staff **are** be trained

Food Defence

Scope

The Site Security Program needs to define:

- Methods, responsibilities and criteria for identifying risk areas and preventing intentional contamination of the food
- A Tampering or Adulteration Prevention Program

Food Defence

Site Security Program

- A Site Security Program must be developed and updated as required

The program must outline :

- Effective security policies and procedures to protect food, ingredients and packaging from tampering, theft, adulteration and intentional contamination
- Handling threats
- Facility evacuation in the event of a security issue
- Disposal of potential dangerous materials
- Contact information of appropriate authorities

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

TACCP

- Reduce the likelihood of malicious attack
- Reduce the impact of an attack
- Protect the Brand
- Reassure customers and media that appropriate and proportionate steps are in place to protect food
- Satisfy international expectations and support the work of allies and other trading partners.

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Procedures

- Food Safety procedures cannot prevent a malicious attack
- Can be of use to establishing integrity
- Actual incidents will invoke business continuity management systems, including media management and public relations strategies
- The procedures should compliment and not replace continuity strategies
- People focused procedures

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Typical contaminants

May include:

- highly toxic agents,
- toxic industrial chemicals,
- readily available noxious materials and
- innocent but inappropriate' substances like allergens or
- ethnically unwholesome foodstuffs

Ask questions like:

- What would the impact be on the process by these contaminants?
- Will routine procedures detect these contamination?
- Where are the most vulnerable points that contamination could occur?
- How many ways could **YOU** harm your business?

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>



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The team should ask questions like:

“If **WE** were trying to undermine our business,
what would be the **best** way?”

How would the attacker select materials? Availability, toxicity, physical form?

At farm: Safety in use / application of pesticides;

At factory: Aggressive flavour materials.

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>



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Process Records & Actions

- Identify, record and implement controls
- Carry out personnel security risk assessments, relevant to each step in the process
- Agree further necessary preventative actions and a plan for implementation
- Confidential reporting and recording system - does not expose weaknesses to others
- Determine review and revise arrangements.

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Threats and Vulnerabilities Assumes

- Malicious intent needs a person, so the procedure must be people-focussed
- Person may be individual or part of a group, or an insider
- Attacker will want to see a fairly immediate impact;
- Could be a localised misdemeanour involving individual retail packs or food service products, but would have limited impact, more likely that attacker or groups would want catastrophic results
- Expert knowledge of, and access to, critical processing and packaging operations is a prerequisite of a successful widespread attack
- Protective measures will include physical, electronic and personnel security procedures
- Food manufacturing and product assembly will be the focus of attention.

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

1) Malicious intent needs ...

- A person, so the procedure must be people-focussed
- Knowledge of the supply chain and its potential lacks in security
- Knowledge of the business processes, procedures and it's systems
- Ability and ease to enter restricted areas of the supply chain

'Insiders' are employees or contractors who have legitimate access to an organisation's assets, but malicious intentions

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

2) A Person may be individual or part of a group, or an insider

- Evaluate the supply chain at each step to identify individuals who may want to cause harm to your business
- Consider the types of groups or individuals who may wish to harm your business
- Do you know the people who work in your business,
- Are the workforce reasonably content in their roles
- Are grievances dealt with efficiently within the business
- Are the security measures acceptable for on-site visitors and contractors
- Are there any other reasons for employees, contractors, visitors etc. to wish to cause malicious attack

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

3) Attacker will want to see immediate impact

- Leading to acute illness, harm and long term effects even fatalities
- Harm to the business by loss of customers
- Damage by media invasion
- Destruction to brand reputation
- This may be in the form of:
 - Contamination and adulteration – physical, chemical, microbiological, allergens
 - Substitution – materials which may be undetectable in the process
 - Causing a product recall

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

4) Localised misdemeanour involving individual retail packs or food service products, may have limited impact, but it is more likely that an attacker would want catastrophic results

- Localised – mischief in the process – generally not causing widespread harm
- Could be a person in the process causing harm to the business by contaminating packs in the process leading to customer complaints and loss of business
- Bulk ingredients and large batch process would have more impact and larger scale destruction
- Highlight potential attackers or groups – Cover all eventualities!

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

5) Expert knowledge of critical processing and packaging operations is a prerequisite of a successful widespread attack

- 'Insiders' are employees or contractors who have legitimate access to an organization's assets, but motivation contrary to the organization's best interests
- Know your employees, make sure that you understand their needs and that the business treats everyone fairly
- Disputes and grievances must be dealt with quickly
- Are there any other grievances within the workforce

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>



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6) Protective measures will include physical, electronic and personnel security procedures

- Intake inspections for substitution and adulterated of raw materials
- Supplier audits across supply chain
- Agents and Brokers accountability and responsibility
- Assurance through documented procedures across the supply chain
- Certificates of Conformance and documented records
- Electronic tags and seals
- Personal security via photo, retina and fingerprint identification
- Communication with suppliers and contractors
- All employees responsibility for security of raw materials, process and access to site

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>



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7) What... - best applied to specific product

- Identify the product to be investigated
- Identify the type of contaminant that could be hidden in the raw materials, product and process
- Consider the process on the contaminant
- Will the process eliminate the contaminant in any way
- Will the contaminant be denaturalised or cooked out

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>



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8) Food manufacturing and product assembly will be the focus of attention

- Do you really know your workforce?
- Do you have robust procedures in place for recruitment of employees?
- If you use an Agency for Recruitment do they have robust procedures in place?

If you answer NO to these questions then your business is more likely to be at greater risk of malicious attack!

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>



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Risk Mitigation

Vulnerability Assessment

This is the process of assessing vulnerabilities or weak links in food systems to prevent intentional contamination. The following process is useful:

1. Conduct screening to identify and prioritise products, agents, and/or process combinations that can be easily prone to adulteration.
2. Perform full product cycle Farm-to-Table Vulnerability Assessments on these vulnerability priority foods
3. Identify health, economic, and psychological consequences of possible intentional contamination

Risk Mitigation

Risk Mitigation will assist your business in assessing potential risks from malicious attack, substitution, fraud and adulteration providing you implement key procedures

Carrying out Risk Assessment

Use HACCP with Risk Assessment to:

- 1) Define areas where food fraud might arise?
- 2) How can we implement a strategy to prevent this from happening?
- 3) What areas from farm to fork support the greatest risk for food fraud and malicious attack?
- 4) What strategy could be implemented to defend against economically adulterated product?

Analysis of Incidents

Vulnerability assessments following incidents have shown 4 factors consistently associated with foods at higher risk of terrorism:

- Large batches – large number of consumers
- Uniform mixing – contaminate all servings in batch
- Short shelf life – minimal time to identify problem and intervene
- Ease of access – accessible targets are more attractive

Three generic threats to food and drink

- Malicious contamination with toxic materials causing ill-health and even death
- Sabotage of the supply chain leading to food shortage
- Misuse of food and drink materials for terrorist or criminal purposes.

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Food Safety vs. Food Defence

Methods of Analysis

Food Safety:

- **Risk Assessments:** An assessment is made of the magnitude and severity of the adverse health outcome due to a hazard and the likelihood of its occurrence

Food Defence:

- **Vulnerability Assessments:** An assessment of a food system made to identify vulnerable products; potential sites where contamination can be introduced; and likely threat agents

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Food Safety vs. Food Defence

Prevention and Control Strategies

Food Safety:

- Risk management strategies such as GMP; HACCP

Food Defence:

- Measures or actions to reduce the impact of intentional food contamination at vulnerable points in a facility as well as government or industry-wide measures

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Food Safety vs. Food Defence

Decontamination and Disposal

- **Food Safety:** Contaminated food can be cooked or sent to landfill. Sanitation procedures should be sufficient for cleaning facility before resuming food production
- **Food Defence:** Contaminated food may be hazardous waste. Need to identify decontamination techniques and confirm facility is free of residual contaminant before resuming food production

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Horizon Scanning

Horizon scanning is the exploration of potential threats, challenges and likely future developments.

Consider the following:

- Implement an early warning system for new and emerging threats.
- Communication to senior management of the new and emerging threats.
- Utilise a multi-disciplinary team to ensure coverage of different threats.
- Filter and prioritise information which is captured within the organisation to avoid overload.

Who are we Protecting From?

- Rogue or disgruntled employees
- Terrorists, ideologically motivated individuals or Groups
- Criminals and fraudsters
- Protesters - Anti-capitalist demonstrators
- Subversives, radicals, saboteurs
- Pressure Groups

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>



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Food Fraud Vulnerability Assessments

- Information Harvesting on your Supply Chain
- Map / Document your supply chain
- Raw Materials inputs
- Ingredient inputs
- Products and Packaging
- Identify and prioritise vulnerabilities for food fraud
- What, Where, How, Who ?

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>



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Team selection

The Team must have expertise across the food chain

With this in mind, list the departments who should be part of the team?

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>



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The Team

- HACCP Team might provide a suitable starting point, however a Business Continuity Team may be more suitable
- Team would typically be an established and permanent group, able to review its decisions over time
- Very knowledgeable of processes, trustworthy, discreet and aware of the implications of the study.

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>



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The Team

Individuals to be selected with the following areas of expertise:

- Security (Food Defence Co-ordinator)
- Human resources (People);
- Food technology (Technical);
- Process engineering (Facility & Plant);
- Production and operations (Factory & Plant);
- Distribution (Supply Chain);
- IT and Marketing (Media & Computer)
- Front Line Employees, loyal, long serving (Trust and Experience)
- CEO / Director / Company Secretary (Corporate Approach)

The team may include representatives of key suppliers and customers.

All nominees should be very knowledgeable of actual processes, highly trustworthy, discreet and aware of the implications of the study.

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>



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Remember, be people focused!

You need the right people on your team! So focus on operations:

- **Raw Materials**
- **Packaging**
- **Processes**
- **Premises**
- **Distribution networks**
- **Business systems**

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>



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Control and Security

Countermeasures may include:

- Physical Security – Tamper evident materials
- Personnel Security
- Operational Security
- Equipment re-design
- Change process technology to destroy threat agents
- Assess facility-specific or industry-wide vulnerabilities:
Vulnerability Assessment
- Develop food defense plans based on results of assessments

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Control and Security

Countermeasures may include (cont'd)

- Surveillance inspection of critical areas in facilities, laboratory testing for threat agents in food
- Vulnerability assessments
- Outreach & training, including e.g., Guidance, awareness training, food defense exercises, international activities

Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Visitors

- A visitor reporting system **must** be in place
- Procedures **must** be in place for the secure storage of materials based on risk assessment
- Procedures **must** be in place for the secure transportation of products
- The site should, where appropriate, be registered or approved by the relevant authority
- The site boundaries should be clearly defined



Reference <https://www.food.gov.uk/sites/default/files/pas962017.pdf>

Supplier responsibility to prevent malicious attack

- Critical to obtain accountability from every section of the 'Farm to Fork' process
- Security of the food chain is paramount
- Supplier responsibility must be assured by supplier approval and audit programme
- Agents and Broker have a responsibility to ensure that products are purchased according to customers standards
- Hauliers must be committed to following essential security measures to prevent malicious attack
- Everyone including customers have a responsibility to ensure compliance is endorsed, supported and maintained through senior management commitment and continuous improvement.

Product Security

- Good product security builds on sound food safety practices to prevent, detect and remove adventitious contamination
- Commit to transparency at all times, even at the cost of some short term embarrassment when managing contamination incidents
- Adventitious contamination occurs by chance.

- It could include:
 - parts of the original plant or animal from which the food has come e.g. a stone in a cherry or hide on a piece of meat;
 - material closely associated with the original food source e.g. earth stones with dried fruit or oat grains in a wheat harvest;
 - physical contamination from the process e.g. hair from an operative or pieces of process machinery.



So, A Great British Tradition?

As Arthur Hassall commented in 1855,

"It is curious to notice how constantly the adulterating shopkeeper endeavours to shelter himself, and to excuse his dishonest practices, under the assertion that the public...

.....'LIKE IT' and 'WILL HAVE IT'."

<http://www.telegraph.co.uk/news/uknews/1484479/Food-scares-are-one-of-the-great-British-traditions.html>

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So, A Great British Tradition?

Maybe, there is something in this? But throughout this make sure you consider:

Traceability
Transparency
Trust

Useful websites

- <https://www.food.gov.uk/sites/default/files/pas962017.pdf>
- <http://shop.bsigroup.com/forms/PASs/PAS-96>
- <http://foodfraud.msu.edu/2014/05/08/gfsi-direction-on-food-fraud-and-vulnerability-assessment-vaccp/>
- www.defra.gov.uk/foodfarm/index.htm
- www.food.gov.uk/foodindustry
- [www.homeoffice.gov.uk/counter-threat of terrorism. terrorism/index.html](http://www.homeoffice.gov.uk/counter-threat-of-terrorism-terrorism/index.html)
- www.tradingstandards.gov.uk
- <http://www.who.int>
- http://www.ifst.org/sites/default/files/Tony%20Hines_0.pdf

The First Line of Defence...

Human Intervention & Control

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