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Food Fraud Prevention

Overview

Background

The food industry considers the safety of its products as its main concern. Over the years, industry and regulators have developed food safety management systems, making major outbreaks of food poisoning now quite unusual in many countries.

Hazard Analysis

These systems typically use Hazard Analysis Critical Control Point (HACCP) principles, which are accepted globally. HACCP has proven to be effective against accidental contamination. However, HACCP principles have not been routinely used to detect or mitigate deliberate, fraudulent actions on a system or process. These actions include the deliberate contamination of food, or food fraud.

Objective

This document

- describes a process for food fraud prevention and the principles of the assessment
- outlines measures that can deter fraudsters or detect food fraud early, and
- provide sources of information and intelligence that may help to identify emerging threats.

Scope

Though food fraud commonly encompasses a wide range of deliberate fraudulent acts, this document focuses on one type of food fraud – the intentional and economically motivated adulteration of foods.

Economically Motivated Adulteration (EMA)

The Economically Motivated Adulteration (EMA) pertains to any or all of the following for the economic gain of the seller:

- fraudulent addition of non-authentic substances
- removal or replacement of authentic substances without the purchaser's knowledge, for economic gain of the seller

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EMA and Food Fraud Prevention

Overview

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EMA Types and Food Safety Management

Types of EMA

The types of EMA include the following:

- **sale of unfit and potentially harmful food**, such as
 - recycling of animal by-products back into the food chain
 - packing and selling of meat with unknown origin, or
 - knowingly selling goods past their ‘use by’ date
- **deliberate mislabeling of food**, such as
 - products substituted with a cheaper alternative (*Example: Farmed salmon sold as wild, or Basmati rice adulterated with cheaper varieties*), or
 - false statements about the source of ingredients, i.e., their geographic, plant or animal origin

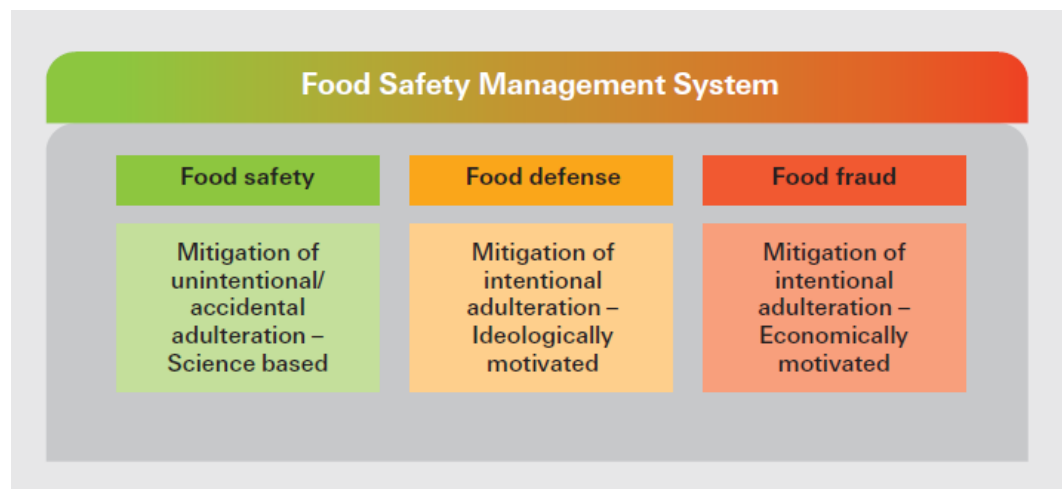
Types not covered

This document does *not* address the following types of food fraud:

- counterfeiting (fraudulently passing off inferior goods as established and reputable brands)
- product tampering
- theft
- smuggling
- document fraud
- product diversions
- food adulteration intended to cause

Food safety management system

The image below is a pictorial representation of the food safety management system.



Food Fraud Prevention: Introduction

Deception

Food fraud deceives the consumers by providing them with lower quality foodstuff, against their knowledge and will.

While it is not the intention of food fraud to harm consumers, such acts can cause illness and even death.

Incident: melamine in infant formula

This was the case in 2008 when melamine was used as a nitrogen source to fraudulently increase the measured protein content of milk, resulting in more than 50,000 babies being hospitalized and six deaths after having consumed contaminated infant formula.

Common factor

The common factor in many cases of food fraud, is that the adulterant is neither a food safety hazard, nor readily identified (as this would defeat the aim of the fraudster).

Common adulterants

Common adulterants include

- water and sugar, or
 - ingredients that may be legitimately used and declared, but whose improper use constitutes fraud.
-

Implications

The implications of EMA deprive the consumers of the following:

- food safety and health of consumers
 - good quality products that the consumers intend to purchase
-

Prevention

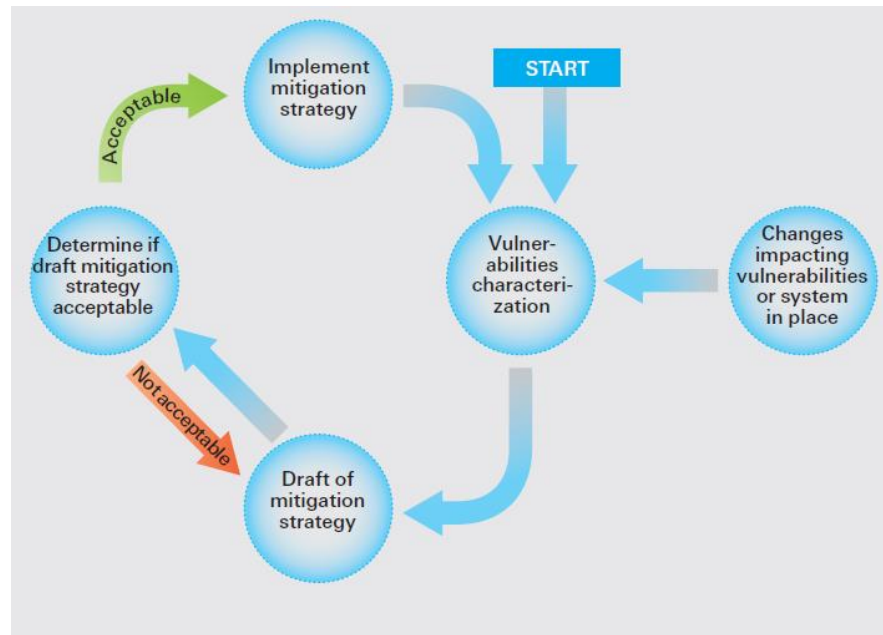
The prevention of food fraud is paramount to

- protect the trust of our consumers, and
 - maintain fair and sustainable business practices.
-

Food Fraud Management System: Process

Flowchart: food fraud management system

A food fraud management system is a continuous process as depicted in the flowchart below (from U.S. Pharmacopeia Appendix XVII: Food Fraud Mitigation Guidance).



Stages: food fraud management

The table below depicts the stages of food fraud management.

Stage	Description						
1	<ul style="list-style-type: none"> Evaluation to characterize food fraud vulnerabilities. Assessment of the changes impacting the vulnerabilities in place. 						
2	Drafting the mitigation strategy.						
3	Review of the mitigation strategy. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>When the mitigation strategy is ...</th> <th>Then the process ...</th> </tr> </thead> <tbody> <tr> <td>acceptable</td> <td>proceeds to stage 4.</td> </tr> <tr> <td>not acceptable</td> <td>repeats at stage 3.</td> </tr> </tbody> </table>	When the mitigation strategy is ...	Then the process ...	acceptable	proceeds to stage 4.	not acceptable	repeats at stage 3.
When the mitigation strategy is ...	Then the process ...						
acceptable	proceeds to stage 4.						
not acceptable	repeats at stage 3.						
4	Implementation of the mitigation strategy.						

Note: Periodically or when changes occur that may impact the previously identified vulnerabilities, carry out the entire process again to ensure its continued effectiveness.

Example: A newly identified adulterant for an ingredient that changes the supply chain for an ingredient.

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Food Fraud Management System: Process, Continued

Preventing food fraud

The table below describes the steps in preventing food fraud.

Step	Action
1	Conduct vulnerability assessment that includes knowing your <ul style="list-style-type: none"> • materials and risks (history, economic factors, geographical origins, physical state, emerging issues) • suppliers (manufacturer, broker, history) • supply chain (length, complexity, supply & demand arrangements, ease of access), and • existing control measures.
2	<ul style="list-style-type: none"> • Design a mitigation strategy. • Implement the mitigation measures. <p><i>Reference: For more information about mitigation measures, refer to Mitigation Measures.</i></p>
3	Validate and verify mitigation measures.
4	Review food fraud management system continually.

Vulnerability and Self-Assessment

Vulnerability assessment: aspects

The three aspects of vulnerability assessment are dependent on the following factors driving vulnerabilities:

- inherent to the ingredient
 - impacting the business (business pressure)
 - under the control of the buyer
-

Factors inherent to the ingredient

The factors inherent to the ingredient that are entirely independent of the actions taken by the buyer to mitigate the risk of fraud are the following:

- ingredient market price
- fraud history
- composition
- physical state
- level of processing

Certain ingredients are by nature more vulnerable to adulteration.

Example: *Apple juices or apple purees are more vulnerable than apple pieces.*

Fraud history: indicator of vulnerability

Fraud history (past cases of adulteration of specific raw materials) is a good source of information which is an indicator of the following:

- raw material potential vulnerability
 - important source of possible adulterants needing detection and deterrence
-

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Vulnerability and Self-Assessment, Continued

Factors impacting the business (business pressure)

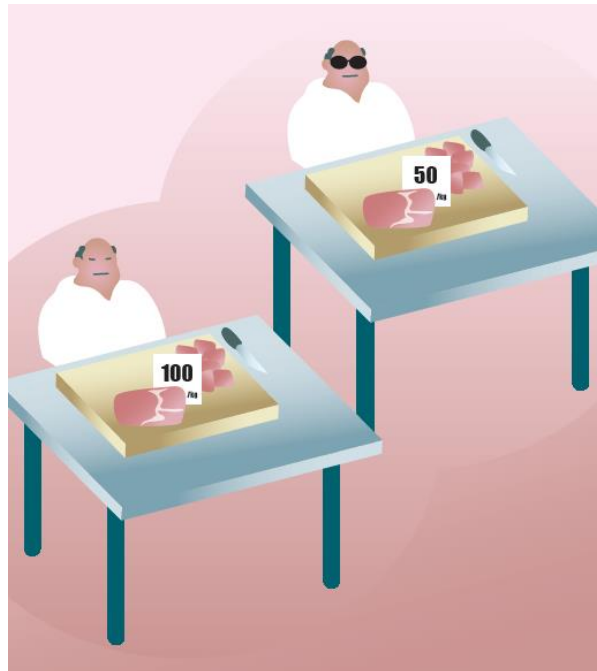
Factors that may contribute to an increased level of vulnerability to fraud are one or all of the following:

- demand for a specific ingredient (volume)
- extent of its use (ingredient used in several products and businesses)
- market price fluctuation
- economic anomalies of
 - particular raw material sources
 - drastic increases in market price of raw materials
 - scarce supplies of a raw material (**Example:** Poor harvest because of bad weather or a new parasite)
- geopolitical considerations indicating
 - a country-specific low price compared with the rest of the market
 - a lack of food control, and/or
 - regulatory/ enforcement framework in the country of origin, (or any other country through which the ingredient may transit)

Low price of food: possible fraud

This image depicts a situation of possible food fraud where the price of a valuable food is too good to be true.

If the price of a valuable food is too good to be true, it probably is!



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Vulnerability and Self-Assessment, Continued

Factors under the control of the buyer

This reflects the strength, or the weakness of a company's mitigation strategy such as

- full traceability
 - adequate purchasing specifications, and
 - availability of analytical methods, and robustness of surveillance programs.
-

Risk assessment

Assessing the risk of fraud for a food ingredient requires the understanding of the following:

- inherent raw material vulnerabilities
- business vulnerabilities
- existing controls

This understanding helps define what preventive actions are needed and where, to mitigate adulteration risks.

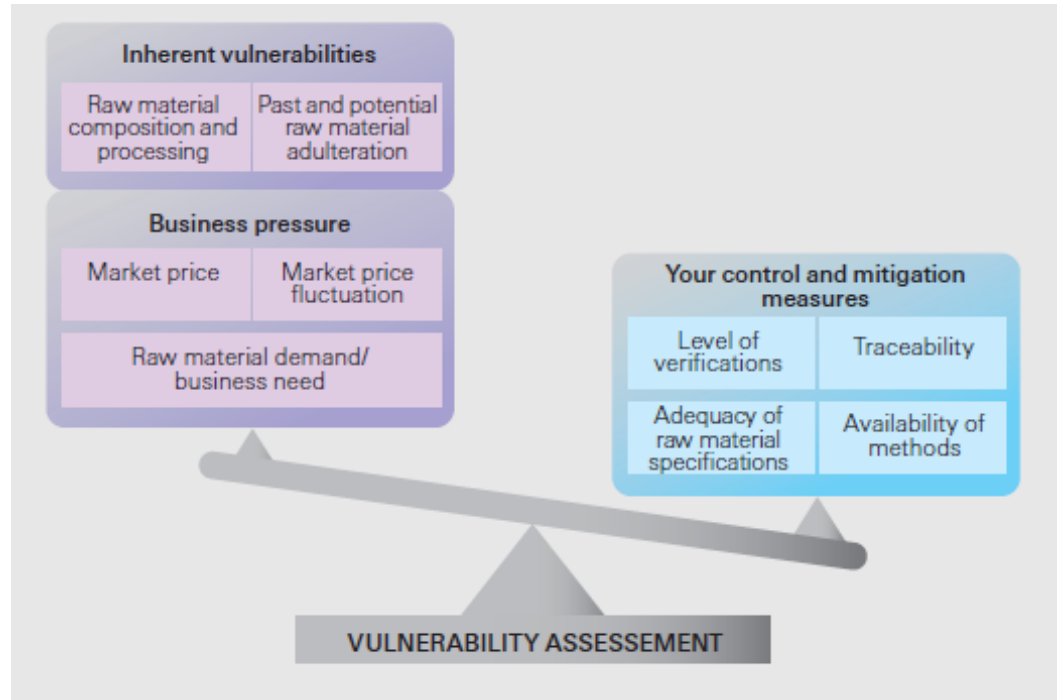
Note: Such vulnerability assessment is not a one-time activity but a dynamic process, which needs to be maintained with regards to new information and external pressures such as economic anomalies and bad harvest year.

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Vulnerability and Self-Assessment, Continued

Vulnerability assessment: mitigation measures

The image below shows adequate vulnerability assessments help in mitigating food fraud.



Self-assessment

Recent food fraud crises have highlighted the need to reinforce companies' ability to combat fraud within their own organization, and across the entire food value chain. Companies are expected to work proactively towards mitigating the risk of food fraud.

Guidance and Self-assessment Tools

A number of organizations have developed guidance and self-assessment tools to help food companies undertake their own vulnerability assessments and implement appropriate control plans.

Examples: *US Pharmacopeia, SSAFE, BRC*

Reference: *For more information about guidance and self-assessment tools, refer to [Useful Resources and Tools](#).*

Mitigation Measures

Mitigation measures: guidelines

The following are the measures in mitigating food fraud:

- raw material specifications
- analytical surveillance

Raw material specifications

To prevent food fraud, have adequate raw material specifications that include the following:

- Appropriate authenticity criteria to mitigate the inherent vulnerabilities (as much as possible) identified in the self-assessment. (**Example:** *UV absorbance is specified to detect the potential adulteration of extra virgin olive oil with refined oils*).
- Criteria linked to food fraud prevention thoroughly defined, in line with the level of complexity and variability of the ingredient's composition.

Note: *When you need to measure a specific parameter to control the raw material authenticity, focus on using analytical methods that fit the purpose (i.e., adapted for natural variability in the raw material).*

Prerequisite: analytical surveillance

Perform the following to be able to plan the analytical surveillance:

- Characterize the adulteration risks for a given raw material.
- Define a set of analytical control criteria.

Analytical surveillance

Establish a surveillance plan that allows to

- build confidence in the company's suppliers
- gain reassurance on the company's raw material supply
- confirm that the prevention measures in place are adequate, and
- detect food fraud issues.

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Mitigation Measures, Continued

Analytical methods: raw material monitoring

Monitor raw materials using appropriate analytical methods for the verification of authenticity. The methods must be selective, specific, and of appropriate sensitivity to verify that the food authenticity process is efficient.

There are two approaches:

- targeted analyses (linked to parameters specified in raw material specifications)
 - untargeted techniques (fingerprinting) that assess the raw material integrity against adulteration
-

Supplier Relationship

Overview

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Trusted Supplier Relationship

Building a trusted supplier relationship: adulteration prevention

To build a trusted supplier relationship, have processes to approve the suppliers' production sites, with requirements for approval based on risk

Examples: Raw material risk, location of food safety control measures, and supplier performance.

Once suppliers are qualified according to a robust approval process, the relationship between buyer and supplier is critical to support any adulteration prevention effort.

Trusted supplier relationship: benefits

The development of trusted suppliers (rather than continuous rotation) has the following benefits in mitigating the risk of food fraud.

- The closer the relationship,
 - lower the risk, and
 - more knowledge and confidence gets shared between each party.
- Confidence increases with a supplier's readiness to share information on their supply chain and processes.

Questions to ask yourself

While building a trusted supplier relationship, ask yourself the following questions:

Question to ask	Example(s)
How well do you know your suppliers?	<ul style="list-style-type: none"> • How long have you been dealing with them? • What is their track record like? • What is their business situation? • Are they under any financial stress?
How can you learn more about them?	Partnerships supplier schemes

Trusted Supplier: Types

Different types of trusted suppliers: The various supplier types could be as follows based on the business relationship you one shares with them:

- long-standing partnership-type arrangement
- trusted supplier for a new ingredient
- some relationship with an established supplier
- no relationship with an established supplier
- no relationship with an unestablished supplier

Long-standing partnership-type arrangement

The long-standing partnership type arrangement entails the following:

- high degree of
 - confidence established through long positive business relationship
 - transparency and/or testing programs
- sharing of key information and expectations
- understanding of key needs and controls in both the buyer and supplier processes

Trusted supplier: new ingredient

The trusted supplier arrangement is similar to the “long-standing partnership-type arrangement”, except the buyer only recently began purchasing a particular ingredient from the supplier.

A high degree of confidence gets established through the purchase of other ingredients.

Established supplier: some relationship

The established supplier type of relationship with some relationship represents that of a short history of business with the supplier, who is well respected in their market with a solid reputation, and no significant issues reported.

Established supplier: no relationship

The established supplier type of relationship with no relationship entails a supplier who is respected in their market with a solid reputation, but a business relationship and history have not yet been established.

Unestablished supplier: no relationship

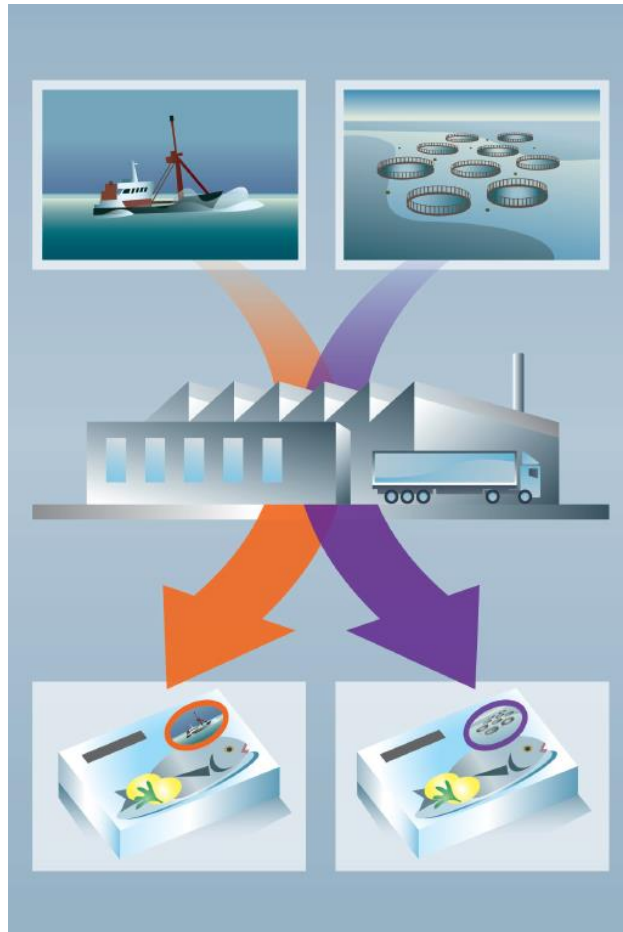
The unestablished supplier may be new to a given industry. They are often people with whom the buyer has no history or any general industry knowledge of the supplier.

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Trusted Supplier: Types, Continued

Purchase records and traceability of raw material usage: maintaining facility

The image below is a representation of purchase records and traceability of raw material usage in a product.



Supplier Audit: Example (BRC Issue 7, 2015)

Food safety schemes

In response to food fraud issues reported in the recent years, a number of requirements have been added to food safety schemes to minimize the risk of operating sites purchasing fraudulent or adulterated raw materials.

Supplier audit

The guidelines of supplier audit conducted in 2015 are the following:

- processes to identify threats in the supply chain
- documented vulnerability assessment
- raw materials at risk of adulteration

Identification of threats in the supply chain

Processes were established to access information about past and current threats to the supply chain. These threats were likely to present a risk of adulteration or substitution of raw materials. Such information was obtained from

- trade associations
- government sources, and
- private resource centers.

Documented vulnerability assessment

Documented vulnerability assessment was carried out on all food raw materials or groups of raw materials to assess the potential risk of adulteration or substitution. The following were considered during this assessment:

- historical evidence of substitution or adulteration
- economic factors that may make adulteration or substitution more attractive
- ease of access to raw materials through the supply chain
- sophistication of routine testing to identify adulterants
- nature of the raw material

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Supplier Audit: Example (BRC Issue 7, 2015), Continued

Vulnerability assessment review

The vulnerability assessment was reviewed annually to understand the following factors that could alter the potential risk:

- changing economic circumstances
- market intelligence

Raw materials at particular risk of adulteration

Where raw materials were identified as being at risk of adulteration or substitution, appropriate assurance and/ or testing processes were put in place to reduce the risk (e.g., auditor to review the historical test results of materials identified at risk of adulteration).

Absence of Scheme-specific Requirement

The site undertook documented mass balance tests (for example: every 6 months in the absence of a scheme-specific requirement).

Finished packs dependent on status of raw material

The status of each batch of the raw material was verified when

- products were labelled, or
- claims were made on finished packs which were dependent on the status of a raw material including
 - specific origin
 - breed/ varietal claims
 - assured status (For example: GlobalGAP)
 - genetically modified organism (GMO) status
 - identity preserved, or
 - specific trademarked ingredients.

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Supplier Audit: Example (BRC Issue 7, 2015), Continued

Claims handled The facility maintained the following to substantiate claims:

- purchasing records
- traceability of raw material usage
- final product packing records

Methods of Production

Where claims were made about the methods of production (for example: organic, Halal, Kosher), the site maintained the necessary certification status to make such a claim.

Auditor inspection

The auditors were able to do the following during their inspection:

- Carry out more targeted examination at a specific raw material production/ handling site. (**Example:** On a meat production site).
 - Detect the presence of the following in the production and/or storage areas:
 - Unapproved flavors
 - Dyes
 - Preservatives
 - Look for the presence of equipment used to inject brine on a poultry production site.
-

Supply Chain Transparency and Simplification

Supply chain transparency: benefits

A streamlined upstream supply chain has the following benefits:

- Improves transparency, traceability, and the management of material safety and quality standards.
- Gives fewer opportunities for fraudsters to penetrate your supply chain.

First questions

The first step towards supply chain transparency is to ask yourself the following questions first:

- Do you have full visibility of your supply chain?
- Who are your immediate suppliers?
- Who supplies them?
- Are you changing a supplier or process?

Simplifying the supply chain

The table below describes the steps in simplifying the supply chain.

Step	Action
1	Map your supply chain.
2	<ul style="list-style-type: none"> • Gather information from suppliers to identify those who are most at risk. (Examples: Via questionnaire, supplier assurance and audit processes). • Gather the relevant information using expertise from both within your organisation and outside. (Example: Your trade association).
3	Simplify your supply chain. <i>Note: Simplifying the supply chain helps eliminate sources of risk to a great extent.</i>

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Supply Chain Transparency and Simplification, Continued

How well do you know the suppliers?

The image below depicts transparency in the supply chain as a means to eliminate the sources of risk.



Alert System

Routine watch of official and industry publications

Maintaining a routine watch of official and industry publications does one or all of the following:

- Gives an early warning of changes that may trigger new threats.
 - Changes the priority of existing threats, including more local issues as they develop (**Example:** Climate impact on certain crop yield and subsequent fraud).
-

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Overview

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Abbreviations

List of terms and their full forms

The table below provides the full forms of the abbreviated terms used within this document.

Term	Full Form
BRC	British Retail Consortium
EMA	Economically Motivated Adulteration
GMO	Genetically Modified Organism
HACCP	Hazard Analysis Critical Control Point
SCS	Supply Chain Security

Glossary

List of terms and definitions

The table below provides the definitions of the terms used within this document.

Term	Definition
Buyer	The party that is buying materials (raw or semi-finished), food ingredients or food products from suppliers
Economically motivated adulteration (EMA)	The intentional adulteration of foods, motivated by economic gain. It is the type of fraud covered in this document
Food operator	<p>Organisation carrying out any of the activities related to the following:</p> <ul style="list-style-type: none"> • Processing • Manufacture • Packaging • Storage • Transportation • Import • Distribution of food, including food services and sale
Mitigation measure	Measure taken to decrease vulnerability to a certain type of adulteration in a given supply chain
Mitigation strategy	Selected set of mitigation measures aimed at preventing food fraud in a given supply chain
Supplier	The party that is supplying materials (raw or semi-finished), food ingredients or food products to other parties (e.g., food operators) in the value chain
Vulnerability assessment (or vulnerability characterization)	Within a food fraud management system, the step aimed at reviewing and assessing various factors, which create vulnerabilities in a supply chain (i.e. weak points where fraud has greater chances to occur)

Frequently Asked Questions

Questions and answers: adulteration

The table below answers the frequently asked questions about adulteration.

Topic	Question	Answer
EMA	What is economically motivated adulteration (EMA)?	<ul style="list-style-type: none"> • EMA is the intentional sale of substandard food products or ingredients for the purpose of economic gain. • Common types of EMA include using illicit or unapproved substances (such as unapproved dyes) to substitute or dilute an authentic ingredient with a cheaper product (Example: Replacing extra virgin olive oil with a cheaper oil) <ul style="list-style-type: none"> – flavor, or colour enhancement, and – substitution of one species with another (such as fish species fraud).
	Is EMA the same as “food fraud”?	<ul style="list-style-type: none"> • EMA is often referred to as “food fraud”. • The two terms are used interchangeably.
	Is EMA the same as contamination?	<ul style="list-style-type: none"> • EMA is intentional and perpetrated for the sake of economic gain. • Contamination of a food product or ingredient can be <ul style="list-style-type: none"> – accidental – environmental, or – malicious (i.e. not for economic gain).

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Frequently Asked Questions, Continued

**Questions and answers:
adulteration,
continued**

Topic	Question	Answer
EMA and food items	What foods are affected by EMA?	<ul style="list-style-type: none"> • Many foods are susceptible to EMA. These include <ul style="list-style-type: none"> – meat – fish and seafood – dairy products – fruit juices – oils – honey – spices and – wine. • EMA is not a new concern though there seems to have been an increase in incidents over the recent years. This is partly due to increased media coverage and, perhaps, increased surveillance in certain food products. • The number of documented incidents is most likely a fraction of the true number of incidents, since the goal of EMA perpetrators is to avoid detection.
EMA and health	Does EMA cause harm to health?	<ul style="list-style-type: none"> • The good news is that most incidents of EMA do not result in public health harm. • Unfortunately, perpetrators sometimes make mistakes resulting in unintended health consequences. • Example: <ul style="list-style-type: none"> – In 2008, some companies in China were found to be adulterating milk supplies with a chemical called melamine, because it artificially increased the apparent protein content. • Melamine-adulterated milk was used in the manufacture of infant formula, which led to the hospitalisation of more than 50 000 Chinese infants and the deaths of at least six. In 1981, industrial grade oil adulterated with multiple chemicals was sold as olive oil in Spain, and resulted in more than 300 deaths.

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Frequently Asked Questions, Continued

**Questions and answers:
adulteration,
continued**

Topic	Question	Answer
EMA and humans and pets	Does EMA only affect humans? What about pets?	<ul style="list-style-type: none"> • Since the food supply chains for humans, pets and production animals are interconnected, EMA in food products can affect both humans and animals. <p>In 2007, an EMA incident involving adulterated wheat gluten used in pet food caused thousands of dogs and cats in the USA to suffer illnesses and death.</p>
EMA and regulatory agencies	Are government regulatory agencies concerned about EMA?	<ul style="list-style-type: none"> • In the USA, the following organisations are working to protect the food supply from EMA and other food safety risks: <ul style="list-style-type: none"> – The US FDA (FDA.gov) – USDA (USDA.gov) – DHS (DHS.gov) • In the European Union, the food industry and regulators are working towards an enhanced management framework to prevent food fraud, with guidance available from agencies such as the UK Food Standards Agency and other government agencies. • Reference: For more information about such agencies, refer to Useful Resources and Tools.

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Frequently Asked Questions, Continued

**Questions and answers:
adulteration,
continued**

Topic	Question	Answer
Detection of adulterated material	What should I do when I detect an adulterated material?	<p>Follow the guidelines below when you detect an adulterated material:</p> <ul style="list-style-type: none"> • Assess the impact of the deviation (food safety, regulatory, impacted products) with the support of experts whenever needed. • Take action based on the outcome of the assessment (Example: block raw material and/ or finished product stock, destroy stock, recall products). • Conduct a full traceability exercise to identify the source of the adulterated material. • Initiate an investigation. • Alert your business partners (customers, distributors, companies including competitors operating in your business) to prevent the fraudulent material from reaching other parts of the value chain. <p><i>Report the case to competent authorities.</i></p>
Identification of a new adulteration risk	What should I do when I identify a new adulteration risk?	<p>Follow the guidelines below when you identify a new adulteration risk:</p> <ul style="list-style-type: none"> • Include this new risk in your vulnerability assessment for the concerned raw material category. • Define measures that could mitigate this particular risk <p>Continue to monitor this risk (e.g. through analytical surveillance plans) to ensure that your mitigation measures are effective to prevent occurrence of this issue in your supply chain.</p>

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Frequently Asked Questions, Continued

Questions and answers: food fraud

The table below answers the questions about food fraud.

Topic	Question	Answer
Nestle and food fraud prevention	What is Nestlé doing to prevent food fraud?	<ul style="list-style-type: none"> • Nestlé has established a process for prevention and mitigation of EMA, which includes the following: <ul style="list-style-type: none"> – A vulnerability assessment step (per raw material category) – The definition of mitigation measures – Continual review of both the vulnerability assessment and the efficiency of mitigation measures. • Nestlé also drives longer-term initiatives to create transparency across the food value chain that include the development of <ul style="list-style-type: none"> – non-targeted analytical methods, and – collaborative tools across the industry and with authorities.
Food fraud and operators and suppliers	What should food operators and suppliers do about food fraud?	<p>To prevent food fraud and better ensure food safety and consumer protection, the food operators, their suppliers and all partners along the food value chain (including industry associations and authorities) need to follow the guidelines below:</p> <ul style="list-style-type: none"> • Conduct vulnerability assessments in their supply chains. • Implement (and verify) mitigation measures accordingly. • Develop collaborative tools across the industry and with authorities to create transparency across the food value chain.

Continued on next page

Frequently Asked Questions, Continued

Questions and answers: food fraud, continued

Topic	Question	Answer
Consumers and food fraud	What should consumers know about food fraud when purchasing food?	<ul style="list-style-type: none"> • There are certain things consumers can do to help protect themselves from food fraud. Here are a few guidelines: <ul style="list-style-type: none"> – Do <i>not</i> buy products if the price of a valuable food product is too good to be true. – Buy whole, unprocessed foods such as unground coffee and spices, or whole fruits instead of juice as they are more difficult to adulterate. – Buy processed foods from reputable sources and brands that have a vested interest in protecting their reputation. • Information for Consumers: When fraud incidents are discovered, they can result in large profit losses and reputation damage for companies. Therefore, companies with brand recognition will actively take steps to protect their products. • Some trade associations also certify products through quality and purity assurance testing programmes, such as the North American Olive Oil Association Seal Program (Reference: For more information about the North American Olive Oil Seal Program, refer to http://www.naooa.org/sealprogram).

Useful Resources and Tools

Guidance documents

The list below provides hyperlinks to the following guidance documents:

- [BRC Global Standard for Food Safety Issue 7: Understanding Vulnerability Assessment](#)
 - [TA CCP \(Threat Assessment and Critical Control Point\): a practical guide 2014 \(Campden BRI\)](#)
 - [UK Food and Drink Federation \(FDF\)](#)
 - [US Pharmacopeia Appendix xvii: Food fraud mitigation guidance](#)
-

Self-assessment tools

The list below provides hyperlinks to the following self-assessment tools:

- [SSAFE Food Fraud Assessment Tool:](#)
 - [PWC](#)
 - [SSAFE](#)
 - [US Food and Drug Administration \(FDA\) Vulnerability Assessment Software](#)
-

Alerts and databases

The list below provides hyperlinks to the following alerts and databases:

- [Australia and New Zealand](#)
 - [Canada Recalls and Alerts](#)
 - [EMA Susceptibility Database \(registration required\)](#)
 - [European Union Rapid Alert System](#)
 - [Online tool compiling information on import refusals](#)
 - [The Department of Food Safety, Govt of N.C.T of Delhi](#)
 - [UK Food Standards Agency \(FSA\)](#)
 - [UK Serious Fraud Office](#)
 - [US Food and Drug Administration \(FDA\) Enforcement and Criminal Investigations](#)
 - [US Food and Drug Administration \(FDA\) Food Defense](#)
 - [US Food and Drug Administration \(FDA\) Import Alerts and Refusals](#)
 - [US Food and Drug Administration \(FDA\) Recalls and Enforcement Reports](#)
 - [US Pharmacopeial Convention Food fraud database](#)
-

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Useful Resources and Tools, Continued

Standards

The list below provides hyperlinks to the following standards:

- [BRC Global Standard Food Safety Issue 7](#)
- [BS 10501, Guide to implementing procurement fraud controls](#)

Supply chain security

The table below provides the specifications of supply chain security with their specification codes.

Specification Code	Specification
BS ISO 28000	Specification for security management systems for the supply chain
BS ISO 28002	<ul style="list-style-type: none"> • Security management systems for the supply chain • Development of resilience in the supply chain • Requirements with guidance for use
PD CEN/TR 16412	<ul style="list-style-type: none"> • Supply chain security (SCS) • Good practice guide for small and medium sized operators

Sources of information and intelligence: emerging risks to food supply

The list below provides hyperlinks to the following sources of information:

- [FAO Early Warning Bulletin](#)
- [GIEWS](#)
- [INFOSAN](#)

Further reading

The list below provides hyperlinks to material for further reading.

- [Centre for the Protection of National Infrastructure Holistic management of employment risk \(HoMER\). London: CPNI, 2012](#)
- [GFSI position on mitigating the public health risk of food fraud](#)
- [Scottish Government and Food Standards Agency Expert advisory group report the lessons to be learned from the 2013 horsemeat incident; 2013](#)
- [US Michigan State University](#)