



Food FRAUD

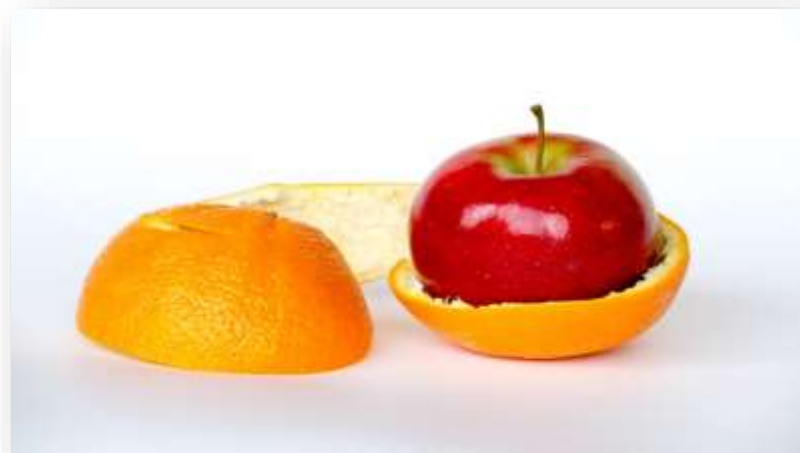
By: Bassant Alaa

Definition of food fraud:

- ▶ Food fraud is a collective term used to encompass the deliberate and intentional

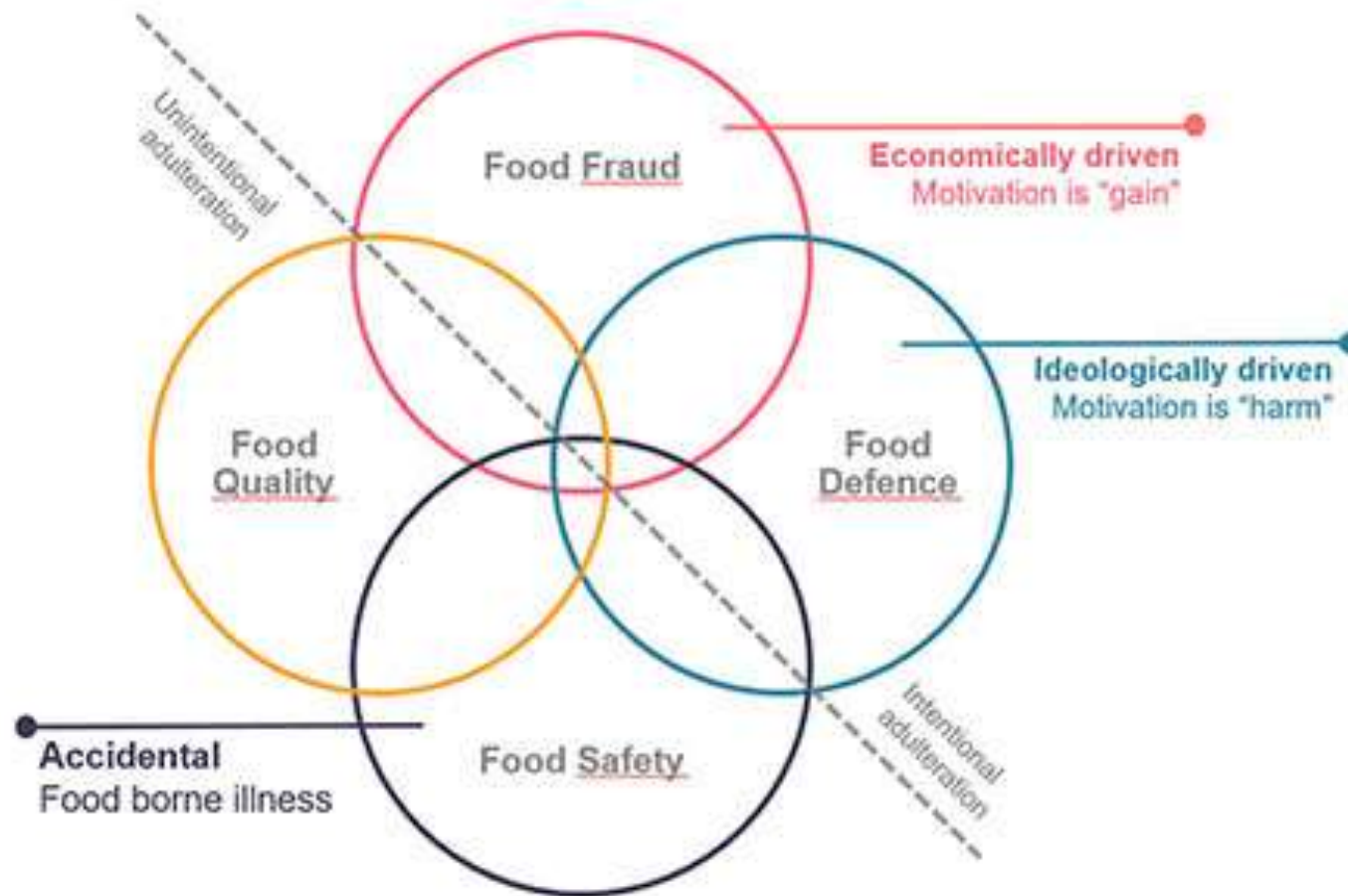
substitution, addition, tampering, or misrepresentation of food, food ingredients, or food

packaging; or false or misleading statements made about a product, for economic gain



Types of food risks:

- ▶ Food quality risk: an **unintentional** act that results in a food product not meeting the stated or required attributes or standards (may be caused by mishandling)
- ▶ Food safety risk: an **unintentional** act that results in a food product that poses a health concern if consumed as intended (may be caused by unintentional contamination)
- ▶ Food fraud risk: an **intentional** act on a food product that is economically motivated and not intended to pose a public health threat(intentionally done to increase profit margin)
- ▶ Food defense risk: an **intentional** act on a food product that is intended to pose a public health threat, such as malicious tampering or terrorism.(deliberately carried out to cause harm)



Food risk Matrix:

The Food Risk Matrix

The **Cause** leading to the **Effect** of Adulteration

| | | |
|---------------|---------------------------|---|
| Food Quality | Food Fraud ⁽¹⁾ | Motivation Gain: Economic |
| Food Safety | Food Defense | Harm: Public Health, Economic, or Terror |
| Unintentional | Intentional | |
| Action | | |

Built on a 4 quadrant Boston Consulting Group (BCG) matrix

| | |
|---|---|
| High profit High likelihood detection Medium food fraud risk | High profit Low likelihood detection High food fraud risk <div data-bbox="1169 594 1740 748">Top right</div> |
| Low profit High likelihood detection Low food fraud risk <div data-bbox="216 948 789 1102">Bottom left</div> | Low profit Low likelihood detection Low food fraud risk |

- Top right = products most attractive to fraudster
- Bottom left = least attractive to fraudster

What is causing Food fraud?



- ▶ Food fraud is usually committed for economic reasons. Food fraud pays off.
- ▶ Additional and related factors causing food fraud are the following :
 - ▶ • The financial crisis
 - ▶ • Rising food prices
 - ▶ • Demand for cheap food
 - ▶ • Complex food supply chain
 - ▶ • Low risk of detection

What Are The Types Of Food Fraud?



- ▶ Existing research on product fraud and counterfeiting have defined **seven** distinct types of food fraud. These fraudulent incidents include:
- ▶ Adulteration
- ▶ tampering
- ▶ over-run
- ▶ theft
- ▶ diversion
- ▶ simulation
- ▶ Counterfeiting
- ▶ • Most food fraud cases are not harmful

Food Fraud Types

Dilution

Process of mixing an ingredient with high value with an ingredient with a lower value.

Substitution

Process of replacing a nutrient, an ingredient, a food or a part of a food with another one of lower value.

Concealment

Process of hiding the low quality of food ingredients or products.

Unapproved enhancement

Process of adding unknown and undeclared compounds to food products in order to enhance their quality attributes.

Counterfeit

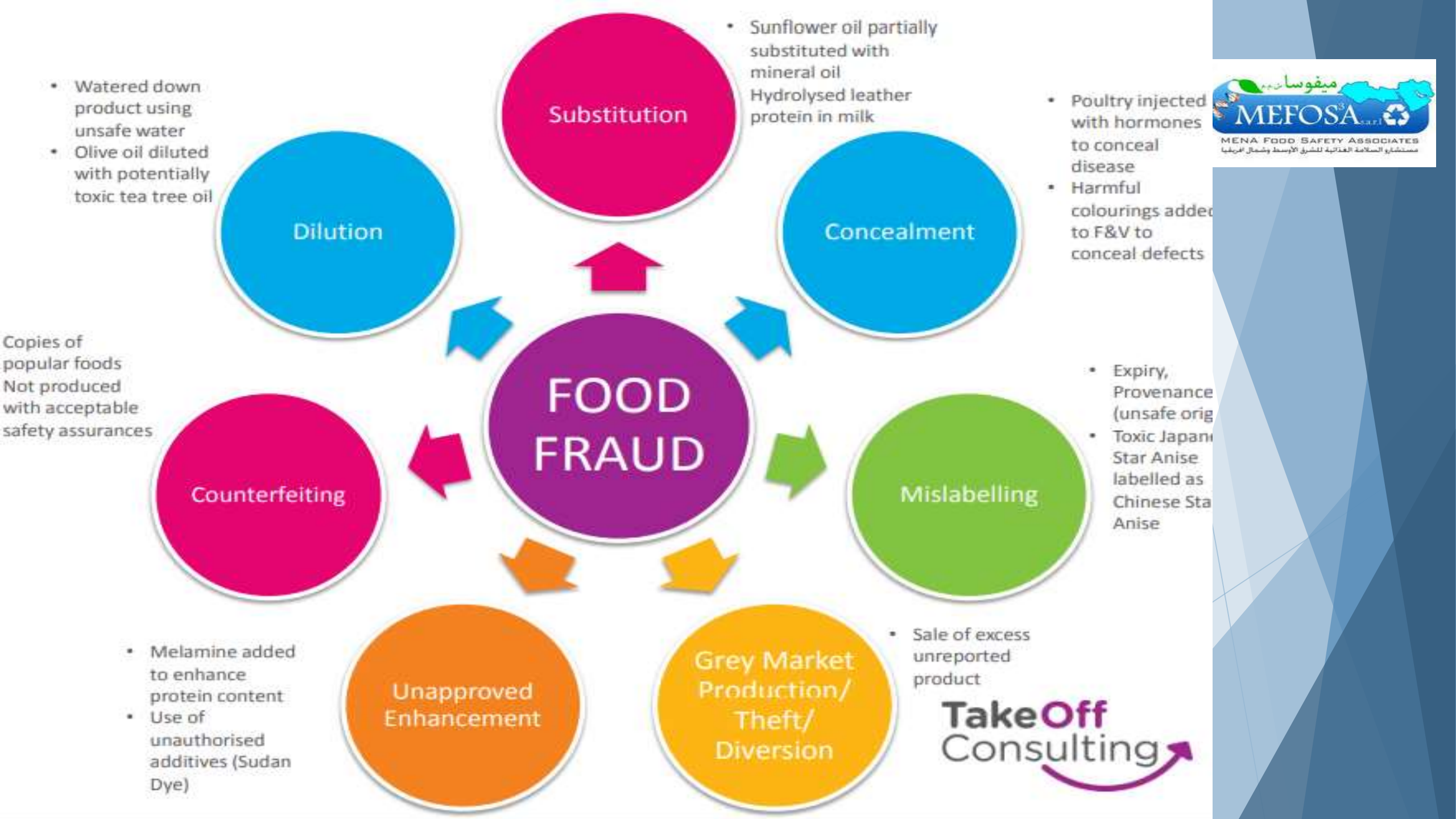
Infringements to intellectual property rights.

Mislabelling

False claims or distortion of the information provided on the label / packaging.

Grey market, forgery

Production, theft, diversion...



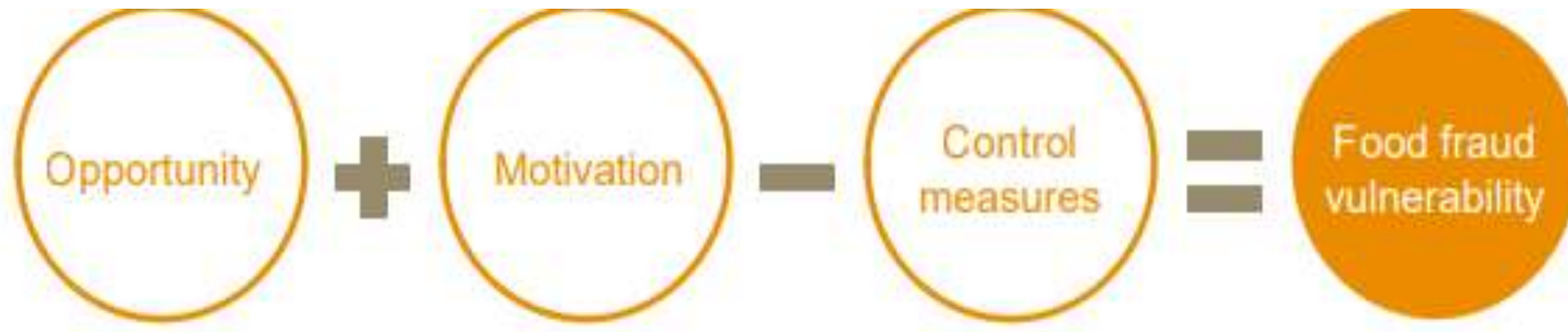
CONTAMINATION VS. ADULTERATION



- ▶ • **Contamination**: unintentional activity and being technically unavoidable in food product
- ▶ • **Adulteration**: intentional replacement of an ingredient that is specifically motivated, for example economic or ideological gain

The Global Food Fraud Situation

- ▶ Increasingly globalized food supply chains and the economic motivation to provide cheaper food products have contributed to the food fraud issue
- ▶ In addition to the globalization of the supply network making detection harder and adulteration easier, other trends influencing the rise in food fraud include cost cutting as the food industry is under constant pressure to keep prices down,



Who is responsible?



- ▶ Everyone has a role in addressing the threat of food fraud. Suppliers play a crucial role in deterrence and detection of economic adulteration.
- ▶ In addition to implementing strategies similar to manufacturers', suppliers also can consider ways to facilitate appropriate testing procedures, provide increased transparency and timely information and partner with manufacturers in their downstream efforts to reduce fraud.

For the retailer, it's very important to partner with reputable suppliers and manufacturers that utilize the highest standards in terms of deterrence and detection and to monitor their activities on an ongoing basis.

- ▶ Retailers should confirm their suppliers are providing safe products that have not been counterfeited.
- ▶ They also can work with supply chain partners to minimize the impact when incidents occur through timely communication and an efficient product recall process, which now is more important than ever.

Examples of food adulteration and to detect

1. Olive oil:

Researchers found that olive oil is often substituted by ingredients such as hazelnut oil, grape seed oil, corn oil, sunflower oil, peanut oil, vegetable oil, soybean oil, palm oil and walnut oil.



DETECT OTHER OILS IN COCONUT OIL

- 1) Take coconut oil in a transparent glass.
- 2) Place this glass in the refrigerator for 30 minutes. (Do not keep in the freezer)
- 3) After refrigeration, coconut oil solidifies. 4) If coconut oil is adulterated, then other oils remain as a separate layer.



Examples of food adulteration and to detect

2. Milk:

Not all cow milk comes from cows only. Some milk have been found to be mixed with reconstituted milk powder, urea, rennet, oil, urea, detergent, caustic soda, sugar, salt, skim milk powder, vegetable oil, cane sugar, formaldehyde, buffalo milk protein

HOW TO DETECT WATER IN MILK

- 1) Put a drop of milk on a polished slanting surface.
- 2) Pure milk either stays or flows slowly leaving a white trail behind.
- 3) Milk adulterated with water will flow immediately without leaving a mark.



HOW TO DETECT DETERGENT IN MILK

- 1) Take 5 to 10ml of a sample with an equal amount of water.
- 2) Shake the contents thoroughly.
- 3) If milk is adulterated with detergent, it forms a dense lather.
- 4) Pure milk will form very thin foam layer due to agitation.



Examples of food adulteration and to detect

3. Honey

Honey is known for its antioxidant properties but sometimes companies substitute it with sugar syrup, corn syrup, fructose, glucose, high-fructose corn syrup, beet sugar, illegal Chinese antibiotics, heavy metals and essential oils.

DETECT SUGAR SOLUTION IN HONEY

- 1) Take a transparent glass of water.
- 2) Add a drop of honey to the glass.
- 3) Pure honey will not disperse in water. 0 If the drop of honey disperses in water.
- 4) If the drop of honey disperses in water, it indicates the presence of added sugar.



DETECT WATER IN HONEY

- 1) Take a cotton wick dipped in a pure honey and light with a matchstick.
- 2) Pure honey will burn.
- 3) If adulterated, the presence of water will not allow the honey to burn if it does; it will produce a cracking sound.



Coffee:

may seem like the least fraudulent, however researchers have found twigs, roasted corn, ground roasted barley, roasted ground parchment, starch, malt, figs, chicory, cereals, caramel, leguminous plants, acorns and potato flour.

DETECT CLAY IN COFFEE POWDER

1. Add ½ teaspoon of coffee powder in a transparent glass of water.
2. Stir for a minute and keep it aside for 5 minutes. Observe the glass at the bottom.
3. Pure coffee powder will not leave any clay particles at the bottom.
4. If coffee powder is adulterated, clay particles will settle at the bottom.




Examples of food adulteration and to detect

5.sugar:

SUGAR

ADULTERANTS

-chalk powder



HARMFUL EFFECTS

-stomach disorders

TEST 7

Detection of chalk powder in sugar/pithi sugar/jaggery

Testing method:

- 1 Take a transparent glass of water.
- 2 Dissolve 10g of sample in water.
- 3 If sugar/pithi sugar/jaggery is mixed with chalk, the adulterant will settle down at the bottom.



Pure



Adulterated

Examples of food adulteration and to detect

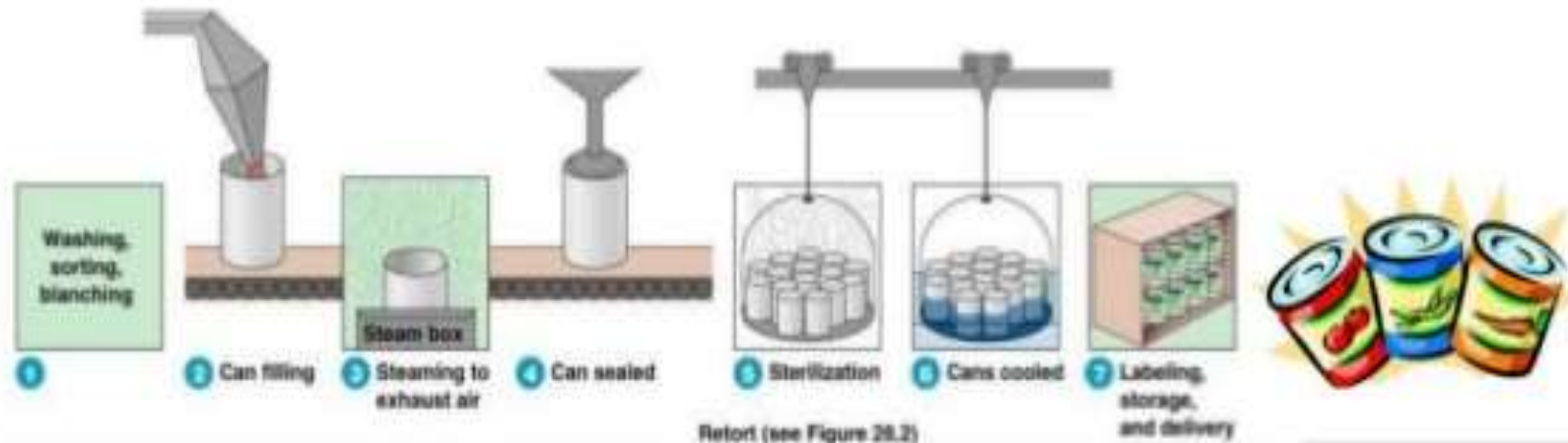
Meat:

- ▶ Adulteration of meat by slaughtering dead carcass of cow which infected by a disease
- ▶ Slaughtering without preslaughter examination for critical diseases as Tuberculosis
- ▶ Minced meat also consider acritical type of meat which frequently adulterated due to we buy it after minced it may be mixed with bone and other viscera of cow
- ▶ Adulterate ruminant meat by equine meat which characterize by sweaty taste due to high glycogen into muscle



Food Fraud of canned Food

- **canned food** - **food** preserved by **canning**.
- Canning is a method of preserving food in which the food contents are processed and sealed in an airtight container. Canning provides a shelf life typically ranging from one to five years.



Food Fraud of canned Food

1. Can without label □:

The stander canned food need to have label But in some cases the producer Tend to remove the label for individual or/and economic and adulteration purpose.



Mislabeling:

written wrong information about the product such as writing perfect ingredient but in the exist canned food doesn't contain the perfect ingredients

Food Fraud of canned food

3- writing wrong weight for economic

Purpose. For example the really weight is

300g but on the label they write 500g



4.using cheap materials in production. Such as cheapest metal to producing can and using cheap additive and cheap raw material

Food Fraud of canned food

5- changing the origin of the product such as the canned food produced in the Iraq but they write made in Turkey .

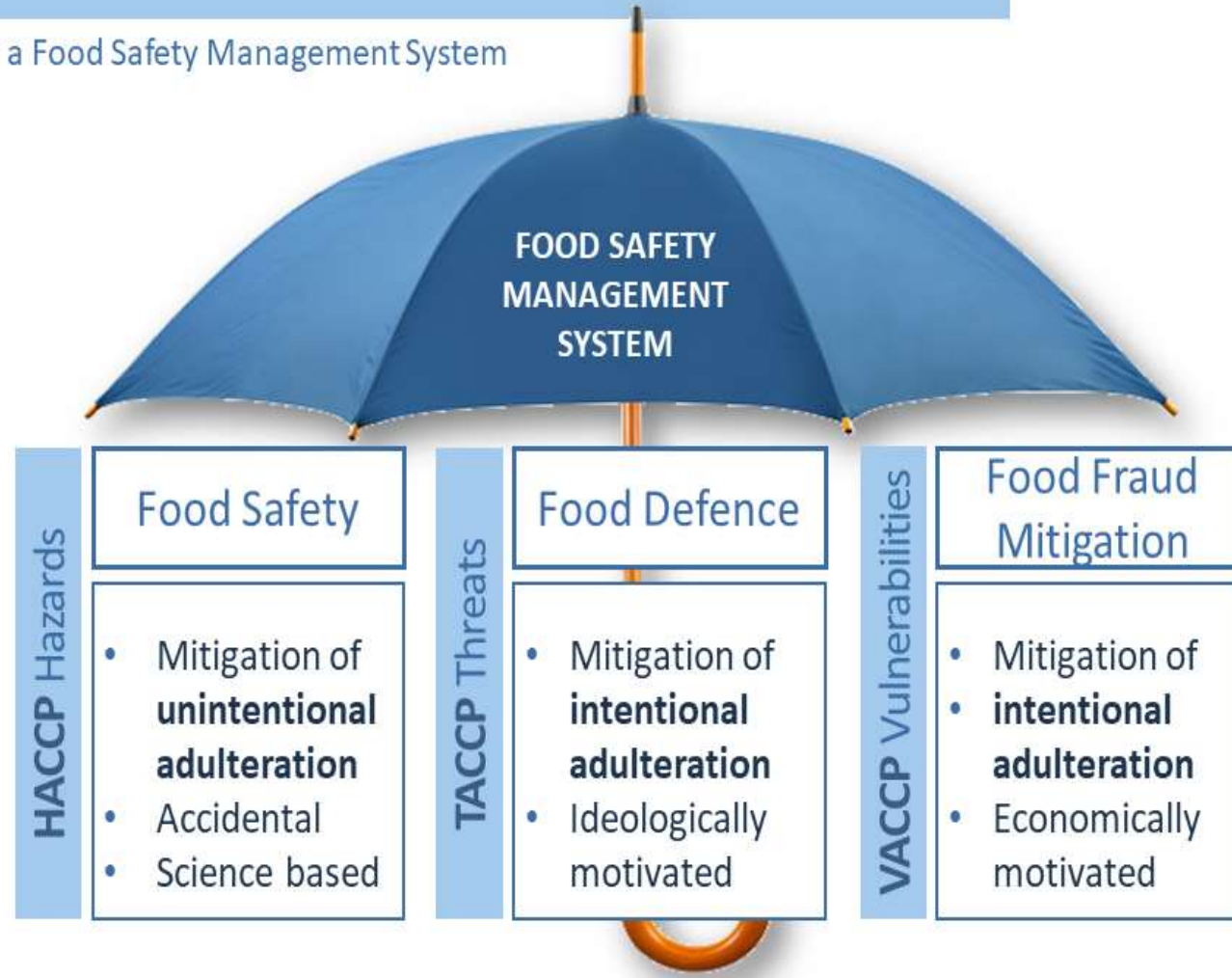


6- changing the really expiry date.(wrong expiry date).



Food Fraud Mitigation

An Integral Part of a Food Safety Management System



VACCP



- ▶ Vulnerability Assessment and Critical Control Points:
- ▶ Systematic management of risk through the evaluation of vulnerabilities of (generally) raw materials
- ▶ Vulnerability = Susceptibility or exposure to a gap or deficiency that
- ▶ could place consumer health at risk and/or have an economic or reputational impact on a food company's operations if not addressed.

VACCP

Vulnerability Assessment - WSEP

- List of Materials
- Map Out Supply Chain
- Evaluate Risk
- Assess Need for Additional control
- Record Findings
- Review at least annually

What Are The Public Health Risks Associated With Food Fraud?

Three types of public health risks can result from food fraud:

- ▶ **Direct food fraud risk** occurs when there is an immediate or imminent risk to the consumer, such as the inclusion of an acutely toxic or lethal contaminant.
- ▶ **Indirect food fraud risk** occurs when the consumer is put at risk through long-term exposure, such as the build up in the body of a chronically toxic contaminant through the ingestion of low doses. Indirect risk also includes the omission of beneficial ingredients, such as preservatives or vitamins.
- ▶ **Technical food fraud risk** is non-material in nature. For example, food documentation fraud occurs when product content or country-of-origin information is deliberately misrepresented.

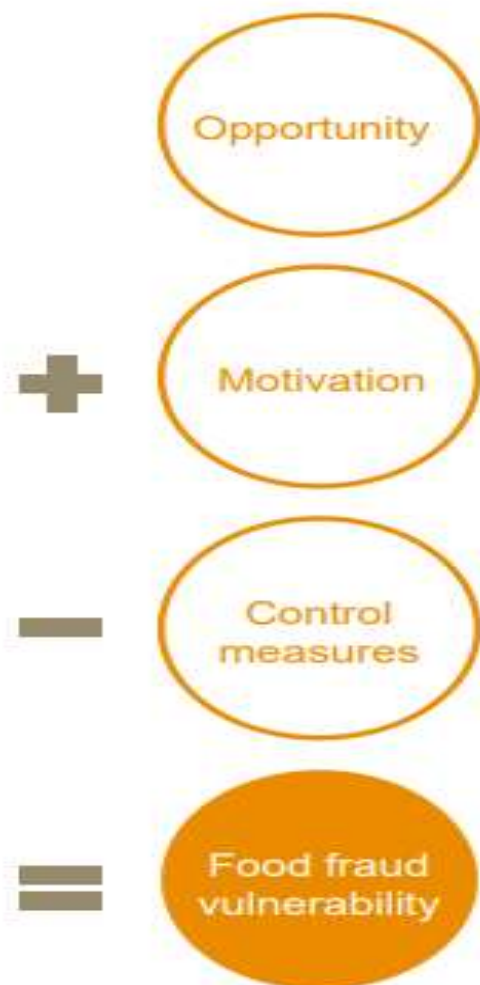
HOW to implant Food fraud prevention program?

- ▶ Buying quality food for all
- ▶ • Always buy fresh food from a reliable supplier in a clean premise.
- ▶ • Always make sure that you check the expiry dates of raw material and processed food before purchasing.
- ▶ • Make sure you do not buy products which are damaged, dented, puffed or leaking. This is biggest food safety mistake one can do.

HOW to implant Food fraud prevention program?



- ▶ The first step is to do a vulnerability assessment test, where you answer a basic question: how likely is my company to be on the receiving end of food fraud? To do that, you'll have to audit your suppliers first.
- ▶ How to prevent and detect food fraud
- ▶ **Here is a series of question to guide you:**
- ▶ Do they have a good reputation?
- ▶ Were they involved in food fraud incidents in the past?
- ▶ What's the level of trustworthiness of the country where they operate?
- ▶ Who are the suppliers of your suppliers?
- ▶ Is it a new supplier, or do you have an established relationship with them?
- ▶ Is the documentation they provide complete and clear?
- ▶ Are the ingredients you buy from them at risk of adulteration?
- ▶ Are their products certified?



- **Opportunities**

The Opportunities section looks at vulnerability to criminal activity. It includes eleven questions related to ingredients, product and process characteristics, features of the chain/industry network, and historical evidence of fraud with particular food products and ingredients. (Please refer to Figure 5 on page 20 for an illustrative summary of a food fraud opportunities assessment.)

- **Motivations**

This section assesses the types of motivations individuals may have to commit fraud for a particular ingredient or food product. It includes twenty questions that cover pricing and market characteristics, history of fraud and other criminal offences for the industry and individual parties in the supply chain, as well as the economic challenges for the company, suppliers and the industry. (Please refer to Figure 6 on page 21 for an illustrative summary of a food fraud motivations assessment.)

- **Control measures**

The Control Measures section assesses the measures currently in place to help prevent fraud. This section consists of nineteen questions about mitigation and contingency measures, including internal hard controls, internal soft controls, and external controls of suppliers/customers and the wider sector environment. (Please refer to Figure 7 on page 22 for an illustrative summary of a food fraud controls assessment.)

Figure 5: Illustrative example of the Opportunities segment of the food fraud vulnerability assessment

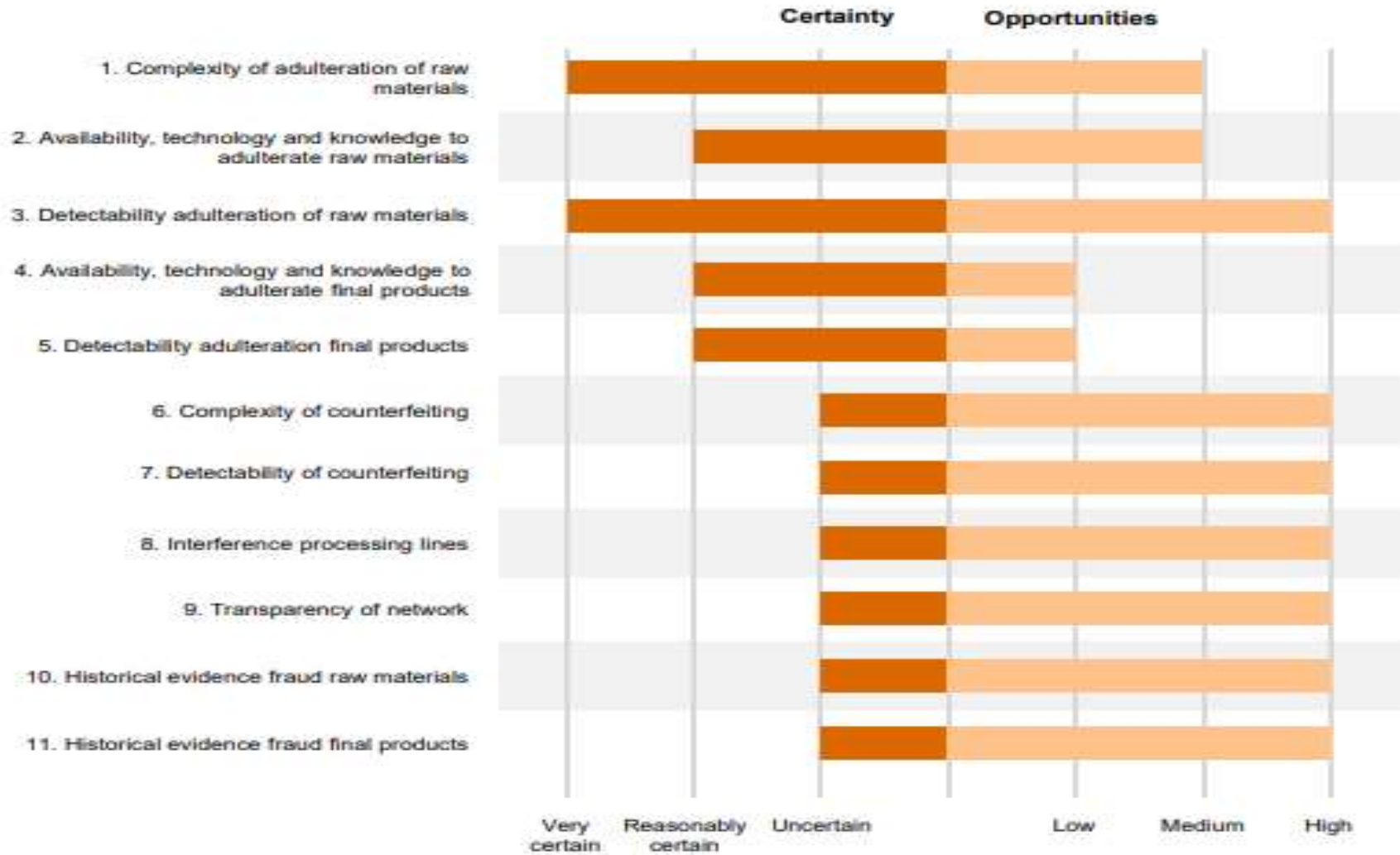


Figure 6: Illustrative example of the motivations segment of the food fraud vulnerability assessment

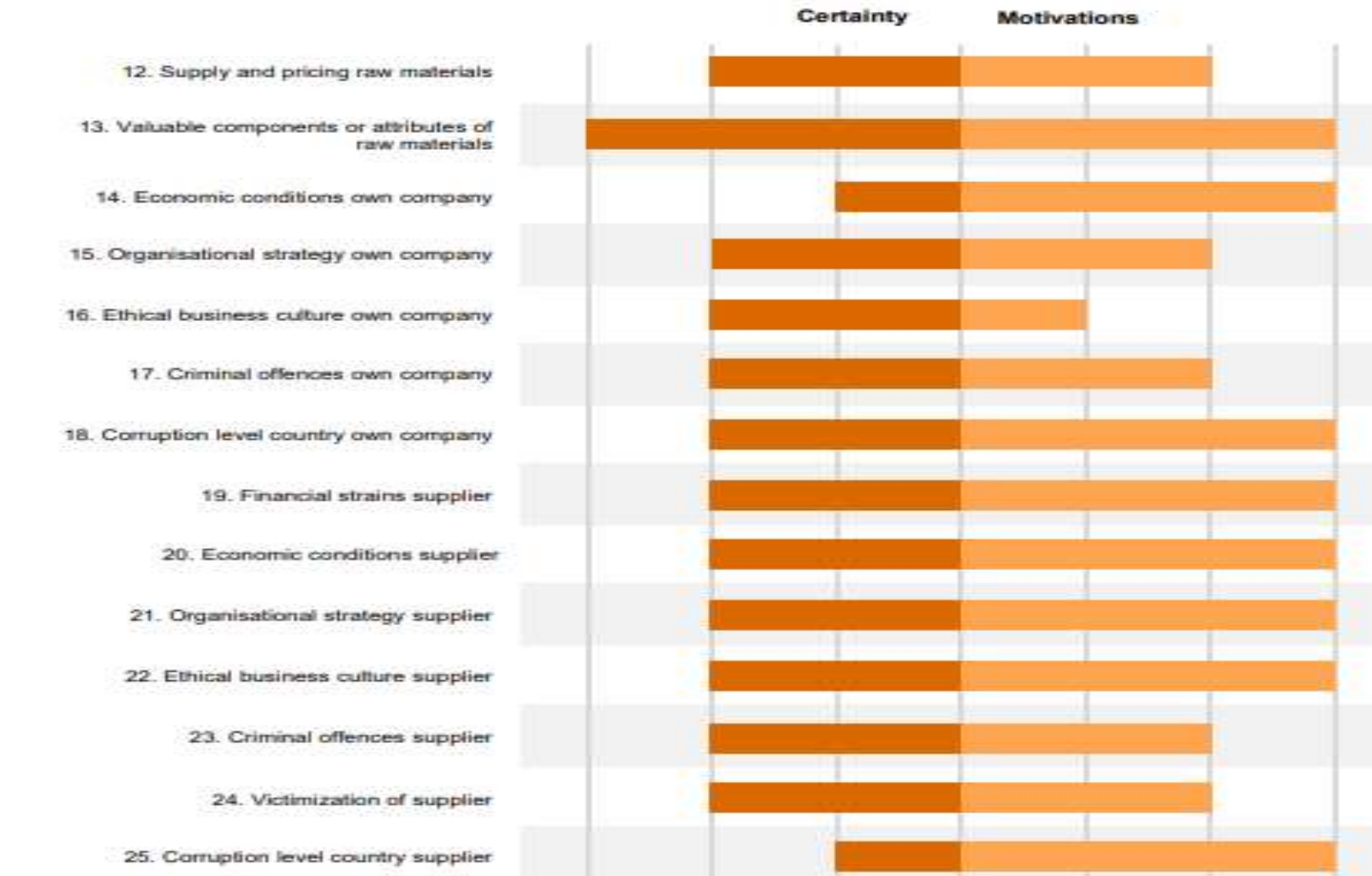
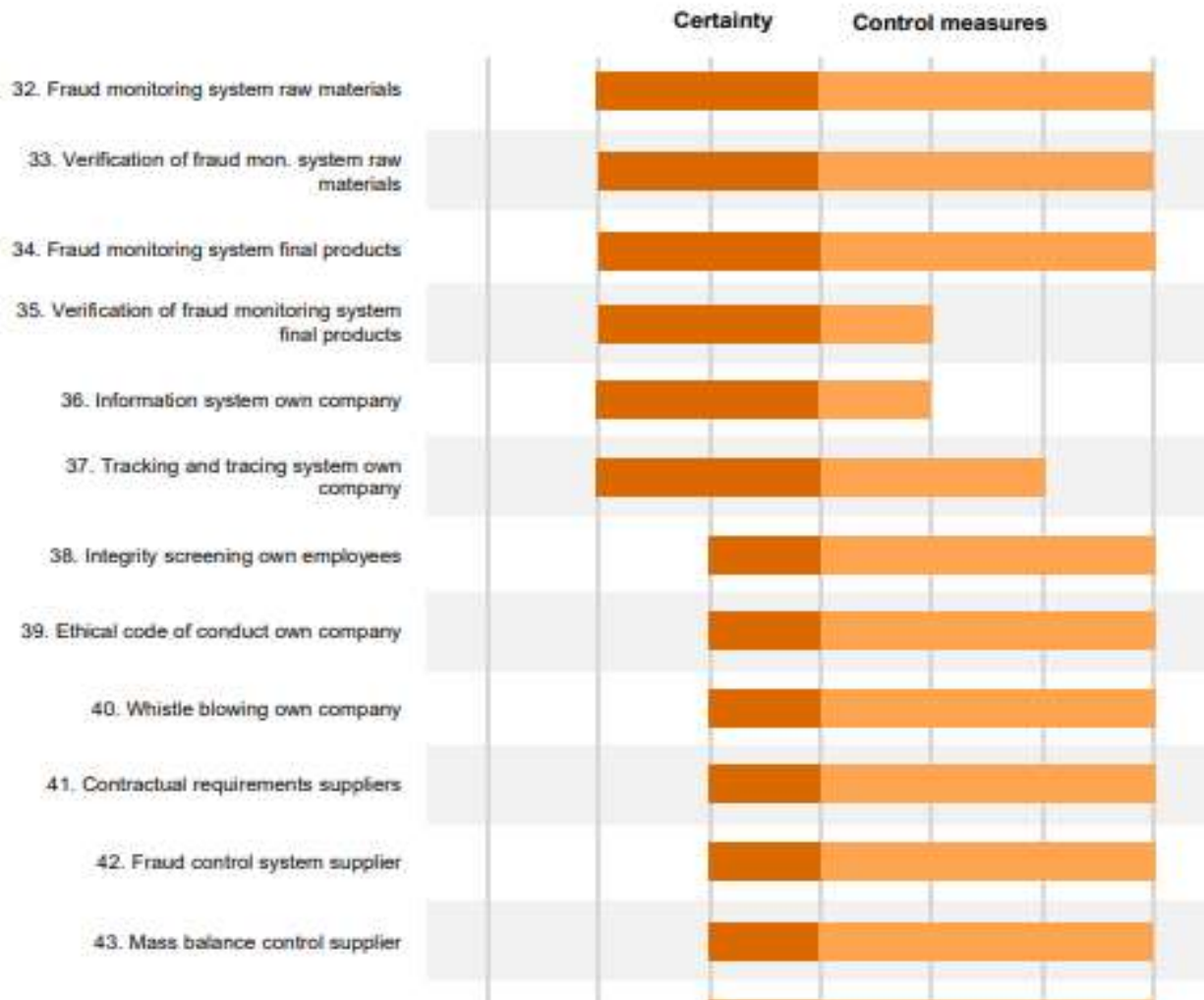
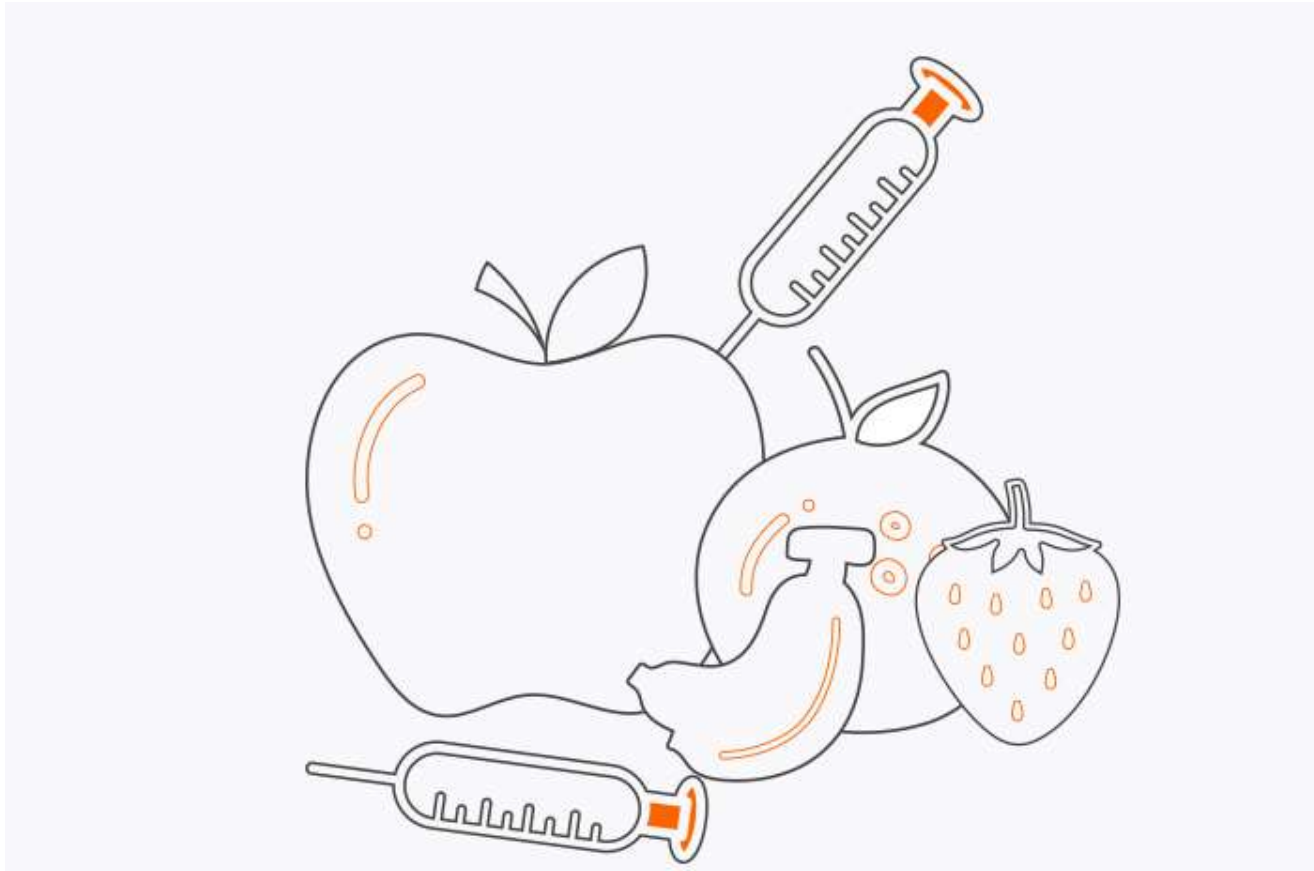


Figure 7: Illustrative example of the Food Fraud Controls segment of the food fraud vulnerability assessment



Thanks
Food safety=Human safety



Recourses:



- ▶ <https://foodfraud.msu.edu/wp-content/uploads/2014/07/food-fraud-ffg-background-v11-Final.pdf>
- ▶ <https://www.foodsafetymagazine.com/magazine-archive1/februarymarch-2014/trends-and-solutions-in-combating-global-food-fraud/>
- ▶ https://www.slideshare.net/AhmedNabaz/fraud-food?qid=e6a675a1-033e-4acc-8abb-a85cf285d771&v=&b=&from_search=62
- ▶ https://fs.ntou.edu.tw/ezfiles/21/1021/attach/59/pta_23020_8298974_33227.pdf
- ▶ https://media-exp1.licdn.com/dms/document/C4D1FAQFEUIAh6hCWYA/feedshare-document-pdf-analyzed/0?e=1593028800&v=beta&t=i_xiBDorIUdoZVNcp5aERpOuNMnUDEkUp2QSptSYzKc
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