



ESALQ

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Fraud in Animal Food Products

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Outline

- **Challenges of the Food System**
- **Definitions**
- **Types and examples of food fraud**
- **Motivations to commit fraud**
- **Fraud vs COVID-19**
- **Methods of detection**
- **Detection and prevention**
- **Costs and losses**
- **Global commitment**
- **Final considerations**

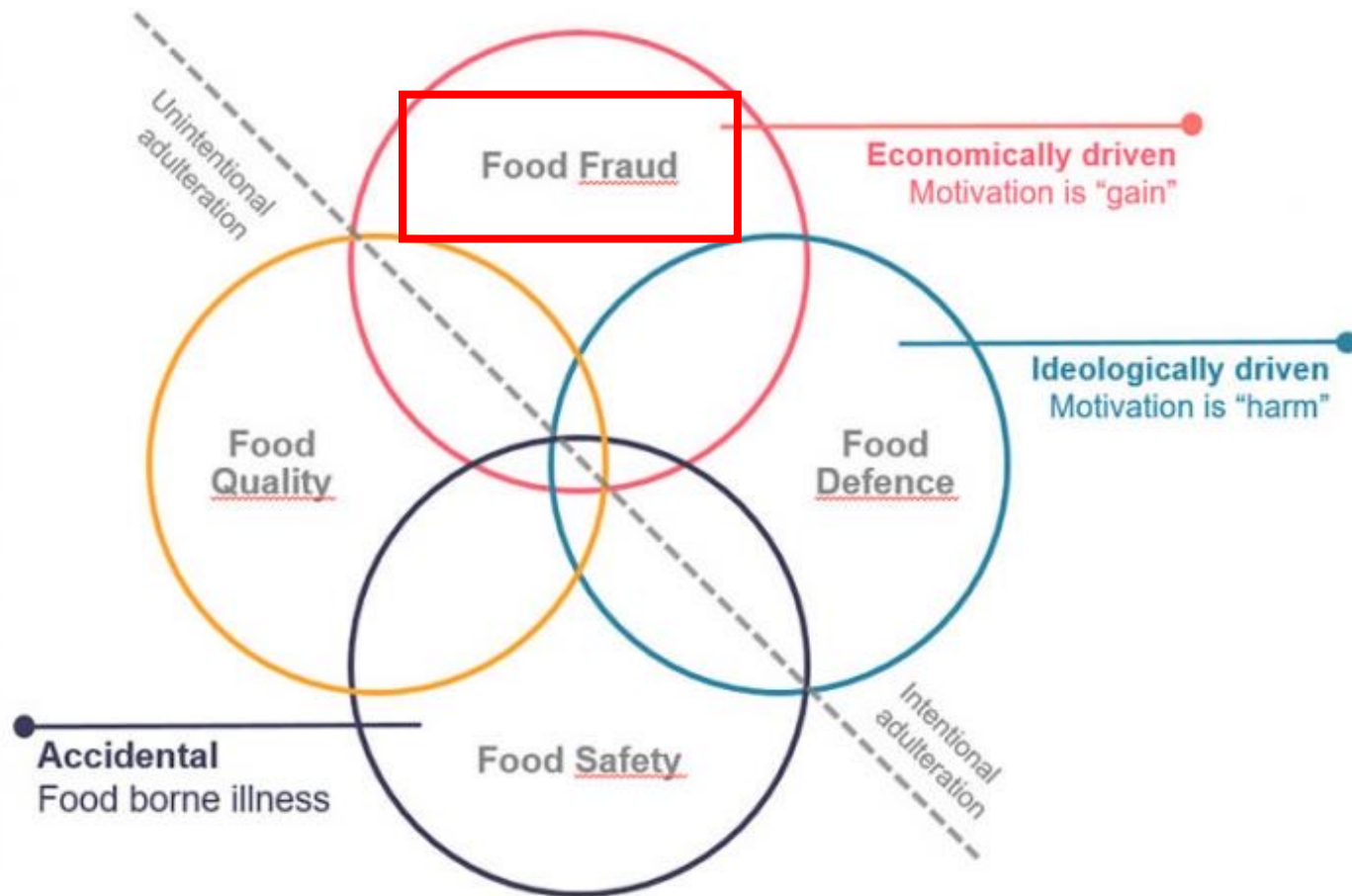
Challenge

“CREATE A WORLD WHERE NO ONE IS LEFT BEHIND”



<http://www.fao.org/>

Food Safety/Defense/Fraud



Food Fraud

The act of purposely altering, misrepresenting, mislabeling, substituting or tampering with any food product at any point along the farm-to-table food supply-chain

Economically-motivated adulteration (EMA) → FDA/US



Main Targets

1. OLIVE OIL (origin, mixing with other oils) 	2. FISH (species, quality, fresh vs frozen-thawed, wild vs farmed) 	3. ORGANIC FOODS 	4. MILK (origin, type, dilution, melamine) 	5. GRAINS (basmati rice, durum vs tender wheat in pasta, GMO) 
6. HONEY & MAPLE SYRUP (sugars added, origin) 	7. COFFEE & TEA (arabica/robusta, origin and varieties, grass cuttings) 	8. SPICES (saffron origin, chilli coloured with illegal dyes) 	9. WINE (origin-PGI) 	10. CERTAIN FRUIT JUICES (diluted, 100% declared fruit) 

Main Targets- FDA

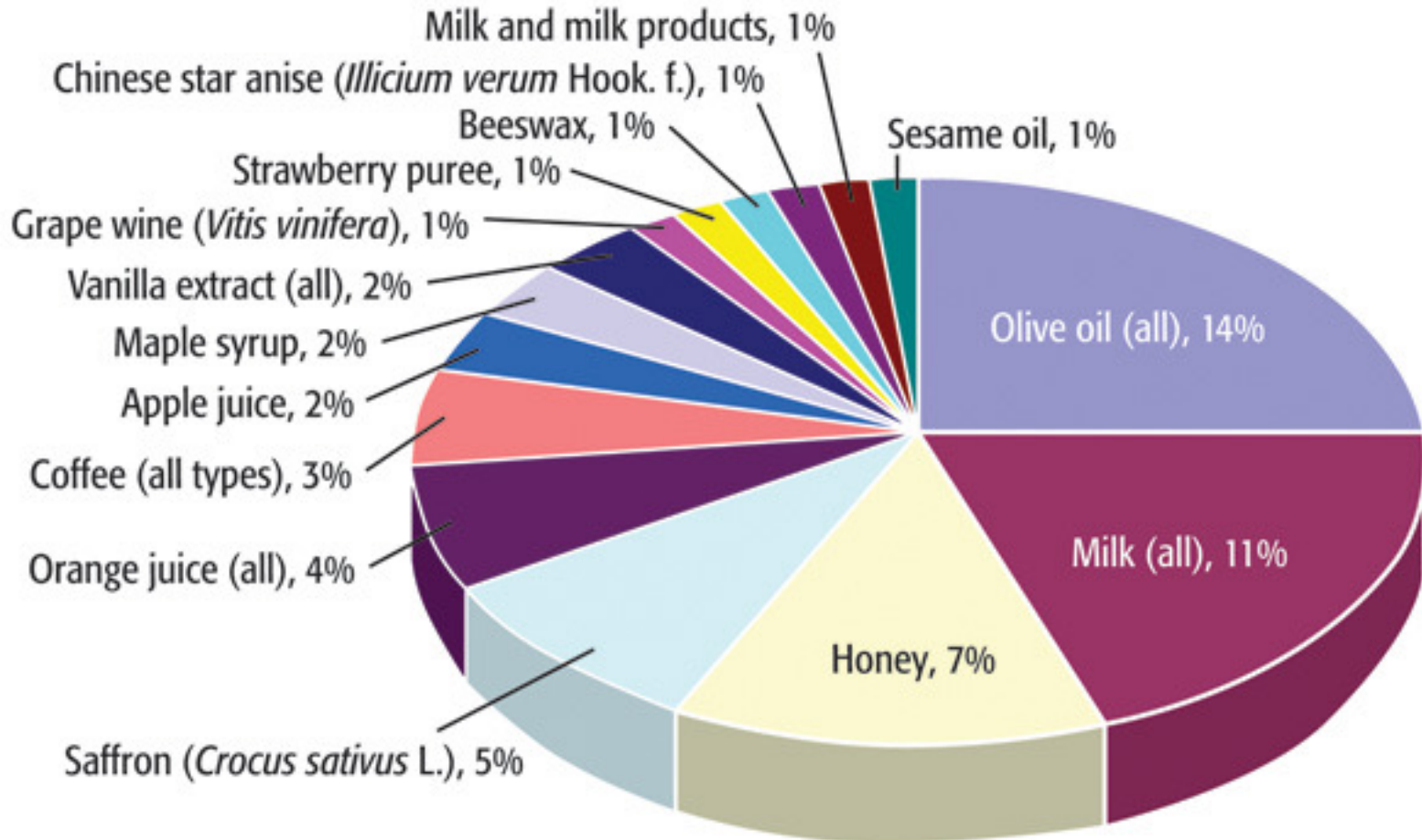
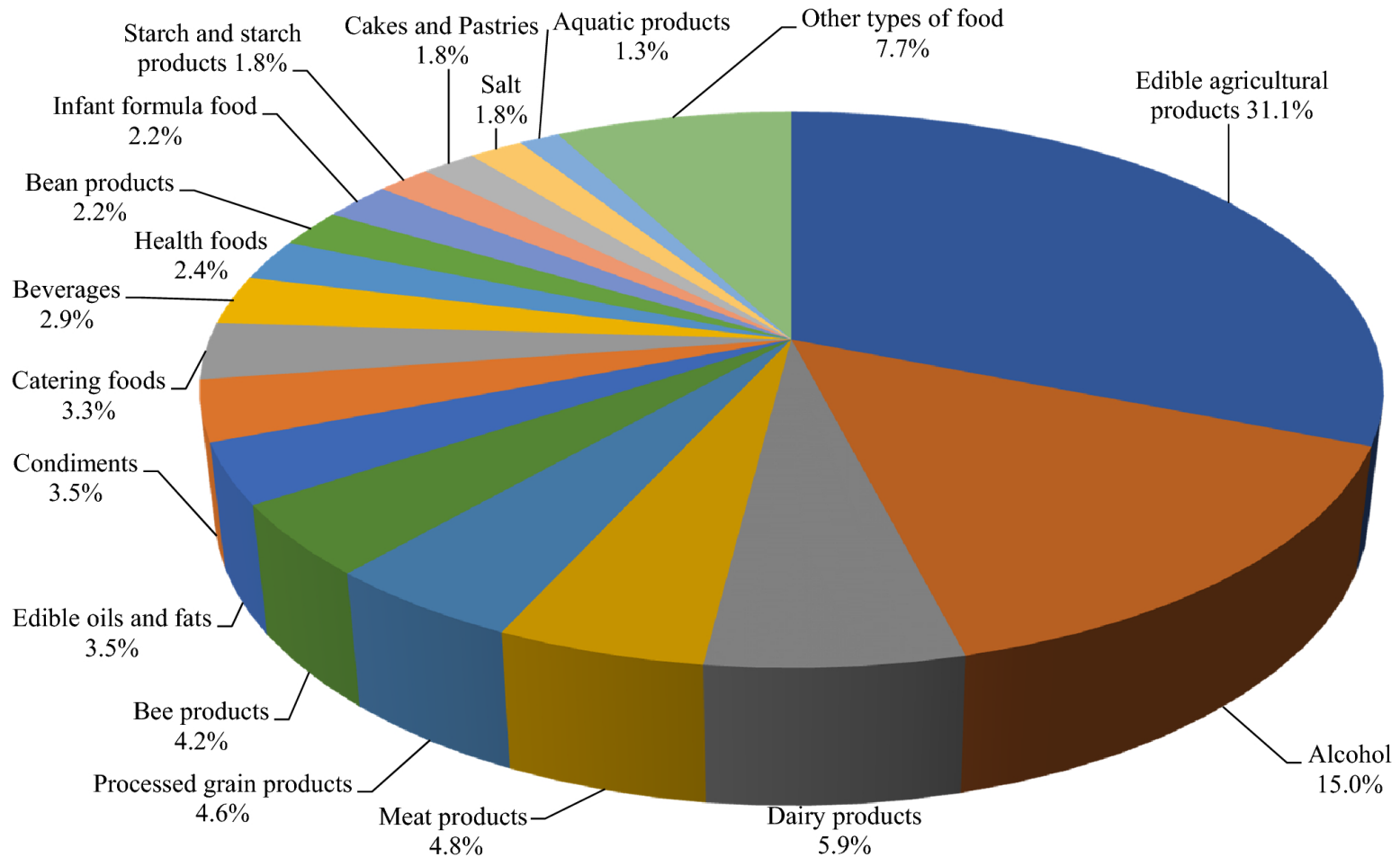


Figure 2: Fifteen Most Problematic Ingredients for EMA.^a

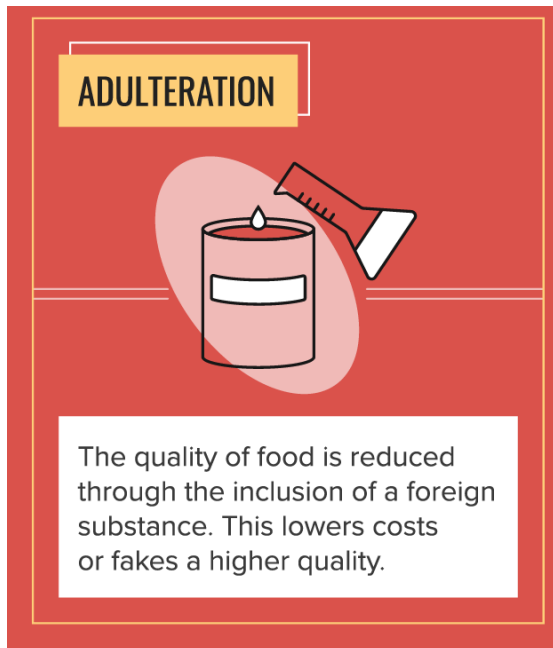
<https://www.food-safety.com/>

Recent Study- China



Li et al., 2022

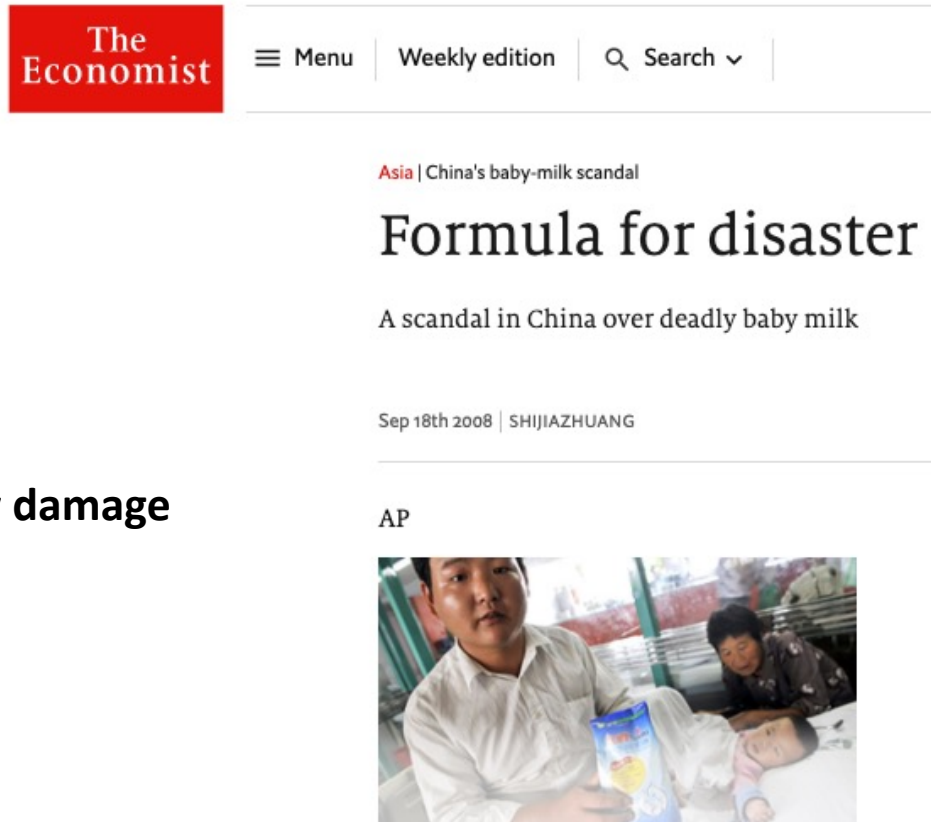
Types of Food Fraud



Pakistan The country is the world's fifth largest milk producer, authorities commonly confiscate milk adulterated with urea and contaminated water (The News, 2019; Daily Times, 2019).

China Scandal

Melamine added to infant formula → killed 8 babies (China)



Kidney damage

The use is not approved in food

Increase nitrogen → apparent protein level

Types of Food Fraud

ADULTERATION



The quality of food is reduced through the inclusion of a foreign substance. This lowers costs or fakes a higher quality.



Australia Almost 20 percent of honey on the Australian market is adulterated with substances such as cane sugar or corn syrup. The rate of adulterated samples went up to 50 percent for imports from Asia (Zhou *et al.*, 2018).

Types of Food Fraud

ADULTERATION



The quality of food is reduced through the inclusion of a foreign substance. This lowers costs or fakes a higher quality.

Water is not meat!



Countries in Asia and Pacific Injection of gel into shrimp to increase their weight and make them look more appealing.



It could be dangerous

Types of Food Fraud

SUBSTITUTION



A food or ingredient is replaced with another similar, but inferior, substance.

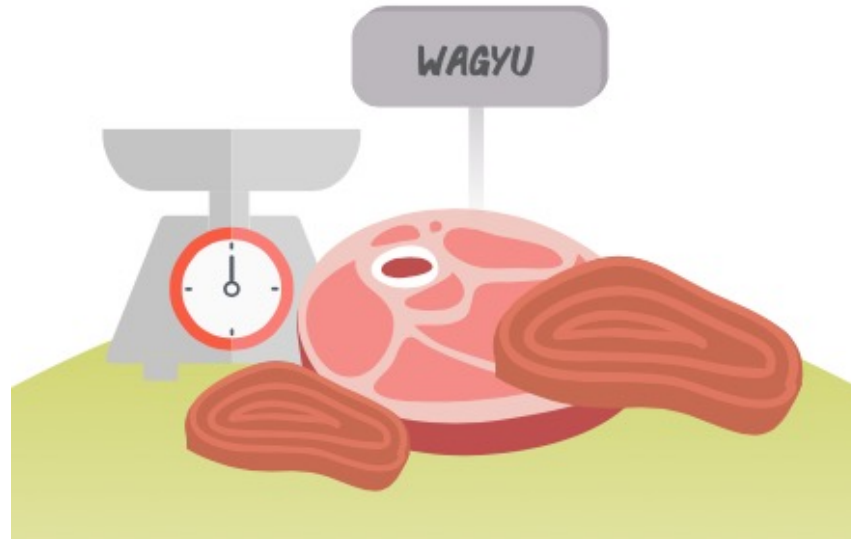


Types of Food Fraud

MISREPRESENTATION



A product is marketed or labelled to portray its quality, safety, origin or freshness incorrectly.



Types of Food Fraud

DOCUMENT FRAUD



The making, use and possession of false documents for the purpose of selling or marketing a fraudulent product.



Types of Food Fraud

THEFT



Food or drink is appropriated by illegal means for use or sale, resulting in profits.



Monday, August 1, 2022

Syrian Ship Carrying 'Stolen Ukrainian Barley, Flour' Docks in Lebanon

By Maya Gebeily and Laila Bassam July 28, 2022



© Panourgias Tax / MarineTraffic.com

A Syrian ship under U.S. sanctions has docked in the northern Lebanese port of Tripoli carrying barley and wheat that the Ukrainian embassy in Beirut told Reuters on Thursday had been plundered by Russia from Ukrainian stores.

The Laodicea docked in Tripoli on Wednesday, according to shipping data website MarineTraffic.

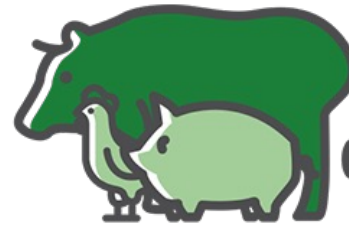
"The ship has traveled from a Crimean port that is closed to international shipping,

Types of Food Fraud

UNLAWFUL PROCESSING



Unapproved premises or unauthorised techniques are used, usually during the slaughter or preparation of meat.



1

FREEDOM FROM
HUNGER AND THIRST

2

FREEDOM FROM
DISCOMFORT

3

FREEDOM FROM PAIN,
INJURY OR DISEASE

4

FREEDOM TO
EXPRESS NORMAL
BEHAVIOR

5

FREEDOM
FROM FEAR

Types of Food Fraud

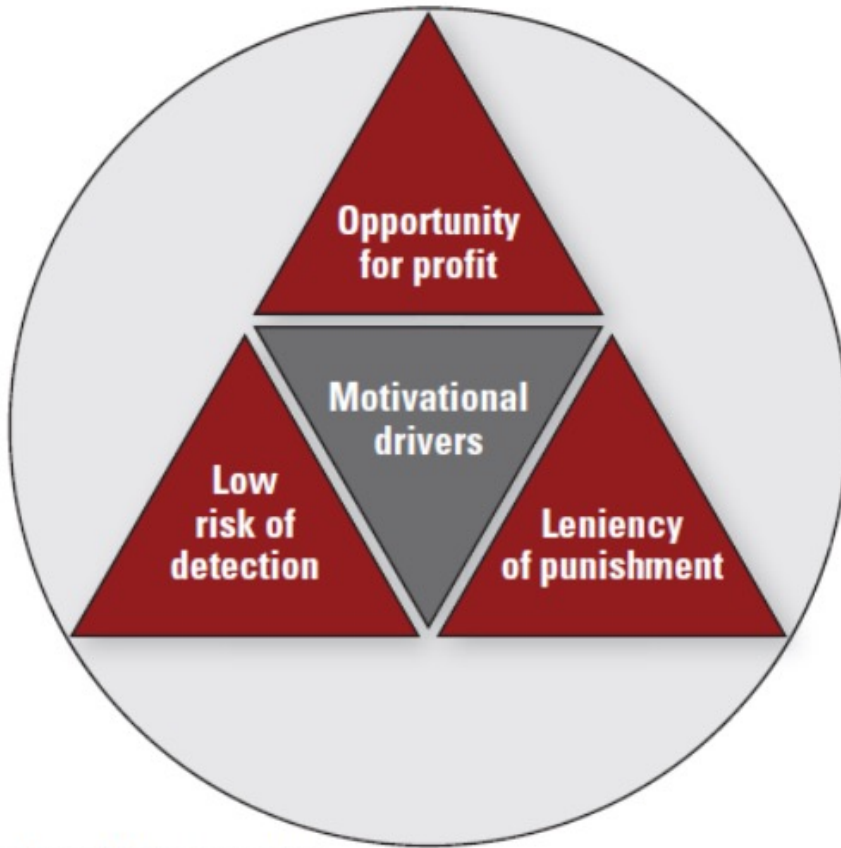
WASTE DIVERSION



Unlawfully diverting food, drink or feed meant for disposal, back into the supply chain.



Motivations



Source: A.T. Kearney analysis

Many Countries:
Fraudsters will not go to
the jail for food fraud,
the punishment is just
on the company

Food Fraud increase

Even with technological advances and law enforcement action

The situation is exactly this:



GSI, 2021.

COVID-19: Example of Challenging

Growing financial pressures, less frequent monitoring and supply chain disruptions led to a rise in fraudulent foods and ingredients over the past two years

Products:

- ✓ dairy products contaminated with bactéria
- ✓ meat from illegally slaughtered animals
- ✓ food products falsely labelled as medicinal cures

Detection Methods – Meat products

- **Physical Analysis**

- **Color**
- **Texture**
- **Flavor**
- **Presence of other parts of the body along with meat**

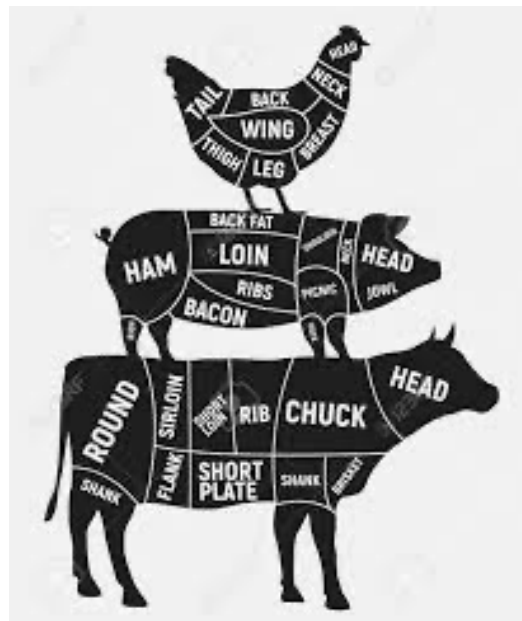
low-cost method
that needs trained
personnel



Detection Methods – Meat products

- **Anatomical evaluation**
 - Typical tooth formations
 - Vertebra-based identification
 - Number of ribs present in the carcass

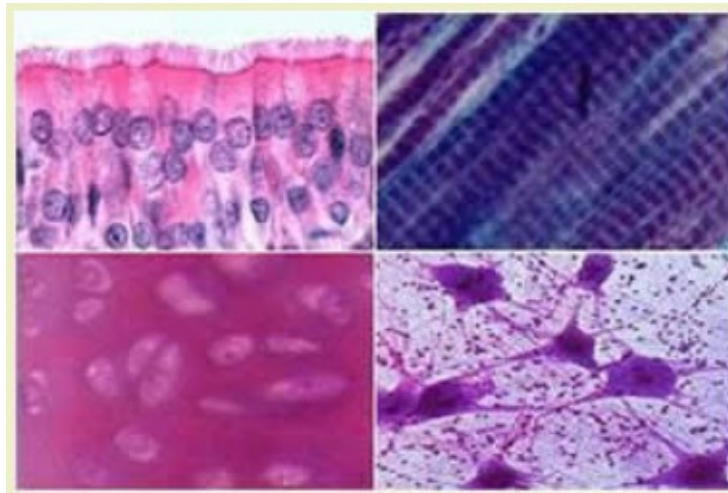
low-cost method
that needs trained
personnel



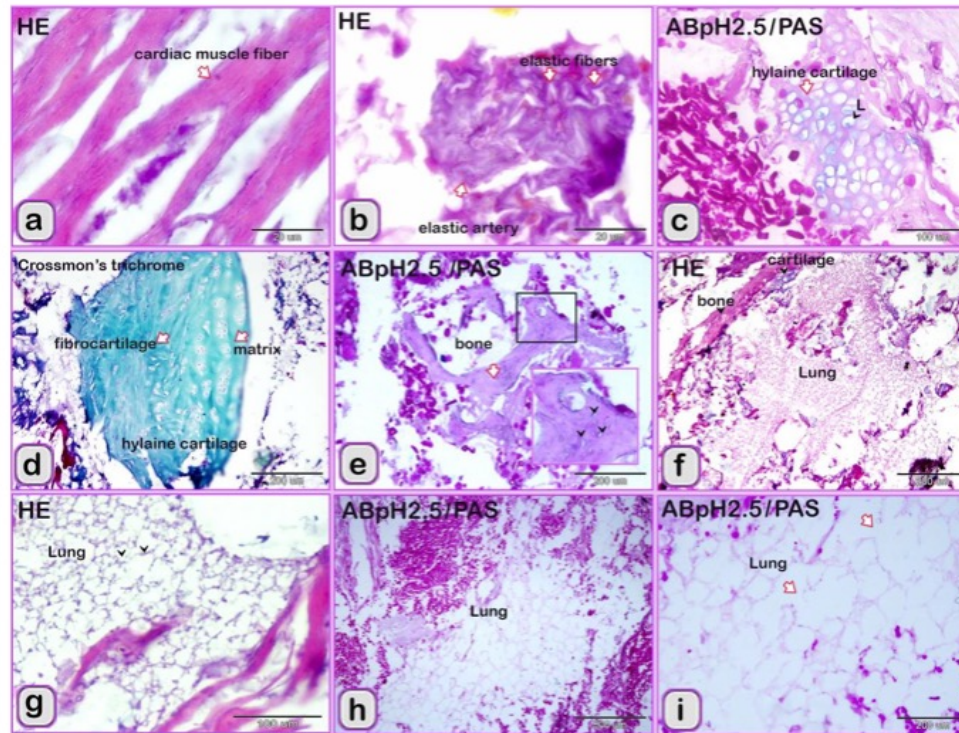
Detection Methods – Meat products

- **Histological Analysis - Electron Microscopy**
 - Muscle fiber length
 - Diameter
 - Density
 - Muscle fiber pattern
 - Coloring

more complex
method, non-low-
cost, and needs
specialized
personnel



Example

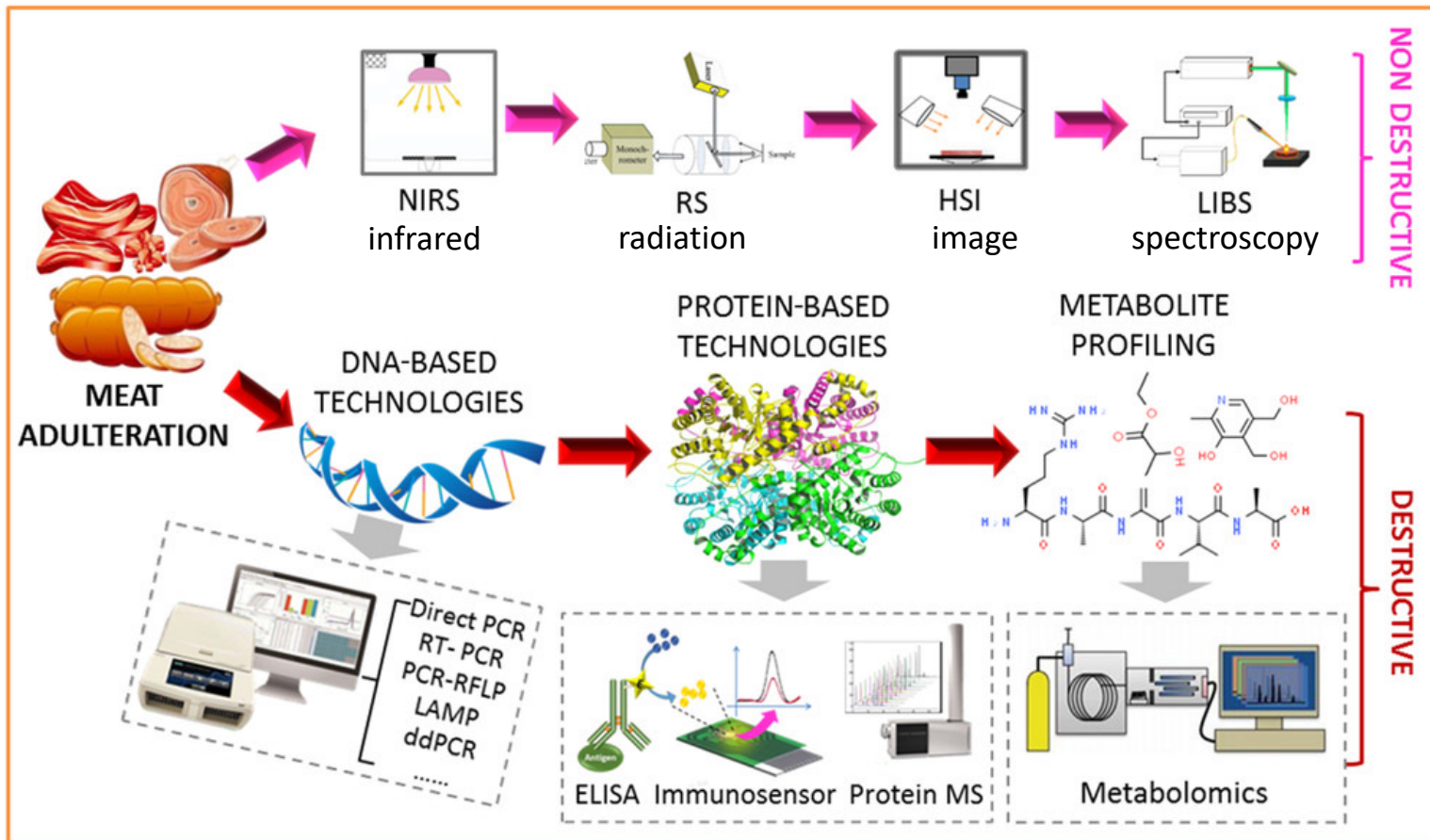


Scanning electron microscopy image of bovine hamburger (paraffin):

- a) Cardiac muscle – presence of heart
- b) Elastic tissue – presence of arteries
- c) Chondrocytes – presence of cartilage
- d) Chondrocytes – presence of cartilage
- e) Cancellous bone – presence of trabecular bone where the bone marrow is located
- f) g) h) i) Alveolar architecture tissue - presence of lung

Detection Methods

- Next Generation Technologies



Challenges: Detection and Prevention

Key challenges make detection and prevention of food fraud difficult:

- **Where is the line between food fraud and marketing lies**
- **Specialized instruments and knowledge requirement**
- **Food fraudsters are constantly moving on to a different method, potentially avoiding detection for a long time**
- **Access to next generation Technologies**
- **Fund and personnel**

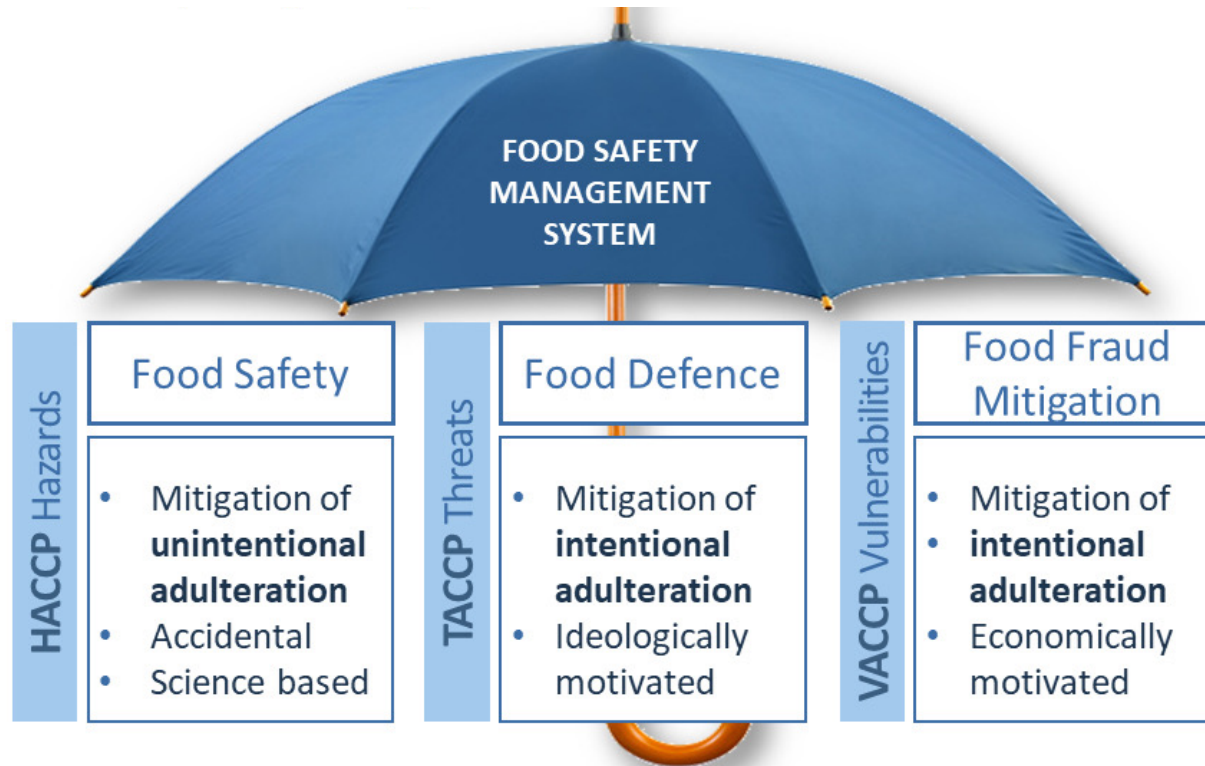
Costs and Losses

- The cost of food fraud for the global food industry is approximately EUR 30 billion every year
- Food fraud cases can decrease the trust and confidence of consumers in the country's food supply
- Successful food fraud can place the safety and integrity of food supply chains in danger



Global Commitment

- ✓ Legal interventions
- ✓ Constant creation and updating of food standards and labeling rules following the Codex Alimentarius standards – Global standard



Final Considerations

- Allergens → life-threatening consequences
- Religious needs may be compromised if products sold as halal and kosher
- Dietary requirements → life-threatening consequences



Take home



**We should be alert to
feed the world with
food security and
food safety**

Quiz

- Do you know the difference between the two terms.....?



FOOD SECURITY



FOOD SAFETY

YES or NO

Harlan et al., 2019. DOI: 10.1093/oso/9780190886455.001.0001

Quiz



FOOD SECURITY

Refers to the adequacy of food to society, the equitable distribution, confirmed supply, fair access and sustained sources.



FOOD SAFETY

Refers to the activities, processes, and policies encompassing the food chain, ensuring that the food is safe for consumption.

Resources

- www.agrolab.com
- www.frozenfoodeurope.com
- www.digicomply.com
- www.highspeedtraining.co.uk
- <http://www.fao.org/legal/development-law/magazine-1-2020/en/>
- <https://food.ec.europa.eu/safety/agri-food-fraud>
- https://food.ec.europa.eu/system/files/2021-09/ff_ffn_annual-report_2020_1.pdf
- <https://www.lichtapgym.com>
- <https://www.semanticscholar.org/>
- <https://www.food-safety.com/>

Thank you for your attention

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