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भारतीय खाद्य सुरक्षा और मानक प्राधिकरण
Food Safety and Standards Authority of India

सत्यमेव जयते

स्वास्थ्य एवं
परिवार कल्याण मंत्रालय
MINISTRY OF
HEALTH AND
FAMILY WELFARE

Opportunity in Innovations in Food Emergency Response, Recall and Analysis

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Food Safety a Global Concern

- Food safety is one of the major concerns in every country regardless of their economic and social development.

- A comprehensive monitoring and surveillance system that not only focuses on the end products but also the whole process (raw material /manufacturing/processing) is a necessity.

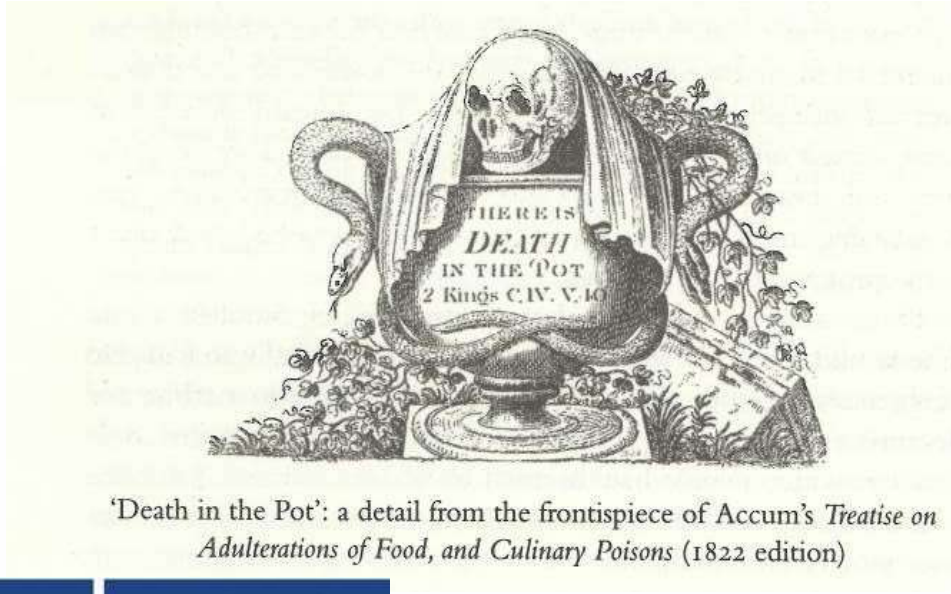
Emerging Challenges to Food Safety

New challenges to food safety will continue to emerge, largely because of:

- ✓ Changes in our food production and supply, including more imported foods.
- ✓ Changes in the environment leading to food contamination.
- ✓ New and emerging bacteria, toxins, and antimicrobial resistance.
- ✓ Changes in consumer preferences and habits.
- ✓ Changes in the tests that diagnose foodborne illness.

Can we trust what we see?

Food adulteration has been an issue of concern for food producers, regulatory agencies, scientific organizations, and even news and media groups for a long time.



'Death in the Pot': a detail from the frontispiece of Accum's *Treatise on Adulterations of Food, and Culinary Poisons* (1822 edition)

Increasing and new consumer demands

Does it contain Heavy metals

Which species?

Irradiation?

What is the age of the meat

Does it contain vet drug residues

Is it Halal /Kosher?

Does it contain added gelatin? If so animal species, source?

Is it cultured meat?

Is it reconstituted meat

Is it PDO/PGI

Does it contain added water

Which country does it come from?

Is it fresh or frozen or thawed meat

Does it contain chemical contaminants /pathogens/growth hormone

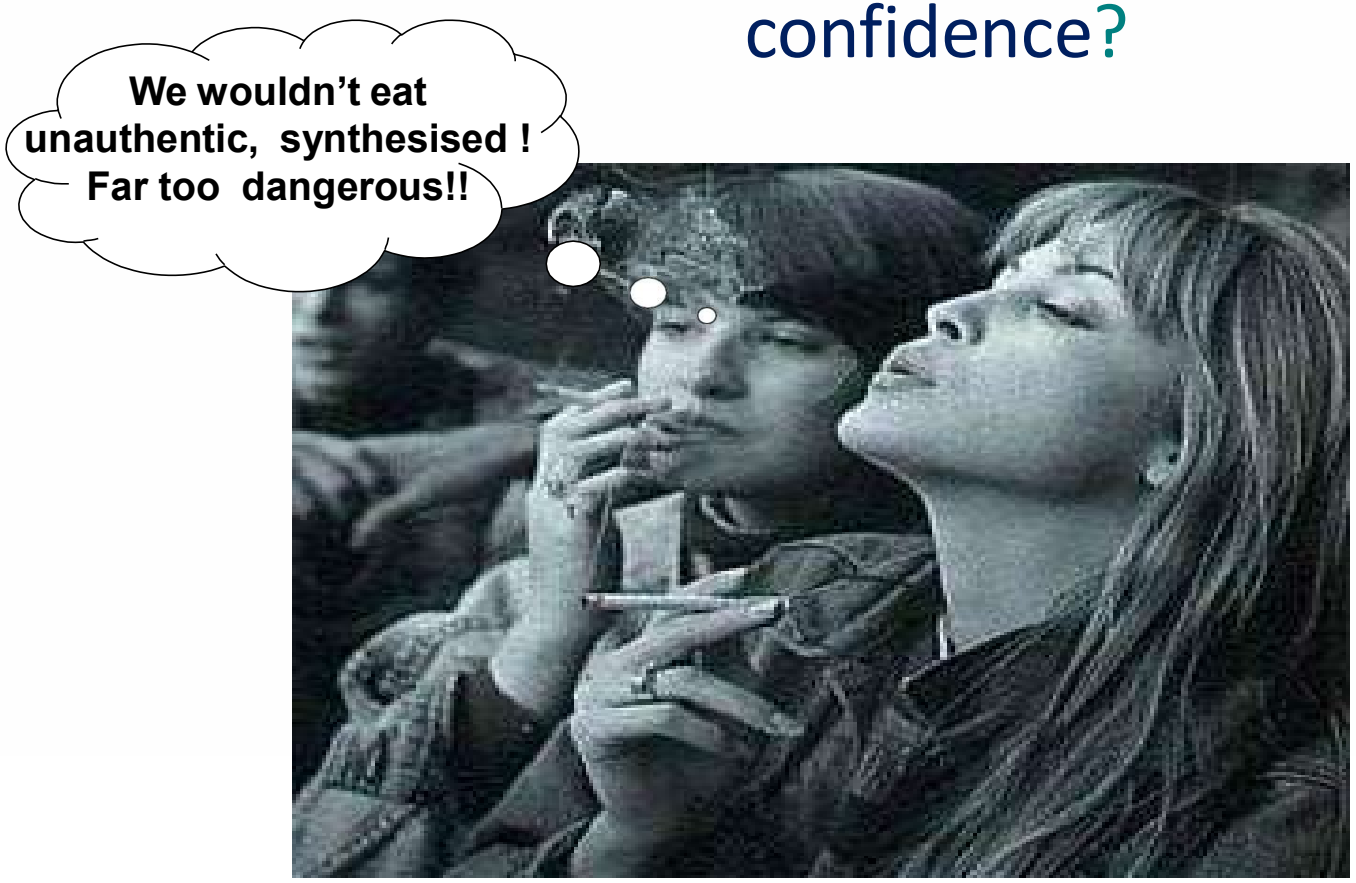
Food Advertising / Marketing

- Quality
- Sustainability
- Traceability
- 100% Authenticity
- DNA tested

Food Quality, Authenticity and Integrity used to advertise and add value to food products

Brand name, suppliers, are for illustrative purposes only. No endorsement is implied

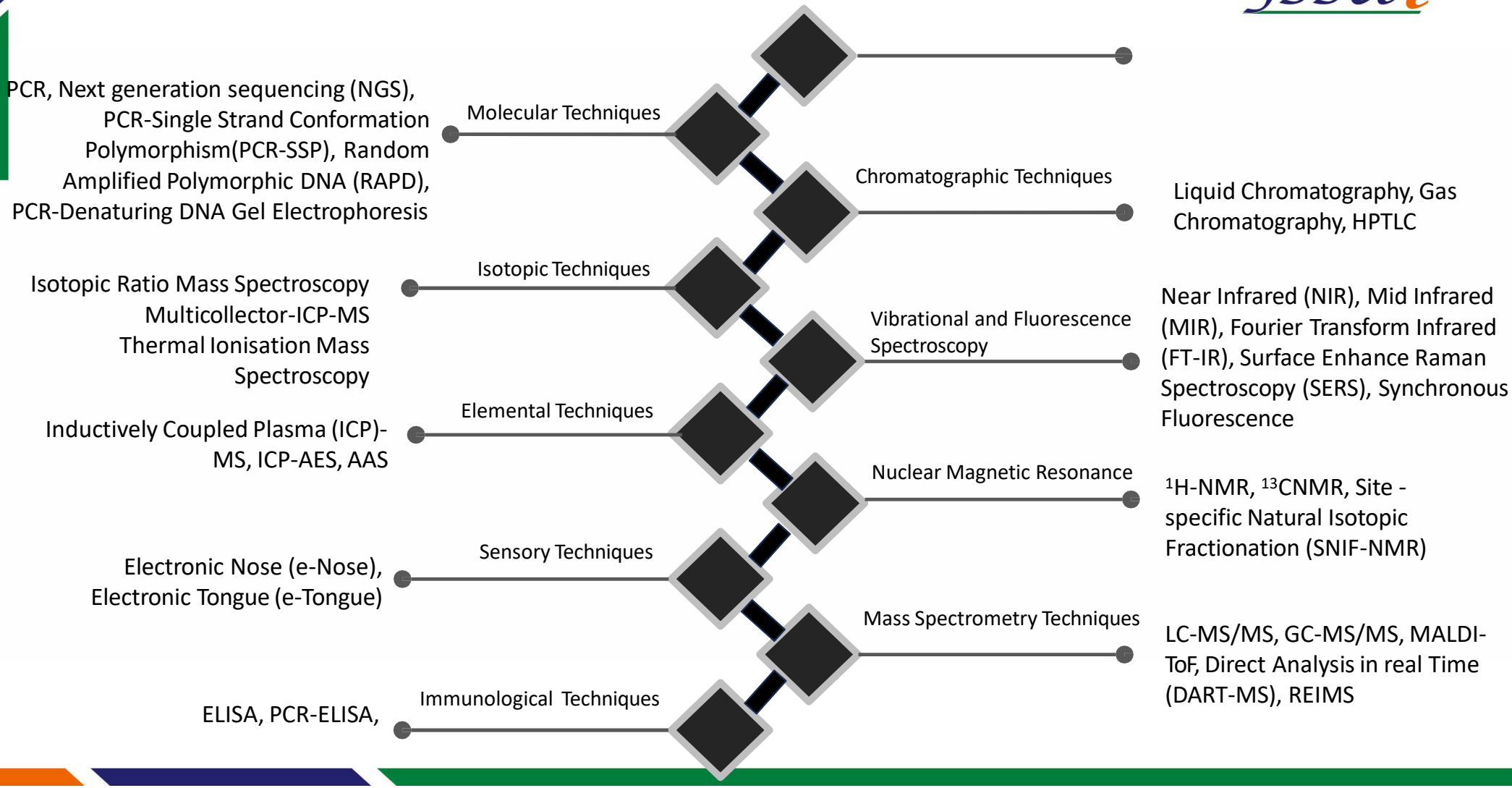
Consumer perception of risk. How do you enhance consumer confidence?



Food is a very complex matrix.

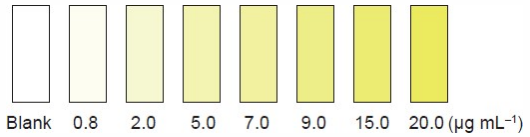
The development and application of analytical methods and techniques has grown in parallel to the consumers concern about what is in their food and the safety of the food they eat.

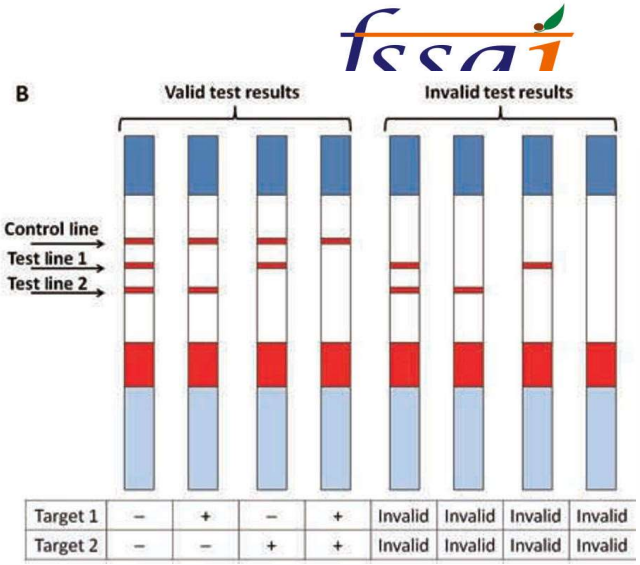
Analytical Techniques: Robust and validated fit –for-purpose methods



INNOVATIONS IN ANALYSIS: OUTSIDE THE LABORATORY

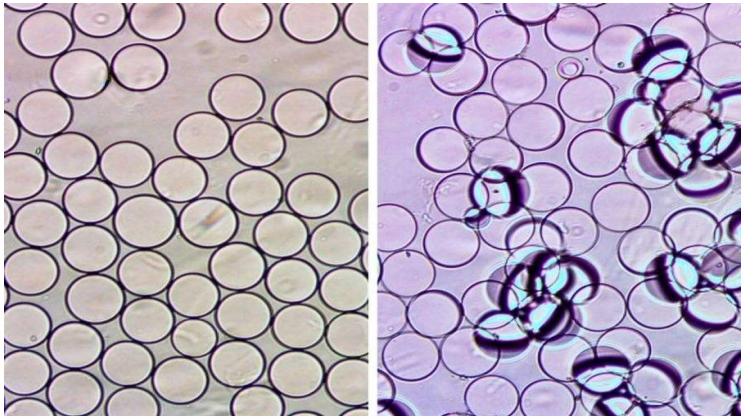
- GRAIN elevators: mycotoxins
- DAIRY industries : antibiotics, aflatoxin M_1

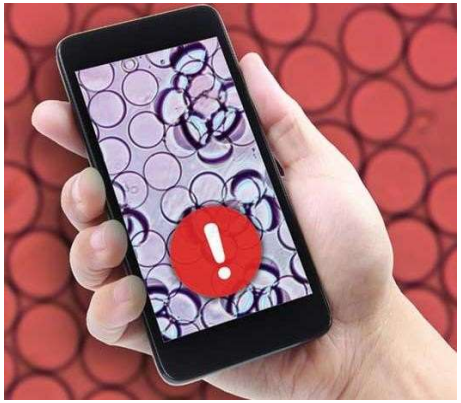




Grain inspection in the harbours, food and feed mills (Mycotoxins, GMO)
Restaurants > food allergens
Fish market, fish processing plants > Formaldehyde, Histamine

Innovation in Detecting foodborne pathogens



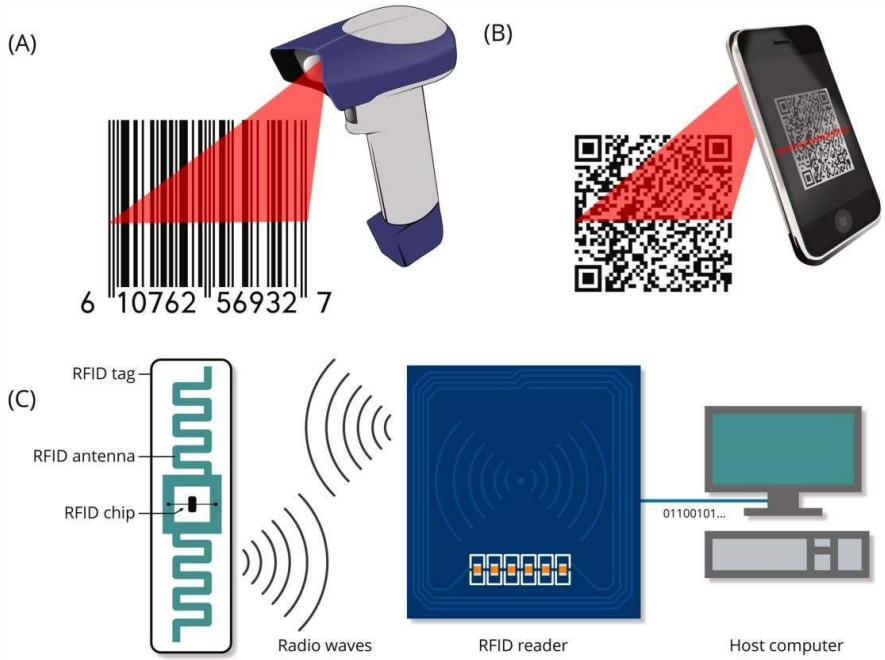


- The methodology is based on liquid droplets (called Janus emulsions) that can bind to bacterial proteins.
- This interaction, which can be detected by either the naked eye or a smartphone, could offer a much faster and cheaper alternative to existing food safety tests.
- These Janus droplets consist of two equally sized hemispheres, one made of a fluorocarbon and the other made of a hydrocarbon. Fluorocarbon is denser than hydrocarbon, so when the droplets sit on a surface, the fluorocarbon half is always at the bottom containing mannose sugar
- These molecules can bind to a protein called lectin, which is found on the surface of some strains of *E. coli*. When *E. coli* is present, the droplets attach to the proteins and become clumped together. This knocks the particles off balance, so that light hitting them scatters in many directions, and the droplets become opaque when viewed from above.

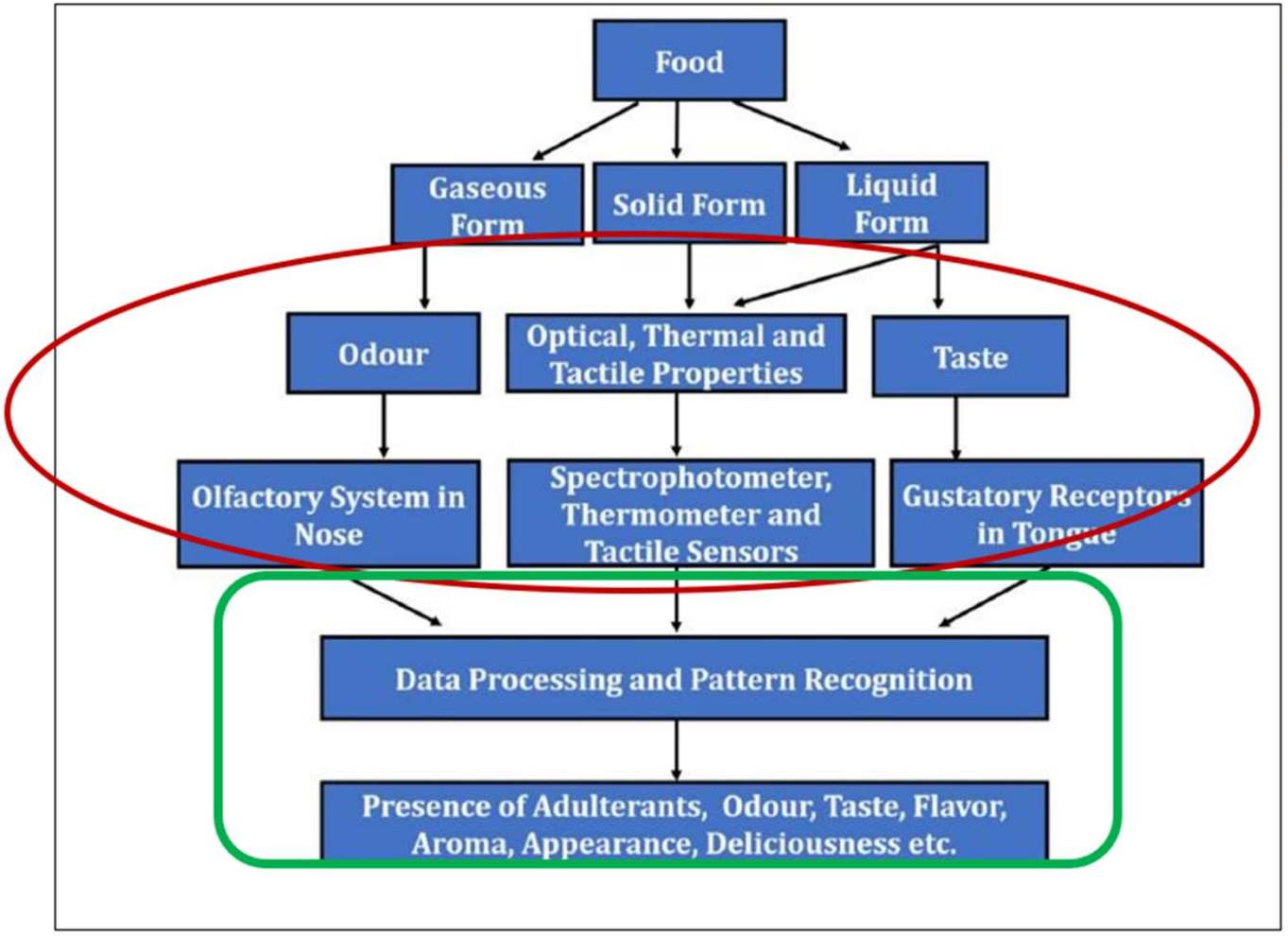
A new era of digital transformation in food recall and analysis is unfolding right before our eyes.

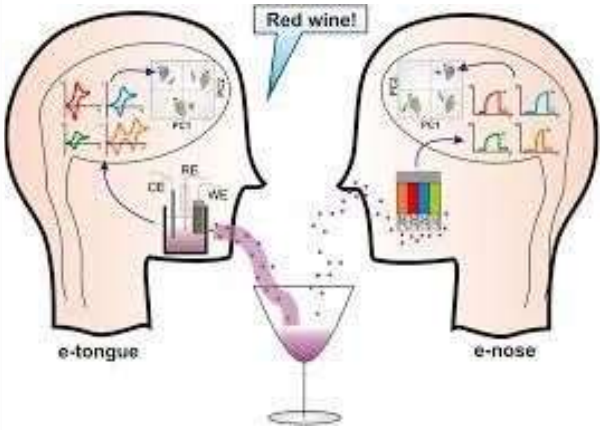
Technology is increasingly contributing towards food's journey from farm to fork ..

- Machine Learning,
- Deep Learning,
- Blockchains,
- Artificial Intelligence
- Satellite imaging
- Internet of Things (IoT).
  - Low-power wide area networks
  - ZigBee, Bluetooth, Wi-Fi,
  - Radio-frequency identification (RFID)

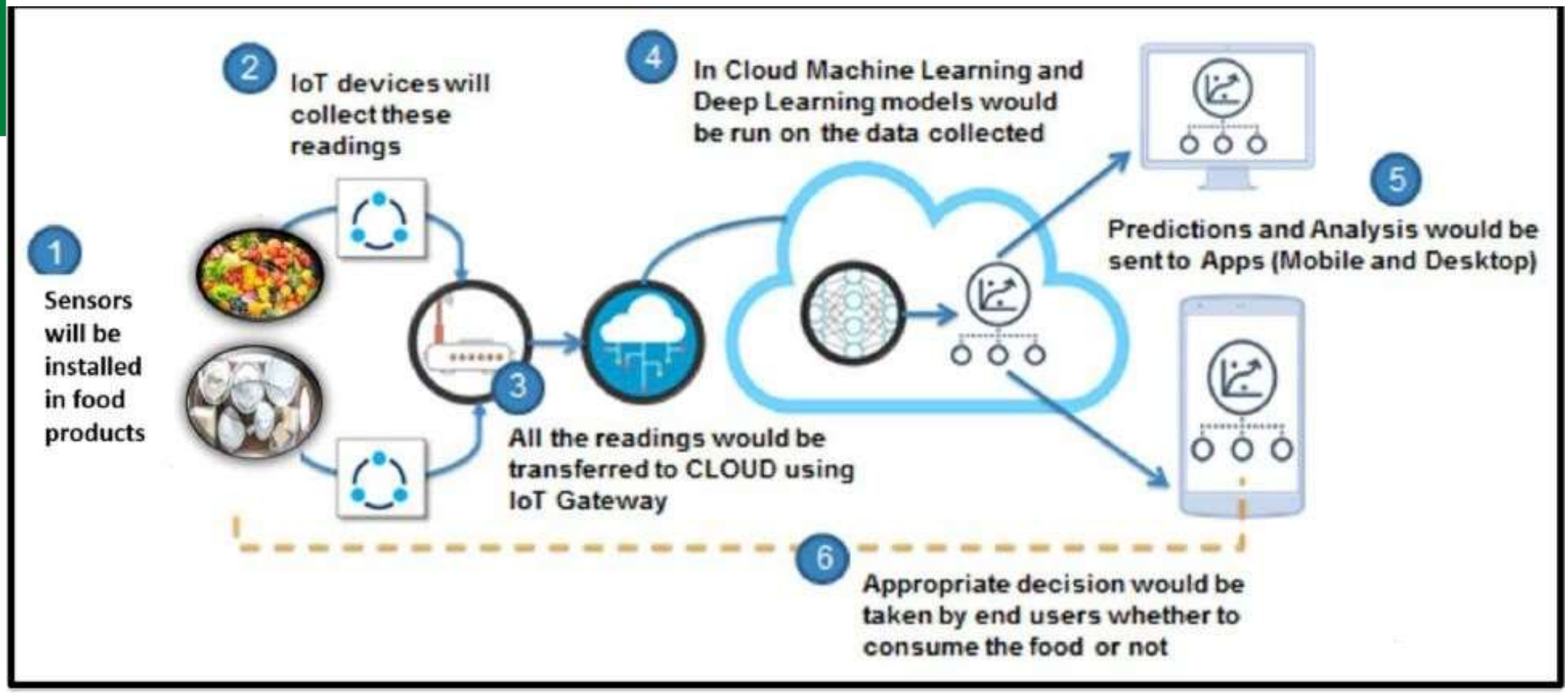


Digital transformation in food analysis





IoT Based Detection Methods



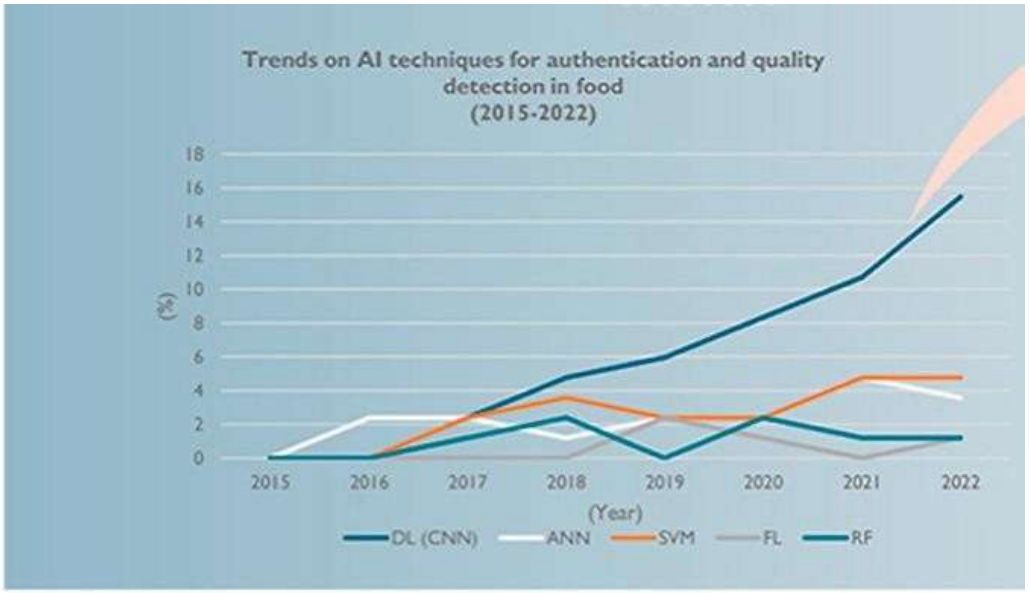
Recent advancement coupling AI techniques and sensors improves detection efficiency

Coupling of artificial intelligence with instrumental analysis

Devices
- Spectral scanning
- Camera
- Imaging
- Laser induced fluorescence

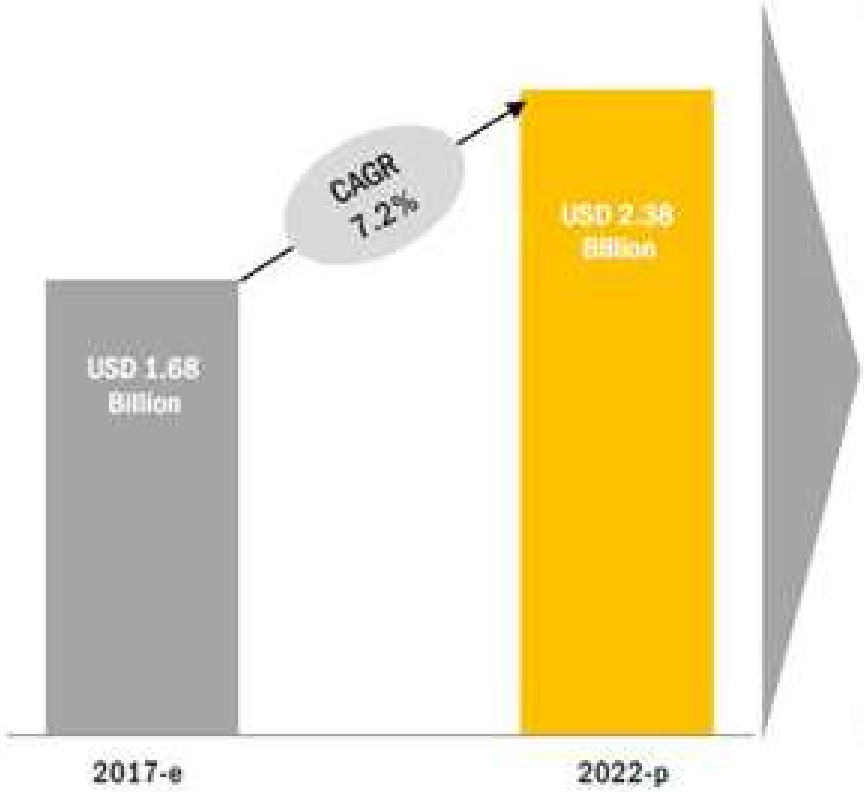
AI Techniques
- CNN
- ANN
- SVM
- FL
- RF

Food quality
- Adulteration detection
- Defect detection



Opportunity....

Emerging Countries to Drive the Growth of the Food Testing Kits Market



ATTRACTIVE MARKET OPPORTUNITIES

- The food testing kits market is estimated at USD 1.68 billion in 2017. It is projected to grow at a CAGR of 7.2% through 2022.
- The market growth is attributed to the following factors:
- Growth in demand for faster and reliable test results
- Stringent regulatory environment
- Advantages of test kits over other testing technologies

Any Questions ?


Thank
You