



# The analytical challenges of the future

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# European Commission - JRC



*Providing scientific evidence throughout the whole policy cycle*

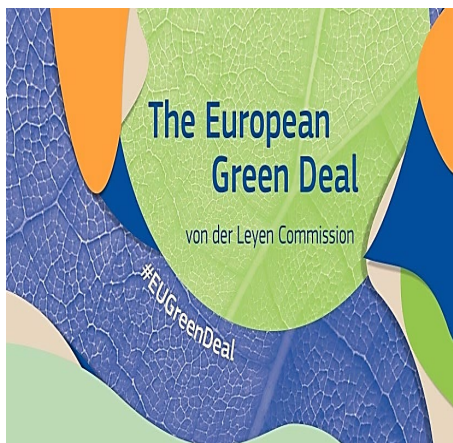
# JRC – Food & Feed Compliance unit



ENFADL



# Challenge for the future



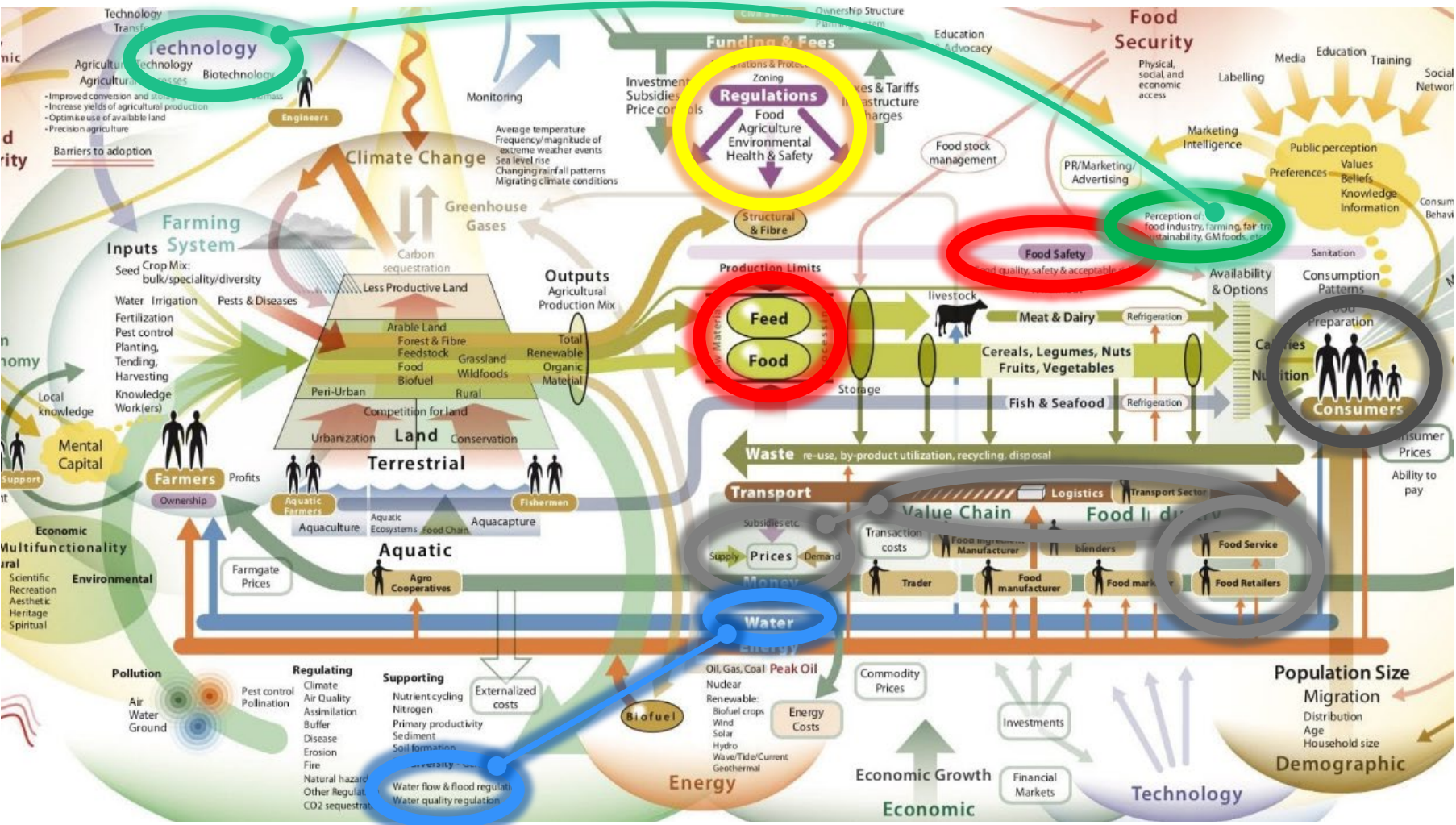
JRC Priority # 5 Moving towards sustainable food systems

JRC Portfolio Transition to **Sustainable Food Systems**  
in a European and Global Context (**SFS**)









# Food Safety

Known facts:

- Sustainability needs **food safety / food chain integrity** – Pre-requisites!
- Highest **safety standards** of the EU **food and feed chain**
- Food and feed safety (FFS) **crises** will continue to emerge

FS's contribution:

- Science data, **robust methodologies** and scientific advice
- Harmonised regulatory implementation, including **enforcement**
- Focus on **food packaging materials** – Current and novel, more sustainable
- Food **allergens** information to consumers
- Support to **standardisation**



# Project features – Food Safety

## Food Contact Materials

Official controls

Enforcement

FCM Regulation revision



## Safety of novel food

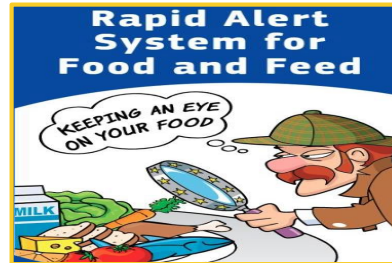
New proteins, traceability



## Food Allergens

European Network of Food Allergen Detection Laboratories

Support consumer choice (reliable FIC)



## Food crises response & Surveillance

Preparedness

# Market Authorisations

Preconditions:

- Sustainability counts on **food safety / food chain integrity** – Pre-requisites!
- Functioning of the **EU single market**, specifically for **food and water supply**
- **Substances and materials** to be placed safely on the single market  
⇒ prior **authorisation** needed!

MA's contribution:

- Compliance to EU food and feed legislation: **authorisations** and **official controls**
- **Regulatory science** for a safe use of materials in drinking water distribution
- Support to **standardisation**

# Project features – Market Authorisations

## GMOs - GM Food & Feed

Pre-market authorisations and official controls



## Drinking Water Materials

Acceptance and surveillance



## Feed Additives

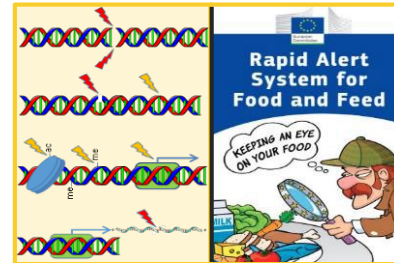
Pre-market authorisations and official controls

## Biotechnologies (NGTs)

Detectability, traceability, IAs

## Food crises response & Surveillance

Preparedness



# Implementation – Market Authorisations – Food Safety



## Skills

Analytical methods  
Validation for  
regulatory purposes

Robust science  
Proficiency testing  
RMs, Accreditation

Scientific advice in  
policy design and  
implementation



## Networks & Training



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## Standardisation



## Facilities

**EURL**  
European Union Reference Laboratory  
for GM Food & Feed

**EURL**  
European Union Reference Laboratory  
for Feed Additives

**EURL**  
European Union Reference Laboratory  
for Food Contact Materials



# Partners in the challenge at all levels



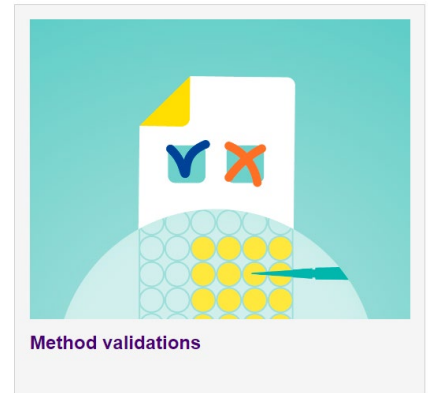
- JRC
- EU: DG SANTE, DG ENV, EFSA, ECHA
- Europe: Close cooperation with Member States and EEA countries competent authorities (NRLs – OCLs)

# Some concrete examples

- GMOs and upcoming NGTs:
  - CRMs
  - Methods
- FAs: Authenticity and traceability
- Insects as alternative source of proteins:
  - Safety?
- Allergens: can we remove the “may contain...”?
- Standardisation

# GMO analysis

## 1. Validated detection methods



## 2. Certified Reference Material for the GM event

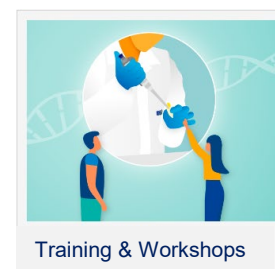
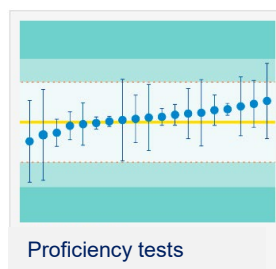
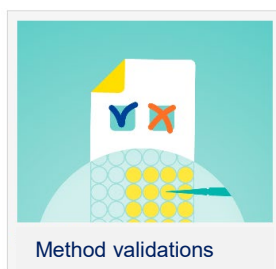


## 3. Official controls

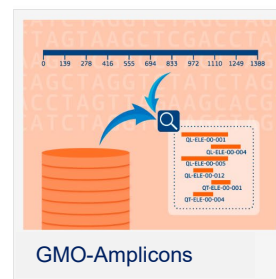
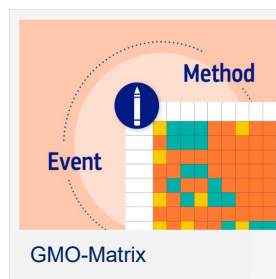


# What we also offer

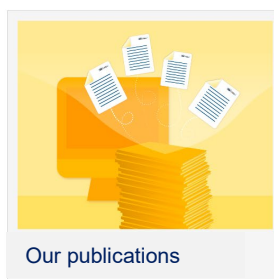
## What we do



## Tools



## Other information





# GMO analysis *ctd.*

## Certified Reference Material (CRM)

- Analytical measurements require **CRMs** for calibration or as control materials to ensure **reliability** and **comparability** of the measurement results
- For **each GMO application**, the applicant needs a CRM (ISO 17034) produced by:
  - Joint Research Centre (JRC), BE (35 GMOs)
  - American Oil Chemists' Society, US (47 GMOs)
- In principle, CRM production is also possible for NGT products
  - Uncertainty: **are CRM producers ready to face increasing demand?**

# GMO analysis *ctd.*

## EU food and feed control system

**REGULATION (EU) 2017/625** applies **among others** to:

- (a) **food** and food safety, integrity and wholesomeness at any stage of production, processing and distribution of food;
- (b) deliberate release into the environment of **Genetically Modified Organisms (GMOs)** for the purpose of food and feed production;
- (c) **feed** and feed safety at any stage of production, processing and distribution of feed and the use of feed;
- ...
- (h) requirements for the placing on the market and use of **plant protection products** and the sustainable use of pesticides;
- (i) organic production and labelling of **organic products**;
- (j) use and labelling of protected **designations of origin**, etc.

# The dual purpose of GMO analysis in the EU regulatory context

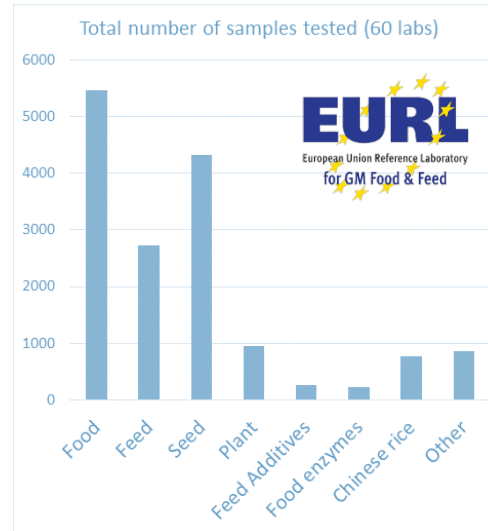
1. To **inform** and give the **consumer** a choice in buying (safe) GMO-containing products or not
2. To **identify** the presence of **unauthorised GMOs** which may potentially pose a safety risk for the consumer or the environment



# GMO control analysis in the EU



37 National Reference Laboratories and >100 official laboratories perform GMO analysis for law enforcement



Every year > **30.000** samples are analysed for GMOs, including food, feed, seed, plants, etc.



Twice as much **food** samples are analysed compared to *feed* samples

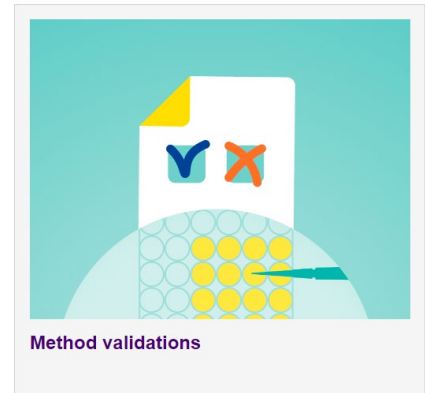
While the large majority of **food** samples tested are negative for GMOs, many of the *feed* samples contain GMOs and **are correctly labelled** as such, and occasionally unauthorised GMOs are detected.

**Conclusion: the EU GMO control system works well**



# GMO analysis: fit for NGT products?

## 1. Validated detection methods



## 2. Certified Reference Material for the GM event

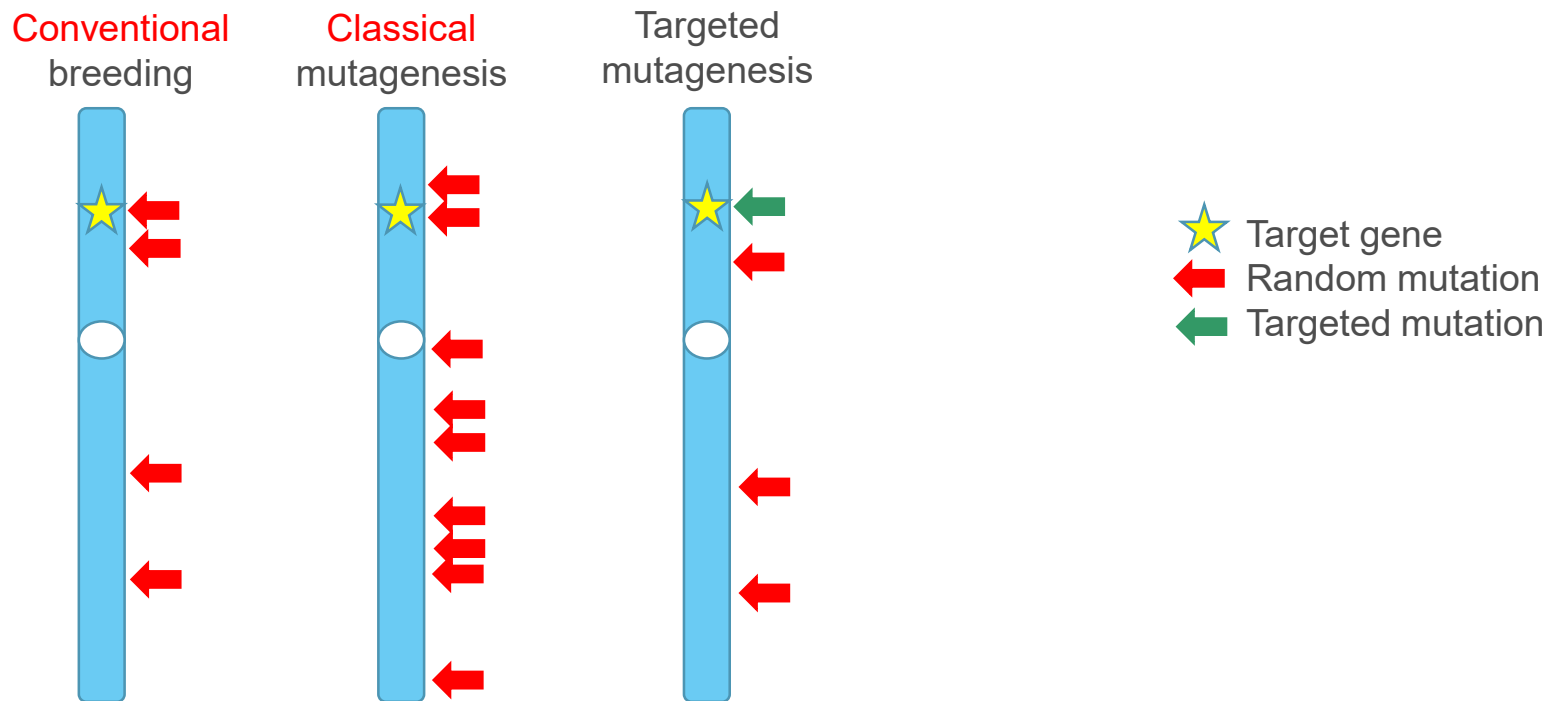


## 3. Official controls



# Specificity of methods for NGT products

- NGTs create mutations in the genetic material, *i.e.* in the DNA
- **Spontaneous alterations** in nature and conventional breeding may create **similar mutations** in the genetic material



# Validation of NGT products?



- An addendum to **Minimum Performance Requirements** guidance (MPR2) includes recommendations for the data requirements and validation of methods for the detection of NGT products (mainly if containing mutations of a few nucleotides)
  - Specificity tests: specifications on how to perform, on which materials, etc.
  - If more than one mutation: method for each mutation required
  - Technique update: MPR for digital PCR methods (before only for qPCR)

Remaining question:

What to conclude if same mutations already occur in nature?

# What do we know so far?

- Validation of methods for the detection of plants obtained with NGT is *possible*, but perhaps **not in all cases**
- Demonstrating the **specificity** of such methods remains the major problem and is opt for court disputes when applied for enforcement
- GMO analysis in official control laboratories may be *compromised* by the significantly increased number of (event-specific) tests per sample for NGT products
- **Unknown NGT products**, e.g. entering the market through imports, **cannot be detected** in routine analysis
- In case of emergencies, in-depth investigations using **NGS** may help to identify suspicious products



# Conclusions

- Main **challenge** for the future: ensuring **food sustainability**
- Main **analytical challenges**:
  - Continuous assessment of the **fitness for purpose** of the regulatory arsenal
  - **Developing and validating analytical methods** for emerging **novel foods, novel feed additives, food contact materials, products obtained by new genomic techniques, allergens**
- More than ever, **networking, collaboration** between organisations and use of **robust** techniques and data treatment necessary



Thank you for your attention