



European
Commission

Science for food

The European Commission plays a key role in developing and implementing sound food policies that protect the well-being of consumers and safeguard public health. Ensuring that safe food reaches our plates is a complex task involving diverse actors: farmers, food producers, retailers and control laboratory personnel among others.

The European Commission's in-house science service, the Joint Research Centre (JRC), supports the EU's work in securing the safety and quality of our food, promoting at the same time the sustainable use of resources.

Food safety

We want our food to be nutritious and tasty, but above all, safe. From the moment a food product is grown, harvested, manufactured, produced or processed, packaged and transported, until it finally reaches our plates, several safety issues must be addressed.

The JRC supports EU legislation with **scientific advice** on a great variety of areas ranging from chemical residue and contaminants, to food contact materials, feed and food additives such as sweeteners, colours, flavourings, or allergens. The JRC's activities underpin the work behind the 'from farm to fork' policy approach with validated methods, risk and exposure assessments, databases, reference materials, models, training courses and other scientific tools.

Thanks to the JRC's scientific support, consumers can be sure that the food they purchase in the European market has been tested to the most appropriate standards to guarantee that what they eat is safe.

National reference laboratories (NRLs) in EU Member States ensure the quality of food products. **EU reference laboratories** (EURLs) coordinate networks of NRLs and provide them with tools, reference methods, reference materials, proficiency-testing schemes, guidance and laboratory staff training. They support the creation of efficient



The JRC helps to make legislation to establish which substances manufacturers may use for the production of food contact materials and what their restrictions are.

networks of official control laboratories throughout the EU. The EURLs' work boosts the implementation of EU legislation by contributing to the harmonisation of compliance testing, by reducing the need to repeat tests, and by saving costs. As a result, consumers benefit from safe food products, and the EU's single market is strengthened. The JRC hosts six EU reference laboratories which work on food and feed related issues: four in the area of food safety control (heavy metals, mycotoxins, polycyclic aromatic hydrocarbons, and food contact materials) and two in the area of control as well as pre-marketing authorisation of certain products (feed additives and genetically modified organisms).

Food labelling

Around 17 million EU citizens suffer from **food allergies**, 3.5 million of them being less than 25 years old. Food products containing one or more of the top 14 allergens, such as eggs and milk, are required to have a label according to EU legislation. If those allergens are intentionally present, labelling is easy. However, cross-contamination



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may occur, for example, if the same machines are used for producing more than one food product. This results in the use of confusing 'may contain' labels. In order to reduce the number of these labels, the JRC develops and validates analytical methods supporting food control authorities to detect allergens in processed foods. These methods are intended to be used worldwide so that consumers can trust the labels on the food they buy.

Trustworthy labels are also crucial for people with food intolerances. **Intolerance to food products** varies from one individual to another. Some individuals cannot eat any gluten, for instance, others only very limited amounts. In order to correctly inform citizens, the EU sets levels below which a food can be sold as 'gluten-free' or 'low gluten'. The JRC assesses the comparability of the measurements in use to determine these levels via various analysis methods. Additionally, the JRC has produced internationally accepted guidelines for the validation of test methods for food allergens and gluten, helping to make reliable test kits available to individual consumers.

Information on labels is essential for a healthy and balanced diet. Labels on processed food products are obliged to display **nutrition information**. To help realise this goal, the JRC provides technical advice to national authorities in order to control whether the values shown on the labels are the real values in the food product.

Food authenticity

Food authenticity and quality are important for European consumers and businesses, as well as for trade relationships in the global market. Food fraud, such as the watering down of milk or wine, has existed for many decades. Certain products, for example olive oil, fish and honey, are particular targets of fraudulent activities.



Olive oil has been a target of fraudulent activity for many years.

To detect **food fraud**, the JRC develops widely accepted standard methods of analysis and best practices guides, underpinned by advanced measurement science to test food products for their authenticity. For example, since 1991 the JRC has managed the European wine databank on authentic European wines through the European Reference Centre for Control in the Wine Sector. Another example are the methods which the JRC has developed to detect and quantify so-called cocoa butter equivalents. According to EU legislation, chocolate can contain up to 5% of those equivalents. Because the equivalents are very similar to real cocoa butter, the JRC developed internationally validated methods to help Member States comply with the EU legislation. With these measures, the JRC protects the interest of consumers who need to trust what is written on food labels, whether they are produced locally or abroad.

A number of **goods imported** from foreign countries are classified in different categories, according to a specific set of rules in order to determine the custom duties. To this end, the JRC provides the custom administrations with expert advice related to relevant analytical methods

to determine the category of imported products. In some cases, such as the content of milk fat, an analytical method to test the products is not available. Administrations have to rely only on information provided by the companies. To tackle this problem, they have asked the Commission for guidance and testing methods including definitions for differentiating product varieties. The JRC carries out the development of those methods and provides additional scientific and technical tools. The availability of the methods fosters international trade, helps to resolve disputes and prevents the evasion of customs duties.

Healthy food

A **healthy diet** is crucial for living a healthy life. In Europe today, six of the seven biggest risk factors for early death can be related to our diets: high blood pressure, elevated blood cholesterol, high body mass index, inadequate fruit and vegetable intake, physical inactivity and alcohol abuse. While half of the world's food-related problems are linked to under-nutrition and nutrient deficiencies, the other half is related to over-nutrition and imbalanced diets. The JRC is providing scientific expertise in the field of nutrition, healthy ageing, overweight, and obesity-related health issues.



The JRC supports the EU's Action Plan against childhood obesity.

The JRC published a report in 2014 **mapping school food policies** across the EU. By mapping and detailing the school food policies throughout Europe, the JRC helps public health policy makers, educators and researchers to understand the status quo and use it as a starting point for targeted research and future intervention. The JRC's work highlights commonalities and differences between school food policies in the EU and gives quick access to source documents, facilitating knowledge exchange among experts in the field. <https://ec.europa.eu/jrc/en/research-topic/food-and-feed-safety>
<https://ec.europa.eu/jrc/en/research-topic/food-authenticity-and-quality>
<https://ec.europa.eu/jrc/en/research-topic/nutrition>
<https://ec.europa.eu/jrc/en/eurls>

Food security

More than 800 million people face hunger worldwide. Crises and natural disasters frequently aggravate the situation of vulnerable households already affected by poverty, social instability, diseases and hunger.

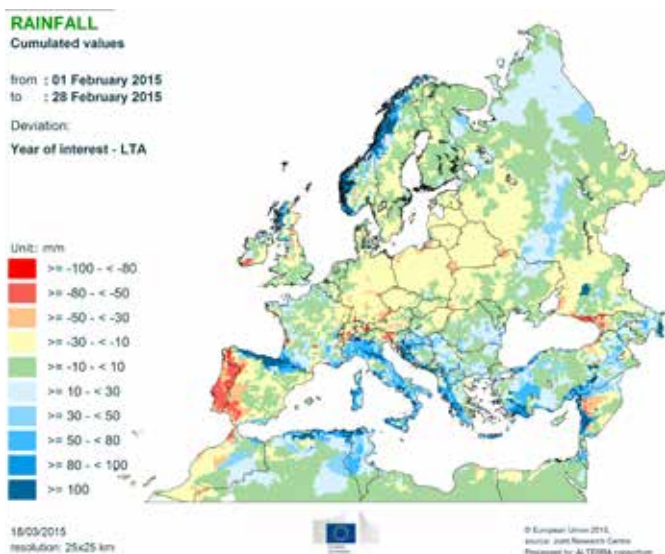
Food availability and prices, access to food and the allocation of resources all have an impact on food security. Environmental conditions such as low rainfall affect agricultural production and therefore the availability of food. Moreover, the food supply is expected to come under additional pressure because of the growing population. According to the Food and Agriculture Organization (FAO),

demographic growth and changes in diets and incomes are likely to cause demand for food to grow by 60% until 2050. The current outlook of increasing global demand is mirrored by significant uncertainties of supply linked to unpredictable economic, political, climatic and biological changes, e.g. new crop and animal diseases.



The JRC supports the European Commission's agriculture and food security policies by monitoring and economic analysis of agricultural resources and farm systems.

The JRC is at the forefront of international scientific developments on food and nutrition security information and analysis. To tackle the issue of food insecurity, it is developing several scientific tools for modelling, data management and monitoring. Planning and implementing development activities and emergency interventions to improve food security require detailed agricultural monitoring information. The JRC uses global data mainly based on satellite observations and meteorological information to **monitor seasonal agricultural performance**. It provides timely, detailed reports whenever crop production is affected by water or temperature stress, allowing for planning of palliative measures. The main JRC research activities in this area include: improving early drought detection and assessing its impact on agriculture; developing and disseminating tools to process and interpret large time series' of satellite data; improving agricultural statistics and carrying out impact assessments on adaptation of crop systems to climate change.



The long term average of cumulated rainfall between 1-28 February 2015 in millimetres.

Crop yields, among other variables, influence food prices. Those prices are likely to fluctuate, affecting the long-term competitiveness of agriculture. The JRC supports EU policy with simulations and modelling techniques for projections of the evolution of food markets worldwide. These tools can anticipate and guide policies which tackle food security issues on a global scale. Amongst others, the JRC is involved in the European Commission's annual exercise for the outlook of the main agricultural commodity markets in the ten coming years. These outlooks and their impact on EU farm income under a number of plausible (such as normal weather) and macroeconomic assumptions are compared to expert knowledge. The studies are used to calculate alternative scenarios and to analyse policy options.

To further support policy decisions, the JRC has also developed DataM, a unique tool to **compare the most relevant data sets** available worldwide on agriculture, trade and related models. This initiative aims to simplify the work of analysts and modellers using data from various reliable sources such as the statistical office of the European Union (Eurostat) and the World Bank. Over 250 datasets from 25 different original providers are accessible to analysts and modellers for the comparison of more than 120 variables and 350 commodities between all these datasets. DataM was complemented with DataMweb, a web application containing the most relevant and harmonised data on different sectors of the economy.

<https://ec.europa.eu/jrc/en/research-topic/agricultural-monitoring>
<https://ec.europa.eu/jrc/en/research-topic/global-food-security>
<https://ec.europa.eu/jrc/en/research-topic/crop-yield-forecasting>
<http://datamweb.com>

Fostering innovation for better food

In times of increasing concern over the planet's capacity to feed an ever-growing population, innovation in the food and feed supply chain offers solutions to help meet demand sustainably and ensure product safety and quality. The JRC is currently looking into new plant breeding techniques, nanomaterials, methods to support sustainable and efficient aquaculture, and next generation sequencing technologies for identifying food elements.

Plant breeding can help address the increasing food demand, the depletion of fossil resources and the impacts of climate change. It also supports the European bioeconomy policy by providing new plant varieties as feedstock for food and feed, biofuels and bio-based chemicals. The JRC constantly revises a list of new plant breeding techniques that might trigger changes to the EU definition of GMOs, and periodically updates a list of scientific publications, patents, EU field trials and data on commercialisation about most relevant new techniques. The JRC is also looking into the possible challenges in detecting the use of these new technologies in modified crops.

Aquaculture is well-regarded as a high quality and healthy source of food, contributing to global food security. It serves as an efficient alternative to wild capture fisheries, helping alleviate the high pressure on commercially exploited stocks. However, if fish adapted for breeding interbreed with wild fish, this could introduce unwanted genes in the native fish population and as a result, reduce their fitness. The JRC aims at improving competitiveness and environmentally-friendly production through genomics in the AquaTrace project. The project takes advantage of cutting edge genetic and genomic analytical approaches to develop reliable and cost-effective molecular tools for the identification of the genetic origin of both wild and farmed fish, as well as for the detection of interbreeding between farmed and wild stocks, which can be used

to help understand the effects of interbreeding on key fitness traits, namely survival and reproduction.

To ensure the quality of our food, DNA sequences are used to monitor food ingredients. Current methods to detect the composition of food require a priori knowledge. Next Generation Sequencing (NGS), on the other hand, does not require knowledge of the DNA beforehand, reducing significantly the time and cost required for sequencing experiments. NGS can be, for example, applied to research into the food composition of new and unknown GMOs, or to identify microbes in animal feed. The JRC established an in-house facility to monitor, analyse and store the impressive amount of results of experiments obtained via these new technologies. The JRC's initiatives are performed not only to monitor food composition, but also to prevent unwanted substances from entering the food chain.

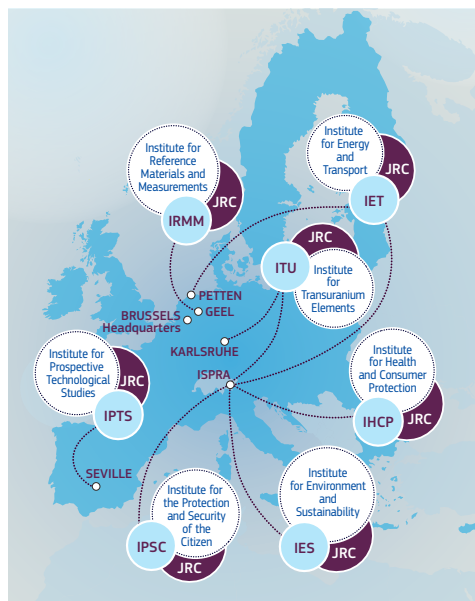
Another key area where the JRC uses advanced technologies is the area of **nanomaterials**. Nanomaterials are very small materials used in a variety of sectors, such as cosmetics and construction materials. The JRC is actively involved in research into nanomaterials safety, identification and detection, and in particular focuses on a science-based understanding of nanomaterial properties and effects, alongside development of improved measurement and testing methods. In addition, the JRC is providing scientific support to develop a harmonised definition of nanomaterials and is building up a repository and database consisting of test and research results. The database is used to provide policy support based on sound information and scientific judgement.

<https://ec.europa.eu/jrc/en/research-topic/nanotechnology>
<https://ec.europa.eu/jrc/en/research-topic/gmos>
<https://aquatrace.eu>

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Joint Research Centre

The European Commission's in-house science service



Serving society
Stimulating innovation
Supporting legislation

JRC mission

As the Commission's in-house science service, the Joint Research Centre's mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle. Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new methods, tools and standards, and sharing its know-how with the Member States, the scientific community and international partners.

Facts & figures about the JRC

- Established in 1957
- Around 3 000 scientific and technical personnel
- 7 scientific institutes
- 1 370 publications in 2014

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