TRACEABILITY FOR SUSTAINABLE FOOD SYSTEMS

Traceability for the Agrifood sector represents a strategic tool for R&D, Innovation and competitiveness. An adequate Metrological Infrastructure is at the basis of food traceability and is one of the key elements for trade, economic and social development. It allows to demonstrate and guarantee the quality of products and services, to promote the innovation of products and processes and to ensure the cognitive bases for decision-making. In addition to the improvement of production both in terms of quality and safety, strengthening the infrastructure of metrology allows the development of research in various disciplines related to Agrifood system with important impacts on Food Traceability.

European approach to food traceability

Traceability has been introduced in the European legislation on food safety as a key element of the "Rapid Alert System", to respond quickly to food safety/quality incidents thereby ensuring that consumer exposure to the affected product is prevented or minimised. Traceability - Reg. (EC) 178/2002 and 931/2011 is related to “the ability to trace and follow a food, feed, food-producing animal or substance intended to be, or expected to be incorporated into a food or feed, through all stages of production, processing and distribution”. Reg. (EU) No 1169/2011 on the provision of Food Information to Consumers (FIC) is strictly linked to the concept of traceability, with particular reference to the country of origin or place of provenance.

The existing EU traceability legislation is based primarily on the need to ensure food safety. It is set up on the concept of 'one step back – one step forward' along the food chain. In this context traceability is based on a documental approach aimed to identify for each Food Business operator its immediate supplier(s) and its immediate customer(s), except when they are final consumers. However, the traceability requirements need both documental and measurement data to foresee readily origin information, playing on the double meaning of the term traceability (Documental and Metrological). From a metrological point of view, to prove the food authenticity requires the availability of suitable Reference Materials and the development and validation of methods based on the use - even contemporary - of different analytical techniques (including: IRMS, LC-MS, GC-MS, ICP-MS, NMR, NIR, XRF, RT-PCR) with the application of multivariate
statistical analysis, and quantification and combination of uncertainty contributions.

Metrology permit to develop methods for obtaining traceability and demonstrate authenticity from measurements data.

**Consumer approach to food traceability**

Consumers today consider the origin of the product in the 5th place in the priority of purchase after taste, expiration date, appearance and price. It becomes a more important element of choice if it is associated with information on the characteristics of the production practices and site, such as: environmental quality, production technologies, highlighting the relationships with the quality and/or the identity of a product. To this end it is necessary to promote research to identify markers of quality and origin (geographical, botanical, of process) and to carry out a systematization of the information related to the territories and to the various products.

The existing traceability systems in the EU, in terms of "cumulative traceability for origin determination purposes" is related to the Country of Origin (CofO) and the Place of Provenance (PofP) **Regulation (EC) No 2913/92** and its integrations. CofO and PofP of a Food can be not the same as that of its primary ingredients. Where more detailed traceability systems exist, these vary between the different kind of foods and do not extend beyond a) the unprocessed food phase (i.e. slaughterhouses/packing plants), b) single ingredient products and c) ingredients that represent more than 50% of a food.

On the base of Art. 24 “Country of origin” means that “Goods whose production involved more than one country shall be deemed to originate in the country where they underwent their last, substantial, economically justified processing or working in an undertaking equipped for that purpose and resulting in the manufacture of a new product or representing an important stage of manufacture.”

"Place of provenance" means any place where a food is indicated to come from, and that is not the "country of origin".

On 2015 the Commission adopted a Report on mandatory indications of the Country of Origin And Place of Provenance regarding a), b) and c).

The analysis indicates that mandatory origin labelling would entail considerable increases in cost. Voluntary origin labelling generally tends to occur: 1. When there is significant interest of consumers; 2. Where traceability is feasible and at reasonable cost.
**Traceability challenges**

The issues related to the origin of productions are nowadays one of the metrology challenges for the agrofood sector. Particularly concerning geographical origin demonstration, the study of the relationships among the territory, the genotype and the specific characteristics of a product allows to deepen knowledge and perform integrated and interdisciplinary assessments of the agricultural ecosystem. It is possible to distinguish between “traceability of products”, based on the study of “markers of products” (namely characteristics of a given product or ingredient, that can be taken as a tracer in the finished product), and “traceability of process”, based on the study of “markers of process”. Traceability of products can be referred to both geographical origin and biological origin, with reference to the botanical and zoological origin. For this purpose, different kinds of markers can be used: chemical, biological and genetic. Some markers or characteristic patterns (fingerprints) can be strictly related to the biological origin or the agroecosystem of production, some others mainly to production factors, such as agricultural and zootechnical practices (e.g.: irrigation, fertilization, use of feedstuffs), climatic effects (e.g.: temperature, precipitations), geological (e.g.: soil composition) and geographical (e.g.: latitude, altitude, distance from the sea) parameters.

Research should permit to the production system to be “one step ahead” of the regulatory requirements, need to provide to the control system the adequate measurement tools and to the consumers the scientific evidence for making aware chooses of purchase and adopting correct food consumption practices. To invest in Food quality and safety means being able to place on the market products – or combinations of products – more sustainable and healthy and/or particularly appropriate for an increased consumption. In order to immediately convert Metrology approach in element of competitiveness with practical applications for the Food supply chain, it is necessary to promote information/education measures that allow consumers to make aware chooses towards value products, supported by an objective traceability system and regulation, laying the foundation that permit to establish the virtuous circle of supply and demand of more and more healthy and quality products.

Finally, considering the great importance of metrology for the agrofood sector, a proposal for a new pan-European Research Infrastructure for supporting metrology in food and nutrition has been submitted for the 2016 ESFRI call.