

TNO IN FOOD SAFETY



TNO innovation
for life

Efficient risk assessment of food and feed has become a challenging task. Products and production processes are increasingly complex, and the task of determining allergy risks and toxicological and microbiological hazards correspondingly difficult. TNO has developed a range of innovative, integrated methods for risk assessment and risk management, saving manufacturers and governments time and costs in these important areas. The organization also offers support in regulatory affairs and in product and policy development.

TNO is a strategic research partner. We develop innovations to consolidate and improve the level of safety in a changing world. As a world leader in safety assessment and risk management, we have a strong track record in the Netherlands, Europe and the USA. TNO develops advanced methods that allow manufacturers and governments to obtain rapid insight into the toxicological and microbiological safety of complex food products. Its work on allergenicity of proteins and peptides delivers more efficient assessment protocols and a better understanding of the factors causing allergenicity.

INTEGRATED APPROACH

TNO works from an integrated approach that enhances innovation and efficiency in food safety management. The organization has a broad expertise that ranges from microbiology and physical/

organic chemistry to modern genomics and modelling techniques.

TNO's ambition is to create a set of internationally-acknowledged assessment methods that accelerate product and policy development and increase accuracy, whilst reducing emergency response times for (re)emerging food incidents.

TNO offers food and feed manufacturers and governments tailor-made, advanced risk assessment and management support in five complementary areas:

- › Toxicological risk assessment
- › Allergy risk assessment
- › Crisis prevention and risk management
- › Inline detection
- › Microbiological investigation and management



INNOVATION AND EFFICIENCY IN FOOD SAFETY MANAGEMENT

TNO'S KEY STRENGTHS IN FOOD SAFETY

- › Strong track record
- › Advanced methods for risk assessment and management
- › Unique integrated approach
- › Tailor-made services

TOXICOLOGICAL RISK ASSESSMENT

TNO offers an integrated approach for the safety assessment of new food and feed ingredients and products: overall risks are determined combining toxicological and physical-chemical data with food consumption information.

For safety assessment of complex food matrices TNO has developed innovative methods based on the principle of Threshold of Toxicological Concern (TTC). The validity of the TTC principle for the safety assessment of known substances was supported by a recent EFSA opinion. For application of TTC to complex food contact materials, food or food ingredient mixtures where many unidentified substances may be present, further research and case studies are being developed.

ALLERGY RISK ASSESSMENT

TNO supports industry and governments in the assessment and prediction of allergy risks in new food products, infant nutrition, and in cases of possible contamination. Together with Utrecht University and the University Medical Centre Utrecht and in collaboration with other partners, TNO maintains the world's largest database on allergic responses.

TNO is the first in the world to develop a probabilistic approach for accurate qualitative and quantitative assessment and prediction of protein allergenicity. It takes into account a wide range of established and new hazard parameters: from protein resistance against digestive enzymes to amino acid sequencing in the protein's peptide chain—a marker for the risk of cross-allergic responses. At present, TNO offers qualitative protein allergy risk assessment based on single hazard parameters. Within a few years, overall quantitative risk assessment will be possible using multiple hazard parameters, and will offer the best available information on the allergenic potential of proteins.

TNO recently introduced another unique probability-based method that enables quantification of food allergy risks of allergens in food. In this approach, risks are calculated from data on allergen concentrations in foods, on food consumption and on the response of allergic patients to allergens. This information offers manufacturers guidance in the labelling of allergens and in the development of effective cleaning processes at production plants. It also allows for quantitative cost-benefit analyses for risk management procedures or attempt for improving cleaning procedures.





CRISIS PREVENTION AND RISK MANAGEMENT

TNO offers pro-active and tailor-made consultancy in risk management, based on advanced risk analysis methods, chain vulnerability assessment and expertise on supply chain management.

Recently, TNO introduced a unique Emerging Risk Identification Support service (ERIS) that helps to identify new and unexpected hazards and supports stakeholders make well-considered decisions at an early stage. ERIS, an intelligent information management system, offers valuable and cost-efficient support in risk management, issue management and product development. It helps identifying (re)emerging food or feed safety issues and potential crises, which helps companies and governments to prepare thoroughly and appropriately. ERIS was initially optimized as a tool for risk and issue management in the food and feed industry. Currently, TNO is adapting ERIS for new applications in early fraud detection and for product development—where it could be a useful tool in the selection of bioactive ingredients by manufacturers making products with health-benefit claims.

INLINE DETECTION

TNO offers an advanced tailor-made detection approach that enables food manufacturers to monitor product safety, quality and authenticity during processing—in cases of both known and unknown markers. This allows manufacturers to adjust production processes at an early stage, thereby optimizing product quality and safety. It also means they can check raw materials for authenticity: for example, the country of origin of specific meat and vegetables, or whether eggs have been produced by organically grown chickens. Inline detection results in improved, consistent product quality, reduced production losses, fewer product recalls and lower costs.

TNO's inline detection approach combines traditional and new assessment tools based on analytical chemistry, genomics and sensor technology. TNO can develop, on request and either or not in collaboration with partners, inline sensors, process and packaging control systems and non-invasive detection equipment for specific applications.



TAILOR-MADE RISK ASSESSMENT AND MANAGEMENT SUPPORT

INNOVATIVE METHODS TO SAVE TIME AND MONEY

MICROBIOLOGICAL INVESTIGATION AND MANAGEMENT

TNO offers tailor-made and state-of-the-art detection methods for complex microbiological issues in food products and processing. They give quick and detailed information on the presence and behaviour of both known and unknown micro-organisms.

New developments are initiated in collecting and comparisons of genome sequences of bacterial strains and linking genome information to phenotype information. This development is the basis of a novel risk prediction tool for specific pathogens. Such is translated to multi target detection systems gaining simultaneously strain information on reservoirs, antibiotic resistance, virulence, biofilm formation and transmission routes.



BUSINESS MODELS

Several business models are available that facilitate collaboration:

- › Consultation on risk assessment, risk management and regulatory affairs
- › Contract research
- › Co-development research

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HEALTHY LIVING

TNO initiates technological and social innovation for healthy living in a vital society.

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