

RECENT TRENDS IN APPLICATION OF MOLECULAR BIOLOGY BASED METHODS IN FOOD ANALYSIS

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For more than 15 years modern DNA-based techniques are used for official food control purposes such as the GMO detection. The invention of the polymerase chain reaction (PCR) a decade ago provided analysts with totally new tools for the specific amplification of the inherited material. Based on the high specificity of the PCR process, individual species/races/breeds can be distinguished. The PCR process is also very well suitable for automation and standardisation. Consequently, several PCR-based methods for various purposes such as species identification, GMO and pathogen detection are globally applied in food control and recognized as international standards (ISO). Recently, new DNA sequencing approaches have been developed, called 'Next-Generation Sequencing' (NGS). Due to the high demand for technologies that parallelize the sequencing process, producing thousands or millions of sequences concurrently, companies have developed respective instruments for ultra-high-throughput sequencing. NGS can be used both for metagenomics studies and the detection of sequence variations within individual genomes, e.g., single-nucleotide polymorphisms (SNPs), or structural variants (such as the 16S RNA). First applications have been also reported to identify microorganism and/or species-specific DNA in food samples. Beside those sophisticated applications, DNA molecules are also used as aptamers, single-stranded DNA or RNA molecules, which are able to form a tri-dimensional structure similar to antibodies, enabling those molecules to act according the same principles as antibodies, binding to specific domains on the surface of the antigen of interest. The presentation will give an overview about the current status and the capabilities of DNA-based methodologies suitable for food/feed control and will discuss it in the context of legal requirements and harmonisation among laboratories applying such technologies.

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