

WHOLE GENOME SEQUENCING: FOOD SAFETY MANAGEMENT TOOL AND PUBLIC HEALTH PROTECTION

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Food safety is a global concern, and consumers have the right to safe and nutritious food. However, the estimated annual burden of foodborne diseases at global level remains unacceptably high, including the related social and economic costs (hospitalization, loss of income, employment and market access). For instance, 600 million foodborne illnesses and 420,000 deaths from 31 major food safety hazards are reported annually at global level; in the USA around 48 million people acquire a foodborne disease each year, 128,000 are hospitalized, with 3,000 reported deaths; in the EU, around 400,000 confirmed human illnesses and 463 deaths from the five major food safety hazards (Listeriosis, Salmonellosis, Campylobacteriosis, STEC infections, Yersiniosis) are annually registered. Tracking the foodborne pathogens along the food chain, e.g. on farm – food processing – distribution – retail – consumer continuum is of utmost importance for prevention of foodborne outbreaks and facilitation of outbreak investigation. Whole Genome Sequencing (WGS) recently emerged as a new tool which offers great potential in the way we investigate, assess and manage microbiological food safety risks and illnesses. The use of WGS can facilitate the understanding of contamination/colonization routes of foodborne pathogens within the food production environment and can enable efficient tracking of pathogens` entering routes and distribution from farm – to – consumer. Therefore, WGS is a powerful tool for obtaining genomic data, which gives a higher level of resolution discrimination, i.e. better information about genetic similarity between isolates than conventional molecular typing such as Fluorescent Amplified Fragment Length Polymorphism (FAFLP) or Pulsed Field Gel Electrophoresis (PFGE); such molecular methods only determine if isolates are the same or different but not how closely related they are genetically. Implementation of WGS is likely to be beneficial for many countries in a foreseeable future, in support of food safety management systems and foodborne outbreak investigations.

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