

Scientific opinion on the application of Whole Genome Sequencing for the detection of foodborne outbreaks and bacterial risk assessment

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INTRODUCTION

Technological development of Whole Genome Sequencing (WGS) provides new opportunities for the identification of the causes of foodborne toxi-infections, the genotypic characterisation of antimicrobial resistance, the serotyping of pathogens and the exchange of data. At the same time, there are also a number of concerns about the implementation of WGS in the context of (inter)national surveillance and food safety management.

The following terms of reference are addressed in the opinion, with a focus on the Belgian context:

1. The benefits of using WGS for investigating outbreaks
2. The benefits of using WGS for bacterial food safety risk assessments
3. Interpretation of the link between contaminated food, human infections and the source of contamination in the food chain
4. Recommendations on the (further) implementation of WGS for managing food safety in Belgium
5. Validation of WGS methodology: importance, current status and expected evolutions
6. What is required to share WGS data in the context of food safety from a technical and organisational viewpoint

METHODOLOGY

The opinion is based on information available in scientific literature and on expert opinion.

The Scientific Committee (SciCom) is a consultative body established at the Belgian Federal Agency for the Safety of the Food Chain (FASFC). The SciCom occupies a central position in the assessment of the risks in the food chain by providing independent scientific opinion.

Draft opinions are prepared with the aid of working groups, including both SciCom experts and external scientific experts. In the context of this opinion, we would like to acknowledge all the members of the working group that helped with the preparation of the draft opinion: N. Botteldoorn (DGZ), V. Delcenserie (ULiège), L. De Zutter (UGent), A. Geeraerd (KULeuven),

L. Herman (ILVO), J. Mahillon (UCLouvain), M. Mori (Sciensano), N. Roosens (Sciensano), K. Van Hoorde (Sciensano) and B. Verhaegen (Sciensano).

RESULTS

WGS is becoming the preferred method for bacterial food safety investigations due to its high level of discrimination and the phasing out of various older typing methods at international level. Despite that, WGS methods and pipelines for data analysis are still continuously evolving and improving. WGS has been increasingly used in routine outbreak investigations and surveillance.

In this opinion, firstly the scientific background of WGS is described and the technology is placed in the broader context of other bacterial and molecular methods. In the second part, the terms of reference related to the implementation of this technology are addressed with a particular focus on the Belgian context. The opinion focuses on different foodborne pathogens, including *Salmonella*, *Listeria monocytogenes* and Shiga Toxin-producing *Escherichia coli* (STEC). These three pathogens are described in more detail because they are the primary, and actual, focus of the joint WGS database co-developed by EFSA and ECDC.

DISCUSSION

The Scientific Committee formulates several recommendations regarding the implementation of WGS in a Belgian context. To facilitate the transition to WGS for the analysis of food isolates, including AMR monitoring, a transition period can be implemented. This gives the labs time to gain experience and prepare sufficient infrastructure. Efforts should be made to validate the WGS methodology and to facilitate data sharing. It is recommended that WGS-based results regarding strain comparison in outbreak investigations be interpreted by a multidisciplinary team with sufficient expertise. It is recommended that a vigilant approach be adopted to the correct interpretation and communication of the responsibilities of the various actors (competent authority, food business operator, consumer) in case of an outbreak. It is thus important to communicate that zero risk in relation to bacterial food safety does not exist.

The complete opinion is planned to be available by the end of 2021, in Dutch, French and English, on the website of the Scientific Committee:

<http://www.favv-afsc.fgov.be/scientificcommittee/opinions/> > 2021