

SCIENTIFIC OPINION

Scientific Opinion on monitoring and assessment of the public health risk of “*Salmonella* Typhimurium-like” strains¹

EFSA Panel on Biological Hazards (BIOHAZ)^{2, 3}

European Food Safety Authority (EFSA), Parma, Italy

SUMMARY

Following a request from the European Commission, the Panel on Biological Hazards (BIOHAZ) was asked to deliver a Scientific Opinion on the monitoring and assessment of the public health risk of “*Salmonella* Typhimurium-like” strains. In particular, the Panel was asked to evaluate the analytical methods currently used and to advise on the appropriateness for identifying these strains; to propose a harmonised terminology for reporting which allows trend-analyses, comparison between Member States and with humans isolates, as well as to indicate if these strains should be classified as variants of *Salmonella* Typhimurium or as a separate serotype. Finally, the Panel was asked to assess the public health risk posed by these emerging strains, in particular to advise whether the public health risk, when detecting these strains in animals or food, should be considered similar, more or less important than (other) *Salmonella* Typhimurium strains.

The BIOHAZ Panel concluded that, within *Salmonella* Typhimurium-like strains, monophasic variants lacking the second phase H antigen (1,4,[5],12:i:-), encoded by *fljB*, appear to be of increasing importance in many EU Member States (MSs) and have caused a substantive number of infections in both human and animals bred for food. Strains lacking expression of the phase one flagellar antigens (e.g. *S.* 4,[5],12:-:1,2) or both (*S.* 4,[5],12:-:-) are also possible, but have not commonly been reported to be associated with significant disease in animals or humans. Therefore, for the purposes of this Opinion, only the monophasic variants lacking second phase H antigens were considered. Such variants have been referred to as ‘monophasic *S.* Typhimurium’ in this document.

With regard to the analytical methods currently used and their appropriateness for identifying these strains, the current standard methods (ISO 6579 and Annex D of ISO 6579) were considered suitable for isolation of monophasic *Salmonella* Typhimurium strains. Various genetic and phenotypic characteristics have been described for the identification and subtyping of such strains. For identification of the monophasic 1,4,[5],12:i:- variant, it is advisable to proceed with serotyping until

1 On request from the European Commission, Question No EFSA-Q-2010-00055, adopted on 22 September 2010.

2 Panel members: Olivier Andreoletti, Herbert Budka, Sava Buncic, John D Collins, John Griffin, Tine Hald, Arie Havelaar, James Hope, Günter Klein, James McLauchlin, Christine Müller-Graf, Christophe Nguyen-The, Birgit Noerrung, Luisa Peixe, Miguel Prieto Maradona, Antonia Ricci, John Sofos, John Threlfall, Ivar Vågsholm and Emmanuel Vanopdenbosch. Correspondence: biohaz@efsa.europa.eu

3 Acknowledgement: The Panel wishes to thank the members of the Working Group on *Salmonella* Typhimurium-like strains: Robert Davies, Beatriz Guerra-Roman, Ida Luzzi, Kirsten Mooijman, Luisa Peixe, Antonia Ricci, John Threlfall and Therese Westrell for the preparatory work on this scientific opinion, and EFSA staff: Frank Boelaert, Ernesto Liebana-Criado and Pablo Romero Barrios for the support provided to this scientific opinion.

a first negative result of agglutination after flagellar phase inversion, and then apply a PCR protocol in order to confirm the lack of the second phase antigen. Other methods such as phage typing and genotyping are used to confirm relatedness to *S. Typhimurium* and/or to further subtype these isolates. Accurate characterisation of monophasic strains is deemed important, since misidentification of a non-*S. Typhimurium*-related strain could result in unnecessary regulatory action. Similarly, failure to confirm identity of a *S. Typhimurium*-like organism could have significant public health consequences.

The Panel found that it is currently difficult to monitor trends in the proliferation of monophasic strains because of the inconsistent way in which they are reported by different organisations within and between EU MSs and internationally. To ensure complete consistency of reporting, all isolates of putative *Salmonella* should ideally be fully serotyped in accordance with the White-Kauffman-Le Minor scheme, and the full antigenic formula reported, as recommended by the WHO Collaborating Centre for Reference and Research on *Salmonella* i.e., in the case of monophasic *S. Typhimurium*, 1,4,[5],12:i:-. It was suggested that, whenever possible, as much detail of the antigenic formula as determined by testing should be provided and reported. If the full antigenic formula is not available but a phage type that is consistent with *S. Typhimurium* lacking phase two flagellar antigens has been confirmed, and the lack of the second phase flagellar antigen has been verified by PCR, then the term ‘monophasic *S. Typhimurium*’ is recommended for reporting purposes in the current situation.

It was further concluded that, on the basis of genetic similarity and ability to obtain a recognised *Salmonella Typhimurium* phage type, these emerging epidemic monophasic strains with the basic antigenic formula 1,4,[5],12:i:- are regarded as variants deriving from *S. Typhimurium*. Moreover, monophasic *S. Typhimurium* strains have been shown to have similar virulence and antimicrobial resistance characteristics to strains of *S. Typhimurium*. Similar to what has been observed in the past for epidemic clones of *S. Typhimurium*, recent studies in numerous countries worldwide confirm the rapid emergence and dissemination of such strains in food animals, companion animals and humans. The public health risk posed by these emerging monophasic *S. Typhimurium* strains is therefore considered comparable to that of other *S. Typhimurium* strains which have caused widespread epidemics of infection over the past four decades.

The BIOHAZ Panel made a series of further recommendations on typing, molecular methods, antimicrobial susceptibility testing and on monitoring the spread of these strains in EU MSs.