Optimising extraction and RT-qPCR-based detection of hepatitis E virus (HEV) from pork meat and products: Lay Summary

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Awduron: Martin D'Agostino, Nigel Cook, Liam O'Connor, Annette Sansom, Dima Semaan, Anne Wood, Sue Keenan Linda Scobie.
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Lay Summary

Hepatitis E is an infection of the liver caused by the hepatitis E virus (HEV). HEV infection usually produces a mild disease, hepatitis E. However, disease symptoms can vary from no apparent symptoms to liver failure. There are 4 main types (genotypes) of the virus that cause concern in humans. Genotypes 1 and 2 infections are mainly restricted to humans but 3 and 4 can be identified in numerous other animal species including pigs. Transmission routes of HEV genotypes 3 and 4 have been identified to include the consumption of food products derived from infected animals and shellfish, and via transfusion of infected blood products.

Hepatitis E infection is still an emerging issue in the UK and there is evidence to suggest an association of this virus with undercooked pork and pork products. Currently, there is no standardized method for evaluating the stability of HEV that may be present in food during cooking processes. There is also lack of a suitable method that can detect only infectious HEV.

The proposed project aimed to address a key gap in resources for methodology related to the detection of HEV in pork and pork products. Currently the lack of a standardised method for the detection of HEV has resulted in individual laboratories either utilising their own methods or adapting methods from previously published work. This leads to a high degree of variability between the interpretation of results and does nothing to progress or provide benefit to the food

industry. By interrogating the existing published methods, the project sought to refine and optimise elements of existing protocols in order to enhance the performance characteristics of the method and to simplify the methodology wherever possible. The aim was to produce a validated method which is both robust and repeatable which can be easily integrated into food laboratories capable of performing virus related work.

Overall, the final method chosen was devoid of hazardous reagents and utilised easily accessible equipment. To verify the robustness of the method, an international collaborative trial was performed, with 4 UK and 3 European participant laboratories. The participating laboratories conducted analyses of pork liver samples artificially contaminated with various levels of HEV (including uncontaminated samples). The trial showed that the HEV DETECT method was just as reproducible between laboratories as it was repeatable within a laboratory.

It is envisaged that the developed system will be put forward as a suitable candidate for ISO certification as a standard method. The establishment of these methods in UK laboratories could result in the availability of independent testing services for both domestic and imported pork /pork-based products. The availability of this method is in essence innovation. This work is essential to industry to help support further research to ensure that public health safety and confidence in pork and other “HEV risk” food products is maintained and improved.