Survival of SARS-CoV-2 on food surfaces: Lay Summary

COVID-19, caused by the SARS-CoV-2 virus, was first reported in China in December 2019. The virus has spread rapidly around the world and is currently responsible for 500 million reported cases and over 6.4 million deaths.

A risk assessment published by the Foods Standards Agency (FSA) in 2020 concluded that it was very unlikely that you could catch coronavirus via food. This assessment included the worst-case assumption that, if food became contaminated during production, no significant inactivation of virus would occur before consumption. However, the rate of inactivation of virus on products sold at various temperatures was identified as a key uncertainty, because if inactivation does occur more rapidly in some situations, then a lower risk may be more appropriate. This project was commissioned to measure the rate of inactivation of virus on the surface of various types of food and food packaging, reducing that uncertainty. The results will be used to consider whether the assumption currently made in the risk assessment remains appropriate for food kept at a range of temperatures, or whether a lower risk is more appropriate for some.

We conducted a laboratory-based study, artificially contaminating infectious SARS-CoV-2 virus onto the surfaces of foods and food packaging. We measured how the amount of infectious virus present on those surfaces declined over time, at a range of temperatures and relative humidity levels, reflecting typical storage conditions. We tested broccoli, peppers, apple, raspberry, cheddar cheese, sliced ham, olives, brine from the olives, white and brown bread crusts, croissants and pain au chocolat. The foods tested were selected as they are commonly sold loose on supermarket shelves or uncovered at deli counters or market stalls, they may be difficult to wash, and they are often consumed without any further processing i.e. cooking. The food packaging materials tested were polyethylene terephthalate (PET1) trays and bottles; aluminium cans and composite drinks cartons. These were selected as they are the most commonly used food packaging materials or consumption of the product may involve direct mouth contact with the packaging.

Results showed that virus survival varied depending on the foods and food packaging examined. In several cases, infectious virus was detected for several hours and in some cases for several days, under some conditions tested. For a highly infectious agent such as SARS-CoV-2, which is thought to be transmissible by touching contaminated surfaces and then the face, this confirmation is significant.

For most foods tested there was a significant drop in levels of virus contamination over the first 24 hours. However, for cheddar cheese and sliced ham, stored in refrigerated conditions and a range of relative humidity, the virus levels remained high up to a week later, when the testing period was stopped. Both cheddar cheese and sliced ham have high moisture, protein and saturated fat content, possibly offering protection to the virus. When apples and olives were tested, the virus was inactivated to the limit of detection very quickly, within an hour, when the first time point was measured. We suggest that chemicals, such as flavonoids, present in the skin of apples and olives inactivate the virus. The rate of viral decrease was rapid, within a few hours, for croissants and pain au chocolat. These pastries are both coated with a liquid egg wash, which

may have an inhibitory effect on the virus. Food packaging materials tested had variable virus survival. For all food packaging, there was a significant drop in levels of virus contamination over the first 24 hours, in all relative humidity conditions and at both 6°C and 21°C; these included PET1 bottles and trays, aluminium cans and composite drinks cartons.