The influence of water antimicrobials and low temperature storage on inactivating MS2 bacteriophage on whole strawberries.

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Foodborne illness caused by viruses such as Noroviruses and Hepatitis A (HAV) on fresh produce remains a concern worldwide. Raw and Ready-to-eat vegetables and fruits contaminated at the point of production serve as a vehicle for virus transmission. To help improve microbial safety, the survival characteristics of viruses on fresh produce during processing and storage should be investigated. This study aimed to evaluate commercial and home processing and storage practices of strawberries for inactivation of bacteriophage MS2.

The MS2 bacteriophage was used as a surrogate of Norovirus. Strawberries were spot inoculated to achieve 6.6 log PFU/g. The inoculated strawberries were washed for 90s using tap water, electrolyzed water (50 ppm free chlorine) or 50 ppm chlorine prior to and after following storage. After initial washing, the strawberries were separately stored at 4 °C for 2 days, or -20°C/-80°C for 30 days. Samples were processed, and the plaque assay was conducted to determine the population of MS2 remaining on strawberries on day 1, 15, 30 for -20°C/-80°C groups and day 2 for 4°C group. The results showed that washing strawberries prior to storage resulted in a significant decrease of MS2 population ($p<0.05$). Frozen and refrigerated storage had minor effects on inactivating MS2, which resulted in approximately a 0.5 log PFU/g reduction at the end of storage. No significant difference in MS2 population was observed between -20°C and -80°C storage($P>0.05$). After storage, washing berries in electrolyzed water or chlorine resulted in an additional 1 log PFU/g decrease in MS2 compared to no second washing. The level of inactivation was lower when water alone was used.

This study demonstrates that washing and low temperature storage have a limited effect in inactivating MS2 on strawberries. Regardless, it is recommended to wash strawberries using a water antimicrobial prior to consumption/further processing.