RESEARCH ABSTRACT

SWINE HEALTH

Title: Disinfection of foreign animal disease viruses on surfaces relevant to the Pork Packing Industry **– NPB #12-204** revised

Investigator: Luis Rodriguez

Institution: Agricultural Research Service, USDA, Plum Island Animal Disease Center

Co-investigator: Peter Krug

Support scientists: Michael LaRocco, Talina Davis, Cate O'Brien

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Scientific Abstract

In the event of an intentional or accidental incursion of a foreign animal disease (FAD) virus into the US, one concern to the meat production industry would be the potential contamination of packing plants by processing infected animals. FAD agents such as foot and mouth disease virus (FMDV), African swine fever virus (ASFV) and classical swine fever virus (CSFV) are found in swine products such as blood and feces and are present in the tissues of infected animals. Since packing plant sanitization is focused on the elimination of bacteria, not viruses, it is not known if the procedures and components used during plant disinfection are effective against FAD viruses. Further, because FAD virus research must take place in high containment laboratories, data for disinfection efficacy of these agents is limited. The discovery of suitable surrogate viruses would aid in the development of valid disinfection data and exclusion of ineffective biocides.

A previously developed disinfection assay was used to test disinfectants currently used by industry sanitarians, against FAD viruses dried on industry relevant surfaces. FAD viruses diluted in phosphate buffered saline were dried and then disinfected with the two commercial biocides or other common disinfectants with a predetermined 10-minute contact time. All tested disinfectants were effective against ASFV and CSFV dried on steel and plastic surfaces in the absence of swine organic products (e.g. blood, meat juice). The acid-containing disinfectant was effective against FMDV at the currently used concentration, but sodium hypochlorite-based disinfectant required concentrations of at least 1000 ppm for complete FMDV inactivation in the absence of organic material.

In additional experiments, FAD viruses were dried in fresh swine blood, meat juices and feces to model potentially contaminated swine products, then disinfected with the two commercial biocides or other common disinfectants. The activity of all the tested disinfectants was greatly inhibited by the presence of blood and meat juices in the dried samples. These data highlights the importance of pre-cleaning steps to remove organic material before surface disinfection. The acidic disinfectant was able to rapidly inactivate ASFV and FMDV in swine feces whereas the fecal material strongly inhibited 600 ppm and 1500 ppm sodium hypochlorite solutions.

Bare concrete surfaces induced cytotoxic and virucidal effects in our assays and thus could not be tested for disinfection; sealing the concrete with a commercial product rendered the concrete nonporous and suitable for disinfection. FAD viruses dried on sealed concrete were disinfected equally as well as on steel and plastic surfaces. Taken together, these results indicate that acid-based biocides will successfully disinfect ASFV and CSFV-contaminated nonporous surfaces in pork packing plants when the manufacturer's recommendations are followed. The hypochlorite-based disinfectant had levels of available chlorine too low for FMDV disinfection and was not effective in the presence of organic material. The selected acidic quaternary ammonia biocide is highly effective against FMDV when following the manufacturer's recommendations.

In addition, disinfection efficacy tests comparing FMDV with the closely related equine rhinitis A virus (ERAV) were performed to evaluate the latter as a potential surrogate. It was found that while ERAV compared favorably with FMDV in respect to disinfection with citric acid and the acid-based biocide, ERAV is considerably more sensitive to disinfection with hypochlorite-based biocides than FMDV. Thus, ERAV is not a suitable surrogate for FMDV.