Efficacy of an accelerated hydrogen peroxide disinfectant to inactivate porcine epidemic diarrhea virus in swine feces on metal surfaces

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ABSTRACT

This study tested the efficacy of an accelerated hydrogen peroxide (AHP®)-based disinfectant against porcine epidemic diarrhea virus (PEDv) in swine feces on metal surfaces. AHP® effectively inactivated the virus to low enough levels as not to cause clinical disease in live pigs.

BAKGROUND

PEDv, which is a single-strand enveloped RNA virus which is responsible for causing porcine epidemic diarrhea (PED) in pigs. A major route of transmission of this virus is through contaminated livestock trailers such as those used to transport pigs to harvesting facilities. Ideally, these trailers should be washed, disinfected, and dried completely at specialized facilities, but these facilities are not numerous enough to serve the large number of trailers used to support the swine industry on a daily basis. This study sought to determine whether a protocol involving removing organic matter, disinfecting, and drying could be used as an alternative to a full washing procedure for the elimination of PEDv in livestock trailers. Specifically, the authors evaluated the efficacy of AHP® against PEDv in the presence of feces on metal surfaces.

STUDY

Aluminum trays or "coupons" were used as a model for the surface of metal trailers, with small holes drilled into the bottom to simulate runoff. The study used 28 pigs, divided across 7 groups to vary the level of fecal contamination (5 mL or 10 mL), and disinfectant concentration (1:16 or 1:32), and to include control groups. Three-week-old pigs were inoculated with PEDv isolate for a separate experiment, but PEDv-positive feces from these pigs were used in this study. The feces were spread evenly over the aluminum coupons and the treatment groups were disinfected using foamed AHP®, which was allowed to sit for a contact time of 30 minutes at 20°C.

The researchers used a swine bioassay to evaluate whether the disinfectant had sufficiently inactivated the PEDv virus as not to cause illness in live pigs. Following treatment with AHP®, inocula from the coupons was administered to 7 groups of 4 pigs each. Fecal samples from the pigs were tested for concentration of active PEDv.

RESULTS

Swabs collected from coupons collected immediately after treatment with AHP® tested positive for PEDv, but swabs collected after the 30-minute contact time when

the 1:16 dilution was used tested either negative or suspect (none were positive).

Throughout the bioassay test, no pig developed clinical signs of PEDv infection. There was a significant difference in the incidence of PEDv between treatment groups and positive control groups - pigs who had been given inoculum from untreated coupons – indicating that the virus was sufficiently inactivated by the application of AHP®.

CONCLUSION

At a 30-minute contact time, AHP® successfully inactivated PEDv in the presence of feces on metal surfaces. Both the 1:16 and 1:32 concentrations were effective. Based on the results of this study, scraping livestock trailers to remove as much organic material as possible followed by disinfection with AHP® is a potential solution if a full professional wash is not feasible.

IMPLICATIONS FOR AHP®

The safety and efficacy profiles of AHP® help provide a scalable alternative to a full professional washing and drying procedure for livestock trailers. As the industry continues to grow, we can position AHP® as a solution to minimize the risk of PEDv contamination throughout this integral part of the swine industry.

REFERENCES

1. Holtkamp DJ, Myers J, Thomas PR, Karriker LA, Ramirez A, Zhang J, Wang C. (2017). Efficacy of an accelerated hydrogen peroxide disinfectant to inactivate porcine epidemic diarrhea virus in swine feces on metal surfaces. Canadian Journal of Veterinary Research. 81, 100-107.

TABLE 1

	Blank	100% Soil	TB US - 1	TB US - 2	TB US - 3	Prev. -1	Prev. -2	Prev. -3
5-Fluorouracil	< 5.0 ng	40.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng
Cyclophosphamide	< 5.0 ng	65.6 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng
Doxorubicin HCl	< 5.0 ng	30.6 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng
Epirubicin HCl	< 5.0 ng	431.2 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng
Etoboside Phosphate	< 5.0 ng	25.8 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng
Ifosfamide	< 5.0 ng	47.2 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng
Irinotecan HCl <	< 5.0 ng	45.6 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng
Methotrexate	< 5.0 ng	24.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng
Paclitaxel	< 5.0 ng	7.5 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng
Vincristine Sulfate	< 5.0 ng	40.8 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng	< 5.0 ng