Evaluation of truck cab decontamination procedures following inoculation with porcine epidemic diarrhea virus and porcine reproductive and respiratory syndrome virus

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Key Points

- Contamination of truck cabs has been observed as a key gap in biosecurity programs.
- The strategies evaluated in this research reduced, but generally did not completely eliminate, viral genetic material on truck cab interior surfaces.
- Efficient strategies to decontaminate truck cabs requires further validation.

Abstract

It is widely understood that transportation vehicles can serve as a potential vector of pathogen transmission within swine production systems for pathogens of concern such as porcine epidemic diarrhea virus (PEDV) and porcine reproductive and respiratory syndrome virus (PRRSV). This has been further confirmed with African swine fever virus within a large field investigation in 2019 and 2020 further supporting the need for robust cab sanitation procedures. The objective of this experiment was to evaluate several decontamination methods for mitigation of PEDV and PRRSV within truck cabs. A total of 3 full size truck cabs were modified for use in a BSL-2 research facility with multiple surface types including fabric, rubber, and plastic. Surfaces were inoculated with either PEDV alone, PRRSV alone, PEDV + an organic matter mixture of feces and dirt, or PRRSV + organic mixture. Practical decontamination methods were then applied using application with a pump sprayer or Hurricane fogger system, or the use of a commercially available gaseous chlorine dioxide system. Several differences were observed within different combinations of disinfectant and surface indicating that under the conditions of this study the ability for different disinfectants to reduce detection of PEDV and PRRSV genetic material differed depending on the surface being evaluated. In general, most disinfectant applications were only able to reduce the quantity of detectable virus, but not completely eliminate it from surface. Swine bioassay results were inconclusive, indicating further research is needed to identify and validate vehicle interior decontamination procedures.

Table 1. Effect of surface type, disinfectant, and virus on the detection of viral RNA during truck cab decontamination reported as cycle threshold and (# PCR positive / # samples).

Item	Surface type					
	Fabric		Plastic		Rubber	
	PEDV	PRRSV	PEDV	PRRSV	PEDV	PRRSV
No-disinfectant	34.6 (3/3)	37.2 (3/3)	26.7 (3/3)	30.6 (3/3)	26.7 (3/3)	31.4 (3/3)
Misting fumigation						
Intervention	33.4 (3/3)	38.2 (3/3)	28.1 (3/3)	31.6 (3/3)	34.2 (2/3)	36.7 (2/3)
Synergize	36.2 (2/3)	36.4 (3/3)	29.7 (3/3)	34.2 (3/3)	30.3 (3/3)	33.3(3/3)
Pump sprayer						
Intervention	34.8 (3/3)	37.5 (3/3)	28.3 (3/3)	31.3 (3/3)	28.8 (3/3)	32.0 (3/3)
Synergize	37.3 (2/3)	38.7 (3/3)	33.0 (2/3)	32.6 (3/3)	30.6 (3/3)	33.5 (3/3)
10% Bleach	40.7 (2/3)	45.0 (0/3)	26.7 (3/3)	31.2 (3/3)	41.2 (1/3)	45.0 (0/3)
10 hr downtime						
No chemical treatment	36.4 (3/3)	40.3 (2/3)	27.8 (3/3)	29.8 (3/3)	29.7 (3/3)	30.2 (3/3)
Gaseous treatment	36.8 (3/3)	44.4 (1/3)	28.3 (3/3)	31.9 (3/3)	28.6 (3/3)	33.2 (3/3)

Full article available at: Houston et al. (2024)