



Inactivation of two swine viruses on shoes by BioSec, a shoe-sanitizing station



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INTRODUCTION

- Enhancement of biosecurity measures is critical to prevent and control pathogen transmission in swine farms¹.
- Indirect transmission of high economic impact diseases such as those caused by Porcine Reproductive and Respiratory Syndrome virus (PRRSv) and Porcine Epidemic Diarrhea virus (PEDv) by shoes and other fomites, has been described^{2, 3}.
- BioSec (Fig. 1) is a shoe sanitizing station that combines Ozone + UVC (UVZone) technology and has been found effective against bacterial pathogens.
- We assessed the inactivation rate of PRRSv and PEDv on rubber soles and polyblend boot material by BioSec.



Fig. 1 BioSec, shoe-sanitizing station

MATERIALS AND METHODS

Materials tested: Rubber sole (Fig. 2) and Polyblend boot material (Fig. 3).



Fig. 2 Rubber sole material



Fig. 3 Polyblend boot material

Inactivation assessment:

- Coupons of rubber and polyblend boot material were contaminated with 40 µl of PRRSv or PEDv per coupon (Fig. 4).
- Four of the virus-spiked coupons were placed on the right side of the BioSec machine. An operator stepped on the left side of the machine to activate it for a standard time of eight seconds (Fig. 5).
- As control, four of the virus-spiked coupons were not treated with the machine.
- After treatment, coupons were removed aseptically, and the surviving virus was eluted from them using an eluent solution (3% beef extract-0.05M glycine).
- Serial 10-fold dilutions of eluates from treated and non-treated coupons were prepared in MEM and inoculated in monolayers of appropriate cells (MARC 145 for PRRSv and Vero 81 for PEDv) in 96-well microtiter plates.
- Virus titer was calculated by the Karber method and expressed as Log₁₀ TCID₅₀/sample after 7 days of incubation⁴.

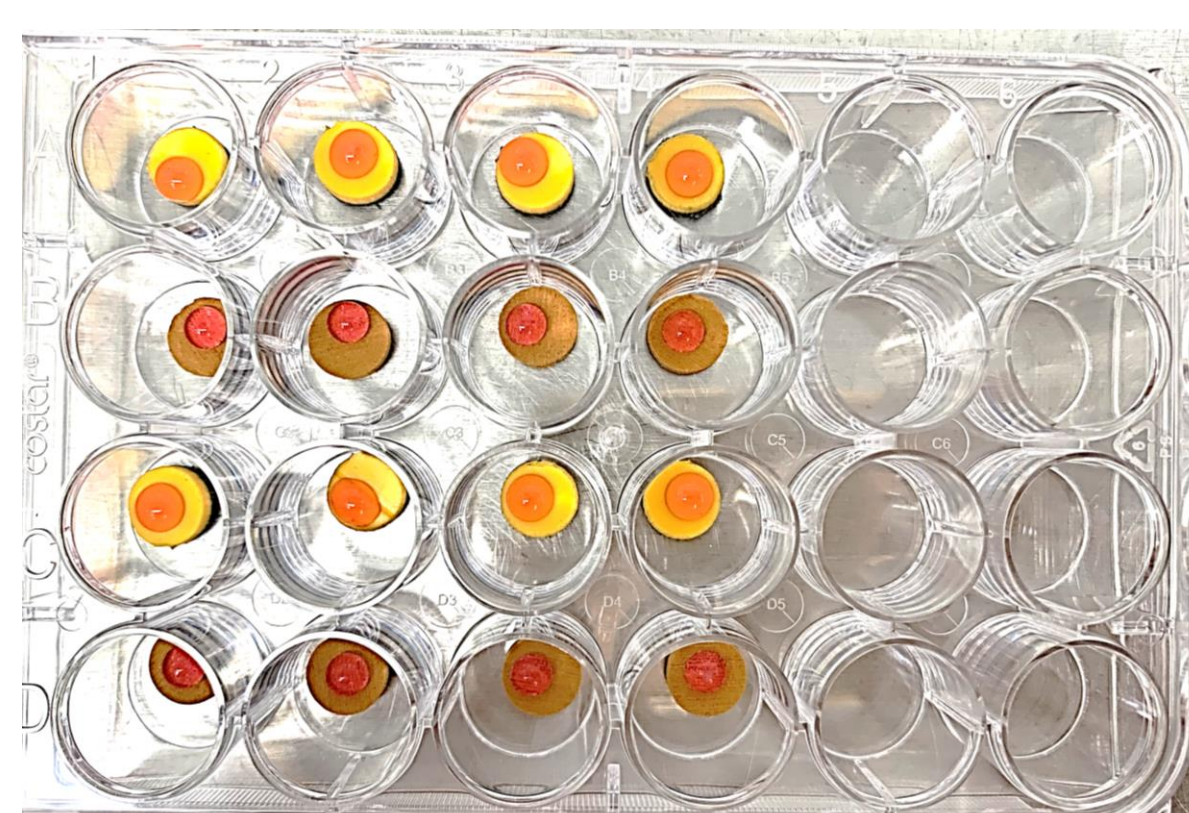


Fig. 4 Contaminated coupons



Fig. 5 BioSec with treated coupons

RESULTS

- Average virus titers for treated and non-treated coupons and the percentage of inactivation for each virus are shown in Tables 1 and 2.

Table 1: Inactivation of PRRSv by BioSec

Material	Log ₁₀ virus titer non-treated coupons*	Log ₁₀ virus titer treated coupons	% inactivation
Rubber sole Experiment 1	3.66	1.58	99.16
Rubber sole Experiment 2	4.91	2.58	99.54
Polyblend boot	4.99	1.50	99.96

*Virus titers are expressed as Log₁₀ TCID₅₀/sample

Table 2: Inactivation of PEDv by BioSec

Material	Log ₁₀ virus titer non-treated coupons*	Log ₁₀ virus titer treated coupons	% inactivation
Rubber sole	4.92	3.08	98.55
Polyblend boot	4.83	2.50	99.53

*Virus titers are expressed as Log₁₀ TCID₅₀/sample

- On an average, ≥ 99% of the PRRSv was inactivated on both rubber sole and polyblend boot material. In addition, an average of 98.55 % and ≥ 99% of PEDv was inactivated on rubber sole and polyblend material, respectively.

CONCLUSIONS

These findings demonstrate the efficacy of BioSec in inactivating swine pathogens on shoe materials and its potential use to enhance biosecurity practices in swine farms.

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