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# Pilot study for the application of Thermo-Assisted Drying and Decontamination to livestock transportation trailers and its effect on bacterial counts

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## Introduction

A new disinfection system, Thermo-assisted drying and decontamination (TADD) has been used in trailers for animal transportation. A recent publication provides information about the use of this system and its effect on the viability of PRRSV, but no bacteria has yet been evaluated using the TADD system.

The aim of this study was to evaluate the effect of TADD on the bacterial numbers of three different pathogens affecting both swine and human populations.

## Materials and Methods

Non-pathogenic F18 *Escherichia coli*, *Streptococcus suis* type 2 and *Salmonella typhimurium* were suspended in sterile PBS. The three bacteria were treated separately. Final titers were  $1.6 \times 10^{13}$  cfu/mL for *E. coli*,  $2 \times 10^{12}$  for *S. suis* and  $4.1 \times 10^{13}$  for *S. typhimurium*.

A large two deck trailer was used for this experiment. Using a 1.2 million BTU/hour diesel heater, hot air was forced into the interior of the trailer. The trailer was washed before the interventions. 1mL of the three bacterial suspensions was placed in ten sites in the trailer.

Bacteria were kept in sterile Petri dishes. Every dish was cut in three equidistant spots to allow the air to get into the plate. The trial consisted of two treatments; the first allowing the bacteria to stand in the trailer for 120 min with no TADD applied and the second, of which two replicates were done, using a similar approach and applying TADD for 120 min. After treatment, plates were wrapped, refrigerated and transported to the laboratory. Each plate was processed within 12 hours after the treatment was finished. Each sample was diluted (10-fold dilutions) to quantify cfu/mL. Sample dilutions were inoculated into solid media; colonies were counted after 24 hours of incubation at 37 C.

## Results and Implications

The average of bacterial counts for species and treatment after culture were converted into cfu/mL and results are shown in table 1.

Average cfu/mL for *S. suis* samples in treatment 2, replicate 1 were four logs lower than the cfu/mL of the control (treatment 1) while the average cfu/mL in

replicate 2 was six logs lower than the control (p-value 0.0000).

Counts from replicates 1 and 2 for *E. coli* were consistently lower than counts in the control, two and five logs (p-value 0.0003), respectively.

The average of the ten samples from replicate 1, for *S. typhimurium*, was 4 logs lower than the control. Replicate 2 averaged 2 logs less than the control (p-value 0.0019).

**Table No. 1** Averaged results per treatment.

Species/Treatment	No TADD	TADD (1)	TADD (2)
<i>Streptococcus suis</i>	$1.78 \times 10^{10}$	$2.32 \times 10^6$	$2.03 \times 10^4$
<i>Escherichia coli</i>	$9.13 \times 10^{10}$	$9.5 \times 10^8$	$7.58 \times 10^5$
<i>Salmonella typhimurium</i>	$4.93 \times 10^{11}$	$2.55 \times 10^7$	$8 \times 10^9$

More replicates would be necessary in order to draw definite conclusions about the effect of the TADD system on the viable counts of the three different bacteria tested in this trial. However, based on the results of this pilot study it can be said that the application of the TADD treatment decreased the number of cfu/mL in at least two logs compared to the control. Therefore, under these conditions the TADD system was capable of killing at least 99% of bacteria present in the samples in 12 out of 90 cases. Although some important reductions in viable counts were seen, it has to be noted that there were still viable bacteria in most of the samples after applying the TADD system, suggesting that a total disinfection of common bacterial pathogens cannot be obtained in this way.

## References:

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