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SDEC Partners Research Update

Project Update: Stability of PEDV on fomites

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Background

- Porcine epidemic diarrhea virus (PEDV) spread rapidly after being diagnosed in the US for the first time in April of 2013.
- Flexible Intermediate Bulk Containers (aka: FIBC or “tote bags”) have been suggested as a means of introduction of PEDV into the US. PEDV has been shown to remain stable in the woven material for 10 weeks at either 4C or -80C, and at room temperature for 5 weeks (USDA risk analysis report).
- There is limited information on the stability of PEDV on fomites commonly used in swine farms.

Objective

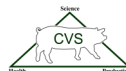
To assess the stability of infectious PEDV on different fomites and under different temperatures

Methods:

- Porcine epidemic diarrhea virus strain (PEDV USA/Colorado/2013) was propagated on Vero76 cells for 16 passages and used as virus stock.
- To test the viability of virus on fomites, small pieces of fomite materials ($\sim 1 \text{ cm}^2$) were cut to fit into individual wells of 24-well plates. Materials used for the experiment were: styrofoam, cloth coverall, nitrile gloves, rubber, plastic, cardboard, Tyvek coveralls, aluminum foil and metal.
- Cell culture propagated PEDV was applied on each type of material ($2.11 \times 10^6 \text{ TCID}_{50}/\text{ml}$) in triplicate, and on a 24-well plate without any fomite material to serve as control. The virus applied on the fomites was air dried for 2 hours at room temperature and then maintained at either 4C or room temperature. Samples for virus titration were eluted from the fomite material at various times after inoculation (0, 1, 2, 5, 10, 15, 20, and 30 days). Eluent samples were titrated for infectious virus immediately after collection.



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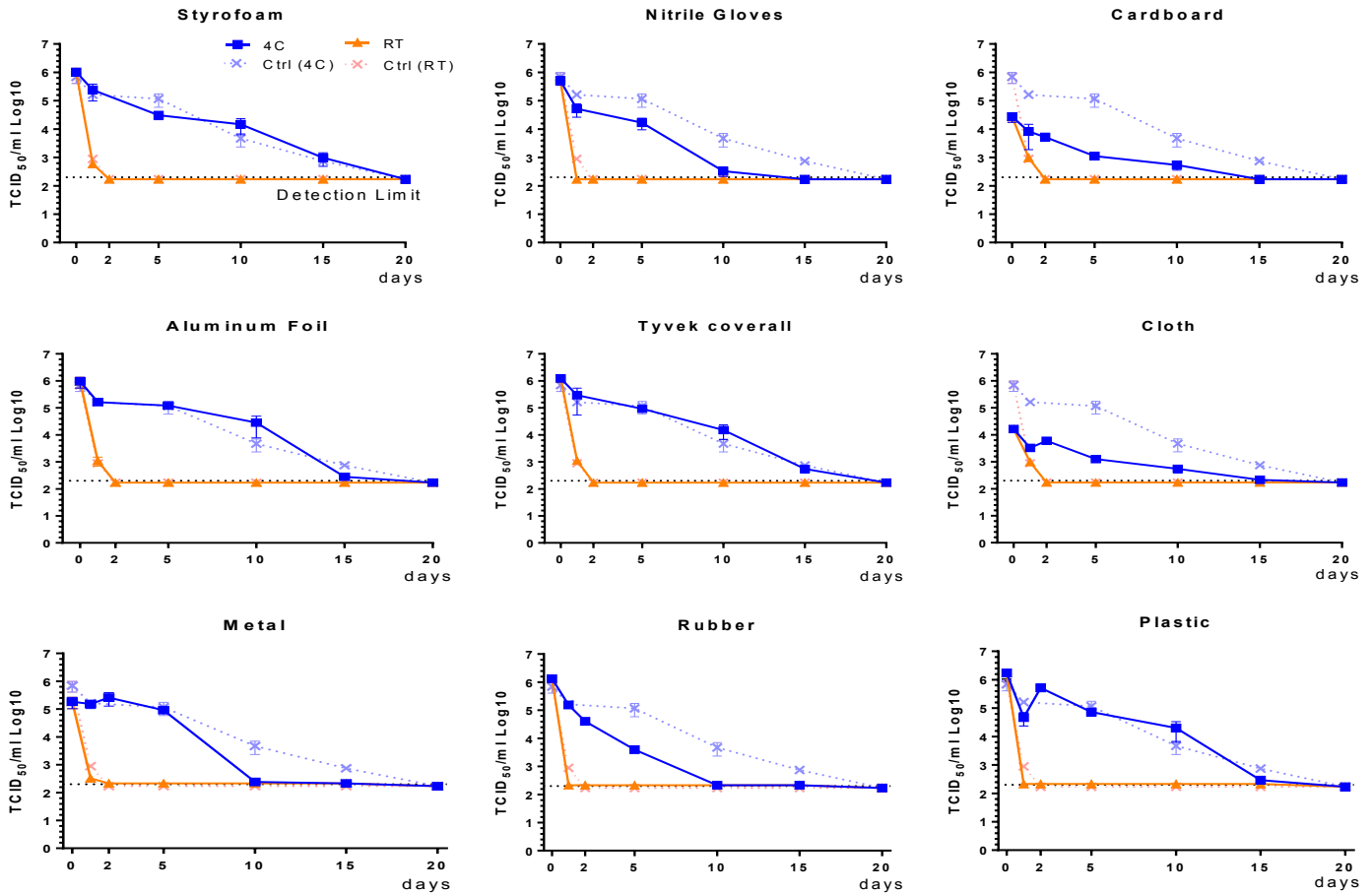


Results

Decline of viral infectivity was relatively rapid on fomites at room temperature but not at 4°C.

- ⇒ PEDV on styrofoam, aluminum foil, Tyvek coverall, and plastic materials were recovered for 15 days at 4°C and were undetected after 20 days post inoculation.
- ⇒ PEDV on nitrile gloves, cardboard, cloth, and metal stored at 4°C could be detected for 10 days.
- ⇒ However, no infectious PEDV was recovered after 2 days post inoculation at room temperature (20-26°C) on all fomites tested.

Graphs show the log₁₀ value of TCID₅₀/ml (± SEM) of PEDV on different fomites.



Conclusions

- ⇒ PEDV can remain infectious for prolonged periods at cool temperature.
- ⇒ Stability of infectious PEDV in various fomites was documented to range between at least 10 to 15 days, with viability being longer in Tyvek coverall, styrofoam, plastic, and foil paper materials.
- ⇒ However, PEDV infectivity declined quickly at room temperature on all fomites tested. The titers of PEDV on fomites stored at room temperature decreased by 4 logs within 2 days post application, to below detection levels.
- ⇒ In conclusion, fomites may be implicated in the dissemination of PEDV, in particular under cold temperatures.