



Comparative Analysis of Sugar Stabilizers on Stability of Thermo-Tolerant *Peste des petits Ruminants Virus* Vaccine

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Introduction

- ❖ *Peste des Petits ruminants* (PPR) is an acute and contagious viral disease of small ruminants (Chowdhury *et al.*, [2014](#))
- ❖ This disease is mainly transmitted through close contact between infected animals and susceptible native animals
- ❖ PPR disease leads to annual losses of up to USD 2.1 billion worldwide
- ❖ The disease is endemic in ASALs where temperatures are high
- ❖ The current conventional PPRV vaccines are thermo-labile and require to be kept at 2°C - 8°C (Parida *et al.*, 2015)
- ❖ The adoption of a thermo-tolerant vaccine will increase shelf life of the vaccine for use in ASALs

Objectives

Overall objective

- To evaluate on the thermo-stability of live attenuated thermo-tolerant PPRV vaccines.

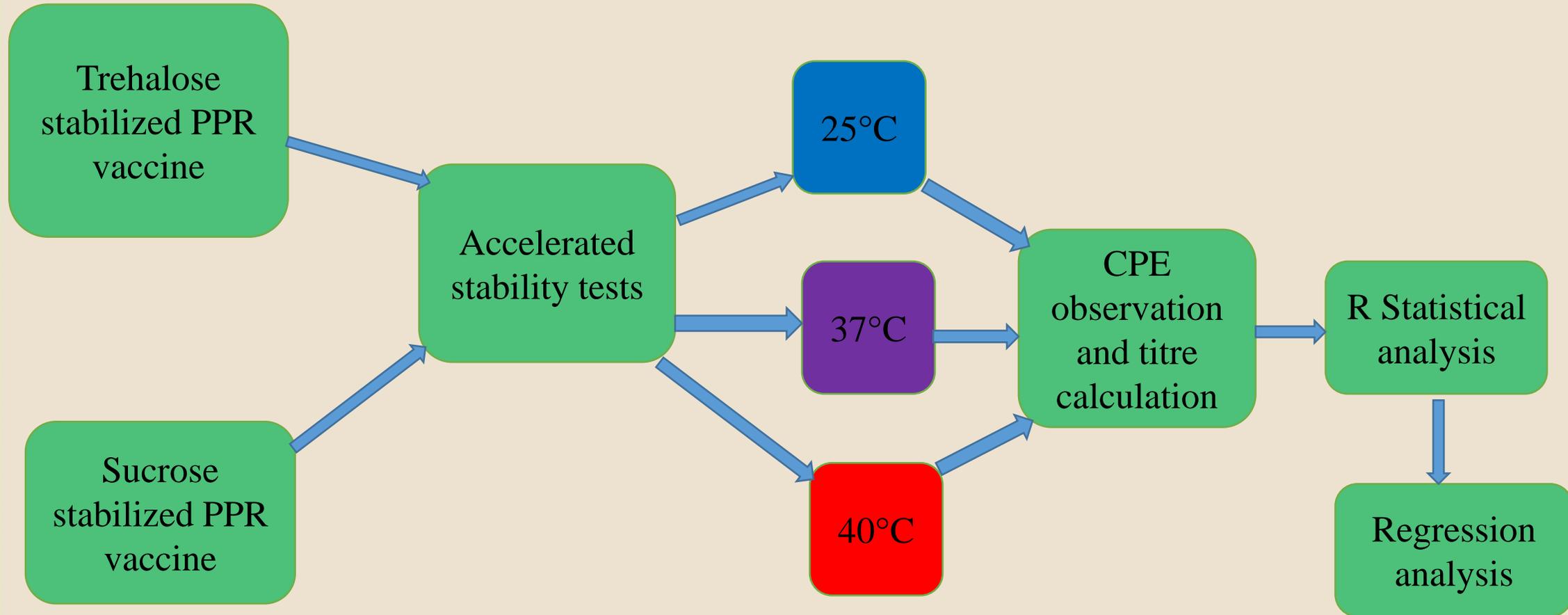
Specific objective

- To determine the thermo-stability of different thermo-tolerant PPRV vaccines at various temperatures *In vitro*.

Materials and Methods

- ❖ Two PPRV vaccines with 10% Trehalose and Sucrose as stabilizers were prepared using Xerovac method.
- ❖ Viral infection dose for each batch was calculated using Spearman Karber Formulae (Karber G, 1931) as TCID₅₀.
- ❖ Vero SLAM cells cultured in DMEM were infected with the 2 vaccines and incubated at different temperatures.
- ❖ Cytopathic effect was observed on a one day interval for 21 days.
- ❖ Viral titre values were calculated using Spearman Karber Formulae.

Materials and Methods



Results and Discussion

- Degradation curves for sucrose stabilizer at 25°C, 37°C and 40°C, respectively.

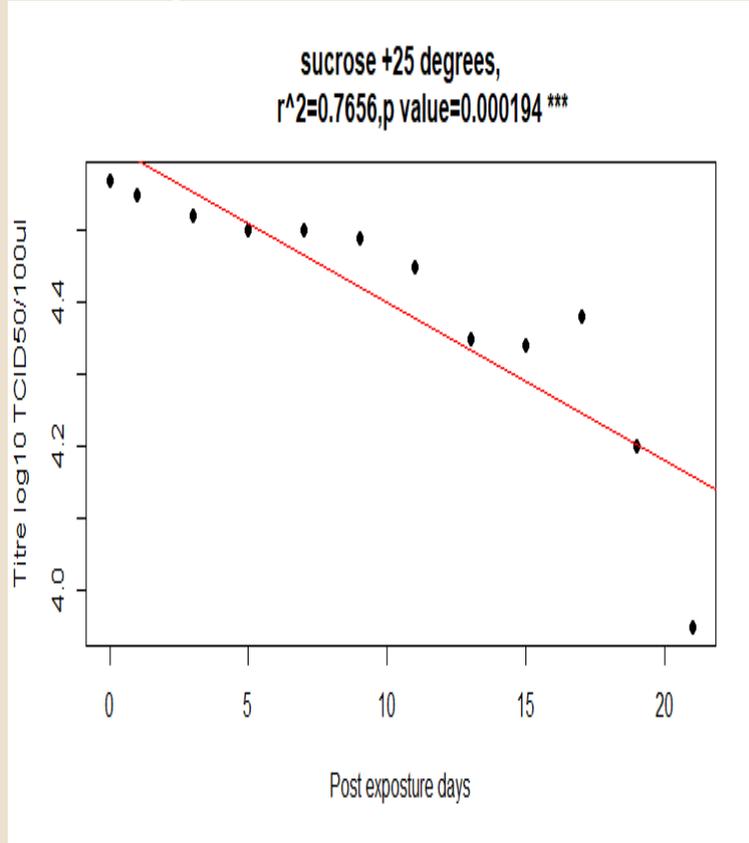


Figure 1: Degradation curve of Sucrose at 25°C

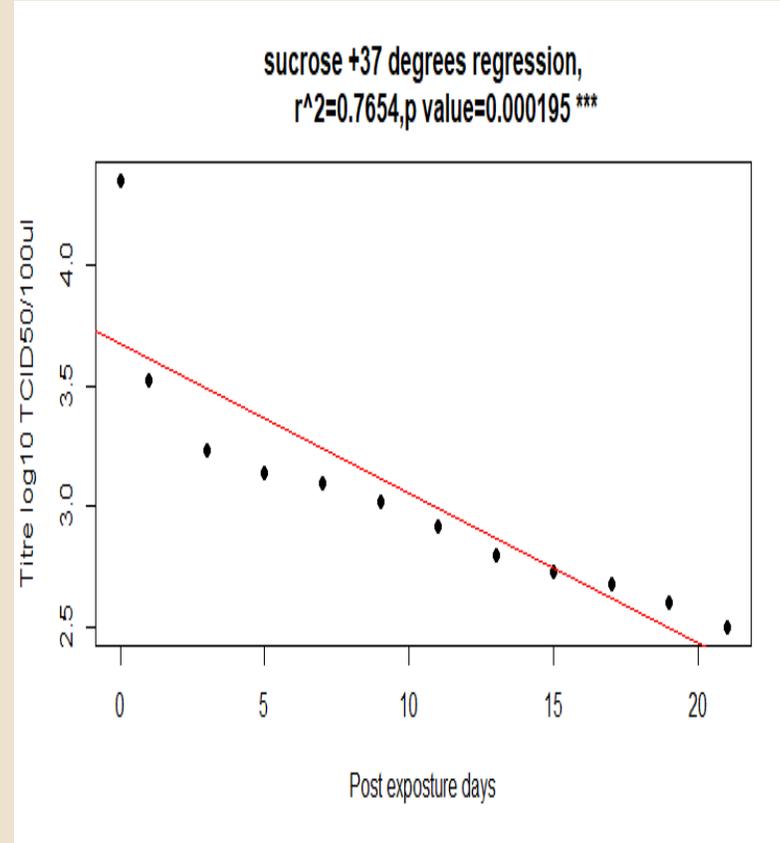


Figure 2: Degradation curve of Sucrose at 37°C

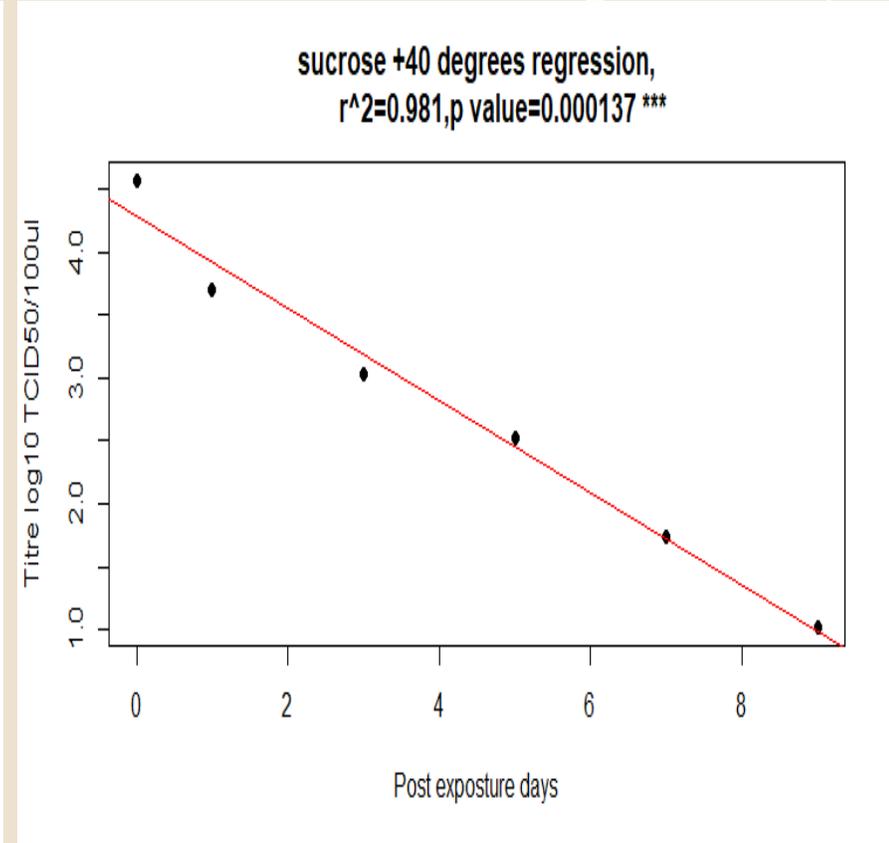


Figure 3: Degradation curve of Sucrose at 40°C

Results and Discussion

- Degradation curves for trehalose stabilizer at 25°C, 37 °C and 40 °C , respectively.

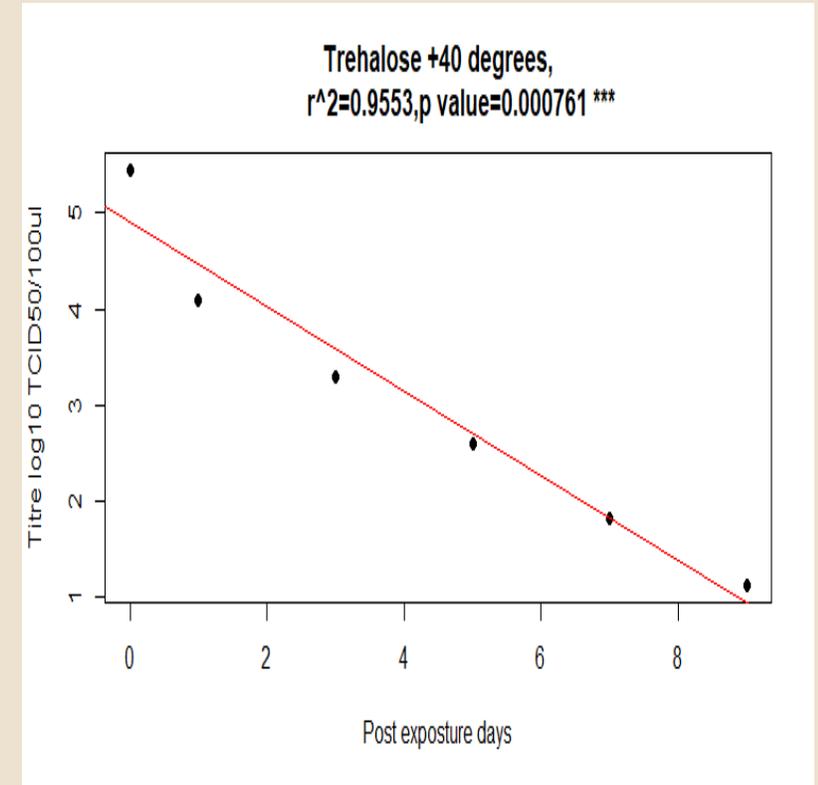
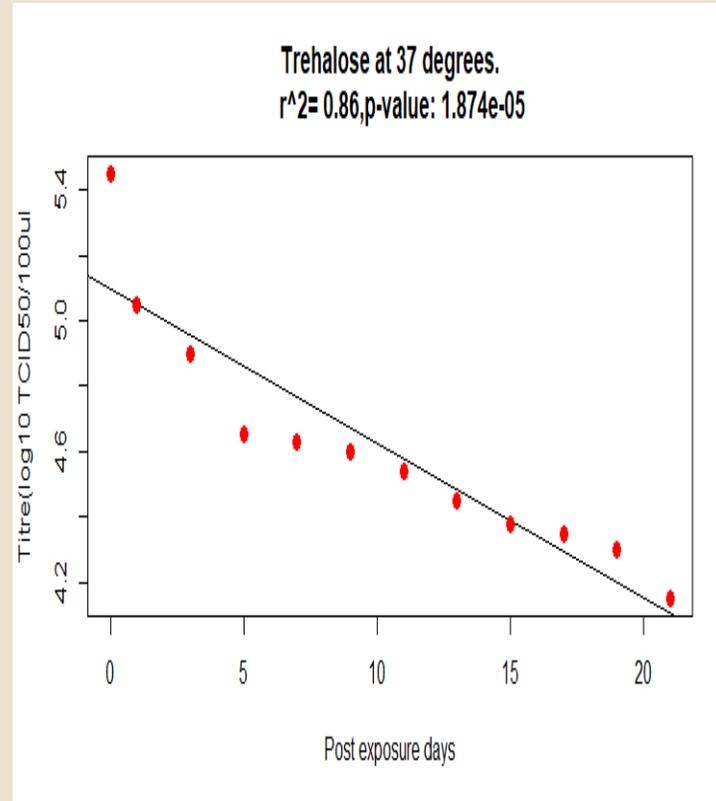
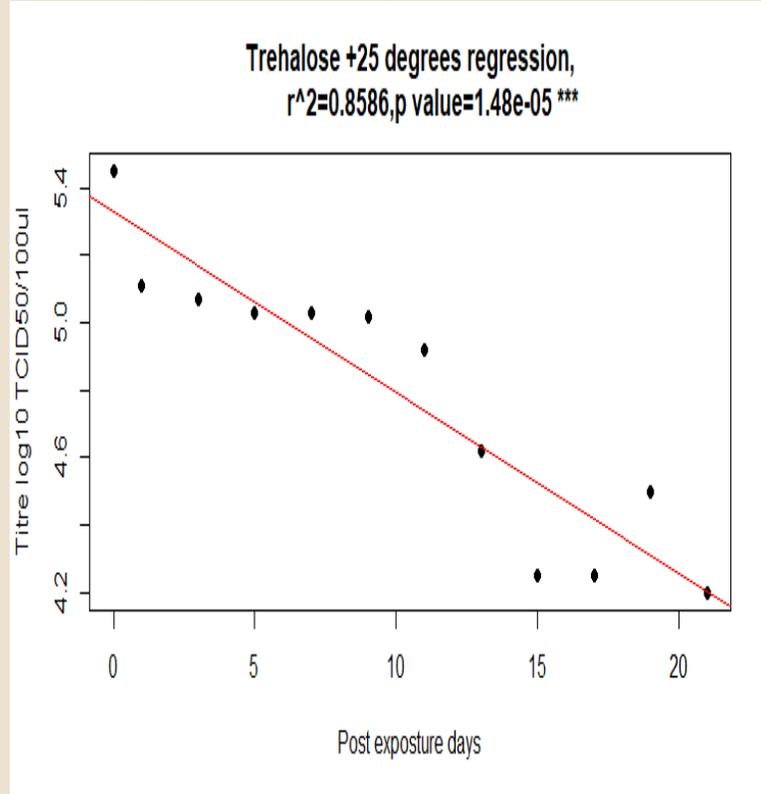


Figure 1: Degradation curve of trehalose at 25°C

Figure 2: Degradation curve of trehalose at 37°C

Figure 3: Degradation curve of trehalose at 40°C

Results and Discussion

- ❖ Regression results showed that temperature affects the vaccine antigenicity negatively over time

Increase in temperature inversely led to low viral titres

- ❖ Generally, Trehalose stabilized vaccine at a high initial titre value of $\log_{10}^{5.45} \text{TCID}_{50/\text{ml}}$ while sucrose showed relatively low value of $\log_{10}^{4.57} \text{TCID}_{50/\text{ml}}$.

At 25°C, there was a relatively slow degradation in viral titres over the 21 day observation period for both vaccines.

- ❖ Exposure of vaccines to 37°C contributed to fast drop in viral titres with a $\log_{10}^{4.15} \text{TCID}_{50}$ for Trehalose stabilizer and $\log_{10}^{2.5} \text{TCID}_{50/\text{ml}}$ for sucrose stabilizer on day 21

At 40°C, no vaccine stabilizer showed any infectivity titres beyond 7 days

Conclusion and/ recommendations

- ❖ Both sugar stabilized vaccines augmented with hydrolyzed proteins retained an infectivity dose for 5 days at 40°C.
- ❖ Generally, a high titre values at 25°C, 37°C and 40°C were observed on Trehalose sugar stabilized vaccine, compared to Sucrose hence the stabilizer of choice for the candidate thermo-tolerant PPRV vaccine.
- ❖ Therefore the study recommends testing of the candidate thermo-tolerant vaccine in small ruminants to determine the changes in immune response levels.

Acknowledgements

- ❖ **Sponsors** - World Bank through the Kenya Climate Smart Agriculture Project (KCSAP)
- ❖ **Training Institution** - Kenyatta University
- ❖ **Employer** - Kenya Agricultural and Livestock Research Organization (KALRO).