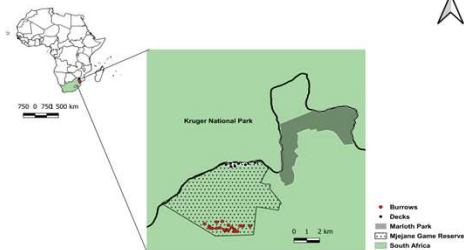


## 1 Introduction

In East and Southern Africa, the African swine fever (ASF) virus is maintained in an ancient sylvatic cycle involving warthogs (*Phacochoerus* spp.) and *Ornithodoros* soft ticks [1,2,3]. However, natural habitats in sub-Saharan Africa are under increasing anthropic pressure, and animals such as warthogs are adapting their resting site preferences in response to different levels of habitat transformation [1].

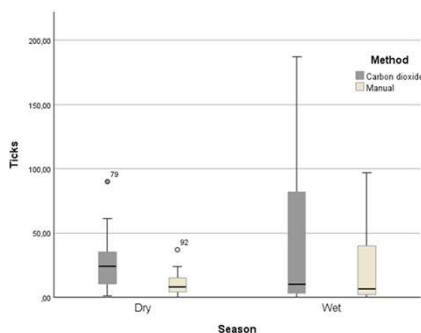
Carbon dioxide (CO<sub>2</sub>) traps have been previously used to collect ticks from pigsties in Portugal. However, this method has never been tested before in the context of the sylvatic cycle of ASF in Africa. Our study aimed to evaluate the effectiveness of CO<sub>2</sub> traps versus a traditional manual collection of soft ticks inhabiting two different warthog resting sites (warthog burrows and house decks) in Southern Africa.



**Figure 1:** Map indicating the distribution of warthog resting sites (burrows and decks) in Mjejane game reserve. The surrounding agricultural and natural areas are also shown.

## 3 Results (Graphs, Tables, Figures)

- The number of ticks collected with CO<sub>2</sub> traps (n=2024) was significantly higher than those collected with the manual method (n=885,  $p < .001$ ) for both types of resting sites (warthog burrows and house decks).
- Moreover, the number of ticks collected from decks using CO<sub>2</sub> traps (n=1399) were significantly higher ( $p < 0.001$ ) compared to those collected from burrows (n=625).
- There were no differences in the number of ticks collected between seasons.



**Figure 4:** Different box plots for the number of ticks collected by each method and their respective confidence intervals and outliers.

## Acknowledgements

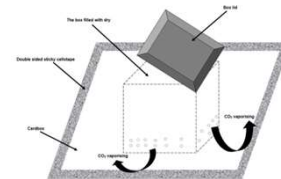
This research was supported by the US Department of Agriculture through a NIFA-AFRI Grant n° 2019-67015-28981

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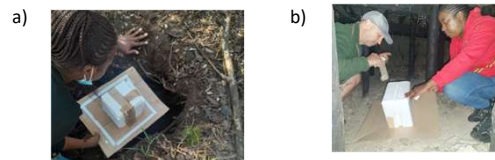
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## 2 Methods/Approach

The study was performed in Mjejane Game Reserve (MGR), a wildlife conservancy adjacent to the Kruger National Park in South Africa (Figure 1). Sixty-one warthog resting sites (31 natural burrows and 30 house decks) were sampled to compare *Ornithodoros* tick numbers using manual and CO<sub>2</sub> trap methods during wet and dry seasons presence.



**Figure 2:** Diagram and picture of the Carbon dioxide (CO<sub>2</sub>) trap



**Figure 3:** Deployment of traps in a) a house deck and b) warthog burrow

## 4 Discussion

This is the first attempt to test the efficacy of using CO<sub>2</sub> traps to collect *Ornithodoros* spp. ticks from resting sites.

The method is more effective than the traditionally described manual collection approach [1, 2]

A key advantage is the higher number of ticks collected per unit time and the possibility of simultaneous deployment of several traps in different locations.

A major limitation is the compulsory availability of dry ice, which can be a major constraint in remote areas.

This study can be considered as a first step to standardize the collection of *Ornithodoros* ticks with the perspective of improving our understanding of ASF ecology in Sub-Saharan Africa [1]

## 5 Conclusion

- Our results suggest that CO<sub>2</sub> traps are highly efficient for collecting *Ornithodoros* ticks from the two warthog resting site types in our study area.
- The standardized use of this method could facilitate investigations on the distribution of tick-related ASF cycles (related to both warthog and domestic pigs) in sub-Saharan Africa.
- They also highlight warthog's capacity to adapt to different levels of habitat transformation and human presence which can generate new opportunities of interactions between soft ticks, humans, and their domestic animals.

## 6