# The Speed of African Swine fever -Radius Expansion or Centroid Movement?

## Tarmo Niine<sup>1</sup>, Imbi Nurmoja<sup>1,2</sup>, Siim Maasikamäe<sup>3</sup>, Arvo Viltrop<sup>1</sup>

<sup>1</sup> Institute of Veterinary Medicine and Animal Sciences, Estonian University of Life Sciences, Tartu, Estonia.
<sup>2</sup> Estonian Veterinary and Food Laboratory (VFL), Tartu, Estonia <sup>3</sup> Institute of Forestry and Rural Engineering, Estonian University of Life Sciences, Tartu, Estonia

## Background

First case of African Swine Fever (ASF) in wild boars was diagnosed in Estonia September 2014. Beginning from that time period up to December 2017 in total 2414 ASF PCR positive cases in 3555 wild boars were detected. One of the common ways to measure velocity in which infected area increases is to calculated centroid movement, however this method could have short-comings.



Methods

Defining infected area - a circle with epidemiologically and biologically plausible radius - 5 km, around each detected case.



#### **Early stage** Week 15 - Spreading of the ASF in early stage.

December 2014. Infected areas (orange circles) of confirmed African Swine Fever cases in wild boar with 5 km radius are still disconnected with each other. Note that due to considerable distance (ca 153 km) between first cases (South vs. North-East), the centroids (red dots) are located off center.

Contact: tarmo.niine@emu.ee



#### **One year later** Week 50 - One year after start and after second increase of velocity.

August 2015. Centroids (red dots) of confirmed African Swine Fever cases in wild boar are still quite unevenly distributed and it is hard to determine the direction in which it is spreading.



#### **Radius vs. centroid** If the outbreaks were far apart, then the centroids seem to exagerate movement speed

African swine fever (ASF) cases (n = 2414) recorded in wild boards in Estonia from 2014 September (week 0) to 2017 December (week 170).

Discussion

Centroid movement speed in comparison to radius expansion seems to be more sensitive to outlying cases and especially when there are still few data points.

 $\frac{1}{20}$   $\frac{1}{20}$ 

### **End game** Week 169 - Almost all territory has been affected.

December 2017. Most of the territory has turned into infected area (colored in orange). Finally, centroids (red dots) have formed semi-distinct line indicating the direction of the African Swine Fever virus spread.

Radius expansion appeared to stay relatively more stable than centroid movement over observation period.

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