Efficacy of "Tooth Extraction" for ASFV elimination and relevance of point of care testing for ASFV to the field

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Introduction

In Vietnam, African Swine Fever (ASF) was officially reported by the Ministry of Agriculture and Rural Development (MARD) February 19, 2019 (1). Subsequently an estimated 6 million pigs were lost, at least 20% of Vietnamese swine industry (2). As ASF outbreaks continue, the "Tooth Extraction" protocol used to control ASFV in China has been widely adopted in Vietnam as an alternative to sow herd depopulation. The protocol is: remove the sow exhibiting ASF clinical signs (index case) plus the sow stalled on each side of her (sampling whole blood for ASFV PCR testing when possible) (3). The objective of this study was to test the efficacy of this "Tooth Extraction" protocol, then use the collected blood samples to compare commercial point of care (POC) assays (quick tests (QT) and PCR) against the laboratory based OIE approved ASF PCR.

Materials and Methods

764 samples from 52 suspected ASF events were collected. A "Suspected ASF event" was defined as a sow exhibiting OIE-established clinical signs as determined by a farm caregiver (4). For each suspected ASFV event, whole blood was collected from the index sow plus 14 animals housed around the index sow (Figure 1). Samples were tested for ASFV DNA by an OIE-approved real-time ASFV PCR (STAND) within 24-hours of arrival to the laboratory. The proportion of positive animals was analyzed as a function of the gestation stall distance from the index sow. 723 of the samples (46 events) plus 50 known ASFV negative samples were further tested in the laboratory by 2 commercial quick tests (POC QT A&B) and 3 POC PCR (POC PCR A, B and C) according to product instructions, and compared with STAND.

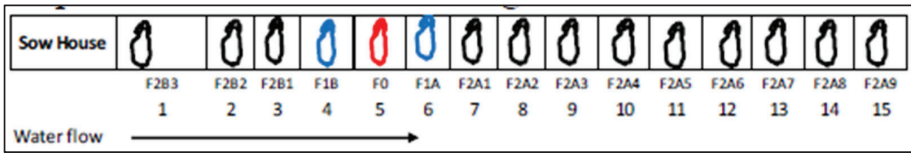

Figure 1: Example of blood sampling protocol around suspected ASF clinical sow in Gestation. †‡
†F0=index sow, F1=direct/closest contact neighbors, F2=indirect contact neighbors; A='down' row, B="up" row
‡The rationale for the sampling distribution was due to an assumption of a common water trough

Results

In 17 of the 52 events (33%), the index sow and 14 neighbor sows were ASFV PCR negative. Of the 35 events where ASFV PCR was positive, in 19 (54%), removal of the index sow and her direct contact neighbors still left one or more ASFV-positive sow (Figure 2). Table 1 details POC test results for 637 ASFV negative and 86 ASFV DNA positive sows.

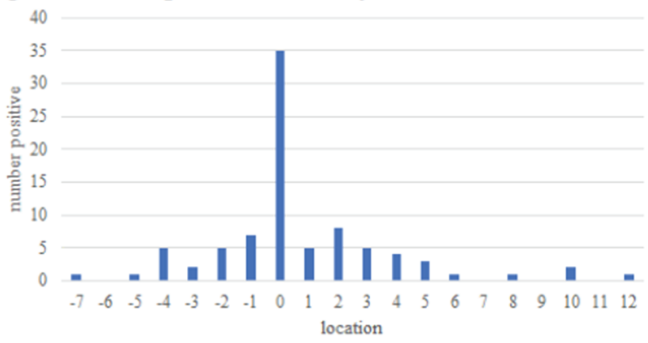

Figure 2: ASF positive sows by location from index sow

STAND PCR Comparison Field Samples (637 neg, 86 pos)	Overall (n=723)		Known Neg (n=50)
	Se	Sp	Sp
POC QT A	60%	88%	100%
POC QT B	53%	74%	100%
POC PCR A	85%	98%	100%
POC PCR B	84%	95%	100%
POC PCR C	84%	98%	98%

Table 1: POC test performance compared to OIE (p72) real time PCR

Conclusions

"Tooth Extraction" is not sufficient to eliminate ASFV from a sow farm. ASFV DNA was detected in blood from sows showing no clinical signs. Point of care tests are not sufficient for ASFV elimination. POC PCR was 85% sensitive in detecting ASF positive sows (both clinical and non-clinical). POC PCR may be considered if access to laboratory-based PCR testing is unavailable. QT are unreliable for on farm use in ASFV detection.

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