RESEARCH ABSTRACT
SWINE HEALTH

REVISED

Title: Evaluation of meat exudate (juice) as a diagnostic sample for the detection of African swine fever (16-022)

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Scientific Abstract: African swine fever (ASF) is one of the most important highly contagious viral diseases of pigs. ASF is an OIE notifiable disease that seriously affects local and international trade of live swine and pork products. ASF is endemic in the African continent, on the island of Sardinia, in Eastern Europe, Russia and in various South East Asian countries, e.g. China. ASF has never been reported in North America, however recent spread of ASF into Europe and Asia has increased the risk of introducing ASF into the US and Canada. Potential spread of ASF to North America is perceived as a serious risk for the pig industry.

Whole blood, serum and tissues from animals are the routine samples tested for the presence of ASFV nucleic acids and/or antibodies to ASFV. These samples however may not be available all the time, and therefore testing of alternative sample types might be required. Meat juice/exudate is such an alternative non-traditional sample that can be easily obtained from muscle tissues collected at slaughterhouses, road kills and supermarkets, and at the border from legally and illegally imported meat and meat products.

In this project we investigated meat juice as alternative sample type for detection of ASFV nucleic acids, ASFV live virus and antibodies to ASFV. A total of 58 pigs were used in the studies infected with highly virulent, moderately virulent or low-virulent ASFV strains. When the animals started to show fever, viremia or antibodies in their blood, they were euthanized and different muscle samples were collected and tested. Animals infected with highly virulent ASFV strain Malawi LIL 18/2 developed clinical signs and all died within 7 days post infection. The amount of ASFV nucleic acids and live virus in meat juice samples was comparable to that of the whole blood samples collected on the same day. No ASFV-specific antibodies were detected in serum or meat juice from these animals. Animals infected with the moderately virulent ASFV strain Malta'78 developed clinical signs but some animals survived up to 25 days post infection. Meat juice samples from these animals showed ASFV nucleic acids in meat juice samples comparable to that of the whole blood samples collected on the same day. Animals surviving beyond 8 days post-infection, developed antibodies to ASFV which could be detected in both serum and meat juice. Animals infected with the low virulent strain ASFV OURT88/3 developed no clinical signs but seroconverted with high titers of anti-ASFV antibodies that could be detected in serum and meat juice. These results showed that meat juice can be successfully used to detect ASFV genomic material and anti-ASFV antibodies.

Current serological confirmatory diagnostic tests for ASF use viral proteins prepared from ASFV-infected cells and therefore can only be performed at high-containment BSL-3 laboratories. In this study we evaluated three commercially available serological kits -INgezim PPA Compac ELISA, ID Screen® assay and INgezim Indirect ELISA. Based on the results it was concluded that the INgezim PPA Compac kit can only be used to detect anti-ASFV antibodies in serum samples not in meat juice samples. The remaining two kits can be used to detect anti-ASFV antibodies in serum and meat juice samples.

The findings from this study provide additional tools to strengthen capabilities of US and Canadian diagnostic laboratories to detect ASF early and thereby prevent a potential ASF outbreak in North America. In the event of an outbreak, meat juice can be assayed with commercially available serological assays at any veterinary animal health laboratory. This will facilitate business continuity and eradication of the disease in case of the ASF outbreak.