First Oral Vaccination of Eurasian Wild Boar Against African Swine Fever Virus Genotype II - Research Summary

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Keypoints:

- A weakly virulent, non-hemadsorbing ASFV strain was isolated in 2017 from a hunted wild boar in Latvia (Strain ID: Lv17/WB/Rie1) with the potential of being used as a vaccine.
- Oral vaccination of wild boars with strain Lv17/WB/Rie1 protects animals against a virulent hemadsorbing (ASF genotype II).
- Contact animals exposed indirectly to the vaccinated animals were also protected against the ASF virulent strain

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Introduction

African swine fever virus (ASFV) genotype II has been circulating in Eastern Europe since 2007, in the European Union since 2014 and in Asia since 2018. Despite control measures, ASF reports in wild boars and domestic pig farms continue to arrive. Neither a vaccine nor specific treatment is commercially available against ASFV. Control measures include depopulation of affected domestic and wild populations, as well as movement restrictions on trade of live pigs and derived products at regional, national and international levels.

The recent re-emergence of ASF in Europe has increased interest in the development of an effective vaccine against ASF. A weakly virulent, non-hemadsorbing ASFV strain was isolated in 2017 from a hunted wild boar in Latvia (Lv17/WB/Rie1). Experimental infection of domestic pigs with this strain provided complete protection against a virulent hemadsorbing ASFV genotype II, suggesting the potential use of Lv17/WB/Rie1 as a live attenuated vaccine. The importance of vaccinating wild boars was demonstrated during the 2000's when classical swine fever affected different European countries. The aim of this experimental study was to assess how well oral immunization of wild boar with the Lv17/WB/Rie1 strain would protect them against challenge with a virulent ASFV genotype II isolate (Arm07).

Material and methods

Eighteen 3-4 month-old female wild boar pigs weighing 10–15 kg were obtained from a commercial wild boar farm in Extremadura, Spain. Nine of these pigs were orally vaccinated with strain Lv17/WB/Rie1. Three wild boars were exposed to the orally vaccinated piglets through contact (hereafter called VContact) from 0, 7, and 15 days after vaccination to test the vaccine transmission at different times. These pigs were housed for 30 days to allow for immune response development. Then, the group of 12 pigs (vaccinates and Vcontact) was exposed to a group of 6 pigs, 4 of which had been recently infected with ASFV genotype II strain Arm07 and the remaining two were naïve pigs. At the end of the observation period (54 days after vaccination), survivor animals were euthanized, a post-mortem examination was performed and samples were collected.

Results

During the 30-day vaccination and pre-challenge period, six of nine orally vaccinated animals were positive for anti-ASFV antibodies based on ELISA and immunoperoxidase test (IPT) tests starting from 15 ± 3 days after vaccination. All three VContact wild boars showed positive antibody response starting at 14 ± 2 days after contact, and titers remained high throughout the experiment. These results indicate that orally administered Lv17/WB/Rie1 strain can induce an antibody response in wild boar. No ASF-compatible clinical signs were detected in animals immunized with Lv17/WB/Rie1.

Vaccinated and VContact animals were protected against ASF virulent strain Arm07 as 11 of the 12 vaccinated and VContact animals survived (92%). Moreover, none of them developed any ASF-compatible clinical signs or gross lesions after challenge. Two orally vaccinated animals that had shown neither anti-ASFV antibody response or an increase in body temperature during the 30-day vaccination period developed intermittent viremia peaks after challenge. All four ASF strain Arm07 intramuscularly infected pigs developed severe clinical signs compatible with ASF. The two late naive in-contact animals showed clinical signs similar to those of intramuscularly challenged controls. Post-mortem analyses revealed ASF-compatible pathological findings only in one each of the unprotected vaccinated animals and the intramuscularly challenged controls.

Discussion and conclusion.

Although the results were obtained with an unbalanced size of animal groups, the high protective effect in wild boar observed in this study is consistent with previous results obtained with Lv17/WB/Rie1 in two domestic pigs inoculated intramuscularly with this isolate and four in-contact animals. In the current context of this transboundary disease, an oral vaccine against ASFV in wild boar is urgently needed as an additional tool to re-inforce and re-design mitigation plans owing that none of the control measures applied in affected wild boar populations has been effective

The complete manuscript can be found at:
https://www.frontiersin.org/articles/10.3389/fvets.2019.00137/full