Poster

A universal new generation vaccine against type I Porcine Respiratory and Reproductive Syndrome Virus

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ABSTRACT

Porcine respiratory-reproductive syndrome (PRRS) is a devastating disease for the global porcine industry. PRRS leads to economic losses above 664 million dollars per year only in the USA and showing an increasing trend. The disease is affecting with a similar magnitude the porcine industry of the European Union. PRRS is caused by an enveloped, single stranded RNA virus (PRRSV) from the Arteviridae family. PRRSV interacts with porcine monocytes, weakening the immune system of the host and leading to pathologies affecting the respiratory and reproductive systems. Because of their immaturity, piglets are very vulnerable to PRRSV infection. Treatment and quarantine are not viable choices for the porcine industry. Therefore, prophylactic vaccines are the best alternative to prevent PRRS. However, the currently marketed vaccines are failing in protecting piglets in all regions of the world. The causes of failure are basically two. On one hand, the use of live attenuated vaccines needed for a complete antigenic presentation is preserving the immune evasion mechanisms of the wild-type virus. On the other hand, high divergence between viral serotypes leads to almost no cross-reactivity of the immune response between viral strains.

This project aims to develop a new PRRS vaccine capable of creating a complete immune response in piglets that neutralizes early-stage infection by any of the viral serotypes running in the USA and the EU. These premises could be possible thanks to the flexibility typical of a recombinant subunit vaccine, which has been designed to improve the usual low antigenic presentation of this type of vaccines. We have successfully produced a recombinant baculovirus for accumulation of the vaccine's active ingredient in insect cells, in the form of protein bodies formed by using a tag derived from vegetal zein proteins (Zera® technology). Expression tests in insect cells confirmed the viability of this production system, obtaining 13 mg/L of purified antigen. The preliminary immunogenicity tests in murine model showed that the new vaccine is immunogenic in vivo and that it could be manufactured formulating the final product in a lyophilized format. We have made experimental batches of the vaccine and designed an experimental trial with challenge in piglets, in order to test the efficacy of our vaccine in comparison with commercial gold-standards. The trial will begin in March 2020 and the results will be part of this work.

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