

Development of a Subunit Vaccine Containing Recombinant Stx2e against Edema Disease of Pigs and its Impact in the Field



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Abstract

Edema Disease (ED) caused by Shigatoxin Stx2e producing strains of *E. coli* occurs worldwide and is responsible for high mortality during the nursery period and substantial economic losses. Therefore, a new vaccine ECOPORC SHIGA was developed containing a genetically modified Stx2e antigen. A one shot injection into piglets from an age of 4 days on induces a humoral immune response against Stx2e and ensures protection from ED during the entire nursery period after weaning.

For antigen production a recombinant *E. coli* strain was constructed containing a plasmid coding for the genetically modified Stx2e antigen being highly reduced in toxicity. Administration into suckling piglets via intramuscular routes induced production of Stx2e-neutralising antibodies in a dose-dependent manner as determined by a Stx2e-specific serum neutralization assay. In challenge studies weaned piglets with detectable amounts of these antibodies proved to be protected against the impact of Stx2e.

Vaccine safety was assessed in laboratory as well as in field trials showing no adverse reactions regarding local reactions at injection site, body temperature or general condition after vaccination.

Vaccine efficacy was demonstrated in laboratory and field studies by significant reduction of morbidity and mortality of vaccinated pigs compared to control animals and by detection of neutralising antibodies after immunisation. Due to vaccination mortality was lowered from 100% to 6.7% among piglets experimentally challenged with Stx2e ($p < 0.001$) and from 11.4% to 0% ($p < 0.0001$) in a field trial. Better growth of vaccinated pigs was partially observed during the nursery period. Furthermore, a significant reduction considering the use of orally administered antibiotics against ED was noticed in the course of longitudinal field studies.

The vaccine ECOPORC SHIGA is a safe and effective tool against ED and has the potential to replace oral antibiotic treatment in herds affected by outbreaks of this life-threatening disease. ■