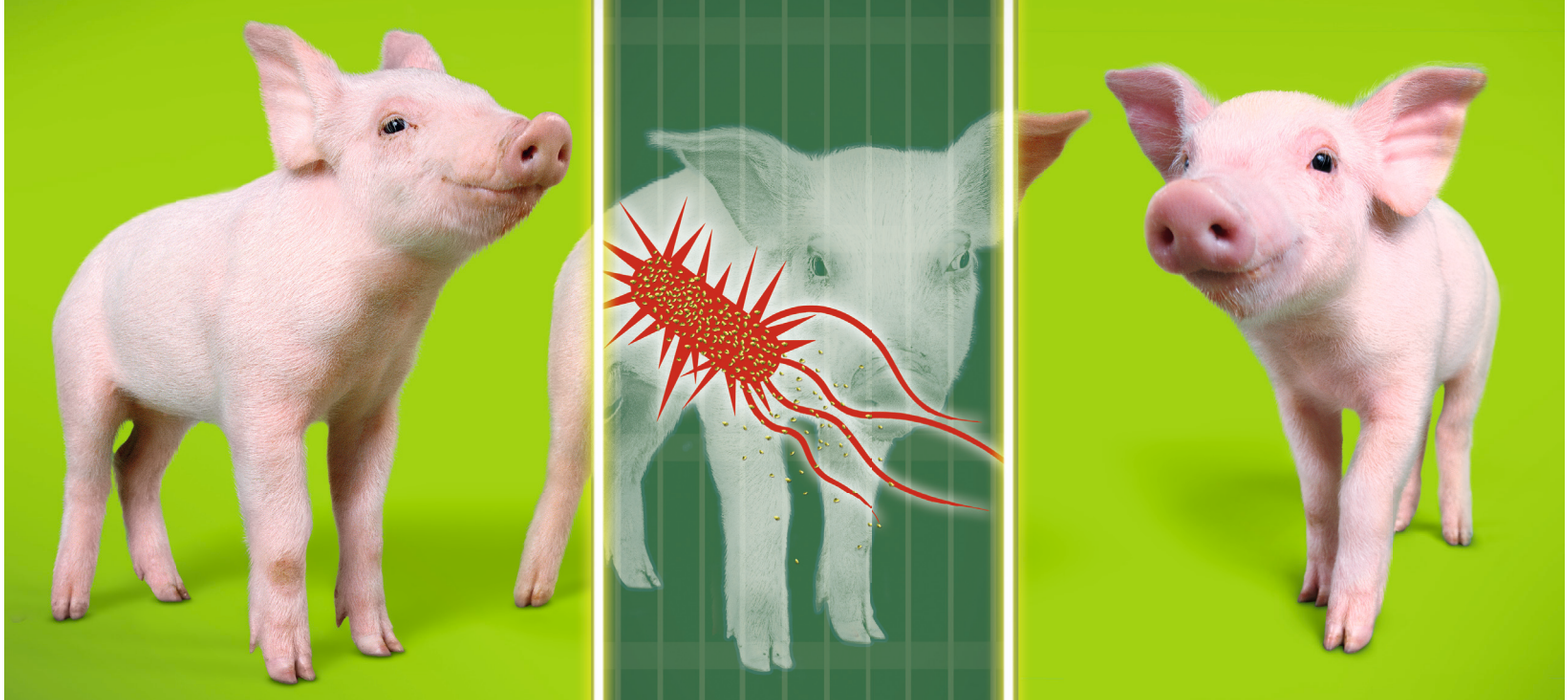
Shiga toxin
The hidden danger

1 out of 3 farms is at risk![1]



The obvious solution:

ECOPORC SHIGA®

Single dose Shiga toxin protection

Shiga toxin: the causative agent of Edema disease

Profile

Pathogen:

Shiga toxin-producing *E. coli* strains (STEC/VTEC)

Risk factors:

Transport, stress, change of housing, change of feed, discontinuing the application of oral antimicrobials and/or zinc oxide

Course of the disease:

- Subacute/acute
- Prolonged course
- Sporadic occurrence
- Increased losses for a longer period of time

Clinical signs:

- Sudden, unexpected death with no clinical signs
- Edema of the eyelids, nasal bridge, and larynx (distorted vocalization)
- Convulsions, ataxia, lateral recumbency with paddling of limbs
- Anorexia with increase number of runts

Gross pathology:

Edema can appear in all organs and locations (e.g. gallbladder bed, mesocolon, nasal bridge, forehead), mesenteric lymphnodes can be enlarged

Histopathology:

Brain edema in acute cases and vascular lesions in prolonged cases

Impacts:

Increased mortality rate, reduced average daily gain, decreased uniformity, increased psychological stress on farmers and co-workers

1 out of 3 farms is at risk![1]

ECOPORC SHIGA®

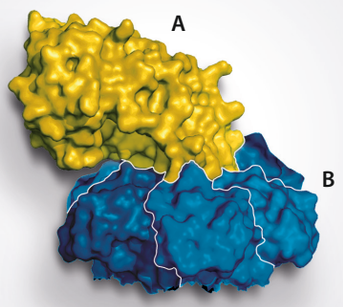
Single dose Shiga toxin protection

Shiga toxin damages blood vessels

Shiga toxin Stx2e

Subunit A responsible for the cytotoxic effect
→ damage capillaries

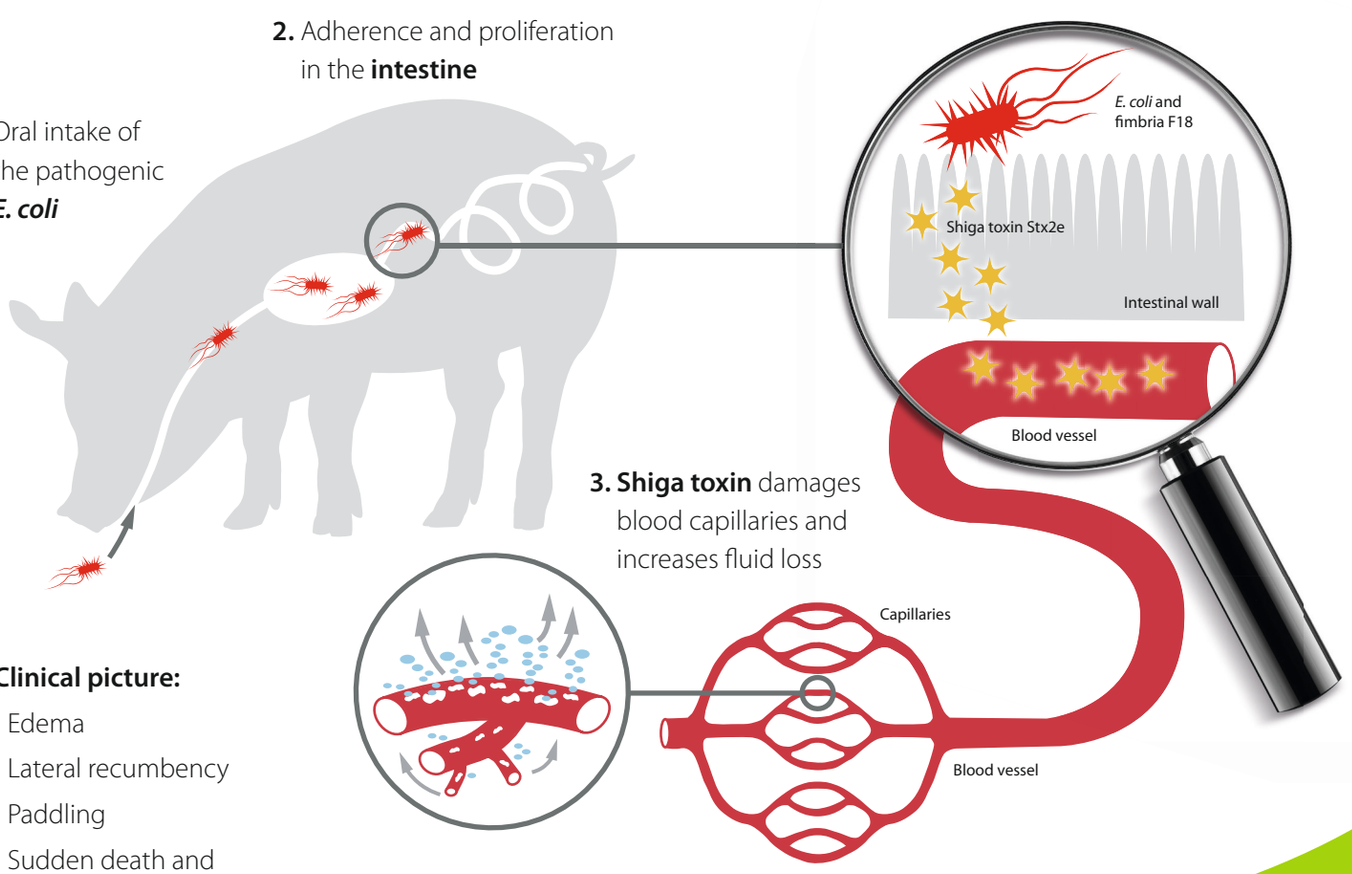
Subunit B responsible for binding receptors → transport to the site of action



E. coli Shiga toxin mode of action

1. Oral intake of the pathogenic ***E. coli***

2. Adherence and proliferation in the **intestine**



3. Shiga toxin damages blood capillaries and increases fluid loss

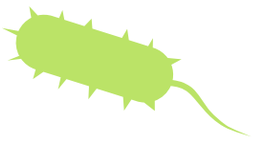
4. Clinical picture:

- Edema
- Lateral recumbency
- Paddling
- Sudden death and high mortality rate

A breakthrough in research

Innovative vaccination technology

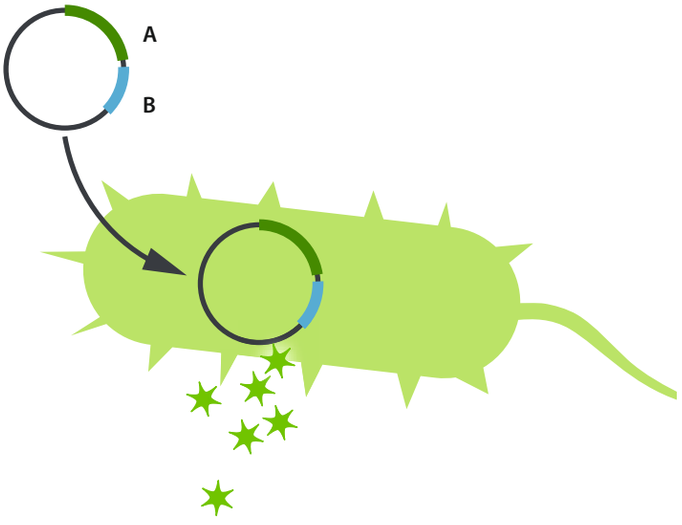
1. Non-pathogenic ***E. coli* K12** for production of our innovative vaccine



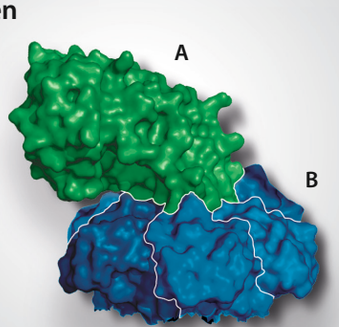
2. Transfer the genetic information of Shiga toxin to a **plasmid**

3. **Subunit A** is genetically modified, minimising toxicity
→ **excellent safety profile**

4. **The plasmid is incorporated into *E. coli* K12:** Modified *E. coli* K12 produces vast amount of genetically modified Shiga toxin
→ **high concentration of the antigen in the vaccine**



Genetically modified Stx2e antigen

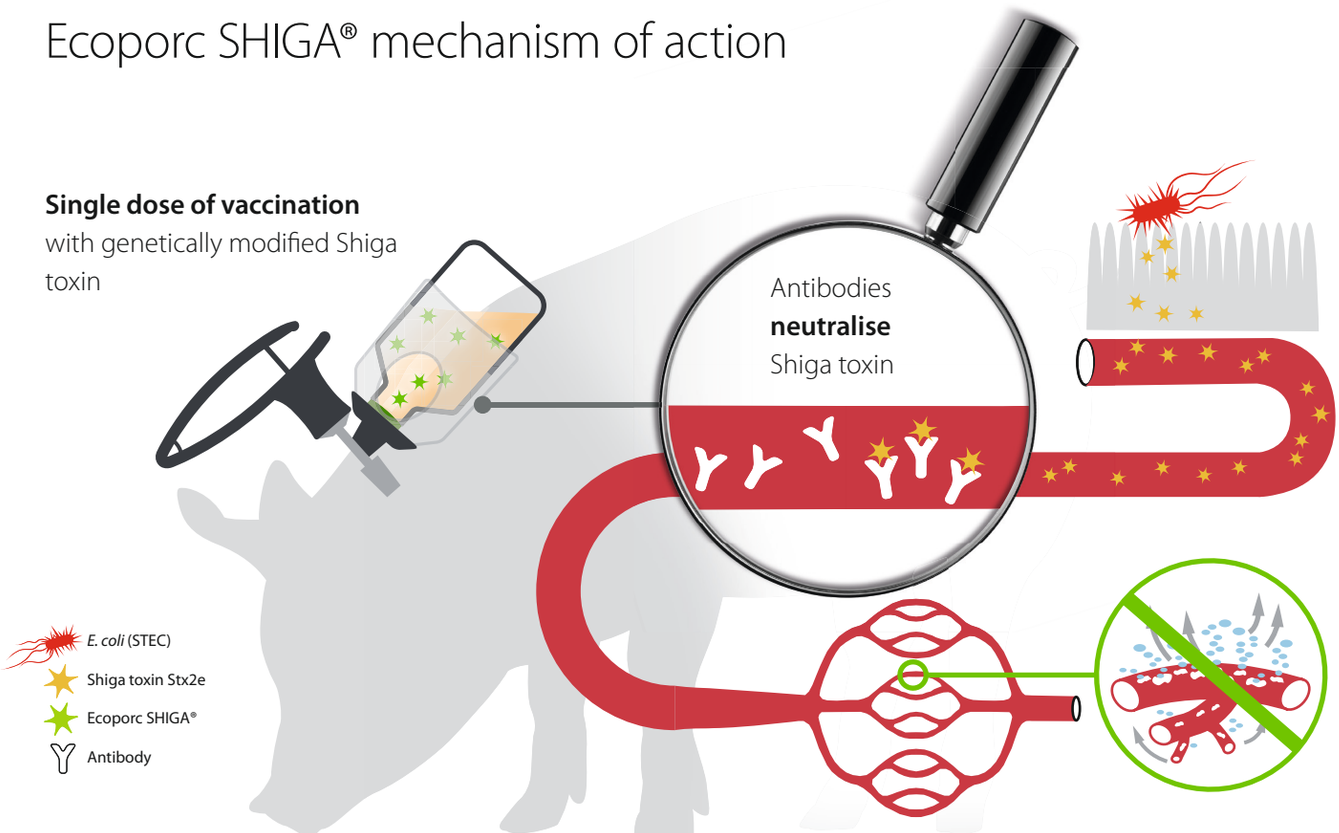


ECOPORC SHIGA®
Single dose Shiga toxin protection

Single dose of ECOPORC SHIGA®

Ecoporc SHIGA® mechanism of action

Single dose of vaccination
with genetically modified Shiga toxin



A single dose of vaccine prevents the damaging effects of Shiga toxin during the critical period from weaning to finishing

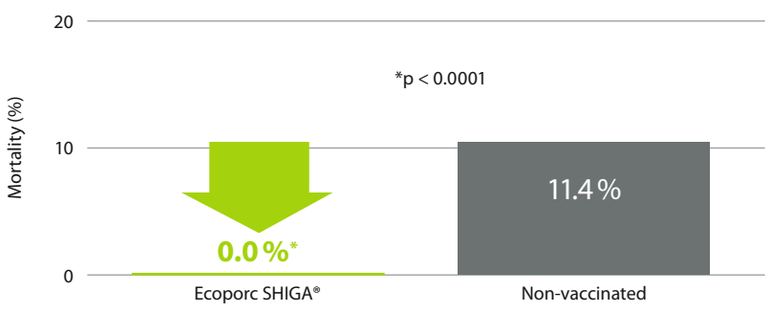
- Vaccination starts from 4 days of age
- 1 ml dose intramuscular injection
- Excellent safety profile

Tested under field conditions

Controlled field trials to determine the efficacy and safety of **ECOPORC SHIGA®** resulted in significant improvements in mortality rate due to Edema disease[2,3]

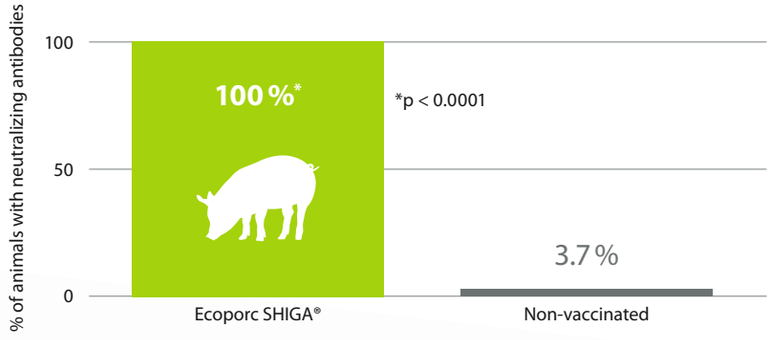
Study design: 170 sow operation, n = 327 animals, the vaccinated group with Ecoporc SHIGA®: 164 animals, the non-vaccinated group = 163 animals

Mortality rate due to Edema disease[2]



The vaccinated group had **0.0 % mortality rate** due to Shiga toxin

Animals with a positive antibody test[3]



100 % of the vaccinated group **had neutralizing antibodies** at 60 days of age

ECOPORC SHIGA®
Single dose Shiga toxin protection

Current strategies managing Edema disease

Metaphylactic administration of antibiotics → **Increase the risk of antimicrobial resistance and recurrent infection**

Restricted feeding → **Increase economic loss, days to market, decrease uniformity within group of animals**

Additional consequences

- Increase in the risk of recurrent outbreak
- Psychological stress on farmers and co-workers

ECOPORC SHIGA®

Return on investment:

Example:

300 sow operations with 4.5 % mortality rate due to Edema disease could have a ROI of 62 EUR per sow per year using Ecoporc SHIGA®.
If the mortality rate due to Edema disease is 1.5 %, the ROI would be 29 EUR per sow per year.

* Return on investment was calculated based on the average of collected data and the cost of vaccination was included in the calculation. The market price for 25 kg pig used in this calculation was 45 EUR/pig.

ECOPORC SHIGA®

A first breakthrough against Shiga toxin

Animal welfare
Vaccinate only once with 1 ml from 4 days of age

Natural
Induces neutralizing antibodies

Protective
Protects pigs from damage caused by Shiga toxin

Nothing is as natural as the pig's own immunity. Actively boost the inherent immunity against Shiga toxin by vaccination.

[1] Berger PI et al., PREVALENCE OF EDEMA DISEASE ESCHERICHIA COLI (EDEC) IN WEANED PIGLETS IN GERMANY, ESPHM 2020/2021

[2] Development of a Subunit Vaccine Containing Recombinant Stx2e against Edema disease of Pigs and its Impact in the Field
O. Bastert, R. Fricke, O. Lüder, V. Florian, H.-J. Selbitz, IDT Biologika GmbH, Business Unit Animal Health, Research and Development, Dessau-Rosslau, Germany
R. Bauerfeind, Institute for Hygiene and Infectious Diseases of Animals, Justus Liebig University, Giessen, Germany
ESPHM 2013

[3] Testing of the Safety and Efficacy of a Vaccine Containing a Genetically Modified Stx2e-Antigen in Laboratory and Field Studies
O. Lüder, H. J. Selbitz, V. Florian, R. T. Fricke, O. Bastert, O. Langer, S. Siebenhaar
IDT Biologika GmbH, Dessau-Roßlau, Germany
IPVS 2012

Ecoporc SHIGA suspension for injection for pigs. Qualitative and quantitative composition: Each dose of 1 ml contains: Active substance: Genetically modified recombinant Stx2e antigen: ≥ 3.2 x 10^6 ELISA units. Adjuvant: Aluminium (as hydroxide) max. 3.5 mg. Excipient: Thiomersal max. 0.115 mg. **Indications for use:** Active immunisation of piglets from the age of 4 days, to reduce the mortality and clinical signs of oEdema disease caused by Stx2e toxin produced by *E. coli* (STEC). Onset of immunity: 21 days after vaccination. Duration of immunity: 105 days after vaccination. **Contraindications:** Do not use in case of hypersensitivity to the active substance, to the adjuvant or to any of the excipients. **Adverse reactions:** Commonly very small local reactions such as mild swelling at the injection site (maximum of 5 mm) may be observed, but these reactions are transient and subside within a short time (up to seven days) without treatment. Clinical signs such as temporary mild behavioural disturbances can uncommonly be observed after application of Ecoporc SHIGA. Commonly a slight rise in body temperature (maximum of 1.7 °C) may occur after injection. But these reactions subside within a short time (maximum of two days) without treatment. **Withdrawal period:** Zero days. **Under veterinary prescription only. Marketing Authorisation Holder:** IDT Biologika GmbH, Am Pharmapark, 06861 Dessau-Rosslau, Germany.

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