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Gut health on nursery

Ramon Jordà Casadevall
Global Product Manager

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1 Introduction

2 What can we do for you?

3 Results

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1 Introduction

2 What can we do for you?

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What is Gut health?

Veterinary

"The absence of digestive pathologies that reduce the development of the animal in question"

Nutricionst

"State of the animal in which the digestive functions develop normally"

Scientist

"More knowledge is needed to narrow the terms well"

Farmer

"Let the piglets eat and fatten well"

What is Gut Health?

"A steady state where the microbiome and intestinal tract exist in symbiotic balance and where animal welfare and performance are not limited by gut dysfunction"

Pietro Celi

Environment

GUT

Microbiome

Host

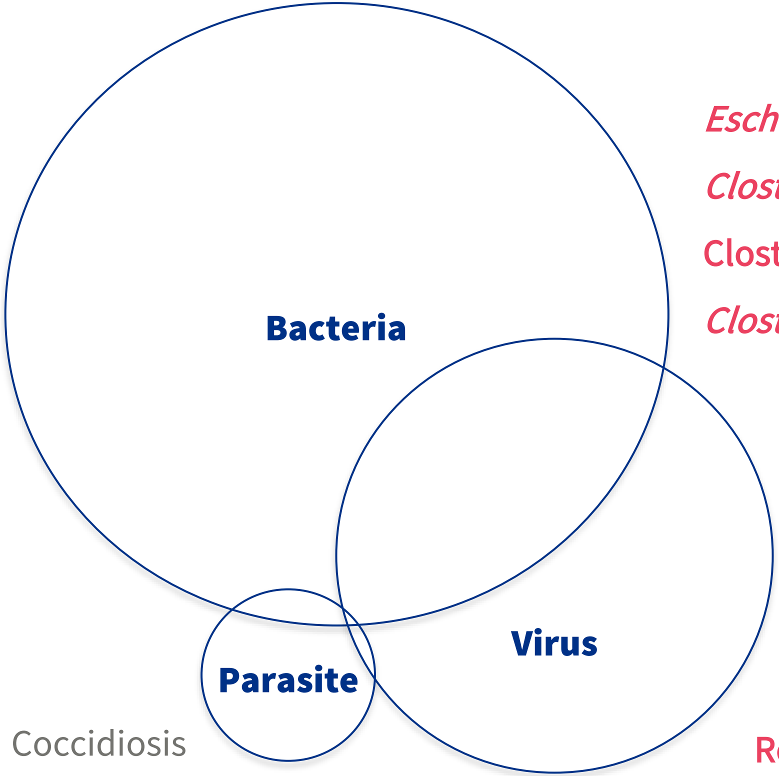
Schokker et al., 2015

Escherichia coli

Clostridium perfringens tipo C

Clostridium perfringens tipo A

Clostridioides difficile



Coccidiosis

Rotavirus

Coronavirus (PED / TGE)

Seneca virus

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Enterotoxigenic E.coli (ETEC) and Verotoxigenic E.coli (VTEC)

- Worldwide problems, endemic manifestation or outbreaks
- Appearance: First days after weaning > introduction to fattening (rare)

ETEC: Post-weaning diarrhoea

- Clinical signs:
  - **Low**: < 3% mortality + ↓ weight gain
  - **Severe:** > 25% mortality + ↓ ↓ weight gain

VTEC: Oedema disease

- Signs:
  - **Clinical**
    - Sudden death
    - Eyelid oedema, incordination, breathing problems, death
    - Mild subcutaneous oedema, pruritus and recovery
  - **Cronhical**
    - ↓ weight gain, neurological clinical signs, muscular atrophy
  - **Subclinical**
    - ↓ weight gain, secondary problems

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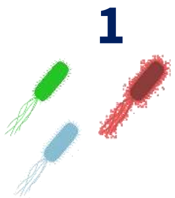
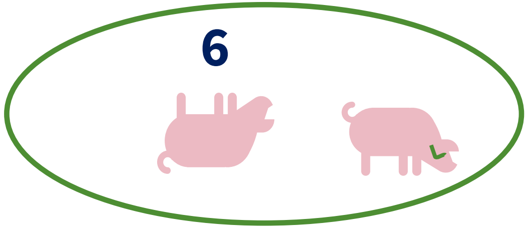
VTEC pathogenesis

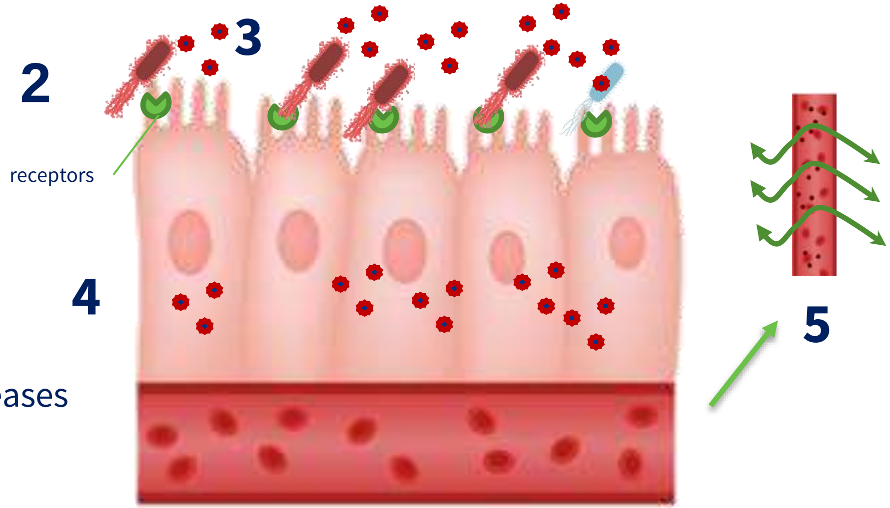




1. Ingestion of VTEC

2. Small bowel colonization (receptors in jejunum & ileum)

- **ETEC:F18** – depends on the age (+15 days) → 3 weeks ↑
  - Slow progession of the disease (5-7 días)
  - End of lactation and post-weaning



3. Verotoxin replication & production (Vt2e/Stx2e)

4. Transport of toxins into blood stream

5. Capillary involvement: degenerative angiopathy→ increases vascular permeability and epithelial necrosis

6. Oedema, ataxia and death

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Pathogenesis ETEC and VTEC

frontiers in Microbiology

ORIGINAL RESEARCH
published: 05 November 2018
doi: 10.3389/fmicb.2018.02650

Swine Enteric Colibacillosis in Spain: Pathogenic Potential of *mcr-1* ST10 and ST131 *E. coli* Isolates

Mixed infections are common

ETEC + VTEC (or ETEC with VTEC in the same bacterium)

- ETEC + VTEC + other pathogens (*Clostridium, Salmonella, Lawsonia, Brachyspira*,…)

Increased pathogenesis

Epidemiological study of 499 *E. coli* isolated from outbreaks of enteric colibacillosis with diarrhea in Spain

	Samples	%
ETEC	277	57,5 %
aEPEC	156	32,4 %
VTEC/ETEC	33	6,8 %
VTEC	15	3,2 %

Risk factors

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ED and PWD Risk Factors

	Aetiology	Risk factors	
Disease	***E. coli* patotipo**	**Host**	**Environment**
Oedema Disease	VTEC/STEC:F18	‣ Some resistant piglets lack F18 (ED + PWD) or F4 (PWD) receptor ‣ Stress ‣ Loss of calostral antibodies ‣ Early weaning ‣ High growth animals (ED)	‣ Transport ‣ Mixing of animals ‣ Dietary changes ‣ Low level of milk or other animal products ‣ Some ingredients (ex: soy) ‣ Presence of other infections such as PRRSv, rotavirus, Salmonella
Post-weaning diarrhoea	ETEC:F4, F18, ETEC:AIDA, EPEC, different pathotypes *E. coli*		

Adapted from Diseases of Swine 11th Ed.

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ZnO ban in 2022

Intestinal balance should be more precise

Table 1- Zinc oxide: 2 different uses - 2 different situations.

	ZnO as a feed additive	ZnO as a veterinary medicinal product (VMP)
EU agency	European Food Safety Authority (EFSA)	European Medicines Agency (EMA)
Legislation	Regulation (EC) No 1831/2003 on additives for use in animal nutrition	Directive 2001/82/EC on veterinary medicinal products + Regulation (EC) No 726/2004
Levels	Max. total 150ppm of zinc (from ZnO and other sources)	Normal dosage ca. 2500ppm
Ban?	No! There is no indication that ZnO will be banned as a feed additive.	Yes! Marketing authorisations for ZnO-based VMPs will be withdrawn the across EU by June 2022.

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Control strategies

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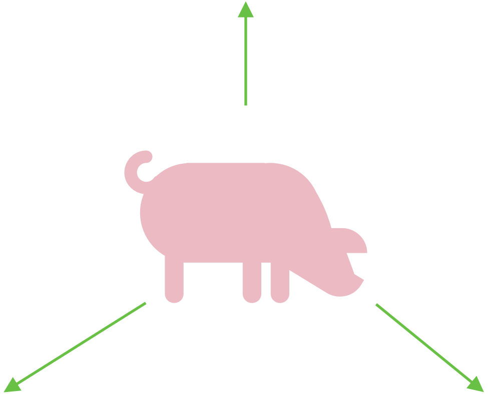
Control strategies

Diagnosis VEROCHECK by VEPURED®



Reduce pathogenic *E. coli*

Protect against infection

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Control strategies

Reduce pathogenic E. coli

Protect against infection

Multifactorial approach

Nutrition

Management/Facilities

Immunity

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Nutrition vs. ETEC and VTEC

Reduction of pathogenic *E.coli* and increase of resistance

Water
- Additives: Organic and inorganic

Ingredients (diet)
- Highly digestive
- Milk proteins
- Protein reduction (<18%)
- Intake restriction
- Fiber increase
- Flour vs pellets
- Calcium reduction 10% (buffer capacity)

Additives
- Organic and inorganic acids
- Essential oils
- ZnO boosted
- Anitmicrobial peptides
- Hydrolyzed plasma
- Beta-glucans
- Probiotics
- Prebiotics
- Oligosaccharides
- Enzymes

Nutrition against ETEC and VTEC

Redution of protein (<18% / <180g/kg)

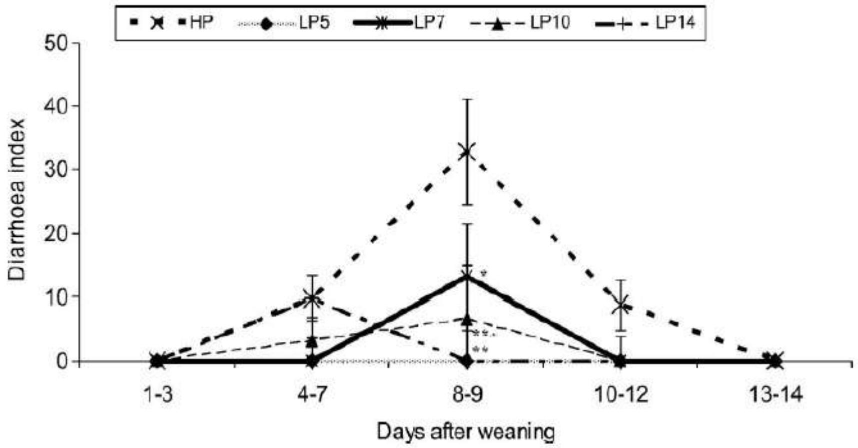
Effects

- Reduction of proteolytic bacteria

How?

- Use highly digestible proteins: plasma, lactic proteins
- Complement with syntetic amino acids following the ideal AA profile

HP = high protein (24,3%)
LP5 = low protein (17,3%) fed for 5 d after weaning
LP7 = low protein (17,3%) fed for 7 d after weaning
LP10 = low protein (17,3%) fed for 10 d after weaning
LP14 = low protein (17,3%) fed for 14 d after weaning



Heo et al. 2008

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animals

MDPI

2023

Article

Protein Content in the Diet Influences Growth and Diarrhea in Weaning Piglets

Rosa Marchetti [1,*], Valerio Faeti [1,*], Maurizio Gallo [2], Massimo Pindo [3], Davide Bochicchio [1], Luca Buttazzoni [4] and Giacinto Della Casa [1]

Table 2. Growth phases based on piglet body weight and overall crude protein percentage in the diet, depending on growth phase and protein level.

Growth Phase	Protein Level (% CP)	
	High	Low
From the start of weaning to 15 kg (Period I and II)	18.5	16.5
From 15 kg to the end of the experiment (Period III)	16.5	14.5

Table 6. Influence of dietary protein level on the diarrhea score summations. The percentages of the scores are shown in parentheses with respect to the total score, referring both to the protein level in the period and to the whole period.

	Diarrhea Score Summations [1]			
	Protein Level			Significance of the Difference
Growth period	High	Low	Total in the Period	
Period I	91 (85.0)	16 (15.0)	107 (45.7)	
Period II	5 (83.3)	1 (16.7)	6 (2.6)	
Total (Period I + Period II)	96 (85.0)	17 (15.0)	113 (48.3)	$p < 0.01$
Period III	71 (58.7)	50 (41.3)	121 (51.7)	NS
Total score	167 (71.4)	67 (28.6)	234	

[1] Scores were calculated as reported in Table 4. NS: not significant.

Table 5. Average value of selected growth parameters during the experiment and significance of the difference between high-protein and low-protein diets (n = 6 per treatment).

	Protein Level		
Growth Parameter	High	Low	Significance of the Difference
Initial body weight (kg)	7.80	7.77	NS
From weaning to change of housing			
Period I [1]	17.2	15.6	NS
Period II [2]	29.8	28.0	NS
Period I + Period II	23.5	21.8	NS
Average daily gain (g)			
Period I	377	313	$p < 0.01$
Period II	599	593	NS
Period I + Period II	479	440	$p < 0.05$
Average daily feed intake (g)			
Period I	585	536	NS
Period II	1181	1138	NS
Period I + Period II	857	810	NS
Feed conversion ratio (-/-)			
Period I	1.55	1.72	$p < 0.01$
Period II	1.97	1.92	NS
Period I + Period II	1.79	1.84	$p < 0.05$
From change of housing to the end of post-weaning (period III) [3]			
Average daily gain (g)	[illegible]	[illegible]	NS
Average daily feed intake (g)	952	952	NS
Feed conversion ratio (-/-)	2.11	2.18	NS
Final body weight (kg)	40.7	38.5	NS

[1] Period I: From the start of the experiment until the change of diet; [2] Period II: From the change of diet until the change of housing; Period I + Period II: From the start of the experiment until the change of housing; [3] Period III: From the change of housing until the end of the experiment.

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Nutrition against ETEC and VTEC

Benefits?

Probiotics

Live micro-organism that when administered in adequate amounts confer benefits to the host (FAO/WHO 2001)

A lot of research on reducing ETEC, VTEC and other pathogens

Barba-Vidal *et al.* 2018

Table 1 *Pig in vivo scientific works evaluating the use of probiotics against digestive bacterial pathogens (Escherichia coli and Salmonella sp.)*

	Probiotic	Pathogen	Animals		
References	Strain, dose per pig and dosing method	Strain and dose per pig	Days old: weaning → Inoculation	Benefits	Main results
De Cupere et *al.* (1992)	(a) *Bacillus cereus var. Toyoi* (1×10^9 cfu/g) (b) *Lactobacillus* spp. (7.5×10^7 cfu/g) (c) *Streptococcus faecium* (5.6×10^8 cfu/g) Included in feed	*Escherichia coli* 0141 K85 (10^9 cfu)	28 → 30	No	No improvements on clinical symptoms or mortality. No improvements on fecal *E. coli* shedding
Shu *et al.* (2001)	*Bifidobacterium lactis* HN019 (10^9 cfu/day) Oral administration	*E. coli* sp.	21 → natural acquisition	Yes	Reduced diarrhea scores and fecal shedding of *E. coli*. Improved animal performance. Increased T-cell differentiation and pathogen-specific antibody titers
Bhandari *et al.* (2008)	*Bacillus subtilis* (6×10^8 cfu/kg) Included in feed	*E. coli* K88 (4×10^{10} cfu)	17 → 24	Yes	Reduced diarrhea scores and mortality. Modulated microbial diversity.
Lessard *et al.* (2009)	(a) *Pediococcus acidilactici* (b) *Saccharomyces cerevisiae* (c) *P. acidilactici* + *S. cerevisiae* Lactation (10^9 cfu). Oral administration Weaning (10^9 cfu/kg). Included in feed	*E. coli* O149: F4 K88 (10^9 cfu)	21 → 49 + 50 + 51	Yes	Before challenge: (a) increased T-cell differentiation. After challenge: (a, b, c) Reduced bacterial translocation. (b) Increased ileal immunoglobulins
Zhang *et al.* (2010)	*Lactobacillus rhamnosus* GG (10^{11} cfu/day) Oral administration	ETEC 149: K91, K88ac (10^{10} cfu)	18 → 26	Yes	Reduced diarrhea scores and fecal coliform shedding. Modulated microbial diversity. Increased jejunal immunoglobulins. Modulated systemic inflammatory cytokines
Bhandari *et al.* (2010)	*E. coli* (4.5×10^{12} cfu) Included in feed (daily mix)[1]	*E. coli* K88 (1.2×10^{11} cfu)	21 → 27	Yes	Reduced ETEC in ileum. Improved animal performance
Wang *et al.* (2009)	*Lactobacillus fermentum* I5007 (2×10^9 cfu) Oral administration	*E. coli* K88ac (2×10^9 cfu)	21 → 21	Yes	Increased T-cell differentiation and ileum cytokine expression
Konstantinov *et al.* (2008)	*Lactobacillus sobrius* DSM 16698 (10^{10} cfu) Included in feed (daily mix)[1]	ETEC K88 O149 F4 (1.5×10^{10} cfu)	21 → 28	Yes	Reduced levels of ETEC in the ileum, improved performance and increased diarrhea
Krause *et al.* (2010)	*E. coli* (1.5×10^{11} cfu) Included in feed (daily mix)[1]	*E. coli* K88 (1.4×10^{10} cfu)	17 → 24	Yes	Increased animal performance and microbial diversity. Reduced diarrhea scores (in presence of raw potato starch)
Daudelin *et al.* (2011)	(a) *Pediococcus acidilactici* MA18/5 M (b) *S. cerevisiae* SB-CNCM I-1079 (c) *P. acidilactici* + *S. cerevisiae* Sows: gestation (3×10^9 cfu) + lactation (6×10^9 cfu). Included in feed (daily mix)[1] Piglets: lactation (1×10^9 cfu). Oral administration Weaning: 2×10^9 cfu/kg. Included in feed	ETEC 0149 F4 (5×10^9 cfu)	21 → 28	Yes	(a, b) Reduced ETEC attachment to intestinal mucosa. (a,c) Induced ileum cytokine expression
Trevisi *et al.* (2011)	*L. rhamnosus* GG (6×10^9 cfu) Included in feed (daily mix)[1]	ETEC F4 (1.5×10^{10} cfu)	21 → 28	No	Reduced animal performance. Increased diarrhea scores. Reduced serum immunoglobulins. Tended to a worse histomorphology

Nutrition against ETEC and VTEC

Probiotics

Benefits?

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Conclusions:

- **Effects**: more articles describing beneficial effects with probiotics (>80%) compared to negative.
- **Against pathogens:**
  - In most of the cases, the effects are positive, although they are quite “dicreet”
  - Potential risks: some probiotics in animals with intestinal damage can suffer translocation pressure.
  - **High variability**: probiotics may have a positive effect in some trials and not in others. Differences in diets, dosajes, genetics or management can influence

TAKE-AWAY

Probiotics can help BUT…

“Do not look to probiotics as a replacement for antibiotics, combine them with other nutritional solutions, management or vaccination strategies”

Control strategies

Reduce pathogenic *E. coli*

Protect against infection

Multifactorial approach

Nutrition

Management / facilities

Inmunity

Management against ETEC and VTEC

Reduction of pathogenic *E.coli* patogénicos and increase of resistance

Water
- Quality control (regularly)

Hygiene
- Washing, desinfection and drying
  - Pen
  - Feeders and drinkers
  - Others: farm boots? toys?
- Sanitary break (+4 days)
- Lactation (animales menos contaminados)

Facilites and environment
- Walls and floors (avoid wind zones, humidity zones, etc.)
- Temperture
- Humidity
- Feeder and drinker space

Management
- All in/All out
- Late weaning
- Transport
- Group size (preaferable smaller groups)
- Density
- Stress
- Health control (vaccination)

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Management ETEC and VTEC

Temperature

Low temperature

Reduces intestinal peristaltic activity and consequently increases bacterial colonization

Low temperaturas at weaning → more diarrhoea

Diseases of Swine. Fairbrother & Nadeau 2019.

T°C fluctuations

High fluctuation of T°C increases diarrohea

23.5 ± 3°C	23.5 ± 0,5°C
High DAW	Low DAW

Research | Open Access | Published: 18 June 2008

Risk factors for post-weaning diarrhoea on piglet producing farms in Finland

Taina M Laine, Tapani Lyytikäinen, Maija Yliaho & Marjukka Anttila

Acta Veterinaria Scandinavica **50**, Article number: 21 (2008) | Cite this article

Variable	P-value
Temperature control: Automatic vs. Manual	0.03
Number of sows	0.02
Only 1 feeder	0.08

Automatic temperature control reduces risk of post-weaning diarrhea

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Strategies against ETEC and VTEC

Reduce pathogenic *E. colis*

Protect against infection

Multifactorial approach

Nutrition

Management/Facilites

Inmunity

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Immunity against ETEC and VTEC

Reduction of pathogenic *E.coli* and increase of resistance

Vaccination

- Vaccination of sows (for neonatal diarrhoea. ex. F4(K88
- Oral vaccines E.coli non-virulent F4(K88) and F18 → Post-weaning diarrhea
- Toxoid vaccines against Vt2e (Stx2e) → Edema disease
-

Oral antibodies

- Oral egg yolk powder with hens immunized against F4(K88) and F18

Genetic selection

- Animals resistant to F4(K88) and F18

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Inmunity against VTEC

Vaccination to increase the resistance of the animals

1. Ingestion of VTEC

2. Small bowel colonization (receptors in jejunum & ileum)

- **ETEC:F18** – depends on age (+10 days?/+20 days?) 3 weeks. ↑
- - cause disease slowly (after 5-7 days)
- - end-lactation and post-weaning

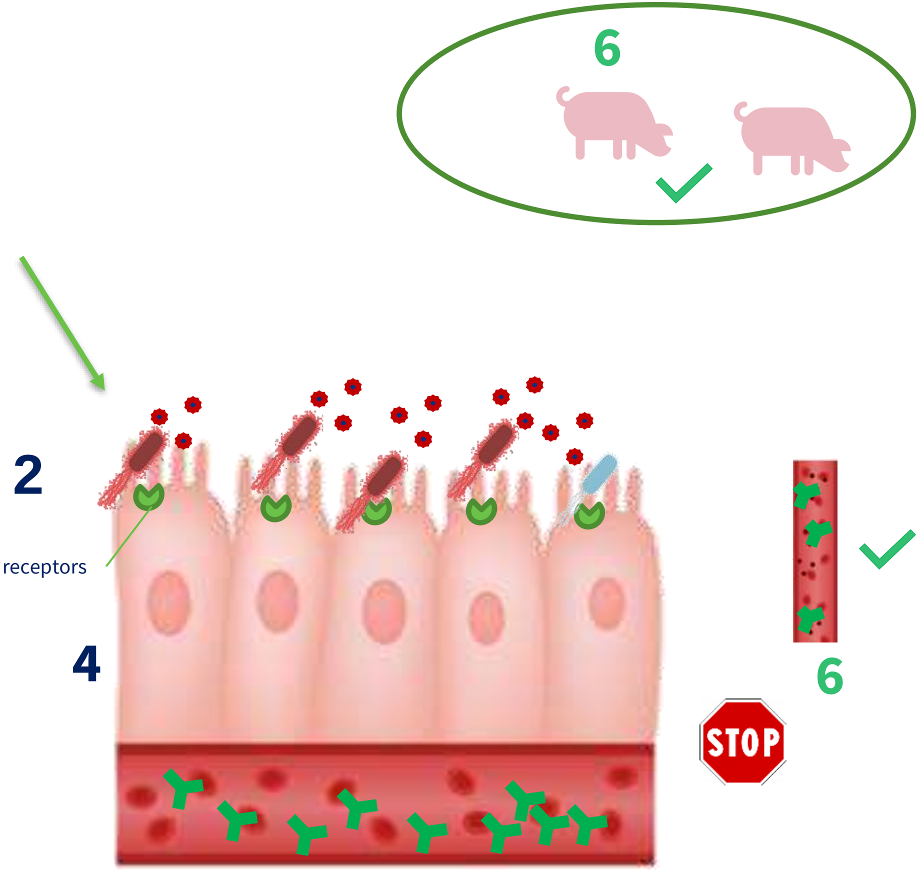
3. Verotoxin production (Vt2e/Stx2e)

4. Transport of toxins into circulation

5. Antibodies neutralize the toxin

6. NO capillary damage

6. Healthy piglets, WITHOUT edema or ataxias



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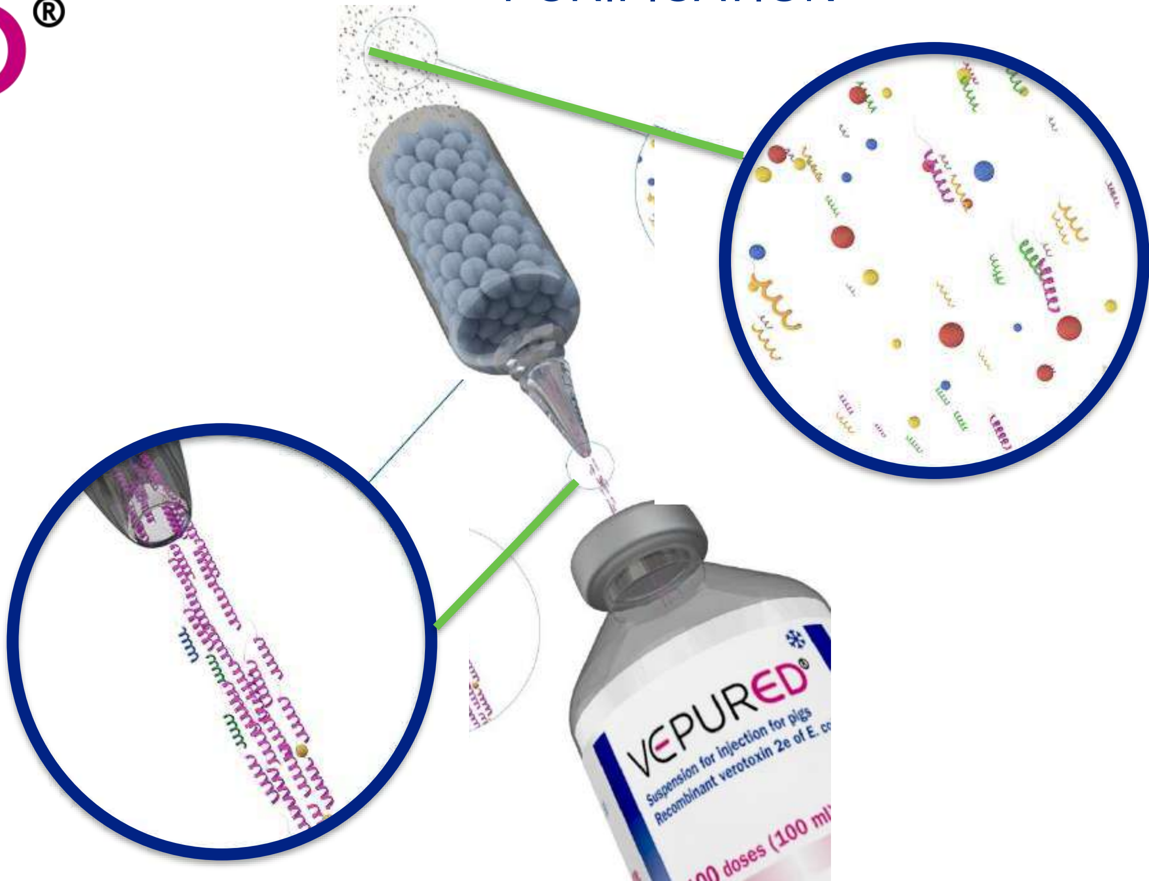
VEPURED®

PURIFICATION



1 ml / IM – One dose

From day 2 of life

Proction until slaughterhouse

Prevention of mortality

Reduction of clinical signs

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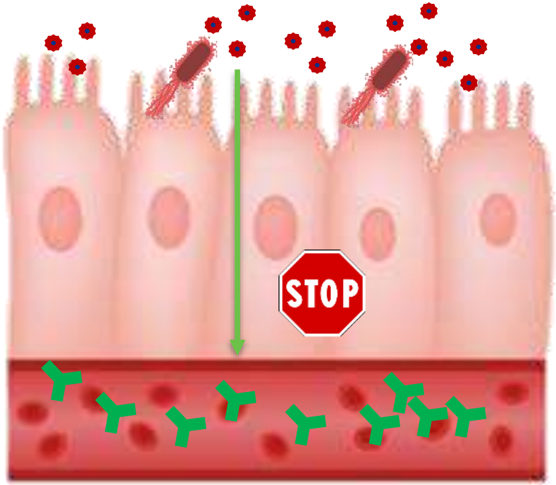
Intestinal integrity



Maintaining intestinal integrity is key to avoiding possible primary or secondary processes that disrupt the intestinal balance

Post-weaning diarrhea
Streptococcus suis problems
Oedema problems

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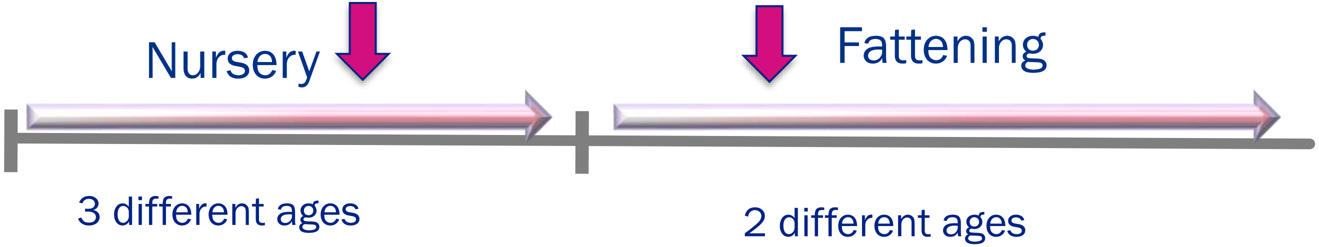
VERO CHECK by VEPURED®

Sampling moment

5 VEROCHECKS IN A PACK



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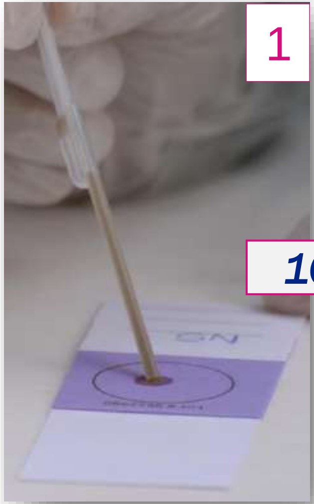
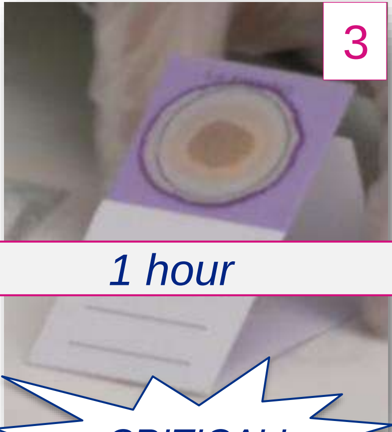
FTA INOCULATION



10 seg.

1 hour



CRITICAL!

1st inoculation

2nd inoculation

Dry for 1 hour at room temperature

Put into the plastic bag with the silica gel

RESULTS

	VT2e PCR-REAL TIME
6 Semanas 6S-1	POS ++ (Ct 33,5)
6 Semanas 6S-2	POS + (Ct 35,5)
9 Semanas 9S-1	NEG
9 Semanas 9S-2	NEG
9 Semanas 9S-3	POS + (Ct 38,1)

COMENTARIO

Valores de referencia para VT2e (Ct): POS < 38,5
NEG: No se ha detectado DNA bacteriano
POS (+): Se ha detectado DNA bacteriano en baja cantidad
POS (++): Se ha detectado DNA bacteriano en moderada cantidad
POS (+++): Se ha detectado DNA bacteriano en alta cantidad

DIAG. MOLECULAR

	VT2e PCR-REAL TIME
7 Semanas T2	POS ++ (Ct 33,7)
7 Semanas T2	POS ++ (Ct 34,6)
7 Semanas T2	POS + (Ct 35,5)
9 Semanas T1	POS +++ (Ct 29)
9 Semanas T1	POS +++ (Ct 27,6)
9 Semanas T1	POS +++ (Ct 29,7)

COMENTARIO

Valores de referencia para VT2e (Ct): POS < 38,5
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POS (+): Se ha detectado DNA bacteriano en baja cantidad
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Prevalence of Verotoxin in Europe

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ZERO ZINC SUMMIT 2022

European screening reveals risk of Oedema Disease with the reduction of ZnO

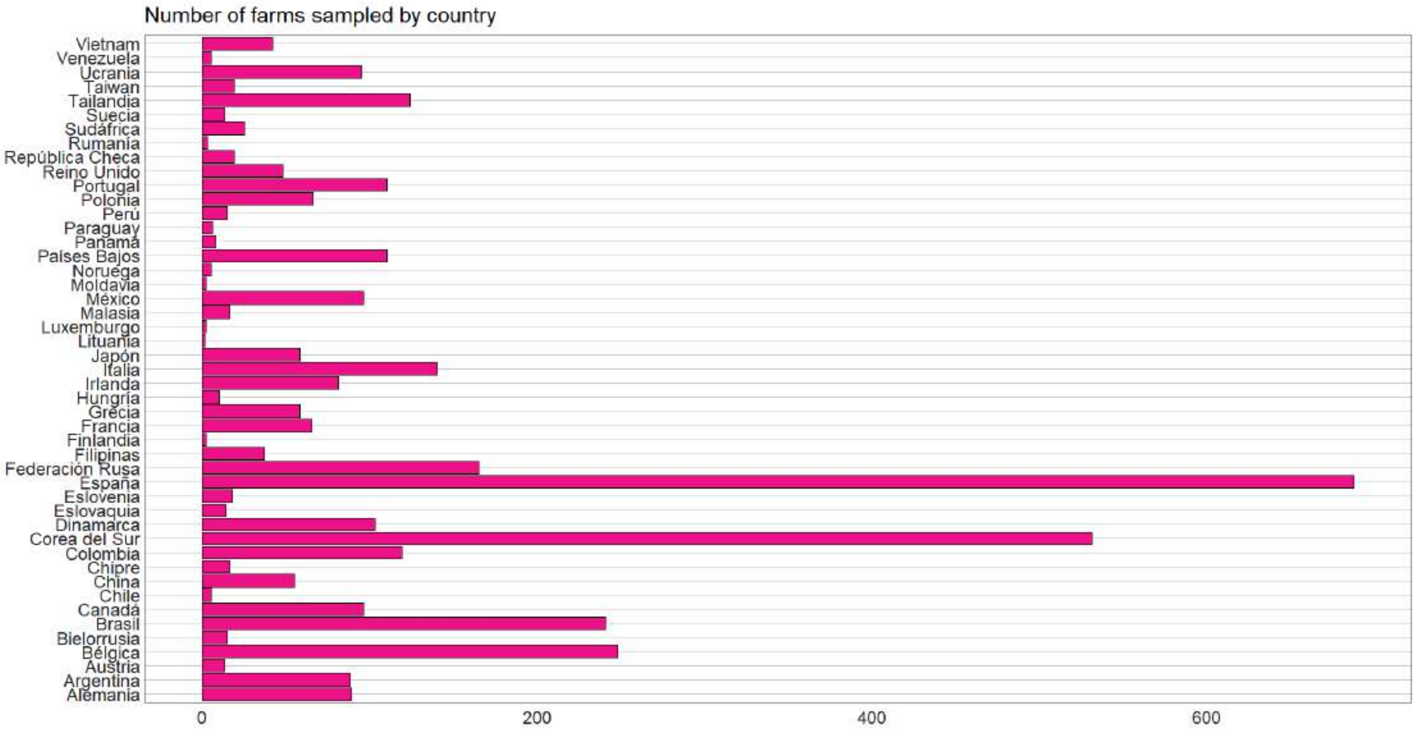
Anne Strunz[1], Anni Andersen[1], Lola Tolstrup[1], Emili Barba[2]
[1] HIPRA Nordic (Denmark)
[2] HIPRA, Amer (Spain)

Corresponding author: anne.strunz@hipra.com

HIPRA

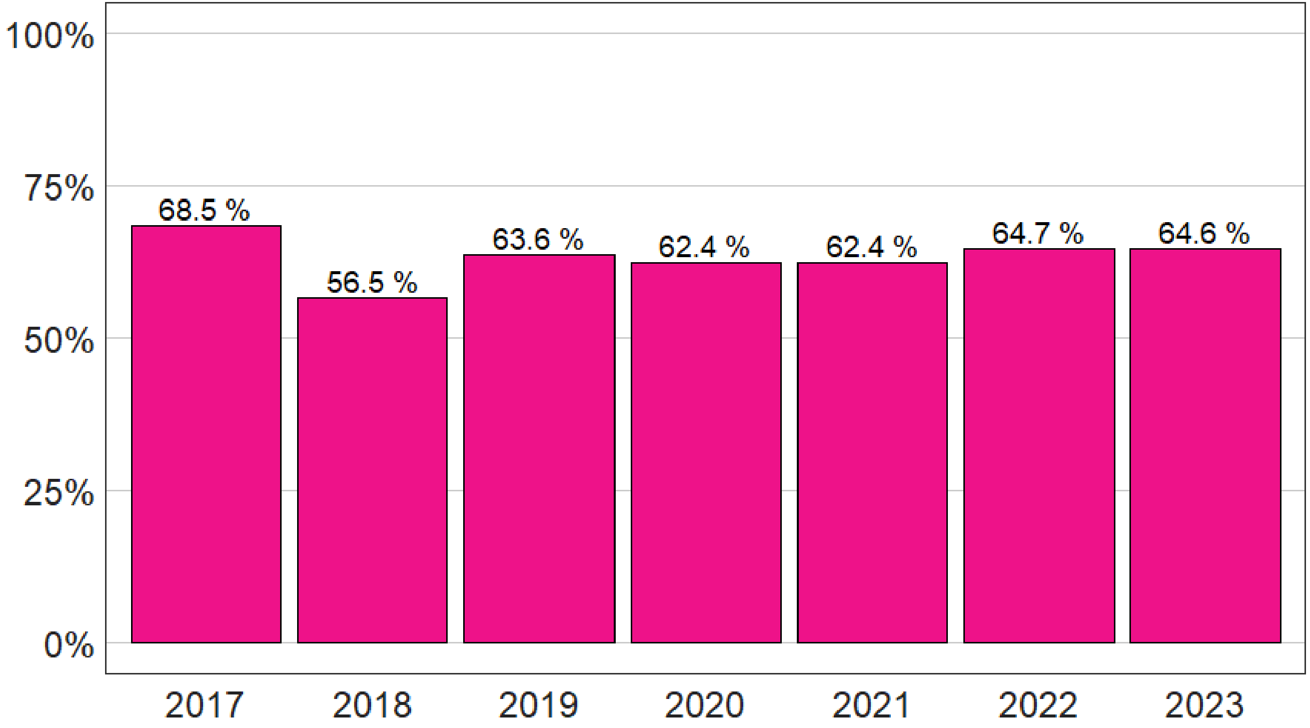
3 785 farms
19 633 samples

MONITORING VEROCHECK PCRs

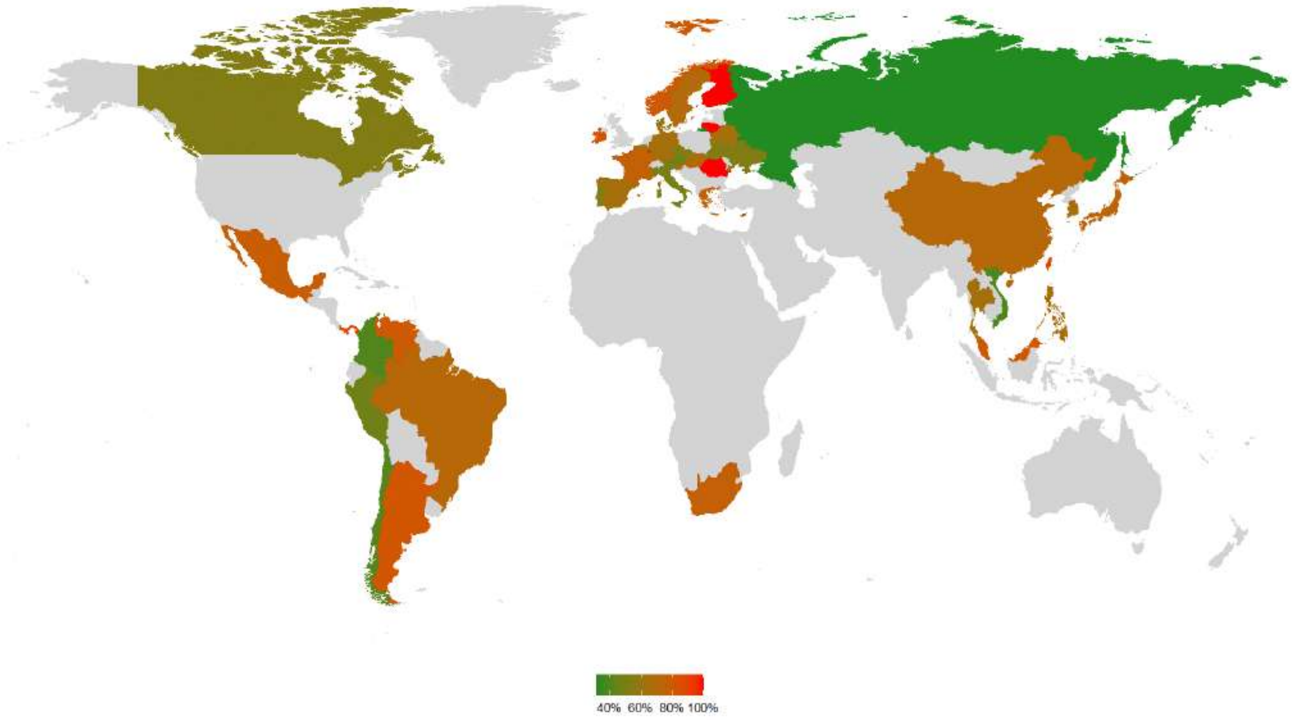


HIPRA

Percentage of Vtx positive farms over time



% OF POSITIVE FARMS



HIPRA

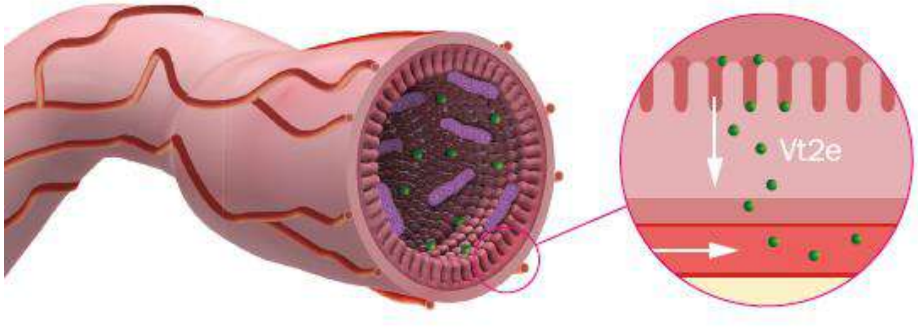
1 Introduction

2 What can we do for you?

3 Results

HIPRA

The verotoxin effect is dose-dependent



+ Clinical signs | Subclinical −

Low growth, *Strepto* problems, post-weaning diarrhoea

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Animal and Veterinary Sciences
2018; 6(6): 95-101
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A Multicenter, Randomized Field Trial on the Efficacy and Safety of VEPURED®, A New Vaccine Against Edema Disease in Pigs

Eva Perozo[†], Joaquim Mallorquí[†, *], Ainhoa Puig, David Sabaté, Laura Ferrer-Soler, Ricard March

Inmunity against VTEC

Vaccination to increase the resistance against VTEC

Trial on 4 commercial farms with oedema problems

Mortality

Farm	Treatment	Number of pigs (n)	Number of pigs that died due to Edema Disease (%)	
3	Placebo	120	7 (7)	
	Vepured	121	0 (0)	
4	Placebo	180	6 (3.3)	
	Vepured	299	1 (0.3)	
All	Placebo	643	26 (4.0)	
	Vepured	764	2 (0.3)	(P < .001)

*Overall comparison p value for Generalized Linear mixed model with binary response and Farm as random effect. Results are statistically significant if the P value <.05.

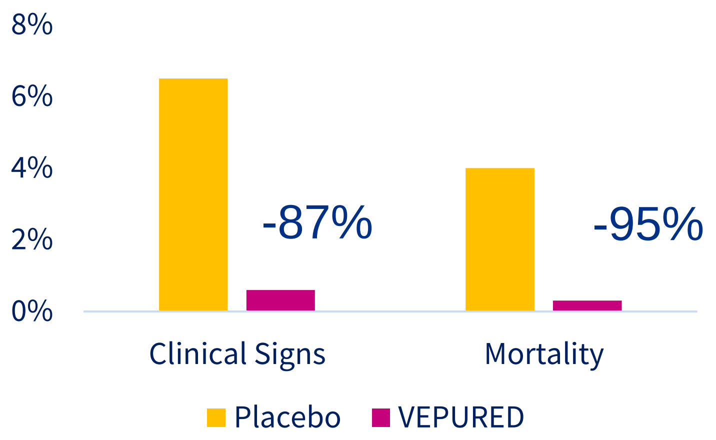
Clinical signs

Table 5. Summary of animals showing Edema Disease Clinical Signs.

Farm	Treatment	Number of pigs (n)	Number of pigs with Edema Disease Clinical Signs (%)	
1	Placebo	223	8 (3.6)	
	Vepured	224	1 (0.4)	
2	Placebo	120	7 (5.8)	
	Vepured	120	0 (0)	
3	Placebo	120	11 (9.2)	
	Vepured	121	0 (0)	
4	Placebo	180	16 (8.9)	
	Vepured	299	4 (1.3)	
All	Placebo	643	42 (6.5)	
	Vepured	764	5 (0.6)	(P < .001)

Overall comparison P value for Generalized Linear mixed model with binary response and Farm as random effect. Results are statistically significant if the P value <.05.

VEPURED® vs PLACEBO



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Trial on 4 commercial farms with oedema problems

VEPURED® vs PLACEBO

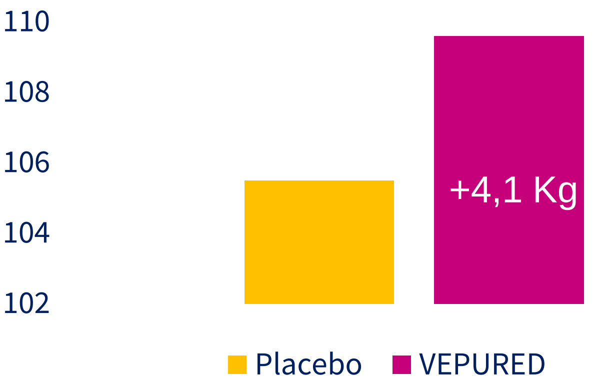
Wight increase

Table 6. Evolution of animal weights in farms with clinical Edema Disease (Mean ± SD).

Farm	Treatment	d-1	d28	d42	d115	End of fattening
1	Placebo	2.26 ± 0.54	8.66 ± 1.52	13.98 ± 2.61	64.69 ± 11.2	101.44 ± 15.24
	Vepured	2.29 ± 0.58	8.62 ± 1.81	14.01 ± 3.15	66.69 ± 10.99	105.42 ± 13.76
2	Placebo	2.04 ± 0.45	8.87 ± 1.73	13.87 ± 2.66	62.90 ± 9.07	109.84 ± 11.12
	Vepured	2.05 ± 0.45	9.20 ± 1.78	14.25 ± 2.42	65.84 ± 7.92	113.27 ± 11.89
3	Placebo	1.82 ± 0.46	6.5 ± 1.35	14.61 ± 2.71	59.42 ± 9.55	97.67 ± 13.63
	Vepured	1.84 ± 0.5	7.23 ± 2.01	14.69 ± 3.27	62.47 ± 9.59	101.46 ± 12.96
4	Placebo	1.95 ± 0.37	7.05 ± 1.18	9.57 ± 2.01	57.22 ± 8.5	110.93 ± 13.77
	Vepured	1.98 ± 0.37	6.93 ± 1.16	10.47 ± 1.85	60.27 ± 9.17	115.45 ± 13.60
All	Placebo	2.01 ± 0.47	7.71 ± 1.69	12.67 ± 3.28	60.62 ± 9.96	105.54 ± 14.81
	Vepured	2.03 ± 0.49	7.77 ± 1.82	13.04 ± 3.21	63.5 ± 9.81	109.64 ± 14.35
	P value*	0.584	0.799	0.009	< .001	< .001

SD: standard deviation.
* P values for overall group comparison at fixed times using a Linear mixed model with farm as a random effect. Results are statistically significant if the P value < .05.

Weights end of fattening (kg)



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Streptococcus suis

It has been reported that coinfections with other pathogens can influence the severity of Streptococcus suis problems[1]

On a farm with *S.suis* problems and positive to Verotoxin:

VEPURED® vs

350 mg/kg amoxicillin in feed after weaning


HIPRA

IPVS2022

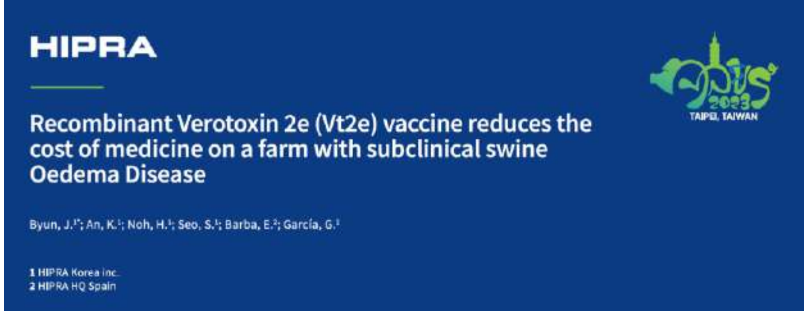
Antibiotic reduction in a farm with *Streptococcus Suis* diagnosis by vaccinating against VT2E

Annelies, M.[1]; De Jong, E.[1]; Claeyé, E.[1]; Barba-Vidal, E.[2]; García, G.[2]; Boix, O.[2]; Matthijs, W.[3]; Van Poucke, S.[4].
[1]Hipra Benelux
[2]HIPRA HQ, Amer (Spain)
[3]DSM Nutritional Products
[4]Syn+
*Corresponding author: gonzalo.garcia@hipra.com

The production cost per piglet at 36.6 kg was reduced by € 1.32 in the VEPURED® group

1. Obradovic *et al.* 2021. Vet Res Mar. 20;52(1):49. doi:10.1186/s13567-021-00918-w

Subclinical disease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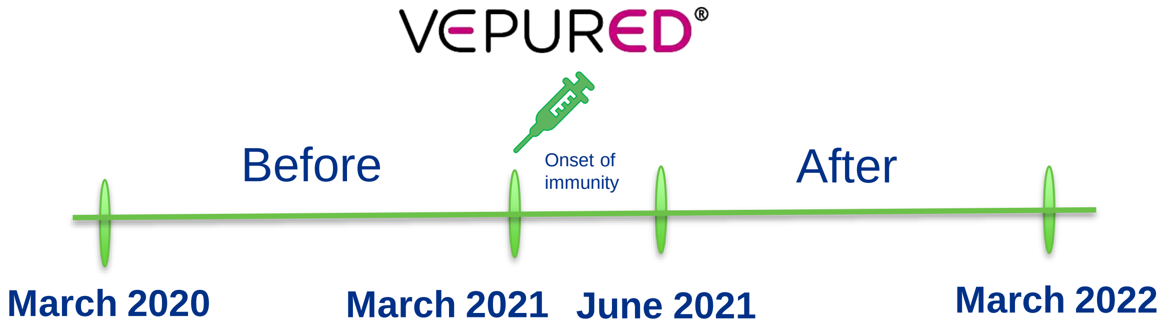
Recombinant Verotoxin 2e (Vt2e) vaccine reduces the cost of medicine on a farm with subclinical swine Oedema Disease

Byun, J.[1*]; An, K.[1]; Noh, H.[1]; Seo, S.[1]; Barba, E.[2]; García, G.[1]

1 HIPRA Korea inc.
2 HIPRA HQ Spain

Farm from South Korea (850 sows)
VT2e rtPCR (Verocheck)→ Positive
Without clinical signs or high mortality



MOLECULAR DIAG.

	VT2e PCR-REAL TIME
6 Weeks	POS ++ (Ct 32,4)
7 Weeks	POS ++ (Ct 33,3)
9 Weeks	POS +++ (Ct 28,5)
10 Weeks	POS ++ (Ct 32)
11 Weeks	POS + (Ct 38,4)

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Subclinical disease

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1 HIPRA Korea inc.
2 HIPRA HQ Spain

TAIPEI, TAIWAN

Results

Fig 1. Monthly cost of all antibiotics and additives over time

Monthly expenses (Unit: millions KRW)	Prevaccination	VEPURED®	P-value
Antibiotics in feed	116	104	0.32
Injectable Antibiotic**	**502**	**269**	**0.006**
Additives	190	261	0.17
Additives & all antibiotics*	**809**	**634**	**0.02**
Total	1.556	1.532	0.21

Even on a farm without clinical signs of oedema, production costs were lower after vaccination, especially because of the reduction of injectable antibiotics

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Conclusions

Reduce the number of pathogenic *E. coli*

Protect against infection and secondary diseases

Multifactorial approach

Nutrition

Management/Facilities

Inmunity

HIPRA

Conclusions

Reduce the number of pathogenic *E. coli*

Protect against infection

Nutrition

Water

Ingredients

Additives

Management/facilities

Hygiene

Facilities & environment

Management (calostration)

Temperature

Immunity

Vaccines

Oral antibodies

Genetic selection

HIPRA

Building Immunity
for a Healthier World