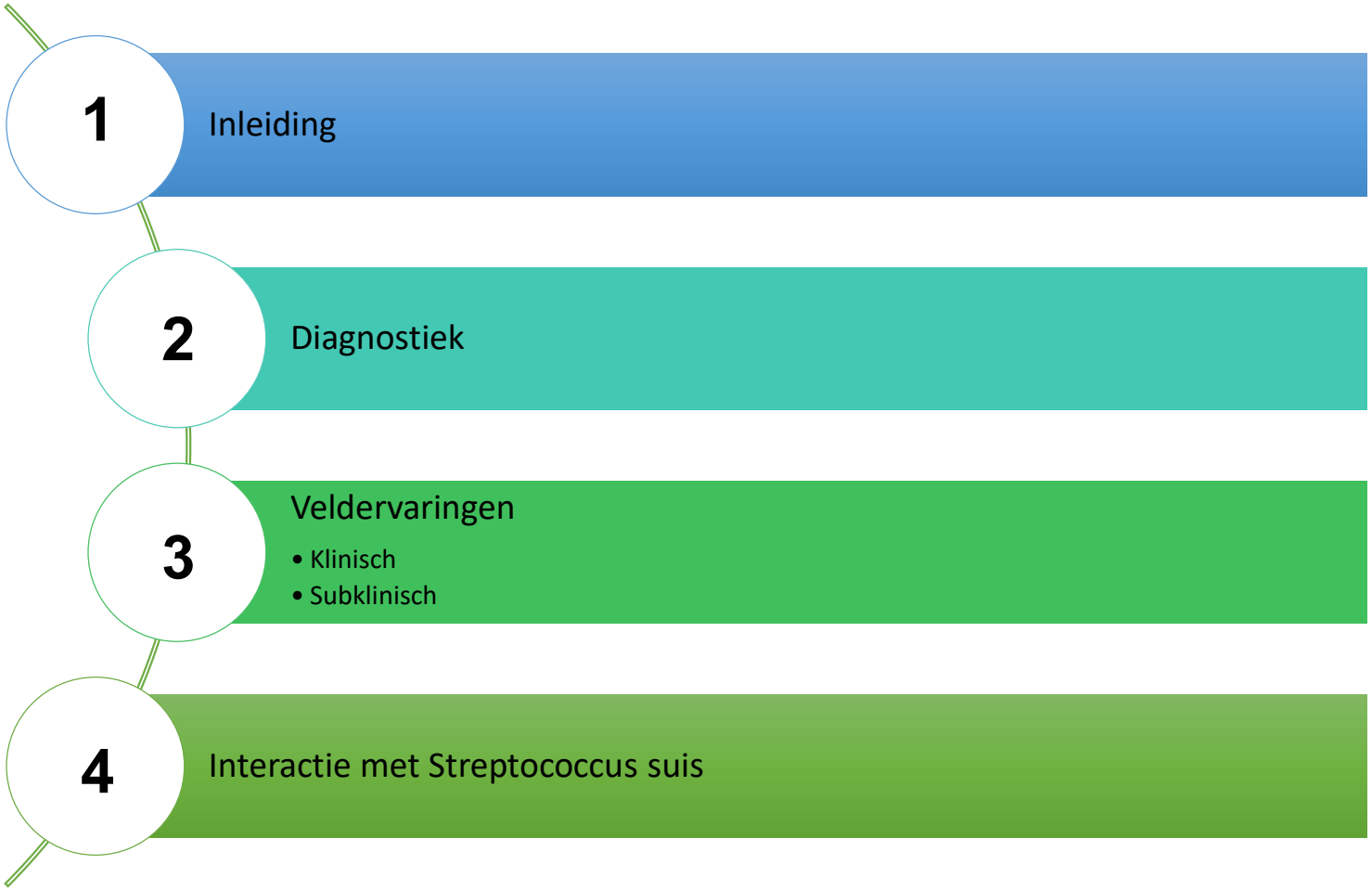
Stille Verstoorder: Subklinische slingerziekte in de praktijk

4 SEPTEMBER 2025

HIPRA

Sjouke Van Poucke

SYN
van data naar optimale diergezondheid

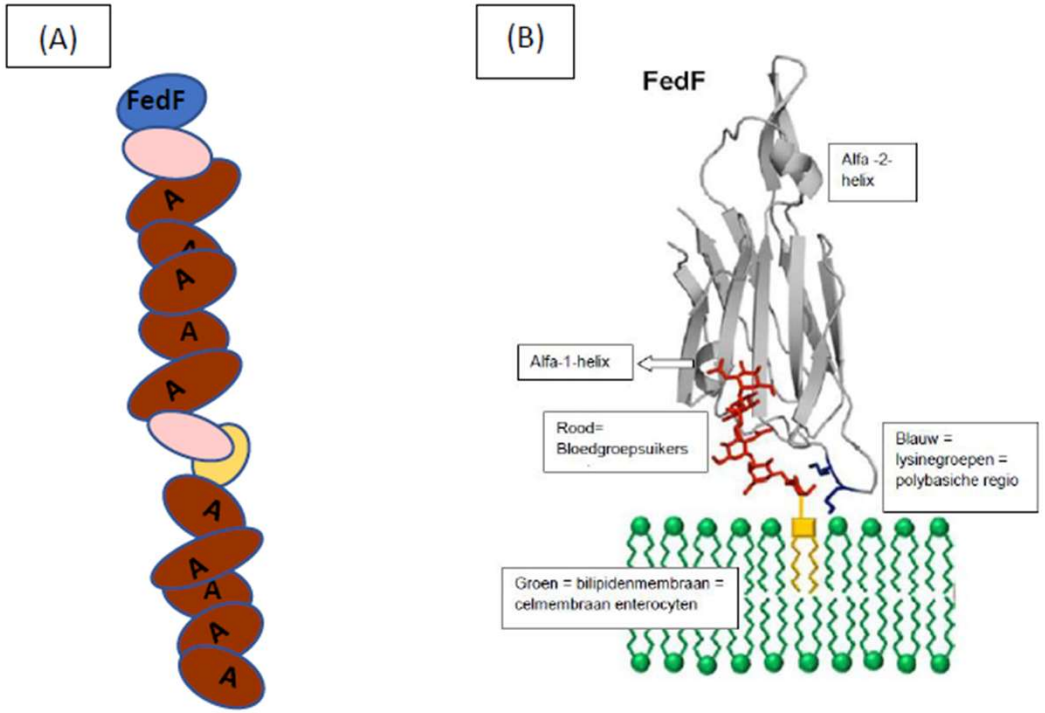

1
Inleiding
2
Diagnostiek
3
Veldervaringen
• Klinisch
• Subklinisch
4
Interactie met Streptococcus suis

1 Inleiding

Escherichia coli

	Adhesiefactoren	Toxines	Problematiek
ETEC	F5, F6, F41	STa	Neonatale diarree
	F4	STa, STb, EAST1, LT	Neonatale diarree
	F4, AIDA	STa, STb, EAST1, LT	Speendiarree
	F18, AIDA	STa, STb, EAST1, LT	Speendiarree
EPEC	Eae		Speendiarree
VETEC	F18/F4	STx2e	Slinger-/oedeemziekte

1 Inleiding-receptor

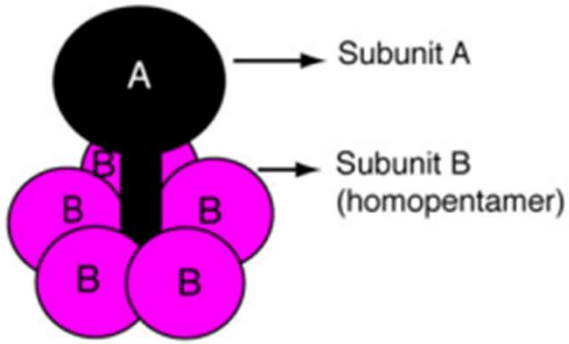


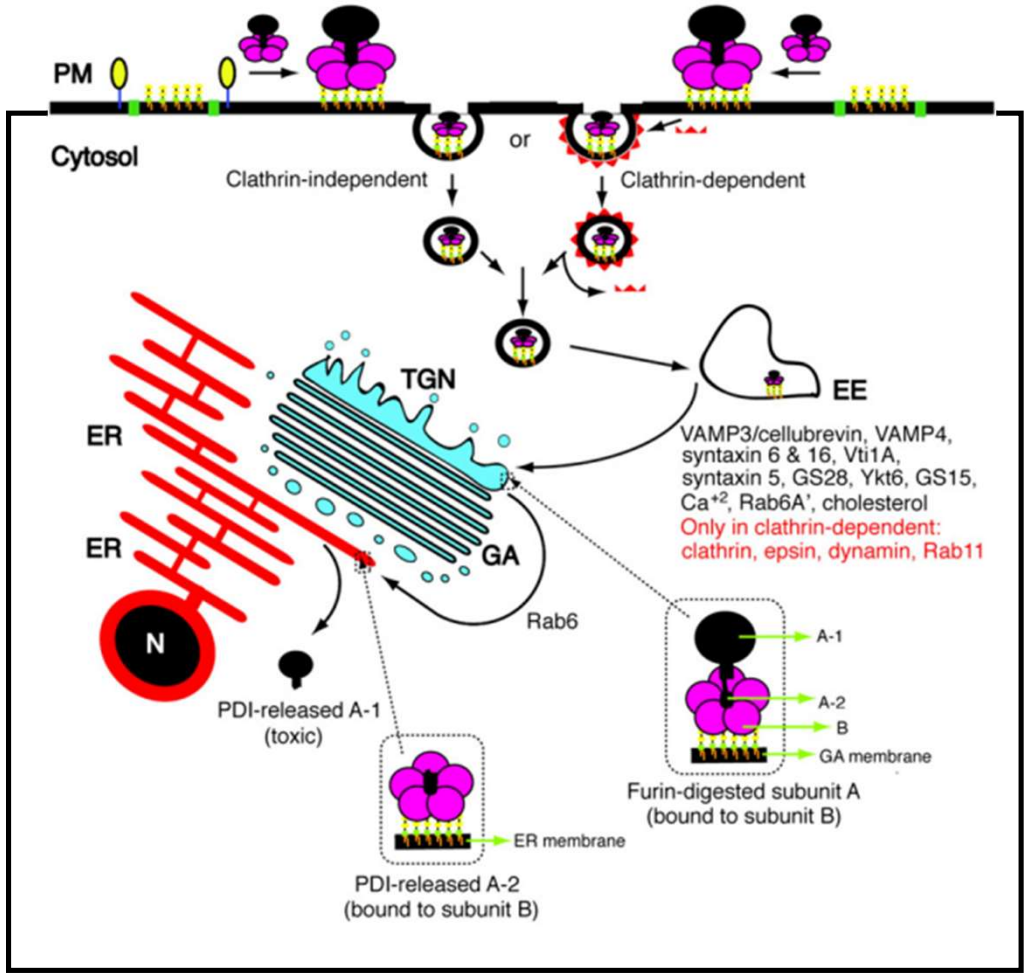
Figuur 1: (A) Schematische weergave van de verschillende subunit-eiwitten van de F18 fimbriae (naar Cox 2017). (B) Schematische weergave van de interactie tussen de kleine FedF subunit van F18, meer specifiek het N-lectinedomein (grijs) evenals de 2 positief geladen lysineresiduen (blauw), met de bloedgroepsuikers (oranje) en de negatief geladen bilipidenlaag van de enterocyt (naar Moonens et al., 2012).

- F18 receptor op het darmepitheel **= GLYCOLIPIDE**
- Versus GLYCOPROTEINE voor F4
- Consequenties voor manier van interactie

(A) Naar Cox 2017
(B) Naar Moonens et al. 2012

1 Inleiding-vaatwandschade

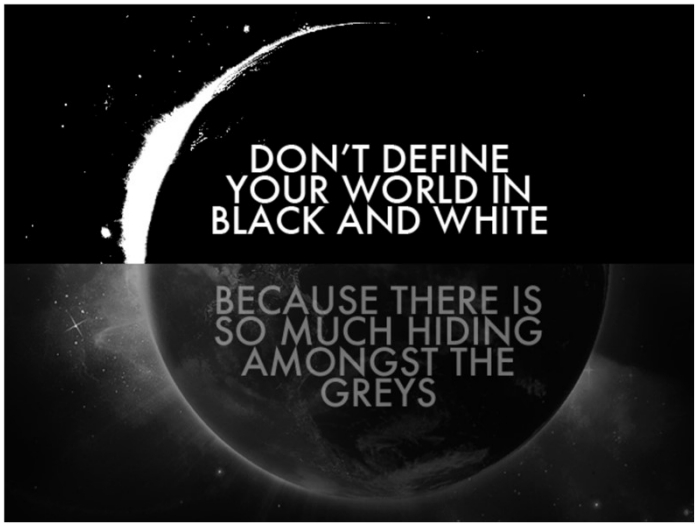




Organelle-Specific Targeting in Drug Delivery and Design
Maria Teresa Tarragó-Trani, Brian Storrie, in Advanced Drug Delivery Reviews, 2007

1 Inleiding-vaatwandschade

- Hoog en laag STx2 producerende stammen
- Verschillen in F18 receptorexpressie (leeftijd, ras,….)
- Binding van STx2 aan RBC en endotheel is complex:
  - 3 bindingsplaatsen per B-subunit, niet allen nodig
  - Invloeden van molecules rondom de receptor
- Remming van de eiwitsynthese door splitsing van een adeninebase uit 28S rRNA/ activering van apoptotische routes/ activering van een ontstekingsreactie



Multifactorieel!

Aanwezigheid van VTEC alleen is niet conclusief!

2 Diagnostiek-prevalentie

- Uitdagingen:
  - Bij acute sterfte: differentiatie andere oorzaken
  - Postmortale overgroei andere bacteriën
  - Kwantitatieve aspect (zowel kiem als STx2e)
  - Geen commerciële test voor detectie STx2e
  - Histologie in het veld: weinig succesvol
  - Snelle shifts in microbioom mogelijk

- Inschatting op bedrijfsniveau, zeker voor subklinische slinger -> Verochecks
- Bevestiging -> “diagnostische vaccinatie”

Table 2. Titers of Shiga toxin 2e at time of death toxin–producing *Escherichia coli* S1191.

	Titer[a] in blood		
Status	Range	Mean	No. positive/no. tested
Clinical	16–512	64	5/7
Asymptomatic		ND	0/18
Control		ND	0/8

2 Diagnostiek-prevalentie

- 27 bedrijven
- 14/27 acute of historische uitbraken
- Overige: verminderde groei, hoog AB-gebruik

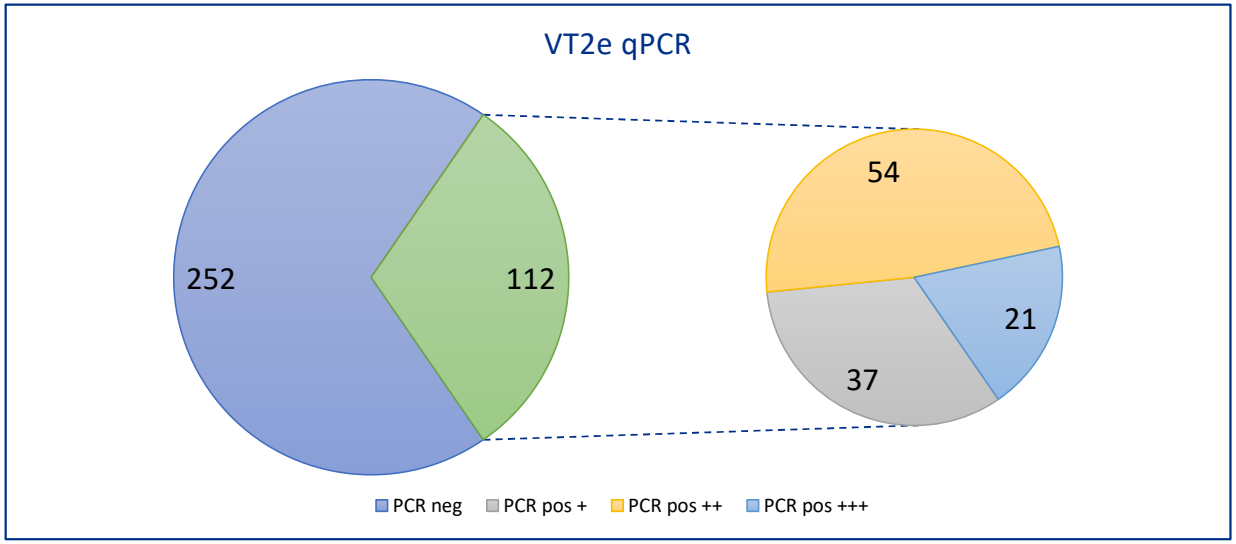
- Elk bedrijf
- 3 leeftijden: 4-7w, 8-12w, vleesvarkens
- 5 stalen/leeftijd
- 200µl/FTA-card
- qPCR VT2e-gen: Ct < 38,5 = positief (~9,6 10^3 KVE/ml)

- Vragenlijst
- Speenleeftijd en weken-systeem
- Symptomen op moment van staalnames
- AB behandeling op moment van staalnames

2 Diagnostiek-prevalentie

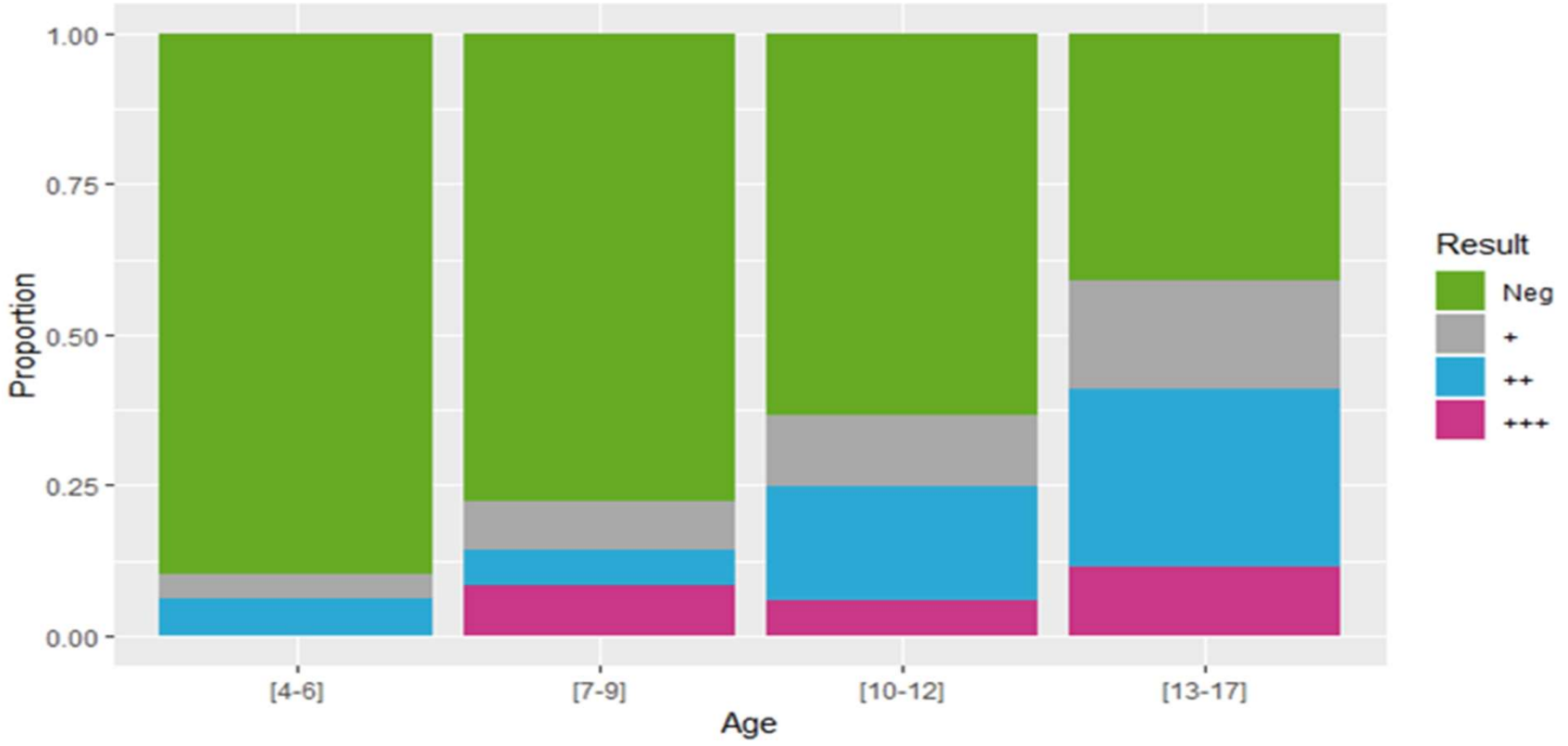
- 364 stalen:
- 69,2% neg
- 30,8% pos
  - laag (+): 33%
  - gemiddeld (++): 48%
  - hoog (+++): 19%

- 27 bedrijven:
  - 74% pos



	Treatment				
PCR	ZnO	Ab	ZnO + Ab	Geen	
pos	3	10	3	4	20
neg	0	4	1	2	7
	3	14	4	6	27

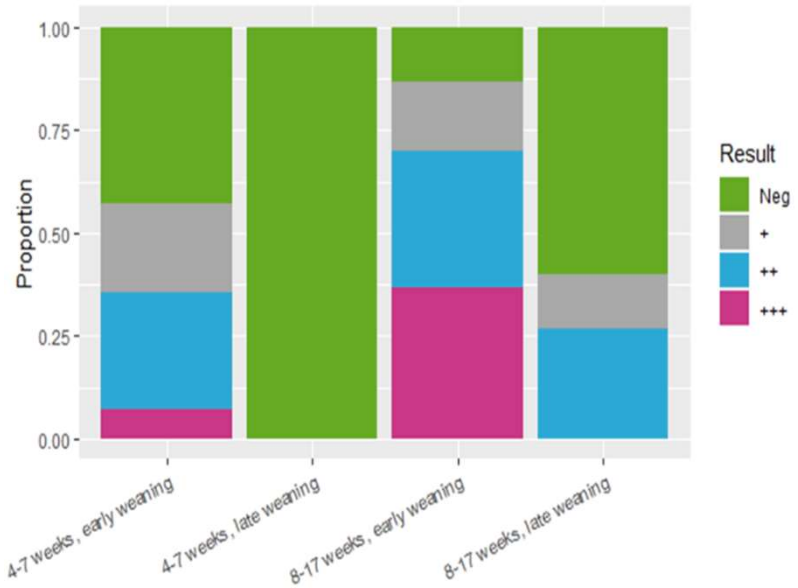
2 Diagnostiek-prevalentie



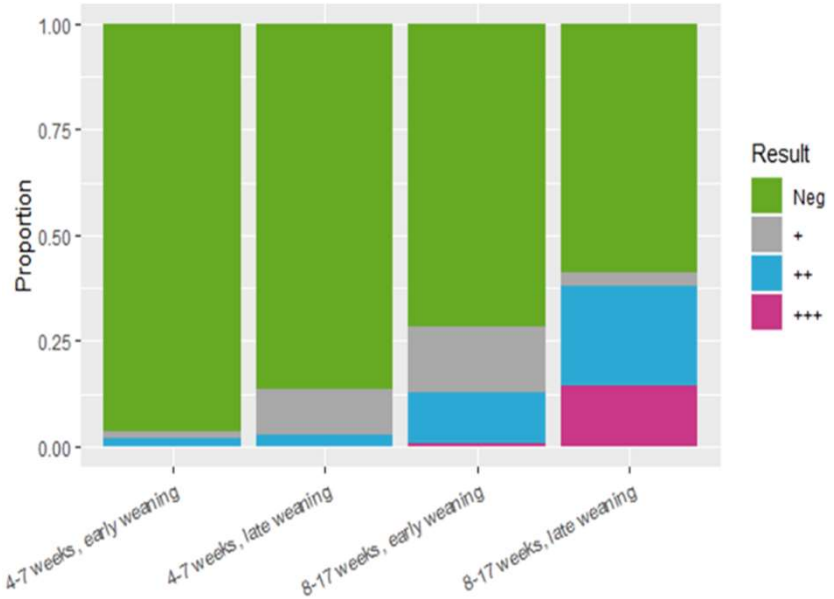
2 Diagnostiek-prevalentie

SYN
van data naar optimale diergezondheid

Klinisch

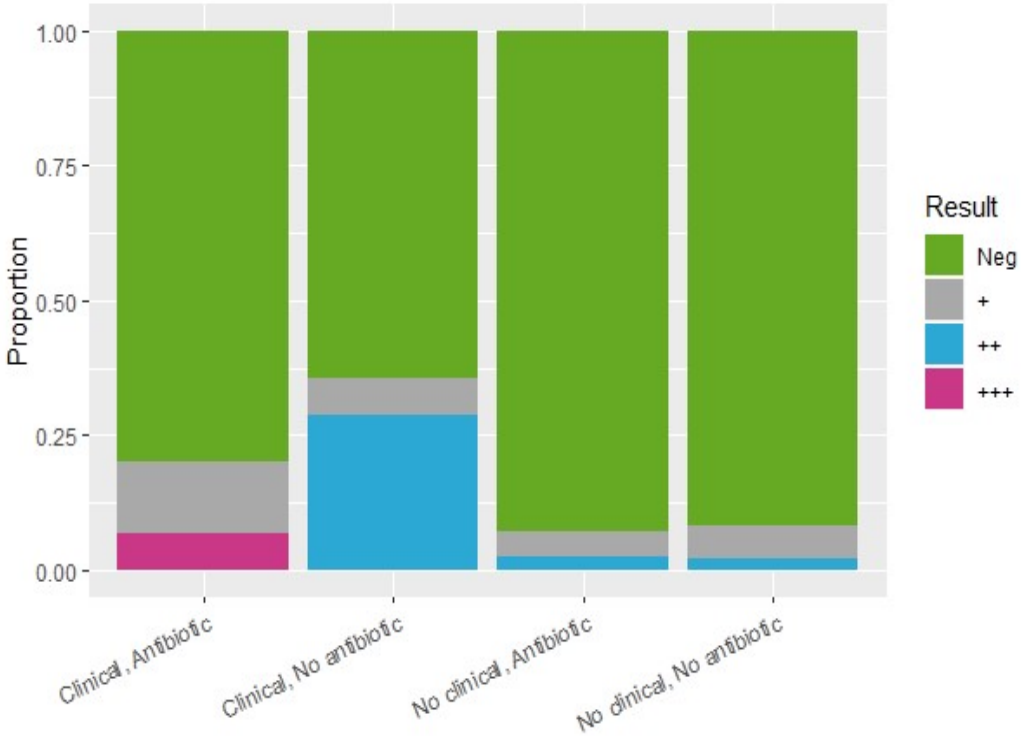


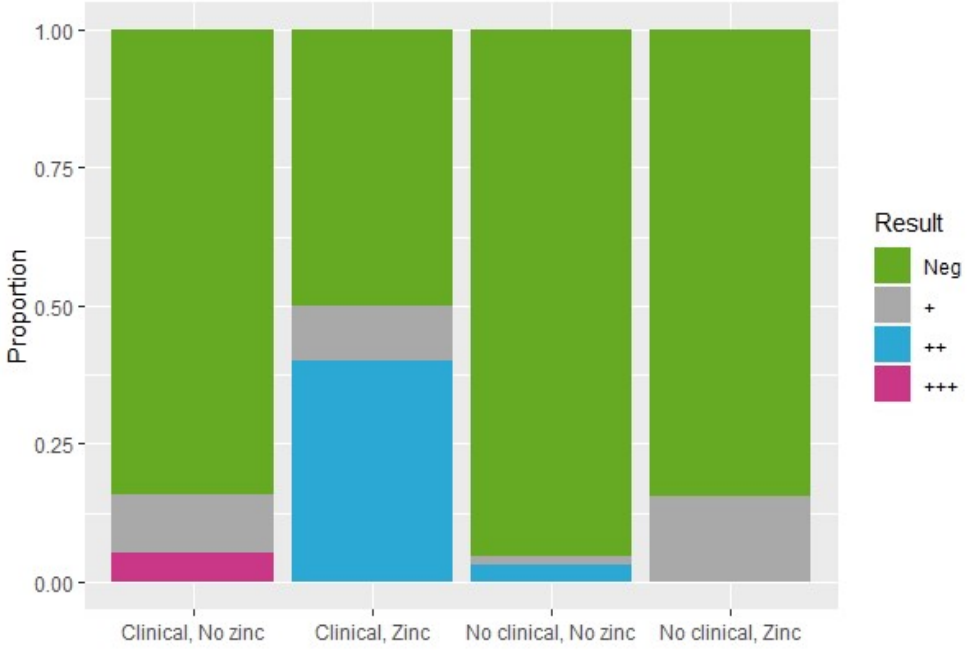
Subklinisch



2 Diagnostiek-prevalentie

Invloed van behandelingen





3 Veldervaringen- klinisch

	# zeugen	Weken-systeem	Speen leeftijd	Vaccinatie
Farm A	50	4	24d	2-4d
Farm B	300	5	21d	4-6d

Verocheck

3,5W	+++			
7,5W	++	+++	+++	+

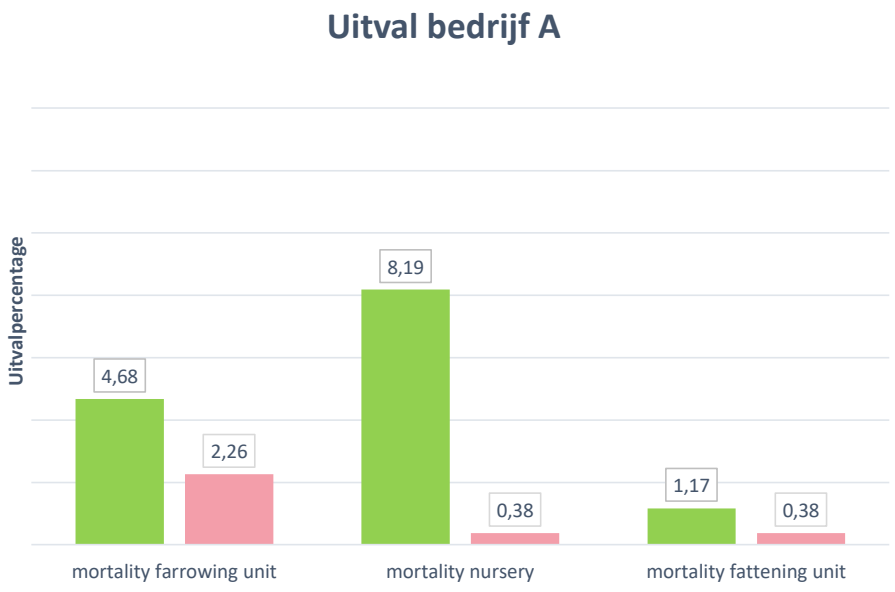
5W	++	+++	+++
10W	++	+	+++

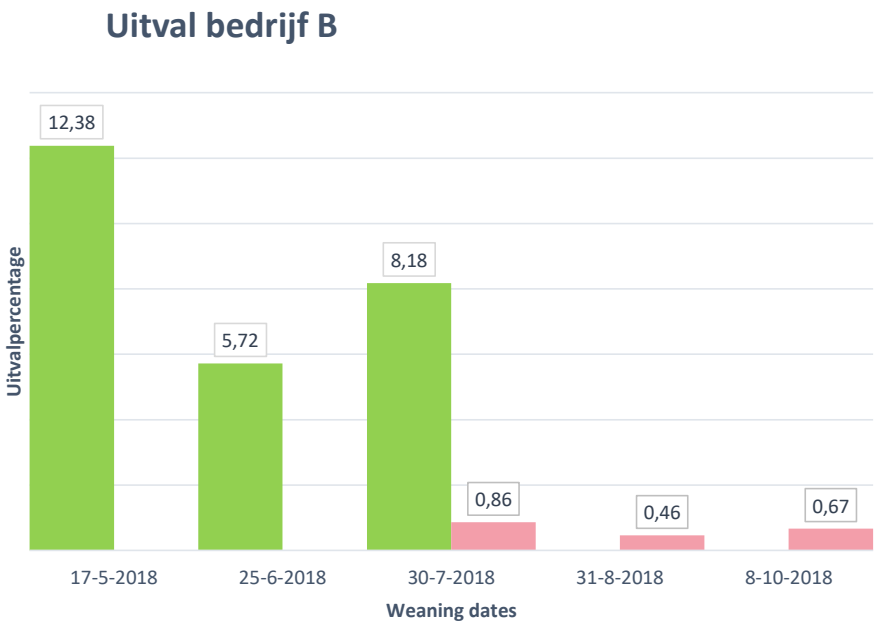
Foto: P. Vyt

3 Veldervaringen- klinisch

	Groep	Groepsbehandelingen	# biggen	# sterftes
Bedrijf A	Vepured	None	265	1
	Control	Colistin	171	14
Bedrijf B	Vepured	Tylosin	2120	13
	Control	Tylosin, Amoxycillin, Paromomycine	2254	199

3 Veldervaringen- klinisch





Controle
Vepured

3 Veldervaringen- klinisch

1. **Significante daling uitval**
2. Eliminatie **groepsbehandelingen** met colistine
3. Algemeen positief effect op **gewicht** en **dagelijkse groei** zowel batterij als vleesvarkens

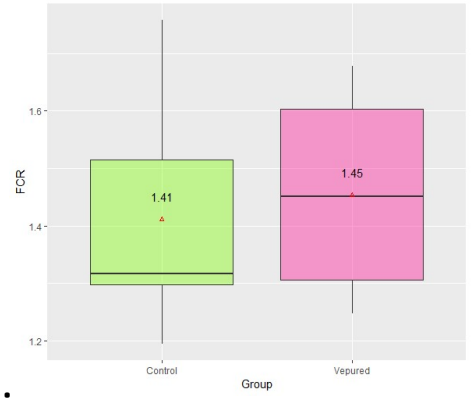
3 Veldervaringen- subklinisch

	# zeugen	Weken-systeem	Speenleeftijd	Vaccinatie	Verocheck				
Bedrijf A	260	5	21d	2-4d	7W	-	-	-	-
					12 W	++	++	+	+

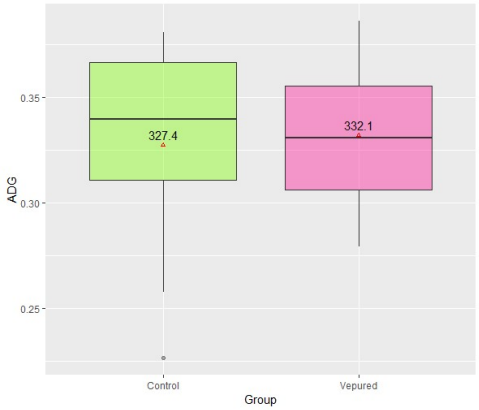
	Group	Groepsbehandelingen	# biggen	# sterftes	motivatie
Bedrijf A	Vepured	Geen	327	5	AB
	Control	Amoxycilline	340	7	

3 Veldervaringen- subklinisch

21-53 days: FCR (P-value: 0.575)



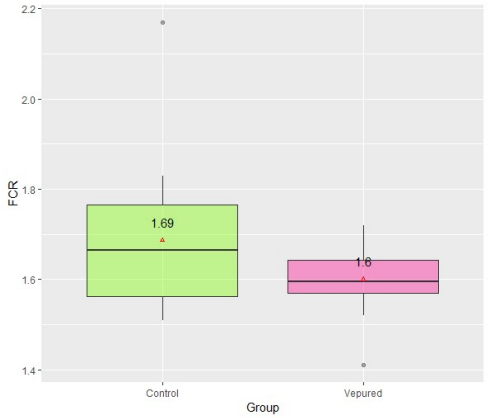
ADG (P-value: 0.802)



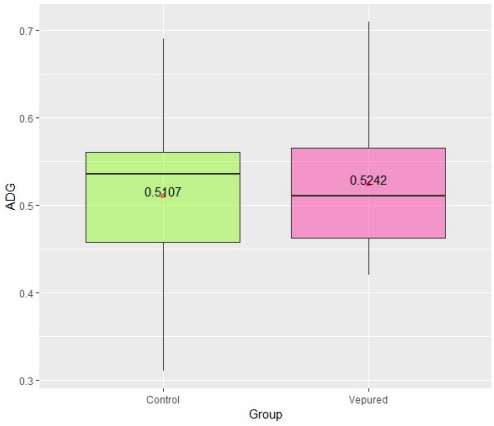
	Control	Vepured
Startgewicht	6,47 kg	6,42 kg
Gewicht op 53 dagen	16,96 kg	17,17 kg
# dagen amoxy	25-29 days	0
# hokjes behandeld	**11/11**	**0/9**

53-79 days:

FCR (P-value: 0.117)



ADG (P-value: 0.71)



	Control	Vepured
Gewicht op 79 dagen	35,9 kg	36,6 kg
# dagen amoxy	19-25 days	19-25 days
# hokjes behandeld	**14/14**	**2/12**

+ 0,7 kg

3 Veldervaringen- subklinisch

	VEPURED®	CONTROL (AMOX)	Price
Entry weight (kg)	6.419	6.473	
Exit weight (kg)	36.61	35.98	
Nº entry animals	327	340	34,00 €
Nº exit animals	322 (-5)	333 (-7)	
Phase 1 (kg/piglet)	2.18	2.44	1.04 €
Phase 2 (kg/piglet)	10.86	10.28	0.53 €
Phase 3 (kg/piglet)	14.12	15.43	0.39 €
Phase 4 (kg/piglet)	18.83	17.11	0.35 €
Feed cost	20.17 €	20.03 €	
Feed cost (kg piglets)	0.67 €	0.68 €	
Treatment days	0 €	49.20	0.04 €
Treatment cost	0 €	**1.91 €**	
Vaccine cost	**1.20 €**	- €	
Cost per entered piglet	55.37 €	55.94 €	- 0.49 €
Cost per exit piglet	56.23 €	57.12 €	- 0.89 €
Cost per kg	1.54 €	1.59 €	- 0.05 €
Cost per exit piglet (36.61 kg)	**56.23 €**	**57.55 €**	**- 1.32 €**

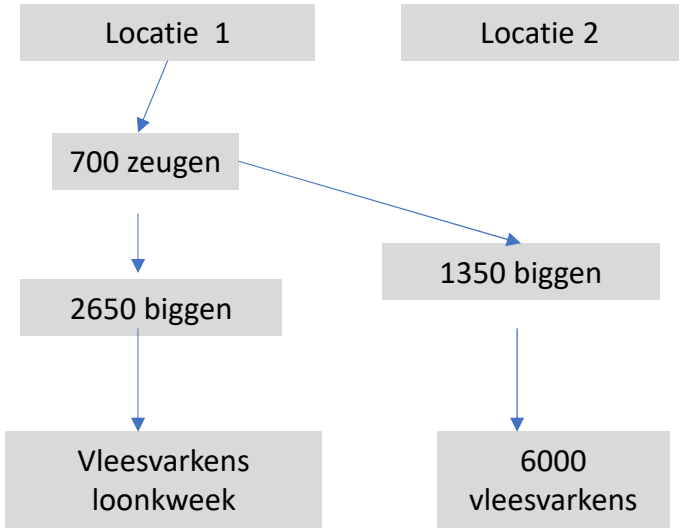
3 Veldervaringen- subklinisch

	# zeugen	Weken-systeem	Speenleef tijd	Vaccinatie
Farm B	700	4	24d	2-4 d

7W	-	-	-	-	-	-
11 w	-	-	+	++	+	++
15 w	-	-	-	-	+	-
24 w	-	-	+	-	-	-

	Groep	Groepsbehandelingen	# biggen	# sterftes	motivatie
Farm B	Vepured	Geen	264	6	Groei
	Control	Geen	279	11	

3 Veldervaringen- subklinisch



Locatie 1: Batterij

Eerste 14 dagen na spenen

* 2 kg/ton zinkoxide (Gutal®, Huvepharma)
* 10 mg/kg doxycycline (Soludox50%®,Dechra)

Pulse-medicatie via water

* 20 mg/kg bw/day amoxycillin(Dokamox80%®,Ecuphar)

Locatie 2: Batterij + vleesvarkens

Geen groepsbehandelingen

Uitval 1,6 à 2 % , geen diarree, S suis aanwezig

Vleesvarkens: uitval <2%

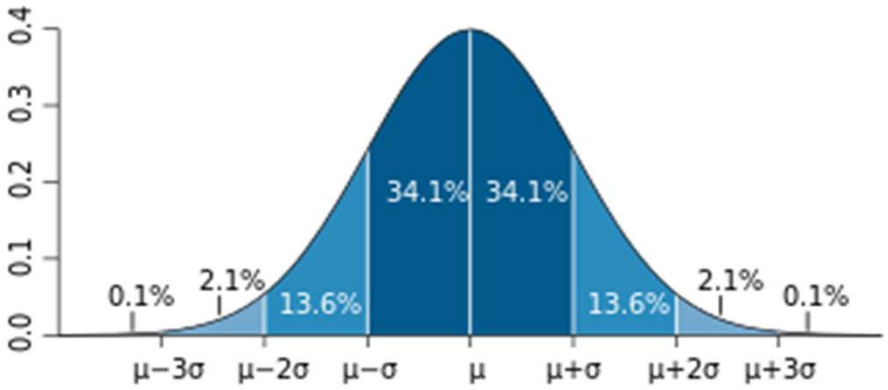
3 Veldervaringen- subklinisch

Weights in kg		
Age	**VAC** **N=245**	**CONTROL** **N=262**
76/77d	**31,73 ± 4,9**	**31,73 ± 4,95**
104/105d	**56,34 ±7,35**	**55,17 ± 7,92**
167/168d	**113,78 ± 9,85**	**111,11 ± 10,68**

+ 1,17kg

+ 2,67 kg

	167-168 Days	
	Control	**Vac**
Total pig	**263**	**245**
Average weight	**111.11**	**113.78**
Pig lower than 102.0 Kg (%)	**47 (17.9%)**	**34 (13.9%)**
Pig lower than 91.7 Kg (%)	**12 (4.6%)**	**3 (1.2%)**



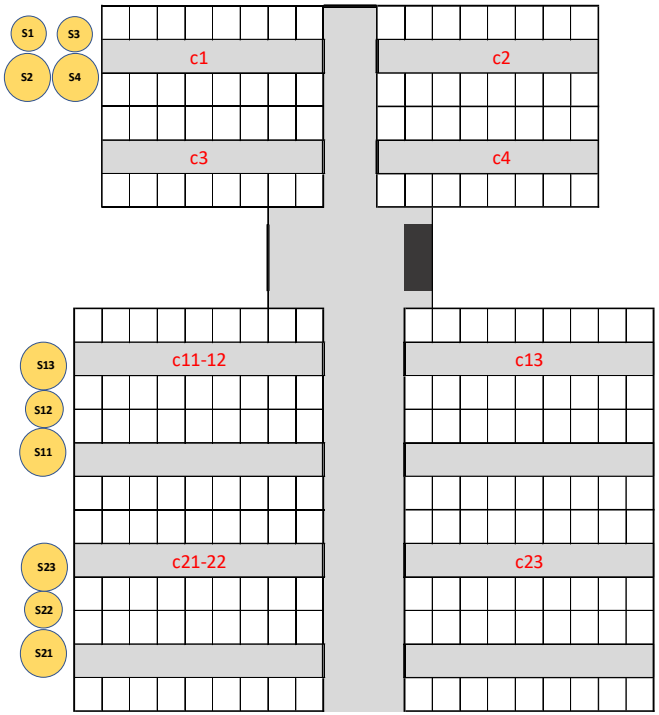
3 Veldervaringen- subklinisch

	# zeugen	Weken-systeem	Speen leeftijd	Vaccinatie
Bedrijf C	980	5	24d	2-4 d

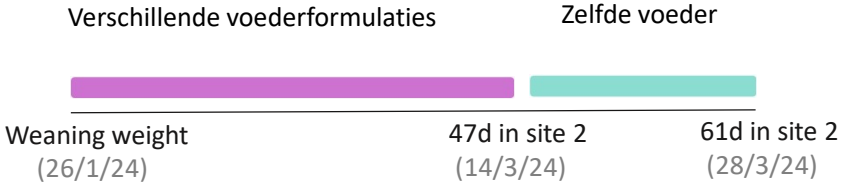
Verocheck			
5W	-	-	-
9 W	++	+	+

	Groep	Groepsbehandelingen	# biggen	isocalorisch geoptimaliseerd dieet met verschillend percentage ruw eiwit
Bedrijf C	Vepured	Geen	509	18%
	Control	Geen	509	16,5%

3 Veldervaringen- subklinisch



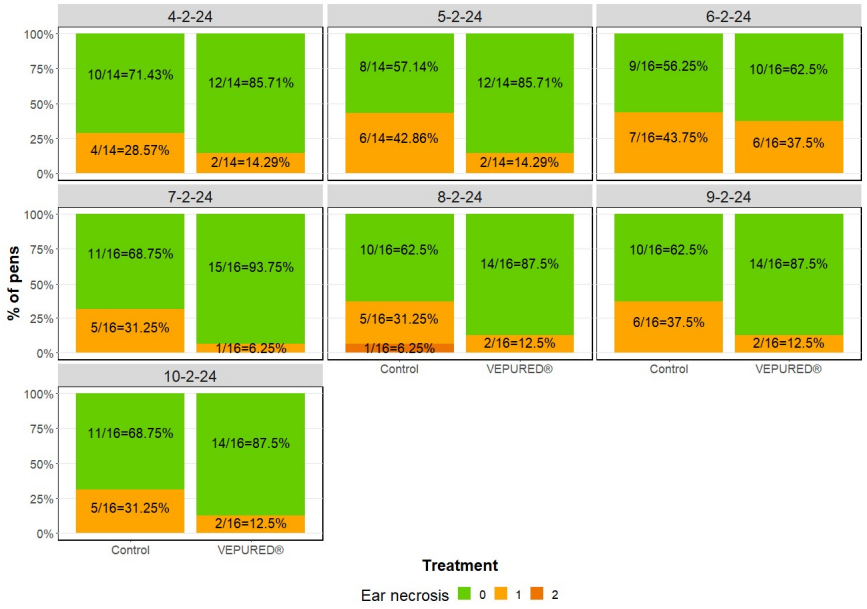
Topigs TN70 x nucleus
Batterij 0,4 m2/dier- meel
Vleesvarkens 0,8 m2/dier-korrel



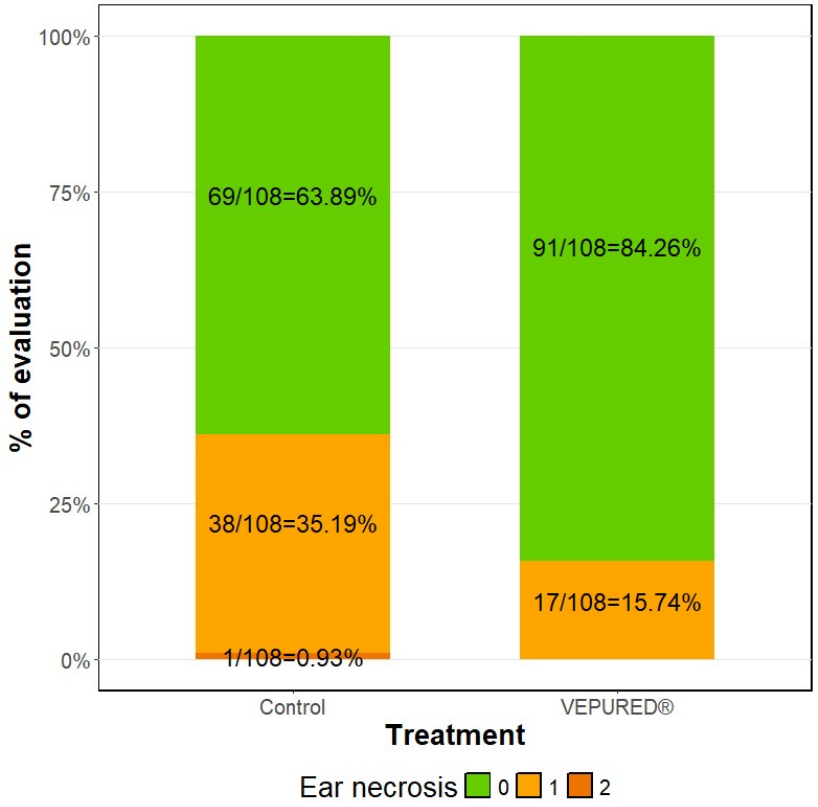
3 Veldervaringen- subklinisch

Oortopnecrose

Meer oortopnecrose in controlegroep(p-value <0,001***)



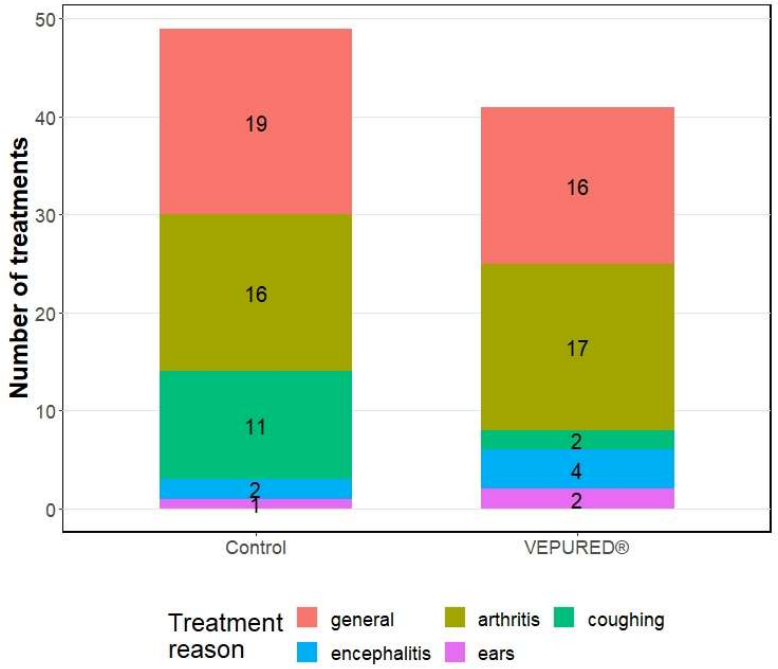
Logistic regression. Ear necrosis (score 2 and 1) vs non-Ear necrosis (0)



3 Veldervaringen- subklinisch

Individuele behandelingen

Geen significant verschil tussen beide groepen (p-value = 0,57)



3 Veldervaringen- subklinisch

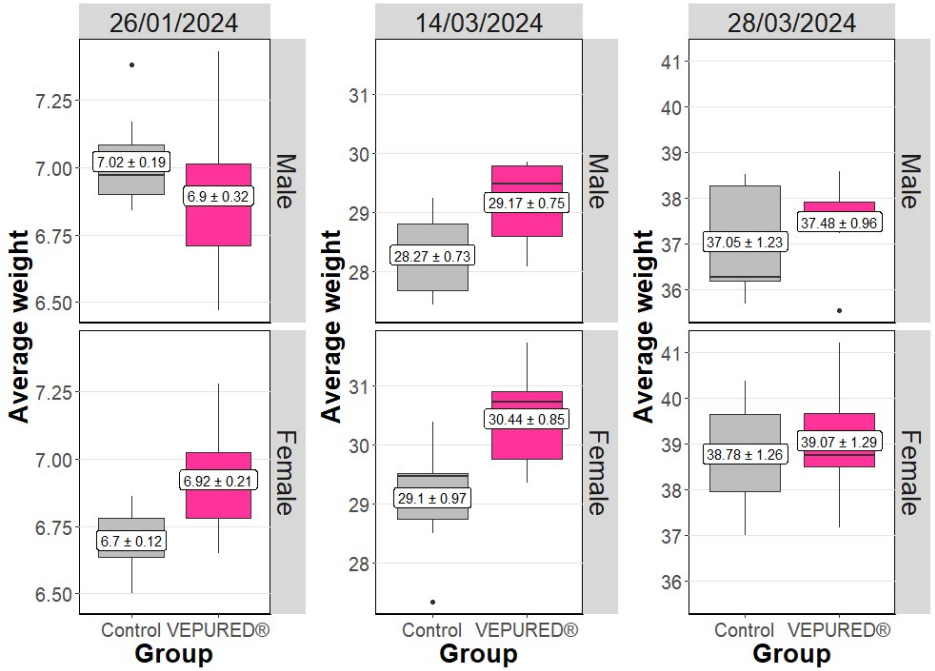
Different feed formulations between both groups

Same feed formulations between both groups

Weaning weight (26/1/24)

47d in site 2 (14/3/24)

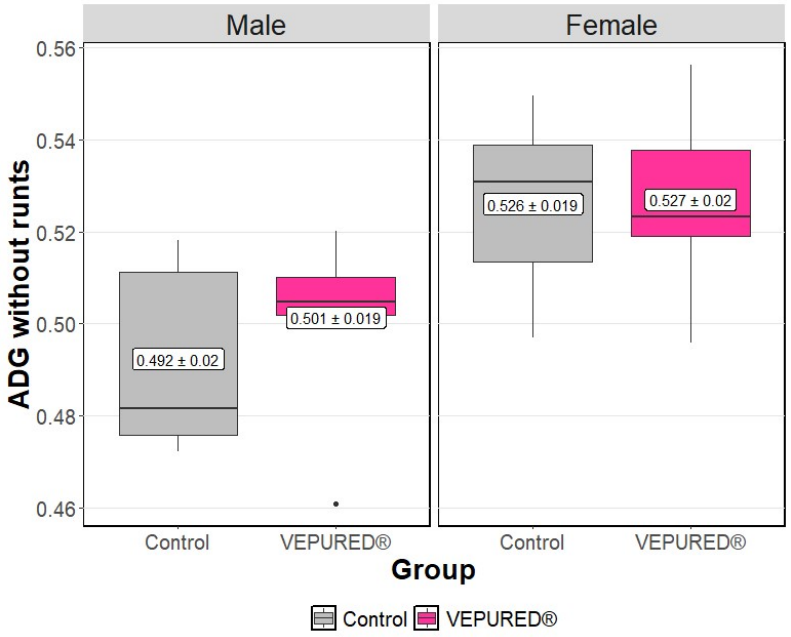
61d in site 2 (28/3/24)



P-value 0,59

P-value 0,001**

P-value 0,43



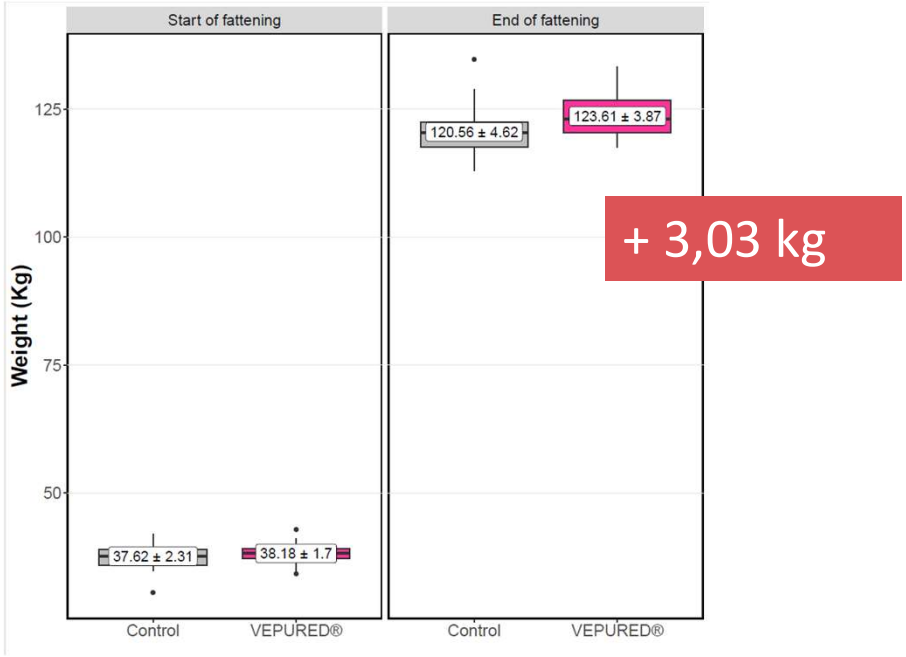
P-value: 0,50

3 Veldervaringen- subklinisch

Zelfde voeder

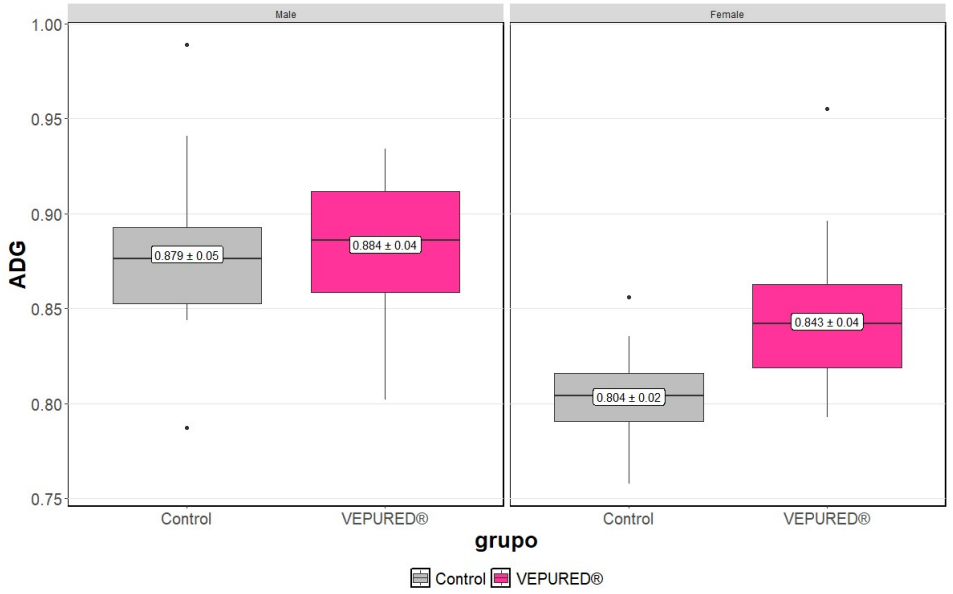
Fattening weight
(28/03/24)

99d in site 3
(05/07/24)



+ 3,03 kg

p-value=0,002*



P-value 0,727

P-value 0,001**

3 Veldervaringen- subklinisch

1. Also on farms without clinical symptoms of oedema disease but with the presence of VT2e E. Coli impact of vaccination can be expected
2. Hoger **eindgewicht** end of fattening 2 to 3,5 kg
3. **Homogener** karkasgewicht
4. Positieve impact on **oortopnecrose**

4 Interactie met Streptococcus suis

Bedrijf A
450 zeugen
4-weken systeem
Spenen op 21 dagen
Batterijen voor alle biggen op zeugenbedrijf.

	VT2e PCR-REAL TIME
10 Weeks	POS + (Ct 36,5)
10 Weeks	POS ++ (Ct 31,7)

4 Interactie met Streptococcus suis

VACCINE	BATCH 1	BATCH 2	BATCH 3	TOTAL
VEPURED®	377	497	405	**1279**
ETEC vaccin	817	467	332	**1616**
CONTROL	0	164	311	**475**

4 Interactie met Streptococcus suis

UITVAL	GROUP 1	GROUP 2	GROUP 3	TOTAL
VEPURED®	**1,86%**	**2,21%**	**3,62%**	**2,81%**
ETEC vaccin	3,92%	3,26%	9,52%	5,05%
CONTROL		6,1%	11,74%	9,66%

4 Interactie met Streptococcus suis

Groep	Vaccinatie	# Streptococcus	# Sterftes en achterblijvers	Percentage
1	ETEC vaccin	4	14	28,6%
	VEPURED	**0**	**1**	**0%**
2	ETEC vaccin	4	15	26,7%
	VEPURED	**1**	**10**	**10%**
	CONTROL	5	10	50%
3	ETEC vaccin	12	36	33,3%
	VEPURED	**1**	**10**	**10%**
	CONTROL	5	13	38,5%

4 Interactie met Streptococcus suis

		# biggen gespeend	# biggen naar vleesvarkens	Piglets Income	Inkomst big/ gespeende big	ROI
TOTAL	**ETEC vaccine**	2083	1920	90.240,00 €	43,32 €	272%
	VEPURED	**1186**	**1123**	**52.781,00 €**	**44,50 €**	**371%**
	CONTROL	375	310	14.570,00 €	38,85 €	
GROEP 1	**ETEC vaccine**	1014	958	45.026,00 €	44,40 €	
	VEPURED	**368**	**354**	**16.638,00 €**	**45,21 €**	
	CONTROL					
GROEP 2	**ETEC vaccine**	580	554	26.038,00 €	44,89 €	417%
	VEPURED	**489**	**465**	**21.855,00 €**	**44,69 €**	**400%**
	CONTROL	164	135	6.345,00 €	38,69 €	
GROEP 3	**ETEC vaccine**	489	408	19.176,00 €	39,21 €	-81%
	VEPURED	**329**	**304**	**14.288,00 €**	**43,43 €**	**271%**
	CONTROL	211	175	8.225,00 €	38,98 €	

4 Interactie met Streptococcus suis

Bedrijf B

Over een periode van 18 maanden, 7 isolaties van Streptococcus suis type 9

Step 1: autovaccine Streptococcus in sows	Little improvement
Step 2: presence of VT2e E. coli	
Step 3: Autovaccine Streptococcus in sows Piglet vaccination Vepured	

VT2e

FTA ELUTE - Pigs - 4 Weeks (2A)
W/R - **NEG**

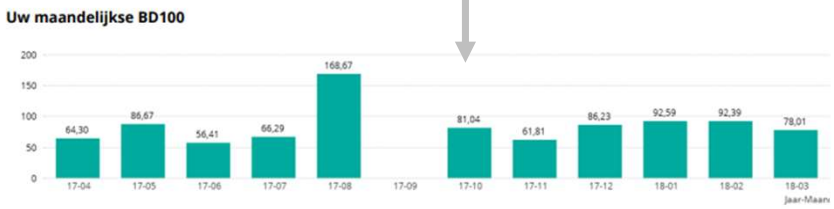
FTA ELUTE - Pigs - 4 Weeks (2B)
W/R - **POS (+++)**

FTA ELUTE - Pigs - 8 Weeks ()
W/R - **NEG**

COMMENT:
NEG: Bacterial DNA was not detected
POS (+): Bacterial DNA was detected in low amount
POS (++): Bacterial DNA was detected in medium amount
POS (+++): Bacterial DNA was detected in high amount

4 Interactie met Streptococcus suis

Streptococcus



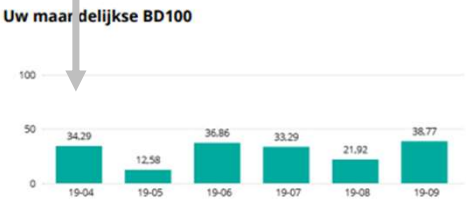
Vepured Streptococcus

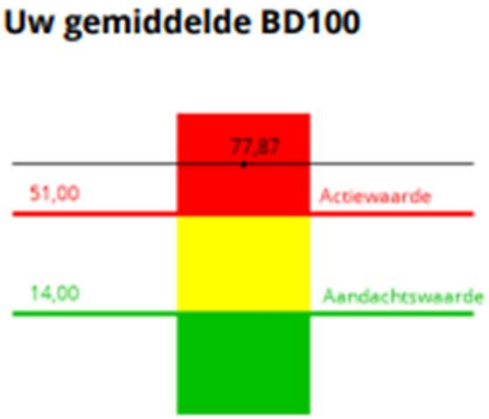
Gem: 26.36

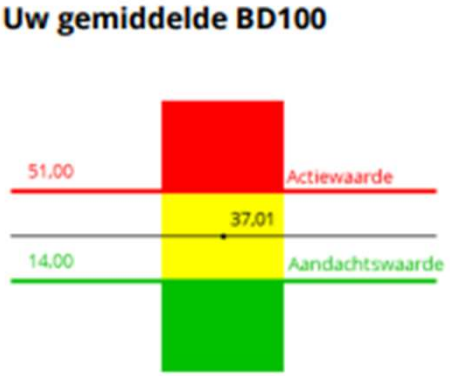
Vepured

Gem: 47.6

Vepured Streptococcus



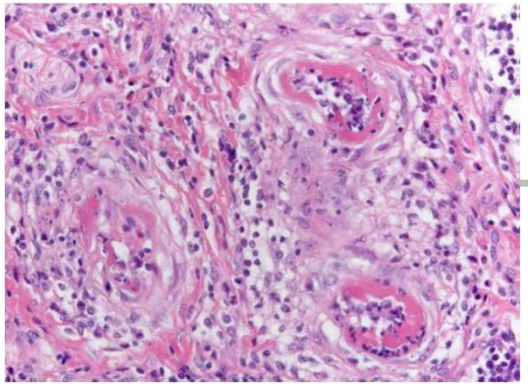




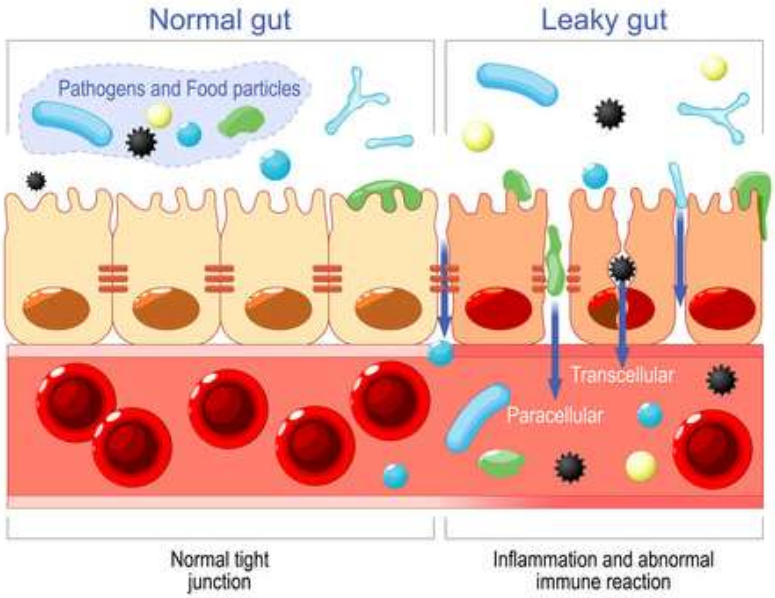
Mortality: 4,5% to 1,5%

4 Interactie met Streptococcus suis

Vaatwandschade



Verhoogde permeabiliteit ter hoogt van de darmbarrière



4 Interactie met Streptococcus suis

Review

Practical Review on Aetio-Pathogenesis and Symptoms in Pigs Affected by Clinical and Subclinical Oedema Disease and the Use of Commercial Vaccines Under Field Conditions

Juan Hernandez-Garcia [1,*], Isaac Ballarà Rodriguez [2], Ramon Jordà Casadevall [2], Sergi Bruguera [2], David Llopart [2] and Emili Barba-Vidal [2,*]

Tissue/Organ	Specific Associated Lesions	Symptoms Associated with Loss of Functionality
Blood vessels, arterioles and capillaries. Large vessels are exempt.	Microangiopathy. Loss of continuity of lining. Necrosis of the tunica muscularis smooth muscle cells.	Oedema in surrounding tissues. Haemorrhages in surrounding tissues. Microthrombi. Ischaemia.
Central nervous system: • Brain • Cerebellum • Brain stem • Cervical spine • Meninges	Angiopathy in vessels in meninges. Oedema in leptomeninges and perivascular space producing compression of the nearby structures, such as cerebrum and cerebellum, causing loss of functionality.	Seizures. Sudden death. Behavioural changes (Figure 2): • Diminished consciousness • Anorexia. Reduced water intake • Low reactivity to stimuli and reduced activity • General pain due to the oedema • Pigs find relief in pressing foreheads against a wall Locomotor effect: • Incoordination, dizziness • Movement in circles • Prostration
	Infarction of vessels producing ischaemia of tissues and malacia in chronic cases.	Postural changes, asymmetric stance leading to change in muscle conformation. Twisted head position.
Skin	Subcutaneous oedema.	Pruritus and swollen areas (oedema) that are visible in certain areas such as eyelids, forehead and chin (Figures 2 and 3).
Ears	Microangiopathy. Reduced irrigation and necrosis.	Secondary bacterial infection. Large areas of necrosis on the auricular pinna (Figure 4). Loss of auricular tissue.
Lungs	Oedema. Patchy sub-lobular congestion.	Difficulty breathing due to lung oedema and reduced alveolar capacity.
Larynx	Oedema.	Altered phonation mechanism, changing pitch and vibration of normal squeak.
Stomach	Oedema in fundic and cardiac submucosa. Gastric haemorrhages. Ulceration.	Interrupted digestion: fresh dry feed is usually found at post-mortem. Presence of blood (from stomach) in intestinal contents.
Intestines and nearby tissues	Microangiopathy. Intestinal wall oedema Mesentery oedema; gelatinous mesocolon oedema, colonic submucosal oedema (Figure 5).	Altered functionality, intestinal permeability and nutrient absorption capacity. Small intestines are generally empty at post-mortem. Constipation is frequent, although diarrhoea can be observed during the clinical phase of the disease.
	Intestinal haemorrhages in most severe cases.	Blood contained in the faeces in cases where there are gastric or enteric haemorrhages. Pigs with these severe lesions die in most cases.

4 Interactie met Streptococcus suis

1. Zien we enkel het topje van de ijsberg?

2. Sturende krachten
   - Labels e.g. FC < 2,43
   - Verdere antibioticareductie

MIEUX POUR TOUS
BETER VOOR IEDEREEN
Pour la terre, les animaux et les hommes
Voor het milieu, de dieren en de mensen

AMCRA
VERBETER GEZONDHEID • VERMINDER RESISTENTIE

4 Interactie met Streptococcus suis

Review

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Table 3. Reported effects of Stx2e toxoid vaccines on clinical and/or subclinical Oedema Disease in different field scenarios.

	Only Subclinical signs	
Reduction in mortality	Mortality reduction ranges from 0.3 to 6%. Average = 3.1%.	[10,63,65,68–77]
Improvement in growth rate	Growth improvement of 5 to 26.5 gr/day extra during the nursery period. Average = 17.5 gr/day Improvement of 22 to 33 gr/day extra when computing the whole wean-to-finish period. Average = 26 gr/day.	[10,11,63,65,68–71,74,78–81]
Antimicrobial reduction	Reduction of 22% of the antimicrobial cost. Savings of 0.54 to 0.71 EUR/grower. Reduction of 10.3 DDD/year (Defined daily dose per year).	[63,74–77,81,82]
Better weight uniformity	3% better weight dispersion.	[78]
Better feed conversion ratio (FCR)	FCR improvement ranges from 0.9 to 0.26 in nursery and 0.12 in fattening.	[71,72,81]
Ear necrosis prevention	Ear necrosis incidence decreased from 36% to 15%.	[11]
Fewer problems with *S. suis.*	Lower clinical impact due to *S. suis.* and reduction in antimicrobial use.	[31,77,81]

VRAGEN?

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SYN
van data naar optimale diergezondheid