

APPROCCIO MULTIFATTORIALE DELLE PROBLEMATICHE ENTERICHE POST SVEZZAMENTO

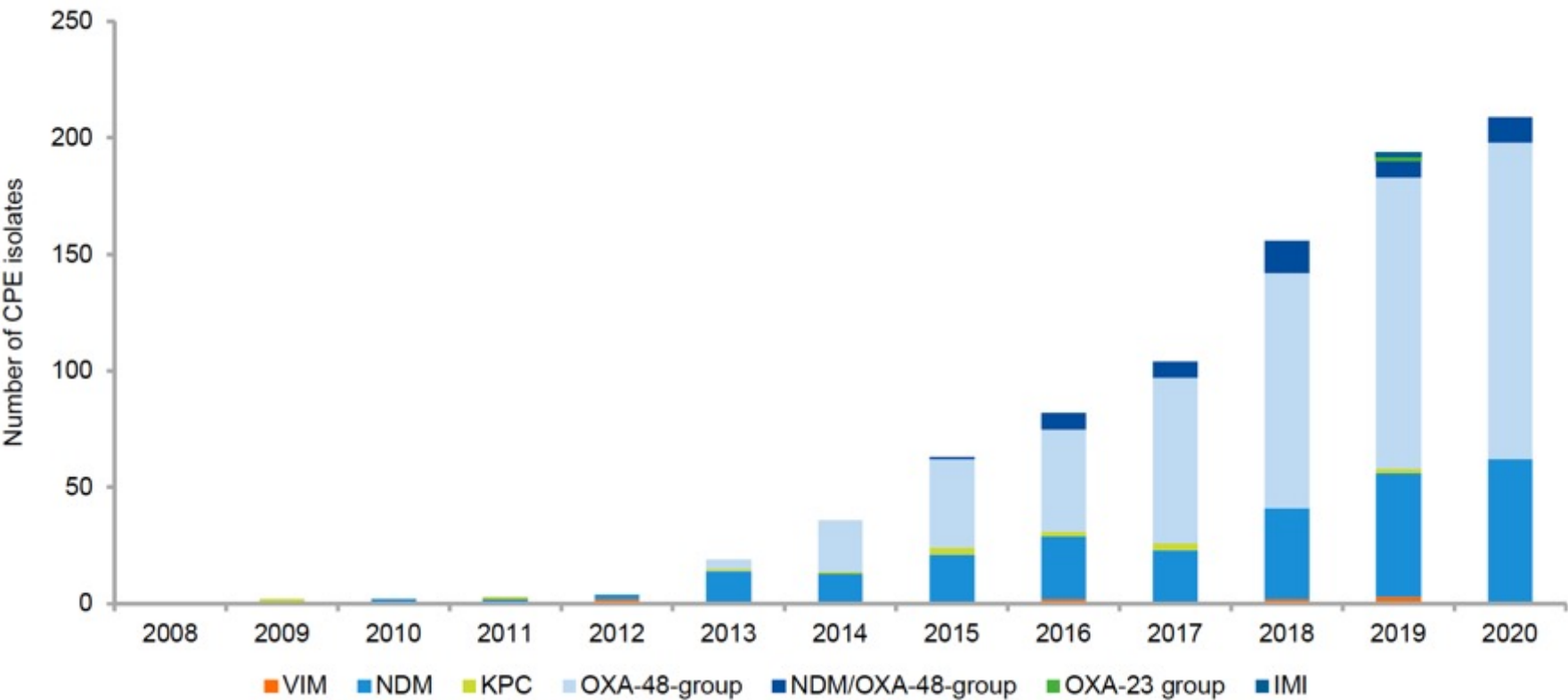
E. Marco

Marco vetgrup; SLP

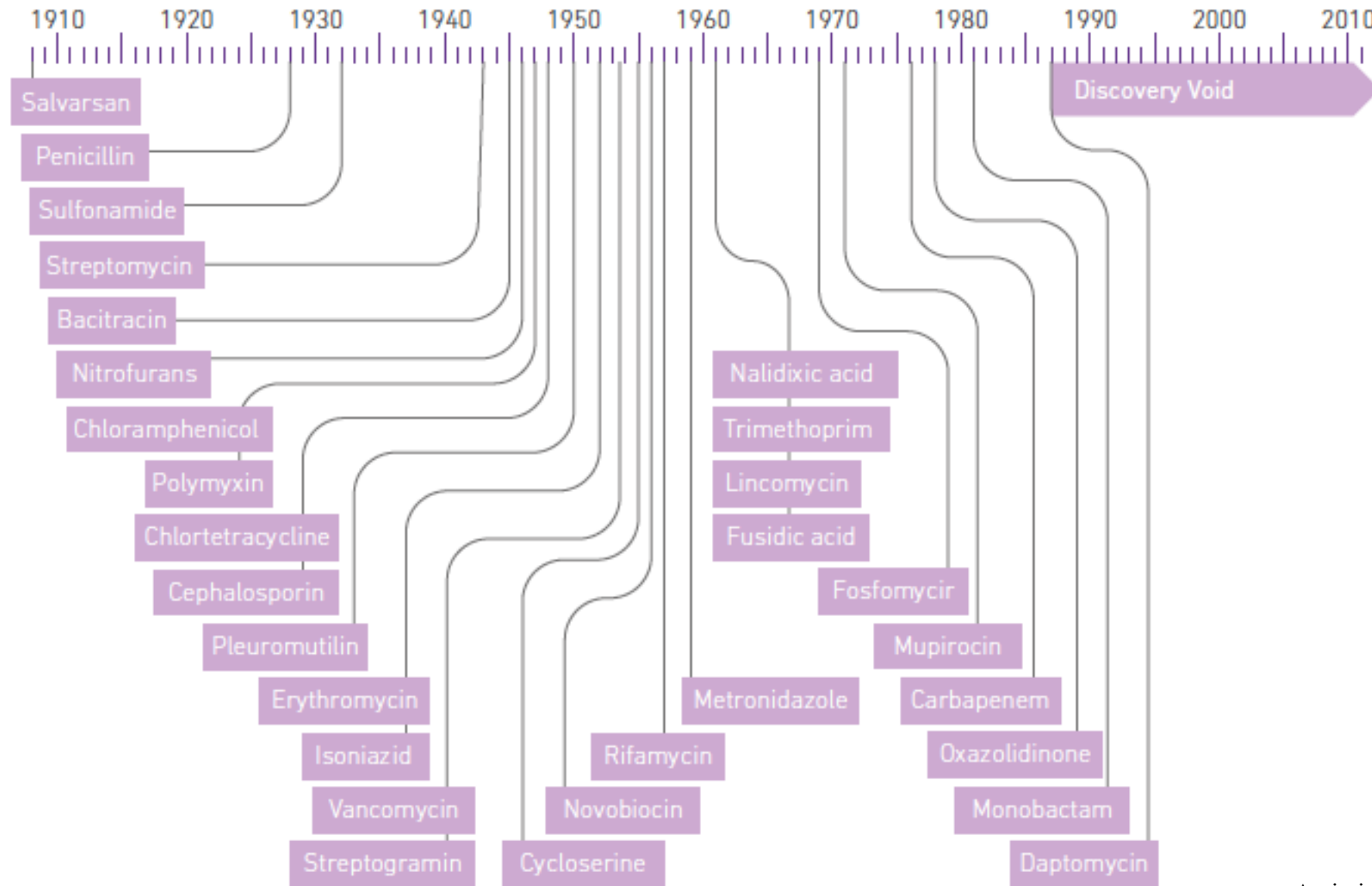
Evoluzione della resistenza agli antibiotici

Figure 8.13 Numbers of carbapenemase-producing Enterobacterales (CPE), Denmark, 2008-2020

DANMAP 2020

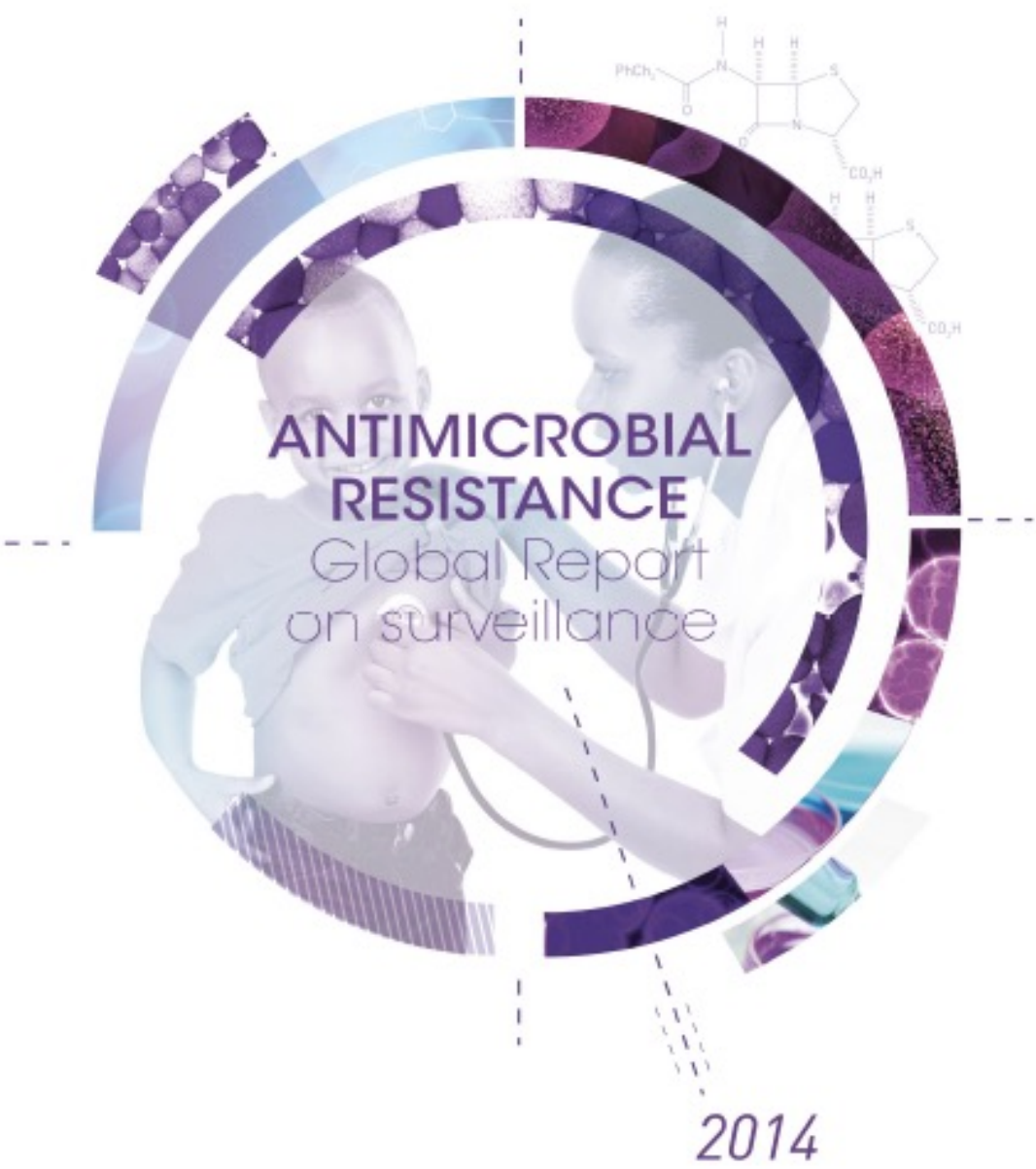


Date in cui sono stati scoperti diversi antibiotici



Adapted from Silver 2011 (1) with permission of the American Society of Microbiology Journals Department.

One health

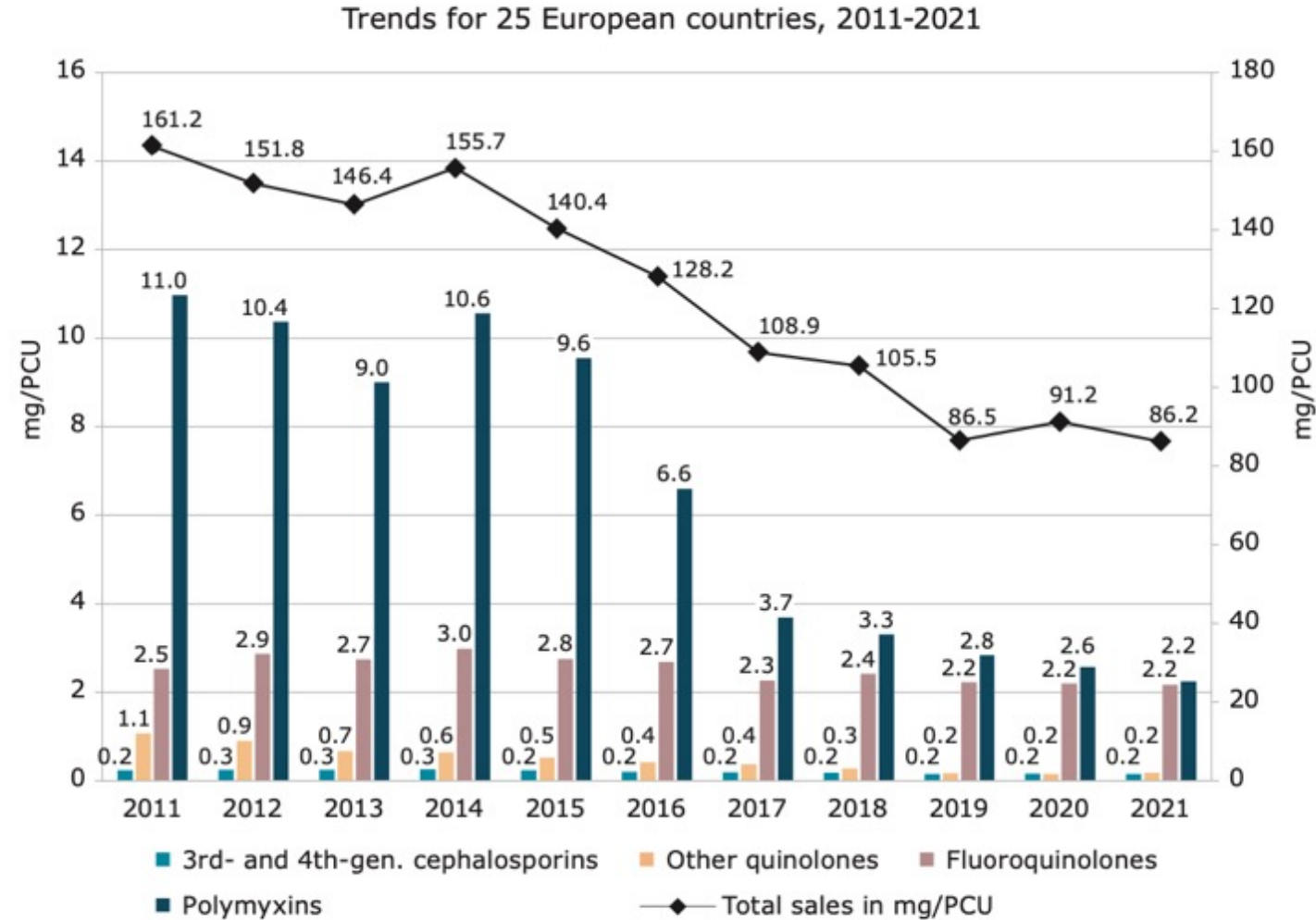




Evoluzione dell'UE

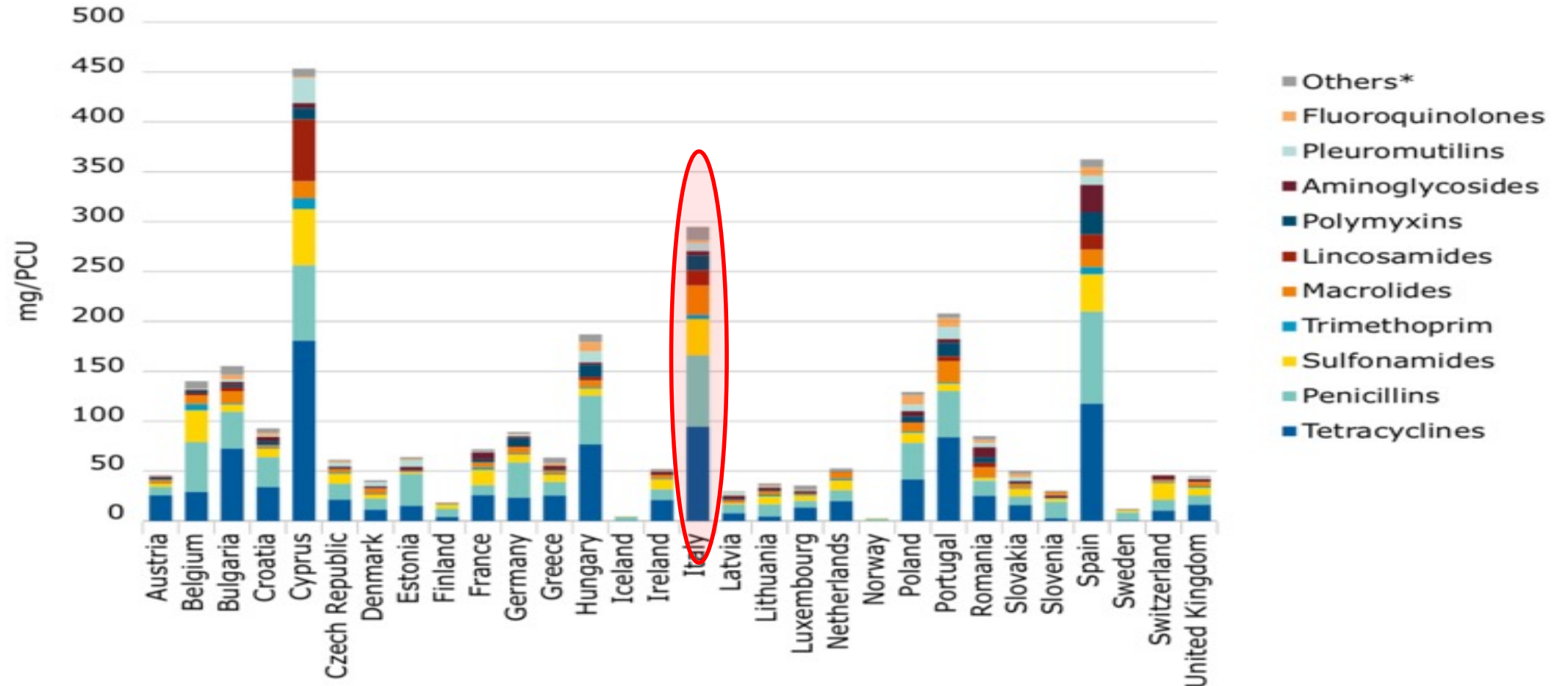
Sales of veterinary antimicrobial agents in 31 European countries in 2021. Trends from 2010 to 2021. Twelfth ESVAC report.

Figure 15. Trends of aggregated overall sales, sales of 3rd- and 4th-generation cephalosporins, other quinolones, fluoroquinolones and polymyxins, in mg/PCU, for the 25 European countries¹ reporting data for ESVAC from 2011 to 2021 (note the different scales of the two y-axes)



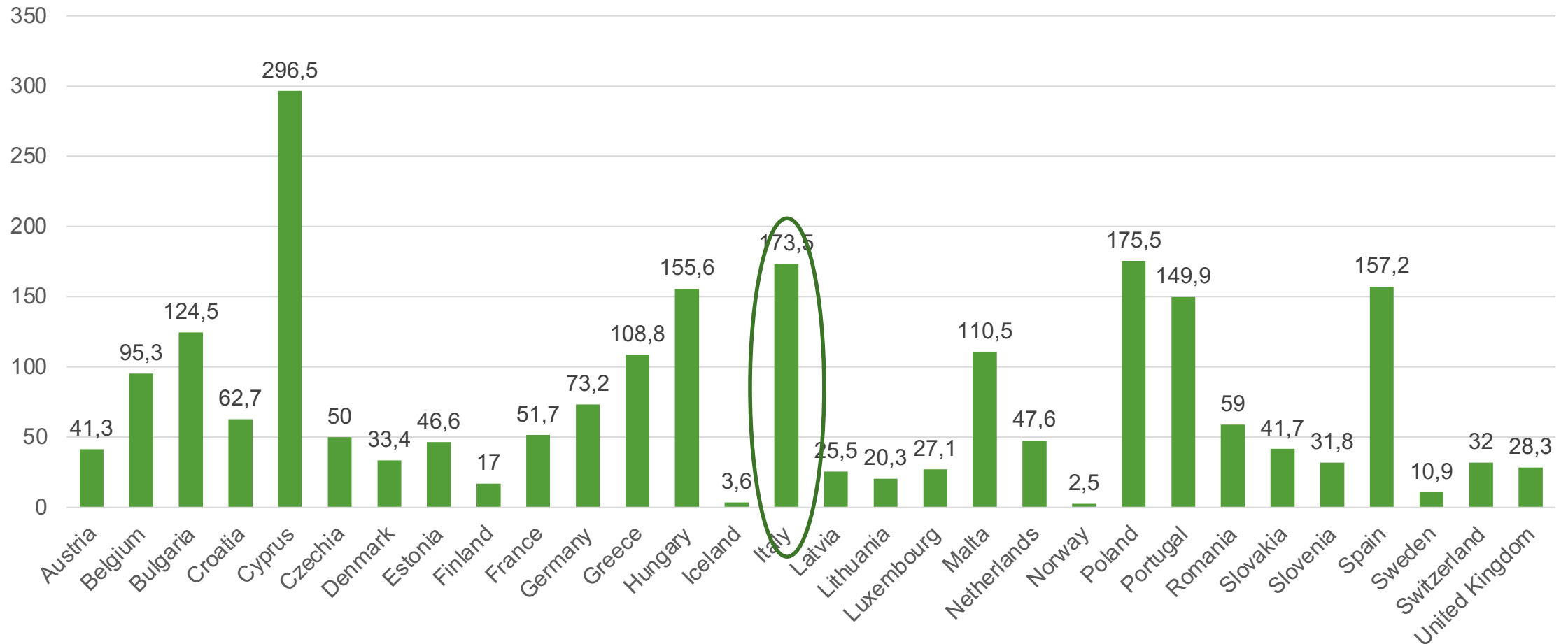
¹ Austria, Belgium, Bulgaria, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

Vendite di antibiotici nell'UE 2016



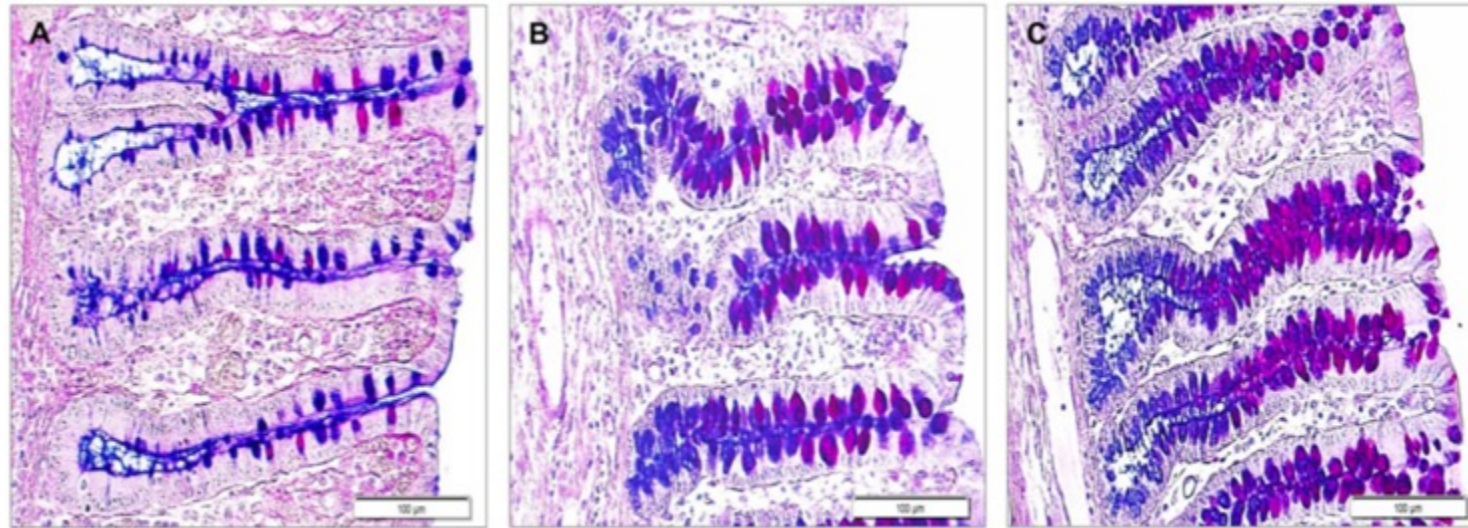


Cambiamenti che si sono verificati: dati 2021



Sales of veterinary antimicrobial agents in 31 European countries in 2021. Trends from 2010 to 2021. Twelfth ESVAC report.

Zinco ossido: il suo uso è vietato dal 26 giugno 2022

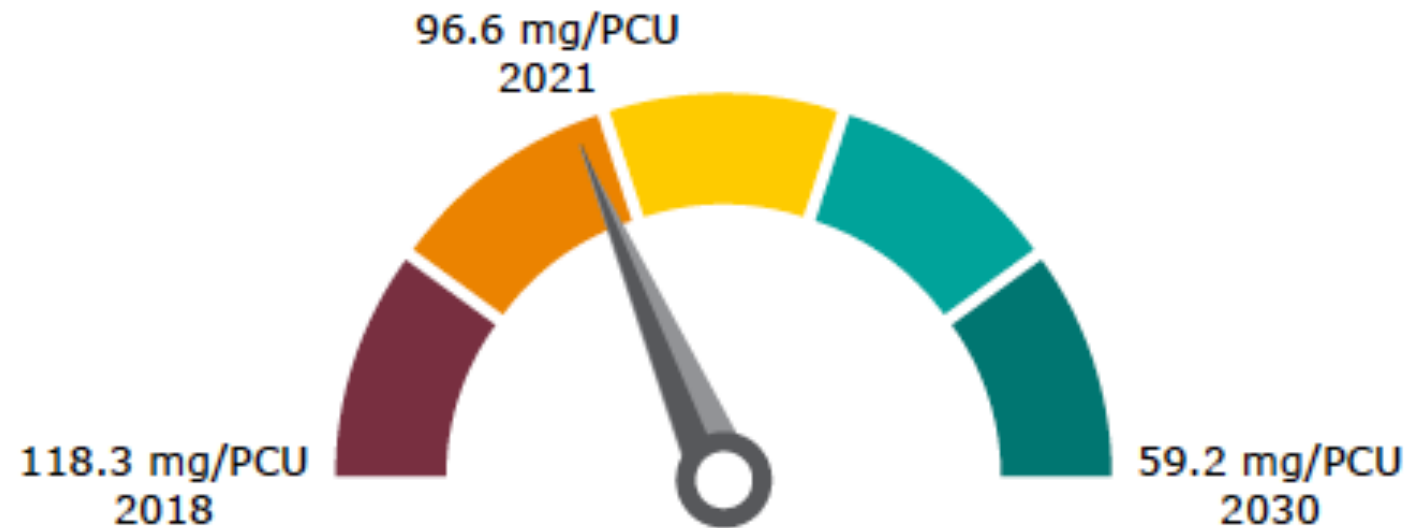


- A. Bassi valori di Zinco Ossido: 57 mg/kg
- B. Valori medi di Zinco Ossido : 164 mg/Kg
- C. Alti valori di Zinco Ossido : 2425 mg/kg

Liu P, Pieper R, Rieger J, Vahjen W, Davin R, et al. (2014) Effect of Dietary Zinc Oxide on Morphological Characteristics, Mucin Composition and Gene Expression in the Colon of Weaned Piglets. PLoS ONE 9(3): e91091. doi:10.1371/journal.pone.0091091

Ma che dire del futuro?

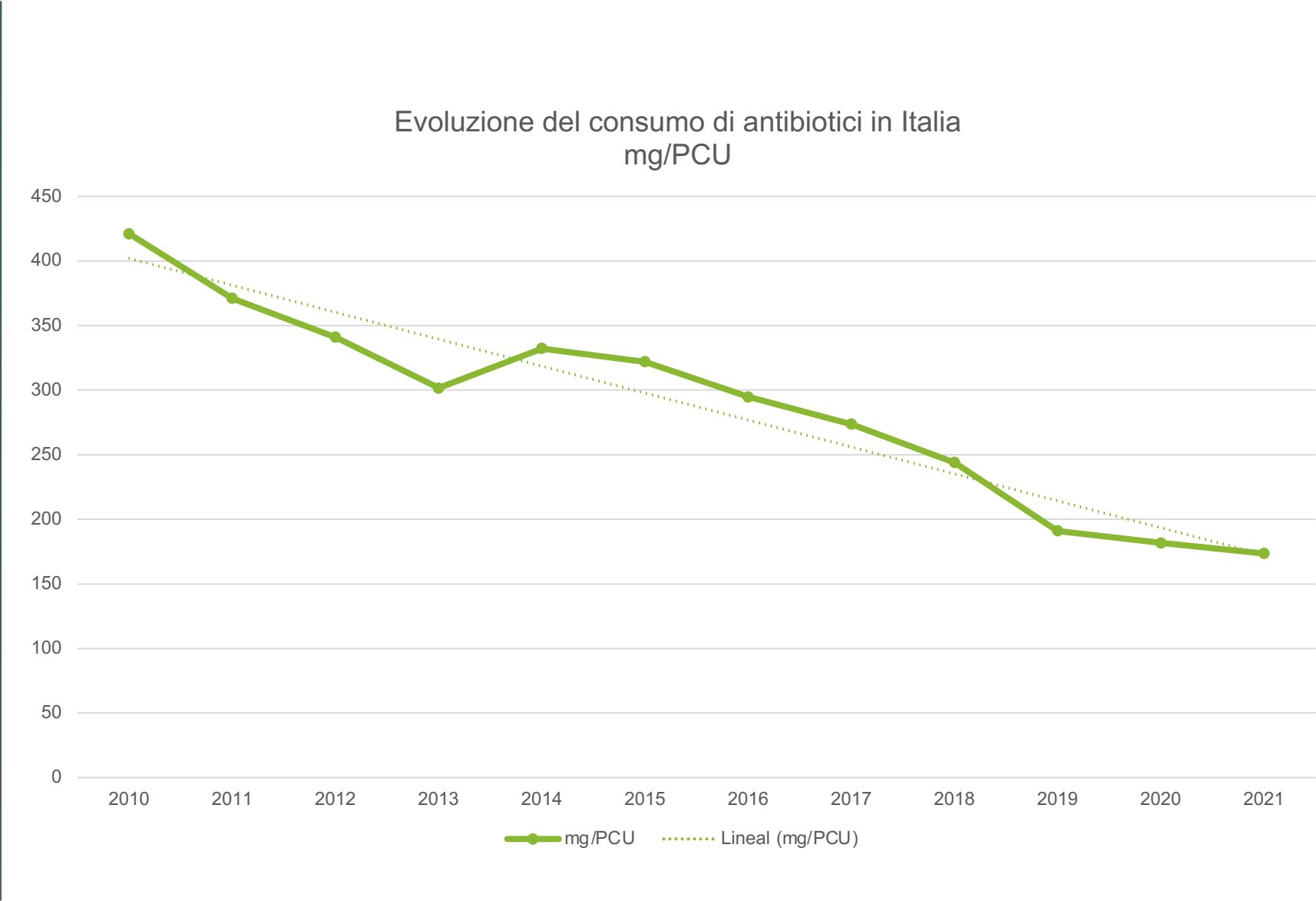
Figure 21. Current progress of the Farm to Fork Strategy target of reducing total EU sales of antimicrobials for farmed animals and aquaculture by 50% by 2030 in 27 EU Member States



Sales of veterinary antimicrobial agents in 31 European countries in 2021. Trends from 2010 to 2021. Twelfth ESVAC report.

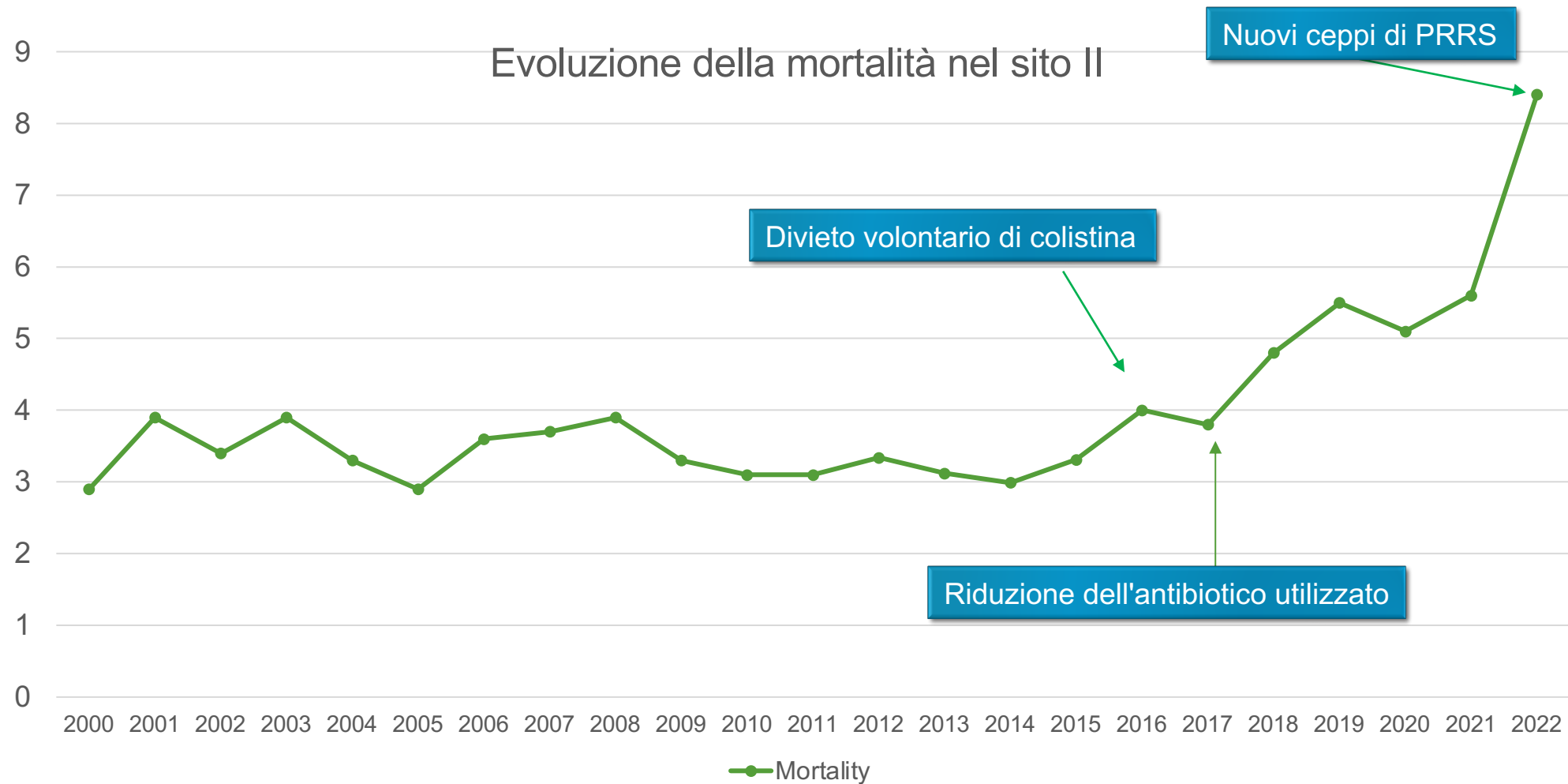
Modifiche che ci vengono chieste

Sales of veterinary antimicrobial agents in 31 European countries in 2021. Trends from 2010 to 2021. Twelfth ESVAC report.

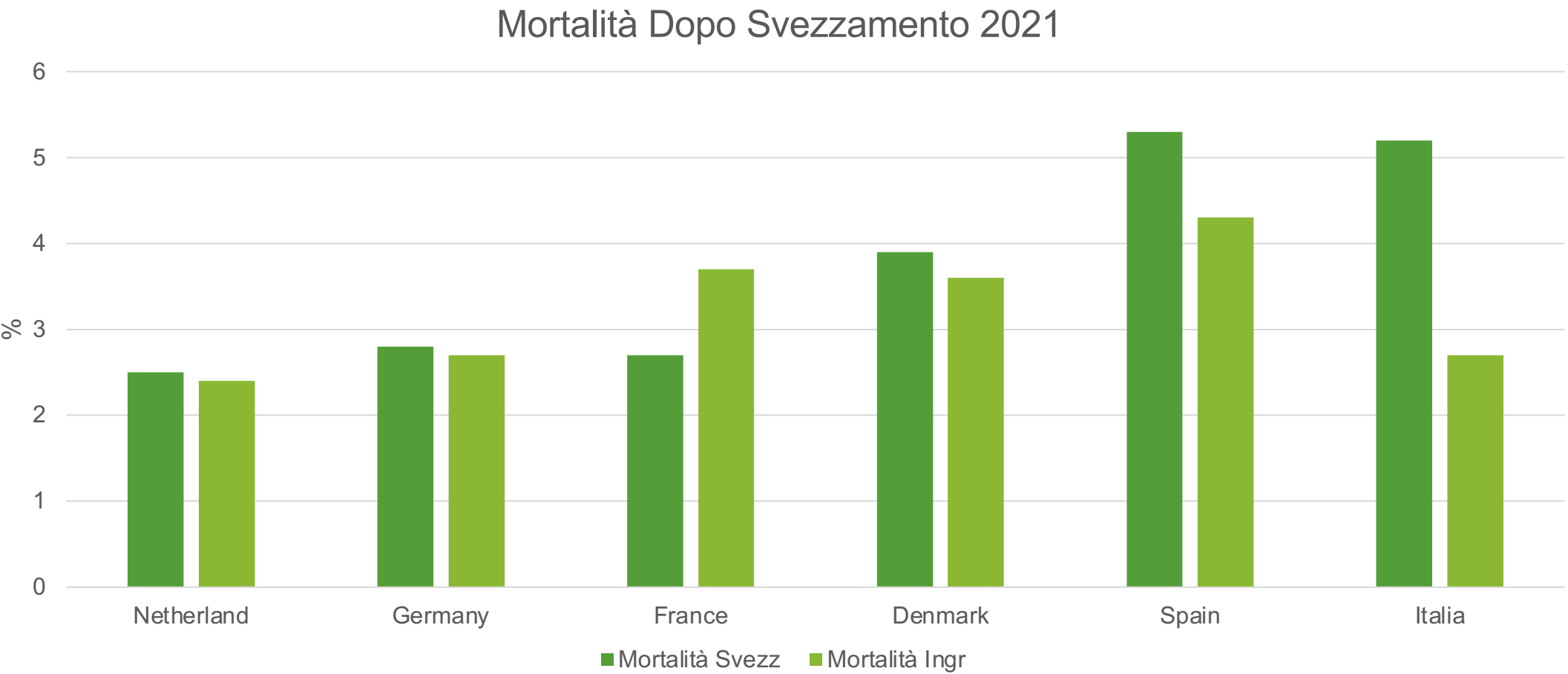


COS'È SUCCESSO?

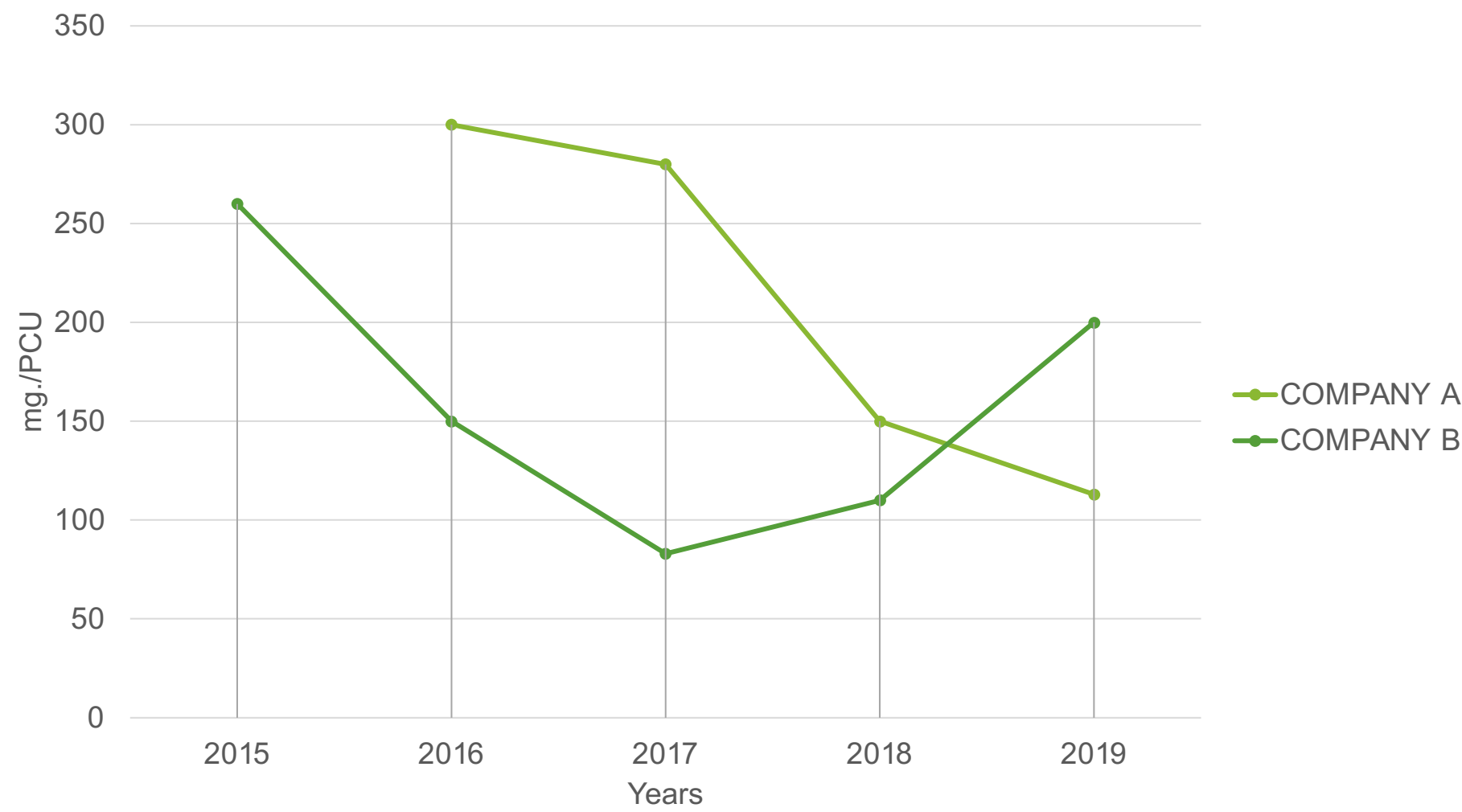
L'esperienza spagnola



Produrre maiale non è facile: Problemi sanitari



Casi reali sull'evoluzione del consumo di antibiotici



Diarrea post-svezzamento



Diarrea post-svezzamento





Foto: Rafael Servacal. <http://servacal.blogspot.com.br/2013/11/enterotoxemia-por-e-coli.html>

Malattia dell'edema



Polisierosite



Meningite



Problemi respiratori



Rilevamento frequente di altri agenti patogeni raramente rilevati prima

- *B. bronchiseptica*
- *M. hyorhinis*
- *A. suis*

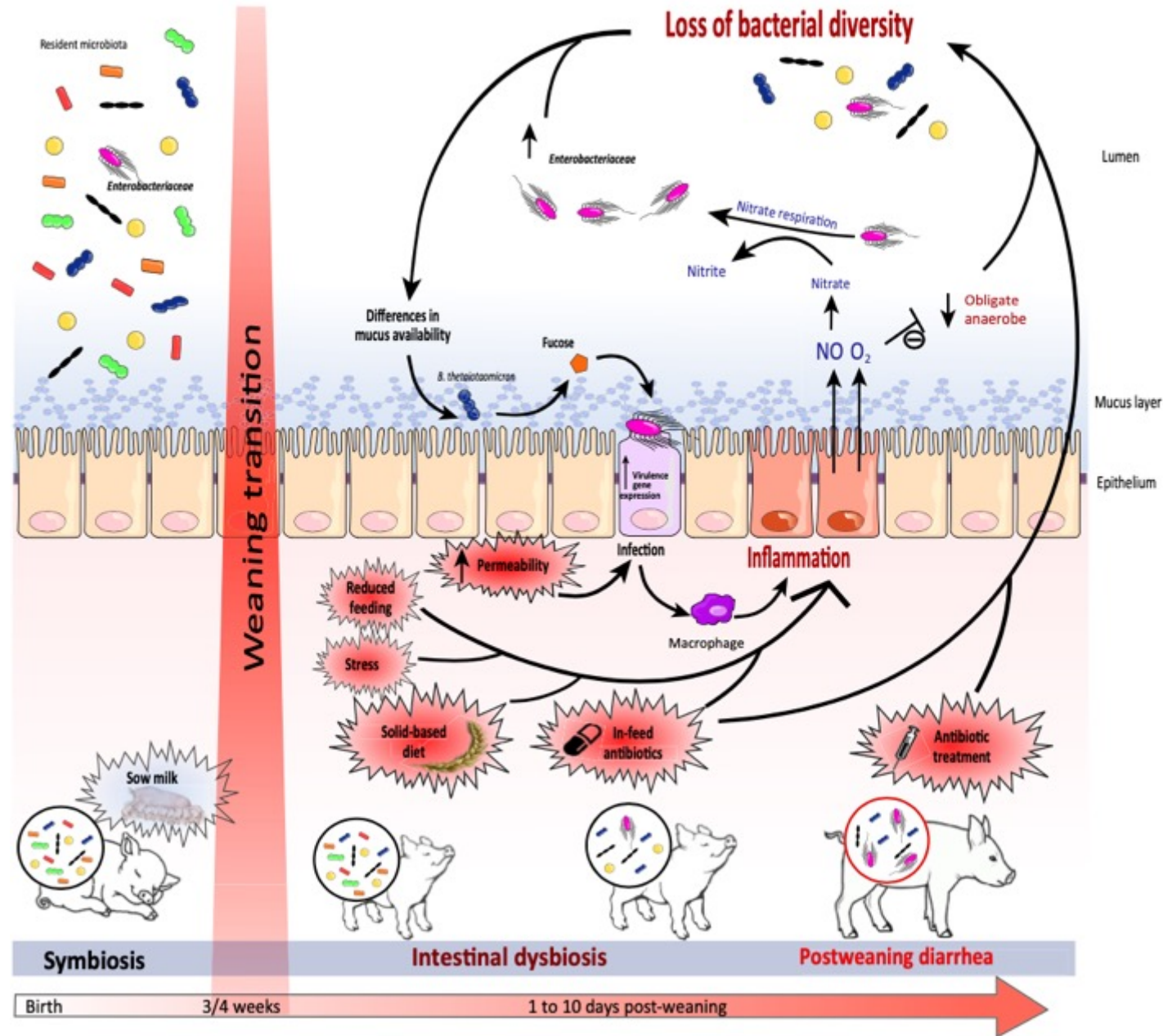
The link between post-weaning diarrhoea and meningitis in piglets

13-02 | [Piglets](#) | [Expert opinion](#)



Francesc Molist

Manager Research and Development, Schothorst Feed Research, the Netherlands

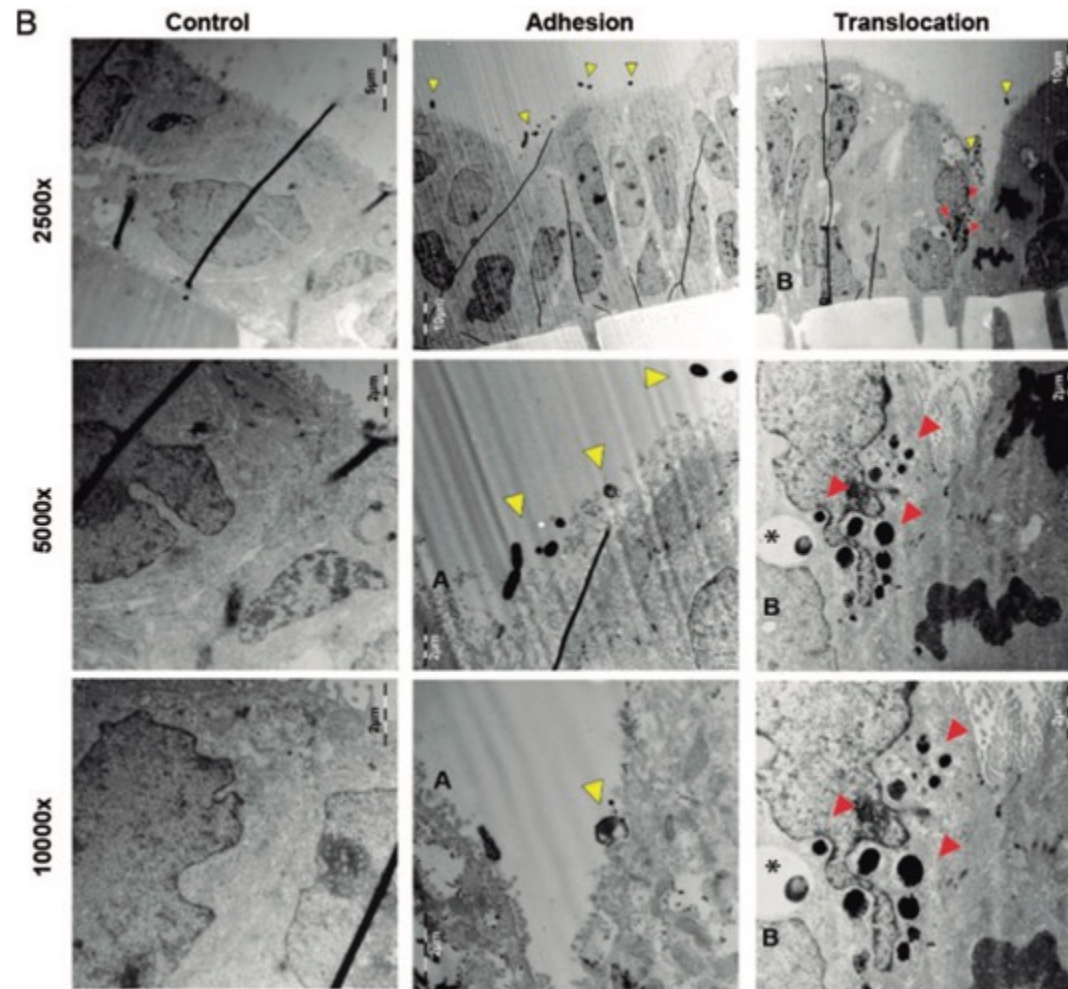


S. suis: traslocazione intestinale



- I suinetti affetti da infezioni da *S. suis* sono in alcuni casi i suinetti con il consumo di mangime più elevato. È stato riferito che alcuni nutrienti come l'amido svolgono un ruolo importante nell'innescare l'espressione genetica della virulenza di *S. suis*.

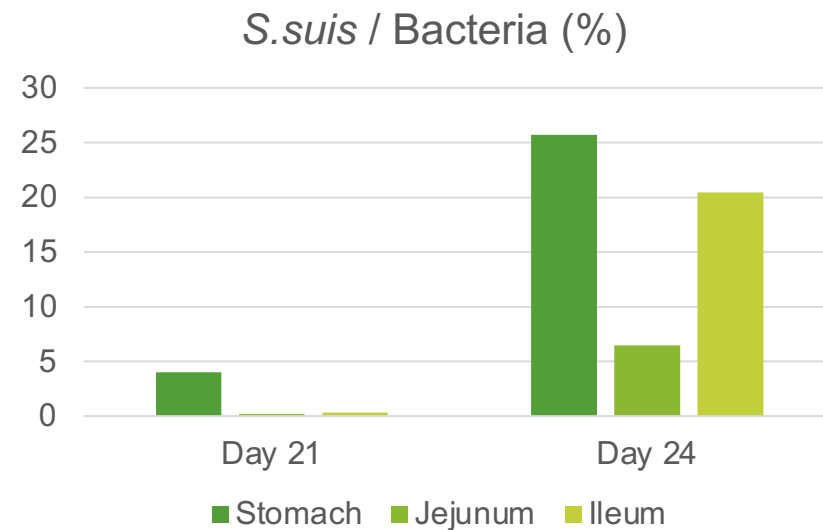
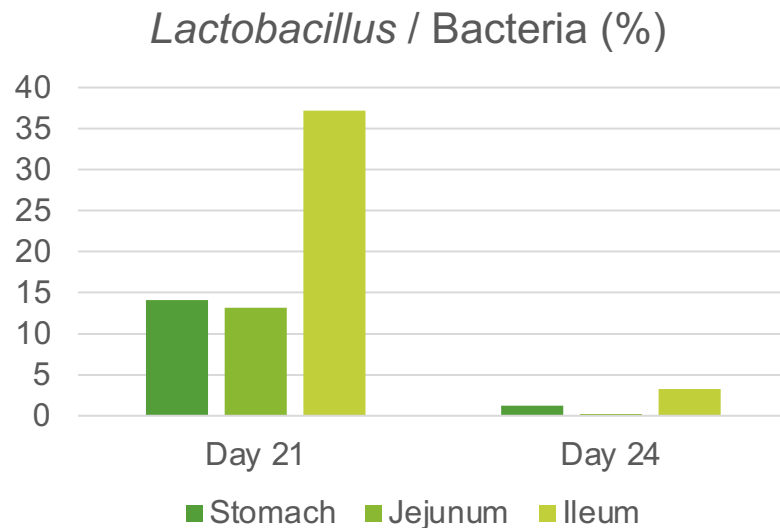
S. suis: traslocazione intestinale



Ferrando, ML, *et al.* 2015. Host-pathogen Interaction at the Intestinal Mucosa Correlates With Zoonotic Potential of *Streptococcus suis*. *The Journal of Infectious Diseases*® 2015;212:95–105

S. suis: traslocazione intestinale

- Mentre predominano i *Lactobacillus* spp. nello stomaco, nel digiuno e nell'ileo dei suinetti da latte diventavano meno abbondanti dopo lo svezzamento, le specie potenzialmente patogene, tra cui *S. suis*, diventavano dominanti nello stomaco e più abbondanti nell'intestino dopo lo svezzamento.



S. suis: traslocazione intestinale



Article

Clearance of *Streptococcus suis* in Stomach Contents of Differently Fed Growing Pigs

Franziska Warneboldt ¹, Saara J. Sander ¹, Andreas Beineke ², Peter Valentin-Weigand ³, Josef Kamphues ¹ and Christoph Georg Baums ^{3,4,*}

- I dati presentati suggeriscono che il passaggio gastrico dei batteri vivi di *S. suis* è un processo raro nei suinetti in accrescimento, la classe di età più spesso e più gravemente colpita dalle malattie da *S. suis*. **Ciò non esclude che malattie da *S. suis* nei suinetti in accrescimento si sviluppino in seguito alla traslocazione intestinale di batteri che hanno colonizzato il tratto intestinale** di questi suinetti nelle settimane precedenti e che sono passati attraverso lo stomaco in condizioni molto diverse nel periodo neonatale, di allattamento o di svezzamento.

S. suis: traslocazione intestinale

Studio epidemiologico condotto presso l'azienda sperimentale dell'Università e della Ricerca di Wageningen a Sterksel, Paesi Bassi, durante un'epidemia di S.suis 9. (20 suini indagati).

Table A1. Presence of *S. suis* serotypes 1, 2, 7, and 9 in tonsils and faecal samples of piglets at Sterksel farm as determined using qPCR.

Sample	Time Point	<i>S. suis</i> 1	<i>S. suis</i> 2	<i>S. suis</i> 7	<i>S. suis</i> 9
Tonsil	1 day preweaning	10/132 (8%)	7/132 (5%)	43/132 (33%)	113/132 (86%)
	1 week postweaning	2/130 (2%)	10/130 (8%)	80/130 (62%)	124/130 (95%)
	4 weeks postweaning	3/109 (3%)	19/109 (17%)	80/109 (73%)	105/109 (96%)
Feces	1 day preweaning	0/132 (0%)	0/132 (0%)	1/132 (1%)	45/132 (34%)
	1 week postweaning	0/130 (0%)	0/130 (0%)	3/130 (2%)	31/130 (24%)
	4 weeks postweaning	0/109 (0%)	2/109 (0%)	0/109 (0%)	11/109 (10%)

S. suis: traslocazione intestinale

Epidemiological study performed at the Wageningen University and Research experimental farm in Sterksel, The Netherlands during a S.suis 9 outbreak. 20 pigs investigated.

Table A2. Presence of *S. suis* serotypes 1, 2, 7, and 9 in specific organs (joints and central nervous system (CNS)) and intestinal samples of piglets at Sterksel farm as determined using qPCR.

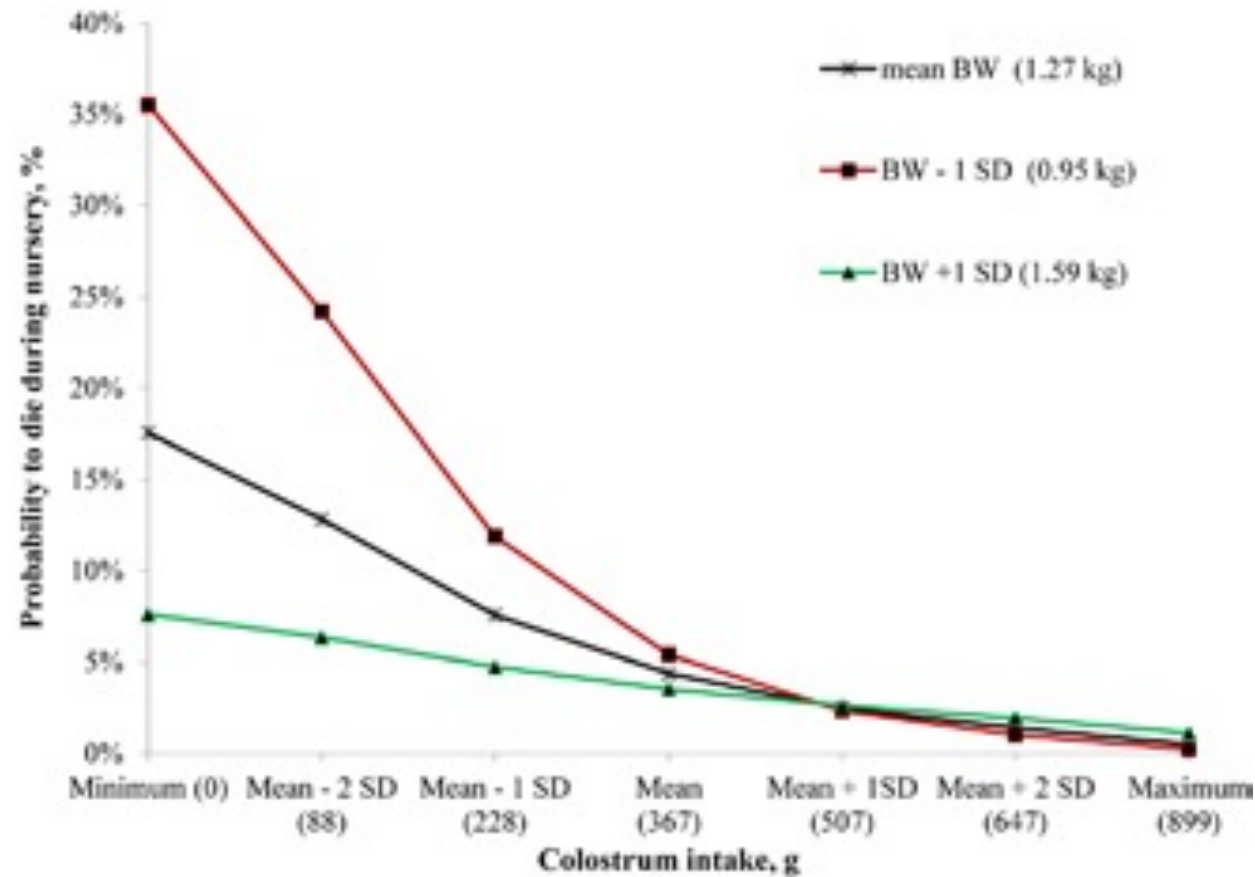
Sample	Status	<i>S. suis</i> 1	<i>S. suis</i> 2	<i>S. suis</i> 7	<i>S. suis</i> 9
Joints/CNS	Diseased	0/20 (0%)	0/20 (0%)	0/20 (0%)	16/20 (80%)
	Healthy controls	0/20 (0%)	0/20 (0%)	0/20 (0%)	0/20 (0%)
Intestine	Diseased	0/20 (0%)	0/20 (0%)	5/20 (25%)	19/20 (95%)
	Healthy controls	0/20 (0%)	1/20 (5%)	5/20 (25%)	17/20 (85%)

Quali misure possono aiutare a controllare la diarrea post-svezzamento?

- Periodo di allattamento
- Assunzione di cibi solidi prima e dopo lo svezzamento
- Igiene
- Immunizzazione
- Fattori specifici dopo-svezzamento
 - Management
 - Dieta
 - Atmosfera
 - Altre malattie
- Corretto diagnostico

PERIODO DI ALLATTAMENTO

Influenza dell'assunzione di colostro sulla mortalità post-svezzamento



Declerck, I. *et al.* 2015. *Long-term effects of colostrum intake in piglet mortality and performance.* J. Anim. Sci. 2016.94:1633–1643

Evitare l'ipotermia

Confinare i suinetti sottopeso

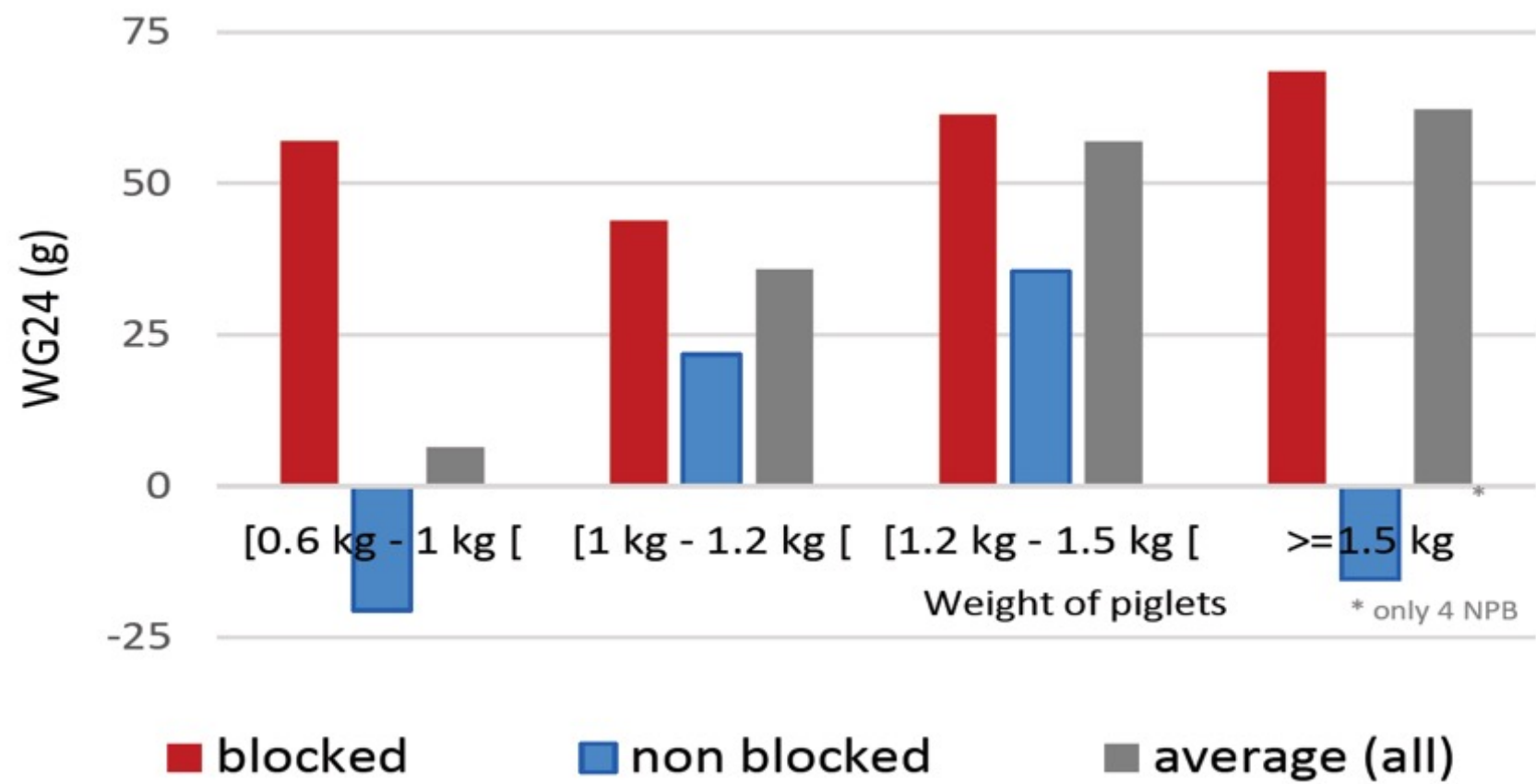


**Temperatura della scatola
34°C**



**La scatola può essere posizionata
all'esterno**

Evitare l'ipotermia

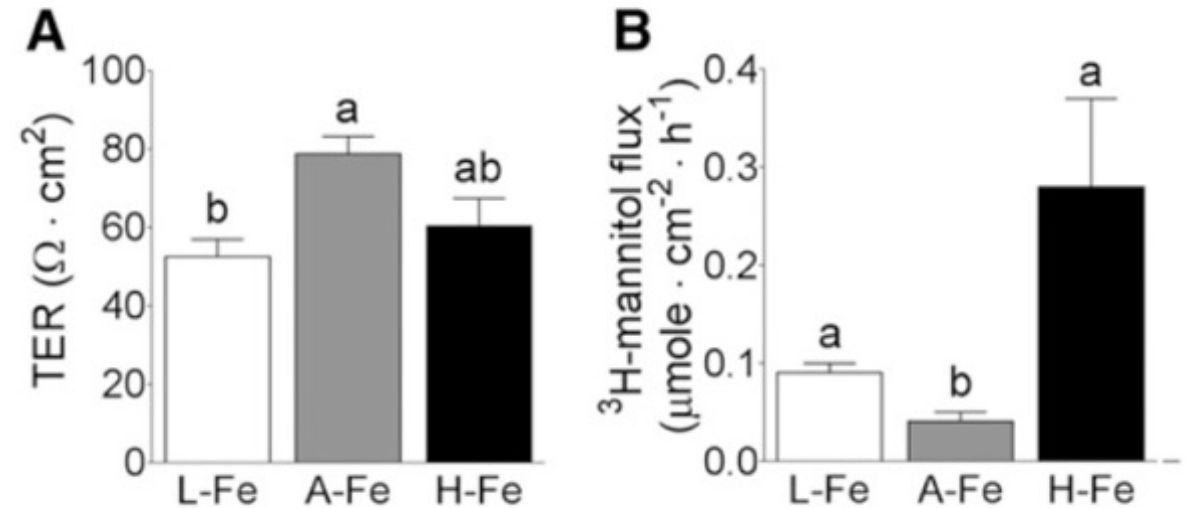


Dalla nascita allo svezzamento

- Effettuare una corretta profilassi dell'anemia.
 - *La carenza di ferro e l'eccesso di ferro inducono infiammazione intestinale e aumentano la permeabilità intestinale (*)*.

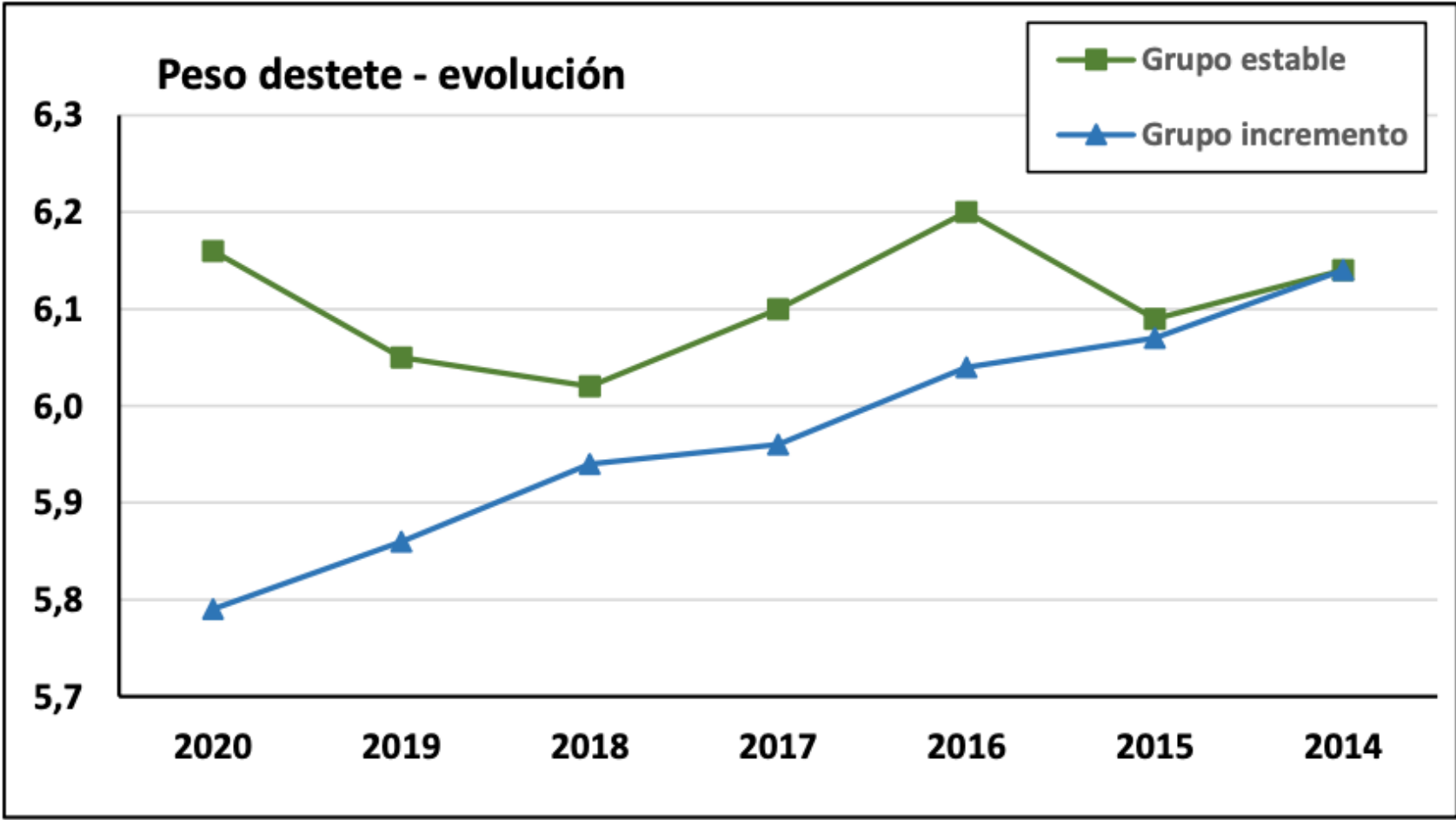
Intestinal permeability assessed as TER (A)
³H-mannitol permeability (B) in the
 duodenum of pigs fed diets for 32 d. :

- L-Fe (20 mg Fe/kg DM)
- A-Fe (120 mg Fe/kg DM)
- H-Fe (520 mg Fe/kg DM)



(*) Li, Y, *et al.* Dietary Iron Deficiency and Oversupplementation Increase Intestinal Permeability, Ion Transport, and Inflammation in Pigs 1–3. J Nutr 2016;146:1499–505.

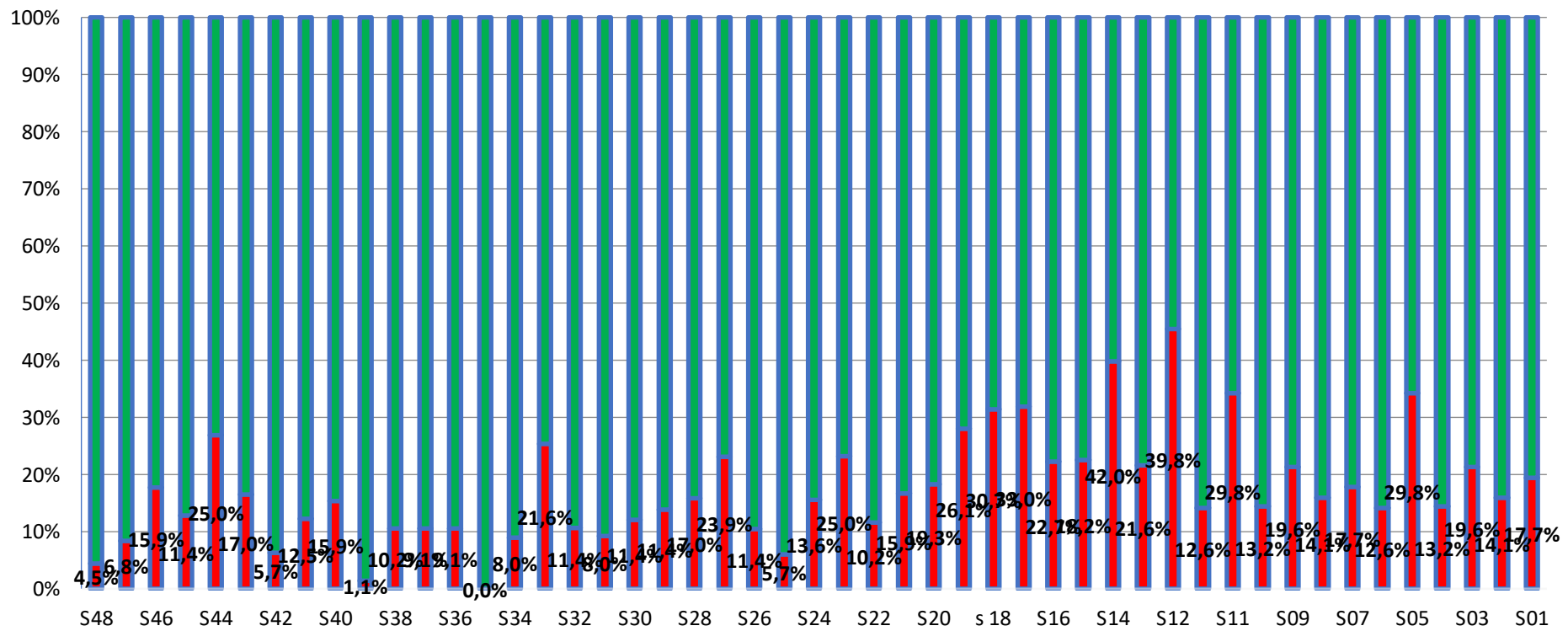
Situazione in Spagna: chi ha problemi?



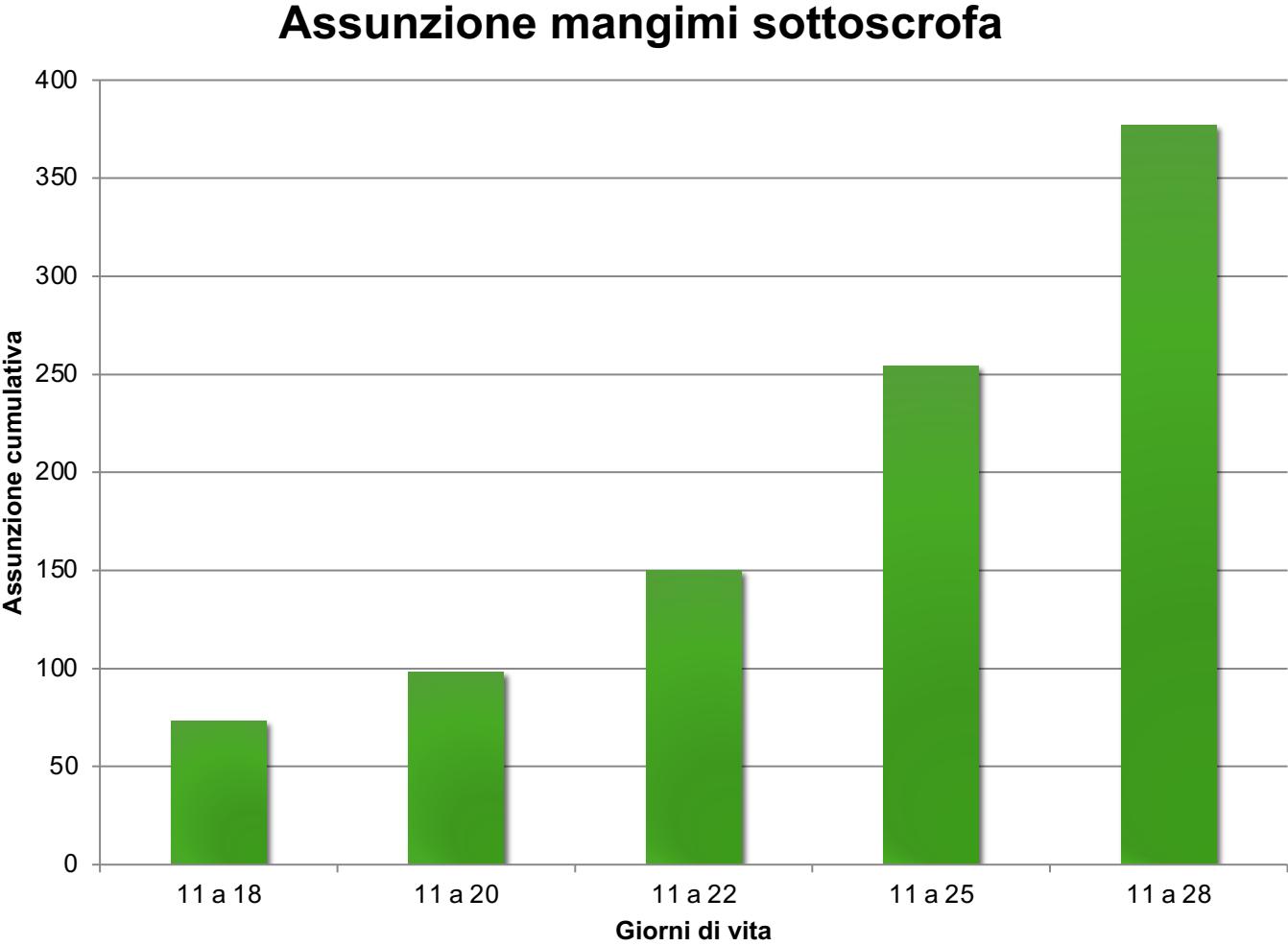
SIP 2021. Evolución de la mortalidad en transición del 2014 al 2020

Età dello svezzamento

Età dello svezzamento : % < 21 giorni



Assunzione di dieta solida



Qualità dalla dieta è importante

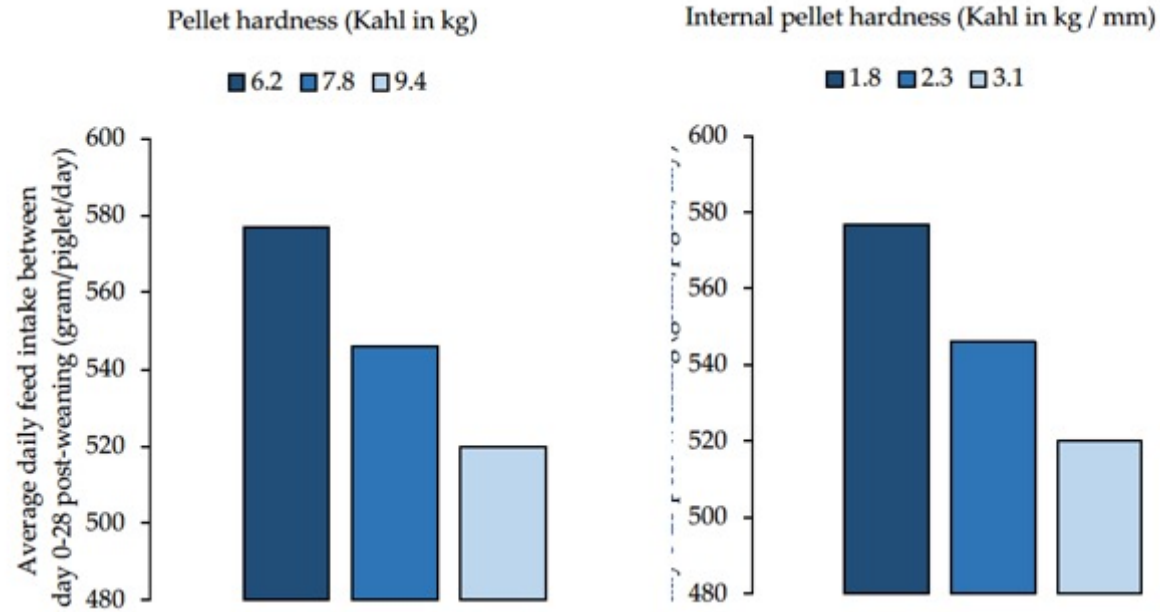
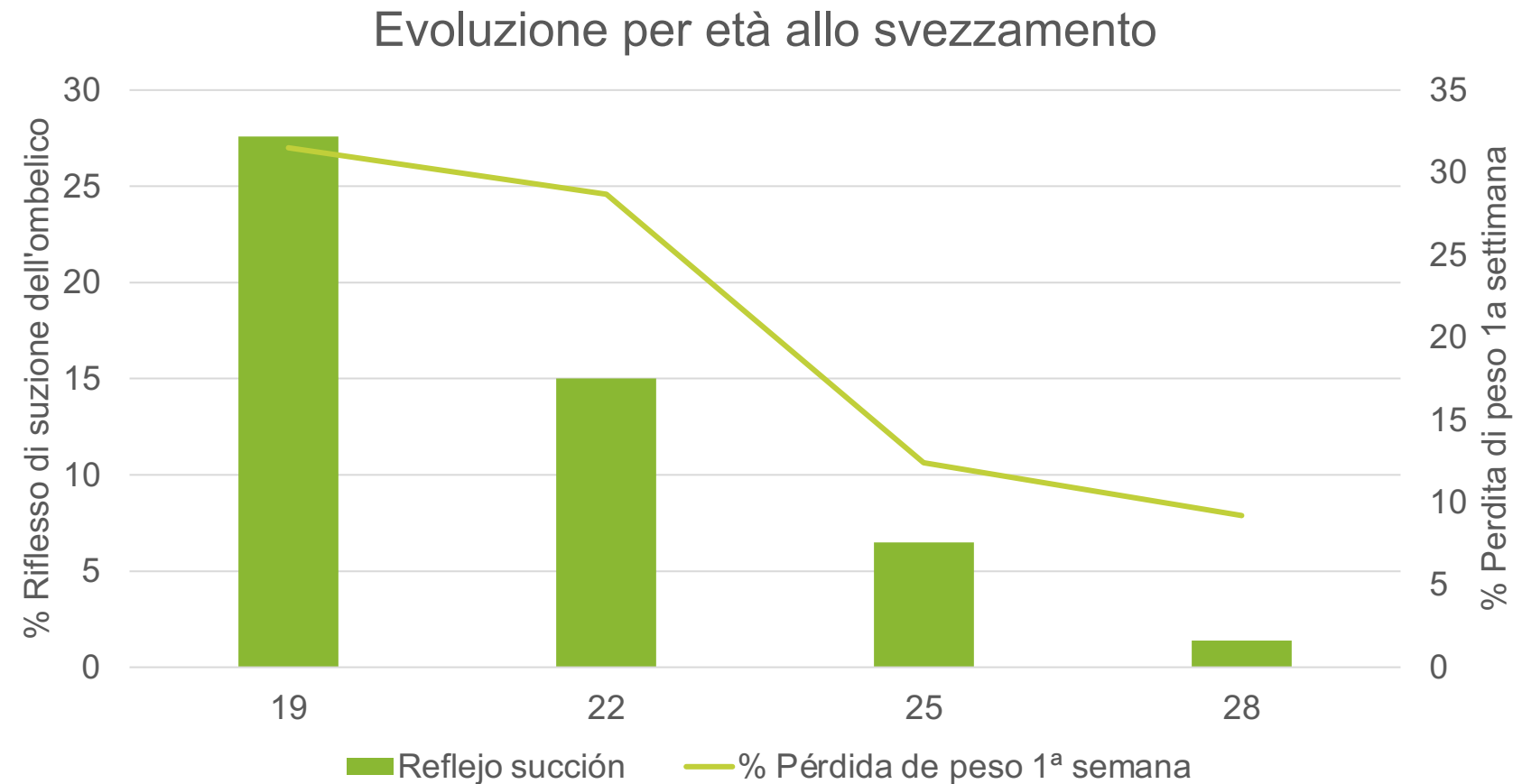


Figure 2. Linear effect ($P < 0.10$) of pellet hardness and internal pellet hardness of the post-weaning diet on piglet feed intake in the first 4 weeks post-weaning (6 pens with 8 piglets/pen per treatment group, Schothorst Feed Research, Lelystad, The Netherlands). The internal hardness is the pellet hardness divided by the pellet diameter.

Succhiare l'ombelico

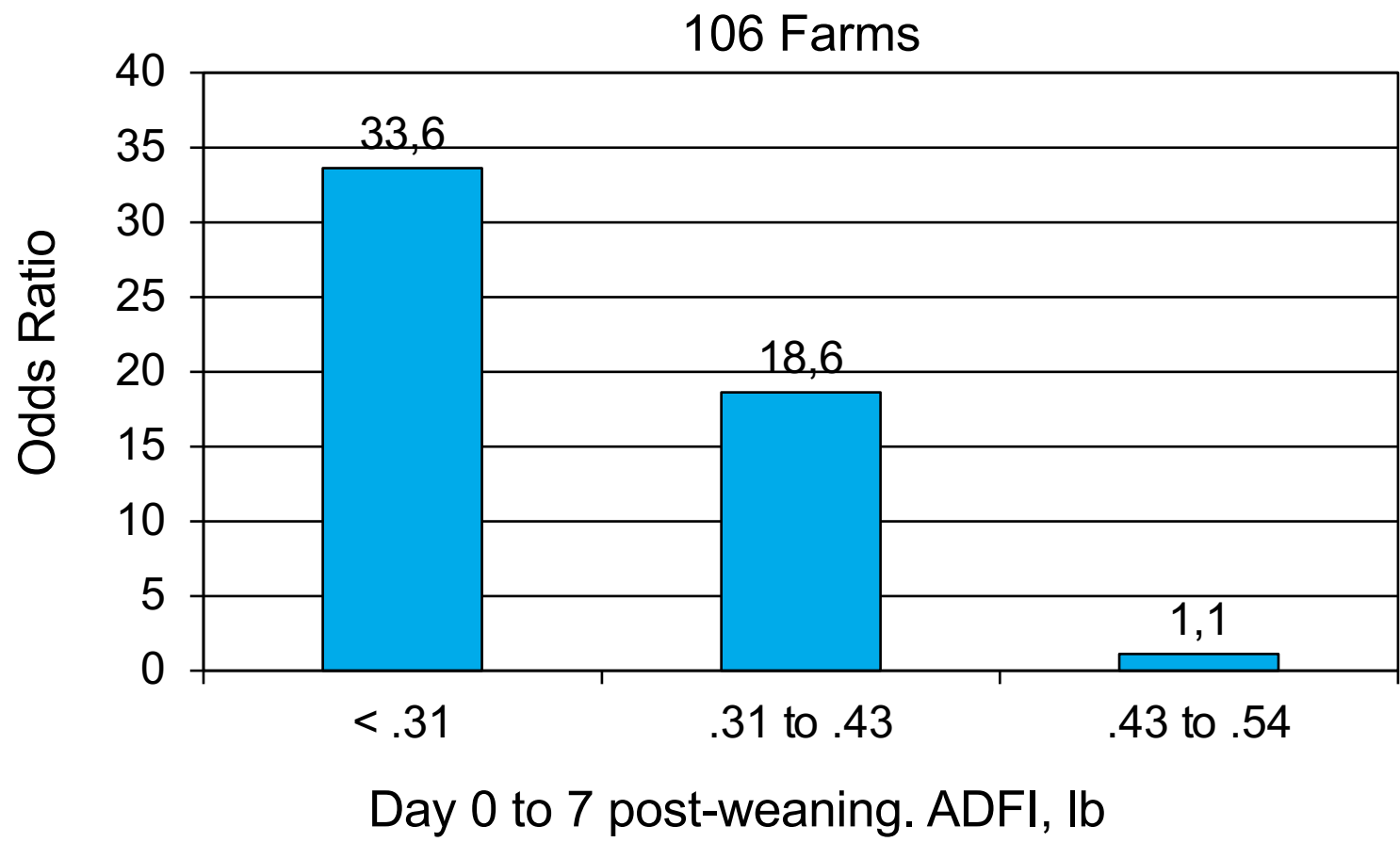


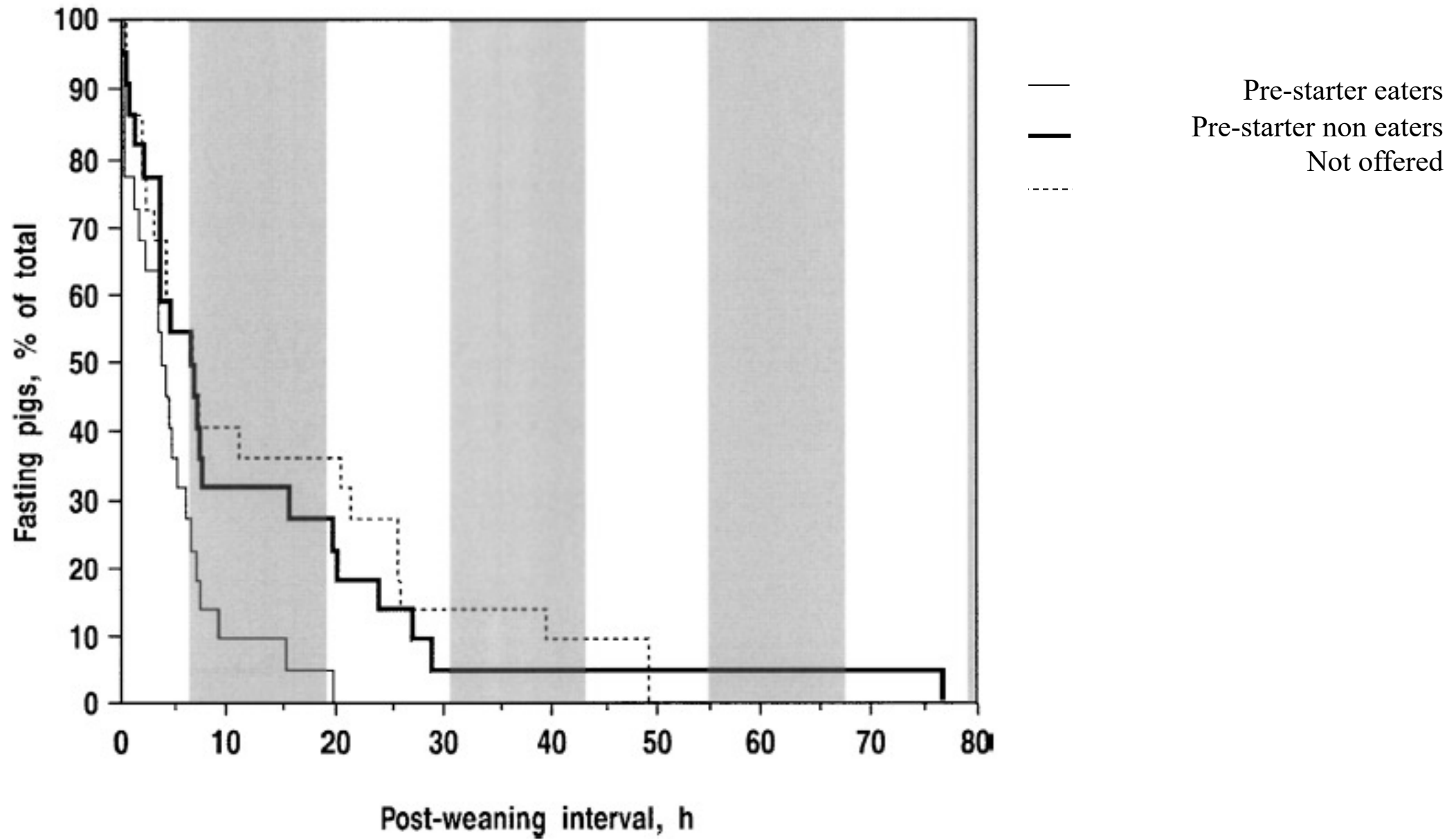
Comportamento in base al peso allo svezzamento



Faccin JEG, *et al.* Impact of increasing weaning age on pig performance and belly nosing prevalence in a commercial multisite production system. *Journal of Animal Science*, 2020, Vol. 98, No. 4, 1–8 doi:10.1093/

Relazione tra l'assunzione di mangime nella prima settimana dopo lo svezzamento e la diarrea





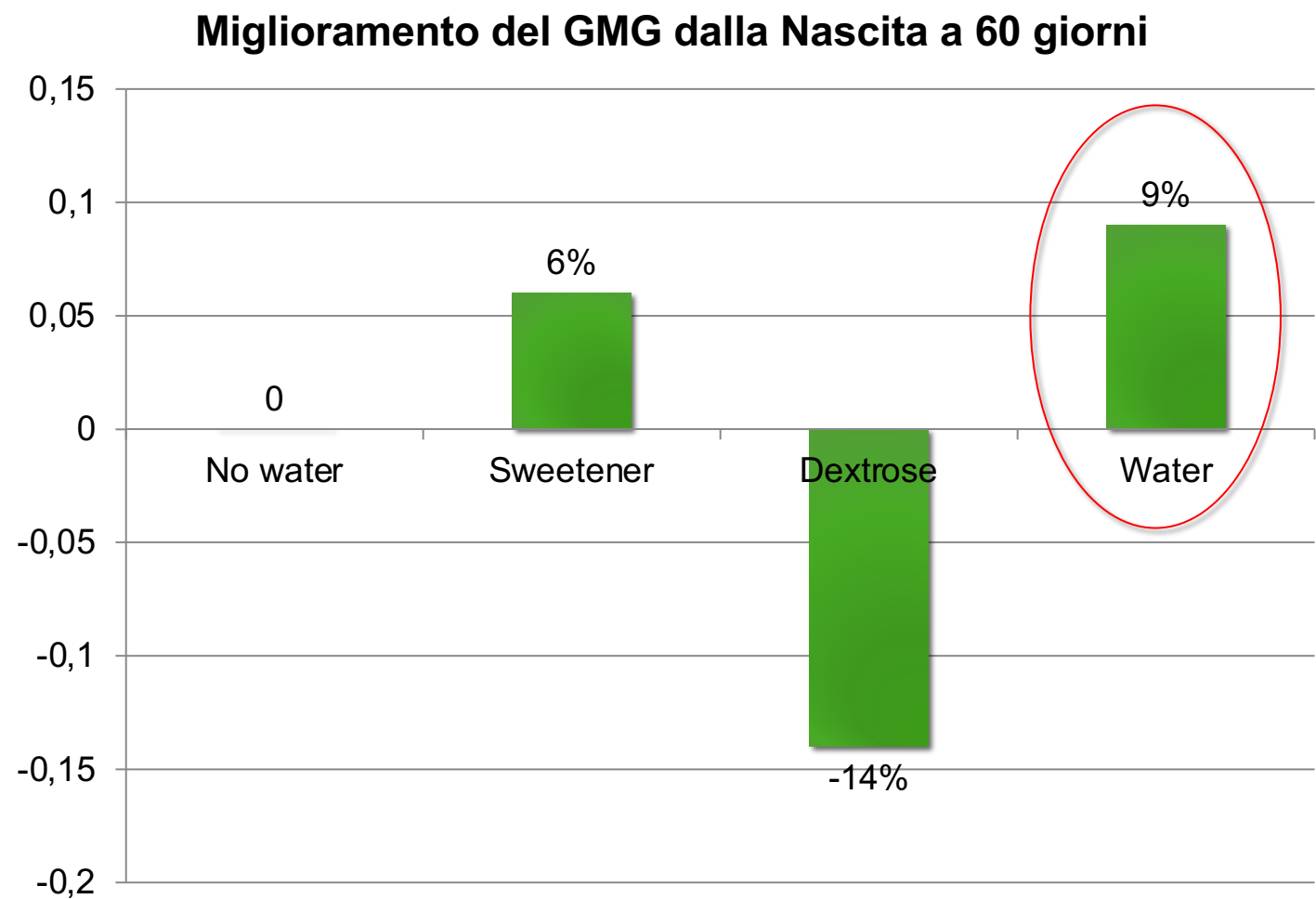




Un piatto con mangime e
un altro con acqua

Dalla nascita allo svezzamento

L'acqua extra li aiuta a mangiare



MA Juvero et al. 2017. "Nuevas estrategias de alimentación en maternidad para conseguir una mejor sanidad intestinal y un mayor crecimiento de los lechones en fase post-destete".

IGIENE



Disinfezione

Table 7. Evaluation of the bacteriocidal activity of seven chemical disinfectants against *E. coli* (Abbotstown strain) and *E. coli* NCTC 10418 (Type strain) using British Standard Method BSEN 1656:2000 (phase 2 /step 1). Results are given as the lowest effective concentration of product giving at least 10^3 reduction in viable bacterial count under the stated test conditions.

Bacteria	Disinfectant	Test conditions											
		Low organic matter						High organic matter					
		4°C		10°C		20°C		4°C		10°C		20°C	
		30 min	60min	30 min	60min	30 min	60min	30 min	60min	30 min	60min	30 min	60min
EC (A)*	A	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100
	B	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100
	C	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100
	D	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100
	E	1/200	1/200	1/200	1/200	1/100	1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/200	NE 1/100
	F	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100
	G	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100
EC (T)*	A	1/400	1/400	1/400	1/400	1/400	1/400	1/100	1/100	1/100	1/100	1/100	1/100
	B	1/800	1/800	1/800	1/800	1/800	1/800	1/200	1/200	1/200	1/200	1/200	1/200
	C	1/1000	1/1000	1/1000	1/1000	1/1000	1/1000	1/200	1/200	1/200	1/200	1/200	1/200
	D	1/200	1/400	1/200	1/400	1/400	1/400	NE 1/100	NE 1/100	NE 1/100	NE 1/100	1/100	1/100
	E	1/400	1/800	1/800	1/800	1/1000	1/1000	1/400	1/400	1/400	1/400	1/400	1/400
	F	1/800	1/800	1/800	1/800	1/1000	1/1000	1/100	1/100	1/100	1/200	1/200	1/200
	G	NE 1/100	1/100	1/100	1/100	1/100	1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100	NE 1/100

* *E. coli* (Abbotstown strain) - field isolate P5297/06. Isolated from porcine intestine (diarrhoea outbreak)

* *E. coli* NCTC 10418 (Type strain)

~ The key for the disinfectant compounds is given in Table 2

NE 1/100 = Not effective at the highest concentration tested (1/100)

Key	Active compound	Recommended dilution range
A	Iodine (acidic based)	1:125 – 1:600
B	Glutaraldehyde plus quaternary ammonium	1:50 – 1:190 (SVD 1:250)
C	Peracetic acid plus hydrogen peroxide	1:100 – 1:200
D	Iodine	1:200
E	Quaternary ammonium plus hydrogen peroxide	1:100 – 1:200
F	Quaternary ammonium	1:50 – 1:100
G	Peroxygen	1:100 – 1:200

Disinfezione

Subito dopo la pulizia e la disinfezione



24 h dopo la disinfezione con polvere secca contenente cloro

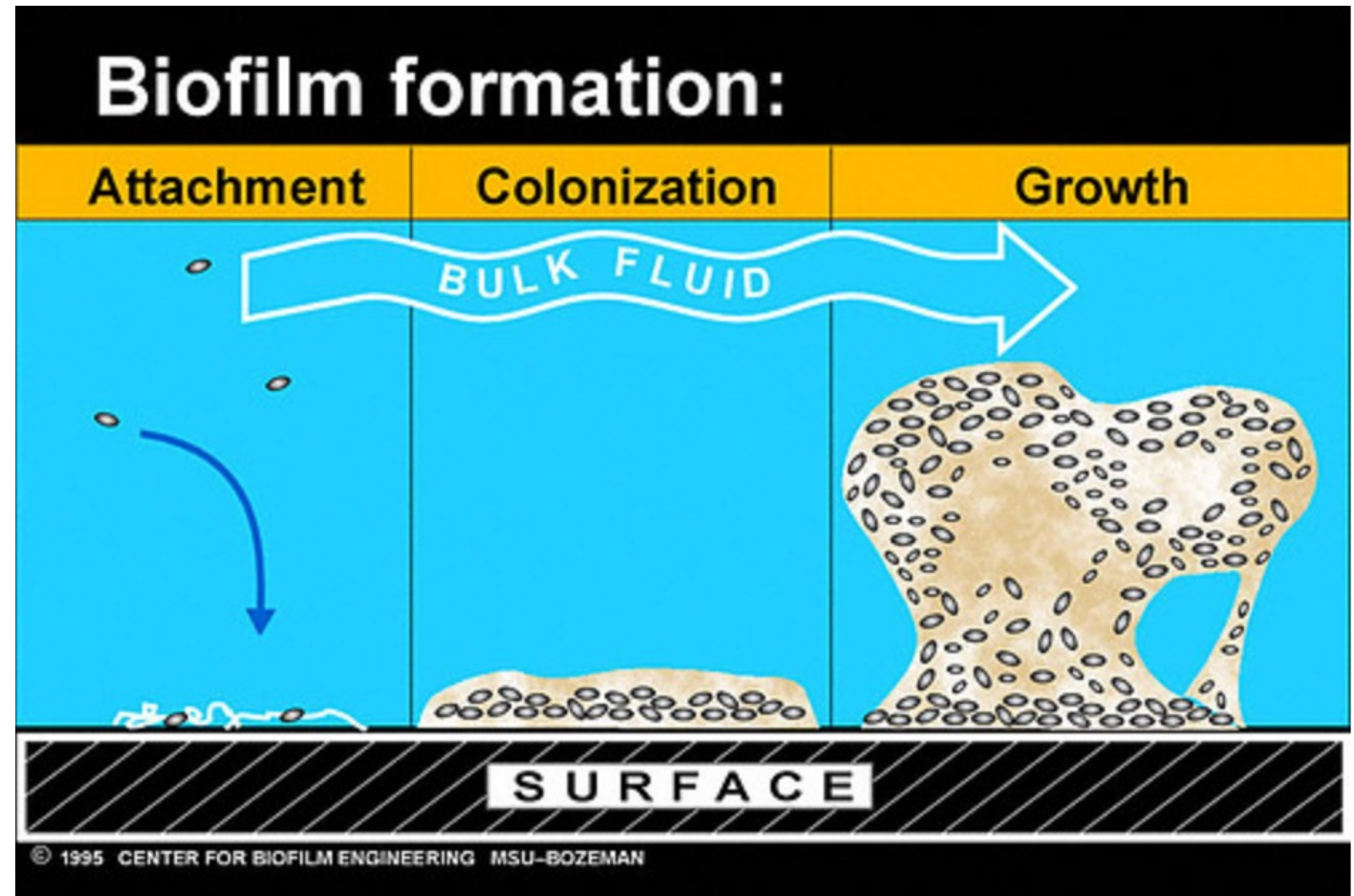


Esame batteriologico dell'acqua

- Non deve contenere più di 100.000 UFC totali/ml
- Effettuare la coltura a 25°C e 37°C. Prendi il valore più alto.
- Non deve contenere più di 100 CFU di E. coli/ml
- Assenza/20 ml di Germi Riduttori di Solfiti
- Assenza/100 ml di streptococchi fecali

Biofilm

La resistenza di E. coli all'interno di un biofilm al trattamento con cloruro è 3.000 volte superiore a solo quando sei in acqua



Igiene giornaliera

Amass SF, Halbur PG, Byrne BA, et al. Mechanical transmission of enterotoxigenic *Escherichia coli* to weaned pigs by people, and biosecurity procedures that prevented such transmission. *J Swine Health Prod.* 2003;11(2):61-68.

Table 4: Cumulative percentage of weaned pigs¹ from which *Escherichia coli* strain M1823B (challenge strain) was isolated during sample collection periods on Day 0 (prior to exposure), and Days 2, 4, 7, and 11 after initial exposure by inoculation (Inoculated Pigs) or direct (Pen Sentinels) or indirect exposure to the Inoculated Pigs.²

Treatment Group	n	No. of pigs (%) from which <i>E coli</i> strain M1823B was isolated ³				
		Day 0 (prior to exposure)	Day 2	Day 4	Day 7	Day 11
Inoculated Pigs	20	0 (0)	18 (90)	19 (95)	20 (100)	20 (100)
Pen Sentinels	5	0 (0)	2 (40)	5 (100)	5 (100)	5 (100)
Direct Sentinels	25	0 (0)	0 (0)	12 (48)	17 (68)	20 (80)
Hand-wash Sentinels	25	0 (0)	0 (0)	0 (0)	13 (52)	23 (92)
Shower Sentinels	25	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Non-exposed Pigs (negative controls)	25	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

¹ Inoculated Pigs were orally inoculated Days 0 and 2, and Pen Sentinels were housed with them except during inoculation procedures. On Days 1 through 10, Direct, Hand-wash, and Shower Sentinel groups (Table 1) were contacted according to the schedule in Table 2. When diarrhea was observed (except in Inoculated Pigs), affected pigs were immediately euthanized for cultural and histological examination. Pigs determined to be positive on a designated sample collection day or on the day of euthanasia were counted as positive for all subsequent sample collection periods.

² Inoculated Pigs were individually offered 1.36 to 8.92 × 10¹⁰ colony forming units of *E coli* M1823B in liquid strawberry gelatin.

³ Strain M1823B was identified on the basis of antimicrobial sensitivity.

INMUNIZACIONE

Esperienze spagnole sul campo

	Controllo	Trattamento
Numero maiali	3,695	1,923
Età dello svezzamento	25.98	28.28
Mortalità	4.3	3.4
mg/PCU (diarrhoea control)	41.1	0.8
mg/PCU (meningitis control)	134	98

- Granja Villares

 - Tipo di produzione: Suinetti fino a 2,5 mesi di età
 - Dimensione dell'allevamento: 550 scrofe
 - Produttività 2017: 30,07 wp/s/y

Prove sul campo dell'UE

Vangroenweghe F. Improved Piglet Performance and Reduced Mortality and Antimicrobial use Following Oral Vaccination with a Live Non-Pathogenic *Escherichia coli* F4/F18 Vaccine Against Post-Weaning Diarrhoea. *Austin J Infect Dis.* 2021; 8(2): 1048.

Farm ID	Treatment	ADWG	FCR	Mortality rate	TI ₁₀₀
1	Control	N/A	N/A	6	54.7
	Vaccination	N/A	N/A	3	15.6
2	Control	384	1.91	3.5	N/A
	Vaccination	390	1.81	2.6	N/A
3	Control	351	1.61	3.15	10.1
	Vaccination	373	1.55	1.65	1
4	Control	358	1.88	3.31	6.3
	Vaccination	420	1.83	2.3	0
5	Control	329	N/A	2.13	16.7
	Vaccination	328	N/A	1.4	0
6	Control	320	N/A	4.3	22
	Vaccination	318	N/A	1.9	4.4
7	Control	304	N/A	0.9	14.3
	Vaccination	307	N/A	0.9	0.7
8	Control	362	1.47	3.56	10
	Vaccination	378	1.49	1.67	0
9	Control	N/A	N/A	11.21	18.6
	Vaccination	N/A	N/A	4.51	2.4
10	Control	N/A	N/A	2.05	7
	Vaccination	N/A	N/A	1.96	0

Prove sul campo dell'UE

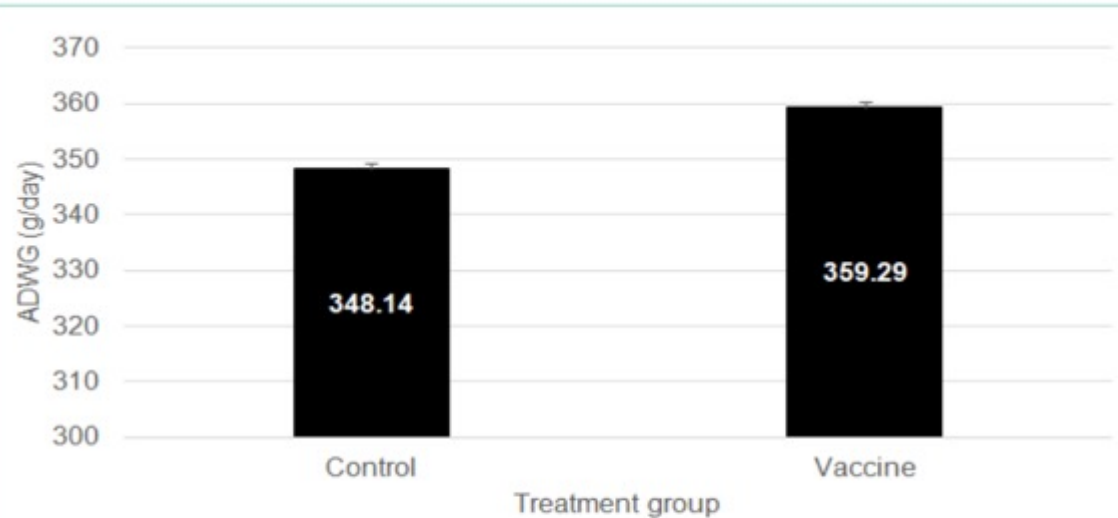


Figure 1: Average daily weight gain (ADWG; mean $\pm$ SEM; expressed as grams per day) in Control and Vaccine-treated animals from different field trials using a live, non-pathogenic, oral *E. coli* F4/F18 vaccine in piglets to prevent clinical impact of post-weaning diarrhea due to *E. coli*. Data were not significantly different ($P=0.1641$).

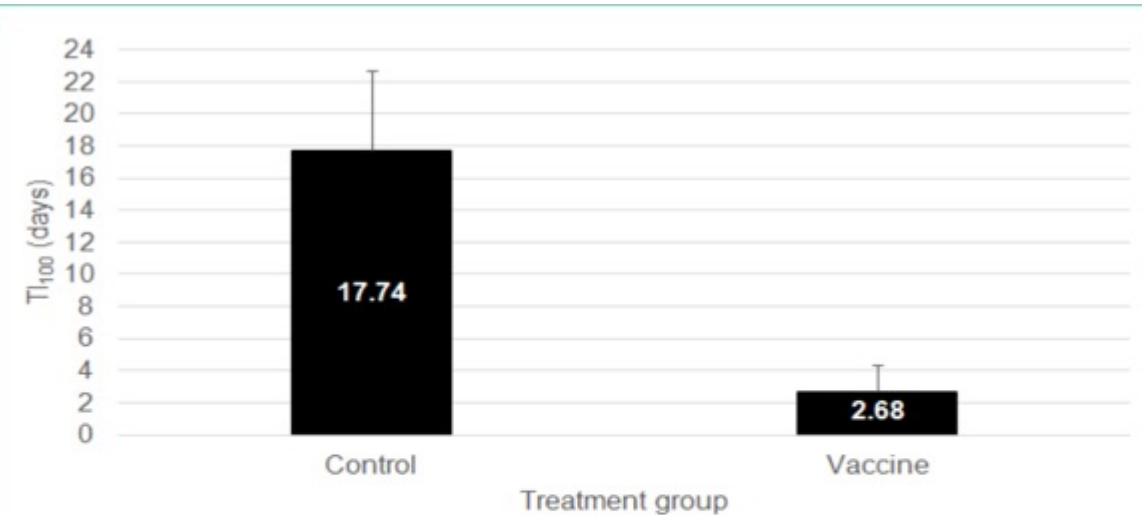
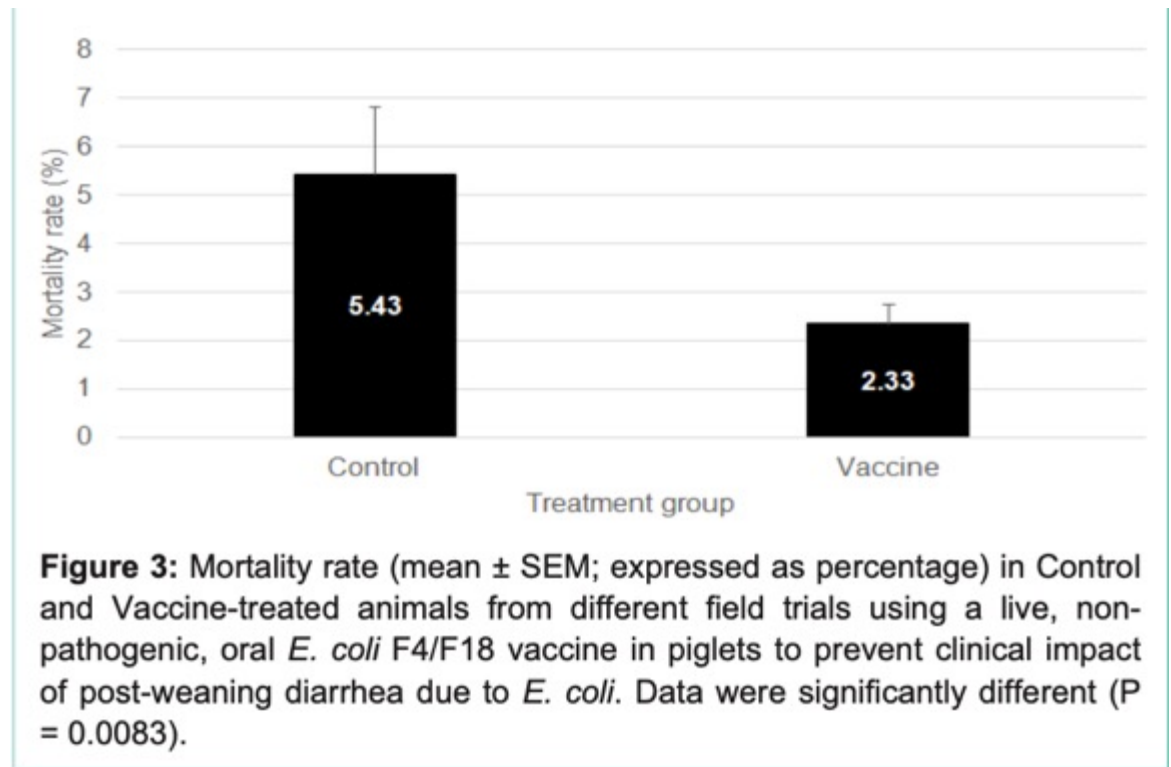
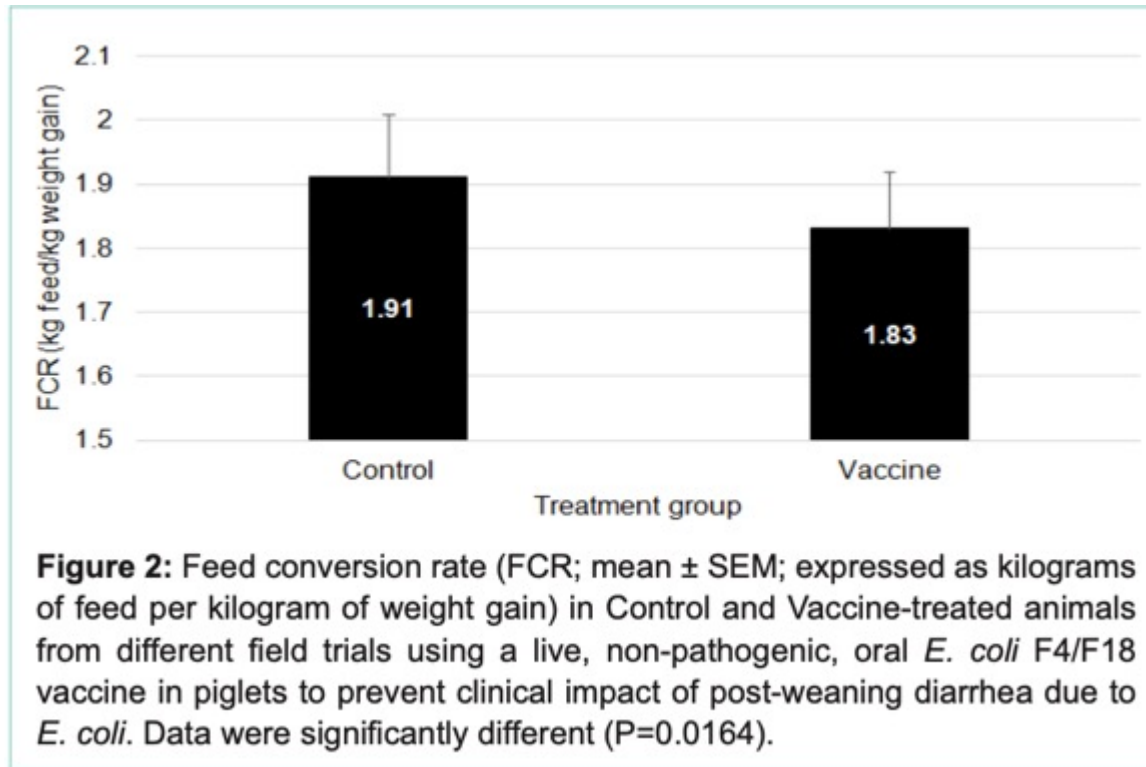


Figure 4: Treatment incidence 100 (TI100; mean $\pm$ SEM; expressed as calculated number of treatment days per 100 days in production) in Control and Vaccine-treated animals from different field trials using a live, non-pathogenic, oral *E. coli* F4/F18 vaccine in piglets to prevent clinical impact of post-weaning diarrhea due to *E. coli*. Data were significantly different ($P=0.0009$).

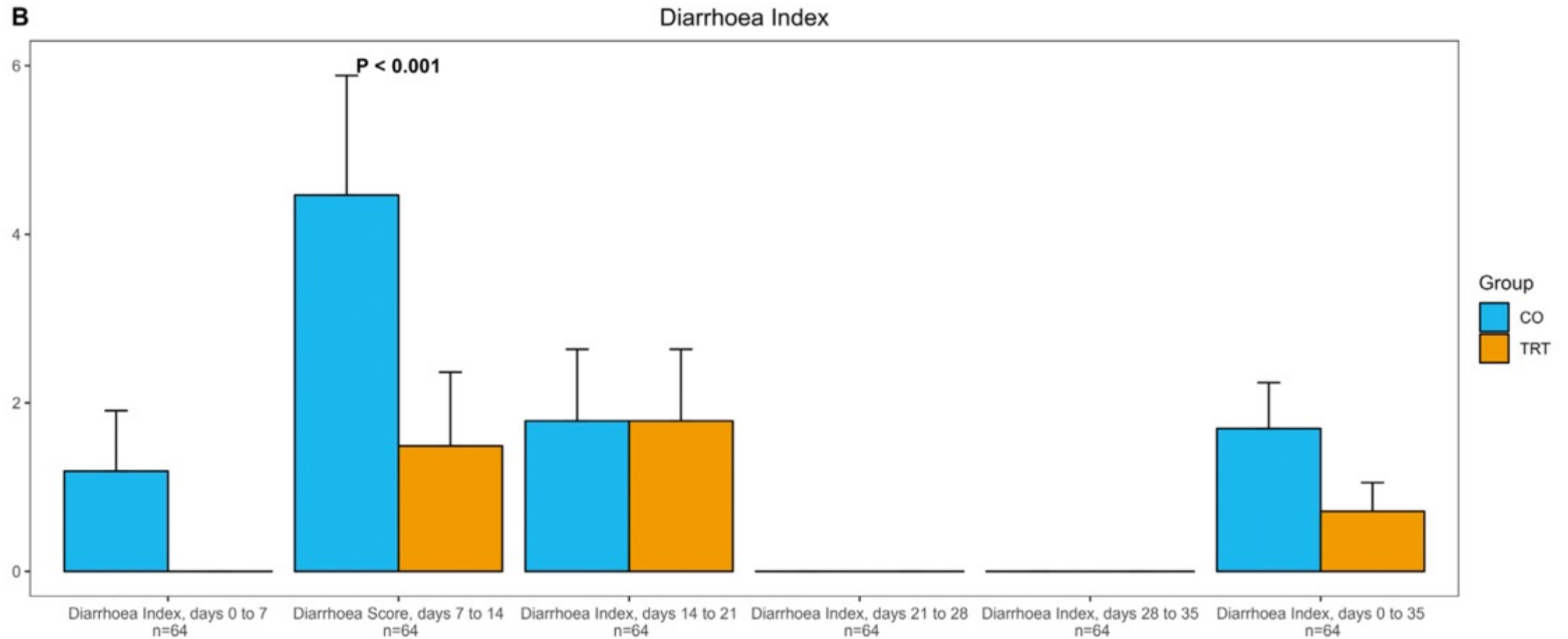
Vangroenweghe F. Improved Piglet Performance and Reduced Mortality and Antimicrobial use Following Oral Vaccination with a Live Non-Pathogenic *Escherichia coli* F4/F18 Vaccine Against Post-Weaning Diarrhoea. *Austin J Infect Dis.* 2021; 8(2): 1048.

Prove sul campo dell'UE



Vangroenweghe F. Improved Piglet Performance and Reduced Mortality and Antimicrobial use Following Oral Vaccination with a Live Non-Pathogenic *Escherichia coli* F4/F18 Vaccine Against Post-Weaning Diarrhoea. *Austin J Infect Dis.* 2021; 8(2): 1048.

Prove sperimentale



Correa, F. *et al.* 2022. Effect of an *Escherichia coli* F4/F18 bivalent oral live vaccine on gut health and performance of healthy weaned pigs. *Animal* 16 (2022) 100654

Vaccino e integrità intestinale

F. Correa, D. Luise, L. Amatucci et al.

Animal 16 (2022) 100654

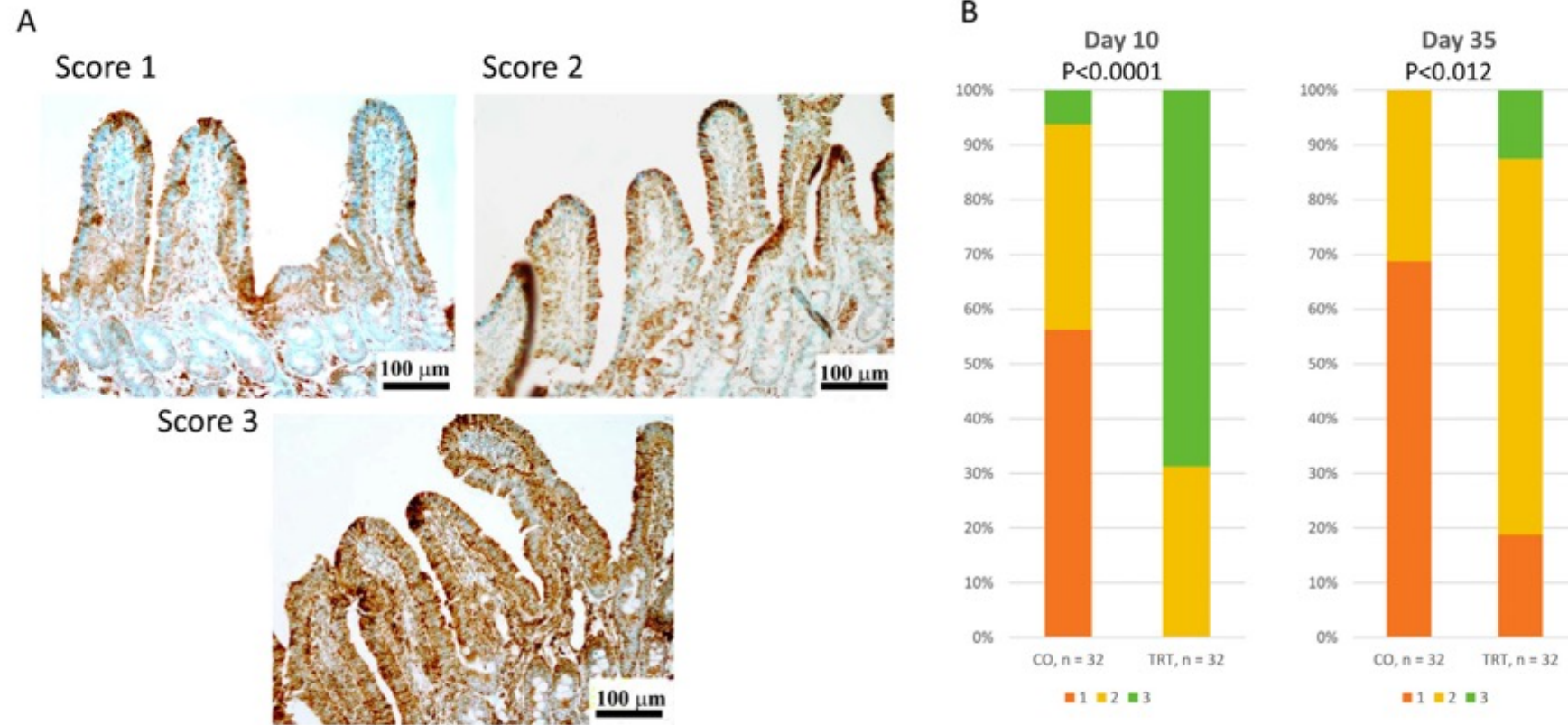
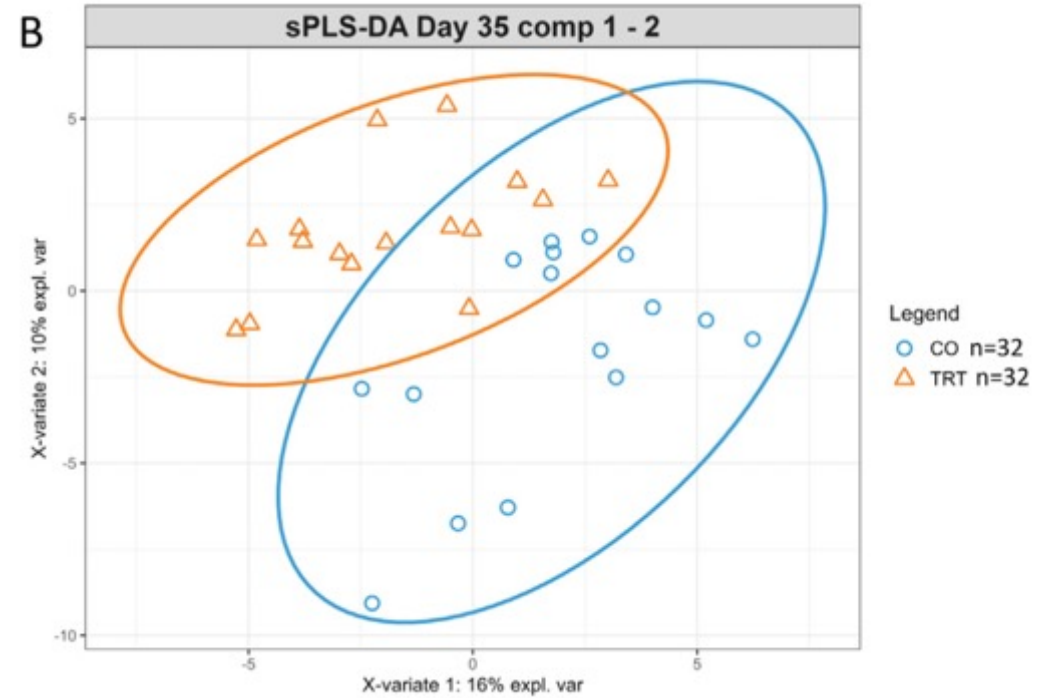
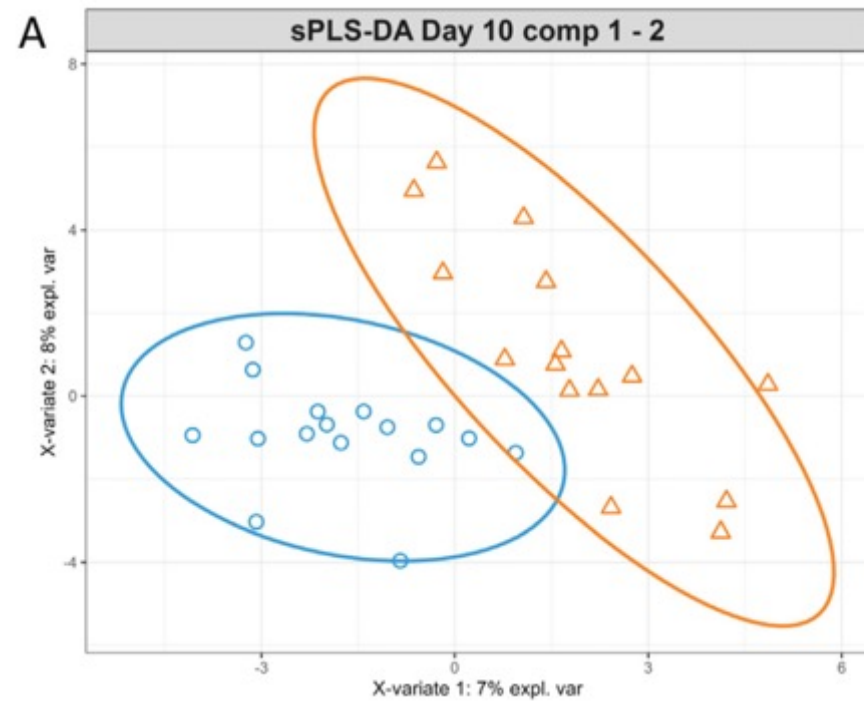


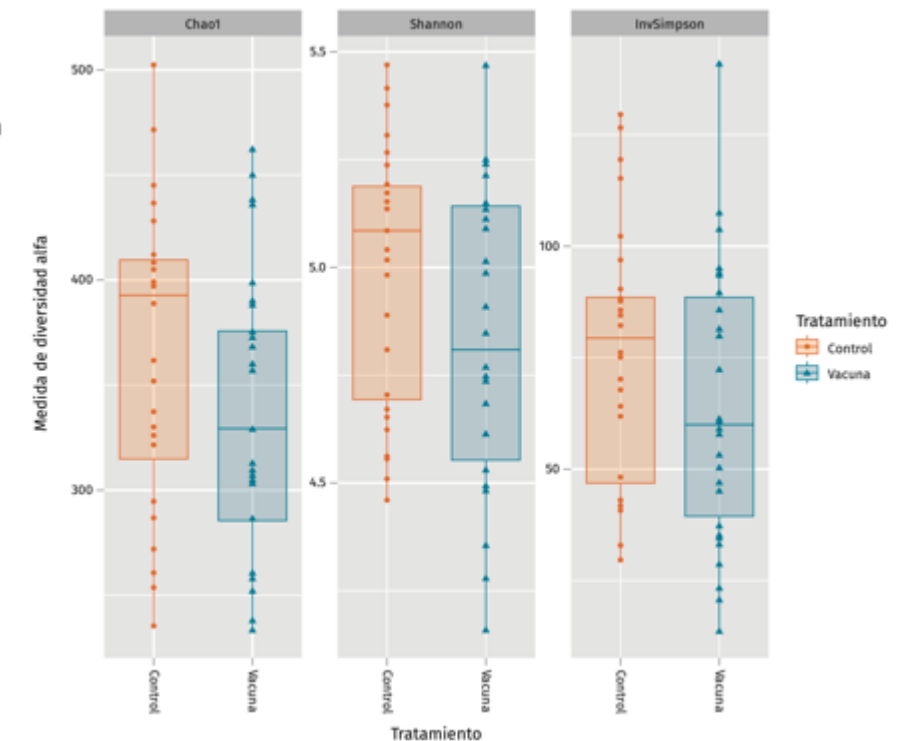
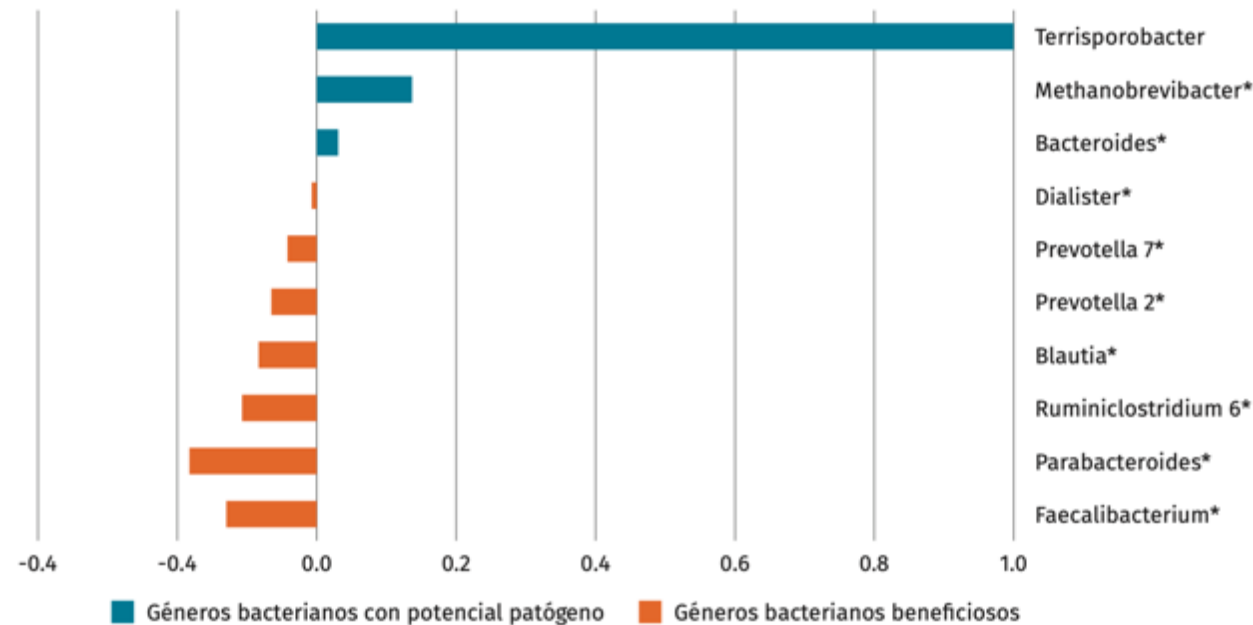
Fig. 1. (A) Representative immunohistochemistry images for Claudin-4. Score 1 = light/scarse staining: some villi and weakly marked crypts are represented; Score 2 = moderate staining: the immunoreactivity for Claudin-4 involves about 50% of the epithelial cells (enterocytes) of the villi; Score 3 = intense staining: the immunoreactivity appears intense and uniformly distributed on the surface of the villi. (B) Relative frequencies of the jejunal immunohistochemistry scores for Claudin-4 (1 = light/scarse staining, 2 = moderate staining, 3 = intense staining) of postweaning piglets orally vaccinated with *E. coli* F4/F18 bivalent vaccine at days 10 and 35 postweaning. Abbreviations: CO = control group; TRT = Group orally vaccinated with *E. coli* F4/F18 bivalent vaccine at weaning.

Vaccino e microbiota



Correa, F. *et al.* 2022. Effect of an Escherichia coli F4/F18 bivalent oral live vaccine on gut health and performance of healthy weaned pigs. *Animal* 16 (2022) 100654

Vaccino e microbiota



Luise, D., *et al.* Effects of *E. coli* bivalent vaccine and of host genetic susceptibility to *E. coli* on the growth performance and faecal microbial profile of weaned pigs. 2020. Livestock Science;241: Article 104247

FATTORI SPECIFICI DOPO-SVEZZAMENTO

Aiutare a
trovare il acqua
ed mangime



Mangime razionato



Relazione tra PWD e consumo di mangime

Engelsmann, MN. *et al.* 2023. Effect of postweaning feed intake on performance, intestinal morphology, and the probability of diarrhoea in piglets. *Animal* 17 (2023) 100891

Table 2

The probability (%) of diarrhoea during different time intervals and the number of days treated with antibiotics against diarrhoea in weaned pigs with either 25% highest (HIGH) or lowest (LOW) accumulated feed intake between postweaning day 0 and 4.

Item	Feed intake level		SEM ¹	P-value
	LOW	HIGH		
Probability ² [%]				
Days 0–5	15	39	9.91	0.01
Days 7–11	21	29	10.5	0.51
Days 14–18	27	45	9.93	0.17
Days 21–28	14	31	10.4	0.14
Days 0–28	25	38	4.54	0.02
No. of antibiotic days	5.76	8.14	0.98	0.04

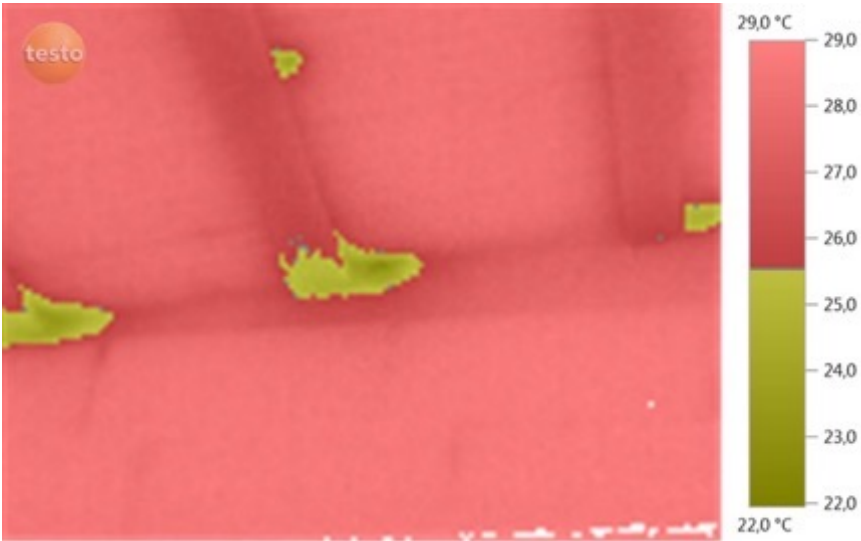
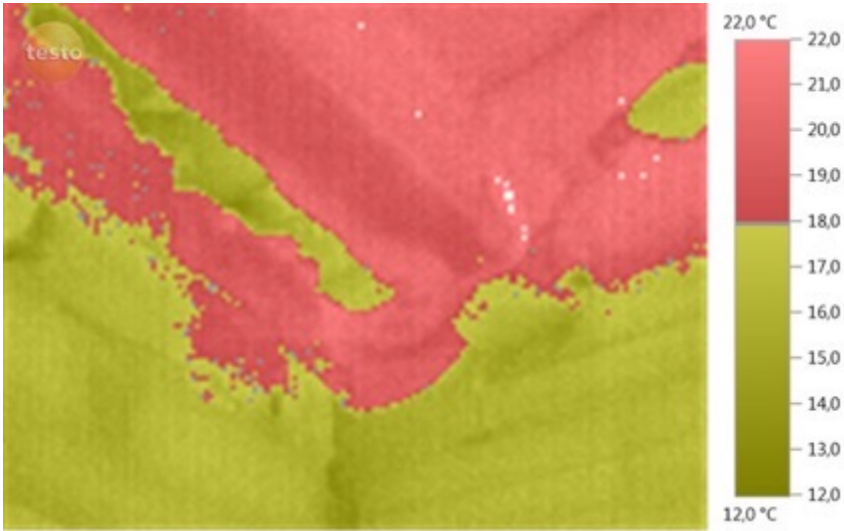
Abbreviations: LOW = Low feed intake between days 0 and 4 postweaning; HIGH = HIGH feed intake between days 0 and 4 postweaning.

¹ Values for diarrhoea probability are presented as least squares means in percent and SEM. Values for number of antibiotic treatment days are presented as least squares means and SEM.

² Probability was calculated as $P = (\text{odds} / (1 + \text{odds})) * 100$, where $\text{odds} = e^{\text{loge}(\text{odds})}$.

Pre-riscaldamento imprescindibile

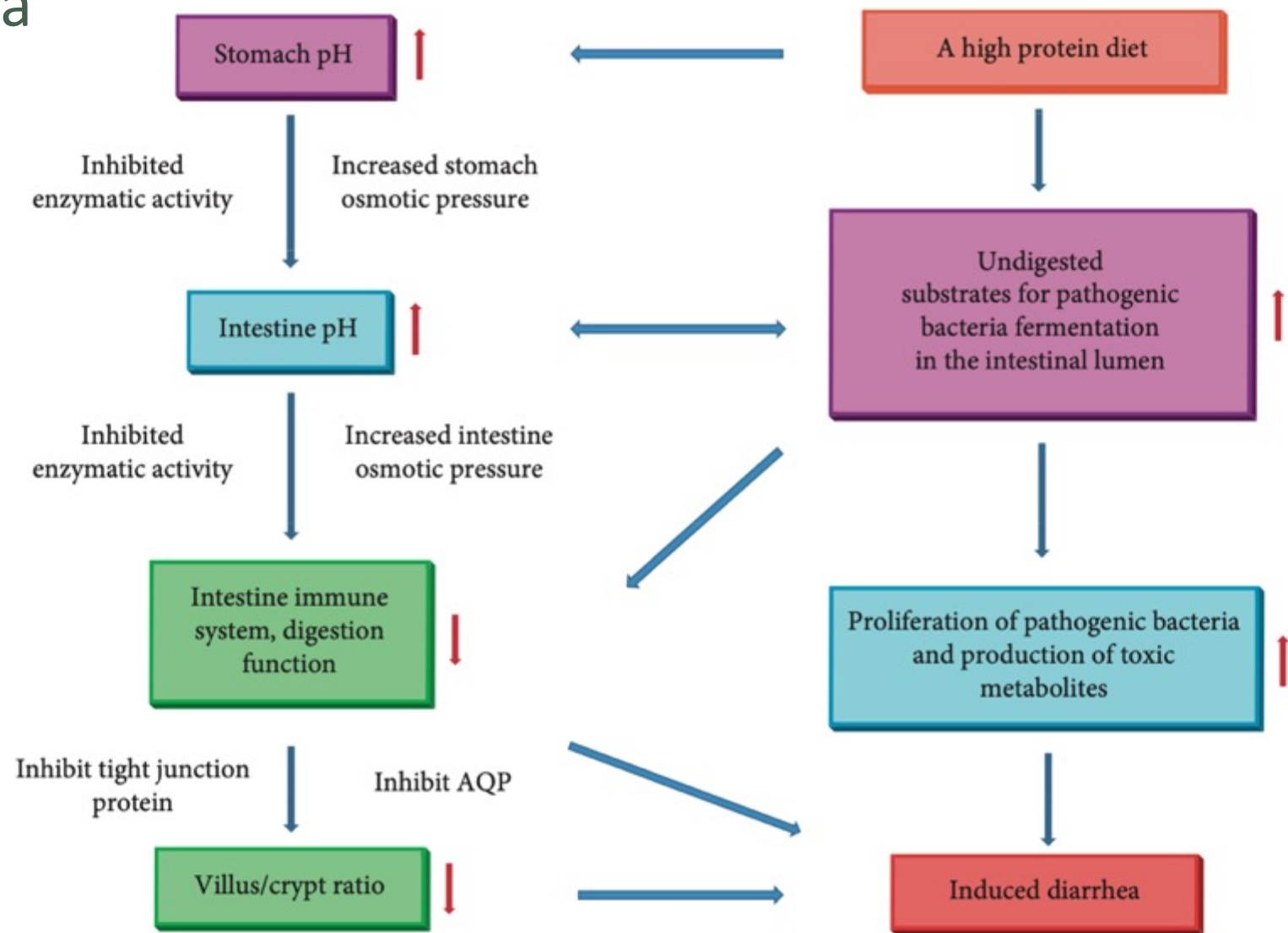
Condizione	Cambiamento T ^a effettiva
Differenza T ^a aire-parete	
13 °C	- 7 °C
3 °C	- 1,5 °C
1 °C	- 0,5 °C



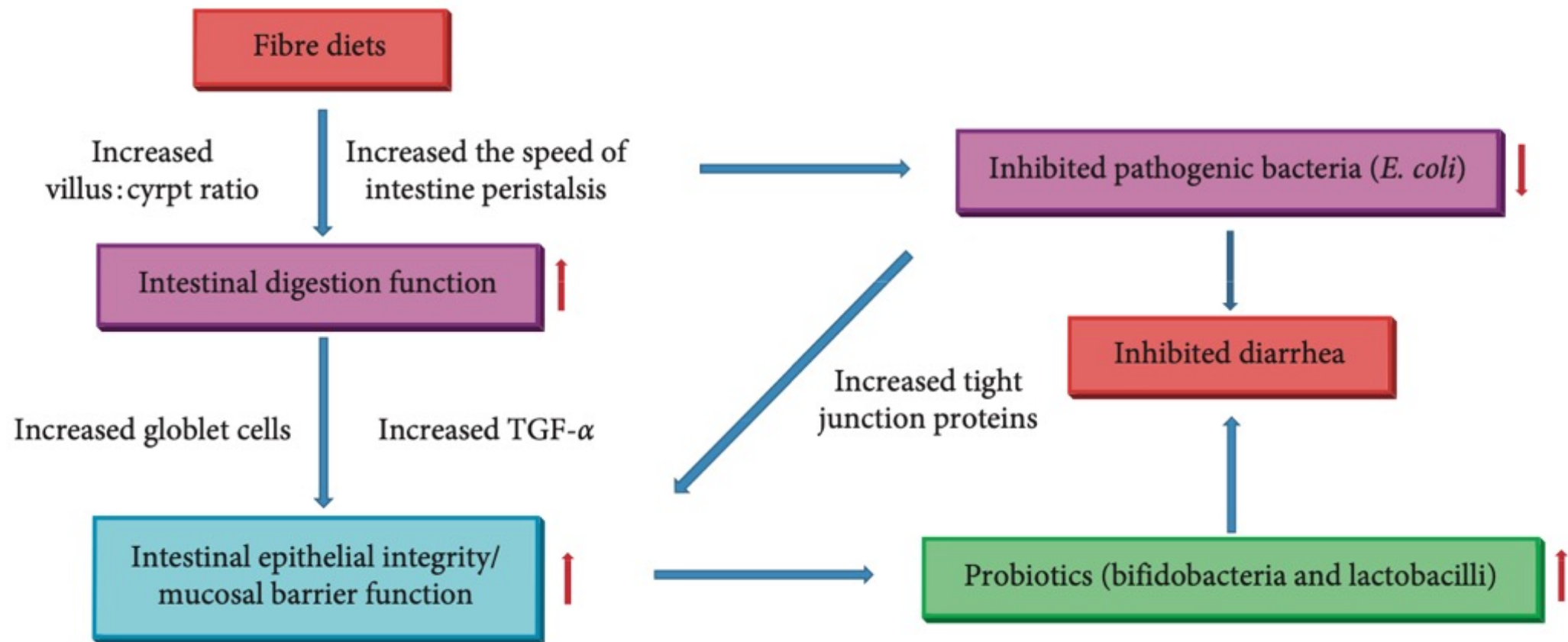


Mancanza di pre-riscaldamento

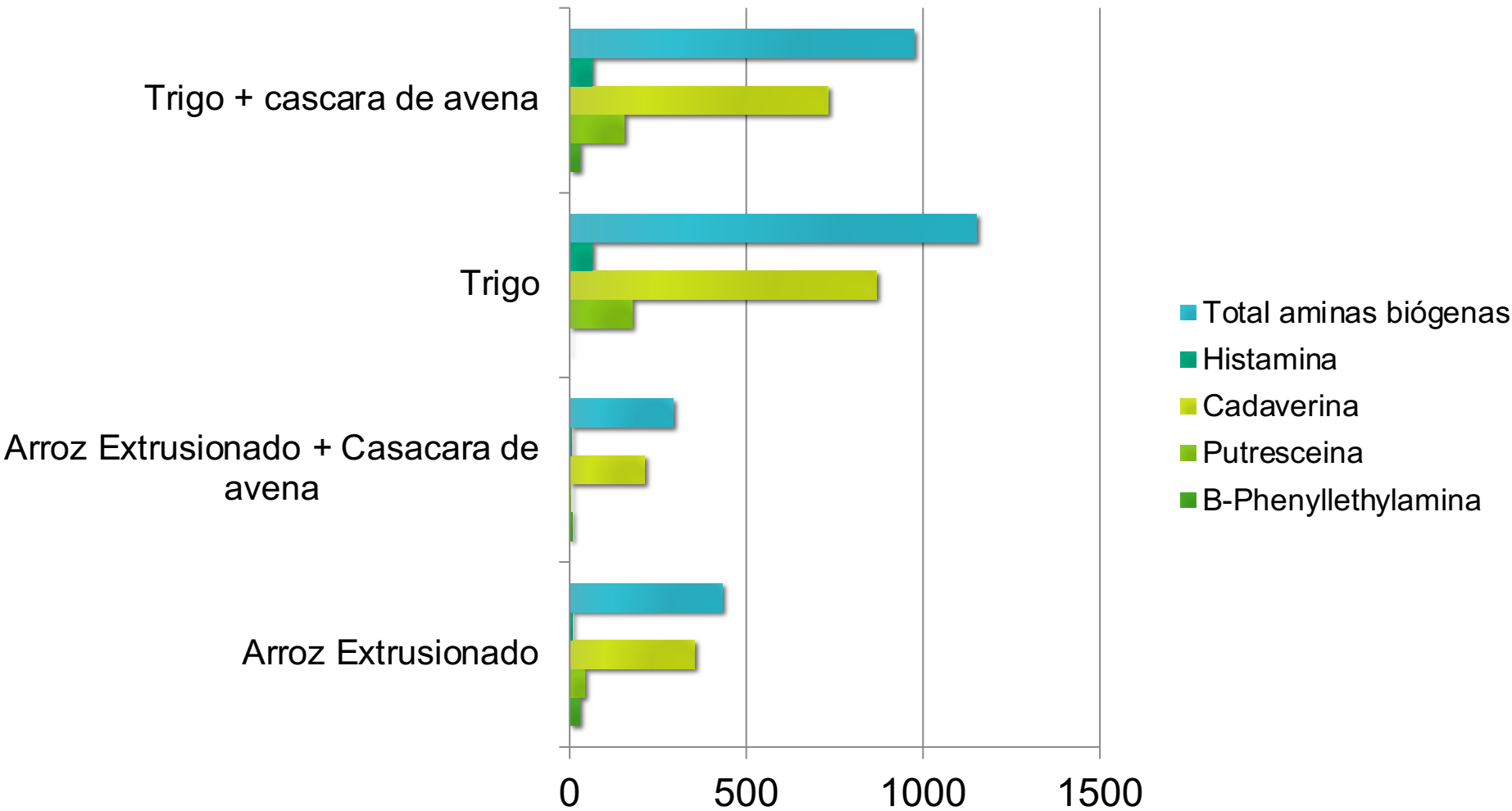
Dieta: proteina



Dieta: fibre



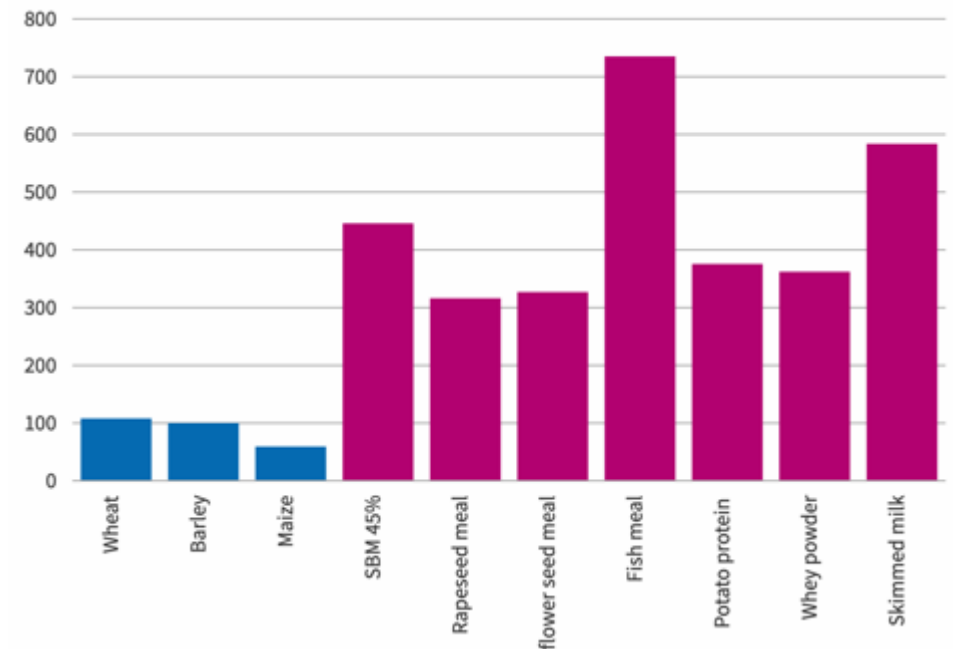
Fonte di carboidrati



Acid Binding Capacity

- Immediatamente dopo lo svezzamento l'ABC-4 dovrebbe essere inferiore a 250-300 meq/kg.
- Ciò si tradurrà in un basso pH dello stomaco, che fungerà da barriera naturale riducendo la possibilità per i patogeni di passare attraverso lo stomaco e raggiungere l'intestino.
- Inoltre, un basso pH dello stomaco ha un effetto positivo sulla digestione delle proteine.

ABC degli ingredienti dei mangimi



Fonti di grassi

- I grassi utilizzati nella dieta post-svezzamento devono essere facilmente digeribili

Table 1. Effect of supplemental lipid sources on apparent fecal digestibility (%) of dry matter, fat, and protein (N × 6.25) in weaned and in growing pigs¹

	Animal fat	Palm oil mix	Palm oil	Vegetable oil mix	Coconut oil/Fat blend ²	Rapeseed oil	SE
Weaners							
Dry matter ³	86.2 ^b	87.9 ^a	87.8 ^a	87.2 ^{ab}	87.5 ^a	87.6 ^a	0.4
Fat ⁴	75.1 ^{bc}	77.0 ^{ab}	76.4 ^b	72.8 ^c	80.0 ^a	80.2 ^a	1.1
Protein ³	84.2	85.3	85.0	84.6	85.0	84.3	0.7
Growers							
Dry matter ³	81.2	82.0	81.7	81.2	80.2	82.2	0.5
Fat ⁴	65.5 ^{bc}	67.8 ^b	64.0 ^{bc}	59.1 ^d	62.1 ^c	73.5 ^a	1.5
Protein ³	76.9	77.5	76.7	75.9	75.1	76.5	1.2

¹A total of six balance periods were included in the study: For weaned pigs, balance periods were from days 30 to 35, days 37 to 42, days 44 to 49. For growing pigs, the three balance periods were initiated when pigs weighed 51.7 kg, 67.0 kg, and 82.1 kg, respectively.

²Coconut oil was used for weaned pigs and fat blend for growing pigs.

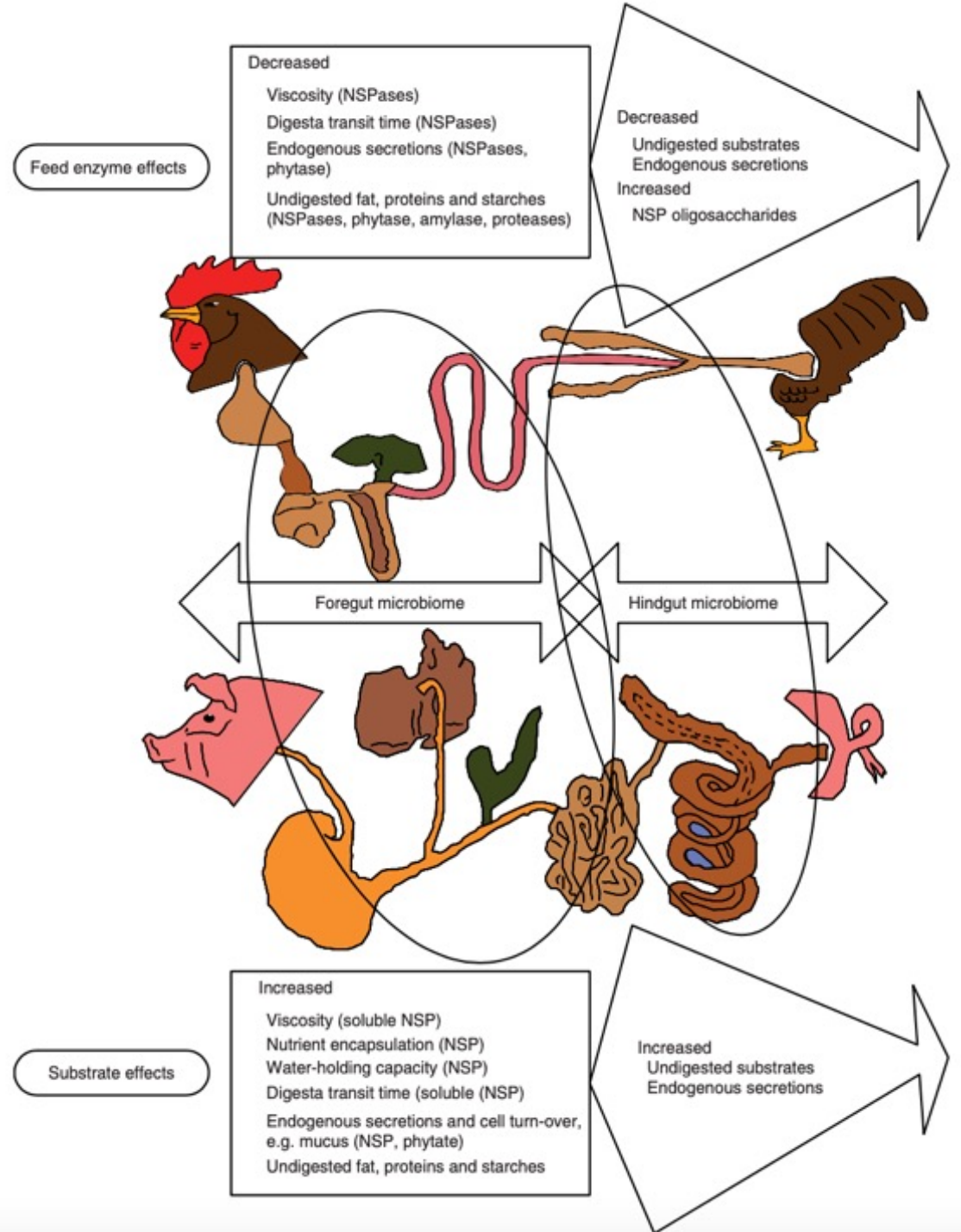
³Unpublished data (Christensen, 2005).

⁴Lauridsen et al. (2005, 2007a).

^{a,b,c,d}Means with different letters within a line are significantly different (P<0.05)

Enzimi

Kiarie, E. *et al.* The role of added feed enzymes in promoting gut health in swine and poultry. *Nutrition Research Reviews* (2013), 26, 71–88. doi:10.1017/S0954422413000048



Diete a basso rischio

Table 1. Minimum and maximum levels of crude protein used in formulations for piglets in three weight intervals after weaning. In case of diarrhoea the gentle recommendations (Tybirk et al., 2021) can be used.

	6-9 kg BW	9-15 kg BW	15-30 kg BW
Min (g digestible/kg feed)	170	161	156
Max (g digestible/kg feed)	178	164	163
Gentle			
Min (g digestible/kg feed)	133	144	147
Max (g digestible/kg feed)	155	153	156

CONCLUSIONI

Conclusioni

- La prevenzione della diarrea e dei conseguenti problemi derivati dall'infezione da *S. suis* deve comprendere diversi ambiti di azione
 - Buon management dal primo giorno di vita
 - Introduzione precoce della dieta solida
 - Buona immunizzazione
 - Mangime di qualità
 - Utilizzando aiuti come: acidi organici, enzimi, ecc.
 - Sistemare i suinetti in condizioni ambientali corrette

GRAZIE
