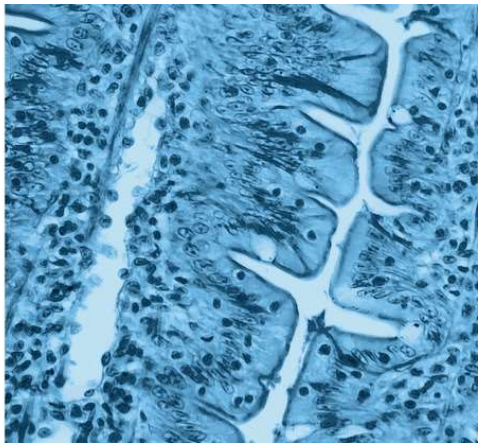
SCHOTHORST FEED RESEARCH

TEAGASC on-line meeting

25-01-2022





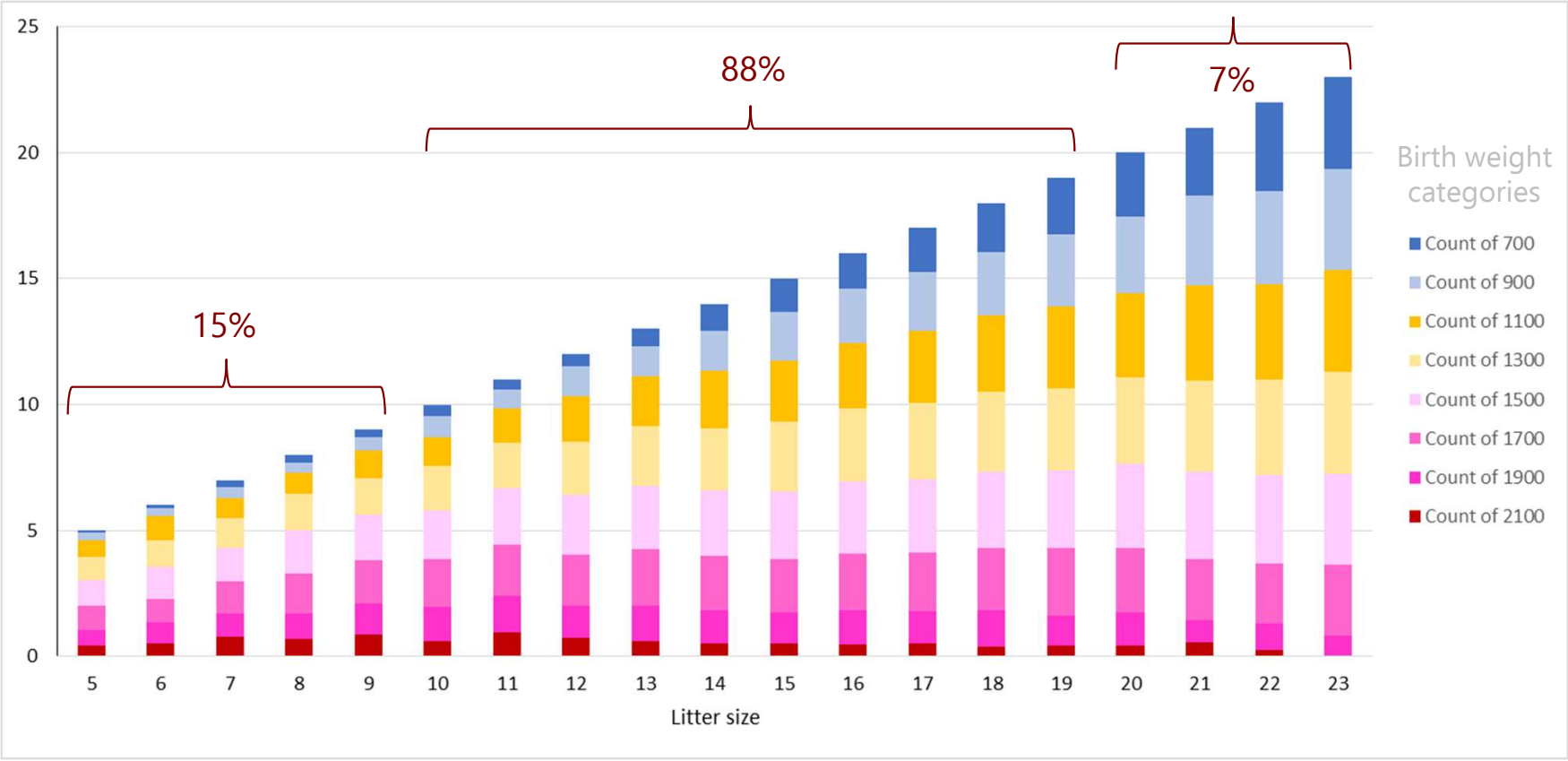
How to remove Zn oxide in post-weaning piglet diets

Francesc Molist, PhD, DVM

Knowhow to feed

Smaller piglets and higher variation…

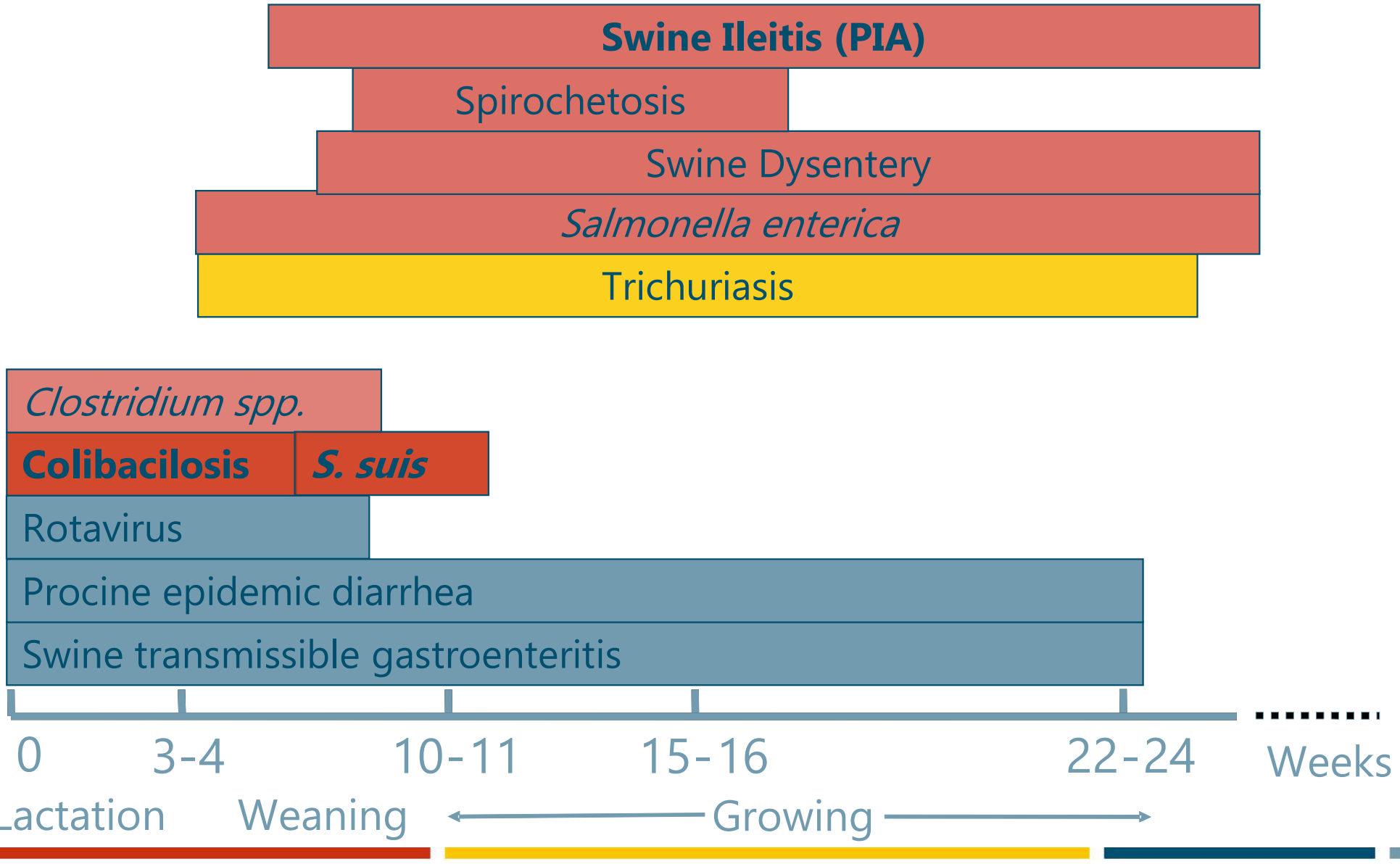
Heterogeneity of litter size between individual sows



SCHOTHORST's RESEARCH FARM / 3113 litters / 2011-2020

unpublished

Current gut health challenges in the pig industry



Types of feed piglets encounter in their life

Colostrum
The first 24 hours

Milk replacer

Weaning

Creep feed

Sow milk

Post weaning

Week 1 | Week 2 | Week 3 | Week 4 | Week 5....

PW diet

Pre-weaning

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- Important colostrum intake.
- Long-lasting effects are due to different programming of the gut immune system. What are the long lasting effect of modifying the gut microbiota?
- Creep feed supplementation as early as possible.
- Develop an stable microbiota and oral tolerance & a robust GIT.
- Minimize the negative effects associated with weaning.
- Role of complex diets vs. simple diets pre-weaning is poorly understood.

Importance of colostrum (2)

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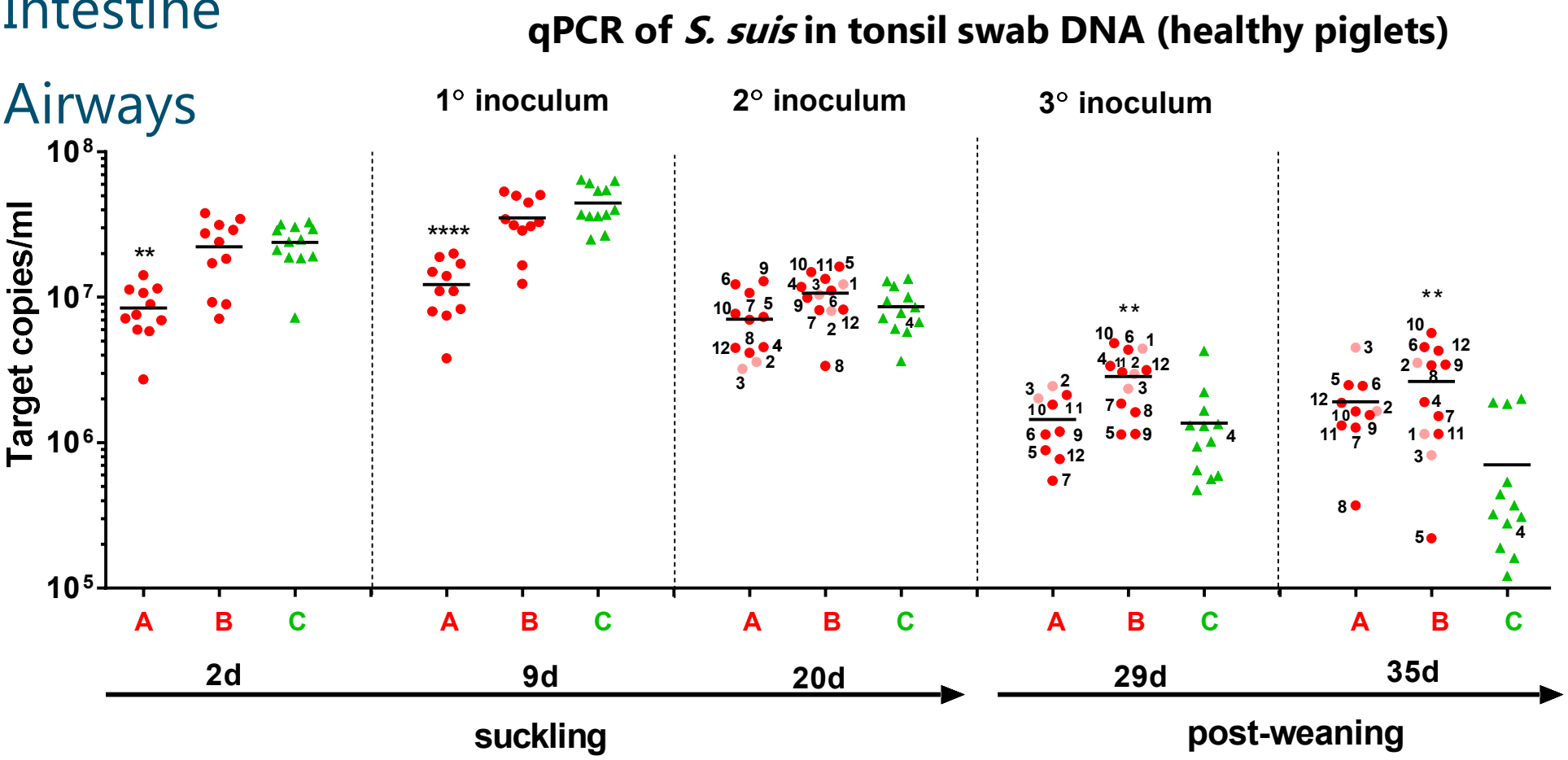
	Piglets alive after 10 days	Piglets dead after 10 days
Birth interval (min)	20.0	23.8
Duration farrowing (min)	136.0 [a]	155.3 [b]
Time to 1st contact udder (min)	13.7 [a]	36.1 [b]
Time to 1st colostrum intake (min)	26.9 [a]	54.7 [b]
Body temperature at birth (°C)	38.9	39.0
Body temperature 1 hour after birth (°C)	38.4 [a]	37.5 [b]
Birth weight (g)	1368 [a]	1063 [b]
Order birth	6.2 [a]	7.0 [b]

Tuchscherer et al., 2002

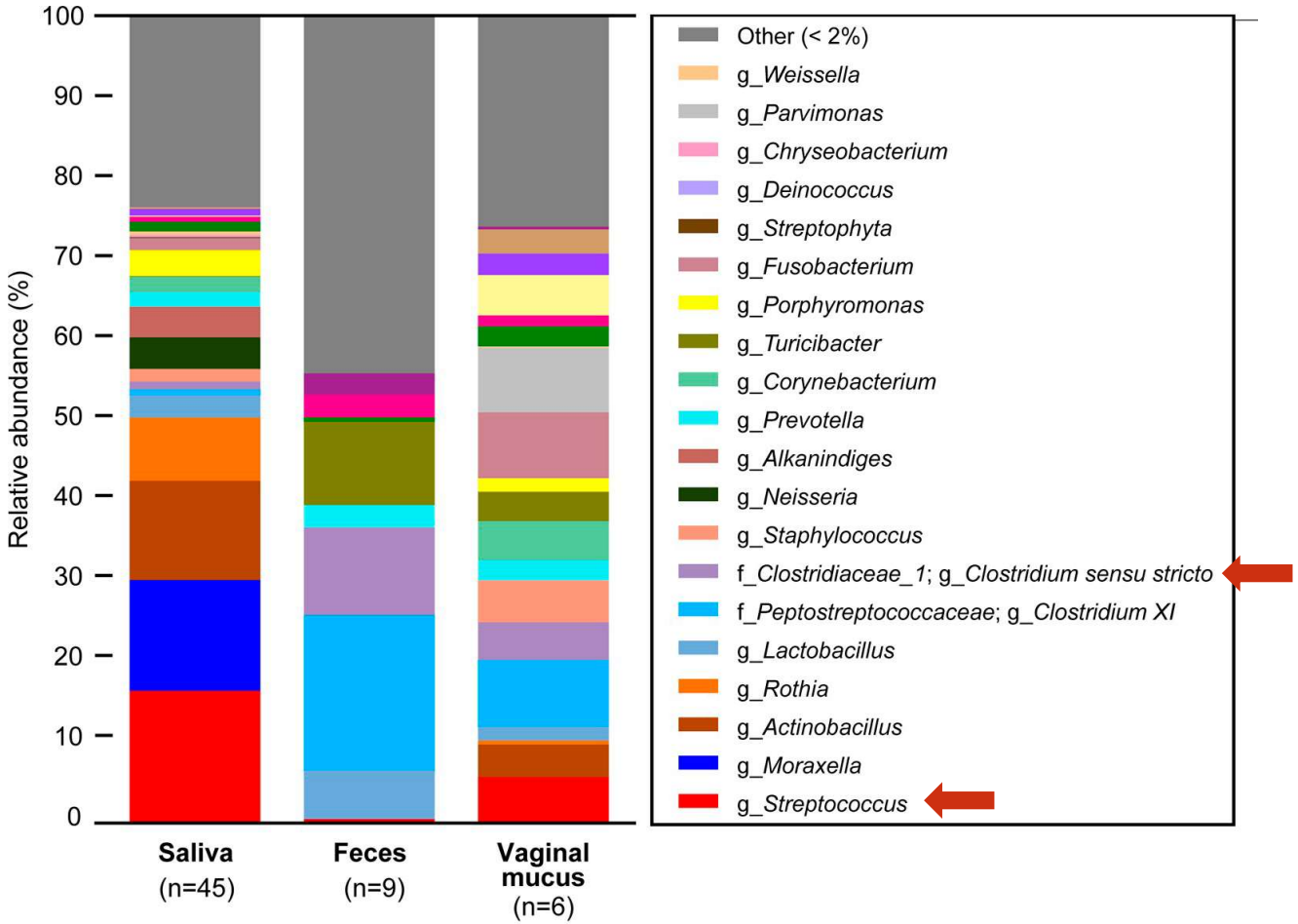
All piglets 2 days of life are positive for S. suis

- Tonsils (a reservoir)
- Intestine
- Airways



Gaiser et al. 2019 submitted

Composition of bacteria in the sows



Murases et al, 2019

Probably we need different strategies to reduce S. suis problems vs. Clostridium neonatal diarrheas

Feeding strategies in pre-weaning diets

Colostrum
The first 24 hours

Milk replacer

Focus on developing microbiota and innate immune system > **Role for prebiotics via milk replacer or creep feed?**

Focus on having a robust GIT and preparing the piglets for the weaning period > **Role complex vs. simple diets**

Weaning

Creep feed

Sow milk

Post weaning

Week 1 | Week 2 | Week 3 | Week 4 | Week 5....

Diet around weaning

Pre-weaning management strategies

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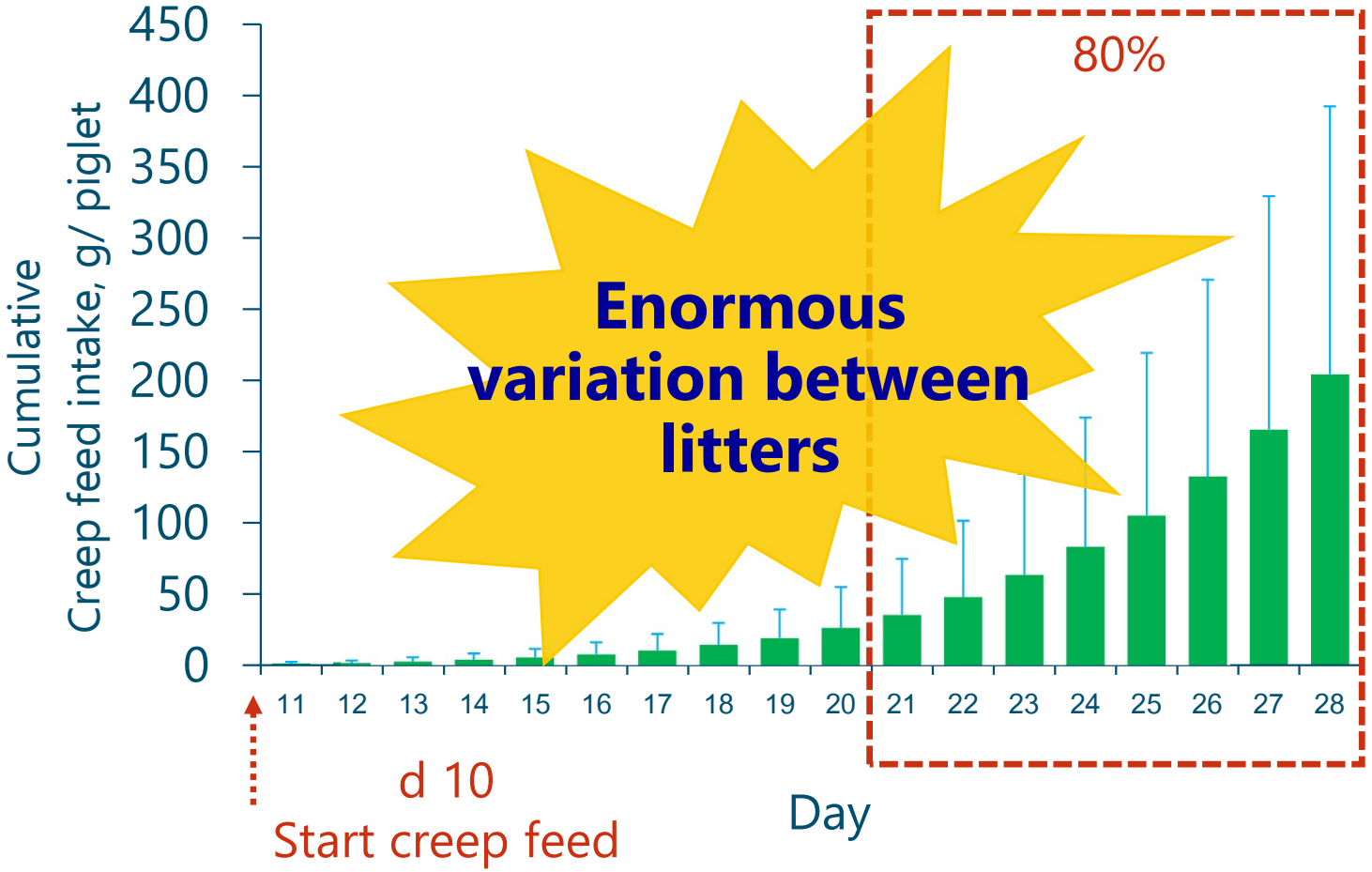
- Pre-weaning creep feed intake



Huting et al., 2017

Role of complex vs. Simple diets pre-weaning

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Hypothesis:

- In the absence of in-feed antibiotics and weaning piglets close to 24 days of age, having a simple low nutrient diet around weaning (+/- 10 days after weaning) could help to reduce post-weaning problems?
- Can we increase the % of eaters in the litters (from 60 > 100%)?
- What are the long term effects post-weaning?

Complex vs. Simple diet pre-weaning

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- 24 sows and litters divided in 3 treatments. All litters standardized at 11 piglets / sow 24h post-farrowing.
- Experiment starts at 14 days of life until weaning. After weaning the middle class piglets were selected and all piglets received the same weaner I and II diets.
- Experimental treatments

1. Litters receiving **creep feed**.
2. Litters receiving a **weaner diet.**
3. Litters receiving **sow feed.**

- 4 Days PW 4 piglets per pen were euthanized to compare gut structure.

Heo et al., 2018

Results Pre-weaning

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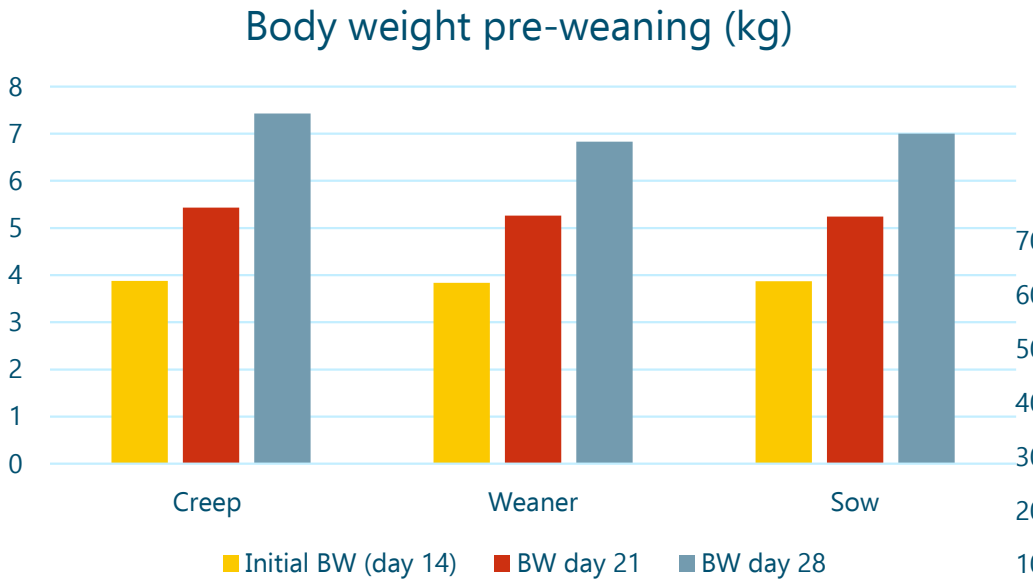
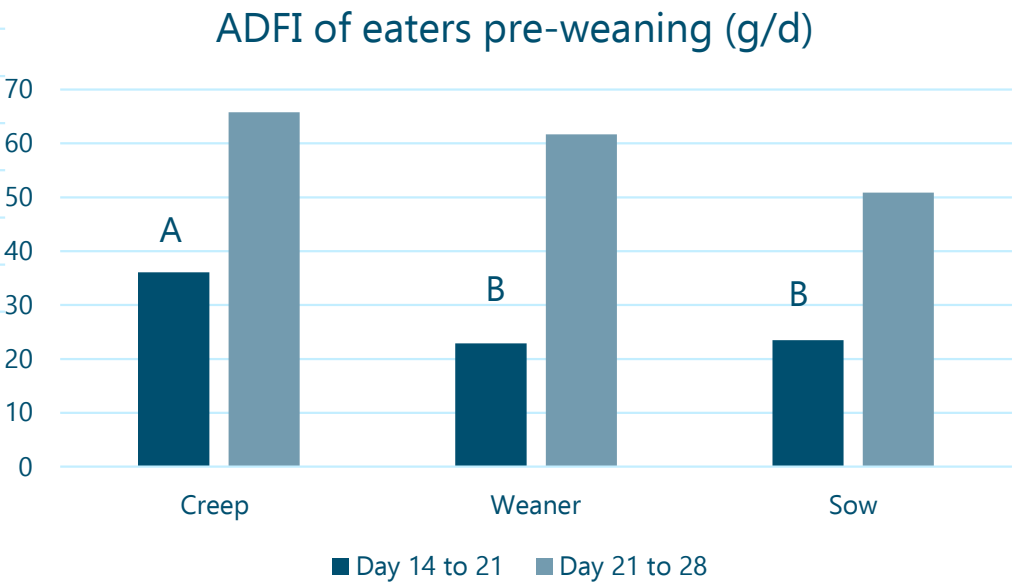
- No differences in sows performance

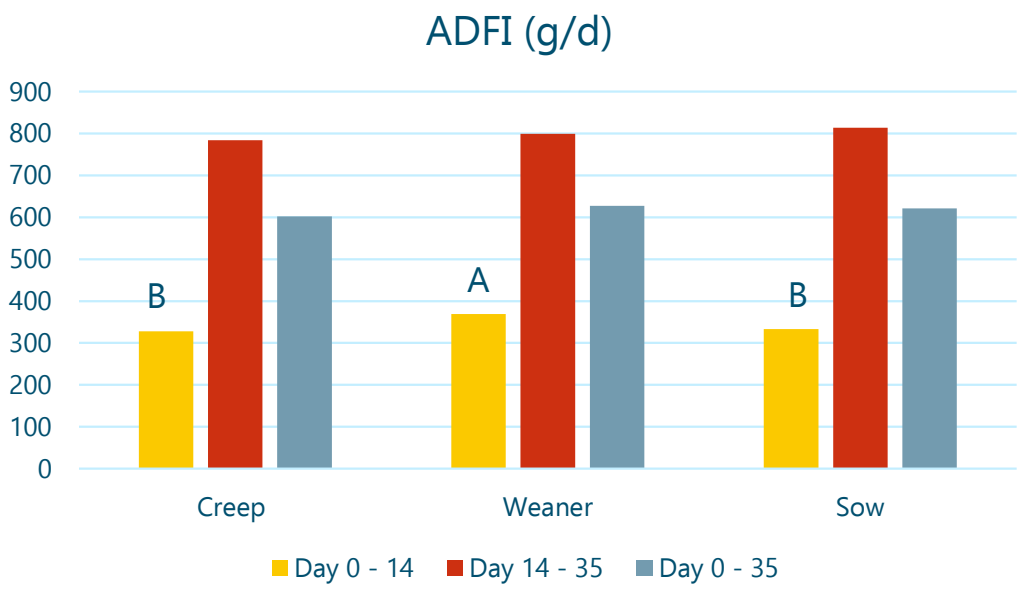


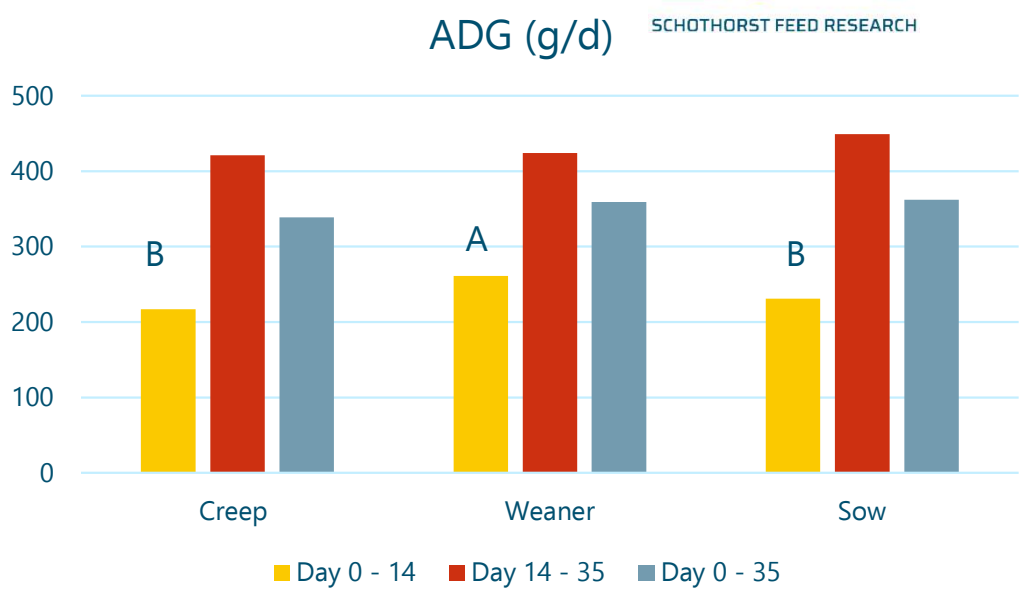


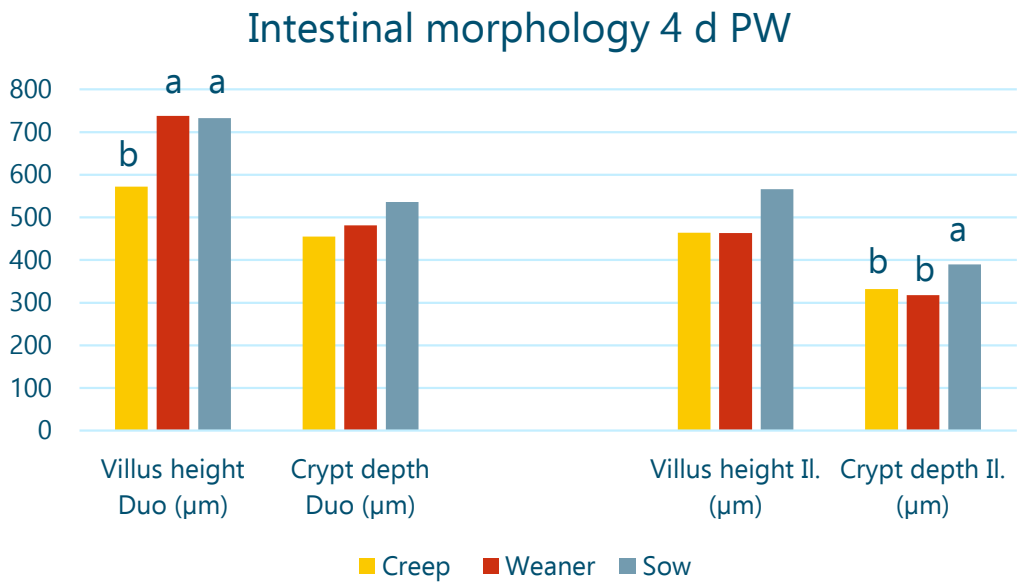
Heo et al., 2018

No differences in BW of the piglets.
A tendency for a higher ADFI of eaters piglets in the creep group.

Effects post-weaning







- Piglets receiving the weaner diet pre- and post-weaning tended to show the highest ADFI and ADG in the first 2 weeks PW.
- Piglets eating the sow and the weaner diet pre-weaning showed longer villus height in the duodenum. Piglets eating sow diet pre-weaning showed deeper crypts in the ileum.

Heo et al., 2018

Post-weaning

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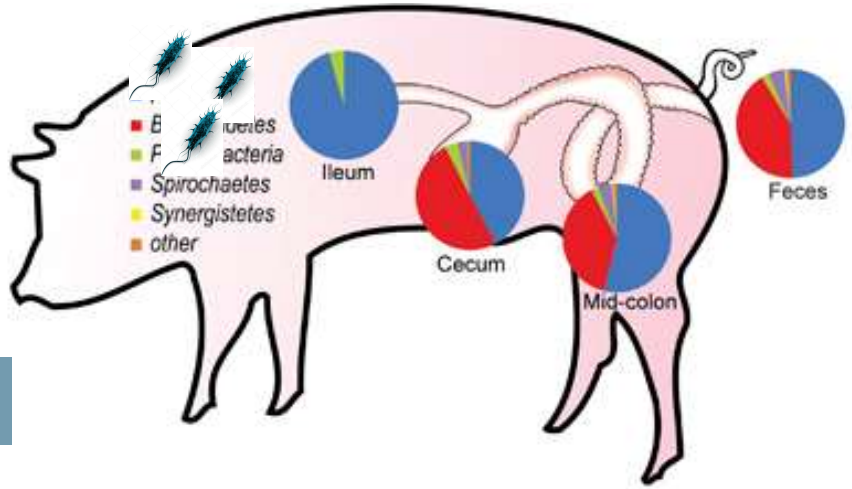
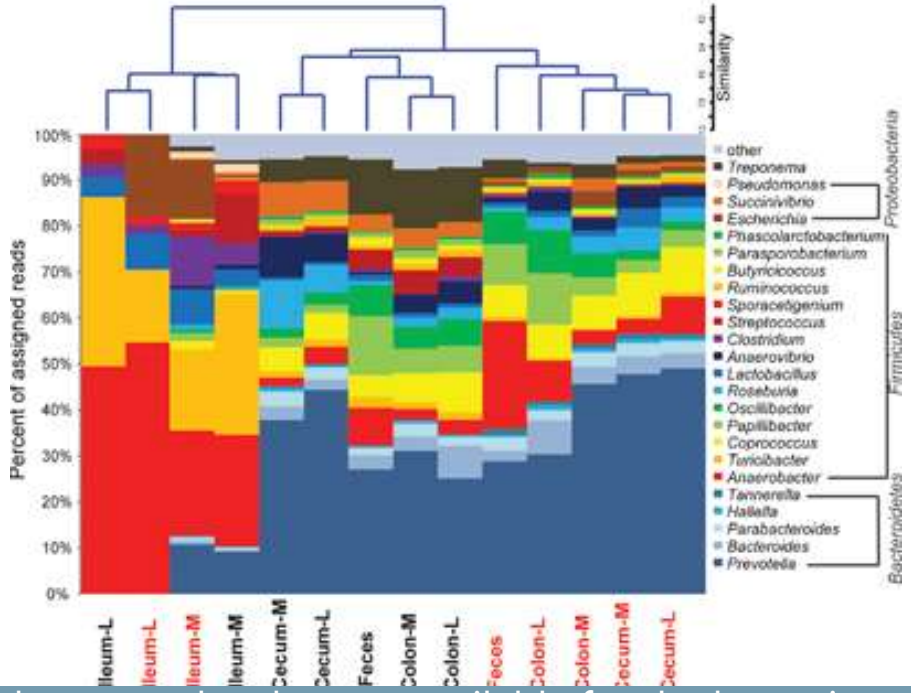
- Important feed intake with control of substrate.
- Phase feeding with nutrient adaptations can help to minimize the risk factors.
- Important management to reduce stress.
- Better knowledge nutrition and vaccination.
- Better understanding substrate – bacteria interactions.
- Animals should remain healthy and then they should grow

Excess non-digested nutrients in the GIT

No feed ab



Higher risk of diarrhea



- Without antibiotics in the feed: too much substrate available for the bacteria => overgrowth of pathogenic bacteria!
- AVOID BACTERIAL GROWTH BY LIMITING SUBSTRATE

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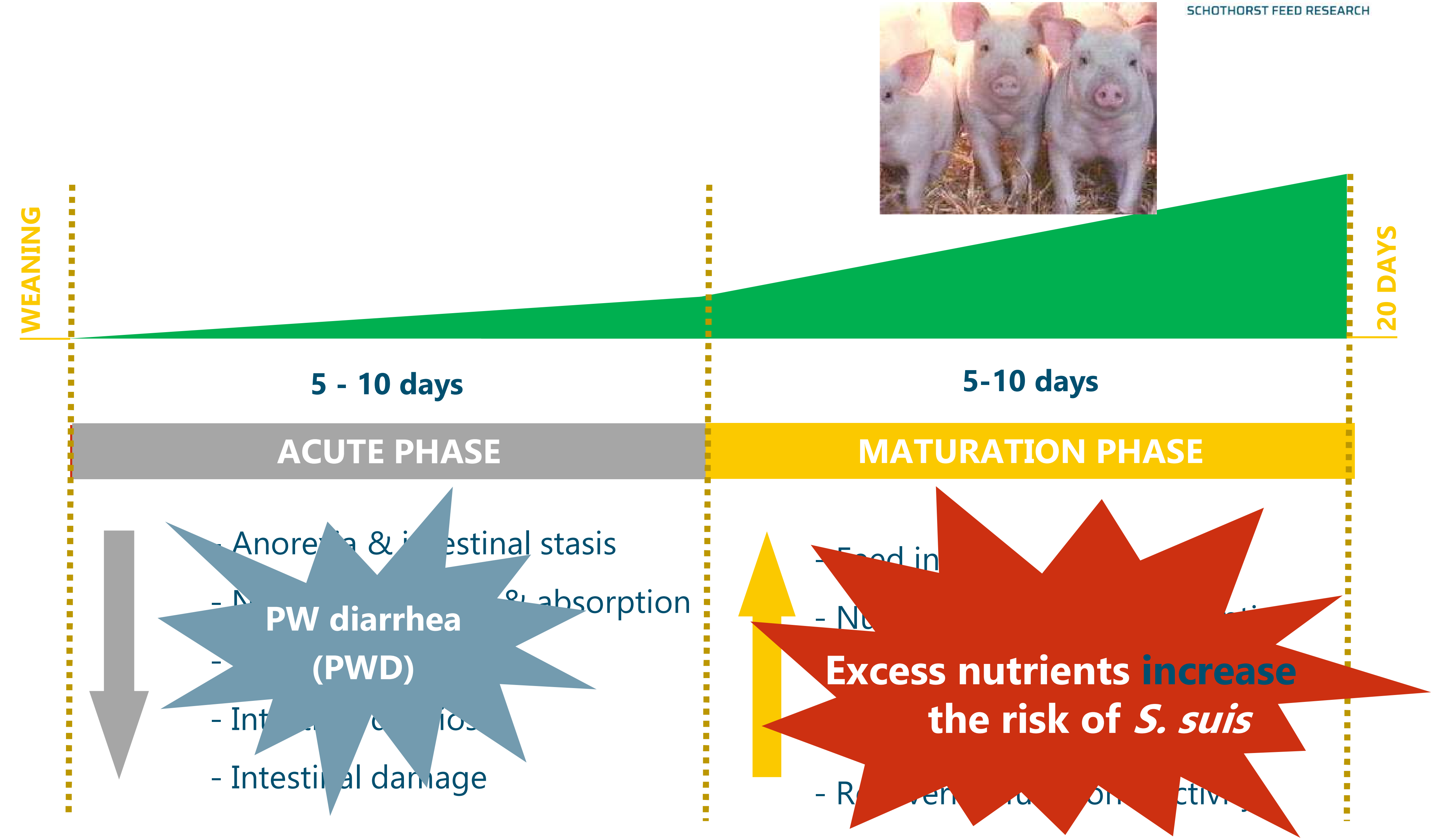

S. suis outbreak: a multifactorial problem!

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Stress + coinfections

Conditional pathogenic S. suis

Unmatured GIT + over eating

Leaky gut + sub-clinical

Pathogenic S. suis

Excess nutrients

Pathogenic S. suis's replication and invasion in the host, and the transmission to penmates

How we can help the piglets to have a good start?

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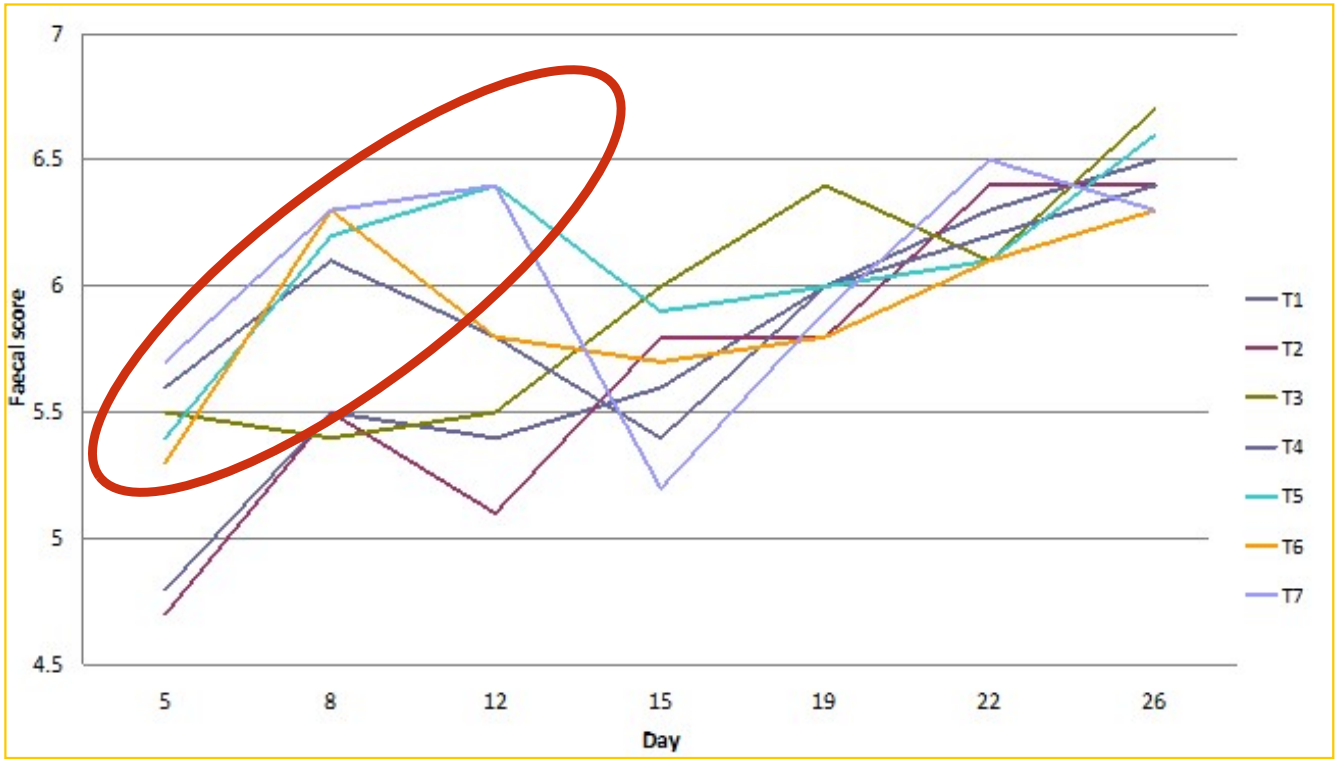
MODIFIERS OF THE MICROBIOTA OF THE GIT

- Acidifiers
- Prebiotics
- Probiotics
- Symbiotics
- Plant extracts
- Minerals: ZnO & Cu
- Dietary fibre
- Low CP diet
- Role of fat

PROMOTERS OF FOOD CONSUMPTION AND PRODUCTION ENHANCERS

- Palatable ingredients
- Digestible ingredients
- Flavours
- Synthetic amino acids

Feacal score results during the first 4 weeks PW



Diluting the diet with l-CHO sources improved the faecal score

Treatment	T1 Control	T2 6% Soya hulls	T3 12% Soya hulls	T4 6% Sunflower hulls	T5 12% Sunflower hulls	T6 6% Wheat straw	T7 12% Wheat straw

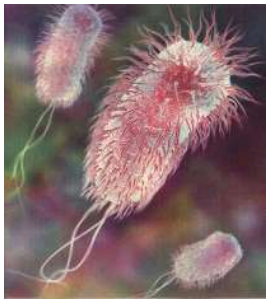
Fiber & CP fermentation

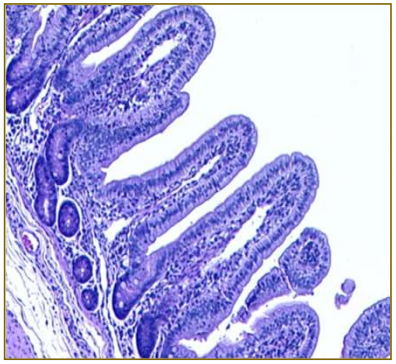
Level of protein

(15 %) → Performance → ¡ Importance! Essentials Aa (Iso, Val)

(19 %) + Fermentable Carbohydrates in pigs of 35 d old

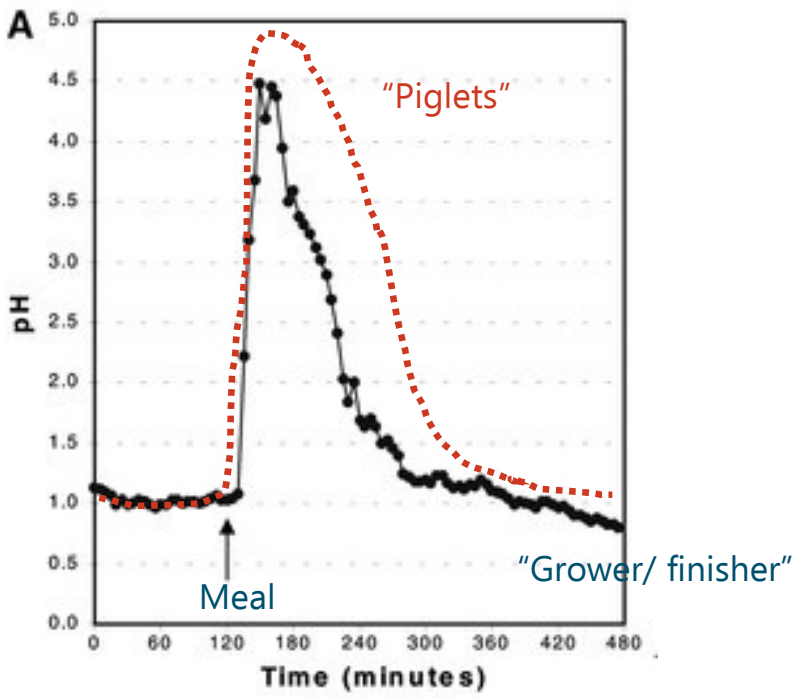
(23 %) → Protein Fermentation → N-ammonia → - gut integrity



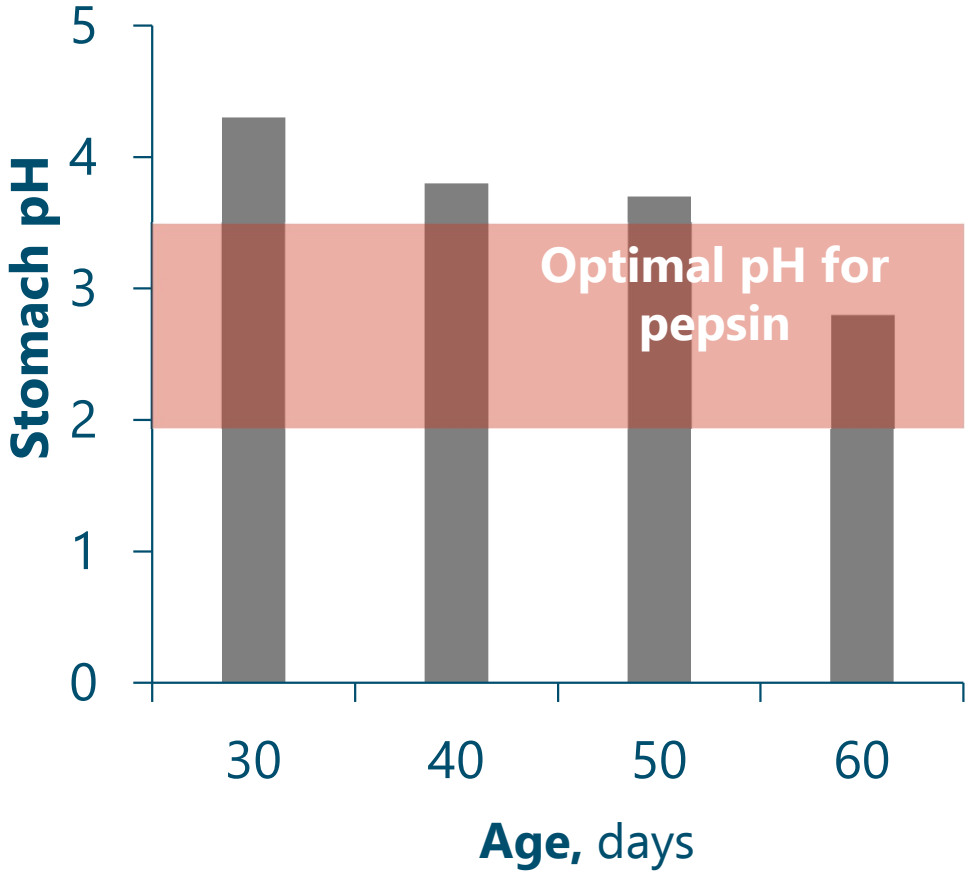


Protein digestion - stomach

Hypothetical difference between piglets and G/F: Piglets have a higher stomach pH/ need longer to acidify their stomach content after a meal than grower/ finishers



adapted from Gardner et al., 2002



Piglets <60 days of age are not able to acidify the stomach sufficiently

Acid binding capacity (mEq/kg)

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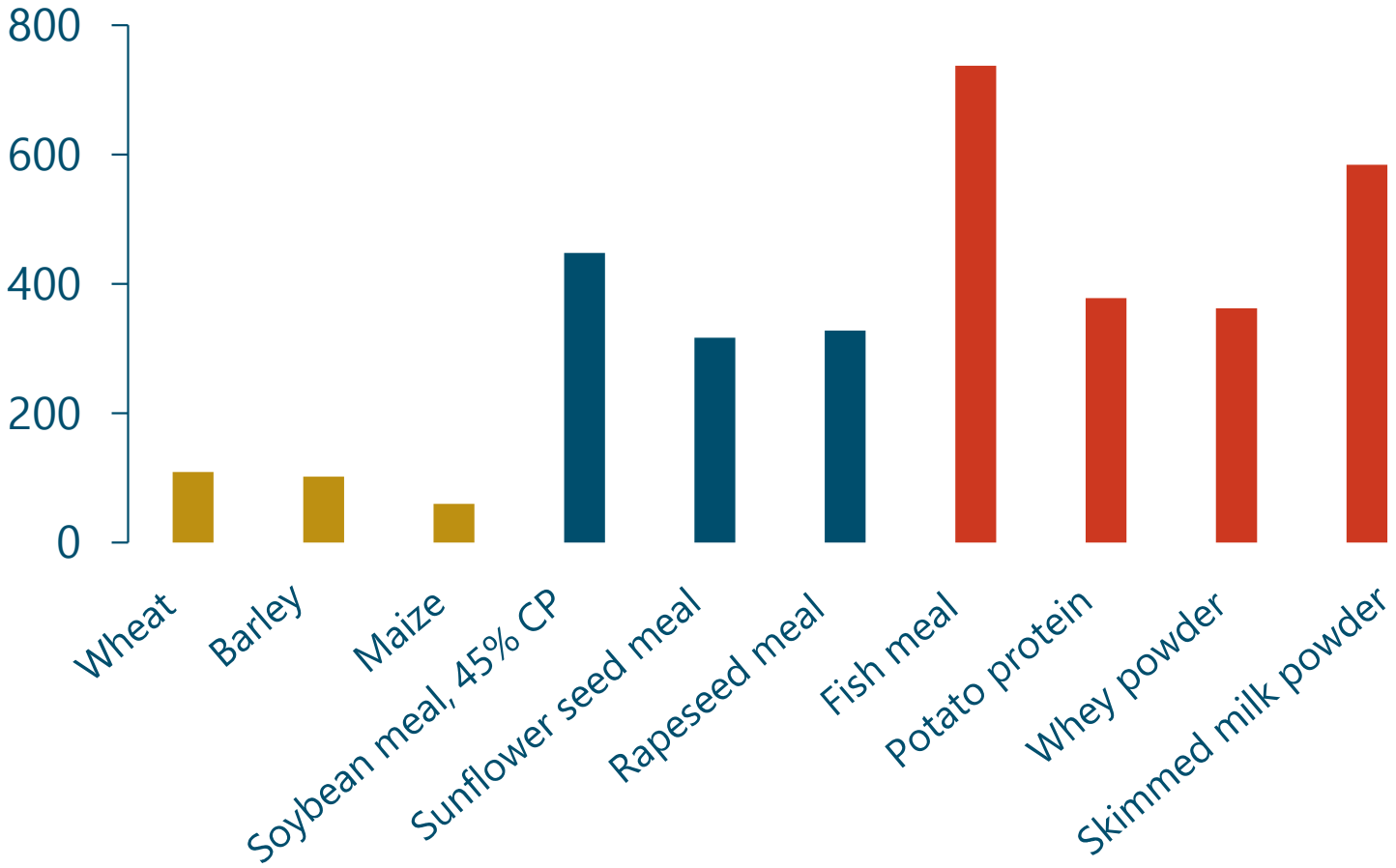
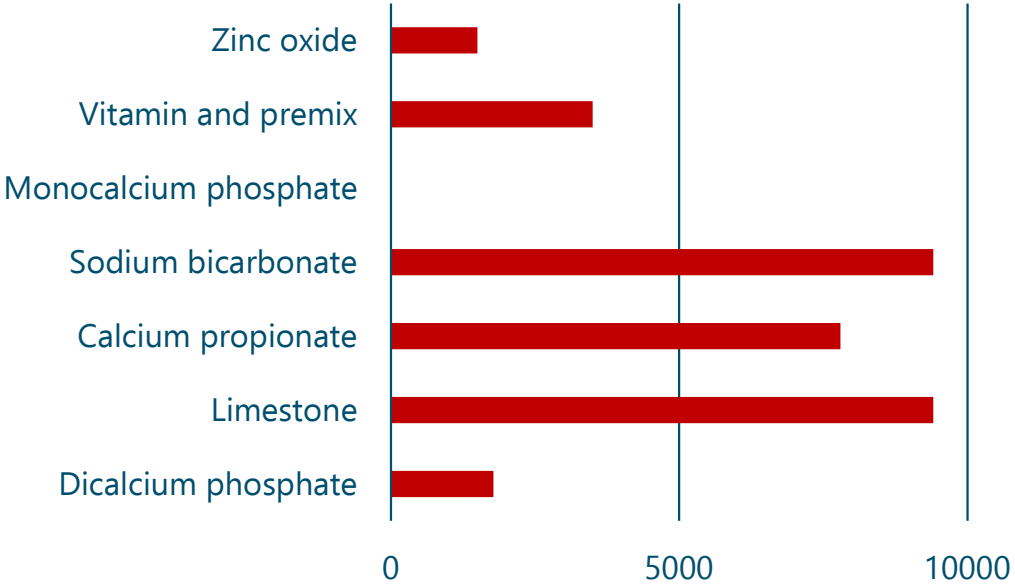
- Feedstuff



Protein sources have a greater impact on acid binding capacity than cereals

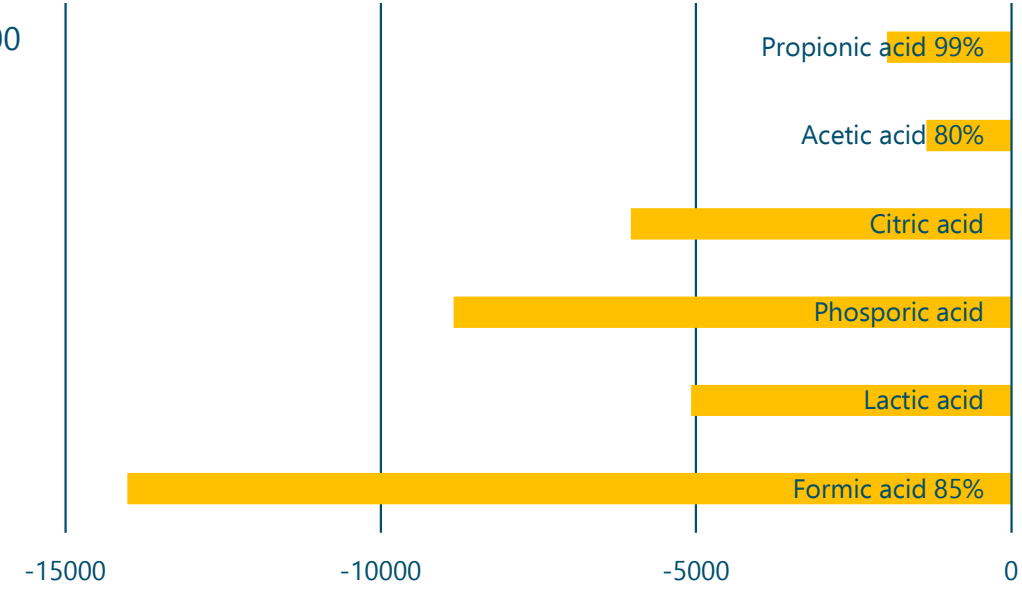
Knowhow to feed

Acid binding capacity (mEq/kg)



Minerals have a large impact on the ABC. Therefore, reduce minerals that will have a negative impact on the pH in the stomach (high ABC-4 value)

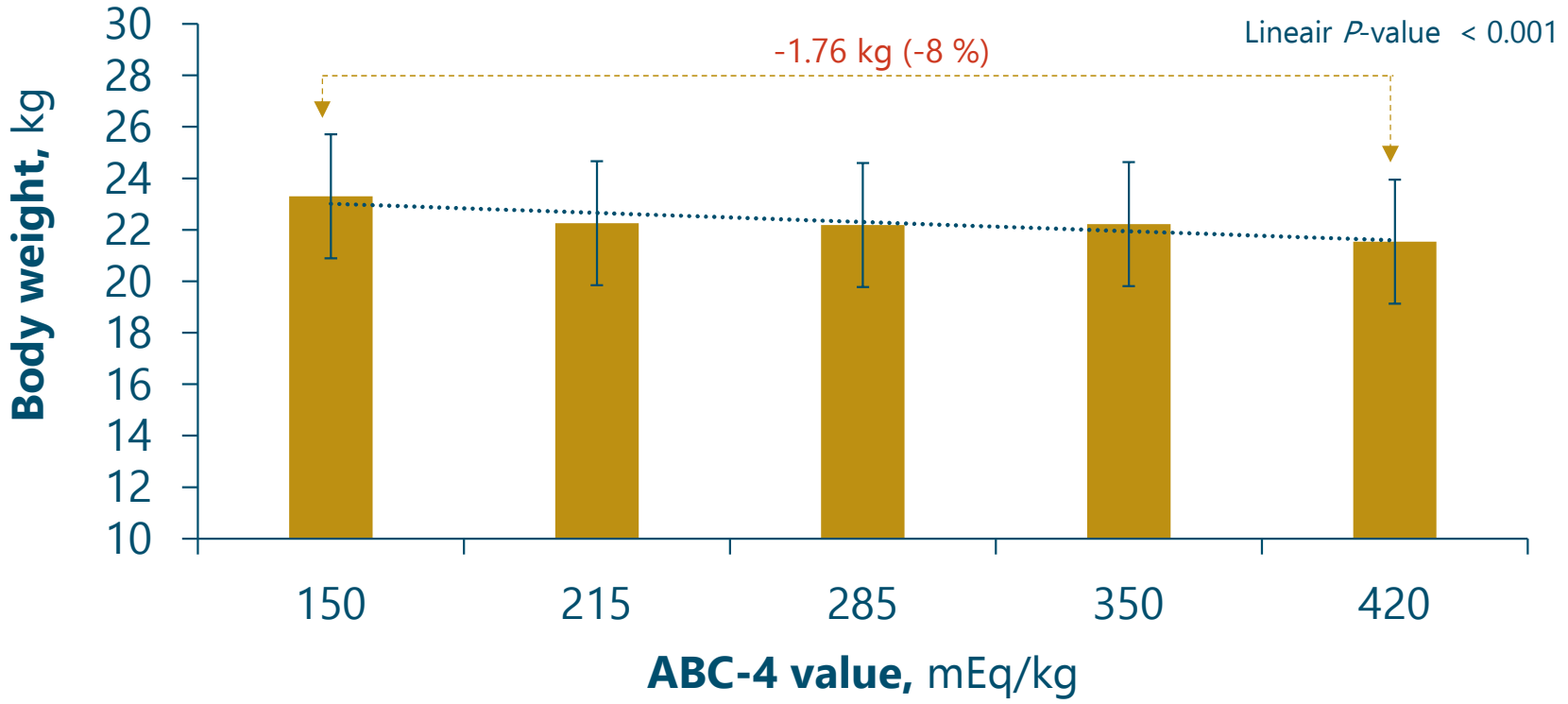
Organic acids will help to reduce the pH in the stomach (acidifying effect)



Knowhow to feed

Optimal ABC-4 value

- Body weight day 35



* Achieved by adding limestone, Ca-formate and fumaric acid

Take home message post-weaning

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Focus on GIT health

- Lower CP & ABC-4.
- Functional AA.
- Lower FCHO.
- Higher ICHO.
- 20 % particles > 1.4 mm?

Keep health and improve ADG

- Higher Lys/NE ratio.
- Higher CP & low ABC-4.
- Medium FCHO.
- Medium ICHO.
- 20 % particles > 1.4 mm.?

Prepare for G/F period

- Important Lys/NE ratio.
- U/S ratio.
- Higher FCHO.
- Lower ICHO

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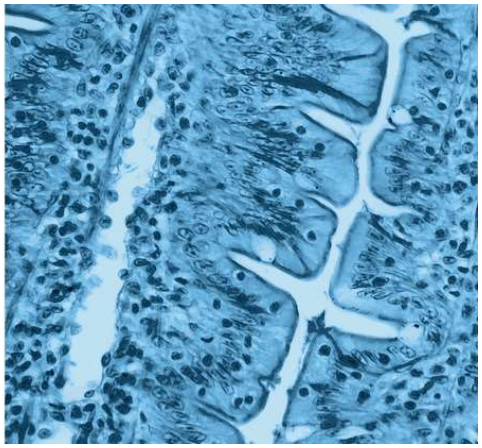

Thank you for your attention

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Knowhow to feed