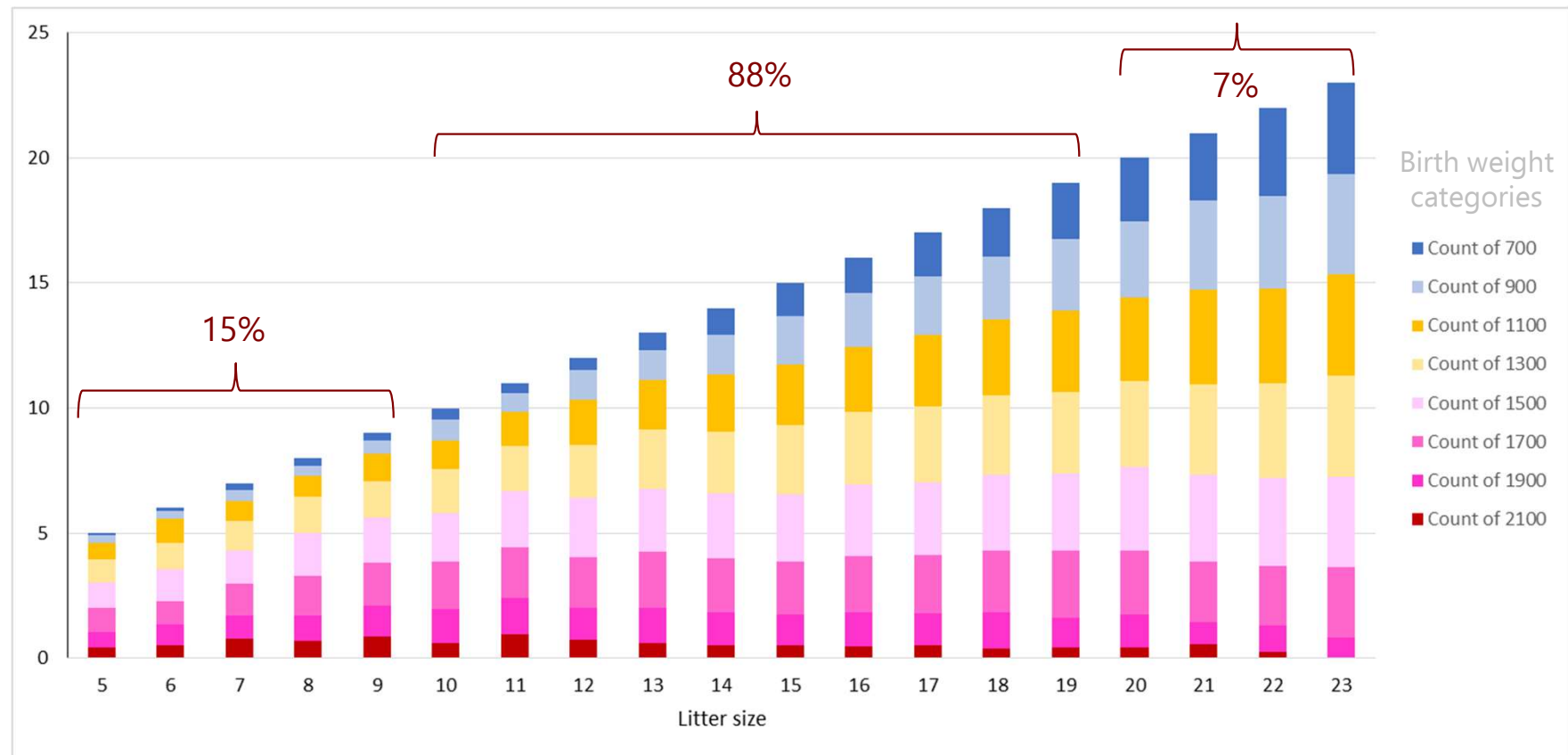


How to remove Zn oxide in post-weaning piglet diets

Francesc Molist, PhD, DVM

Smaller piglets and higher variation...

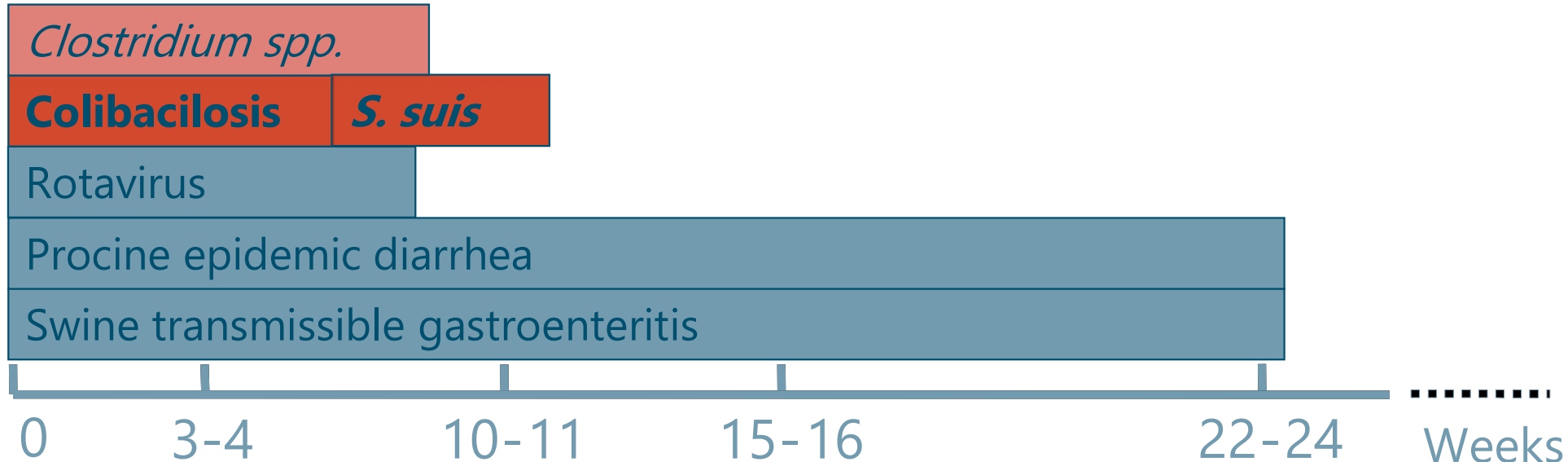
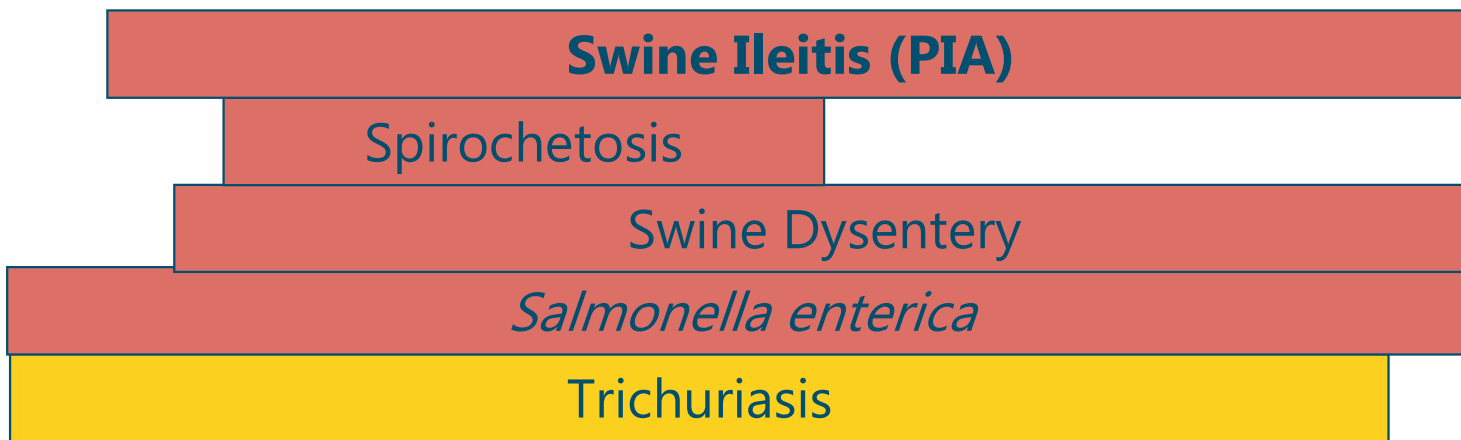
Heterogeneity of litter size between individual sows



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

unpublished

Current gut health challenges in the pig industry



Lactation Weaning Growing

Types of feed piglets encounter in their life



Colostrum
The first 24 hours



Milk replacer



Weaning



Pre-weaning

- 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)

	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 1 st contact udder (min)	13.7 ^a	36.1 ^b
Time to 1 st 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

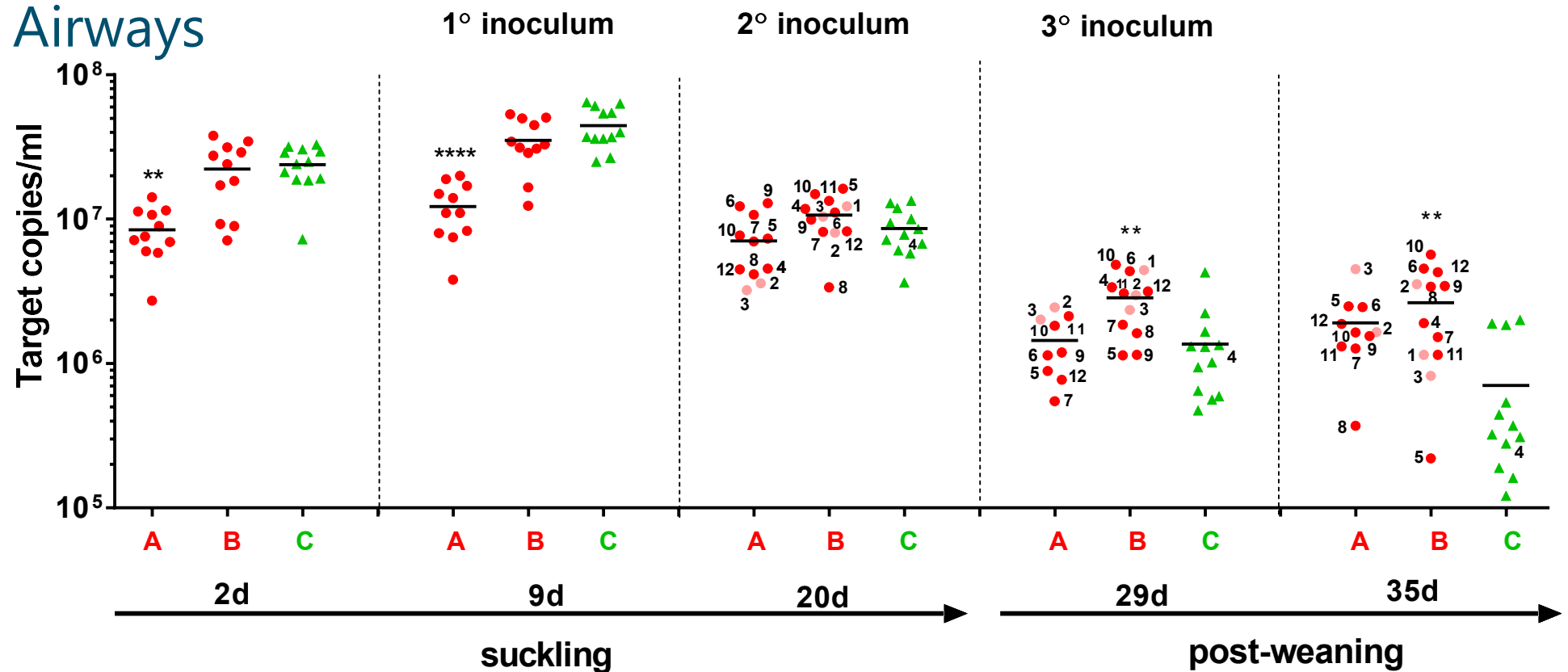
All piglets 2 days of life are positive for *S. suis*

➤ Tonsils (a reservoir)

➤ Intestine

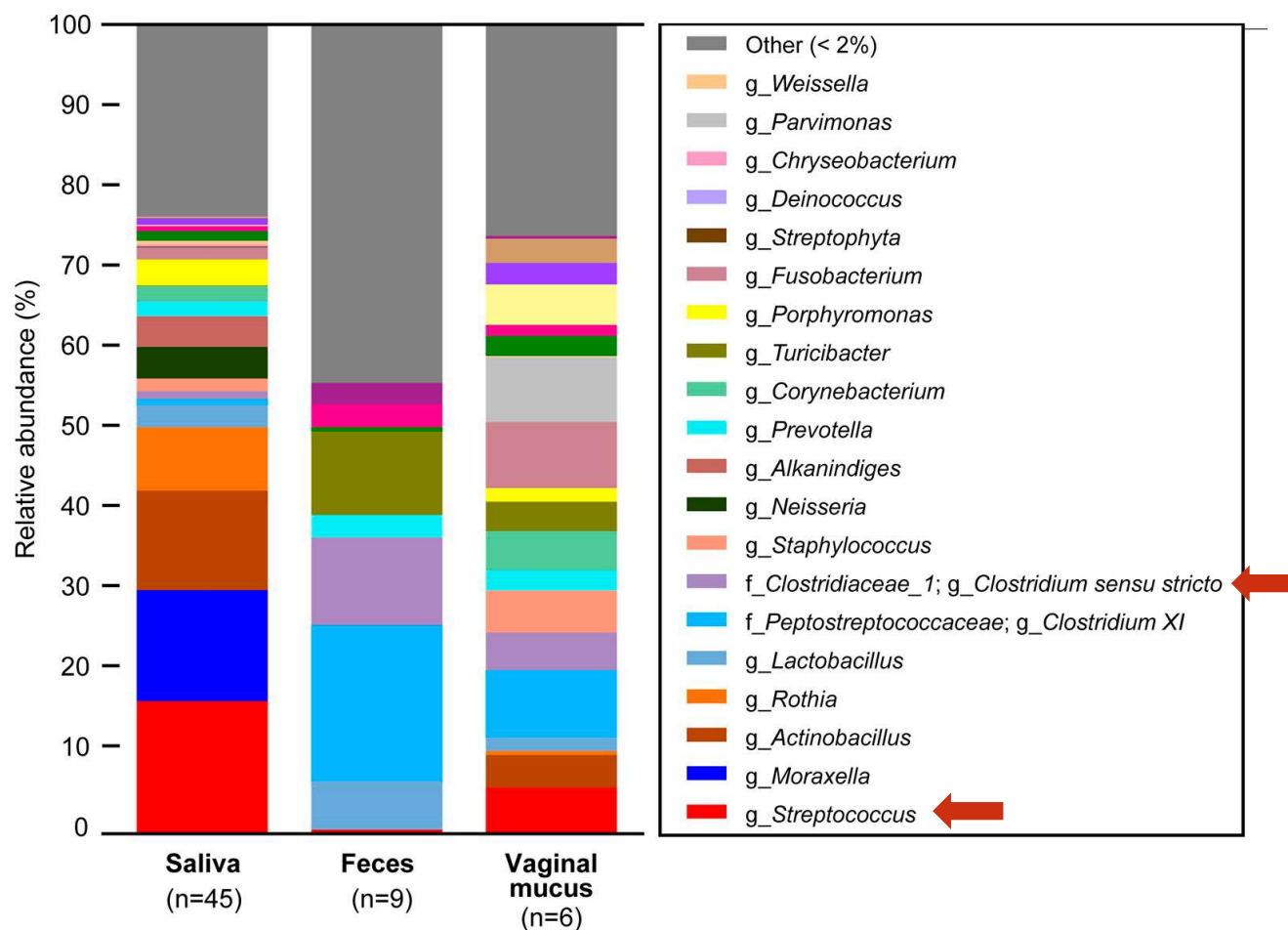
➤ Airways

qPCR of *S. suis* in tonsil swab DNA (healthy piglets)



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

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



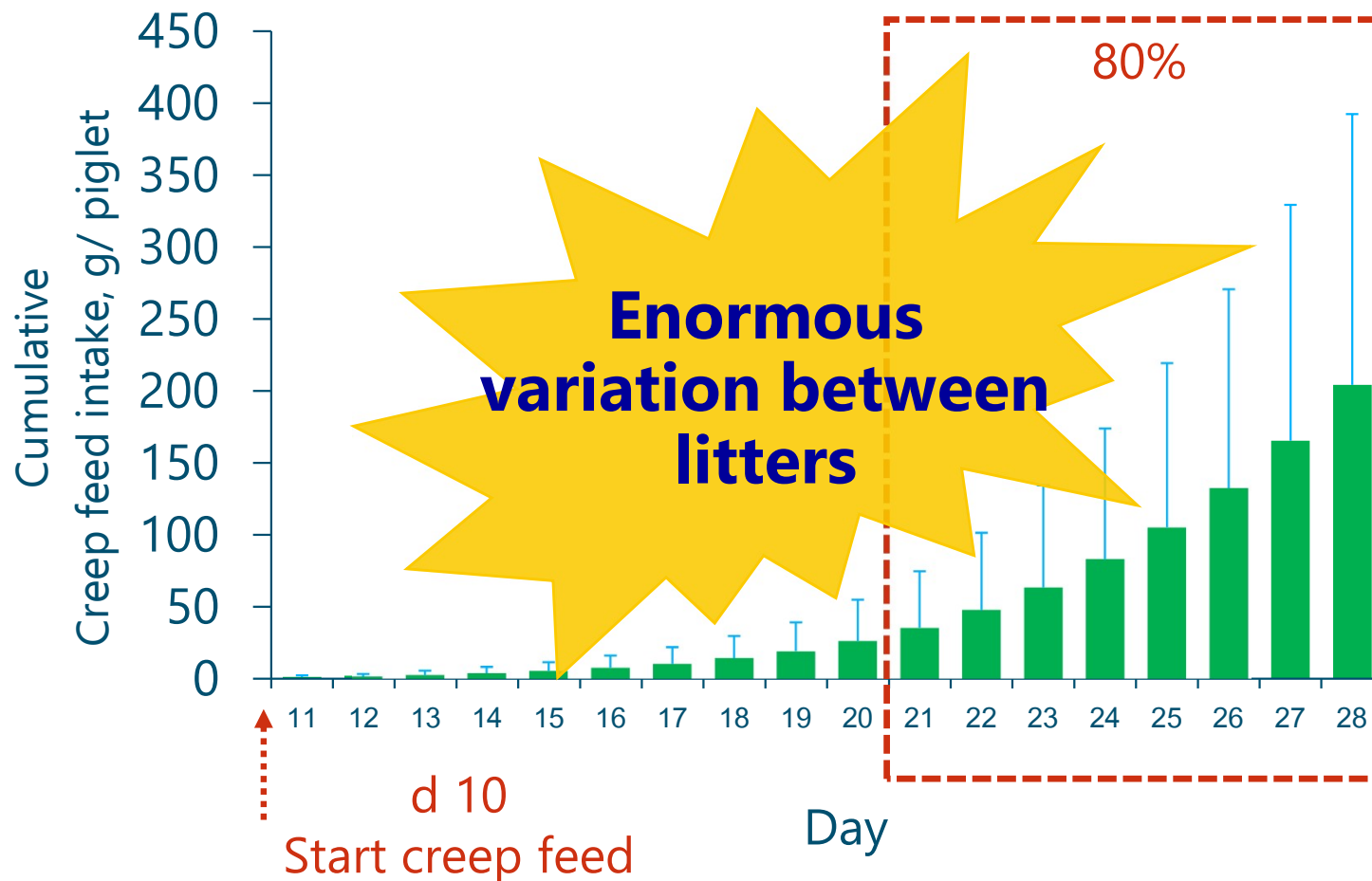
Milk replacer

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



Pre-weaning management strategies

➤ Pre-weaning creep feed intake



Huting et al., 2017

Role of complex vs. Simple diets pre-weaning

Hypothesis:

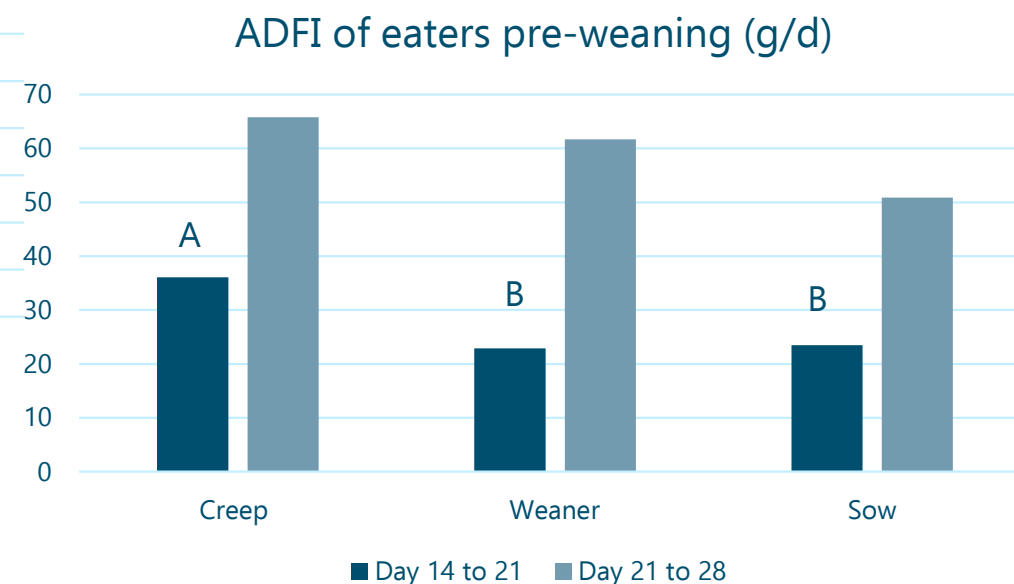
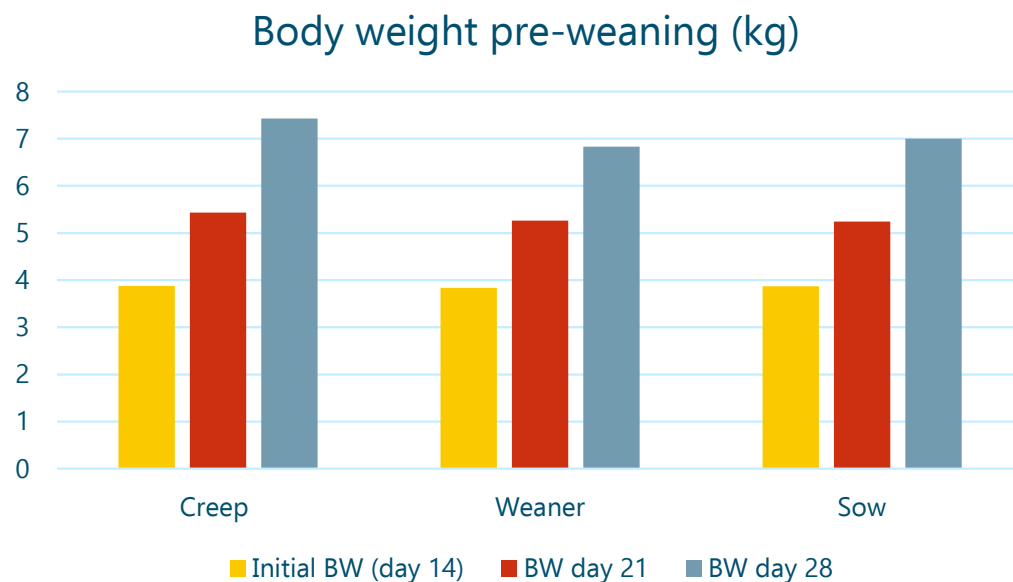
- In the absence of in-feed antibiotics and weaning piglets close to 24 days of age, having a simple low nutrient diet around weaning (+/- 10 days after weaning) could help to reduce post-weaning problems?
- Can we increase the % of eaters in the litters (from 60 > 100%)?
- What are the long term effects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

Complex vs. Simple diet pre-weaning

- 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.

Results Pre-weaning

➤ No differences in sows performance

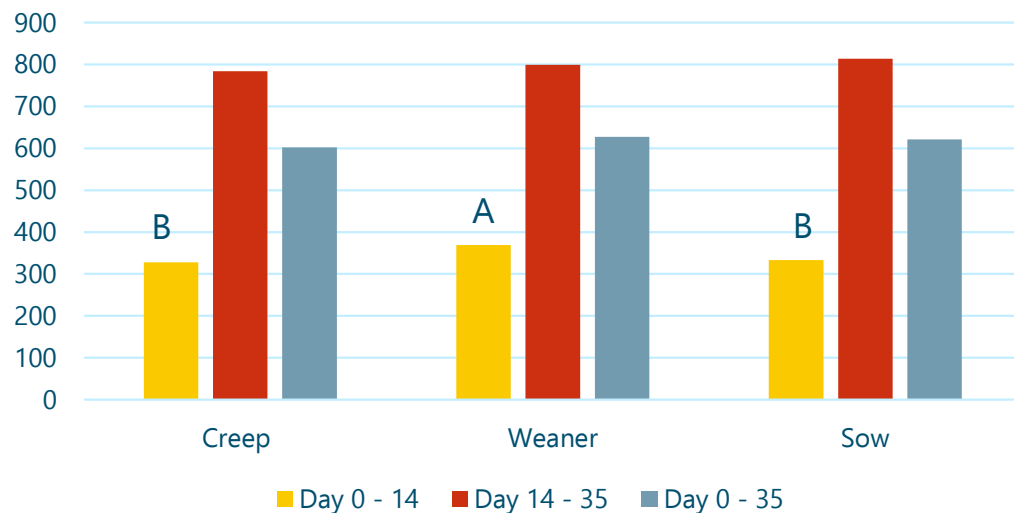


Heo et al., 2018

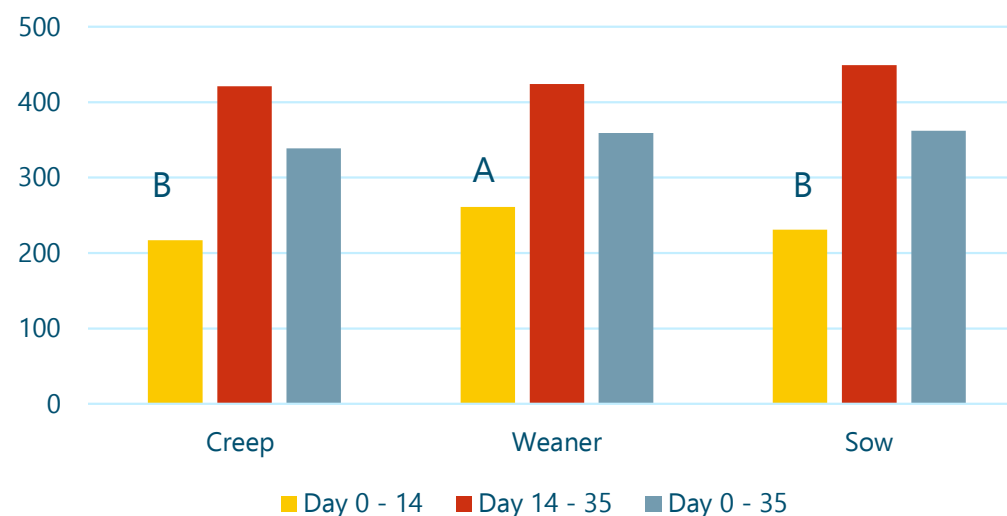
No differences in BW of the piglets.
A tendency for a higher ADFI of eaters piglets in the creep group.

Effects post-weaning

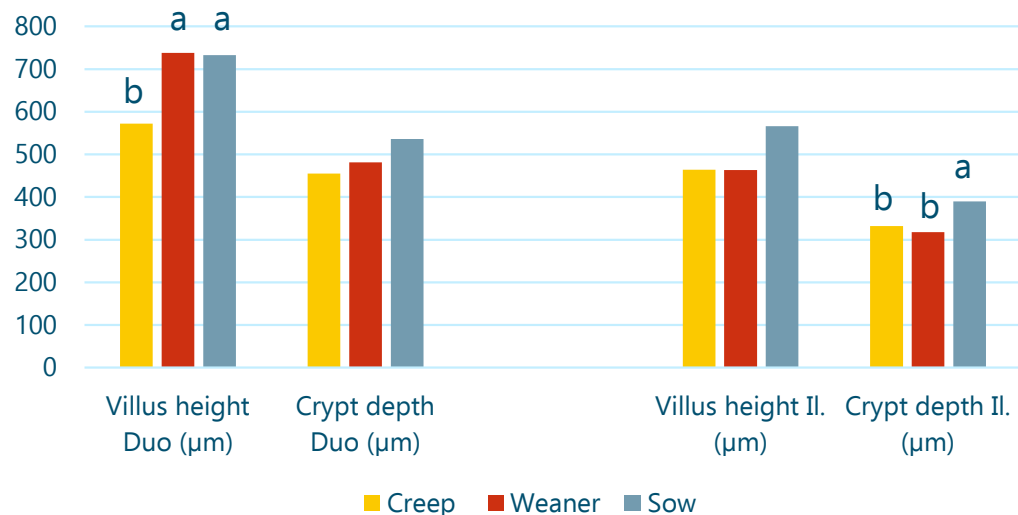
ADFI (g/d)



ADG (g/d)



Intestinal morphology 4 d PW



- 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.

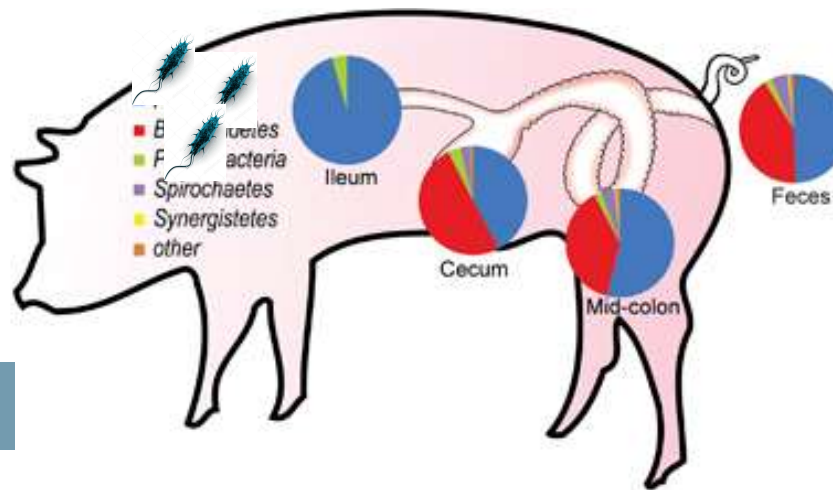
Post-weaning

- 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

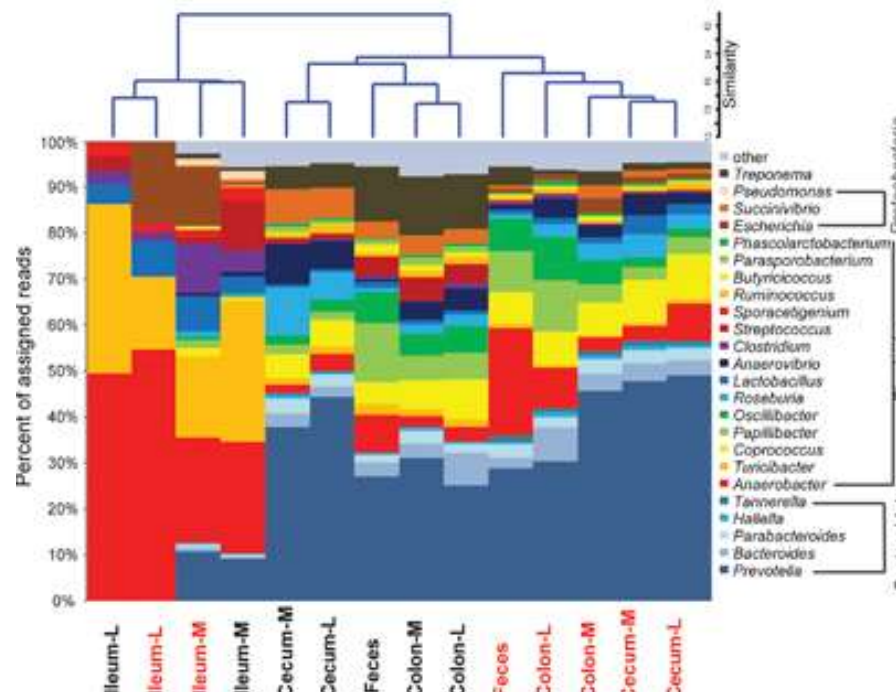
Excess non-digested nutrients in the GIT



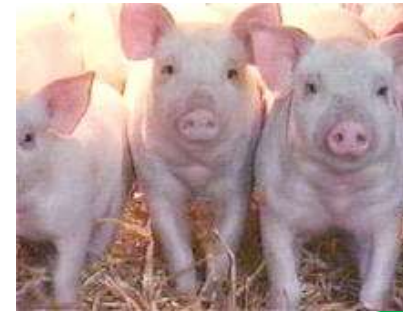
No feed ab



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



WEANING

20 DAYS

5 - 10 days

5-10 days

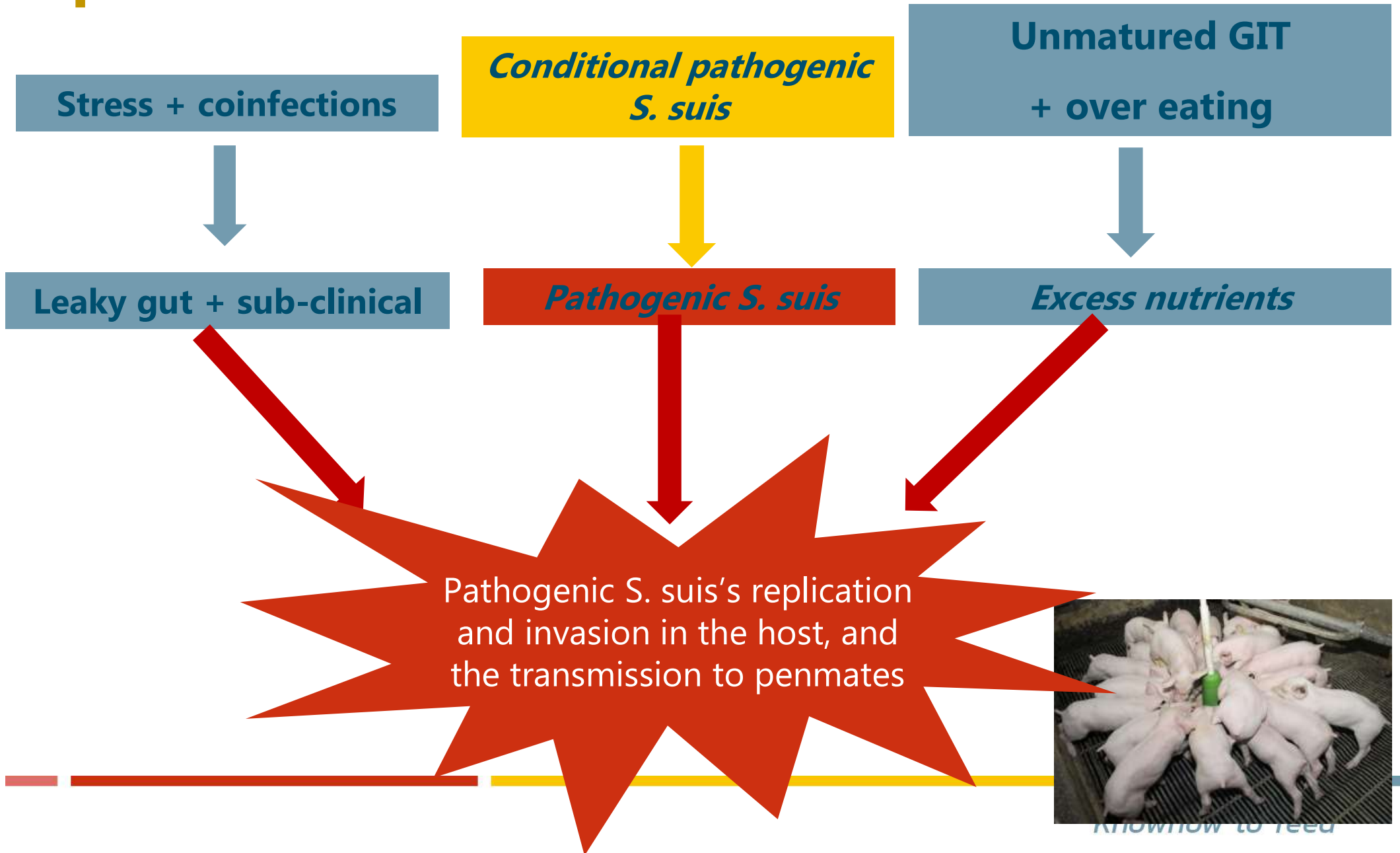
ACUTE PHASE

MATURATION PHASE

- Anorexia & intestinal stasis
- Malabsorption & absorption
- **PW diarrhea (PWD)**
- Intestinal inflammation
- Intestinal damage

- Feed intake
- Nutrient absorption
- **Excess nutrients increase the risk of *S. suis***
- Reduced immune system activity

S. suis outbreak: a multifactorial problem!



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

MODIFIERS OF THE MICROBIOTA OF THE GIT



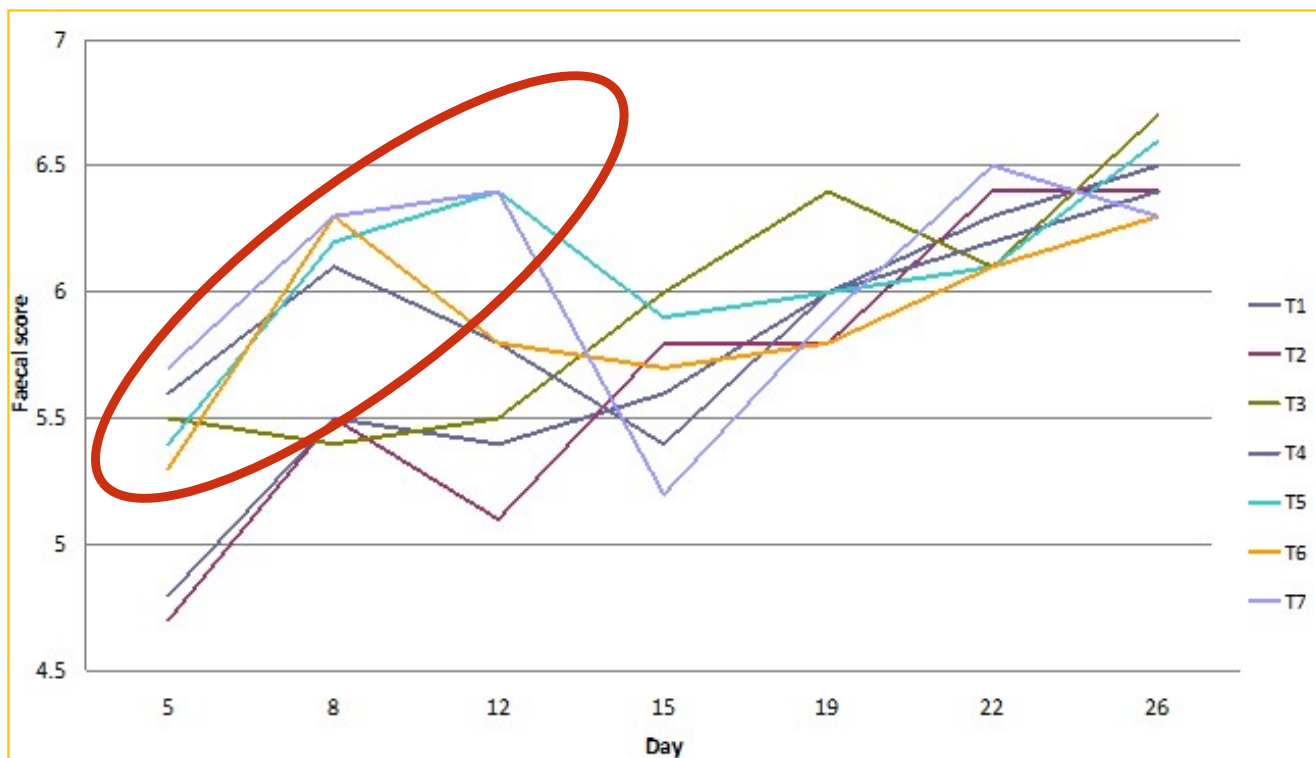
- Acidifiers
- Prebiotics
- Probiotics
- Symbiotics
- Plant extracts
- Minerals: ZnO & Cu
- Dietary fibre
- Low CP diet
- Role of fat

PROMOTERS OF FOOD CONSUMPTION AND PRODUCTION ENHANCERS



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

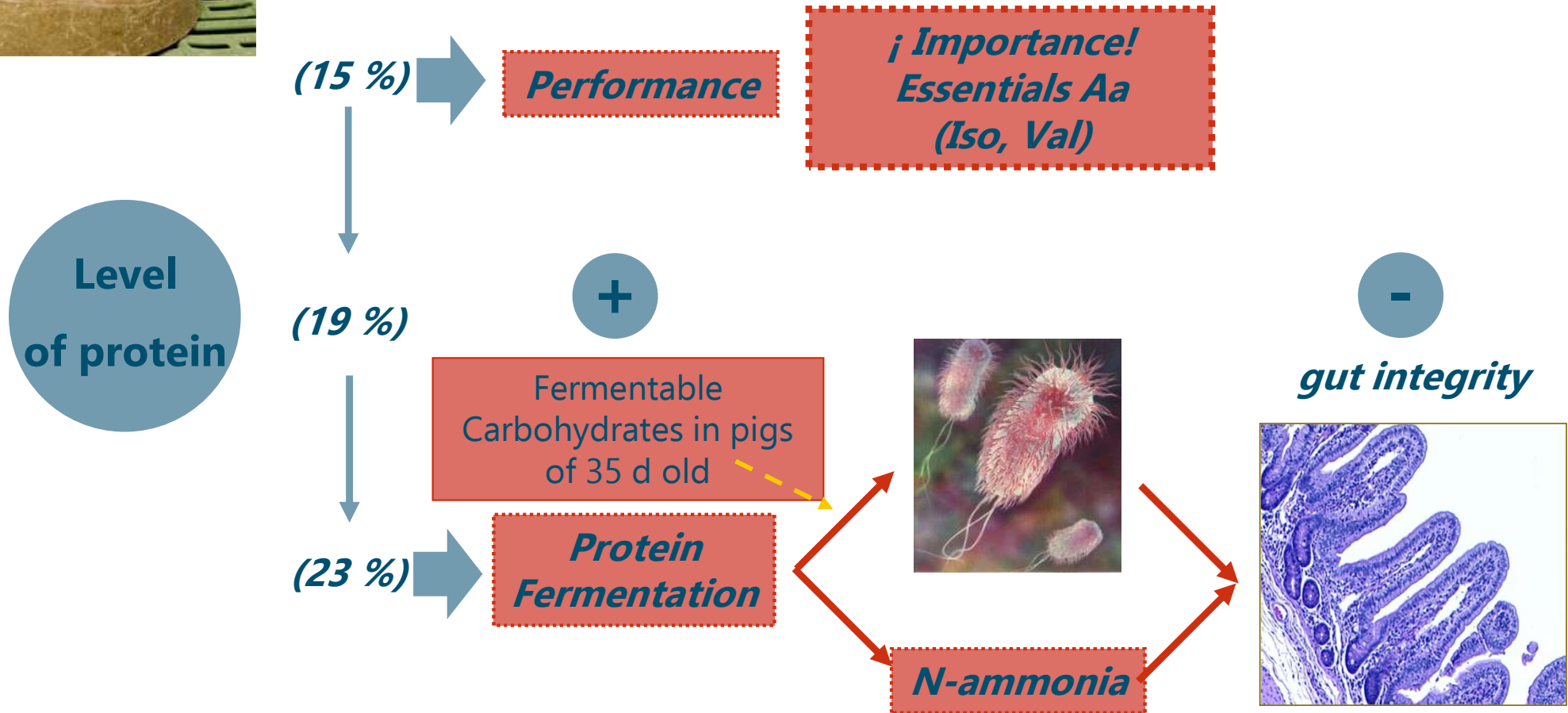
Feecal score results during the first 4 weeks PW



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

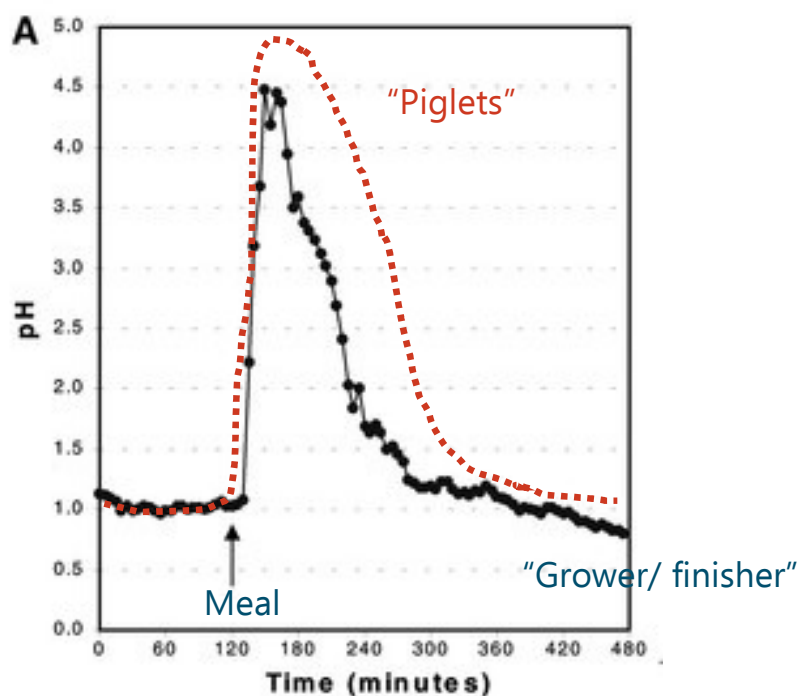
Treatment	T1 Control	T2 6% Soya hulls	T3 12% Soya hulls	T4 6% Sunflower hulls	T5 12% Sunflower hulls	T6 6% Wheat straw	T7 12% Wheat straw

Fiber & CP fermentation

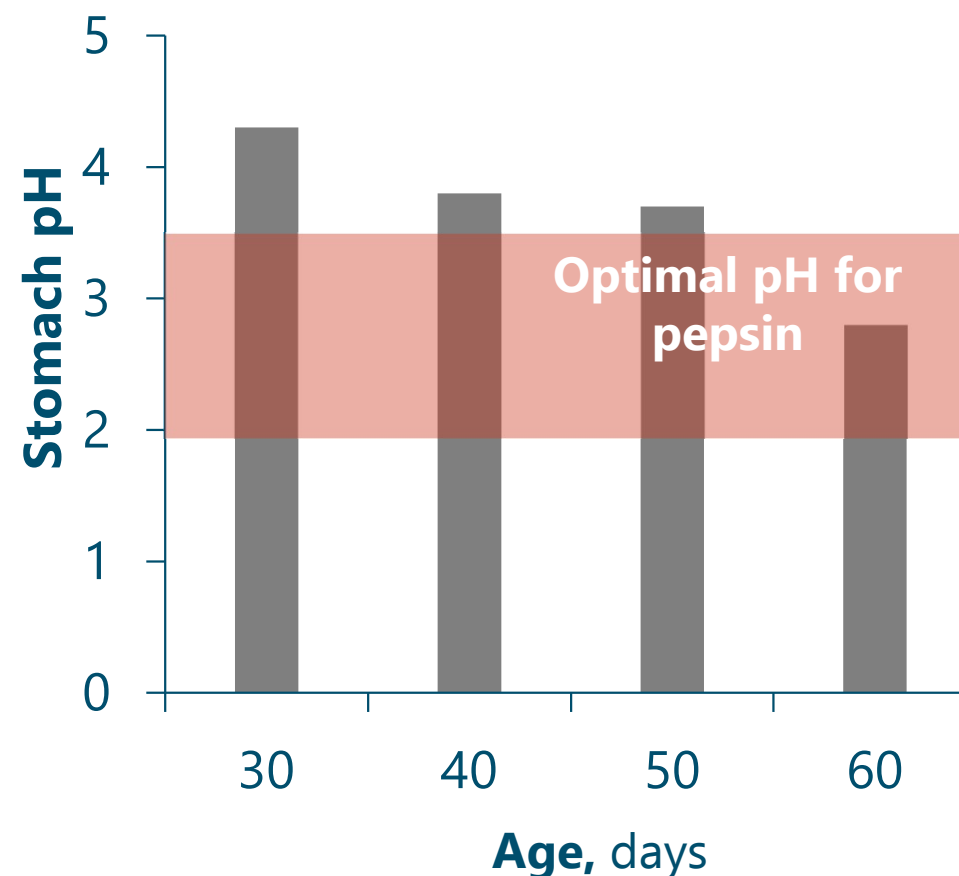


Protein digestion - stomach

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



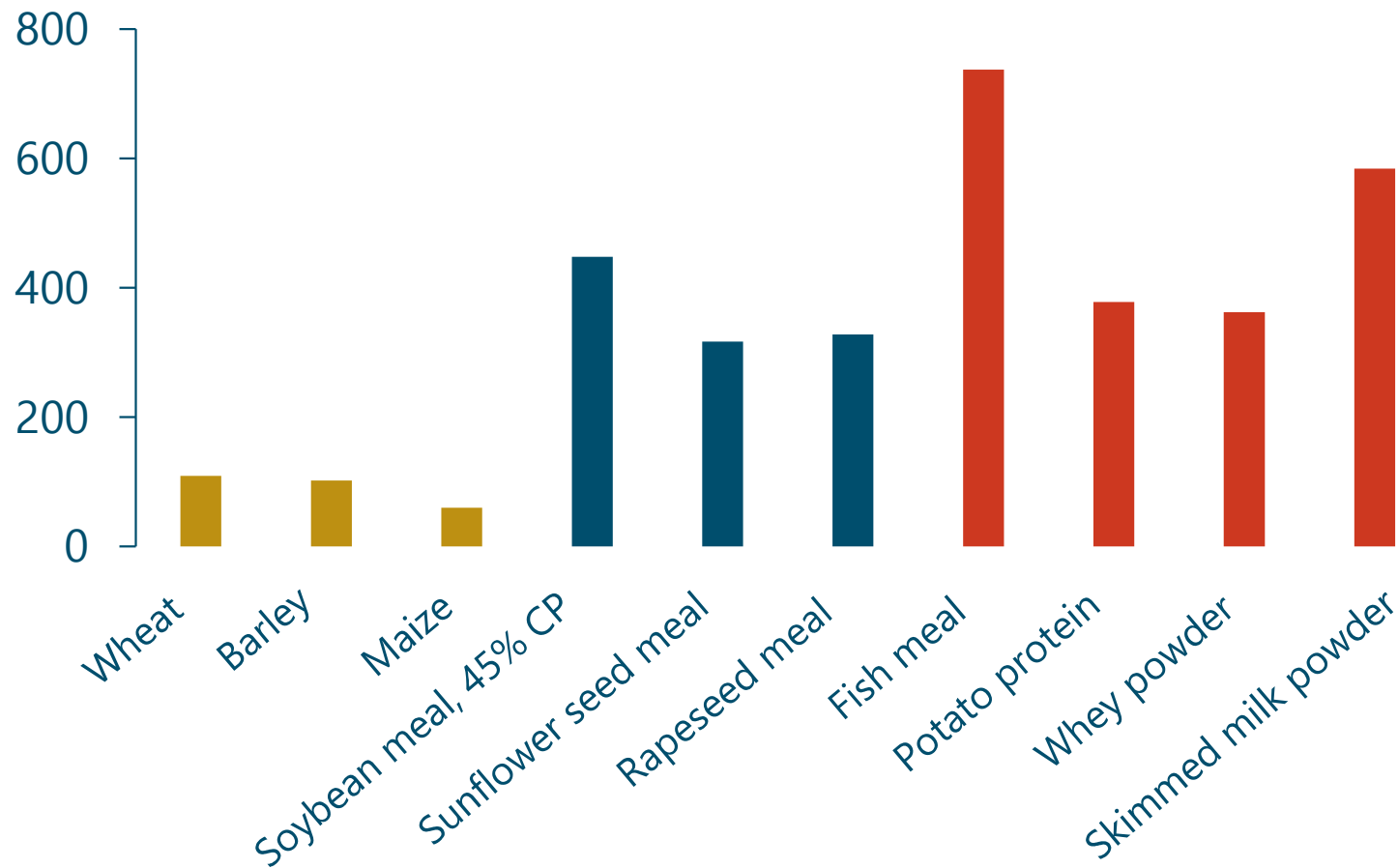
adapted from Gardner et al., 2002



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

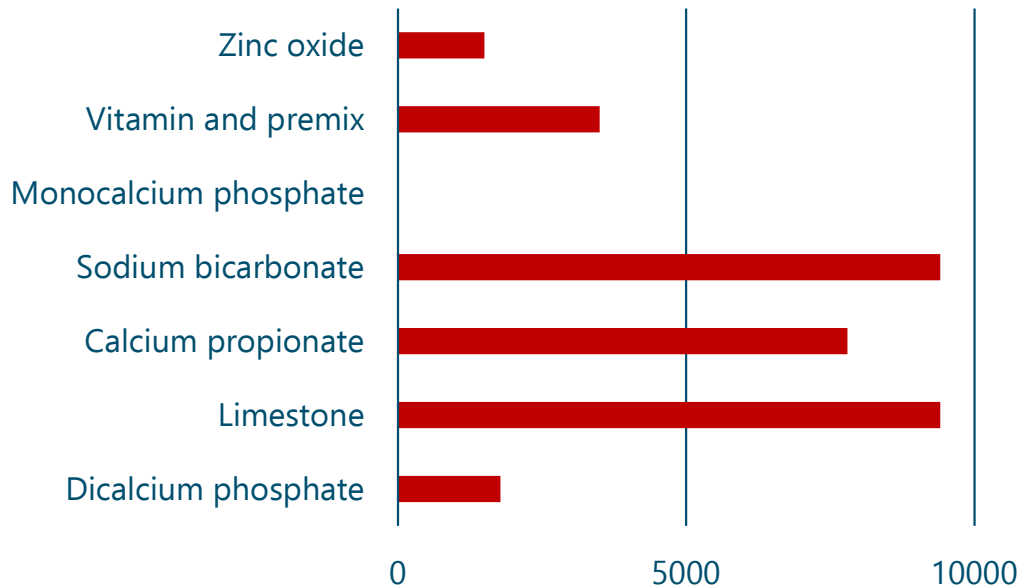
Acid binding capacity (mEq/kg)

➤ Feedstuff



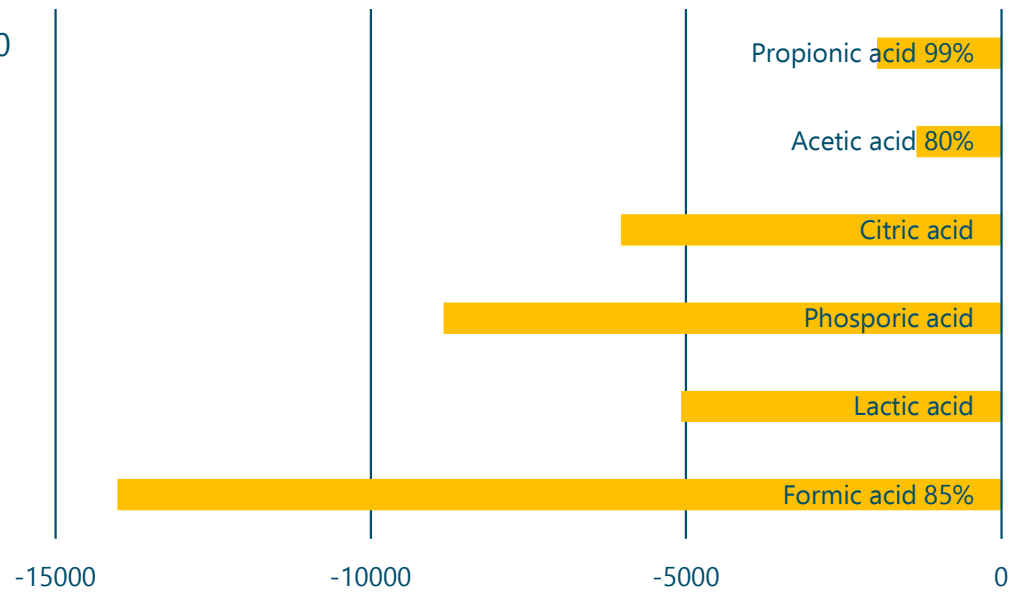
Protein sources have a greater impact on acid binding capacity than cereals

Acid binding capacity (mEq/kg)



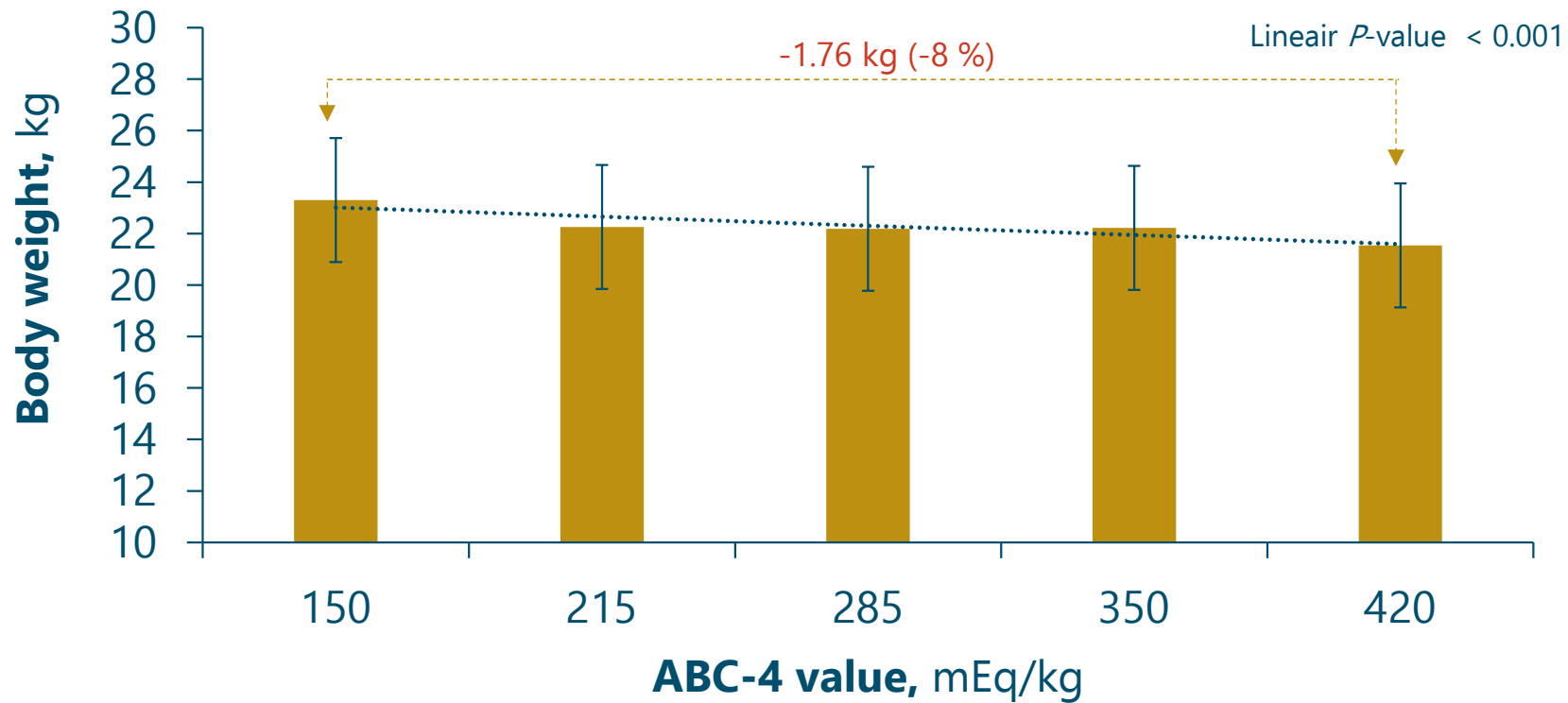
Minerals have a large impact on the ABC. Therefore, reduce minerals that will have a negative impact on the pH in the stomach (high ABC-4 value)

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



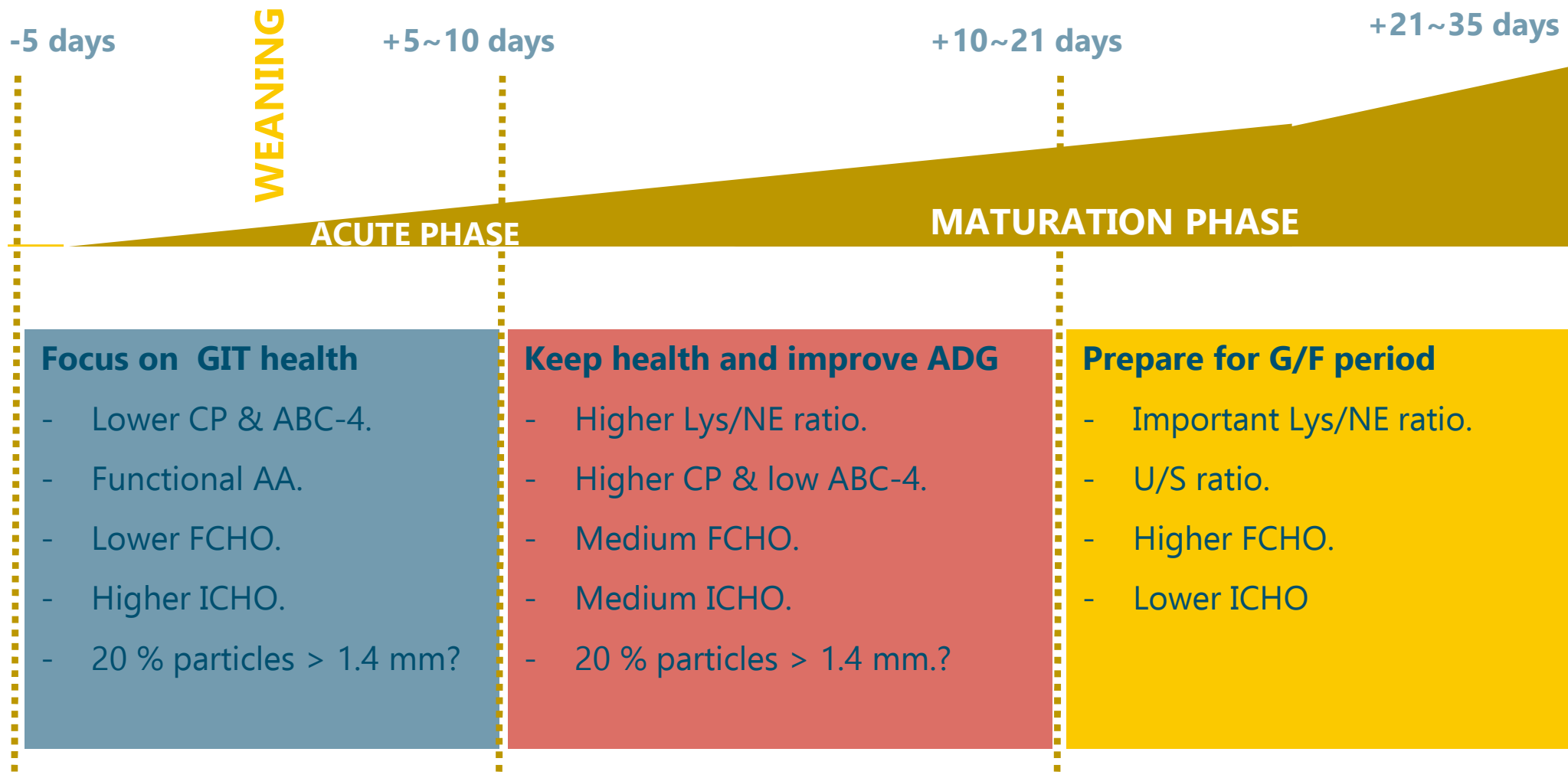
Optimal ABC-4 value

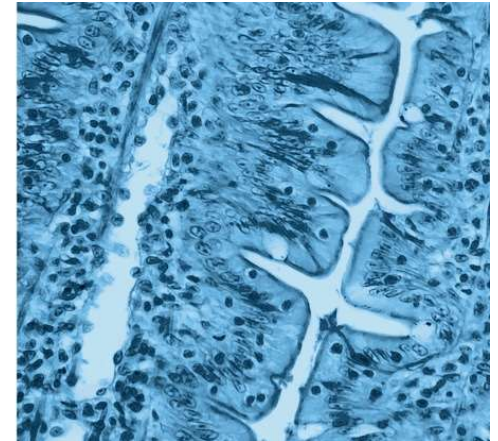
➤ Body weight day 35



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

Take home message post-weaning





Thank you for your attention

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