

STRATEGIES FOR PREVENTION OF POST WEANING DIARRHEA

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Pig health and welfare in eco-efficient organic systems
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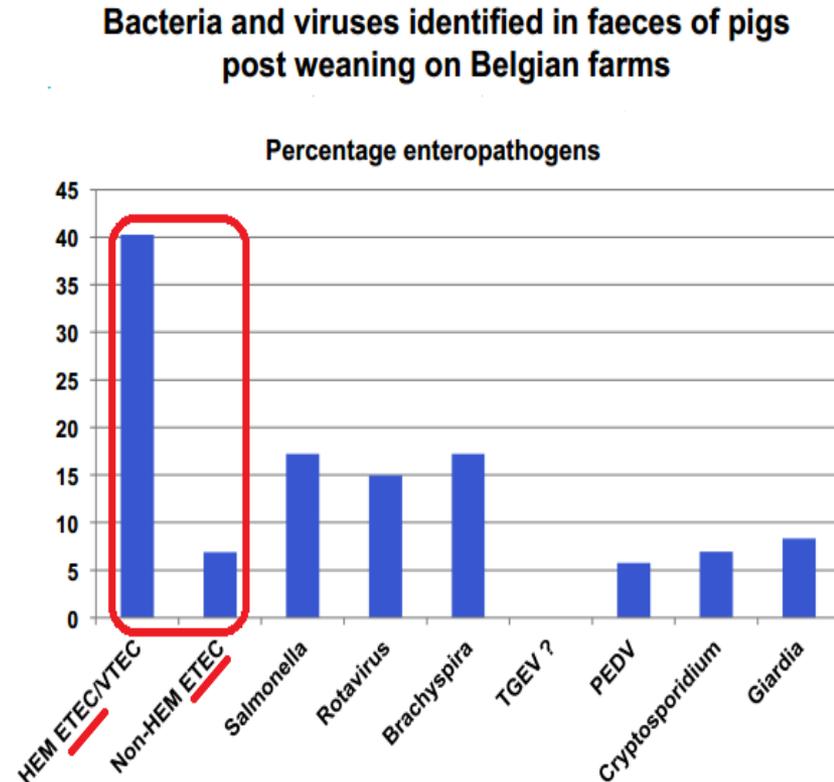


KNOWLEDGE SYNTHESSES

- › **‘A critical review on alternatives to antibiotics and pharmacological zinc for prevention of diarrhoea in pigs post-weaning’ (Lauridsen, C., Højberg, O., Kongsted, H., and Canibe, N, 2017) .**
- › Aim: to investigate the possibilities for prevention of weaning diarrhea in pigs in organic and conventional production based on national and international literature
- › PWD as response parameter – not proxy parameters

DIARRRHEA IN PIGS

- › Most outbreaks occur during the first 2 wk postweaning \approx PWD
 - Morbidity may be over 50%
 - Losses of piglets can be 17%
- › Enterotoxigenic *E. coli* (ETEC) is an important etiological agent
 - ~10 million piglets die annually worldwide due to diarrhea, 50% is caused by ETEC



Adopted from Cox (2013)

Weaned piglets:
Treatment of
gastric-intestinal
sources

(pleuromutilins, tetracyklins)

Sources:

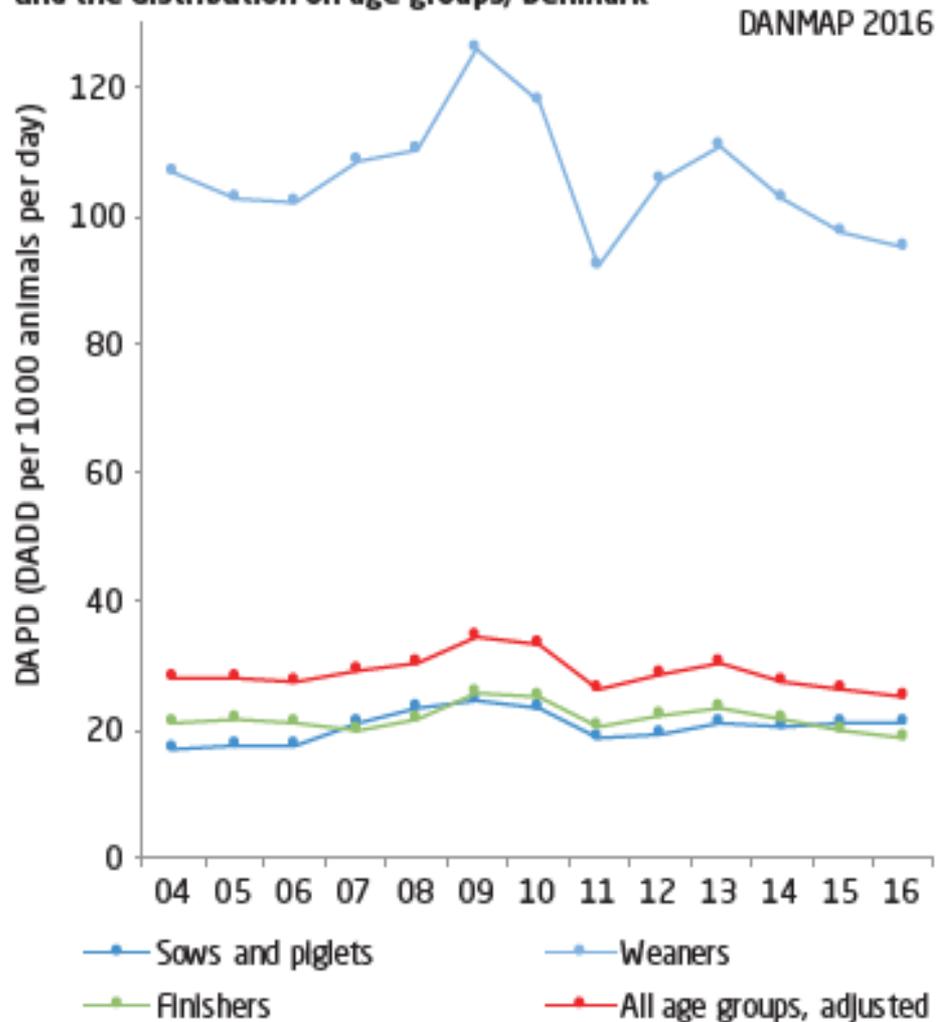
DANMAP, 2016

Udvalget for

Fødevarer, Landbrug

og Fiskeri, sept. 2016

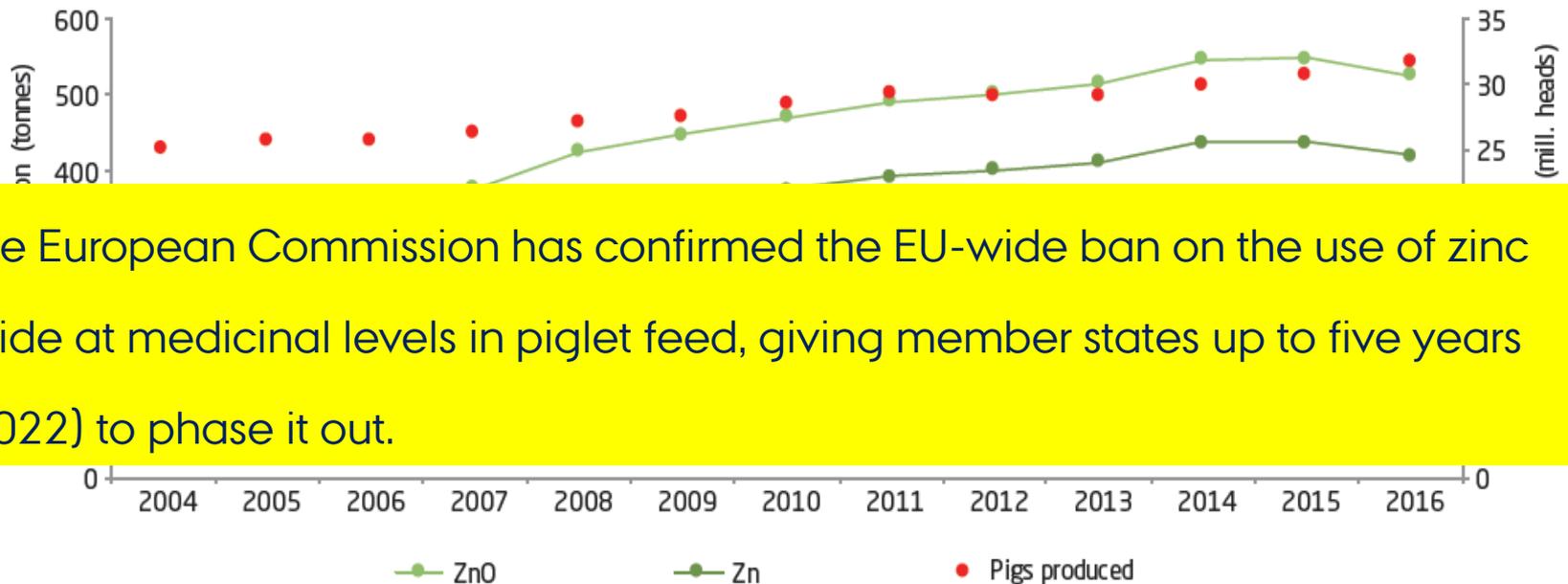
Figure 4.4. Antimicrobial consumption (a) in the pig production, and the distribution on age groups, Denmark



Consumption of zinc oxide in Denmark

Figure 4.6 Consumption (tonnes) of zinc oxide (ZnO) and zinc (Zn) in the pig production, Denmark

DANMAP 2016

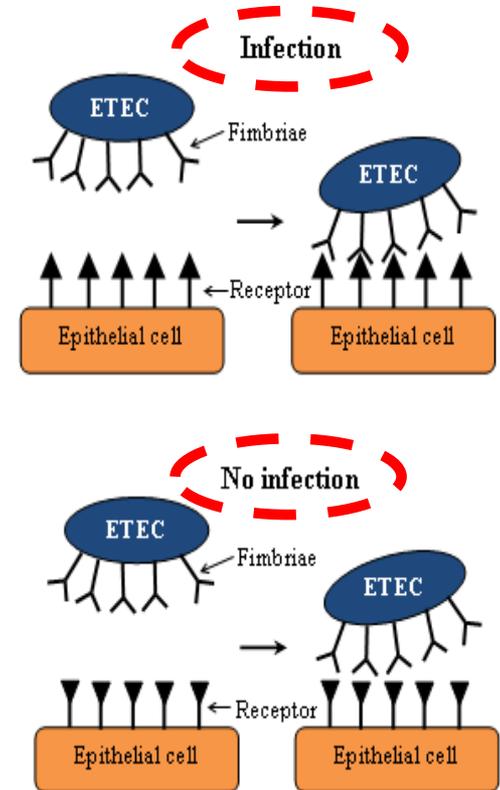
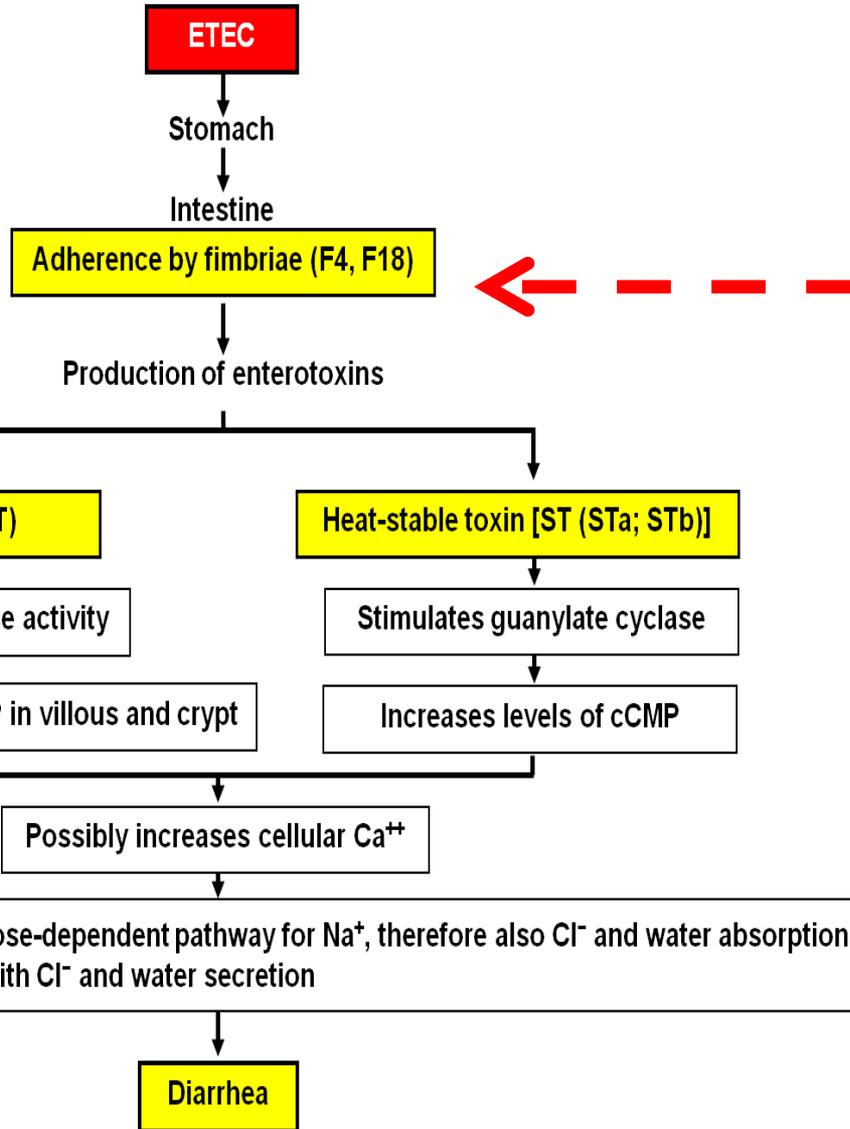


The European Commission has confirmed the EU-wide ban on the use of zinc oxide at medicinal levels in piglet feed, giving member states up to five years (2022) to phase it out.

Increase in veterinary prescription of ZnO (0-2 weeks post weaning).

Critical because high ZnO enhance antibiotic resistance (e.g. E. coli in gut of pigs (source: PLOS one, 2018) (and organically reared pigs eat more post weaning)

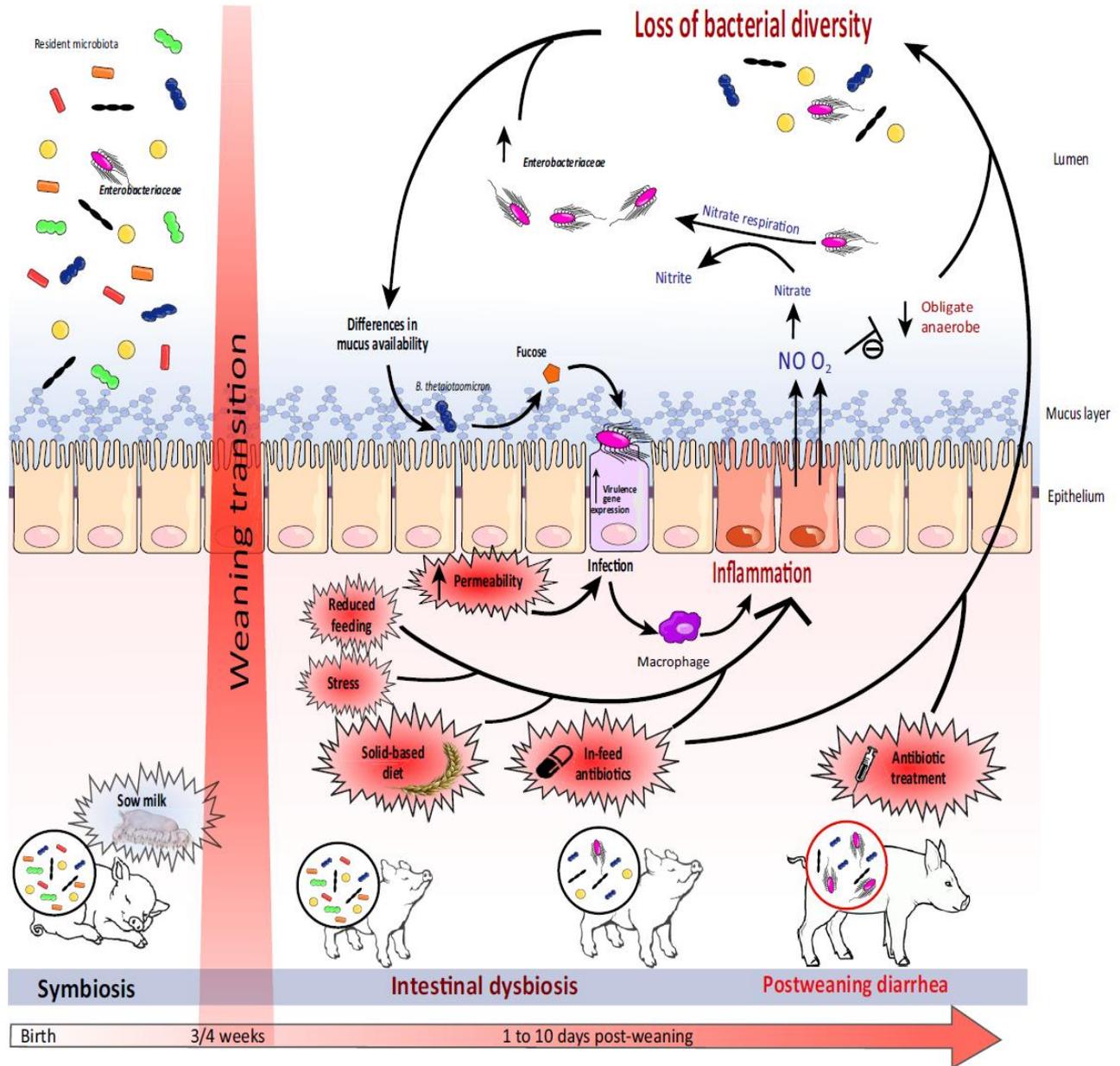
PATOGENESE FOR PWD



Modified from Roubos-van den Hill (2010)

Modified from Fairbrother et al., (2005) and Heo et al. (2013)

Weaning transition



Natural or semi-natural conditions:

- 12–18 wk of age (organic: 7–10 weeks).
- A gradual reduction in the amount of contact between the sow and her piglets.
- A concomitant reduction in nursing frequency and milk production.
- A gradual change of diet from milk to solid or semisolid feed.

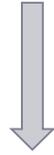


Commercial conditions:

- 3–4 weeks.
- An abrupt separation of piglets from the dam.
- A sudden change in diet.
- A move to a new environment.
- Mixing with unfamiliar animals at a much younger age than would occur in natural conditions.



Weaning



Loss of immune protection by sows' milk



Delay in initiation of feed intake/
very low feed intake in days post-
weaning

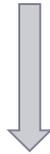


Dysfunction of GI-tract;
Dysbiosis



High susceptibility to enteric diseases and/or disorders

Weaning



**Loss of immune protection by
sows' milk**

Strategies:

- Give the animal more time to develop its immune system (e.g., higher weaning age).
- Enhance immune maturation (e.g., probiotics);
add immunoprotection (e.g., supply antibodies, anti-inflammatory/anti-oxidative components)

Weaning



**Delay in initiation of feed intake/
very low feed intake in days post-
weaning**

Strategies:

- Stimulate feed intake:
 - Give them more time to learn eating feed pre-weaning (e.g., higher weaning age)
 - Increase feed intake pre-weaning (e.g., liquid feed, pen design)
 - Increase feed intake post-weaning (e.g., feed composition, feed additives)

Weaning

Delay in initiation of feed intake/
very low feed intake in days post-
weaning

Dysfunction of GI-tract;
Dysbiosis

Strategies:

- Dysfunction of the GI-tract:
 - Give them more time to develop the GI-tract (e.g., higher weaning age)
- Avoid dysbiosis:
 - Reduced dietary protein.
 - Promote beneficial microorganisms (e.g., prebiotics, probiotics,)
 - Reduce pathogenic microorganisms (e.g., organic acids, plant extracts, fermented liquid feed, high hygiene in environment)
 - Animals resistant to certain pathogens (genetics)
 - Vaccination

Weaning

Loss of immunity in piglets/sows'

- Stressors:
- Nutritional
 - Environmental
 - Psychological

Delay in initiation of feed intake/
very low feed intake in days post-weaning

Dysfunction of GI-tract;
Dysbiosis

High susceptibility to enteric diseases and/or disorders

Weaning

Stressors:

- Nutritional
- Environmental
- Psychological

Delay in initiation of feed intake/
very low feed intake in days post-
weaning

Dysfunction of GI-tract;
Dysbiosis

Strategies:

- Reduced mixing of unfamiliar piglets
- Keep various litters in same area during suckling ('multi-suckling')
- Intermittent suckling (increase feed intake; short separation from the dam)
- 'Weaning of the sow'

CONCLUSION OF LITERATURE REVIEW

Suggested strategies to reduce PWD:

- › **Restriction of dietary protein**

- Valid strategy in herds with high diarrhea incidence

- › **Increasing weaning age**

- Good possibility in organic pig production

- › **Optimizing the hygienic status of weaning facilities**

- Less documented regarding organic pig production

These strategies were included in a cost-benefit analyses.

CONCLUSION OF LITERATURE REVIEW

- › Besides, some dietary factors gained our interest:
- › Organic acids, antibodies, fermented liquid feed,....., but these alternatives requires more development and research to pinpoint their efficacy against PWD.
- › Important to design studies with PWD as primary response variable, and to design the study to test PWD.

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