Post-weaning diarrhoea in herds not using medicinal zinc

Esben Østergaard Eriksen, BSc.med.vet,
Combined Master & Ph.D student
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KØBENHAVNS UNIVERSITET

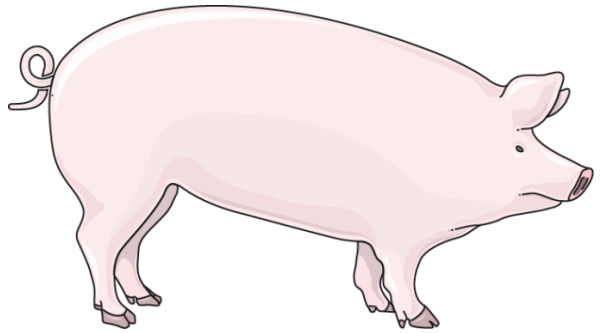
Other contributors

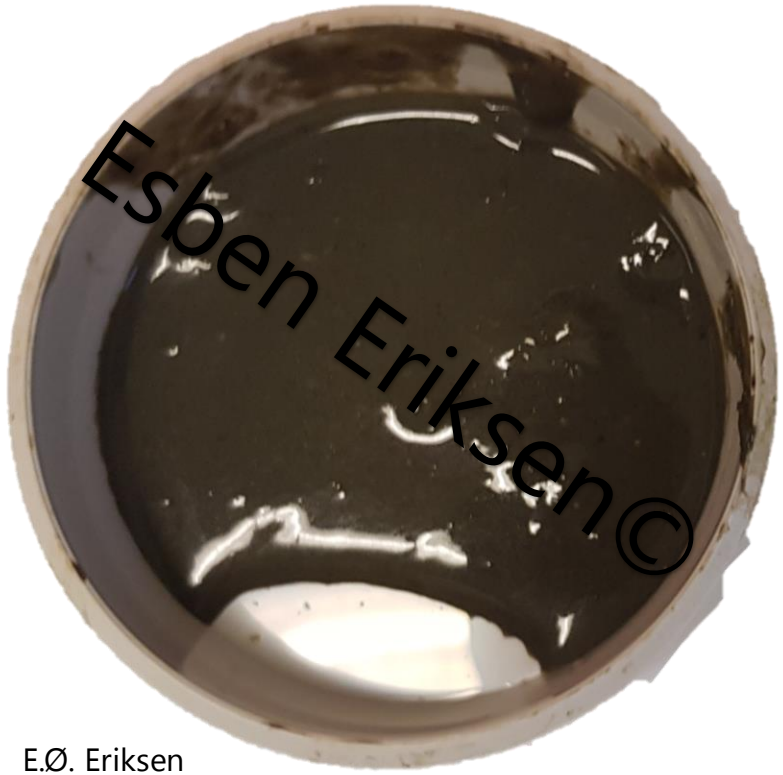
Ken Steen Pedersen

Jens Peter Nielsen

Post-weaning diarrhoea

- Multifactorial condition
- Diarrhoea and other clinical signs
- First 14 days after weaning





E.Ø. Eriksen

Figure [1]

Post weaning diarrhoea is prevented with medicinal zinc oxide

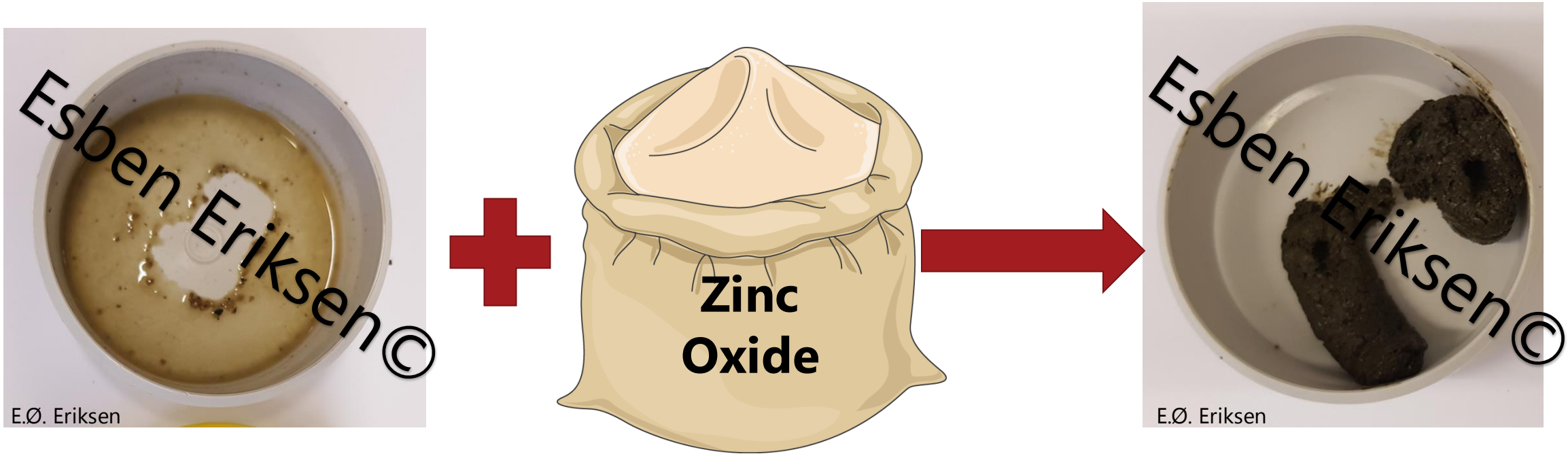


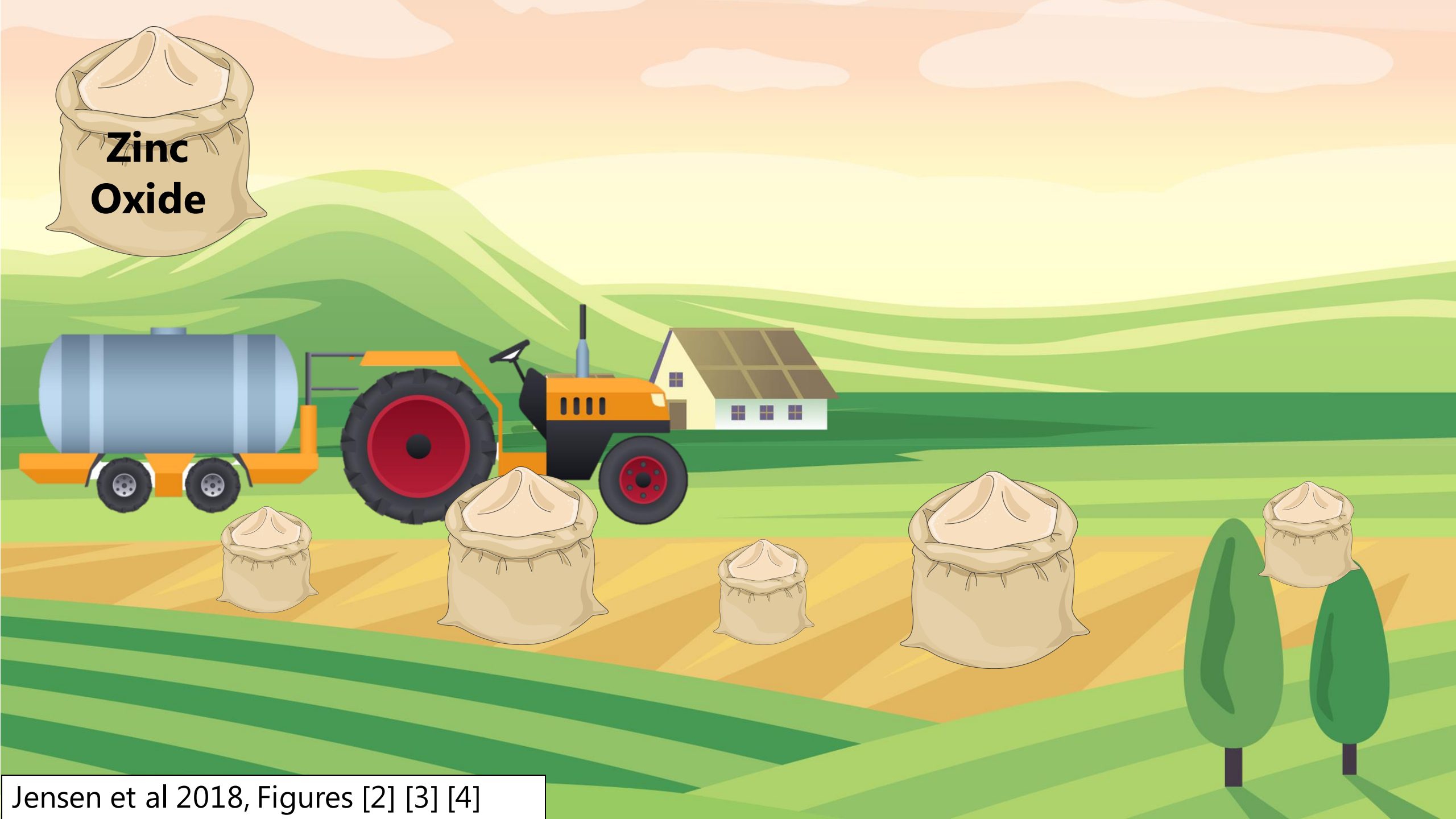
Figure [2]

The use of medicinal zinc oxide must be terminated

- Medicinal zinc co-selects for antimicrobial resistance
- Most of the zinc is excreted to the faeces

(Jensen et al 2018)

Figure [2]



Jensen et al 2018, Figures [2] [3] [4]

Veterinary use of zinc oxide will be prohibited in 2022

EUROPEAN
COMMISSION

Brussels, 26.6.2017
C(2017) 4529 final

COMMISSION IMPLEMENTING DECISION

of 26.6.2017

What will happen when Danish pig producers terminate their use of medicinal zinc oxide?

How far is Danish pig production in this transition?

Two research questions

1. What is the proportion of herds not-using medicinal zinc-oxide in Eastern Denmark?
2. What is the clinical presentation of post-weaning diarrhea outbreaks in herds not-using medicinal zinc-oxide?

An equation to estimate the proportion of zinc-free herds

$$\frac{\text{n herds with newly weaned pigs not using ZnO}}{\text{n herds with newly weaned pigs}}$$

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$$\frac{\text{n herds with newly weaned pigs not using zinc oxide}}{\begin{array}{c}\textbf{n herd with 7–30 kg pigs buying ZnO}\\ +\\ \textbf{n herds with 7–30 kg pigs not buying ZnO}\\ \textbf{confirmed to have newly weaned pigs}\end{array}}$$

Finding herds that were potentially not using zinc oxide

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Round 1

- All swine herds in the Danish Central Husbandry Register (CHR) (28/2/2019)

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- All swine herds in the Danish Central Husbandry Register (CHR) (28/2/2019)
- Inclusion criteria:
  - >200 7-30 kg pigs
  - Indoor production
  - Located on Zealand, Funen Lolland and Falster
  - Vetstat: Did not buy medicinal zinc oxide 1. Nov. 2018-28 Feb 2019.

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<u>145 herds</u>

Finding herds that were potentially not using zinc oxide

Round 2

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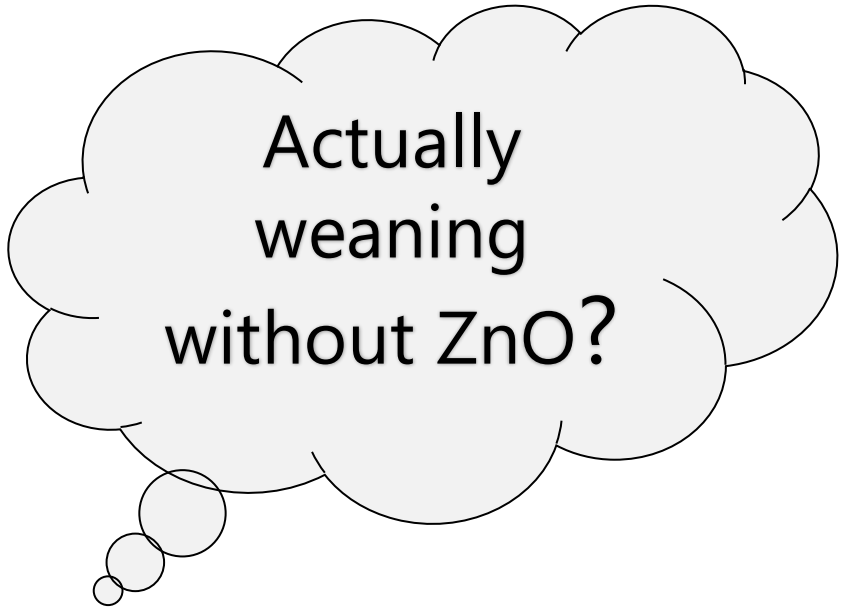
71 herds

Herds potentially not using zinc oxide



$$145\ herds + 71\ herds = 216\ herds$$

Short telephone interviews

- We could classify 212 (98,14%) out of the 216 herds
  - 179 telephone interviews(May-November 2019)
  - 33 based on register data (CHR/VETSTAT)

Short telephone interviews

- We could classify 212 herds
  - No newly weaned pigs: 129 herds
  - Newly weaned pigs: 83 herds

We do not use ZnO:
24 Herds

We do use ZnO:
59 Herds

An equation to estimate the proportion of zinc-free herds

$$\frac{\begin{array}{c}n \text{ herds with } 7-30 \text{ kg pigs not buying ZnO} \\ \text{AND have newly weaned pigs}\end{array}}{\begin{array}{c}n \text{ herd with } 7-30 \text{ kg pigs buying ZnO} \\ + \\ n \text{ herds with } 7-30 \text{ kg pigs not buying ZnO} \\ \text{AND have newly weaned pigs}\end{array}}$$

$$\frac{24}{422+83} = 0{,}048 = 4{,}8\%$$

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Only 4,8% (n=24) of the herds with newly weaned pigs in eastern Denmark did not use medicinal zinc in the autumn 2019

Outline for this presentation

- We use preliminary data
- Two research questions:
  1. What is the proportion herds not-using medicinal zinc-oxide in Eastern Denmark?
  2. What is the clinical presentation of post-weaning diarrhea outbreaks in herds not-using medicinal zinc-oxide?

Short telephone interviews

We do not use ZnO: 24 Herds

12 Herds: PWD-batch medication
- 10 frequent metaphylactic
- 2 routine batch AM

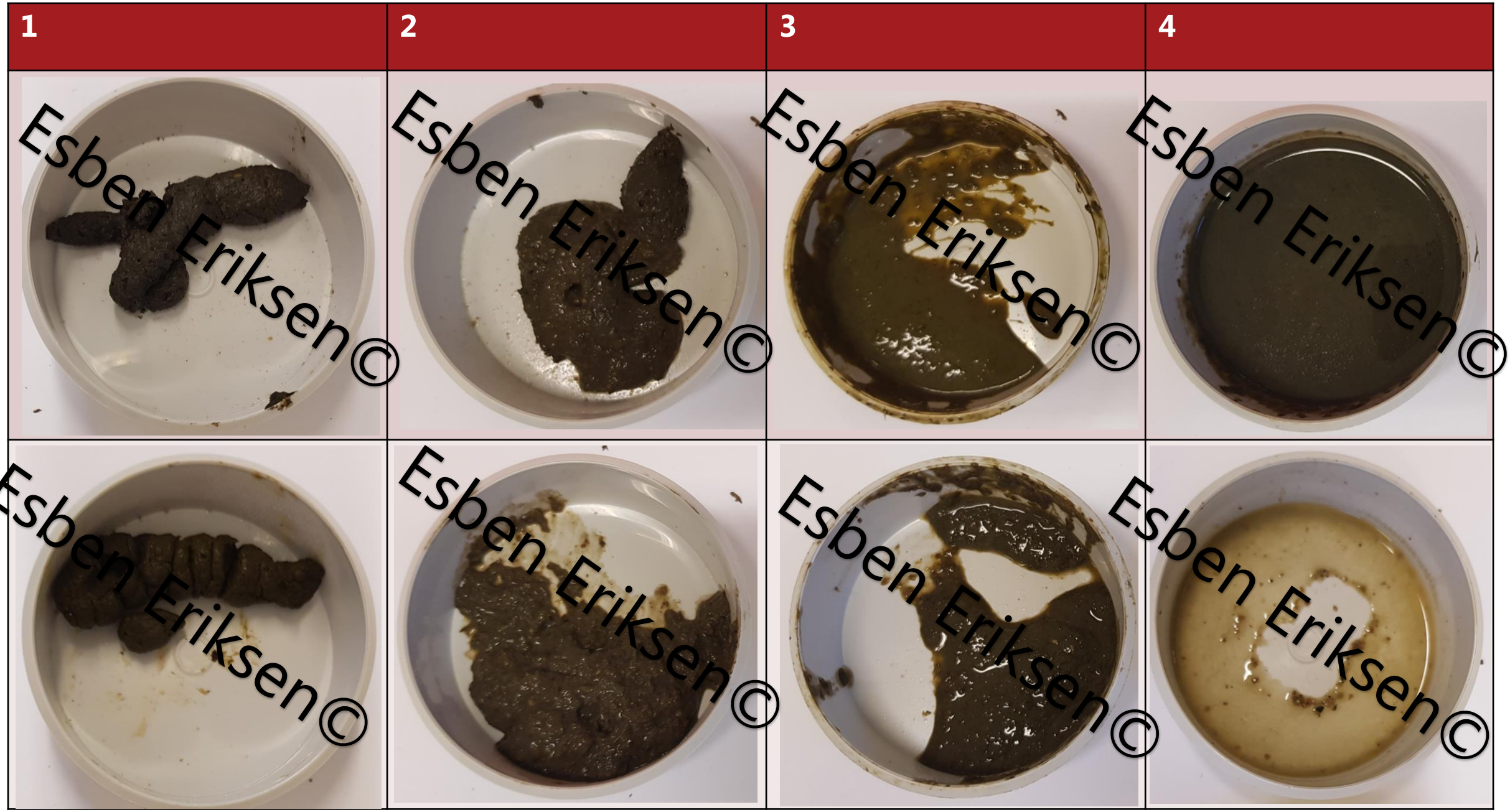
12 Herds: no batch medication against PWD

Cross-sectional investigation of 9 diarrhoea outbreaks:

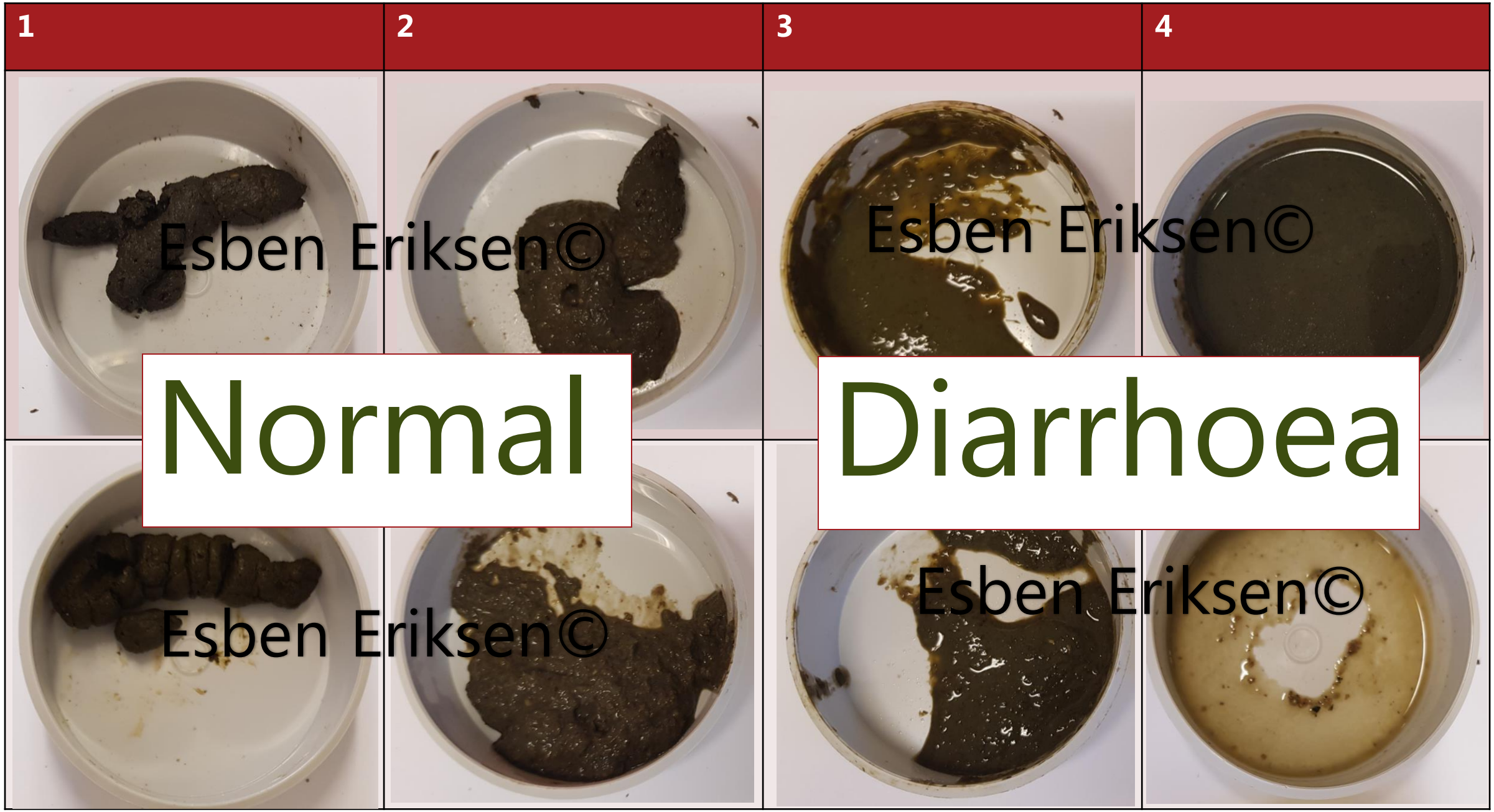
- Herd visits:
  - When farmers deemed antimicrobials flock-medication necessary

Cross-sectional investigation of 9 diarrhoea outbreaks:

- Herd visits:
  - When farmers deemed antimicrobials batch-medication necessary
  - We examined a systematic random sample(n=94-112) of pigs
    - Clinical signs
    - Faecal samples



Faecal consistency scale developed by Pedersen et al, 2011



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Preliminary data

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Can we use faecal staining to diagnose diarrhoea?

- Perineal faecal staining and staining of the hind part/legs is believed a clinical sign diarrhoea
- Binary registrations of staining (yes/no)

Preliminary data

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Preliminary data

Morsing et al, n=174	
Sensitivity	0,95
Specificity	0,95
Pos. predic. value	0,96
Neg. predic. value	0,93

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- Different criteria for faecal staining?

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- Different criteria for faecal staining?
- Faecal dry-matter analysis vs. scoring?

Can we use faecal staining to diagnose diarrhoea?

Preliminary data

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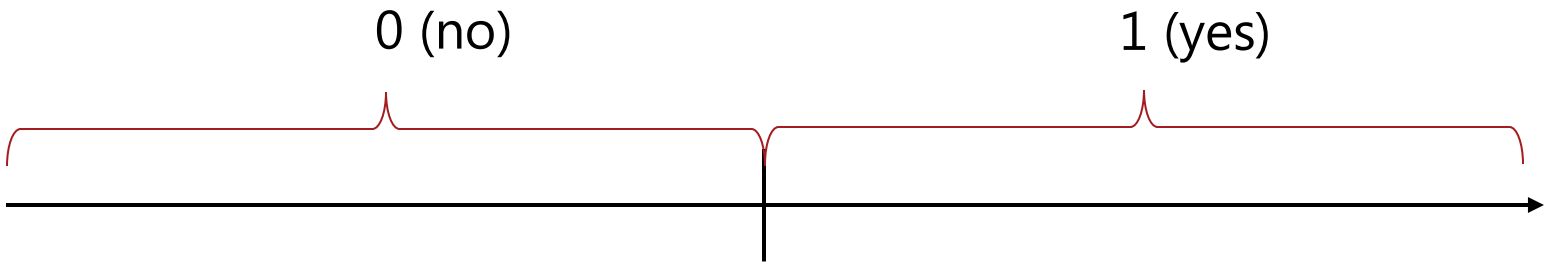
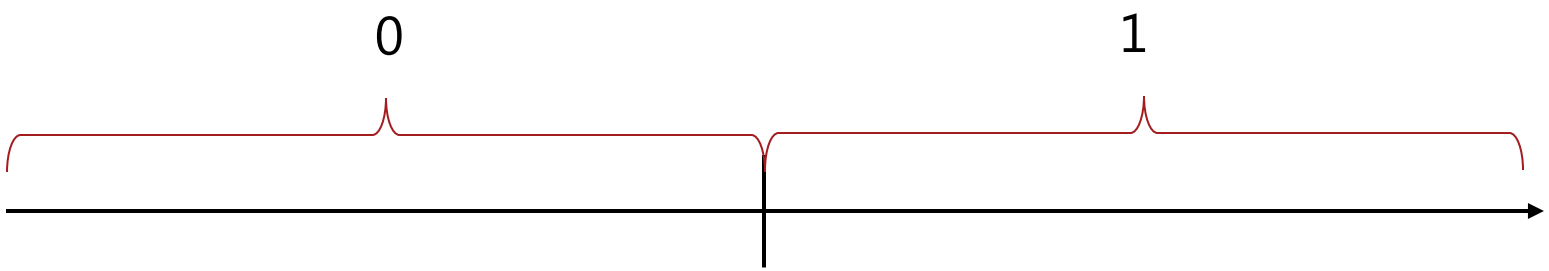
- Different criteria for faecal staining?
- Faecal dry-matter analysis vs. scoring?
- Differences in study design
  - Selection bias: Intermediate/unclear cases omitted?



Perfectly clean pig

Profuse, watery, wet, yellow staining of perineal region and legs



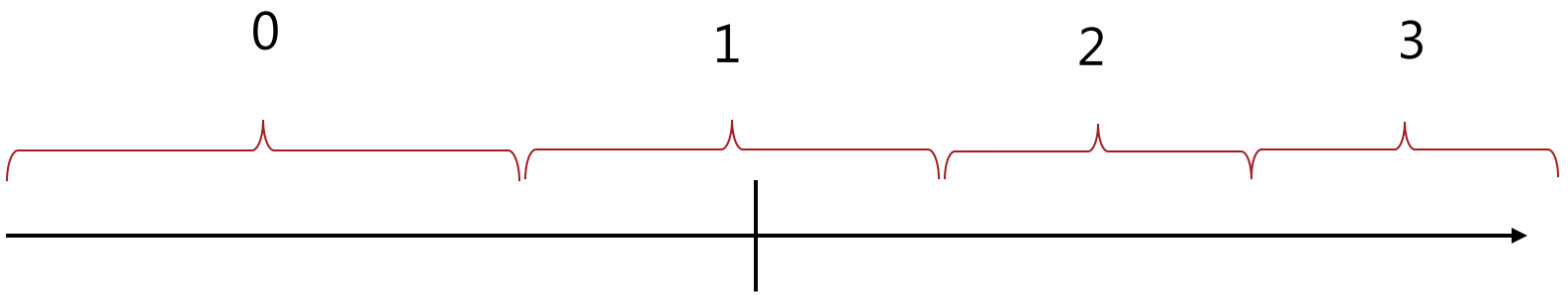
Perfectly clean pig

Normal faecal remnants in the anus

Staining that might originate from other pigs/environment

Subtle, dried staining

Profuse, watery, wet, yellow staining of perineal region and legs



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Reduced skin elasticity is a sign of dehydration

- Reduced skin elasticity(tugor) is a clinical sign of dehydration

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- Measured by pinching-releasing the skin
  - E.g., neck on cattle and dog,
    or underarm in humans:

Diarrhoea is associated with reduced skin elasticity

Reduced skin

Diarrhoea

Preliminary data

Preliminary data

)

Diarrhoea is associated with reduced skin elasticity

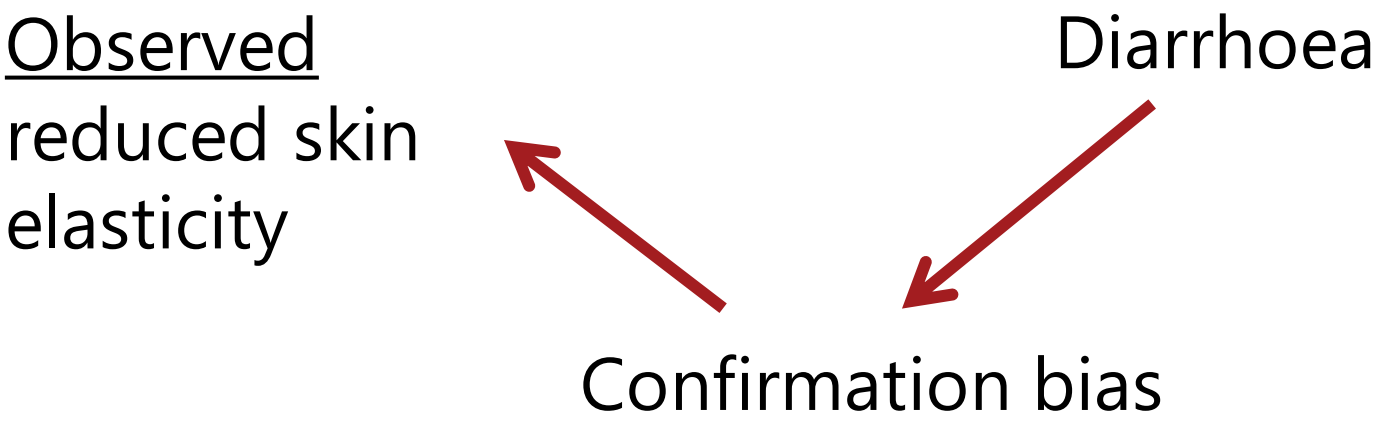
Observed reduced skin elasticity  Diarrhoea

Diarrhoea is associated with reduced skin elasticity

Observed reduced skin elasticity  Diarrhoea

Confirmation bias

Diarrhoea is associated with reduced skin elasticity



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Observed reduced skin elasticity ⟷ Diarrhoea

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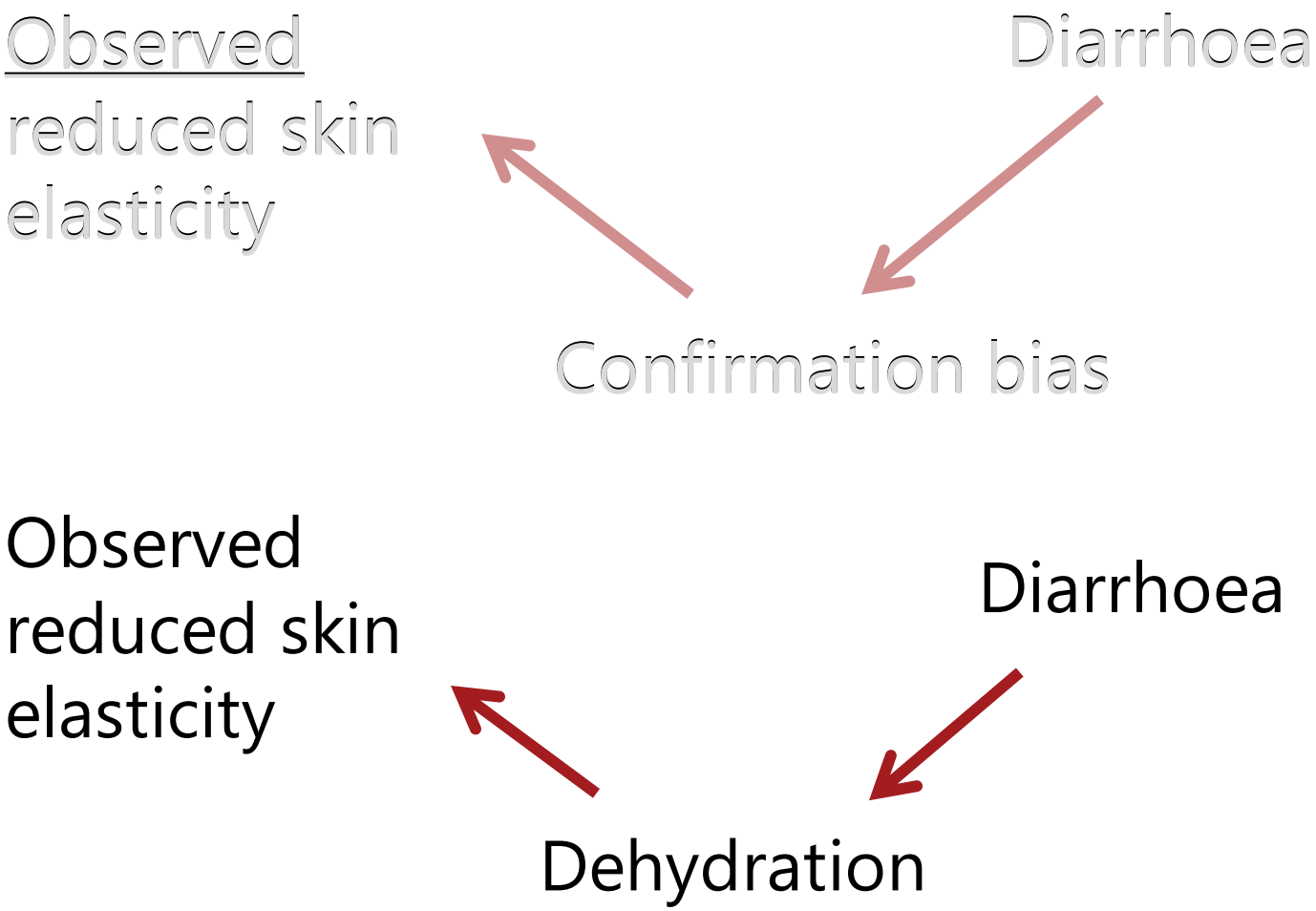

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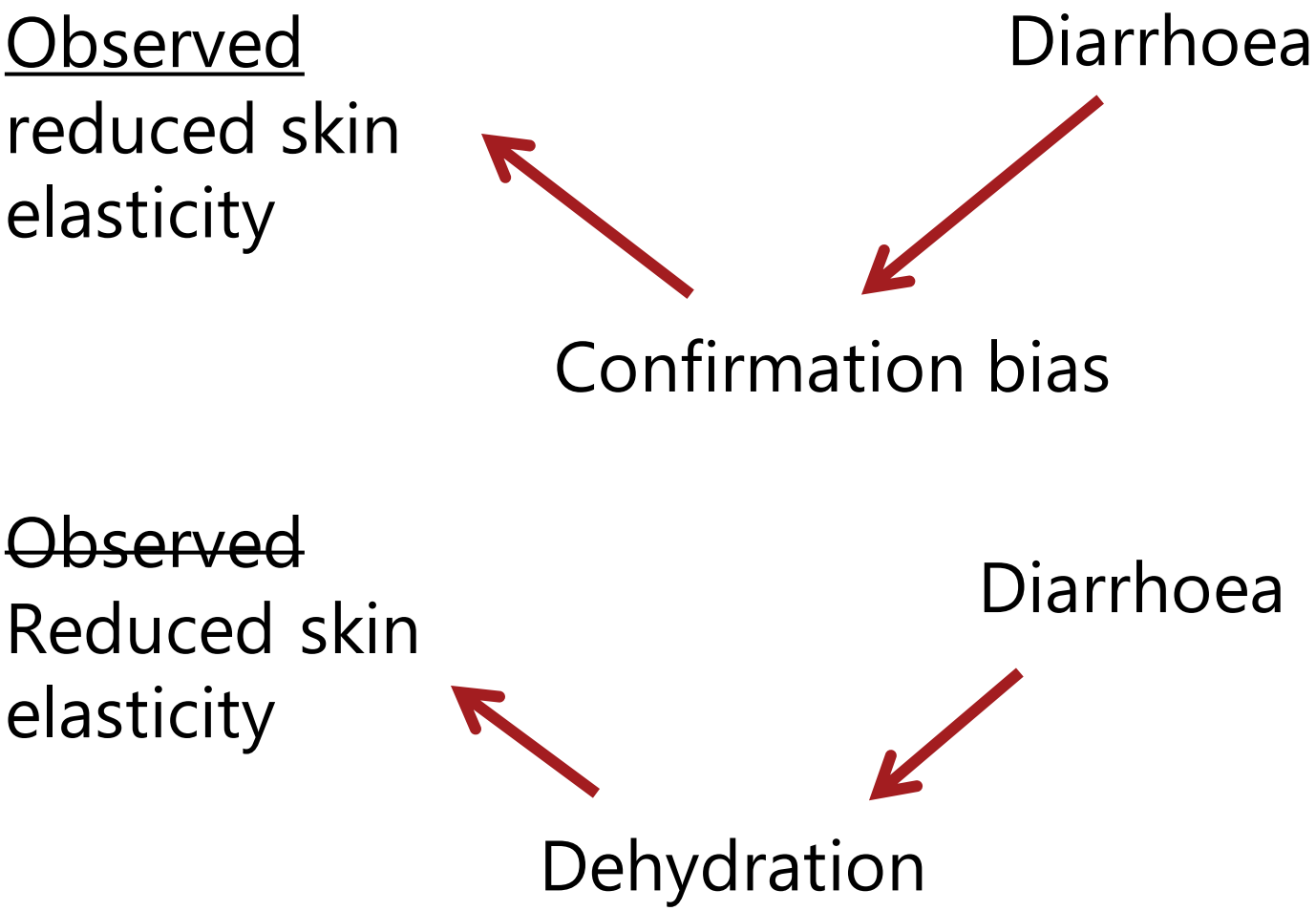

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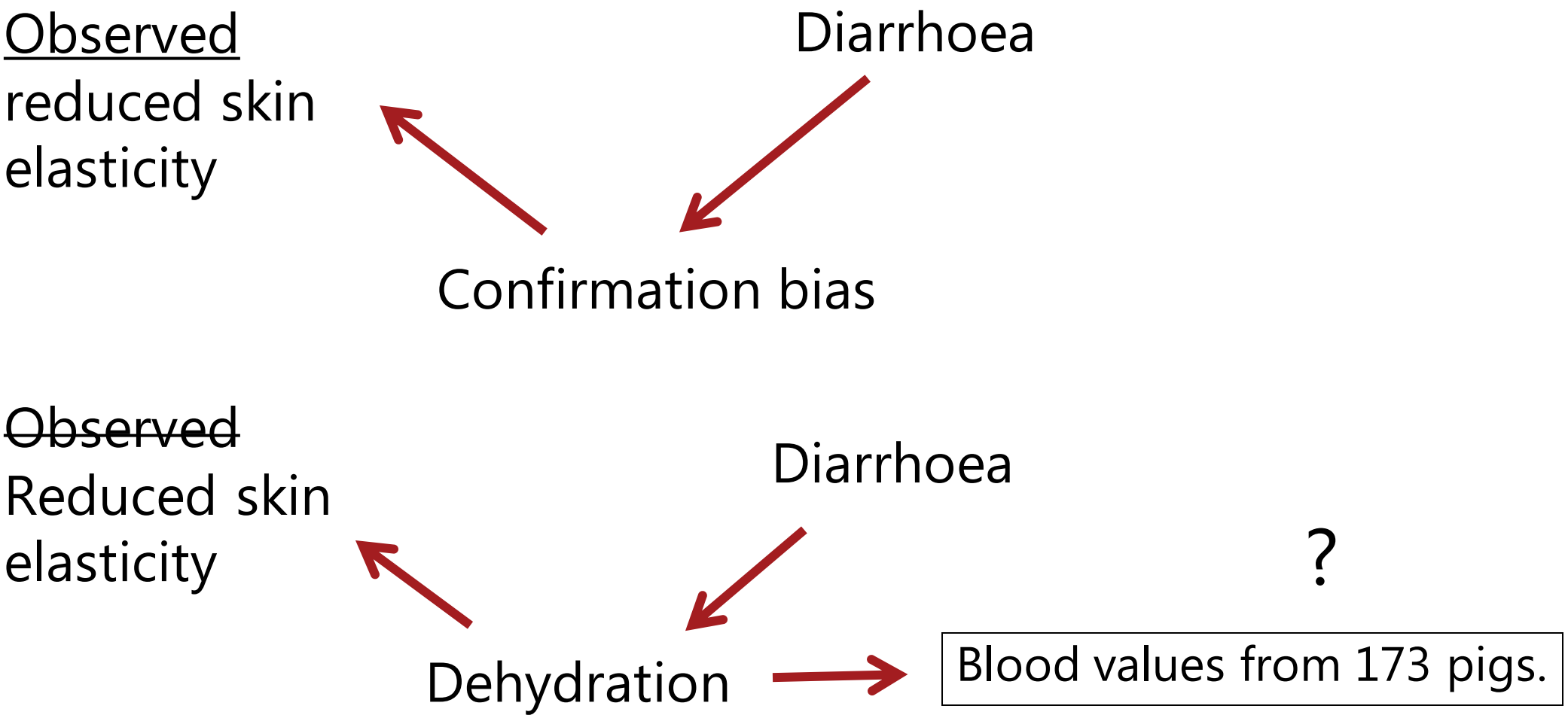

Conclusions

- 4,8%(n=24) of the herds in Eastern Denmark was weaning without medicinal zinc in the autumn 2019
- 50%(n=12) of these frequently used batch medication against Post-weaning diarrhoea
- The unadjusted within-outbreak apparent prevalence of diarrhoea varied between Preliminary data
- Faecal staining can be used to diagnosed post-weaning diarrhoea with
  - Prelimin
  - ary data
- Pigs suffering from post-weaning diarrhoea might be dehydrated, and we can maybe evaluate this by pinching the skin behind the ears

Questions and discussion

Other contributors

Ken Steen Pedersen

Jens Peter Nielsen

References

Figures

[1] https://smart.servier.com/smart_image/pig/

[2] https://smart.servier.com/smart_image/spice/

[3] https://www.freepik.com/free-photos-vectors/background, Background vector created by freepik

[4] https://www.freepik.com/free-photos-vectors/water, Water vector created by macrovector_official

Literature:

Jensen J, Kyvsgaard NC, Battisti A, Baptiste KE. Environmental and public health related risk of veterinary zinc in pig production - Using Denmark as an example. Environment International. 2018 May;114:181–90.

Pedersen, K. S. & Toft, N. Intra- and inter-observer agreement when using a descriptive classification scale for clinical assessment of faecal consistency in growing pigs. Prev. Vet. Med. 98, 288–291 (2011).

Morsing M. K., Pedersen K. S., Larsen I., Weber N. R. & Nielsen, J.P. Prevalence Of Post-Weaning Diarrhoea In Danish Herds Not Using Medicinal Zinc And Antimicrobial Batch Treatment At Weaning, Oral Presentation at European Symposium of Porcine Health management 2019.