

# How to estimate the prevalence of porcine post-weaning diarrhea?

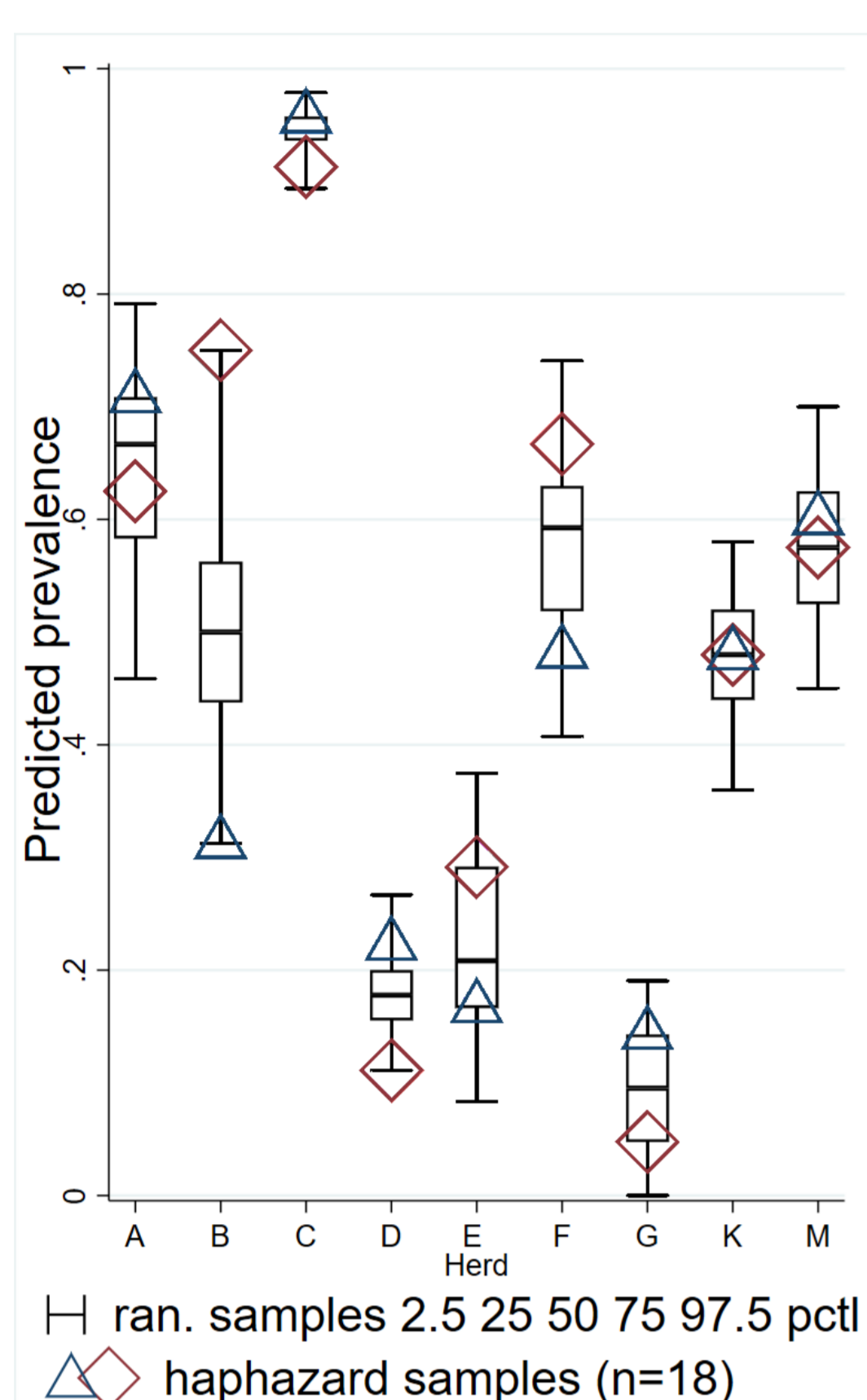
Esben Østergaard Eriksen<sup>1\*</sup>, Jens Peter Nielsen<sup>1</sup>, Martin Friis Sejersens<sup>1</sup>, Marianne Viuf Agerlin<sup>1</sup>, Anja Ejlersgård Christensen<sup>1,2</sup>, Mathilde Markvardsen<sup>1</sup>, Sanne Fredslund Buhl<sup>1</sup>, Hunter Everett<sup>3</sup>, Hannah Lathom<sup>3</sup>, Ken Steen Pedersen<sup>1,2</sup>  
 \*esbene@sund.ku.dk. 1: University of Copenhagen, Department of Veterinary and Animal Sciences. 2: Ø-Vet A/S. 3: North Carolina State University.

- People (e.g. farmers, veterinarians, researchers) want to monitor the prevalence of post-weaning diarrhea within sections (rooms) of weaned pigs [1].
- Well-trained epidemiologists would tell these people to perform clinical examinations of a random sample of pigs.

**However, people are lazy, and they don't want to...**

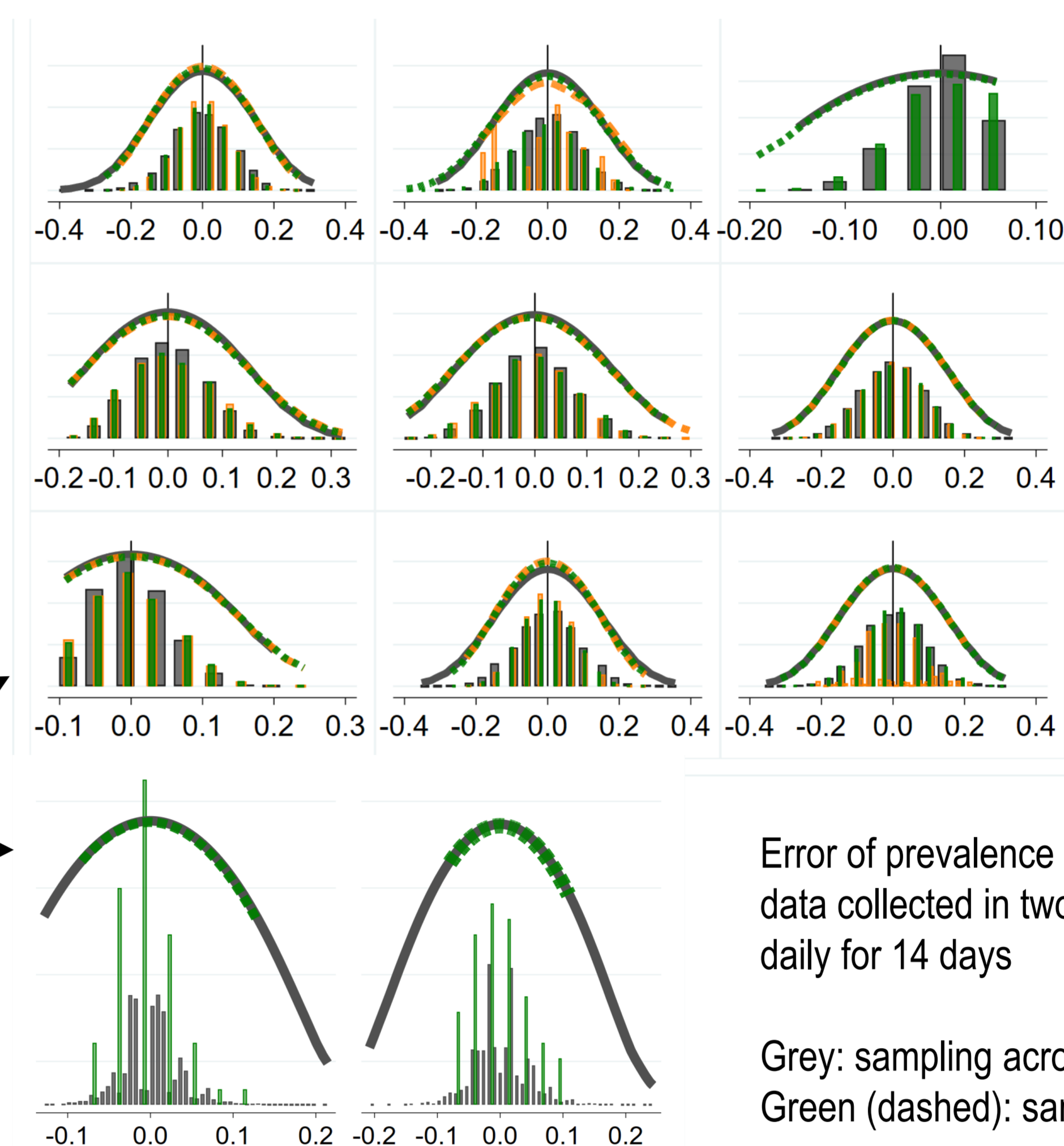
## ... do random sampling from a large population

We simulated samplings with different strategies from two datasets [2].



Prevalence estimates were equally reliable when based on haphazard and random sampling. Predictions of the prevalence from actual haphazard samples (n=18) distributed as expected by random chance within the 95% credible intervals of simulated random samples.

Simulated samplings from a restricted number of pens generally produced prediction errors similar to sampling from all pens in a section.



Error of prevalence estimates; simulated samplings from data collected in nine sections

Grey: Samplings across all pens. Green (short dashes): Samplings in ~half of the pens. Orange (long dashes): Samplings in ~third of the pens.

Error of prevalence estimates; simulated samples in data collected in two sections with four pens observed daily for 14 days

Grey: sampling across all four pens in the section. Green (dashed): samplings from one pen

## ... spend a lot of time and stress the pigs when performing clinical examinations

We have validated two clinical markers of post-weaning diarrhea. They are quick and easy to assess, and require minimal handling of the pigs.

Diarrheic soiling of the hind part predicts diarrhea [2,3].

Sensitivity: 77.2% (73.7; 80.6)\*

Specificity: 97.0% (95.9; 97.5)\*

\* 95% Credible interval



Photo: Malene Kjelin Morsing

Diarrhea may also be predicted by collecting feces on a cotton swab directly from the rectum of a pig [3,4].

Score	1 - Not diarrhea	2 - Not diarrhea	3 - Diarrhea	4 - Diarrhea
Description	Firm	Soft and shaped	Loose	Watery
Picture				

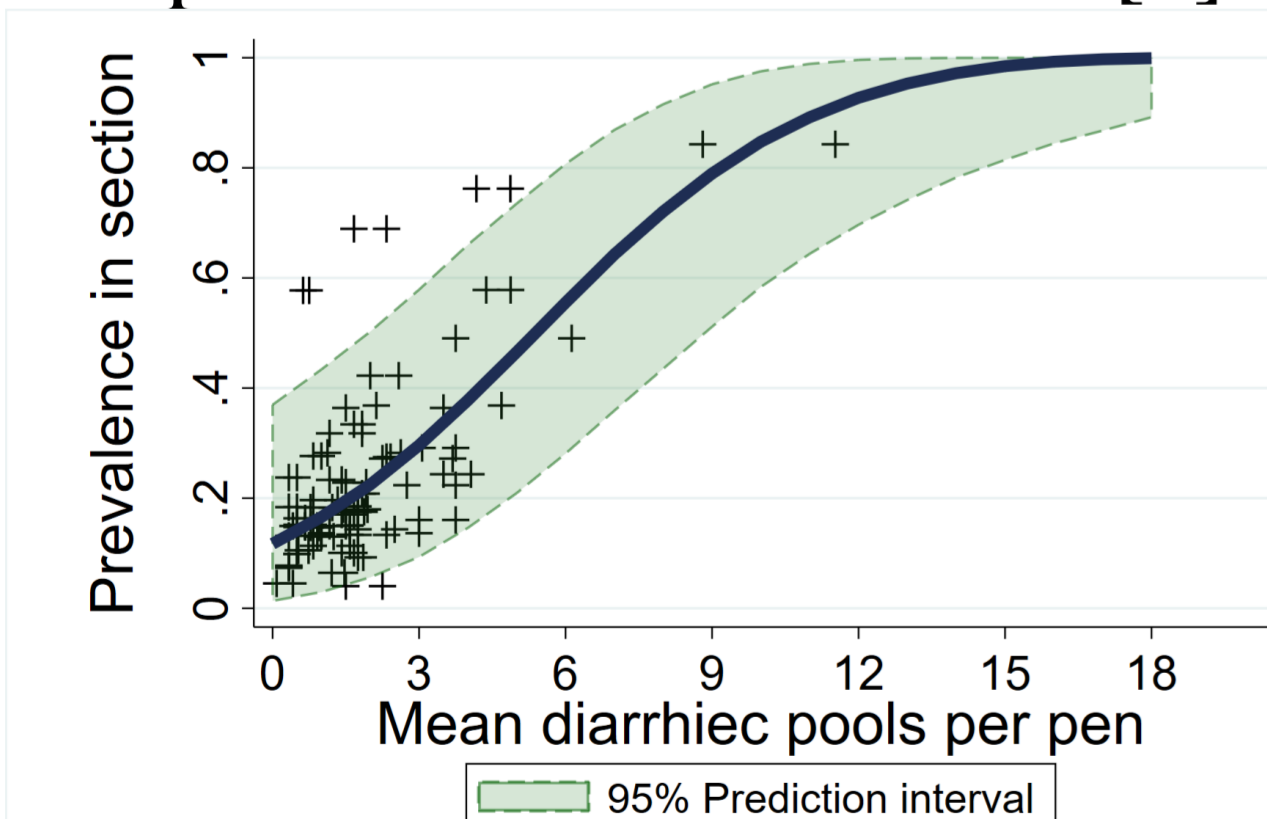
Sensitivity: 85.0% (76.5; 91.4)\*

Specificity: 95.2% (92.0; 97.3)\*

\* 95% Credible interval

## ... examine many pigs

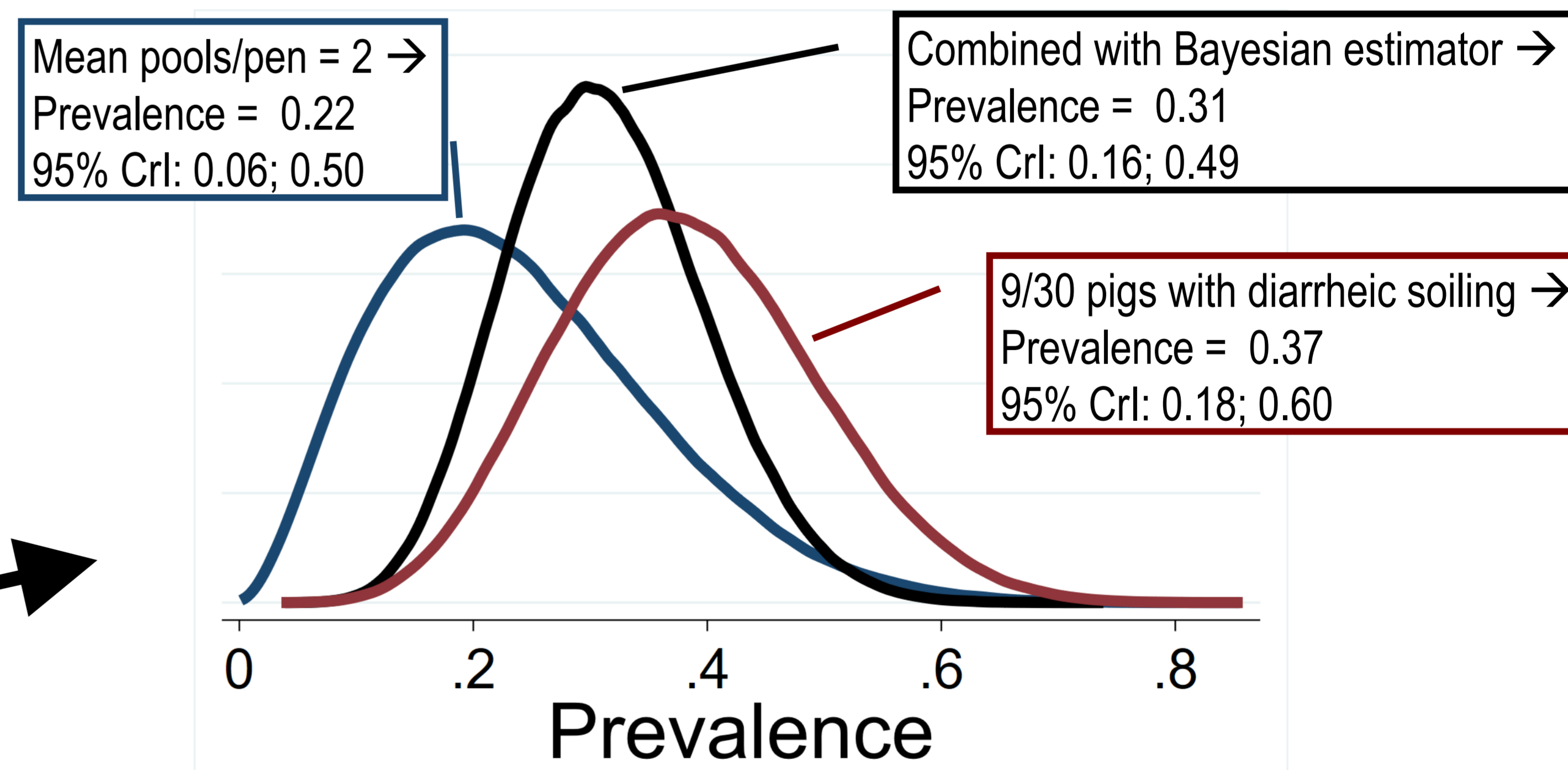
The prevalence of diarrhea within the section may be imprecisely predicted by the mean count of diarrheic pools on the pen floors in the section [3].



This may be used to formulate a prior expectation of the prevalence.

The prior can be combined with data from surveys of pigs using an imperfect clinical marker [5].

Thus, using the prior in a Bayesian estimator [6], a good prevalence estimate can be obtained from a small sample.



## Conclusively, lazy people may...

- Haphazardly select a small sample of pigs (e.g. n = 30) in three randomly selected pens in the section of interest.
- Use diarrheic soiling of the hind part or the cotton swab method to rapidly assess whether the pigs have diarrhea
- Count the number of diarrheic pools on the pen floor and formulate a prior expectation of the prevalence.
- Estimate the prevalence with a Bayesian estimator!

### References

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