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PREVALENCE OF EDEMA DISEASE *ESCHERICHIA COLI* (EDEC) IN WEANED PIGLETS IN GERMANY

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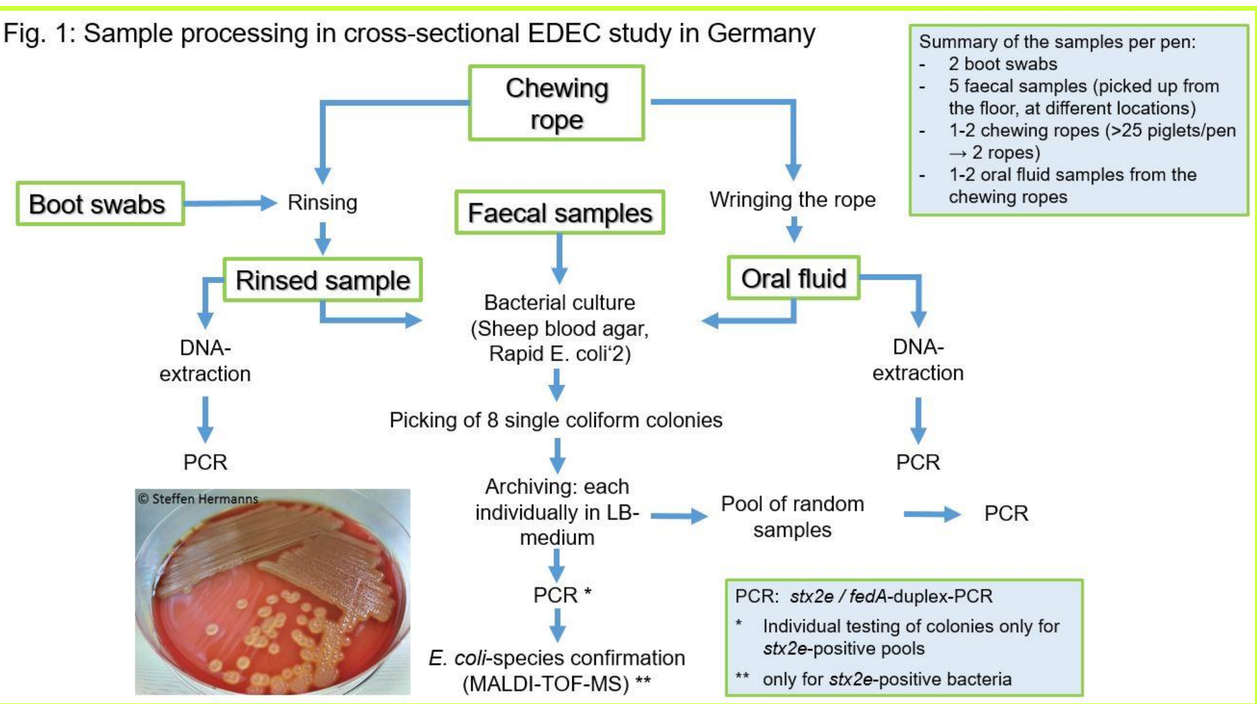
Background and Objectives

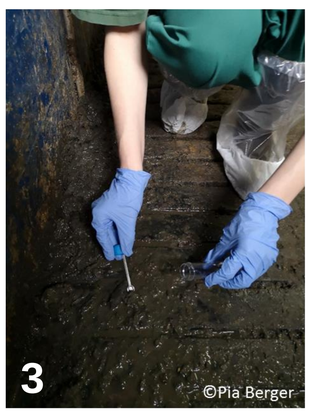
Escherichia coli bacteria encoding shigatoxin subtype Stx2e and F18-fimbriae are referred to as EDEC (edema disease *E. coli*). They are considered as the causative agent of edema disease in pigs, a systemic disorder associated with high mortality rates in piglets suffering from acute disease. The aim of this study was to – for the first time - determine the prevalence of EDEC at pen and farm level in weaned piglets in Germany.

Materials and Methods

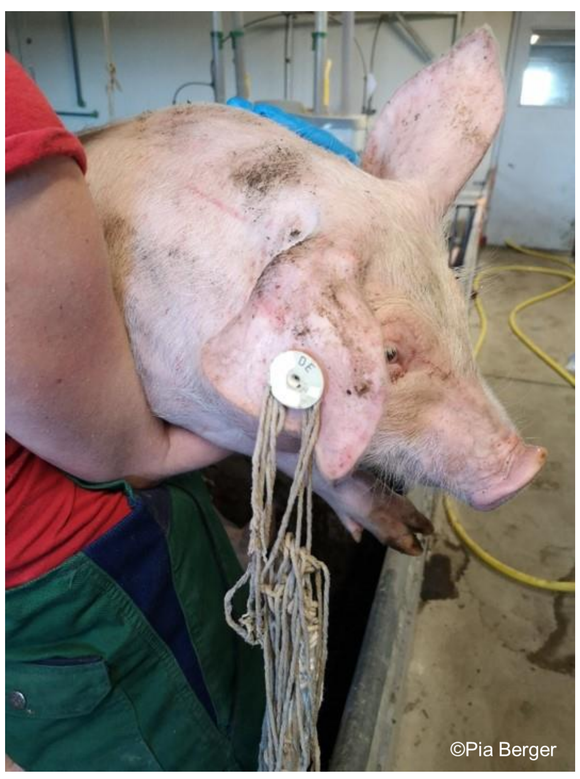
In this cross-sectional study 99 pig farms of unknown infection status were visited. On each farm, five pens were selected for sampling (n = 481). Piglets in these pens were at an age of 1-2 weeks after weaning. In addition to boot swabs and chewing ropes, faecal samples (n = 2,405) were picked from the floor of each pen at five separate locations (Pict. 1 – 3). All samples were subsequently analyzed for EDEC by bacterial culture and subsequent testing of *E. coli* isolates for genes *stx2e* and *fedA* (gene of the major protein subunit of F18-fimbria) by duplex-PCR. Boot swabs, oral fluids and chewing rope rinse samples were additionally analyzed by DNA-extraction and *stx2e/fedA*-PCR (Fig. 1). An evaluation of the relative sensitivity of the different sampling and testing protocols to detect *stx2e* and *fedA* genes was performed (Fig. 2).

Fig. 1: Sample processing in cross-sectional EDEC study in Germany





Pict. 1-3: Different ways of collecting samples for the diagnosis of EDEC: Chewing ropes (Pict. 1), boot swabs (Pict. 2) and faecal samples picked up from the floor (Pict. 3)

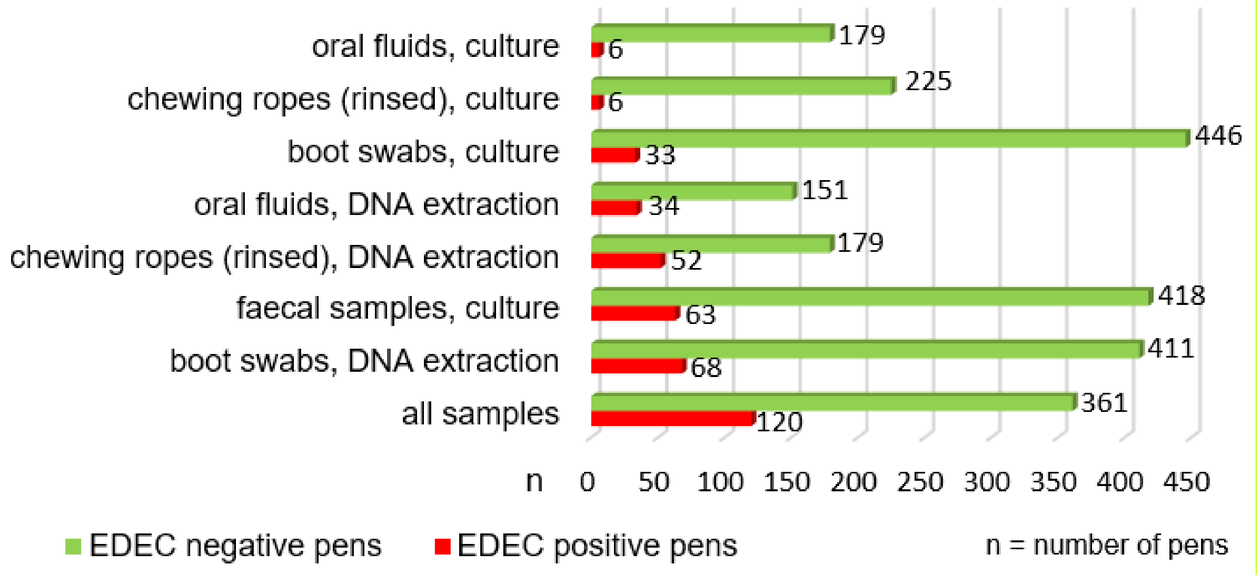


Pict. 4: Chewing rope entangled in ear tag

Results

Pens and farms were considered EDEC-positive if at least one sample from a pen or from a farm proved positive for EDEC.

Fig. 2: Comparison of methods between culture and DNA extraction, each with subsequent *stx2e/fedA*-duplex-PCR (*fedA* represents F18-fimbriae) on pen-level



A substantially higher proportion of positive samples is found in the chewing rope rinsed samples examined by DNA-extraction with subsequent *stx2e/fedA* duplex-PCR and there are big differences to the samples in the cultivation method, however we evaluate this method associated with a higher effort in the laboratory and complications may occur during sampling (Tab. 1). With regard to the examination by cultivation in the laboratory, the faecal samples performed best. A combination of the two mentioned methods is appropriate for increasing the detection rate of EDEC in weaned piglets.

Tab. 1: Comparison of different methods of sample collection for the diagnosis of EDEC

Sampling technique	Effort in the barn	Effort in the laboratory	Remarks
Individual faecal samples (picked up from the floor)	++	+	At least 5 samples per pen should be taken (in 24 % of all positive pens only one out of five faecal samples was EDEC positive)
Boot swabs	+	+++	Two additional pens identified when compared to floor faecal samples
Chewing rope rinsed samples	++	+++	Complications occurred during sampling in 28 % of all chewing ropes used, these included ropes entangled in ear tags (Pict. 4); piglets had no interest in chewing rope or rope dissolved
Oral fluids	+++	+	No fluid could be obtained in 22.2 % of the chewing ropes used (total: 450)

Overall 24.9% (95% CI: 21 – 28.7%) of all sampled pens and 37.4% (95% CI: 28.3 – 46.5%) of all farms were classified as positive.

Conclusion

Based on this new sampling and laboratory testing protocol, more than one third of the pig producing farms in Germany are affected by *E. coli* strains that are considered capable to cause edema disease.

Project Partners
JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN

Acknowledgement
We thank all project partners for their support and Ceva Santé Animale for project funding.

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