Diagnosing edema disease: the first step in prevention

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Introduction

Edema disease (ED) is one of the primary reasons of death and reduced performance in weaned pigs worldwide.[1] The disease is caused by the shigatoxin type 2e (Stx2e) of shigatoxin producing *Escherichia coli* (STEC), sometimes also called edema disease *Escherichia coli* (EDEC).[2] Typical clinical signs include edemas of the eyelids and snout (which gave the disease its name). However, other, more unspecific clinical signs can occur as well, such as lying on the side with paddling legs, "squeaking" vocalizations and stunted growth. Even sudden death without any prior clinical signs has been reported.[2] Therefore, there are several differential diagnoses should be considered. These include (but are not limited to): infections with *Streptococcus suis*, *Haemophilus parasuis*, classical swine fever virus (CSFV), Aujeszsky's Disease virus (ADV) and salt intoxication.[2] The preliminary on-farm diagnosis must therefore be confirmed or refuted by laboratory diagnostics. For many years it has been considered state-of-the art to serotype hemolytic *E.coli* colonies that have been previously isolated via culture. The objective of our study was to show that by using only this method, some cases of ED might not be identified for what they are.

Material and methods

In the year 2015, 462 samples (naïve fecal samples and intestinal swabs) from 167 farms were sent in for analysis to a diagnostic laboratory in Germany (Table 1). All samples came from pigs with the preliminary diagnosis of ED on-farm. The samples were each submitted to bacterial culture. Afterwards colony pools of up to six *E. coli* with similar morphologic characteristics were analyzed for virulence factors via multiplex PCR.

Results and discussion

In total, 821 PCRs were performed of which 122 were positive for Stx2e (Figure 2). Thirteen of these Stx2e positive PCRs were performed on non-hemolytic colonies (Table 2). If these PCRs had not been performed, eleven herds would falsely have been classified as not positive for Stx2e and therefore ED as cause of the clinical signs would have been ruled out. Our study demonstrates that not only is it important to preform additional laboratory diagnostics, but also how they are performed. Veterinarians should be aware of the newest possibilities for diagnostic analyses and should preferably send samples to laboratories that are able to perform these. Only if the diagnosis of ED is based on solid evidence, a preventive strategy can be designed that will not only help to improve animal welfare, but also reduce the use of antimicrobial substances and provide an economic benefit for the farmer.

Table 1: No. of samples, farms and PCRs in 2015.

No. of samples	462
No. of farms	167
No. of PCRs	821

References

1. Frydendahl K (2002): Prevalence of serogroups and virulence genes in *Escherichia coli* associated with post-weaning diarrhea and edema disease in pigs and comparison of diagnostic approaches. Vet Micro 85: 169-182

2. Fairbrother JM, Gyles CL (2012): Colibacillosis. In: Zimmermann, J.J., Karriker, L.A., Ramirez, A., Schwartz, K.J., Stevenson, G.W. (Eds.), Diseases of Swine 10th Edition, Wiley-Blackwell, Oxford, pp. 723-749.

Table 2: Results of the analysis from 2015.

No. of positive samples	108	% of positive samples	23.3
No. of positive farms	50	% of positive farms	29.9
No. of positive PCRs	122	% of positive PCRs	14.8
No. of Stx2e positive PCRs from non-hemolytic *E. coli*	13	% of Stx2e positive PCRs from non-hemolytic *E. coli*	10.6
No. of herds misclassified	11	% of herds misclassified	22.0