Ileitis in nursery and fattening pigs – an underestimated disease

Enteric diseases in nursery and fattening pigs affect animal welfare, contribute to an increased use of antimicrobials and cause major economic losses on intensive pig production systems worldwide. Among the most common infectious diseases in pigs, ileitis (or porcine proliferative enteropathy, PPE) has been estimated to cause losses of € 0.50-1.00 per infected pig.

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Affected animals show non-specific clinical signs such as diarrhoea, reduced growth rate and poorer feed conversion or even no signs in case of subclinical ileitis. Disease awareness as well as rapid and accurate diagnostic methods are a prerequisite to identify subclinical or clinical ileitis to provide efficient treatment and prevention programs and, ultimately, to minimise losses.

Diagnosis

Apart from non-specific clinical signs, pigs may exhibit typical lesions detectable by macroscopic and/or histological examination. In acute cases of ileitis, a catarrhal inflammation or haemorrhages can be found in the mucosa and gut wall of the ileum (Fig. 1).

Chronic gut inflammation is characterised by the replacement of epithelial intestinal villi and intestinal crypts with proliferative immature epithelial cells, which result in considerable thickening of ileum and jejunal wall (Fig. 2).

Lawsonia intracellularis, the causative agent of ileitis, is a very fastidious organism that can only be cultivated and maintained in cell cultures. Thus, isolation is not routinely practised and the detection of L. intracellularis is based either on non-specific staining methods in tissue samples or polymerase chain reaction (PCR) on tissue, ingesta and faecal samples. PCR produces more specific and sensitive results by amplifying specific nucleotide sequences when compared to other diagnostic methods. There is a good correlation between the severity of histological lesions in the ileum and the concentration of genome equivalents of L. intracellularis in faeces of the same pig, detected by quantitative real-time PCR (qPCR) (Fig. 3).

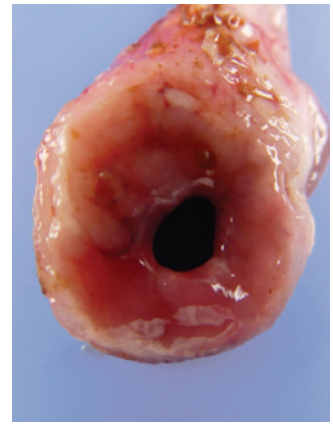
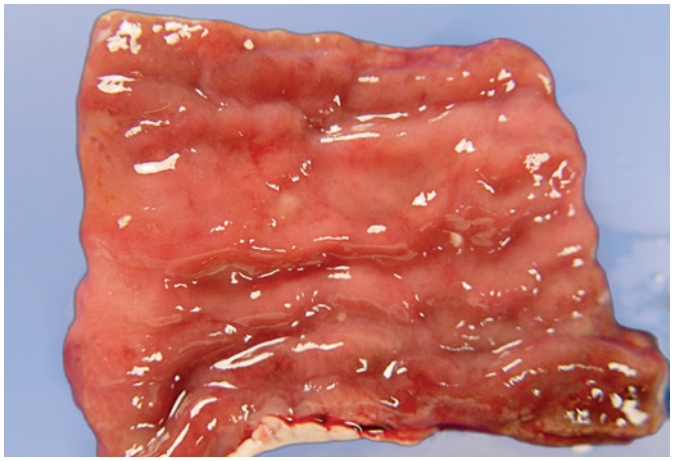


Fig. 2. Thickening of the ileum wall.

Fig. 1. Inflammation of the ileum showing an increased size of the mucosal folds.



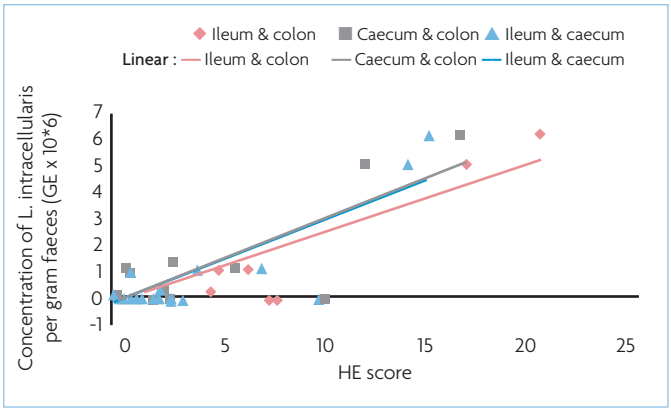


Fig. 3. Distribution of HE-scores (histological lesions visible after HE staining; score ranging from 0-28) and genome equivalents of L. intracellularis in faeces.

Further, it was shown that the clinical impact as measured by means of average daily weight gain in untreated or vaccinated pigs is correlated with the frequency of detecting L. intracellularis in faeces by PCR, making this the diagnostic method of choice for ileitis. At a herd level, the detection of specific antibodies in serum samples by enzyme-linked immunosorbent assay (ELISA) can help to determine the time of infection, but this test should not be used for confirmation of the disease.

Control and prevention

Acutely diseased animals require treatment with antimicrobials such as macrolides and tetracyclines. However, in view of the prudent use of antimicrobials and the threat of antimicrobial resistance, the long-term strategy for controlling and preventing ileitis should be based on farm-specific vaccination programs, biosecurity and the reduction of risk factors.

Field study

The current prevalence and the impact of L. intracellularis-infections in European pig herds is unknown. There is no recent data available which describes the percentage of enteric disease attributed to L. intracellularis infections, highlighting the need for a European-wide study to determine the prevalence of the pathogens in pigs.

An examination of pig herds in Denmark (DK), France (FR), Germany (DE), Spain (ES), the Netherlands (NL) and the United Kingdom (UK) is currently in progress (Fig. 4).

These countries were selected for the study, because they account for more than two thirds (67%) of the European pig population (DK: 12.8 million, FR: 13.1 million, DE: 27.6 million, ES: 30.0 million, NL: 12.3 million, UK: 4.7 million, total: 100.5 out of 150 million pigs in Europe).

At the end of the study, 144 pig herds – farrow-to-finish herds or fattening herds with only one source of fattening pigs – from six European

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countries will have been examined for the presence of L. intracellularis infection. In each herd, faecal samples of 15 nursery pigs (10-25kg bodyweight), 15 growing pigs (25-40kg bodyweight) and 15 finishing pigs (40-100kg bodyweight) are taken.

This sample size was calculated as being adequate to detect L. intracellularis with 95% confidence in batches of approximately 300 pigs of the same age category with an estimated prevalence of approximately 20% using the diagnostic test qPCR.

In view of their history of enteric diseases, 24 herds per country have been or will be included in the study.

To account for seasonal effects, sample collection was distributed over a period of one year, starting in October 2017. Animal selection is on a random basis.

The presence or absence of diarrhoea at the time of sampling is irrelevant to the selection of animals. Faecal samples are taken manually from the rectal ampulla. For each pig, a new pair of disposable gloves is used to avoid any cross contamination.

All faecal samples were tested by qPCR for their concentration of specific genome fragments of L. intracellularis.

Because the data collection

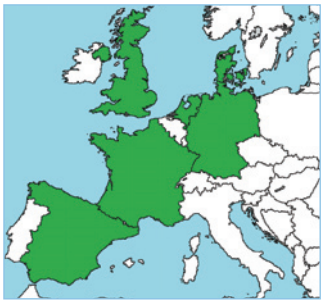

Fig. 4. Countries participating in the study are marked in green.

continued until October 2018, the first available results of 12 herds in Denmark, 11 herds in Germany, Spain and the Netherlands, eight herds in France and five herds in the UK will be discussed. The data presented are from samples taken between October 2nd, 2017 and March 30th, 2018.

L. intracellularis was detected in 100% of these herds. Significant differences could be identified in the number of positive samples per herd and country. While about half of the samples taken in Denmark tested positive for L. intracellularis genome fragments (48%), only a fifth of the samples in Spain (20%) and even less of those in France (18%) tested positive. Overall, about a third of all samples tested positive (34%; Table 1). The variation in samples positive for L. intracellularis per herd was particularly wide in the UK and the Netherlands (Fig. 5).

A large variability between age groups within and between countries was detected (Fig. 6).

On average, genome fragments of L. intracellularis were found in the faeces of 30% of nursery pigs, 42% of growing pigs and 33% of finishing pigs.

In Denmark, the majority of L. intracellularis was found in nursery pigs (83%), while in the UK, Germany and Spain, highest positive percentages were found in growing pigs (60%; 57%; 33% respectively).

In the Netherlands and France, the highest amount of samples testing positive per age category was found in finishing pigs (54%; 29% respectively).

These intermediary results will be completed as further data become available.

Conclusions

As L. intracellularis genome fragments were found in 100% of the sampled herds, L. intracellularis can be assumed to be a ubiquitous pathogen, at least in herds suffering from diarrhoea.

Therefore, antibody detection in serological samples to diagnose infection can be regarded as critical,

Country	Percentage positive
Germany (DE)	39
Denmark (DK)	48
Spain (ES)	20
France (FR)	18
The Netherlands (NL)	37
United Kingdom (UK)	46

Table 1. Percentage of samples per country positive for specific genome fragments of L. intracellularis.

although a final statement about the prevalence of the pathogens can only be made once data collection is complete.

Diagnosis requires the detection of L. intracellularis in animals suffering from diarrhoea by qPCR or pathological lesions in post mortem analyses.

The first results show differences in the prevalence of L. intracellularis between countries, the herd sampled and the sampled age group. Possible causes and influencing factors were recorded in a questionnaire and will be analysed and published as soon as the data collection is completed. ■

Fig. 5. Samples positive for L. intracellularis detected by qPCR per herds per country.

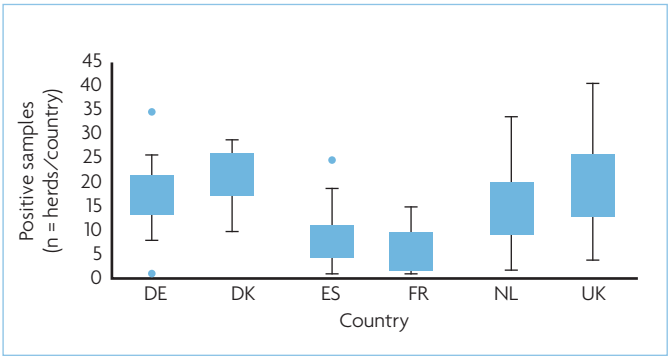

Fig. 6. Sampled pigs positive for L. intracellularis separated by age category and country.