Ileitis gains impact in Chinese pig production

Prior to the process of intensification of pig farms, case reports of proliferative enteropathy (PE, more popularly known as ileitis) due to *Lawsonia intracellularis* were noted worldwide, including in reports from China. However, these cases were confined to occasional cases of acute or chronic lesions in pigs on smaller non-intensive farms.

On those farms, epidemic viral and parasitic diseases were common; this fact was complicating any diagnosis of chronic PE; moreover, no clear laboratory confirmation was available.

Because the causative agent and hence live animal tests have only recently been developed, the only possible method for comparing the prevalence of proliferative enteropathy in China now and historically would be by comparison of percentages of affected pigs at slaughter. The past and current percentages of pigs at slaughter with lesions of PE indicate that in most global settings, a rate of less than 5% has been consistently present.

However, for enteric diseases, like PE, slaughter tests are not optimal. These test tend to yield more accurate results for respiratory and reproductive tract lesions, as these lesions tend to be last longer. Lesions of enteric diseases, like PE, swine dysentery or colibacillosis, are likely to have largely healed by the time the affected pig reaches slaughterweight. In addition, false results may occur due to the non-specific nature of mucosal ‘thickening’ within the ileum.

Tests capable of detecting a specific serologic response or antigen have become routinely available in the past five years. Once used, it became evident that PE is an endemic disease present in post-weaned pigs on most Asian farms, but with many pigs

![Graph showing percentage of positive pigs in different age groups](image-url)
developing only mild clinical or subclinical signs.

**Current prevalence in China**

Prevalence data have been gathered from participating diagnostic laboratories and specific published references, illustrating a high level of infection in China.

In a recent study, the faeces polymerase chain reaction (PCR) was used, with *Lawsonia*-specific primers used to detect the bacteria in DNA extracted from the faeces of pigs, usually pigs with diarrhoea.

Additionally, 54 Chinese farms were tested for serological response using a newly developed ELISA for *Lawsonia* specific antibodies (see results in Table 1 and Figure 1). The PCR test positive indicates that the pig was a clinical case of PE, actively excreting the organism at the time of the test, whereas the serology test indicates that the pig has been exposed to positive ileitis faeces in the recent weeks before the sample was collected.

Surveys of the overall prevalence of PE suggest that the percentage of positive Chinese farms is comparable to, or sometimes even higher than, the percentage of European farms that have some kind of on-going infection (Figure 2).

The widespread nature of the infection suggests that the disease is endemic on most farms, with many pigs presumably not showing obvious diarrhoea. Despite the absence of clinical signs, it has recently been shown that sub-clinical infection with *L. intracellularis* is nevertheless associated with reduced weight gain and increased body weight variation.

**Controlling PE**

An attenuated live vaccine formulation of *Lawsonia intracellularis* has been developed (Enterisol® ileitis, Boehringer Ingelheim). Because this is a live bacterial form that is administered orally to pigs, it is best administered in the middle of a seven-day antibiotic-free period. That way, any antibiotics that had previously been in the pig would be eliminated and would not kill any vaccine bacteria prior to its uptake.

Large controlled studies of on-farm immunisations of over 100,000 pigs against PE caused by *Lawsonia intracellularis* have been completed in North America and Europe. The results indicate that the vaccine was efficacious, with a significant reduction in lesions and reduction in the intestine colonisation of *Lawsonia intracellularis*. An interesting and consistent finding was that there was a significantly improved growth rate and reduced mortality in vaccinates compared to medicated control pigs.

**Chinese farm conditions**

However, this data had not yet been

<table>
<thead>
<tr>
<th>Groups</th>
<th>Vaccinates</th>
<th>Controls</th>
<th>Difference</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of pigs</td>
<td>2,278</td>
<td>2,189</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>PCR</td>
<td>2.56</td>
<td>2.74</td>
<td>-0.18</td>
<td>p &lt; 0.05</td>
</tr>
<tr>
<td>Average weight increase/ pig (kg)</td>
<td>77.0</td>
<td>72.9</td>
<td>+ 4.1</td>
<td>p &lt; 0.05</td>
</tr>
<tr>
<td>Average fattening time (days)</td>
<td>105</td>
<td>114</td>
<td>- 9</td>
<td>p &lt; 0.05</td>
</tr>
<tr>
<td>ADG (g)</td>
<td>734</td>
<td>639</td>
<td>+ 95</td>
<td>p &lt; 0.05</td>
</tr>
<tr>
<td>Export rate (%)</td>
<td>96.5</td>
<td>89.6</td>
<td>+ 6.9</td>
<td>p &lt; 0.01</td>
</tr>
<tr>
<td>Culling rate (%)</td>
<td>3.1</td>
<td>6.6</td>
<td>- 3.5</td>
<td>p &lt; 0.01</td>
</tr>
<tr>
<td>Mortality rate (%)</td>
<td>0.4</td>
<td>1.8</td>
<td>- 1.4</td>
<td>p &lt; 0.01</td>
</tr>
</tbody>
</table>
obtained from trials in Asia. Recently, a study in China was performed to confirm these results under Chinese farm conditions.

Six batches with a total of 4,680 pigs were allocated into three vaccinated groups of 890, 690 and 802 pigs respectively, and three control groups with 787, 743 and 768 pigs were included. The vaccinated groups were vaccinated against *L. intracellularis* at 3, 7 and 9 weeks of age, respectively. The control groups were not vaccinated. The water-vaccine solution was prepared and supplied for four hours consumption; hydrolytes and skimmed milk were added to the water to maintain the stability of the vaccine. Three days before and three days after vaccination, no antibiotics were used.

The results based on the comparison of vaccinated groups and control groups are as shown in Table 2. The economic benefit calculated based on the differences between the vaccinated and control groups incorporating all the production parameters as measured and analysed in this trial was mainly driven by:

- Feed consumption reduction: the saving of feed for growth from 30 kg to 105 kg equals RMB Yuan 25.5 (€2.45) per head in value.
- The good market price for export pigs: the market showed a 6.9% increase in export rate, equaling RMB Yuan 13.8 (€1.33) per head in value.
- The reduction in culling and mortality rate: based on the farm financial department, 1% improvement in culling or dead pigs can be evaluated as RMB Yuan 300 (€28.87) per head. Thus 5.5% culling rate and 1.4% mortality rate decrease equals RMB Yuan 4.2 (€0.40) per head.

The overall beneficial return including all other parameters is RMB Yuan 44.1 (€4.24) per head. The reduction of fattening time by nine days can improve the facility usage and the pig flow, and reduce the infection pressure.

**Important pathogen**

Results showed that *Lawsonia intracellularis* is an important enteric pathogen causing diarrhoea and reduced growth performance in Chinese pig farms. Vaccinating against this pathogen, to round it up, seems to be a necessary step in successful pig management in China, as the results of the above mentioned PCR test not only positively correlated with diarrhoea signs but also are positively coincident with the percentage of seropositive pigs.

So far, the comparative seroprevalence survey with the ELISA test suggests that pig practitioners in China have to face an earlier infection with *L. intracellularis* and face more affected pigs than veterinarians in Europe. It can be assumed that due to the infection patterns found the detrimental economic effects of PE are high in Chinese pig production. More research will be needed to find out the exact causes of the very early time of infection with *L. intracellularis* in Chinese pig farms. PP

References available on request

1 Shanghai Fengxian Vet Station, China.
2 Technical Director of Guangdong Pig Industry Association, China
3 Technical Director of Jiangxi Wufeng Farm, China
4 Nottingham University, UK