Pleuropneumonia in pigs – its importance and prevention

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Porcine pleuropneumonia induced by Actinobacillus pleuropneumoniae is one of the most important respiratory diseases of pigs in both acute and chronic forms. The infection is highly prevalent and difficult to handle. A good knowledge of the pathogenesis can help to diagnose the intensity of the disease according to the frequency of the typical lesions and also to develop a good strategy for the prevention.

Economic importance

A. pleuropneumoniae is widely spread particularly in Europe, Latin America and South-East Asia. A.p. was diagnosed in all European countries with different prevalence. The recent epidemiological studies indicate a very high rate of exposure reaching up to 100% of seropositivity of investigated farms. Of those: 90% in Northwest Germany, 96% in Belgium, 89% in Spain and 100% in Italy and 100% in Belarus.

Acute lesion of A.p. induced pneumonia.

	Coglapix	Competitor	Control
No. of pigs	8	8	8
Clinical score	2.0 ± 2.0	3.4 ± 2.9	6.8 ± 10.7
Lung score	2.6 ± 3.1	3.9 ± 3.6	5.9 ± 8.9

Table 1. Average clinical and pathological scores of vaccinated and non-vaccinated pigs.

	Coglapix	Control	p-value
No. of pigs per group	493	461	
ADG (g)	655	620	
Culled (%)	4	8	0.0097
Mortality (%)	2.2	6.7	0.0007
Total loss (%)	6.2	14.7	<0.0001

Table 2. Losses and performance in fattening pigs.

In Asia 18 out of 22 tested farms in Thailand and 18 out of 69 farms in the Philippines were positive. Those data suggest that the real prevalence is often underestimated and appropriate screening diagnostic methods are necessary.

Dramatically increased mortality due to haemorrhagic necrotic pneumonia, as high as 10-20% during outbreaks, is a threat to the economics of the farm. However, enormous losses due to lower growth performance are also recorded in chronically infected herds, that often have subclinical course of infection. Pleuropneumonia can cause a 34% decrease in daily gain and a 26% decrease in feed efficiency.

Pleurisy scoring

The lesions in the respiratory tract induced by A.p. are mostly associated with the direct effect of RTX toxins named Apx I, Apx II and Apx III. These Apx toxins exert cytotoxic effect on various cell types including endothelial cells and macrophages.

Apx together with lipopolysaccharides (LPS) of A.p. induce the local over production of proinflammatory cytokines, complement and toxic oxygen metabolites.

Damage of endothelial cells by Apx and the action of above mentioned factors lead to constriction of pulmonary airways, vasodilatation, activation of coagulation pathway, localised ischaemia and subsequent necrotic pneumonia and pleuritis characteristic for porcine pleuropneumonia.

Those lesions are localised predominantly in the dorsal part of caudal lung lobes.

This typical lesion localisation is used as a useful indicator for the differential diagnosis. Recently the new SPES method for screening the pleurisy at the slaughterhouse was described by Dottori et al (2007).

It is used for the semiquantitative evaluation of lesions suggestive for previous chronic infection by A.p.

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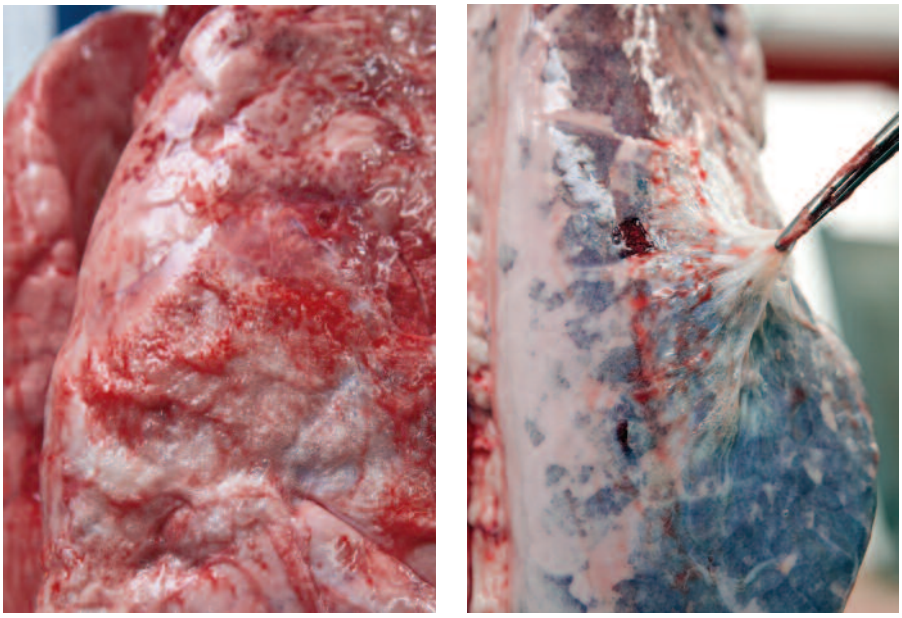

Chronic pleurisy suggestive for previous A.p. infection

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SPES, together with the serological examination and clinic-pathological history of the farm, completes the picture of incidence and severity of pleuropneumonia in the herd.

Using SPES, Meyns et al (2010) evaluated various risk factors associated with the prevalence of pneumonia and pleurisy on 60 farms in Belgium, where 20.8% of examined lungs exhibited pleurisy suggestive for A.p. infection. Percentage of A. pleuropneumoniae seropositivity and also number of pigs/pen during the nursery period positively correlated with the pleurisy score, while age at weaning was negatively correlated.

Prevention

The fact that convalescent pigs are almost completely immune to homologous challenge indicated the possibility of active immunisation against A.p. For effective protection against various serotypes, immunity against of all major factors of virulence is necessary.

Considering that none of the A.p. serotypes produce all of the Apx toxins at the same time, those must be all present in an effective vaccine. Indeed in numerous experimental and field trials with the toxoid based A. pleuropneumoniae vaccine Coglapix (Ceva SA) containing all Apx I, II, III and a controlled amount of LPS, effective protection was accomplished in vaccinated pigs.

Reduced lung lesions

Tenk et al (2011) described significant reduction of lung lesions in Coglapix vaccinated pigs in the experimental high dose challenge study with the calculated vaccine efficacy of 76.7%, compared to 0% achieved by competitor's vaccine. This confirmed previous results when Coglapix conferred high level of protection against the experimental challenge (Table 1.)

In farm conditions Coglapix vaccinated pigs performed significantly better than non-vaccinated control animals in terms of survivability and growth as seen in Table 2.

A. pleuropneumoniae is a typical primary pathogen. The immunosuppressive factors such as PCV2 infection can obviously negatively impact the health status of the batch, co-infected by bacteria.

Even in PCV2 stabilised herds, however, A.p. infection has to be well controlled with the appropriate attention.

Krejci et al (2011) described that pigs vaccinated against PCV2 were still susceptible to A.p. infection and performed worse in the fattening period, compared to pigs vaccinated against A. pleuropneumoniae by Coglapix (see Table 3).

Conclusion

A. pleuropneumoniae is widely spread in most pig herds. SPES scoring method is a highly indicative tool for evaluating chronic lesions induced by A.p. Successful prevention of the losses due to mortality and culling as well as decreased growth performance can be achieved by vaccination using the effective vaccine, Coglapix.

Coglapix contains major virulence factor-derived immunogenic components, including all Apx toxoids and a well controlled level of LPS. This vaccine confers a high degree of protection against both experimental and natural infections of A.p. ■

Table 3. Performance in fattening pigs vaccinated either against PCV2 of with Coglapix against A. pleuropneumoniae.

	Mortality (%)	ADG (g)
PCV2	3.2	600
Coglapix	1.9	661

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