

Porcine pleuropneumonia, the importance of a broad vaccine induced protection

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Porcine pleuropneumonia due to *Actinobacillus pleuropneumoniae* (Ap) is a highly contagious disease which still remains causing significant losses to the swine industry. The majority of contaminated farms deal with the chronic forms in which pigs having persistent lung and pleurisy lesions do not match their growth potential.

Outbreaks with the increased mortality of acutely infected pigs occur mainly when the immunity is compromised or a new serotype appears in the herd.

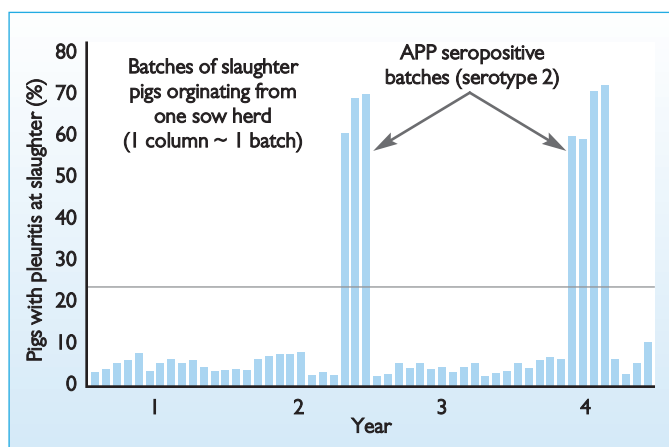
Country specific serotypes

The serotype repartition is highly variable in different countries. Some serotypes may be more prevalent in a certain territory and are considered as 'country specific', however usually more serotypes occur in the same country (Table 1).

The presence and prevalence of various serotypes changes over time and serotypes not or less present in the past may become most important. For example in the UK serotype 3 was predominant in 2004, while in 2009 it was serotype 8.

Multiple serotypes are often identified

Fig. 1. Seropositivity to Ap 2 and incidence of pleurisy in subsequent batches (Busch E. 2010).



Country	Major serotypes	Source
Denmark	2,5,6	Angen 1998
China	7,1,2,3	Qigai He 2013
Czech Republic	2,9,12	Satran 2002
Finland	2	Heinikainen 2013
Philippines	3,5,11	Torres 2006
Spain	7,4,2	Maldonado 2009
Taiwan	1-9-11, 3	Hsu 2013

Table 1. The occurrence of major serotypes in different countries.

within one herd and moreover different serotypes can be isolated from sows and fatteners on some farms.

Even in the stable, low prevalence farms the risk of the outbreaks exists with occasionally exploding seropositivity, correlating with the increased incidence of pleurisy in slaughtered pigs (Fig. 1).

Exact diagnosis essential

In summary, the variability and presence of multiple serotypes maintain enormous demands on the exact diagnosis and also on the multi-serotype focused preventive measures.

Besides the factors of virulence which are

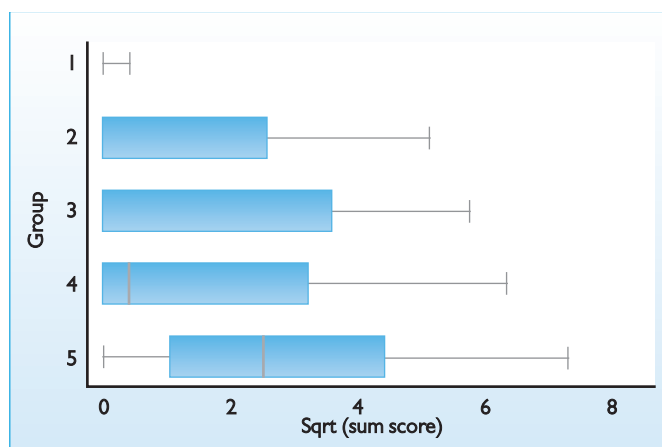
ApXI titre (EU/ml)	ApXII titre (EU/ml)	ApXIII titre (EU/ml)
50.9	19.2	10.0

Table 2. ELISA titres of ApX I, II and III specific antibodies in rabbits two weeks after the second vaccination with Coglapix.

related to the lipopolysaccharide determinants of the serotype specificity, there are three Apx toxins which are significantly involved in the pathogenesis of pleuropneumonia. Apx toxins are produced usually in couple in various combinations by different

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Fig. 2. Lung lesions scores per group (1 = Coglapix, 2 = competitor toxoid vaccine, 3 and 4 = bacterin vaccines, 5 = control).



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serotypes. The active immunity against ApxI, ApxII and ApxIII then provides the protection independent on the serotype involved in the infection.

That is why Coglapix, the vaccine against *A. pleuropneumoniae* developed by Ceva besides the LPS fraction, also expresses all Apx toxoids. Their presence was determined in the industrial antigens by immunoblotting.

Strong immune response

Coglapix elicits a strong immune response to Apx toxoids. Vaccinated rabbits seroconverted with significant titres of anti Apx antibodies two weeks after booster.

The induced antibody titres were evaluated using three in-house Apx-specific competitive ELISAs based on specific monoclonal antibodies (Table 2).

High degree of clinical protection induced by Coglapix, independent on the serotype

Table 3. Incidence of lung lesions (%).

	Serotype 1	Serotype 2	Serotype 7
Coglapix	35.3	38.1	17.6
Control	100	95.2	94.1

	Serotype 1	Serotype 2	Serotype 7
Coglapix	11	15	5
Control	100	149	114

Table 4. Lung lesion scores.

specificity was demonstrated in numerous experiments. The recent studies determined 24 weeks duration of protection against the challenge with Ap serotypes 1, 2 or 7.

Coglapix vaccinated pigs had significantly lower incidence and extension of the lung lesions in comparison to the non-vaccinated control (Tables 3 and 4). Such long lasting immunity provides efficient prevention even in farms raising heavy pigs. The comparative trial with bacterin vaccines demonstrated superior efficacy of Coglapix in the protection against Ap serotype 5 (Fig. 2).

The bacterin vaccines contained the homologous serotype antigens as the strain used in the challenge, while serotype 5 is

heterologous for Coglapix. This fact confirmed the interest of vaccines providing cross serotype protection.

Conclusion

Multiple serotype presence in the pig farms and the continuous risk of the appearance of a new strain of different serotype in a particular farm requires a broad protection against all serotypes.

Toxoid vaccines provide higher degree of active immunity than the bacterin ones in general, even against the serotypes which are homologous for the bacterin vaccines.

Coglapix conferred long lasting protection against Ap strains belonging to various serotypes and demonstrated its capability to prevent porcine pleuropneumonia in diverse conditions. ■

References are available from the author on request