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## Prevalence of major pig production diseases in 2 provinces of Northern Vietnam (Hoa Binh and Vinh Phuc)

### Summary report

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## **Background and objectives**

Over the recent years ILRI has been working in the pig value chain in selected regions of Vietnam with focus on pig productivity and doing assessments of animal health and food safety constraints using various tools such as PRA, questionnaires and participatory methods. Diseases in pigs have been identified as a key constraint by farmers and other VC actors.

In order to prioritize interventions to improve productivity in pigs in Vietnam, there is a need to better understand the prevalence of various potentially important production diseases and underlying pathogens. Available information is scarce or not updated. Therefore the aim of this project is to test samples collected in a cross-sectional on-farm screening for various diseases of relevance for pig productivity.

## **Methods**

The presented cross-sectional study was conducted in 2 provinces of Vietnam which included Hoa Binh and Vinh Phuc. Selection criteria for Hoa Binh was that the province is a selected site of ILRI CRP Livestock and Fish (L&F) program. Vinh Phuc province was selected as it is an important gate to transport animals and animal products to Hanoi. The latter was also based on full compliance of farmers and authorities and feasible logistics. In each province 1 District was selected, furthermore 6 communes in the selected district. In each selected commune 14 households (HH) with pigs were randomly sampling. Only HH with 20-200 heads of pigs were selected for sampling. Within each HH up to five pigs (age range between 1.0 and 3.5 months) were randomly chosen for serological sampling. Following these 840 pigs were sampled (420 per province).

A checklist was applied to collect basic data on farm management (free rooming, housing) and animal data (age, sex, breed ect.). The sample size calculation used a 50% sero-prevalence with a 5% precision. The scope of this study was to test samples for the presence of antibodies for porcine respiratory and reproductive syndrome virus (PRRS), porcine circovirus Type-2 (PCV2), Mycoplasma hyopneumonia (EP) and Porcine Epidemic Diarrhea (PED). All selected diseases have been prioritised by farmers in previous assessments (ILRI, unpublished results, PigRISK) or by expert opinion (Dr Nguyen Viet Khong, NIVR; Dr D V Nhiem, VNUA Vet Faculty). Other pathogens might be included based on budget availability and interest of partners.

The executed survey was organised and implemented by the National Institute for Veterinary Research, NIVR under the guidance of ILRI. Sampling in the 2 targeted provinces was conducted in December 2015. Serological sampling was done under minimal stress conditions for the pig. Collected serum samples were immediately stored on ice and transported to NIVR where all serological tests were conducted. Ethical approval for the study had been gained by relevant Vietnamese authorities.

All samples were subjected to ELISA tests, carried out at the National Institute for Veterinary Research (NIVR), Hanoi to assess the presence of antibody responses to the targeted four production diseases.

The ELISA tests used were as follows:

- IDEXX *M. hyo.* (Mycoplasma hyopneumoniae) Ab Test. IDEXX.  
[https://www.idexx.com/pdf/en\\_us/livestock-poultry/mhyo-ab-test-brochure.pdf](https://www.idexx.com/pdf/en_us/livestock-poultry/mhyo-ab-test-brochure.pdf)
- PED., Porcine Epidemic Diarrhea. Shenzhen Lvshiyuan Biotechnology Co.,Ltd (LSYBT). <http://www.lsybt.com/en/content/?784.html>
- PRRS. Porcine reproductive and respiratory syndrome virus. BioNote.  
<http://www.bionote.co.kr/File/Upload/2013/04/24/2013-04-24%2818%29.pdf>
- PCV2. Porcine Circovirus Type 2. BioNote.  
<http://www.bionote.co.kr/ANIMAL/ENG/Production/procine.asp?LT=2&MODE=V&Idx=517&bcIdx=18&P=1&BLT=L&PC=20&gAIdx=&gSearchText=>

## Results

Two meetings with Sub-DAH (Department for Animal Health) were conducted to prepare for the field visits in Hoa Binh and Vinh Phuc provinces. The NIVR team was led by Dr, Khong (PI) and followed by Dr. Vuong (head of virology), Dr. Hang (head of Epidemiology), MS. Thanh (vice head of science) and Dr. Dai (virology staff).

As planned a total of 840 serum samples were collected following the study design in both provinces and respective districts during the period of 1<sup>st</sup> and 15<sup>th</sup> of December 2015 as shown in Table 1. In addition an on-farm checklist was applied for each selected households as well as GPS readings were recorded.

Table 1. Samples collected in pigs for Hoa Binh and Vinh Phuc

Province/Dis	Commune	No. of HH	No. of sample
Hoa Binh	Nhuan Tranh	14	70
Luong Son	Tu Yen	14	70
	Hoa Son	14	70
	Thanh Lap	14	70
	Lien Son	14	70
	Cao Thang	14	70
Vinh Phuc	Bac Binh	14	70
Lap Thach	Quang Son	14	70
	Lien Son	14	70
	Lap thach town	14	70
	Hop Ly	14	70
	Ngoc My	14	70
<b>Total</b>	<b>12 communes</b>	<b>168</b>	<b>840</b>

Serological results:

Serological results (antibody responses) for PCV2, PRRS, PED and Mycoplasma are presented in table 1 and figure 1.

Results indicate highest serological responses for PED (60.2%) followed by PCV2 (57.9%), Mycoplasma (22.5%) and PRRS (14.5%). There is a tendency for higher serological responses for Vinh Phuc compared to Hoa Binh with a significant higher prevalence's reported for PED and PCV2.

Figure 1: Sero-prevalence for PCV2, PRRS, Mycoplasma hyopneumoniae and PED

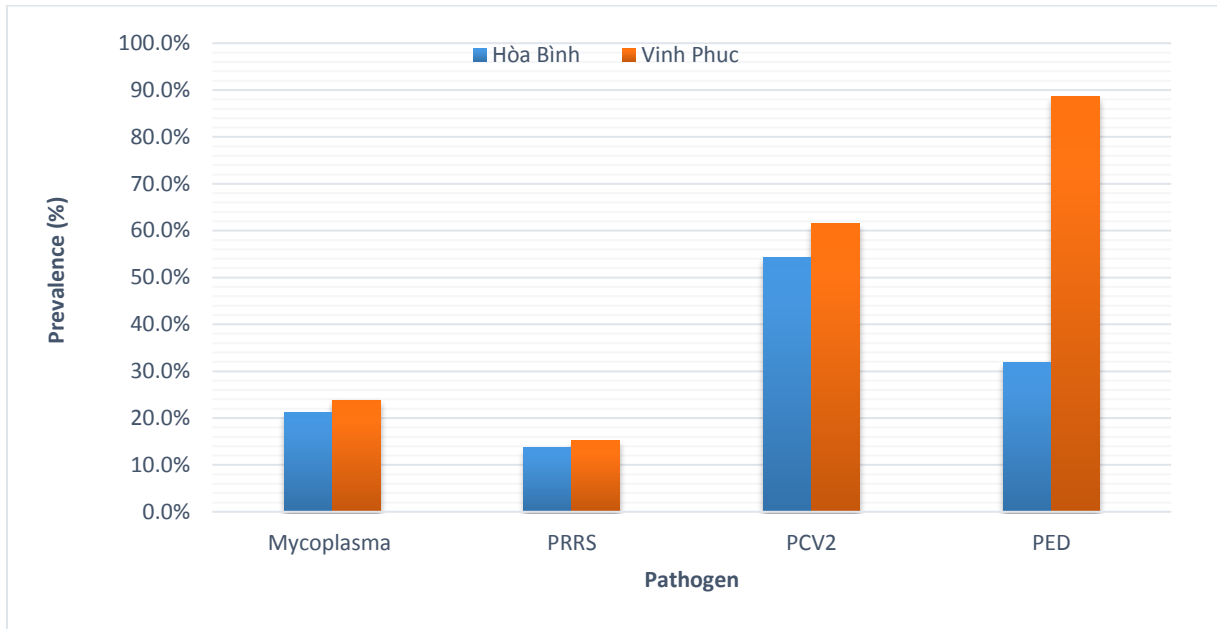


Table 1. Sero-prevalence for PCV2, PRRS, Mycoplasma hyopneumoniae and PED stratified by province

Pathogen	Hoa Binh	Vinh Phuc	Overall
PCV2	54.3% (228/420) <sup>a</sup>	61.4% (258/420) <sup>b</sup>	57.9% (486/840)
PRRS	13.8% (58/420) <sup>a</sup>	15.2% (64/420) <sup>a</sup>	14.5% (122/840)
Mycoplasma	21.2% (89/420) <sup>a</sup>	23.8% (100/420) <sup>a</sup>	22.5% (189/820)
PED*	31.9% (134/420) <sup>a</sup>	88.6%/(372/420) <sup>b</sup>	60.2% (506/420)

<sup>AB</sup> Significant difference between provinces (p<0.05)

\*Lab tests for PED were repeated with a new batch of ELISA kits due to unexpected high background noises.

Serological responses were significantly influenced by age of pigs but the level of influence differed by pathogen (table 2). While for Mycoplasma and PRRS response raised significantly with increasing age this was opposite for PCV2.

Young pigs (1 to < 2 months) showed only limited serological response for PRRS followed by Mycoplasma (11% and 19% respectively), while for PCV 2 and PED approximately 2/3 of pigs in this age class were serological positive (Table 2).

Table 2. Sero-prevalence for Mycoplasma hyopneumoniae, PRRS, PCV2 and PRRS stratified by age classes

Age classes	Mycoplasma	PRRS	PCV2	PED
1 to < 2 months	19% <sup>a</sup>	11% <sup>a</sup>	66% <sup>a</sup>	66% <sup>ab</sup>
2 to < 3 months	21% <sup>a</sup>	15% <sup>a</sup>	56% <sup>b</sup>	54% <sup>a</sup>
3 months and older	35% <sup>b</sup>	21% <sup>b</sup>	50% <sup>ab</sup>	70% <sup>b</sup>

<sup>AB</sup> Significant difference between age classes (p<0.05)

The proportion of serological responses including more than one pathogen varied depending on pathogen. PRRS sero-positive pigs were more likely to be also seropositive for Mycoplasma hyopneumoniae (Odds ratio: 2.3 (1.5; 3.8)) and PED (1.6 (0.96; 2.8)) while for other pathogens no differences were observed.

#### Results from the applied check list

Results of the checklist indicate that 52% of sampled pigs were female, while 48% were male respectively. Most of the farms used concrete floor for pig raising while free rooming of pigs was not practiced.

According to farmer's information the majority of pigs had a vaccination history using vaccine against classical swine fever, pasteurellosis and salmonellosis. Contrary, less than 10% of pigs were vaccinated against PRRS, PED, Mycoplasma and PCV2.

#### **Conclusions**

- Results indicate the presence of the targeted infections in pigs in the study area with varying sero-prevalence in terms of pathogen and location.
- Co-infections (serological responses to more than one pathogen) were common.
- For selected pathogens the proportion of co-infections (expressed as serological response) differed significantly.
- Vaccination against pathogens investigated in this study were not common (<10%). Therefore the observed serological responses can be expected to be mainly caused by field (natural) infections.
- One of the limitation of this study is, that it used serological response to antibodies for prevalence estimates. Hence no conclusions can be made on the clinical impact of the pathogens.

**Further studies:**

- Future research is needed to contextualise the findings from serology (based on antibody responses) in terms of their clinical relevance e.g. what is the proportion of pigs actually showing clinical symptoms
- Further research should further investigate the clinical importance and economic impact of co-infections using direct antigen detection methods combined with clinical data recording.

**Implications for producers**

- The moderate to high prevalence for diseases investigated in this survey indicates that exposure to these pathogens is common as vaccination is the exception (less than 10%)
- One of the options to mitigate or reduce diseases exposure is applying of improved biosecurity. While Western standard biosecurity measures might be not always feasible light touch measures such as restricted access of visitors to the pig houses or use of disinfection matrices can be further promoted to farmers.
- Also farmer's awareness on the investigated diseases could be improved through training.
- As the use of vaccination was low based on farmers response efforts should be made to improve vaccination coverage for diseases for which vaccination is available

**Implications for policy makers**

- Policy makers should be informed on the high prevalence's for PED and PVC2 in this survey to adapt their surveillance and control priorities.