Risk factors for porcine reproductive and respiratory syndrome outbreaks in Vietnamese small stock farms

VM Truong^{*†} and B Gummow^{*‡§}

^{*} School of Veterinary and Biomedical Sciences, James Cook University, Townsville, Queensland, 4811, Australia.

[†] Regional Animal Health Office No. 2, Department of Animal Health of Vietnam, No. 23 Danang Street, Haiphong City, Vietnam.

[‡] Department of Production Animal Studies, Faculty of Veterinary Science, University of Pretoria, Onderstepoort, South Africa.

[§] Author for correspondence. Email: bruce.gummow@jcu.edu.au

[illegible]

[illegible]

Supplementary Table 2. Hierarchical models constructed to select risk factors associated with PRSS infected households in Yenhung district, Quangninh province, Vietnam, 2010 based on results from the univariate logistic regressions (Number of households =300).

Explanatory variables	Category	Odds Ratio	95% C.I.		Coefficient	S.E.	Z-Statistic	P-Value
			LCI	HCI				
Model 1: Location of the farms								
Distance from the pen to a pig abattoir	< 500 m (DP1)	4.22	1.68	10.57	1.44	0.47	3.08	0.0021
	501 – 1000 m (DP2)	2.28	1.15	4.50	0.83	0.35	2.38	0.017
	> 1000 m	Reference						
Model 2: Farm management								
Introduction of newly purchased pigs without isolation (IP)	Yes (IPY)	2.60	1.08	6.26	0.96	0.45	2.14	0.032
	No (IPN)	Reference						
Using water from irrigation system for pig raising	Yes (WIRRY)	21.46 (-)	11.26	40.88	3.06	0.33	9.32	<0.0001
	No (WIRRN)	Reference						
Model 3: People and animal contact								
No confinement of pet animals (CONFN)	Yes	2.51	1.13	5.58	0.92	0.41	2.27	0.023
	No							
Family member visited other PRRS affected farms	Yes (OUTBY)	3.93	2.20	7.00	1.37	0.30	4.64	<0.0001
	No (OUTBN)	Reference						

Supplementary Figure 1. Location of Quangninh province and Yenhung district in Northern Vietnam.

Supplementary Questionnaire

NB! This questionnaire applies only to April-June period, 2010!

1. General information		
1.1	Date (dd-mm-yyyy)	- -
1.2	Full name of pig owner (Capital letter)	
1.3	Address (House No, village)	
1.4	Phone number (if available)	
1.5	Village (Capital letter)	
1.6	Commune (Capital letter)	

1.7 District (Capital letter)

1.8 Full name of interviewer (Capital letter)

2. Herd information (Please tick in the appropriate box)**2.1. Farm type**

Commercial
farm

Small scale (<100 total pigs)

2.2. What kind of pigs did you raise?

	Number			Number	
Young pig (10 to 20 kgs)			Sow		.....
Finishing (over 20 kg)			Boar		.....

2.3. Herd size

How many pigs in total did you raise?

3. Information about premise.

3.1. How many pens?		Min	Most likely	Max
3.2. What kind of floor is it?	3.3. How large is each pen (m ²)?	.....	.....	.....
Concrete	3.4. How many pigs per pen?	.....	.....	.....
Soil	3.5. How many feeders per pen?	.....	.....	.....
Partially slated	3.6. How many drinkers per pen?	.....	.....	.....

3.7. How far is the pen from your living room?

3.8. How far is the pen from the main roads (*)?

< 10 m
From 11 to 20 m
Over 20 m (details)

<100 m
From 101 to 200 m
Over 200 m (details)

(*) Main roads are defined as national roads, district roads or commune roads

3.9. What kind of breed?	Min	Most likely	Max
Local breed	.....	.....	.....
How many? .....	.....	.....	.....

Hybrid breed (localxforeign breed)		How many? .....	.....	.....	.....
Foreign breed		How many? .....	.....	.....	.....

Notes: - Local breed is defined as Mongcai breed
 - Hybrid breed is formed by crossing local breed with foreign breed
 - Foreign breed is defined as Landrace, Duroc, Large White, Yorkshire or crossbred between them.

3.3. Gender

No of males

No of females

3.4. Is there an abattoire in your farm?		3.14. Is there local market near your farm?	
Yes	No	Yes	No
3.5. If yes, what animal are slaughtered?		3.15. If yes, how far is from your home?	
3.6. How far from the pen?		Within 500 m	From 500 to 1000 m
Within 500 m	From 500 to 1000 m	From 1000 to 2000m	Over 2000m
From 1000m to 2000m	Over 2000m.....		

4. Herd management, hygiene, feed.

4.1. Is the pen solid and liquid wastes treated by		4.2. How often is the pen/farm disinfected?	
Biogas plant		Daily	
Taken far away from the pen		2-3 times/week	
Untreated		Never	
Other (details)	.....		
4.3. How often do you clean the pen, feeder, drinker		4.4. How do you process the feed?	
Daily		Buy commercial feed	
2-3 times/week		Self process from agri-products	
Sometimes		Swill from kitchen, restaurant?	
Never		Cooked	
		Not cooked	
4.5. Do you apply all in/all out policy in your farm?		4.6. Do you separate newly bought pigs in an isolation zone before integrating into the herd?	
Yes		Yes	
No		If yes, for how long?	.....

4.7. Your pigs were totally confined?	Yes	No	
	No		
4.8. Where did you buy your breeding pigs?			
From the livestock market		From village where you live	
Homebred raising pig		From other places (details)	

5. Health management

5.1. During April-June, did your pigs exhibit the following clinical signs:							
	<33%	34-66%	>66%		<33%	34-66%	>66%
High fever($\geq 40.5^{\circ}\text{C}$)				Abortion			
Anorexia				Stillbirths			
Red discolorations				Weak piglets			
Blood spot in the body				Other (details).....			
Blue ears				Number of death			
Lethargy							

5.2. How did you deal with your sick pigs?	Report to vet. authority	
	Treatment?	
	If yes, what medicine?	.....
	Sell to the butcher	
	Other (details)	.....

5.3	During April to June period did you buy in from livestock markets or other places?	Pig	Number
		Other animals.....	.....
5.4	If yes, did you separate the newly bought animal from the herd in an isolate pen?	Yes	
		No	
		How long? Details	.....

5.5.	Did you take your live animals to livestock market or other places during that time?	Pig	.....
		Other animals.....	.....
5.6	Has your pigs been vaccinated against any the following diseases?	PRRS	
		Which type? NA EU	
		When were they vaccinated?	
		By who? Yourself veterinarian	
		CSF How long?	
		Pasteurellosis How long?	
		Salmonellosis How long?	
		Others.....	
5.7	Which ways were your sows impregnated?	Purchase of semen for AI	
		Fresh semen frozen semen	
		Sharing boars with other sows	
5.8	Do you know about the health status of boars in the AI centre?	Yes	
		No	
5.9. During the April-June period, who visited your pig pen or your pig farm?			
Family member		Veterinary practitioner	
How often: Daily weekly monthly		How often: Daily weekly monthly	
Pig trader		Neighbours	
How often: Daily weekly monthly		How often: Daily weekly monthly	
Feed supplier		Other (details) 	
How often: Daily weekly monthly		How often: Daily weekly monthly	
5.10. During April-June period, Did you keep other animals? (dog, cat, chicken, duck)		5.11. During that time, did you see the wild animals like rat, wild birds	
Yes		Yes	
Which animal? 		Which animal?	
Were they totally confined?		Rat	
Yes		Wild bird	
No		Which bird? Details 	

Partially confined			
5.12. Were any of these animals sick during this period?			
Yes		If yes, which clinical signs did they show?	
No		.....	
5.13. During April-June period, Did you go to the place where outbreak was occurring?		5.14. During that time, did you sell your pig to the butcher or dealer?	
Yes		Yes	
Which place?	.....	When?	.....
5.15. During April-June period, Did you see anybody buy diseased pigs in your residence?		5.16. During that time, did you see anybody in your residence sell the diseased pigs?	
Yes		Yes	
No		No	
No idea		No idea	

An additional question was supplement to the questionnaire during survey.

Which source of water did you use for raising pig?

Pipe water

Underground

water From

irrigation system

THANK YOU FOR YOUR CO-OPERATION IN THIS INVESTIGATION.

INTERVIEWER