USING ROPES TO DETECT FOOT-AND-MOUTH DISEASE VIRUS INFECTION IN PIGS

- *It is important to constantly monitor for infectious diseases in high density farms.*
- *Pigs are known to excrete large amounts of FMD virus, even before clinical signs are noticed, making it important to detect the virus rapidly.*
- *Rope sampling is a non-invasive method of oral fluid collection which allows samples to be tested for various infectious agents and assist with disease surveillance.*
- *Ropes were used to collect oral fluids from pigs infected with FMD virus and subsequently tested for FMD virus RNA.*

Vosloo et al
Australian Animal Health Laboratory, CSIRO, Australia
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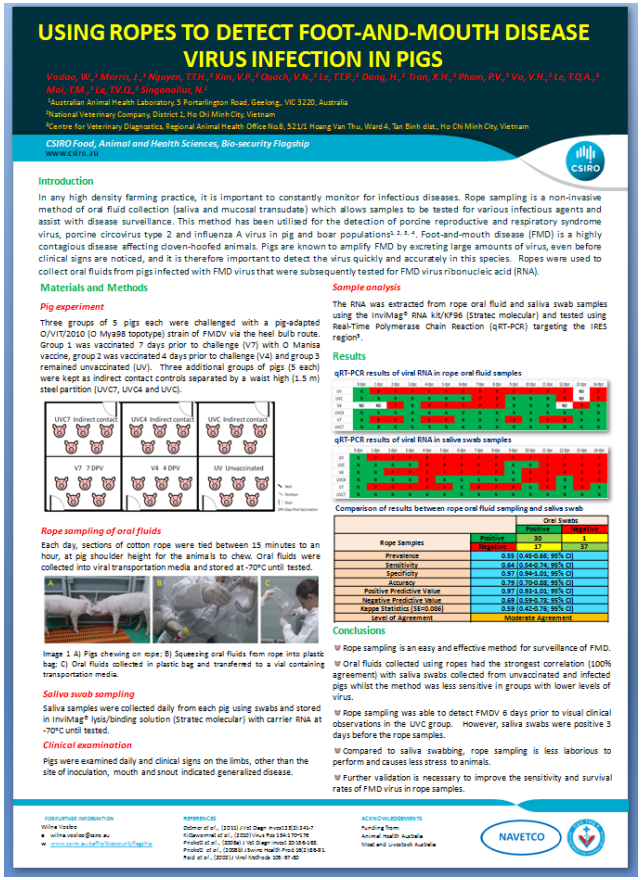
Rope sampling to collect oral fluids

A) Pigs chewing on rope

B) Squeezing oral fluids from rope into plastic bag

C) Oral fluids collected in plastic bag and transferred to a vial containing virus transportation media.

Comparison of results between rope oral fluid sampling and saliva swab



USING ROPES TO DETECT FOOT-AND-MOUTH DISEASE VIRUS INFECTION IN PIGS

Vosloo, W.,[1] Morris, J.,[1] Nguyen, T.T.H.,[2] Kim, V.P.,[2] Quach, V.N.,[2] Le, T.T.P.,[2] Dang, H.,[2] Tran, X.H.,[2] Pham, P.V.,[2] Vo, V.H.,[3] Le, T.Q.A.,[3] Mai, T.M.,[3] Le, T.V.Q.,[4] Singanallur, N.[1]

[1]Australian Animal Health Laboratory, 5 Portarlington Road, Geelong, VIC 3220, Australia
[2]National Veterinary Company, District 1, Ho Chi Minh City, Vietnam
[3]Centre for Veterinary Diagnostics, Regional Animal Health Office No.8, 521/1 Hoang Van Thu, Ward 4, Tan Binh dist., Ho Chi Minh City, Vietnam

CSIRO Food, Animal and Health Sciences, Bio-security Flagship
www.csiro.au

Introduction

In any high density farming practice, it is important to constantly monitor for infectious diseases. Rope sampling is a non-invasive method of oral fluid collection (saliva and mucosal transudate) which allows samples to be tested for various infectious agents and assist with disease surveillance. This method has been utilised for the detection of porcine reproductive and respiratory syndrome virus, porcine circovirus type 2 and influenza A virus in pig and boar populations[1, 2, 3, 4]. Foot-and-mouth disease (FMD) is a highly contagious disease affecting cloven-hoofed animals. Pigs are known to amplify FMD by excreting large amounts of virus, even before clinical signs are noticed, and it is therefore important to detect the virus quickly and accurately in this species. Ropes were used to collect oral fluids from pigs infected with FMD virus that were subsequently tested for FMD virus ribonucleic acid (RNA).

Materials and Methods

Pig experiment

Three groups of 5 pigs each were challenged with a pig-adapted O/VIT/2010 (O Mya98 topotype) strain of FMDV via the heel bulb route. Group 1 was vaccinated 7 days prior to challenge (V7) with O Manisa vaccine, group 2 was vaccinated 4 days prior to challenge (V4) and group 3 remained unvaccinated (UV). Three additional groups of pigs (5 each) were kept as indirect contact controls separated by a waist high (1.5 m) steel partition (UVC7, UVC4 and UVC).

Rope sampling of oral fluids

Each day, sections of cotton rope were tied between 15 minutes to an hour, at pig shoulder height for the animals to chew. Oral fluids were collected into viral transportation media and stored at -70°C until tested.

Image 1 A) Pigs chewing on rope; B) Squeezing oral fluids from rope into plastic bag; C) Oral fluids collected in plastic bag and transferred to a vial containing transportation media.

Saliva swab sampling

Saliva samples were collected daily from each pig using swabs and stored in InviMag® lysis/binding solution (Stratec molecular) with carrier RNA at -70°C until tested.

Clinical examination

Pigs were examined daily and clinical signs on the limbs, other than the site of inoculation, mouth and snout indicated generalized disease.

Sample analysis

The RNA was extracted from rope oral fluid and saliva swab samples using the InviMag® RNA kit/KF96 (Stratec molecular) and tested using Real-Time Polymerase Chain Reaction (qRT-PCR) targeting the IRES region[5].

Results

qRT-PCR results of viral RNA in rope oral fluid samples

qRT-PCR results of viral RNA in saliva swab samples

Comparison of results between rope oral fluid sampling and saliva swab

		Oral Swabs	
		Positive	Negative
Rope Samples	Positive	30	1
	Negative	17	37
Prevalence		0.55 (0.45-0.66, 95% CI)	
Sensitivity		0.64 (0.54-0.74, 95% CI)	
Specificity		0.97 (0.94-1.01, 95% CI)	
Accuracy		0.79 (0.70-0.88, 95% CI)	
Positive Predictive Value		0.97 (0.93-1.01, 95% CI)	
Negative Predictive Value		0.69 (0.59-0.78, 95% CI)	
Kappa Statistics (SE=0.086)		0.59 (0.42-0.76, 95% CI)	
Level of Agreement		Moderate Agreement	

Conclusions

- Rope sampling is an easy and effective method for surveillance of FMD.
- Oral fluids collected using ropes had the strongest correlation (100% agreement) with saliva swabs collected from unvaccinated and infected pigs whilst the method was less sensitive in groups with lower levels of virus.
- Rope sampling was able to detect FMDV 6 days prior to visual clinical observations in the UVC group. However, saliva swabs were positive 3 days before the rope samples.
- Compared to saliva swabbing, rope sampling is less laborious to perform and causes less stress to animals.
- Further validation is necessary to improve the sensitivity and survival rates of FMD virus in rope samples.

FOR FURTHER INFORMATION
Wilna Vosloo
e wilna.vosloo@csiro.au
w www.csiro.au/AnFlu/biosecurity/flagship

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