

# **The prevention and controls of swine enteric coronavirus disease in China**

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Talking from

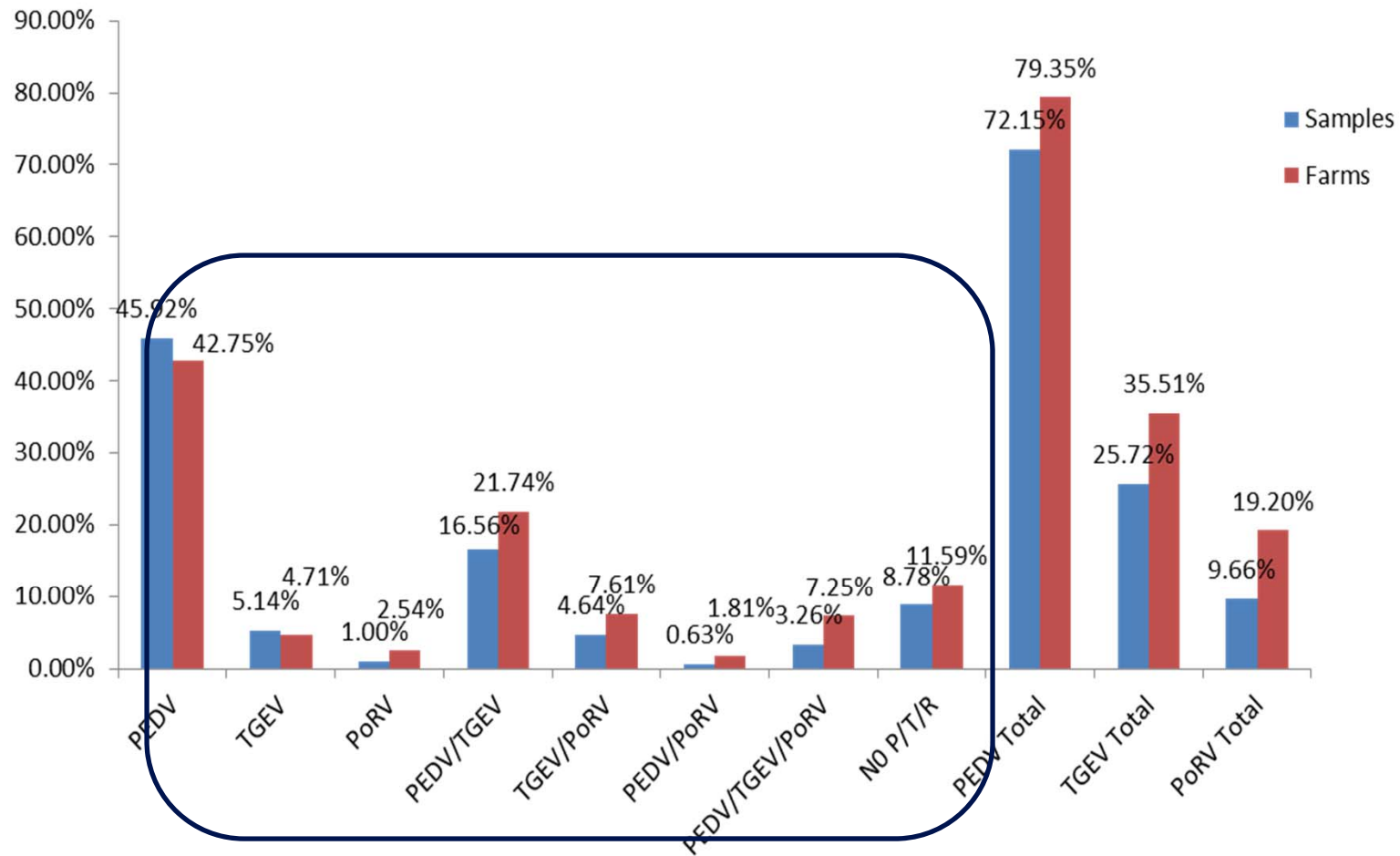
**□ Accurate diagnosis**

**□ Immunization**

**□ Biosecurity**

**□ Treatment**

# There are many kinds of situation of pig diarrhea in China



Positive rates in samples and pig farms

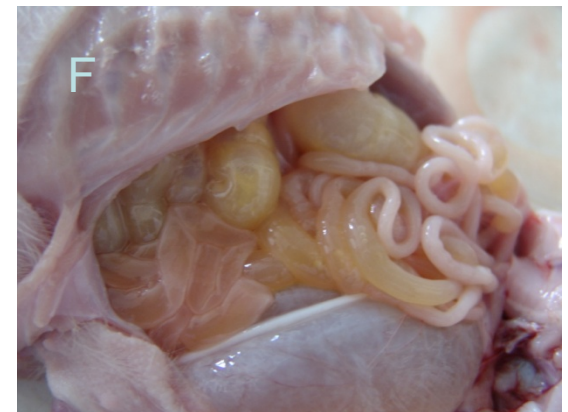
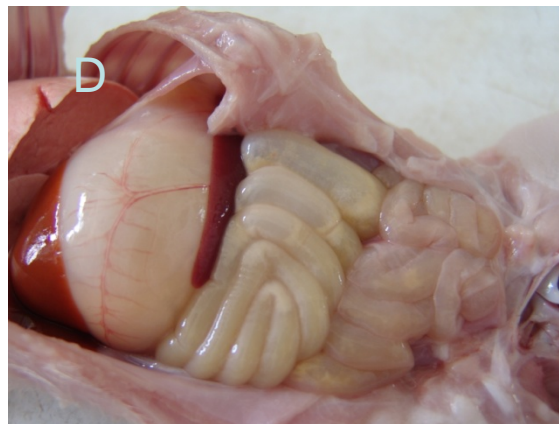
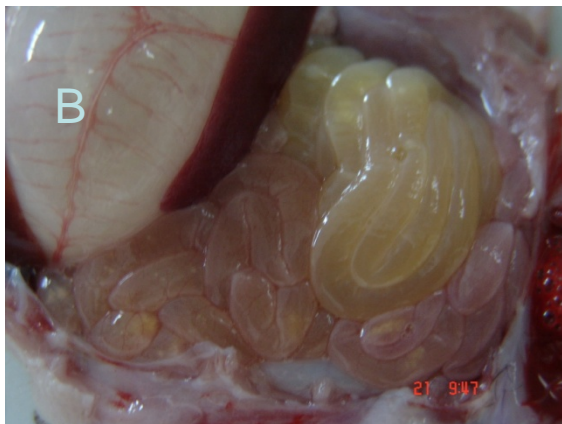
# **Accurate diagnosis is essential**

- Guide immunization**
- Manage farm biosecurity practices**
- Manage prevention and control protocols**

# How to diagnose the pig diarrhea cases

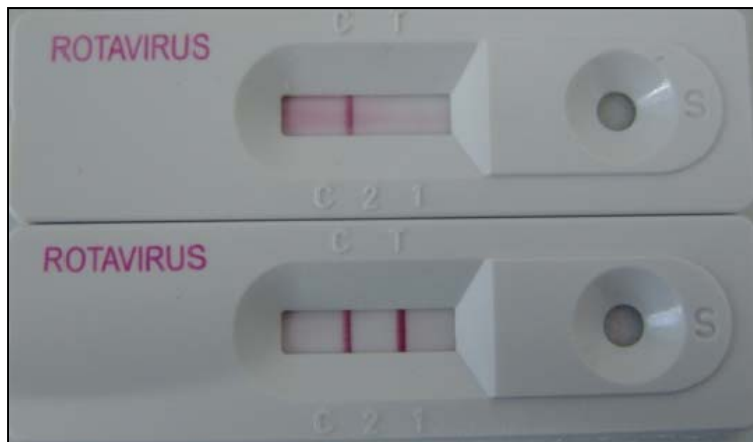
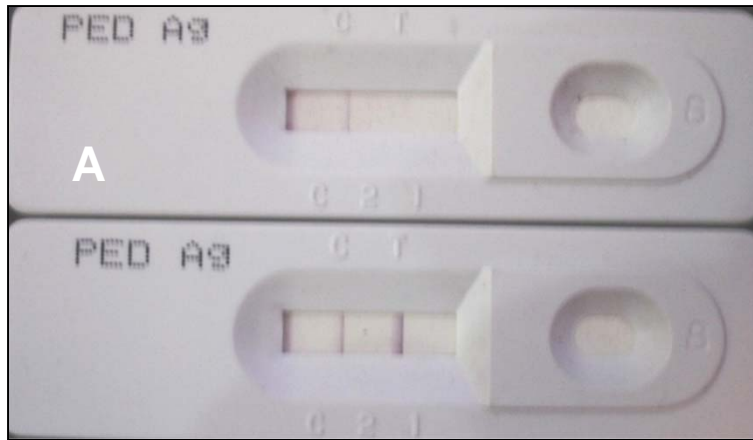
- Primary diagnosis depends on clinical sign in pig farm
- Laboratory assay makes confirmative diagnosis

**It is difficult to make difference diagnosis on  
clinical sign and gross anatomy**



**A,B:TGE C,D:PED E,F:PRV**

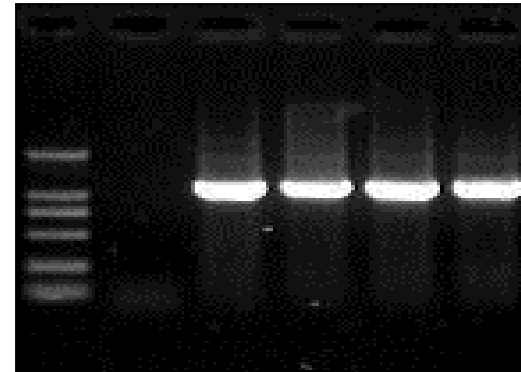
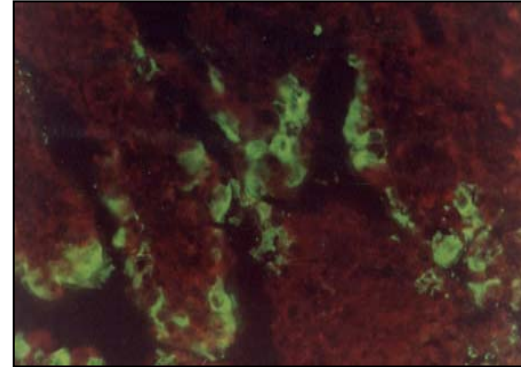
# Colloidal gold test of TGE, PED and PoRV



**A:PED negtive C:TGE negtive**  
**B:PED positive D:TGE positive**  
**E:PoRV negtive F:PoRV positive**

## Diagnosis methods in laboratory

1. RT-PCR(Nest-PCR)
2. Real-time PCR
3. FA(IFA)
4. RT-LAMP
5. ELSIA
6. VN(Virus Neutralization test)
7. Virus isolated

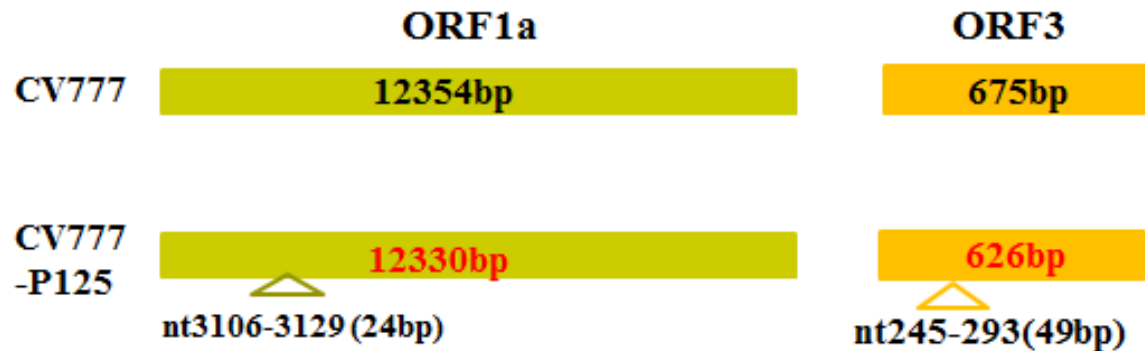




## Analysis of complete genome sequences of CV777 P125, CH/S, CH/FJND-3/2011

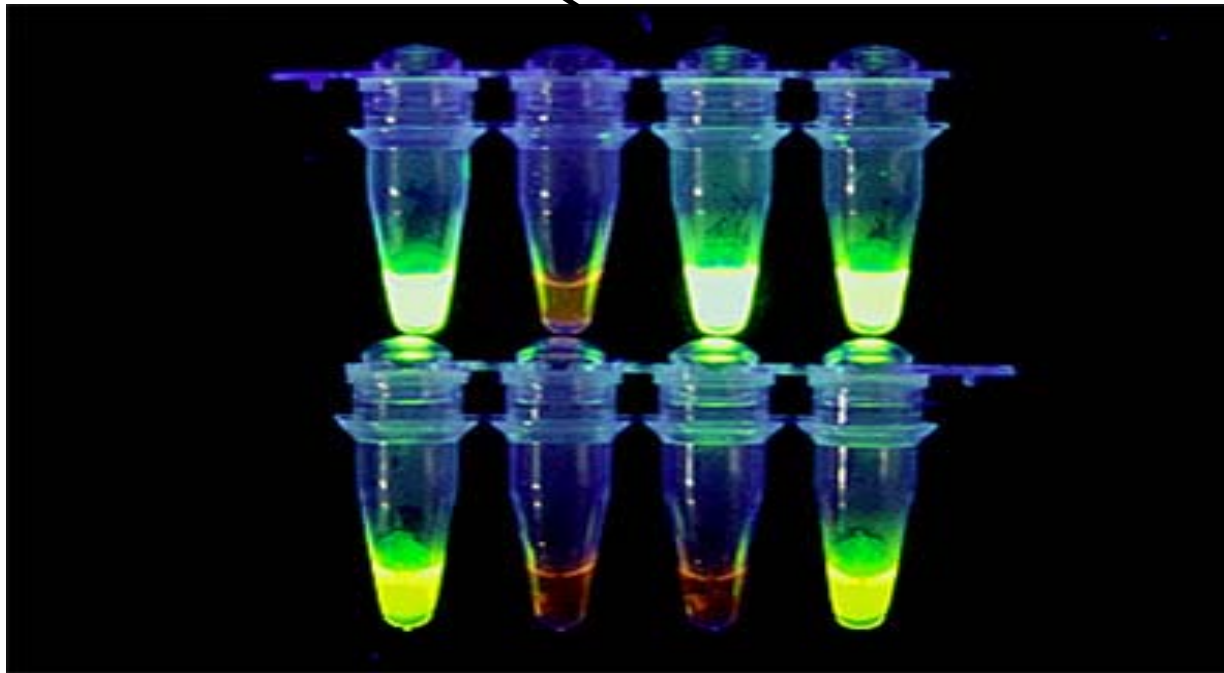
Strains	Genome										
	Full-length(bp)	5'UTR (bp)	ORF1(bp)			S (bp)	ORF3 (bp)	E (bp)	M (bp)	N (bp)	3'UTR (bp)
			ORF1	ORF1a	ORF1b						
CV777	28033	296	20345	12354	8037	4152	675	231	681	1326	334
CV777-P125	27956	<b>292</b>	20321	<b>12330</b>	8037	<b>4149</b>	<b>626</b>	231	681	1326	334
CH/S	28026	<b>292</b>	20342	<b>12351</b>	8037	4152	675	231	681	1326	334
CH/FJND-3/2011	28038	<b>292</b>	20345	12354	8037	<b>4161</b>	675	231	681	1326	334

### Nuclotides deletion in CV 777 P125(Vaccine strain)



RT-LAMP make difference diagnosis between  
WT & AT of PEDV

Positive control  
Negative control  
Vaccine  
Virulent



## RT-PCR make difference diagnosis between WT & AT of PEDV

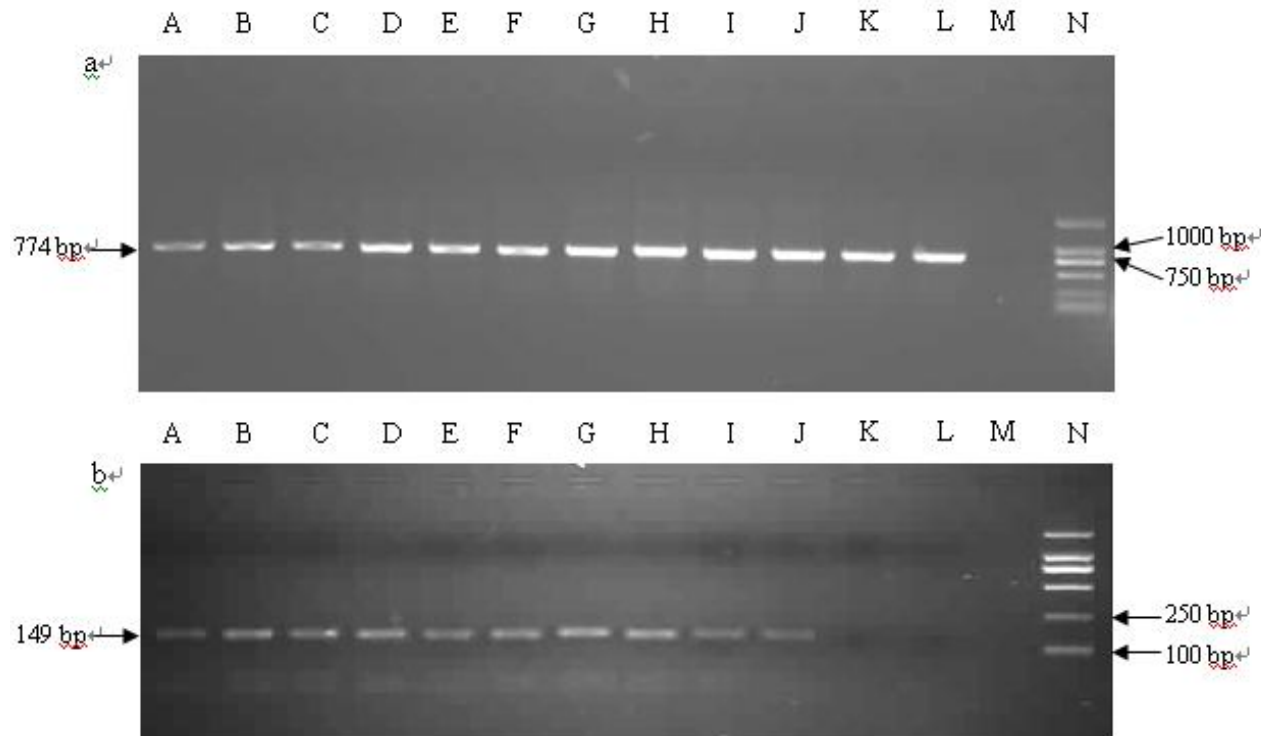


Figure 1 Nested RT-PCR on the PEDV strains (including CV777 vaccine strain) ↵  
a. The first PCR products for the 11 field PEDV strains and CV777 vaccine strain. ↵  
b. The second PCR products for the 11 field PEDV strains and CV777 vaccine strain. From left to right; A, CH/HLJH/06; B, CH/HNCH/06; C, CH/IMT/06; D, CH/SHH/06; E, CH/HLJM/07; F, CH/GSJI/07; G, CH/GSJII/07; H, CH/HNHJ/08; I, CH/JL/08; J, CH/JL/09; K, CH/GSJIII/07; L, CV777 vaccine strain; M, Negative control; N, DNA marker (DL2,000). ↵

# Preventions & Controls of PEDV in China

China	CV777 p125
Japan	P-5V
South Korea	KPED-9、 DR13

## PED Vaccines are developed in China

- ❑ Bi-Combined killed vaccine against TGEV and PEDV(1996)
- ❑ Bi-Combined live vaccine against TGEV and PEDV(2003)
- ❑ Tri-Combined live vaccine against TGEV , PEDV and PoRV (G5) (under way)

# The protective efficiency of live vaccine against TGEV by different immunization pathway

- ❑ The results of attenuated strains **oral and/or intranasal** vaccination have generally been disappointing (Henning and Thomas,1981; Moxley and Olson,1989; Saif and Bohl 1979,1981; et al.)
- ❑ The mortality among challenged pigs from vaccinated dams by **orally or/ and IM** ranged from 25% to 100% (Moxley and Olson,1989a; Saif and Bohl, 1979; Saif and Jackwood,1990)
- ❑ Inoculating lyophilized attenuated virus **in enteric-coated gelatin capsules** induced high levels of TGEV IgA antibodies in milk and reported only 10% piglet mortality (Hess et al., 1978; Votes et al., 1980)

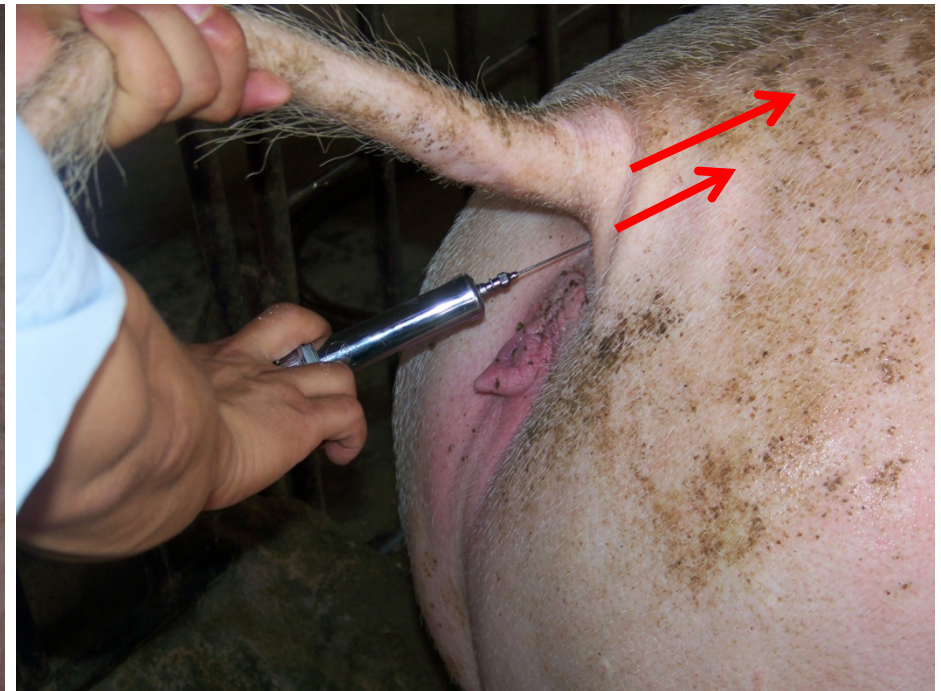
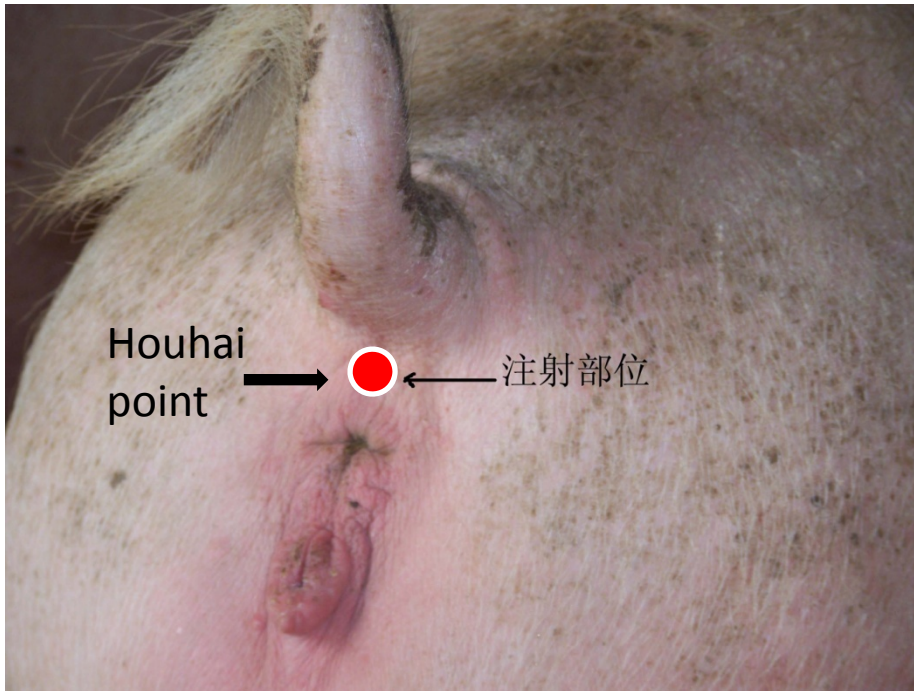
## Comparision of inoculating TGEV attenuated vaccine by HouHai point and oral

Groups	No. of piglets	Age of days	Safety test		DPI	Immunization results		
			Dose*	Morbidity		Challenge ID <sub>50</sub>	Protective rate	Morbidity
HouHai point	38	3	0.1ml	0/38	7-12	1000	<b>23/38</b>	<b>15/38</b>
HouHai point	30	3	0.2ml	0/30	9	1000	<b>30/30</b>	<b>0/30</b>
Oral	15	3	0.1ml	0/15	7-10	1000	<b>1/15</b>	<b>14/15</b>
Control	28	3	PBS 0.2ml	0/28	7-10	1000	<b>2/28</b>	<b>26/28</b>

\*Dose of vaccine:  $10^{7.0}$ TCID<sub>50</sub>/ml

Meng et,al,. 1992 JTCVM No. 5 12~16

## The location of HouHai point and shot method



## Active immunization results of attenuated vaccine against TGEV and PEDV

5 batches vaccine, inoculated 1.0ml, 0.2ml ( titers  $>10^{7.0}/0.3\text{ml}$ ) by HouHai point  
Animals: 3~5 day-old negative piglets (VN antibodies  $\leq 4$ ) of TGEV and PEDV  
Challenge virus: 1000 ID<sub>50</sub> (TGEV H stain, PEDV CH/S strain) by oral

Protective rate: **Vaccine group: TGEV (20/21); PED (24/24)**  
**control group: TGE(0/5); PED(0/8)**

## Passive immunization results of attenuated vaccine against TGEV and PEDV

5 batches vaccine, inoculated 2.0ml ( titers  $>10^{7.0}/0.3\text{ml}$ ) by HouHai point  
Animals: pre-farrowing negatives own piglets (VN antibodies  $\leq 4$ ) of TGEV and PEDV  
Challenge virus: 100 ID<sub>50</sub> (TGEV H stain, PEDV CH/S strain) by oral

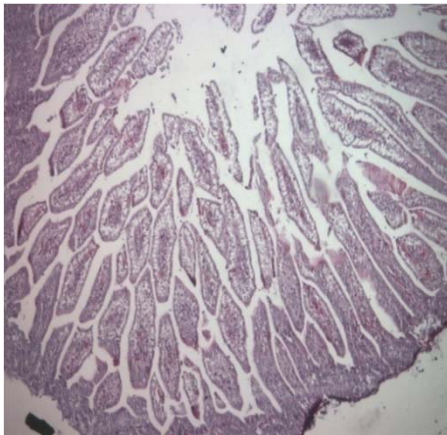
Protective rate: **Vaccine group: TGEV (24/25) ; PED (25/25)**  
**control group: TGE(0/5); PED(0/5)**



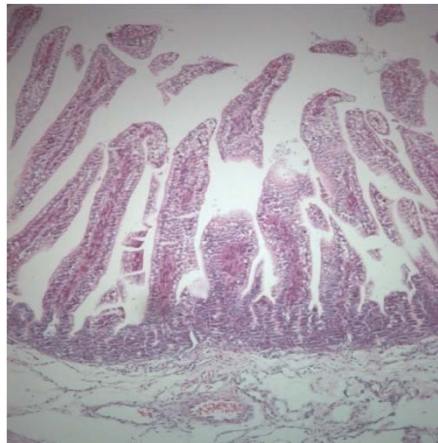
Vaccination group



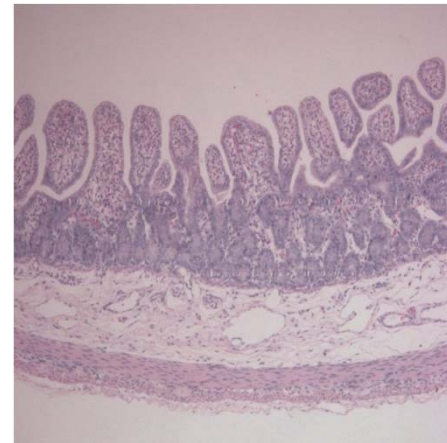
Control group



Normal villi



Vaccination



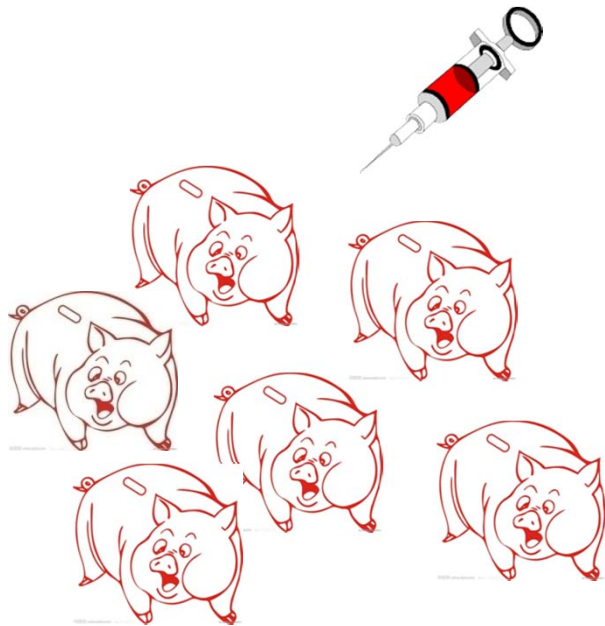
Control (challenge)

# Preventions & Controls of PEDV in China

- **Vaccination: passive or active immunity**
  - ◆ Suckling piglets: passive immunity
  - ◆ Other pigs: active immunity

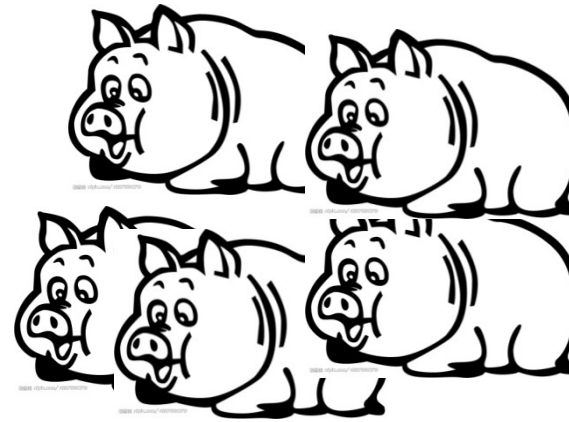
**For suckling piglets, the active immunity is ineffective.  
For the other pigs, the active immunity is effective**

# No whole-herd vaccination causes immunization failure



Immunized pig herd

Susceptible pigs



Non-immunized pig herd

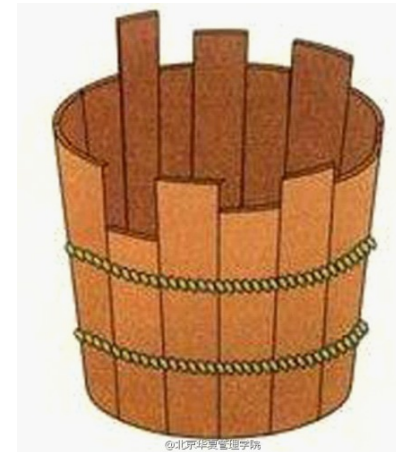
**Remember:** The whole herd of immunization! No susceptible herd of swine left !

Prime Whole-group-vaccination before 40 days before epidemic season

Booster vaccination 20 days at before pre-farrowing

# Who is the shortest wood block?

- Gilts
- Backup boars
- Wean、 nursing, and fatten



If your pig farm is positive of PEDV, and you want to keep the herd health, you must do good vaccination to the gilt. About 4 times vaccination to gilts before first farrowing

# Preventions & Controls of PEDV in China

## ❑ Feedback

- The small intestine used to feed back should be collected within 24 hours post infection or the appearance of clinical signs.
- Do the whole herd inoculation and you can't do many times feedback.
- Sow show clinical sign should be better

## ❑ Autogenous killed vaccine

- If your farm get the PED, you can use killed autogenous vaccine, and you should do it ASAP, and it will get to stop diarrhea more than 1 week post inoculation

Both of them are effective for the PED control, and Autogenous vaccine is better, for the feedback could lead to the virulent virus spread.

# Biosecurities for the PEDV control

- ❑ Disinfection, all-in all-out, keep units empty more than 2 weeks
- ❑ Multipoint feeding (sow and finishing pig)
- ❑ If your pig farm is negative, replacement breeding stock should originate from negative herds
- ❑ Stop workers to move from the sick units
- ❑ Don't cross to use the tools and equipments

# PEDV Treatment Measures

- ❑ Weaned, feeding the milk over 10-day old
- ❑ Another sow for nursing piglets under 10-day old
- ❑ Move the healthy sows to another litter house
- ❑ Controlling the co-infection of bacteria via antibiotic
- ❑ Rehydrated quickly and easily by drinking large quantities of a solution of oral rehydration salts.
- ❑ Antiserum therap

All measures could reduce the rate of mortality of suckling piglets, But it can't stop to be sick, and its effect is limited in sick farm.

# Summary

- ❑ Combine Passive immunity and active immunity in whole pig herds; Vaccination pathway affects the vaccine efficiency
- ❑ Do feedback and autogenous vaccine in right way
- ❑ Establish and strictly enforce biosecurity procedures.
- ❑ We should do both immunization and biosecurity better.



# Acknowledgment

Dr. Jianfei Chen



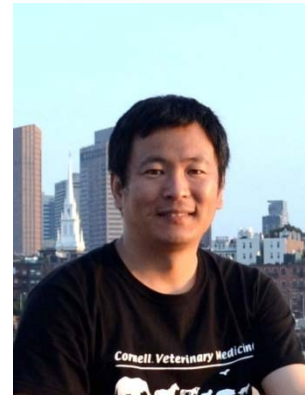
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Mrs Hongyan Shi



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# Thank you for your attention !



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