



2023

Practice Pathways and Effectiveness Evaluation of PCV2 Infection Reduction in Family Farms

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Reporting time : October 16, 2023



Content

I. Theoretical foundation

II. Implementation program

III. Effectiveness evaluation



Content

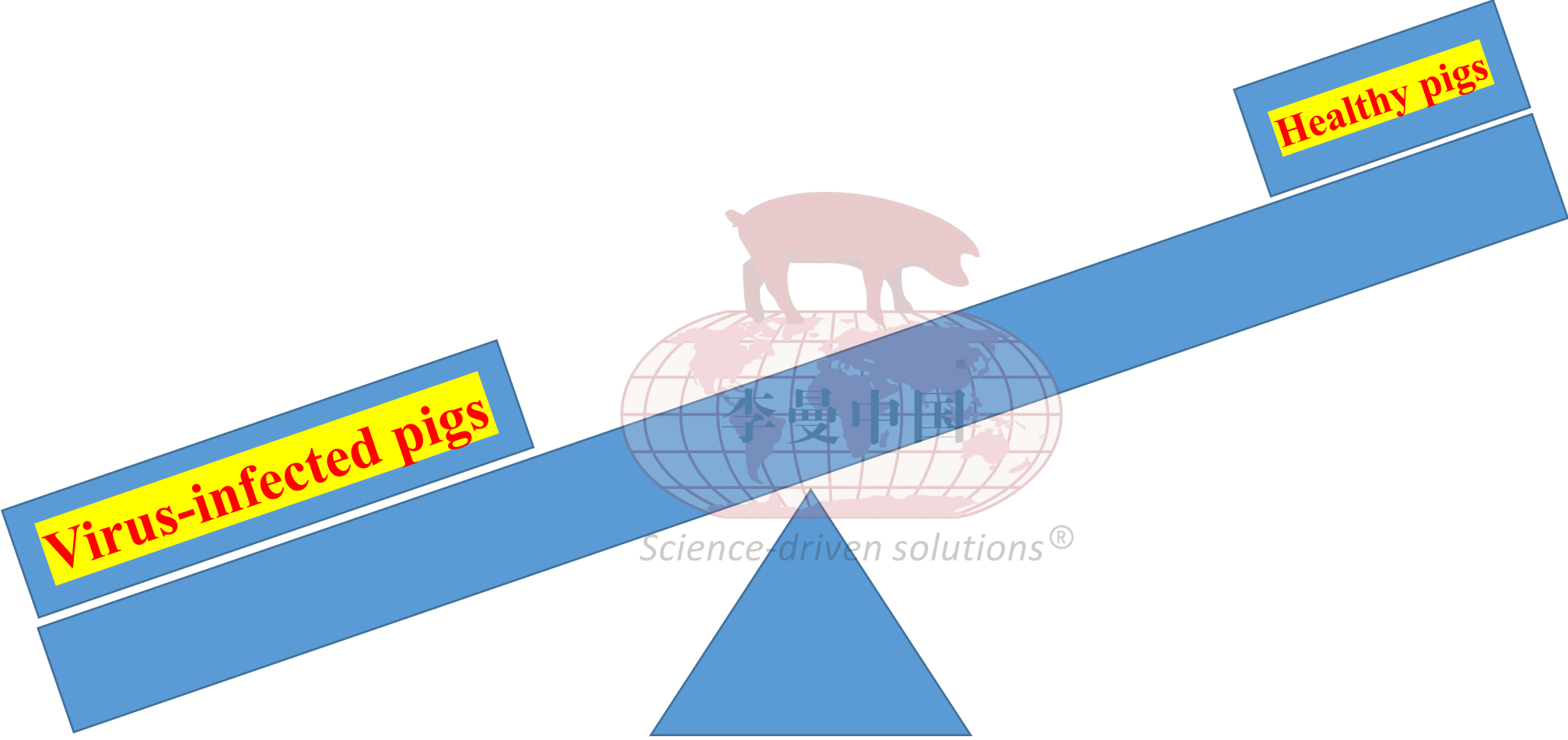
I. Theoretical foundation

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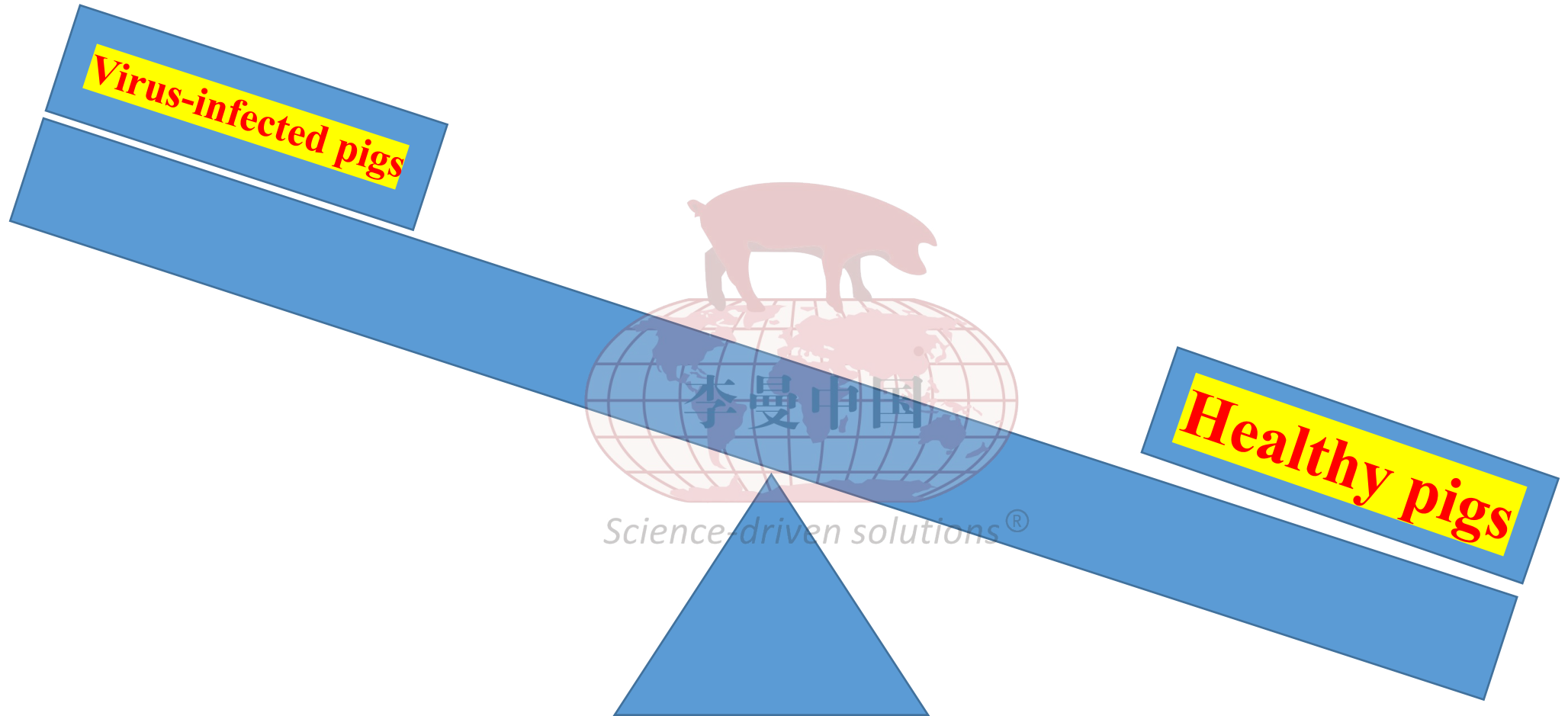


Disease Transmission of “Seesaw” Model



Outbreak

Disease Transmission of “Seesaw” Model



No outbreak

Does PCV2 infection cause disease or not?

PMWS



PDNS



PRDC



CT



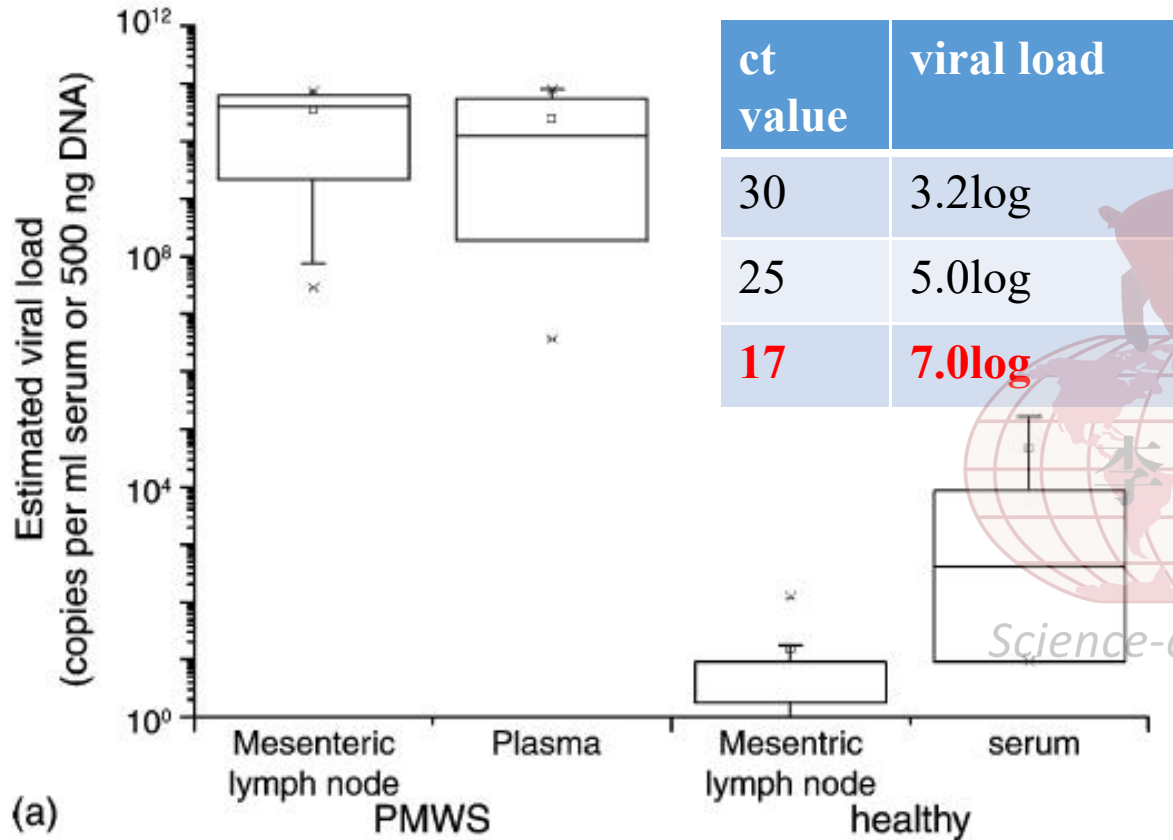
PENS



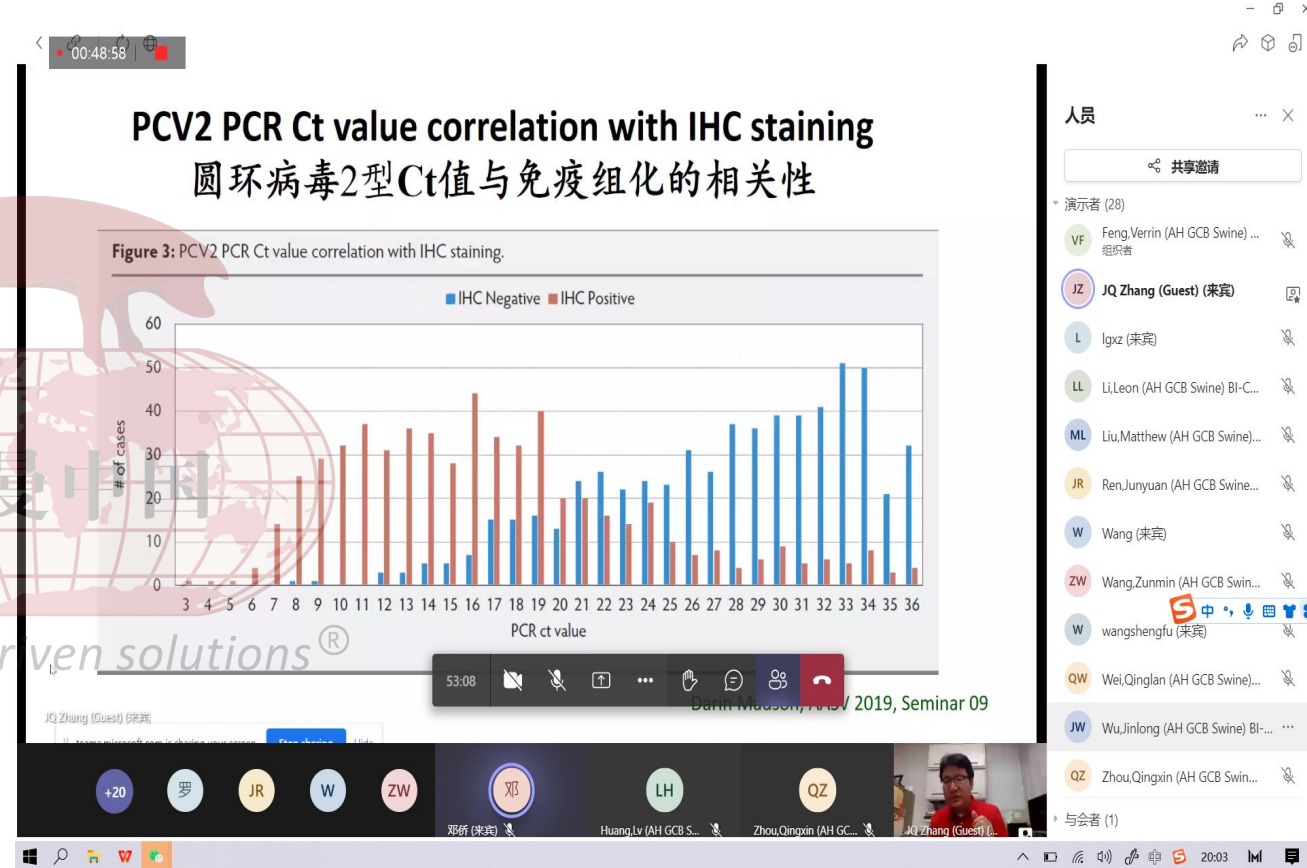
Necrotising enteritis



How much PCV2 infection leads to morbidity?



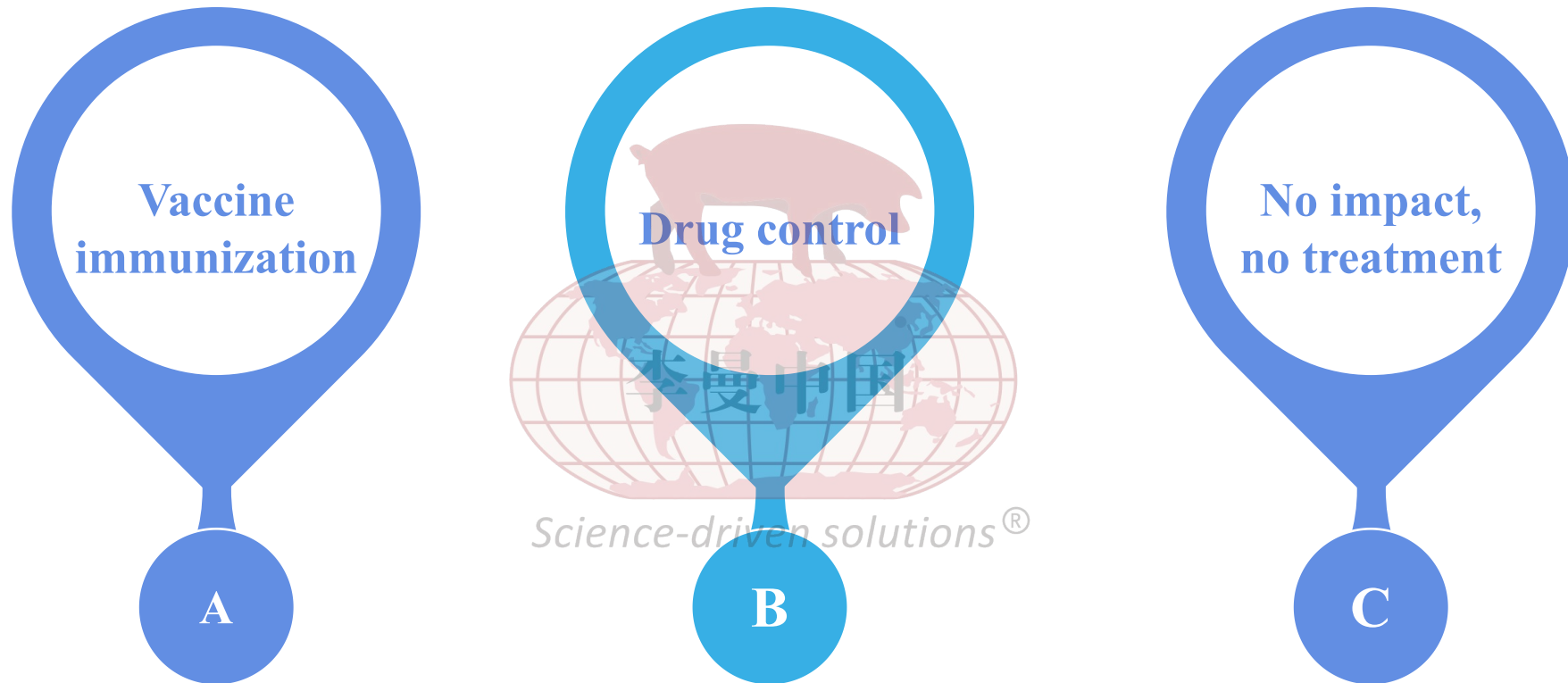
ct value	viral load
30	3.2log
25	5.0log
17	7.0log



Inguinal lymph node virus copy number of PMWS pigs and healthy pigs/500ng DNA, plasma/serum virus copy number/ml

Correlation between viral load and immunohistochemistry (disease)

Current methods of PCV2 prevention and control in production



Control method for PCV2

Current methods of PCV2 prevention and control in production

All three types of programs start with the idea of improving swine health...

Disease Transmission of "Seesaw" Model  富之源集团



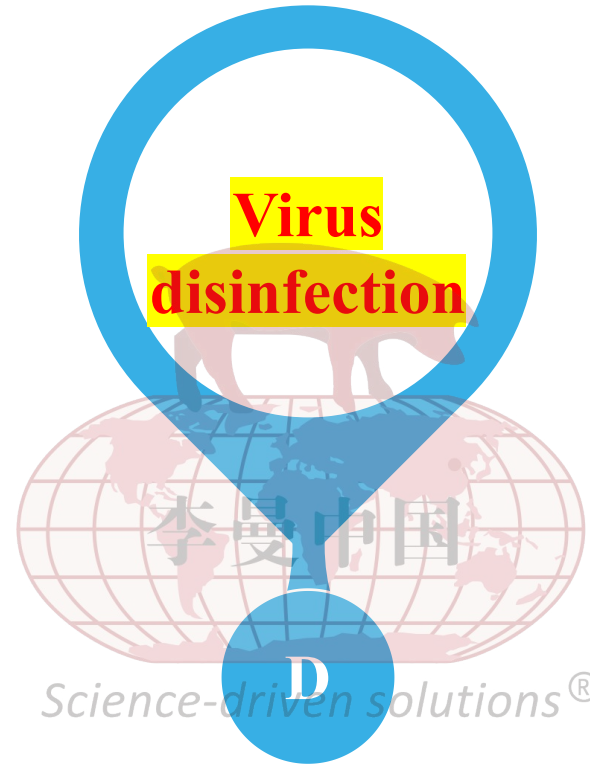
No outbreak

In order to achieve that, we propose a new method...



Though the method may seem simple, few people have gone on to try it in the prevention and control of PCV...

In order to achieve that, we propose a new method...



It happens because:

We are accustomed to the idea that PCV infections have little effect on pig production and can be completely resolved by vaccination...

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I. Theoretical foundation

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Science-driven solutions[®]

1. Establish a testing program

- Establish testing laboratories in all stocking departments
- Establish testing and evaluation program of PCV2



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2. Evaluate the method of PCV disinfection

- A case in point:
 - ✓ A stocking department of a family farm in Changshun, a county in Guizhou province
 - ✓ Pigs in it previously showed PMWS symptoms
 - ✓ Cleaned pens and stopped stocking in March 2021
 - ✓ Cleaned and disinfected in May 2022
 - ✓ Then sampled for ASF and tested for PCV
 - ✓ Result: PCV2 ct value 24
- **Takeaway: PCV2 viruses are extremely viable in the environment and conventional disinfection methods are not easily effective**

2. Evaluate the method of PCV2 disinfection

- Review the basic physicochemical properties of PCV2
 - ✓ PCV2, a DNA virus, has no capsid and is 12-20 nm in diameter
 - ✓ It is not easy to inactivate in a pH3 environment
 - ✓ Survive for 60min at 56°C
 - ✓ Survive for 15min at 70°C



2. Evaluate the method of PCV2 disinfection

● Killing effect of nine commercial disinfectants on PCV2

- ✓ 20 ° C, 30min, acting on PCV2
- ✓ Iodine and phenol disinfectants are not effective in reducing PCV2 titres
- ✓ Potassium persulphate complex (1 type), quaternary ammonium aldehyde complex (2 types), sodium hypochlorite (1 type) and sodium hydroxide (1 type). These 5 types of disinfectants can significantly reduce the titre of PCV2

2. Evaluate the method of PCV disinfection

● Killing effect of nine commercial disinfectants on PCV2

- ✓ 1600 $\mu\text{g/L}$ (1.6g/tonne) effective chlorine reduced PCV2 titre $\geq 1.61 \log_{10}$
- ✓ 2000 $\mu\text{g/L}$ (2.0g/tonne) sodium hydroxide reduced PCV2 titre by $\geq 2.42 \log_{10}$
- ✓ 860 $\mu\text{g/L}$ (0.86g/tonne) peroxyacetic acid reduced PCV2 titre by $\geq 2.21 \log_{10}$
- ✓ 4660 $\mu\text{g/L}$ (4.66g/tonne) hydrogen peroxide reduced PCV2 titre by $\geq 2.21 \log_{10}$
- ✓ 515 $\mu\text{g/L}$ aldehyde + 500 $\mu\text{g/L}$ didecyldimethylammonium chloride reduced PCV2 titre by $\geq 1.74 \log_{10}$
- ✓ 1500 $\mu\text{g/L}$ glutaraldehyde + 800 $\mu\text{g/L}$ alkyl dimethyl benzylammonium chloride reduced PCV2 titre by $\geq 1.74 \log_{10}$
- ✓ 750 $\mu\text{g/L}$ sulfamic acid + 250 $\mu\text{g/L}$ sodium dichloroisocyanurate + 1155 $\mu\text{g/L}$ sodium persulfate reduced PCV2 titre $> 1.61 \log_{10}$
- ✓ 2250 $\mu\text{g/L}$ potassium persulfate + 1000 $\mu\text{g/L}$ malic acid + 500 $\mu\text{g/L}$ sulfamic acid can reduce PCV2 titre $> 1.61 \log_{10}$

Data source: *Virucidal efficacy of nine commercial disinfectants against porcine circovirus type 2*

2. Evaluate the method of PCV disinfection

Our results were confirmed in the seven disinfectants tested. For disinfectant 1, the cytotoxicity observed in PK15 cells after detoxification could artificially increase the disinfectant effect. A 1-fold increase in organic matter required by French regulations protects PK15 cells from disinfectant cytotoxicity, but interferes with the effective chlorine and reduces its activity. The safety factor, which relates to the rapidity of sodium hypochlorite's effect on viruses, is 0.06% (a reduction of 0.7log₁₀), leading us to believe that sodium hypochlorite can actually kill PCV2 viruses at the concentration approved for use (0.3% or 3000[®] µg/l.).

2. Evaluate the method of PCV disinfection

- Preliminary validation experiment of PCV2 elimination by bleaching powder
 - ✓ Pathogen solution: PCV2 sample with ct value 17
 - ✓ Test method: Spray pathogen solution on the concrete floor of the simulated pig house
 - ✓ PCV2 Sampling test: 1:1000 bleach disinfection-1, 10, 15, 20 minutes, sampling for PCV2 respectively
 - ✓ **Test result: 1:1000 bleach (i.e. 1kg/tonne of water) disinfection for more than 10 minutes can kill PCV2**

检测单位	检测项目	样品信息	检测个数	样本信息	CT 值	检测结果
消毒试验	圆环2型	环境	1	消毒前: 漂白粉1:1000 10分钟	22.270	阳性
消毒试验	圆环2型	环境	1	消毒前: 漂白粉1:1000 15分钟	22.395	阳性
消毒试验	圆环2型	环境	1	消毒前: 漂白粉1:1000 20分钟	21.684	阳性
消毒试验	圆环2型	环境	1	消毒后: 漂白粉1:1000 10分钟	32.910	阳性
消毒试验	圆环2型	环境	1	消毒后: 漂白粉1:1000 15分钟	34.770	阳性
消毒试验	圆环2型	环境	1	消毒后: 漂白粉1:1000 20分钟	31.824	阳性
消毒试验	圆环2型	对照	1	病毒原液	17.332	阳性

3. Vaccination

- Sow: 2 times/year, imported baculovirus expression inactivated vaccine
- Piglet: 21 days of age, 1 head of vaccine
- Reserve: 26 weeks old, 1 head of vaccine



4. Environmental disinfection and assessment

● Breeding farm disinfection and source elimination

- ✓ Follow the same level of biosecurity procedures as for ASF
- ✓ Disinfect the environment 2 times/week, using Vicodin in the pig house and bleach in the outside environment
- ✓ After weaning and cleaning of pigs in farrowing houses, disinfect aisles etc. with 1kg bleach/tonne of water.

● Breeding farm sampling assessment

- ✓ Umbilical cord blood sampling of each batch of piglets to assess PCV2 infection.
- ✓ Monthly environmental sampling to assess PCV2 infection
- ✓ Quarterly blood sampling to assess PCV2 viraemia infection

4. Environmental disinfection and assessment

● Family farm disinfection and source elimination

- ✓ 1kg of bleach/tonne of water rinsed and disinfected before seedling placement
- ✓ Disinfect public areas such as walkways once a week
- ✓ 1kg of bleach/tonne of water to flush the fences with pigs at least once a month after seedling placement.

● Sampling and assessment of family farms

- ✓ Sampling negative for PCV to be allowed for seedling placement
- ✓ Blood/oral fluid test for PCV2 in lean pigs, CT<20 will be eliminated.
- ✓ Monthly environmental/oral fluid sampling to assess for PCV infection.

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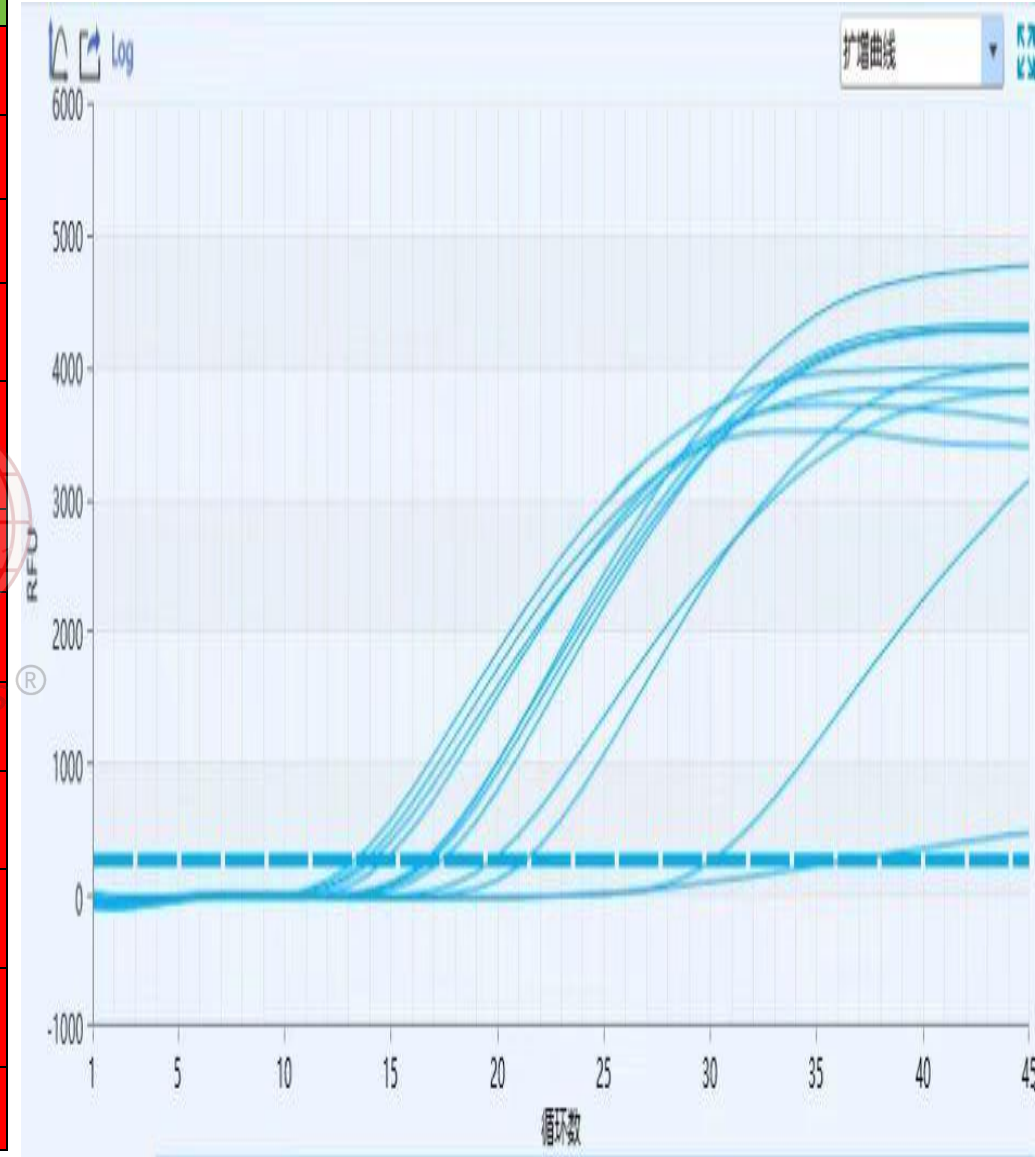


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1. Testing results - Extremely low testing ct values for pathogen before PCV2 reduction



Date	Testing unit	Testing item	Sample category	Number of samples	Sample information	CT value
2022/3/19	Honglin Base	PCV2	pig	3	9-2 108 days old, 9-8 109 days old, 9-9 110 days old	14.598
2022/3/19	Honglin Base	PCV2	pig	3	5-4 150 days old 2, 5-5 162 days old	16.832
2022/3/19	Honglin Base	PCV2	pig	3	55-3 165 days old, 7-2-5, 7-4-25 sick pigs	17.272
2022/3/19	Changshun stocking department	PCV2	pig	3	Pong Ran Po 3 units :136 days old, Gul Yang 3: 151 days old for 2 pigs	13.691
2022/3/19	Changshun stocking department	PCV2	pig	4	Guyang III Unit 2: 160 days old, Wang Tongzhi :163 days old, Li Yingcai :174 days old, Wang Fengyun: 187 days old	13.137
2022/3/19	Xiuwen stocking department	PCV2	pig	3	45 days old, 63 days old, 78 days old	29.934
2022/3/19	Xiuwen stocking department	PCV2	pig	4	100 days old, Xu Fulun: 123 days old, He Yuxia: 143 days old, Hu Cailin :149 days old	35.254
2022/3/19	Xiuwen stocking department	PCV2	pig	4	Liao Zhengyong: 172 days old, Zhou Zhengbin :180 days old, 150-180 days old	13.918
2022/3/19	Zhengfeng stocking department	PCV2	pig	3	90-120 days old	16.559
2022/3/19	Zhengfeng stocking department	PCV2	pig	3	90-120 days old	19.652
2022/3/19	Zhengfeng stocking department	PCV2	pig	3	120-150 days old	16.481
2022/3/19	Xiaotun base	PCV2	pig	3	90-120 days old	21.176



1. Results - Negative for serum antigens after the implementation of volume reduction

日期	检测单位	检测项目	样品信息	混样个数	样本信息	CT 值	检测结果
2023/9/16	ZF-XTC	PCV2	猪样	5	小屯育肥2-3 5混		阴性
2023/9/16	ZF-XTC	PCV2	猪样	5	小屯育肥2-3 5混		阴性
2023/9/16	ZF-XTC	PCV2	猪样	5	小屯育肥2-5 5混		阴性
2023/9/16	ZF-XTC	PCV2	猪样	5	小屯育肥2-5 5混		阴性
2023/9/16	ZF-XTC	PCV2	猪样	5	小屯育肥2-1 5混		阴性
2023/9/16	ZF-XTC	PCV2	猪样	5	小屯育肥2-1 5混		阴性
2023/9/16	ZF-XTC	PCV2	猪样	5	小屯育肥2-2 5混		阴性
2023/9/16	ZF-XTC	PCV2	猪样	5	小屯育肥2-2 5混		阴性
2023/9/16	ZF-XTC	PCV2	猪样	5	小屯育肥1-1 5混		阴性
2023/9/16	ZF-XTC	PCV2	猪样	5	小屯育肥1-1 5混		阴性
2023/9/16	ZF-XTC	PCV2	猪样	5	小屯育肥1-2 5混		阴性
2023/9/16	ZF-XTC	PCV2	猪样	5	小屯育肥1-2 5混		阴性
2023/9/16	ZF-XTC	PCV2	猪样	5	小屯育肥1-4 5混		阴性
2023/9/16	ZF-XTC	PCV2	猪样	5	小屯育肥1-4 5混		阴性
2023/9/16	ZF-XTC	PCV2	猪样	5	小屯育肥1-5 5混		阴性
2023/9/16	ZF-XTC	PCV2	猪样	5	小屯育肥1-5 5混		阴性
2023/9/16	ZF-XTC	PCV2	猪样	5	小屯育肥1-3 5混		阴性
2023/9/16	ZF-XTC	PCV2	猪样	5	小屯育肥1-3 5混		阴性
2023/9/18	ZF-XTC	PCV2	猪样	4	小屯死猪淋巴结4混		阴性
2023/9/18	ZF-XTC	PCV2	猪样	4	小屯死猪肺脏4混		阴性
2023/9/18	ZF-XTC	PCV2	猪样	4	小屯死猪脾脏4混		阴性

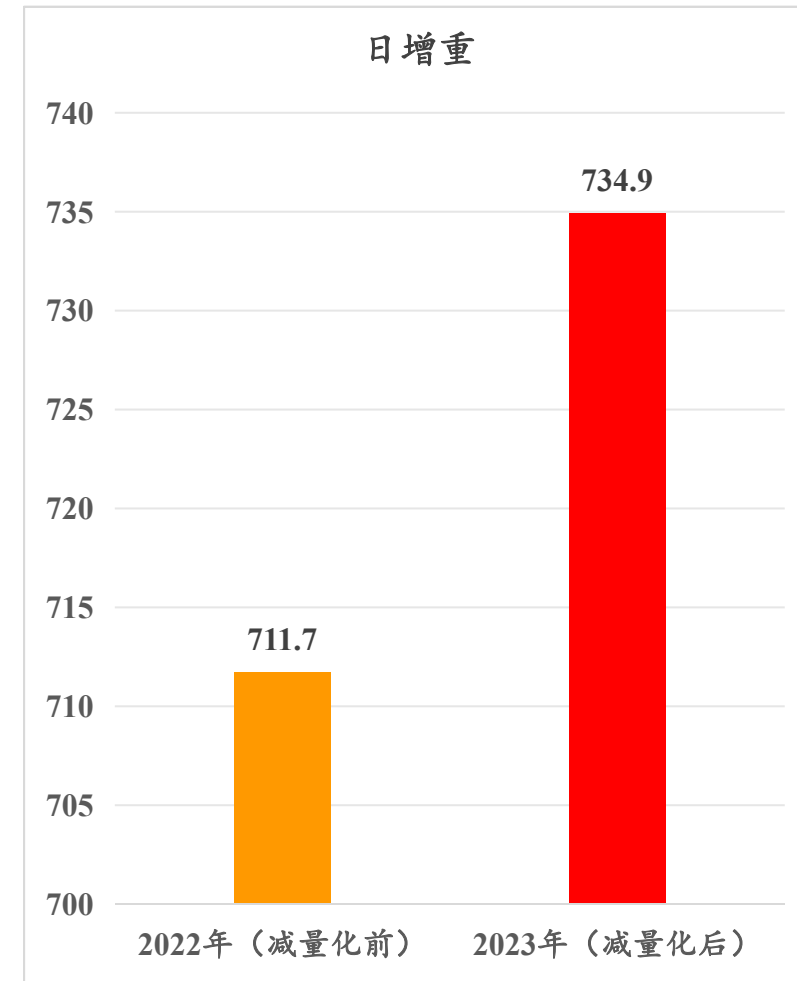
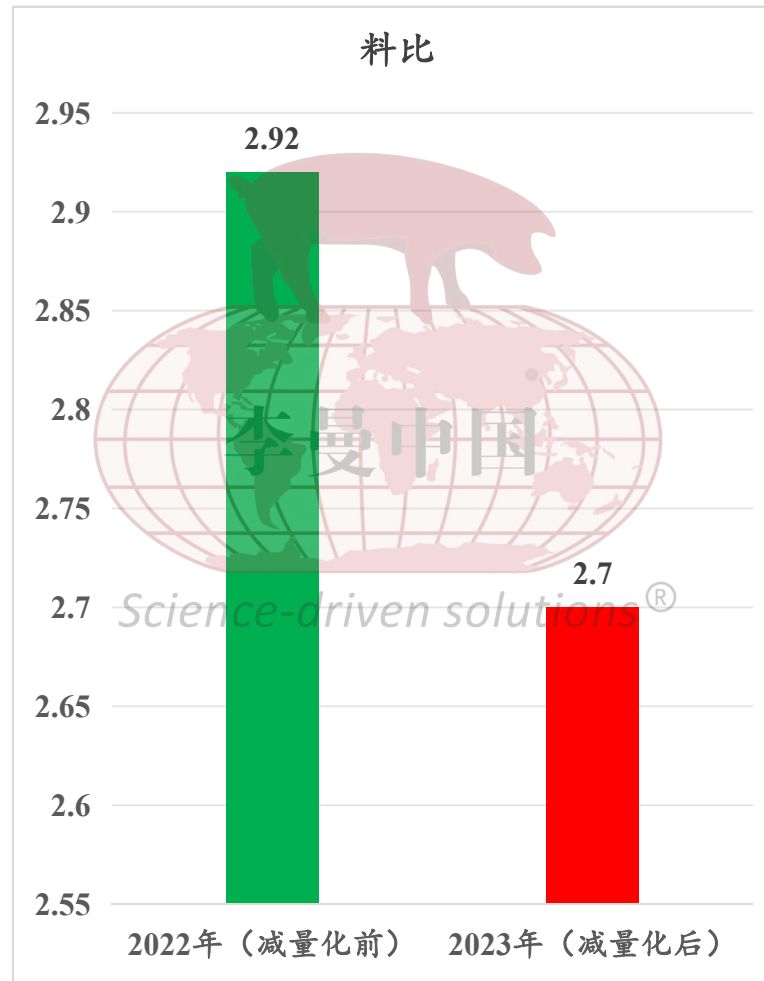
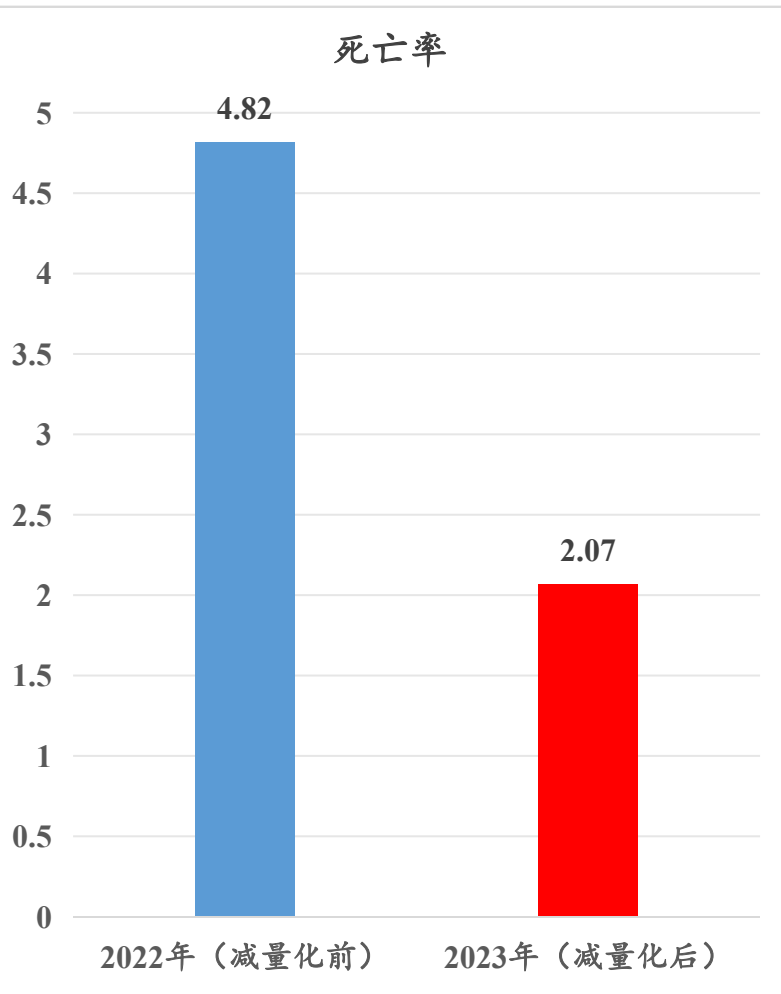
日期	检测单位	检测项目	样品信息	检测个数	样本信息	CT 值	检测结果
2023/9/27	科技种场	圆环2型	猪样	8	科技断奶母猪1-8	40.145	可疑
2023/9/27	科技种场	圆环2型	猪样	8	科技妊娠前期1-8		阴性
2023/9/27	科技种场	圆环2型	猪样	8	科技妊娠中期1-8		阴性
2023/9/27	科技种场	圆环2型	猪样	8	科技妊娠后期1-8		阴性
2023/9/27	科技种场	圆环2型	猪样	8	科技2周仔猪1-8		阴性
2023/9/27	科技种场	圆环2型	猪样	8	科技4周仔猪1-8		阴性
2023/9/27	红林	圆环2型	猪样	8	红林5.20批20周		阴性
2023/9/27	红林	圆环2型	猪样	8	红林6.9批17周	39.848	可疑
2023/9/27	红林	圆环2型	猪样	8	红林7.1批14周		阴性
2023/9/27	红林	圆环2型	猪样	8	红林7.21批10周		阴性
2023/9/27	红林	圆环2型	猪样	8	红林8.21批8周		阴性
2023/9/27	小箐	圆环2型	猪样	8	小箐3.15批1-8		阴性
2023/9/27	小箐	圆环2型	猪样	8	小箐4.20批1-8		阴性
2023/9/27	小箐	圆环2型	猪样	8	小箐5.8批1-8		阴性
2023/9/27	小箐	圆环2型	猪样	8	小箐5.26批1-8	37.707	可疑
2023/9/27	小箐	圆环2型	猪样	8	小箐6.15批1-8		阴性
2023/9/27	小箐	圆环2型	猪样	8	小箐7.2批1-8	43.152	可疑
2023/9/27	小箐	圆环2型	猪样	8	小箐7.22批1-8		阴性

2. Pigs no longer show clinical signs of PMWS after PCV2 reduction.



Pigs are no longer pale, lethargic, coughing, wheezing, dyspnoea, swollen joints, swollen lymph nodes, etc.

3. Significant improvement in production after PCV2 reduction



Data of 294 family farms in Guizhou Fuzhiyuan with a total of 237,000 head of 130kg fattening pigs for market in 2022-2023

Summary - PCV2 reduction measures and effectiveness on family farms

- Starting from the breeding farm
- Zero PCV2 before seedling placement
- Enhanced detection and culling during PCV2 reduction process
- Reduction measures can reduce feed ratios, mortality and increase growth rates

2023

李曼中国
Thank you

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