2种PRRSV驯化方式的应用效果对比与分析
Comparison and Analysis of the Application Effects of Two PRRSV domestication methods

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PART 01

研究背景

Background

Science-driven solutions®

研究背景Background

猪繁殖与呼吸综合征（PRRS）是由PRRSV引起的一种严重危害全球养猪业的疾病。

PRRS is a disease caused by PRRSV that seriously endangers the global pig farming industry.

2013年起NADC30和2017年起NADC34毒株在中国的流行，以谱系1为主的类NADC30/34及重组毒株，致病力变弱，但是病毒的存活时间变长，导致感染猪群带毒时间长，增加防控净化难度。

Since 2013 and 2017, the NADC30 and NADC34 strains have been prevalent in China. The NADC30/34-like and recombinant strains mainly based on lineage 1 have weakened pathogenicity, but the survival time of the virus has increased, resulting in a longer virus-carrying period in infected pig herds and increasing the difficulty of prevention, control and purification.

目前市场暂无成熟的NADC30/34活疫苗上市可使用。At present, there are no mature NADC30/34 live vaccines available on the market for use.

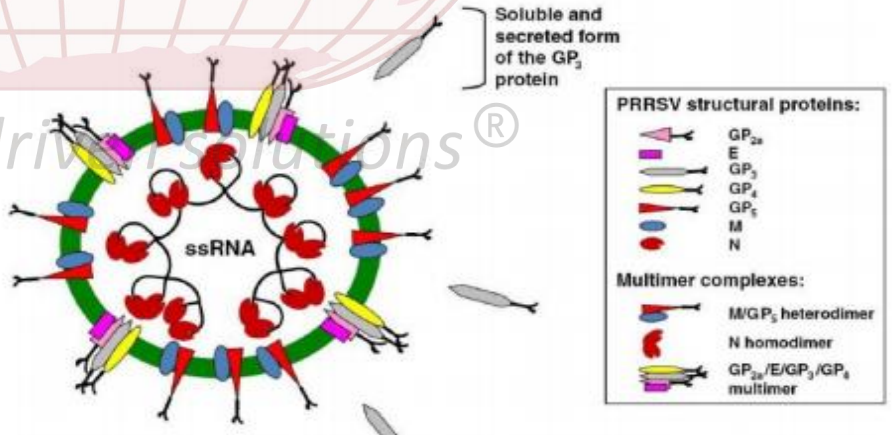


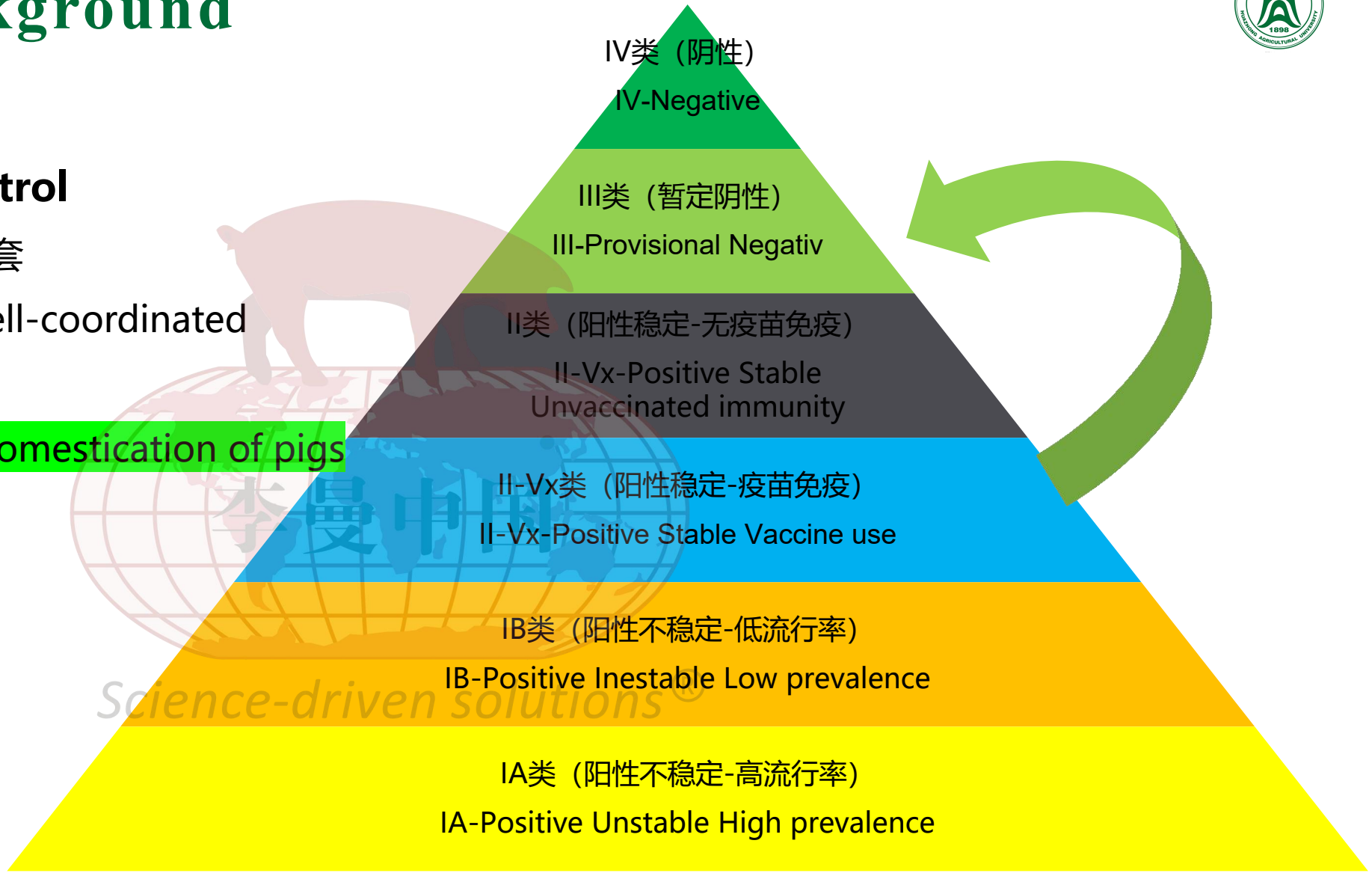
图1 病毒颗粒结构图（Music and Gagnon 2010）
Figure 1 Structure diagram of virus particles

研究背景Background

PRRS整体防控：

PRRS prevention and control

- 首要生物安全，结构化合理配套
- Biosafety, structured and well-coordinated
- 后备猪的健康培育驯化
- The healthy breeding and domestication of pigs
- 生产群健康管理
- Health management



AASV指南（2021）---猪场PRRS分类标准
New AASV guidelines (Hotlkamp et al. 2021)

研究背景Background

针对猪场蓝耳病的净化，目前国际通行的技术路线主要包括：

For the purification of PRRS, the currently internationally accepted technical routes mainly include:

- 封群净化（Herd Closure）
- 清群复养（Depopulation-Repopulation）
- 分胎次生产（Batch Farrowing）

田间案例总结可知具备严格生物安全设施条件，猪群PRRSV阳性，但未出现严重临床症状，适用于封群净化策略，该策略主要包括血清驯化和同型活疫苗驯化。

With strict biosafety facility conditions, the pig herd is positive for PRRSV but has not shown severe clinical symptoms, and is suitable for the herd isolation and purification strategy, which mainly includes serum acclimation and MLV vaccine acclimation.

不管是哪种驯化方式都是群体免疫或感染同步，通过猪群自净，同步结束排毒，最终实现统一转阴。其中同型疫苗驯化相比血清驯化具有更安全和驯化剂量可控等优点。

Domestication is achieved through self-purification of the pig herd, simultaneous detoxification, and turning negative. Homologous vaccine domestication has advantages such as greater safety and controllable domestication dosage compared with serum domestication.

PART 02

目的意义
Purpose

目的意义Purpose

1、使用同型活疫苗驯化和血清驯化应用于PRRS阳性不稳定猪场，评估驯化后猪群的应激反应、健康指标、恢复生产力基线水平等方面的差异。

Homologous live vaccine domestication and serum domestication were applied to PRRS-positive unstable pig farms to evaluate the differences in stress response, health indicators, and baseline levels of productivity recovery in the domesticated pig herd.

2、评估选出PRRS最佳驯化方式。

Evaluate and select the best domestication method for PRRS.

PART 03

材料与方法

Materials and Methods

材料与方法Materials and Methods

1、应用猪场Applied pig farm

广西区域2个蓝耳双阴场，无空气过滤设备，日常维持猪群阴性主要靠高级别生物安全，不免疫蓝耳疫苗。

There are two PRRSV-negative farms in Guangxi region. They have no air filtration equipment. The daily maintenance of negative pig herds mainly relies on high-level biosecurity and they are not immunized with PRRS vaccines.

A场周边扩建道路后防控环境变化，常规样品监测中先出现PRRSV阳性，后陆续出现母猪群异常发烧、流产、咳嗽，初生仔猪活力下降等临床症状。

After the expansion of roads around Farm A, changes in the prevention and control environment were observed. In the routine sample monitoring, PRRSV positive results were detected first, followed by abnormal fever, abortion, coughing in the sow herd, and decreased vitality in newborn piglets and other clinical symptoms.

B场引种带入蓝耳病毒，一直在群体内低流行率，每隔3-4个月波动1次，加重临床症状。

The introduction of the blue ear virus in Field B has maintained a low prevalence rate within the population, fluctuating every 3 to 4 months and exacerbating clinical symptoms.

材料与方法Materials and Methods

1、应用猪场Applied pig farm

图2 A场发病时初生仔猪活力差
Figure 2 shows that the newborn piglets in Farm A have poor vitality when the disease occurs

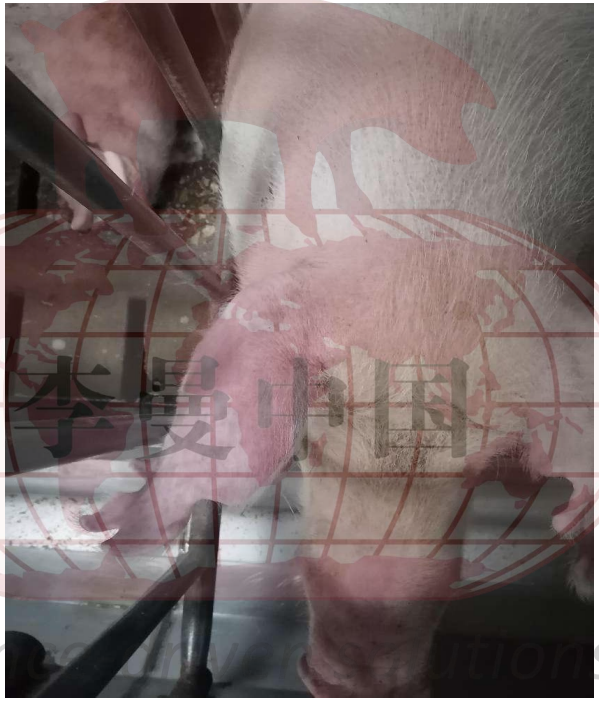


图3 A场发病时母猪耳朵发紫
Figure 3, when Farm A fell ill, the sows' ears turned purple

图4 B场流行时母猪产程不顺、仔猪反复拉稀
Figure 4, during the epidemic in Farm B, the sow had an irregular labor process and the piglets had repeated diarrhea

材料与方法Materials and Methods

经过ORF5序列同源性比较，A场确诊为类NADC34毒株感染，B场确诊为类NADC30毒株感染。

After comparing the homology of the ORF5 sequence, the A field was confirmed to be infected with the NADC34-like strain, and the B field was confirmed to be infected with the NADC30-like strain.

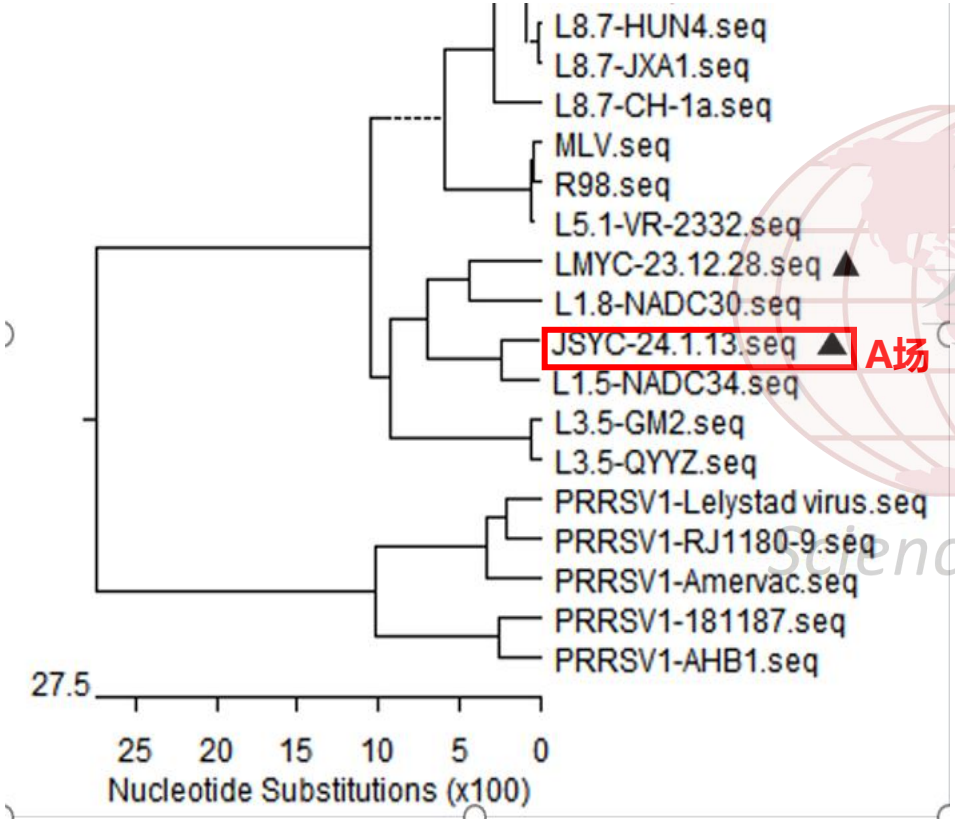


图5 A场基于ORF5核苷酸序列的遗传进化树

Figure 5 Genetic evolutionary tree of Field A based on ORF5 nucleotide sequences

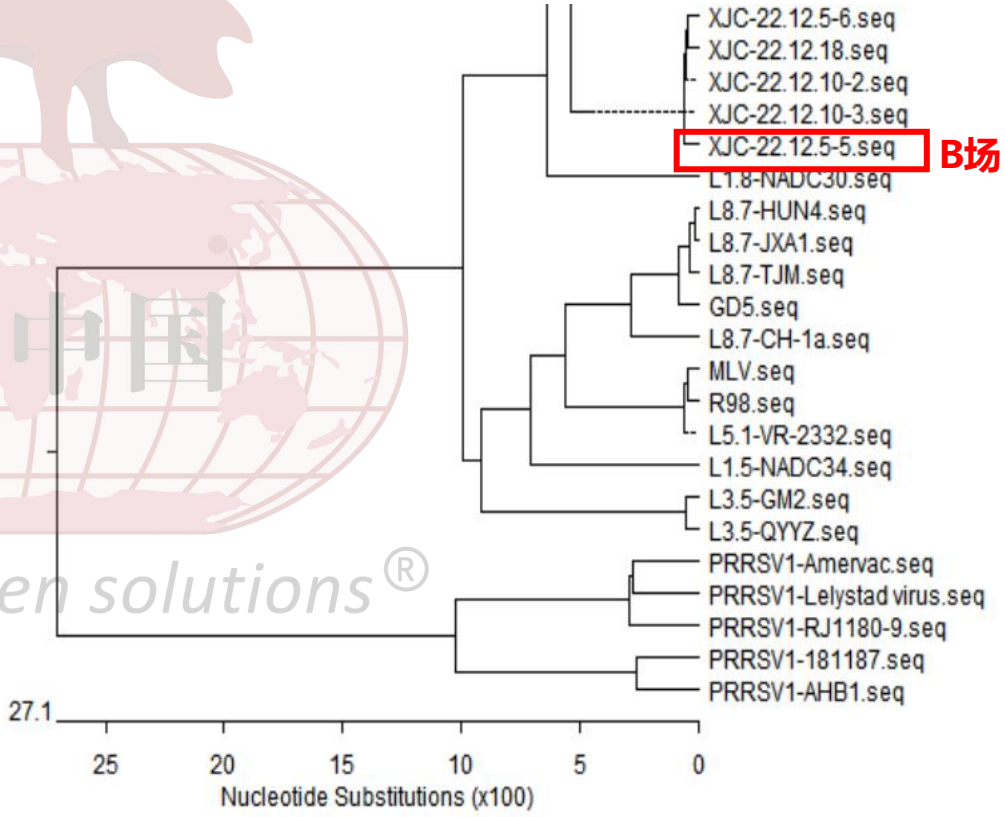


图6 B场基于ORF5核苷酸序列的遗传进化树

Figure 6 Genetic evolutionary tree of Field B based on ORF5 nucleotide sequences

材料与方法Materials and Methods

分为2个试验组，如下表2所示：

It was divided into two experimental groups, as shown in Table 1 below:

表2 PRRSV驯化方式分组
Table 2 Grouping of PRRSV domestication Methods

组别 Group	驯化方式 Domestication method	驯化群体 Domesticate groups	剂量 Dosage	驯化频率 Domestication frequency	CH-1a灭活苗免疫 Immunity against CH-1a inactivated vaccine
第1组（A场） Group 1 (Field A)	初生弱仔血清 Newborn weak baby serum	生产群+后备群 Production group + backup group	1mL/头(10^5 copies/mL) 1mL per head (10^5 copies/mL)	免疫2次 Two immunizations	间隔3周免疫2次 Two immunizations are given every three weeks
第2组（B场） Group 2 (Field B)	蓝耳活疫苗（GX-R18Q株） PRRS MLV vaccine (GX-R18Q strain)	生产群+后备群 Production group + backup group	1头份/头（10^6TCID50） 1 head per head (10^6TCID50)	间隔3周，免疫2次 Two immunizations are given every three weeks	间隔3周免疫2次 Two immunizations are given every three weeks

材料与方法Materials and Methods

2、血清驯化步骤Serum acclimation steps

封群
Herd Closure
2024年3月6日引种后备猪回场

01

猪群第一次驯化
The first domestication of pig herds
2024年3月10-16日注射血清

02

猪群第二次驯化
The second domestication of the pig herd
2024年4月7-13日注射血清

03

蓝耳灭活苗首免
The first vaccination with inactivated PRRS vaccine
2024年5月11日普免

04

蓝耳灭活苗二免
Second immunization with PRRS inactivated vaccine
2024年6月9日普免

05

维持阶段
Maintenance stage
持续监测
Continuous monitoring

06

材料与方法Materials and Methods

3、同型活疫苗驯化步骤The acclimation steps of homologous live vaccines

封群
Herd Closure

2024年8月引种后备猪

01

猪群第一次驯化
The first domestication of pig herds

2024年9月初蓝耳活苗免疫

02

猪群第二次驯化
The second domestication of the pig herd

2024年9月底蓝耳活苗免疫

03

蓝耳灭活苗首免
The first vaccination with inactivated PRRS vaccine

2024年10月普免

04

蓝耳灭活苗二免
Second immunization with PRRS inactivated vaccine

2024年11月普免

05

维持阶段
Maintenance stage

持续监测
Continuous monitoring

06

材料与方法Materials and Methods

4、评估指标Evaluation Indicators

2个试验猪群经过不同的驯化处理方式，对出生、哺乳和断奶仔猪的带毒情况都会产生影响。

The two experimental pig herds, after different domestication treatment methods, will all have an impact on the virus-carrying status of newborn, lactating and weaned piglets.

表2 评估指标Table 2 Evaluation Indicators

序号 Serial number	指标名称 Indicator name	检测方法 Detection method	样本类型 Sample type
1	PRRSV核酸阳性状态 Positive status of PRRSV nucleic acid	qRT-PCR	脐带血、去势液、断奶前弱仔血清 Umbilical cord blood, castration fluid, pre-weaning weak baby serum
2	PRRS抗体阳性状态 Positive status of PRRS antibodies	ELISA	生产猪群血清 Produce pig herd serum
3	周流产率 Weekly miscarriage rate	——	——
4	TTBP (Time-To-Baseline Productivity)	——	——
5	TTS (Time-To-PRRS Stability)	——	——

材料与方法Materials and Methods

5、生物安全管理Biosafety management

两种驯化操作中产房执行McREBEL方法，降低病原传播的风险，最大限度地提高生产母猪窝均活仔的数量。

In the two domestication operations, the McREBEL method was implemented in the farrowing house to reduce the risk of pathogen transmission and maximize the average number of live piglets per litter of sows.

减少寄养 Reduce foster care	禁止跨舍移动母猪和仔猪 It is prohibited to move sows and piglets across sheds	禁止救助因蓝耳病感染的弱仔猪 It is prohibited to rescue weak piglets infected with PRRS	处死无饲养价值的断奶弱仔猪 Kill the weaned weak piglets that have no feeding value	猪群单向流动 Pigs move in one direction only	全进全出 All in, all out
1	2	3	4	5	6

PART 04

结果与分析

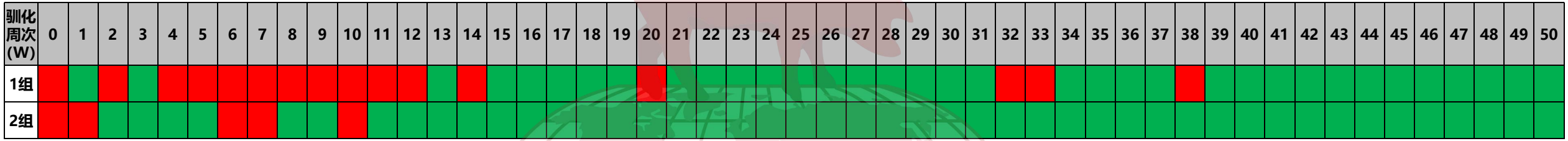
Results and Analysis

结果与分析Results and Analysis

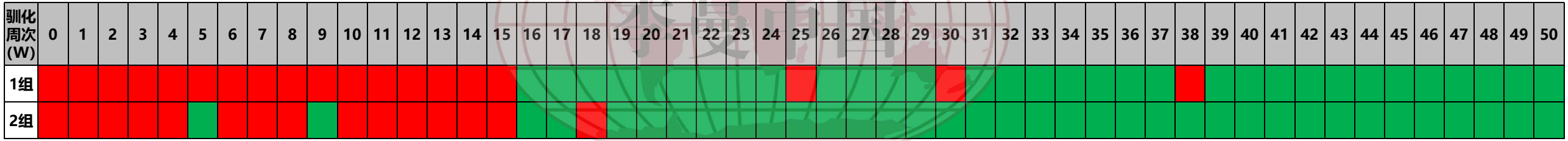
1、不同的病原驯化方式下初生、哺乳和断奶仔猪PRRSV感染

PRRSV infection in newborn, lactating and weaned piglets under different pathogen domestication methods

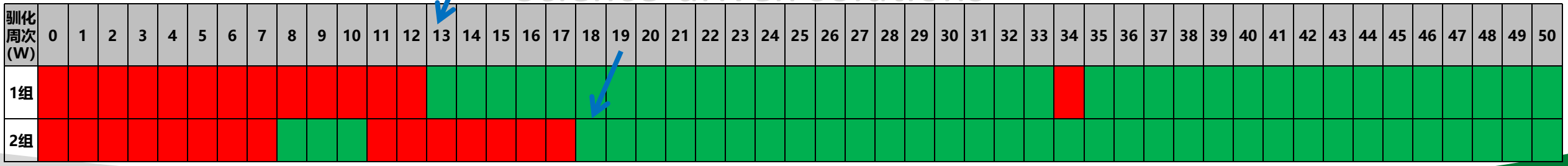
1.1 出生仔猪监测Monitoring of newborn piglets



1.2 哺乳仔猪监测Monitoring of Suckling piglets



1.3 断奶仔猪监测Monitoring of weaned piglets



注：驯化周次取数以最后1次血清或MLV处理周计为0周

Note: The number of domestication weeks is counted as 0 weeks based on the last serum or MLV treatment week

结果与分析Results and Analysis

2、不同的病原驯化方式下的母猪流产影响

The influence of different pathogen domestication methods on the abortion of sows

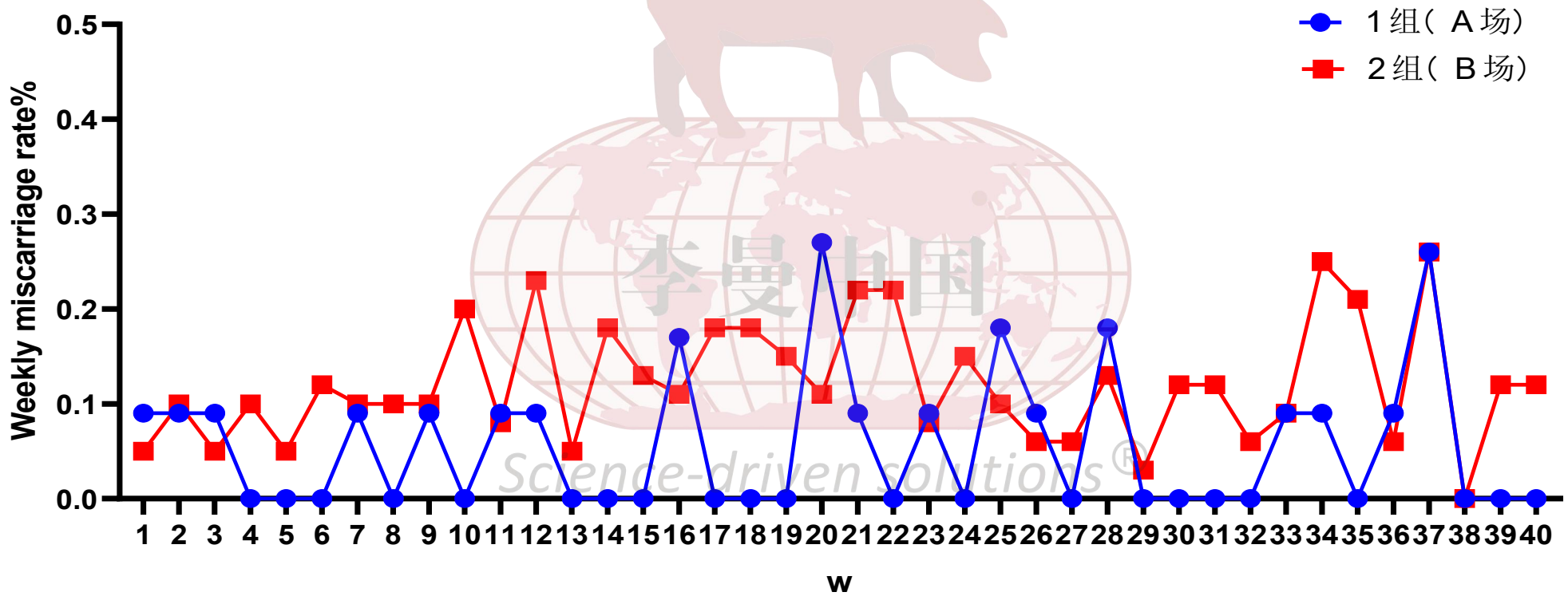


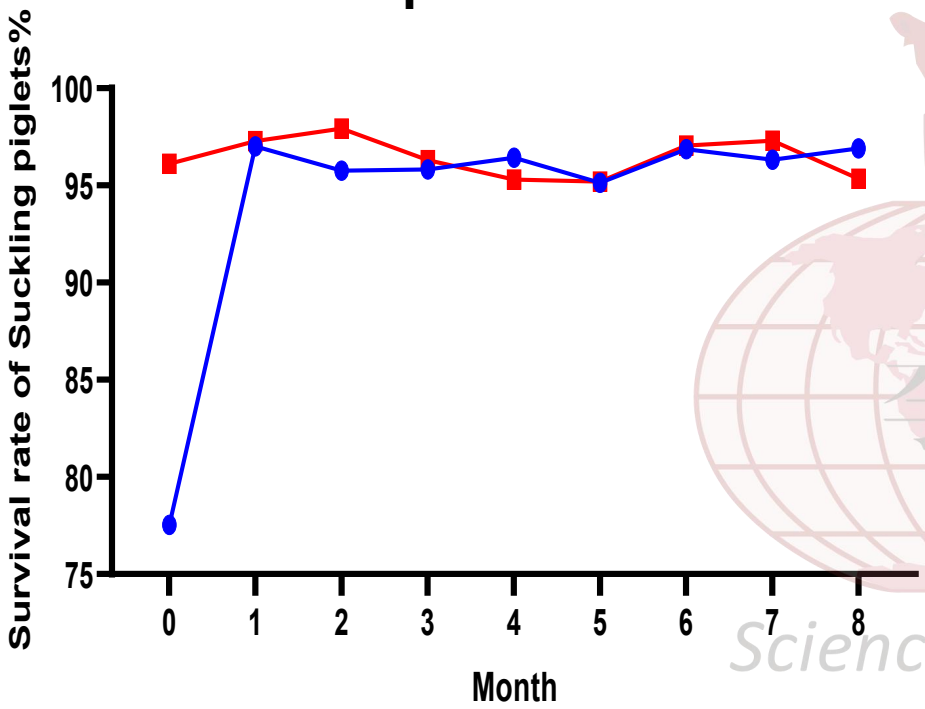
图7 2种不同驯化操作后生产母猪群流产指标均无异常增高影响

Figure 7 shows that there was no abnormal increase in the abortion indicators of the sow herds after the two different domestication operations

结果与分析Results and Analysis

3、不同的病原驯化方式下的生产指标影响

The influence of production indicators under different pathogen domestication methods



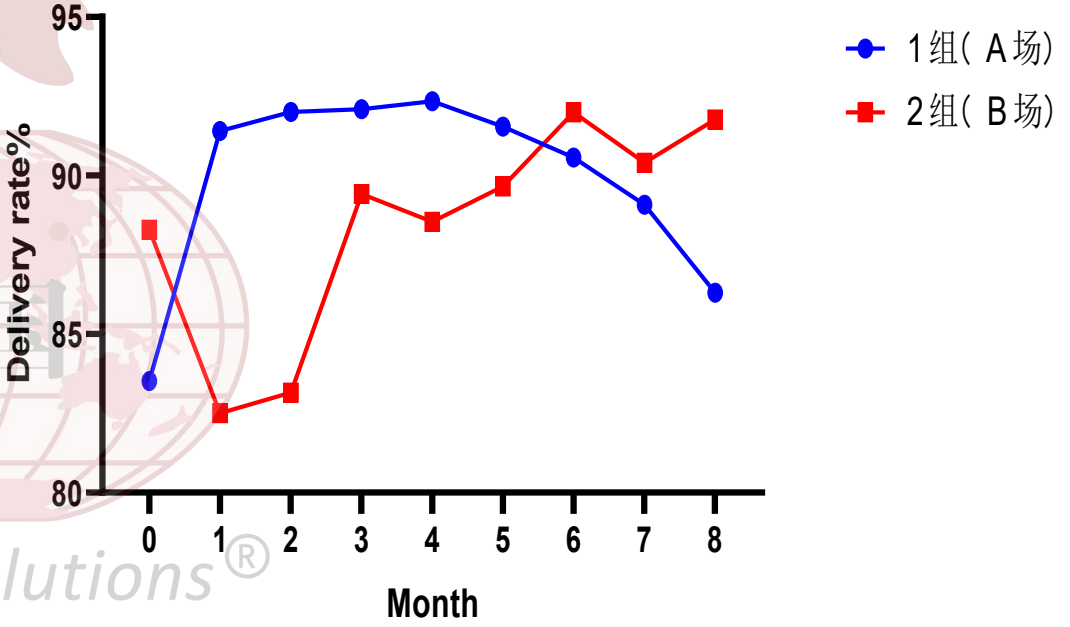


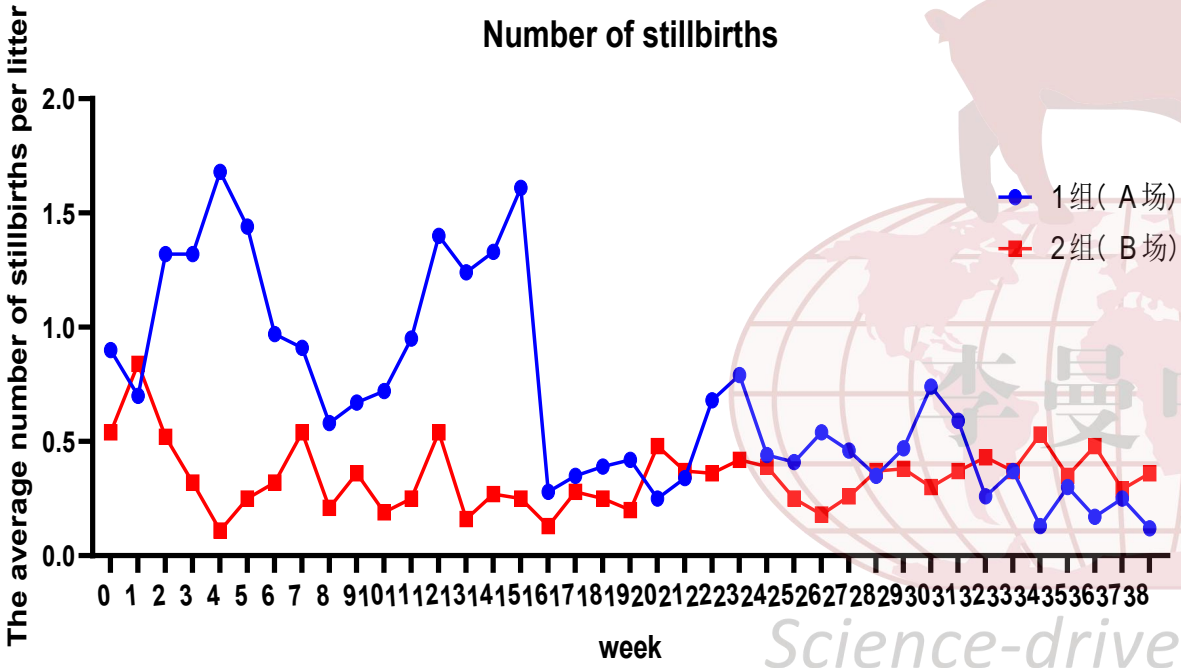
图8 2种不同驯化操作后哺乳仔猪成活率A场影响大
Figure 8 shows that the survival rate of Suckling piglets after two different domestication operations has A significant impact on Farm A

图9 2种不同驯化操作后分娩率A场影响大
Figure 9 shows that two different domestication operations have A significant impact on the delivery rate

结果与分析Results and Analysis

3、不同的病原驯化方式下的生产指标影响

The influence of production indicators under different pathogen domestication methods



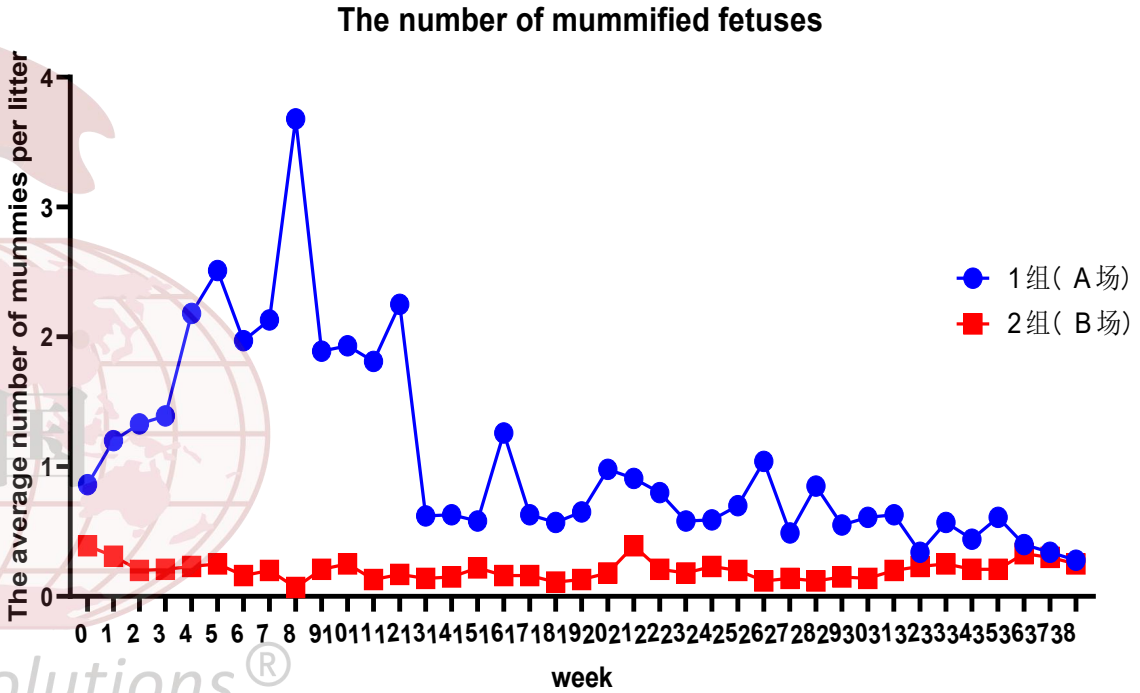


图10 2种不同驯化操作后窝均死胎数对A场影响大

Figure 10 shows that the average number of stillbirths per litter after two different domestication operations has A significant impact on Field A

图11 2种不同驯化操作后窝均木乃伊数A场影响大

Figure 11 shows that the average number of mummies per fossa after two different domestication operations has A significant impact on Field A

结果与分析Results and Analysis

4、生产力恢复情况Productivity recovery situation

猪场 Pig farm	驯化方式 Domestication method	驯化群体 Domesticate groups	TTS	TTBP
1组（A场） Group 1 (Field A)	初生弱仔血清 Newborn weak baby serum	生产群+后备群 Production group + backup group	13 weeks	> 8 weeks
2组（B场） Group 2 (Field B)	蓝耳活疫苗 (GX-R18Q株) PRRS MLV vaccine (GX-R18Q strain)	生产群+后备群 Production group + backup group	1胎线12周 1 Fetal line 12 weeks	0 weeks
			经产线18周 Production line 18 weeks	

- ✓ TTBP (time-to-baseline productivity)：猪群**恢复正常生产水平**所需要的时间，以**生产的断奶仔猪数**为标准(Linhares et al 2014)。
- ✓ The time required for a pig herd to return to normal production levels is based on the number of weaned piglets produced.
- ✓ TTS(time-to-PRRS stability)：猪群**恢复PRRS阳性稳定**所需的时间，以开始**持续生产PRRSV阴性断奶仔猪**为标准（Linhares et al 2014）。至少连续90天生产阴性断奶小猪，即判定猪群达到PRRS阳性稳定状态（Holtkamp et al 2021）。
- ✓ The time required for a pig herd to stabilize PRRS positivity is determined by the start of continuous production of PRRSV-negative weaned piglets. At least 90 consecutive days of negative weaned piglets are given birth to determine that the pig herd has reached a stable state of positive PRRS

PART 05

结论
Conclusions

结论Conclusions

同型疫苗驯化
MLV Domestication
VS
血清驯化
Serum domestication

01

NADC30 GX-R18毒株是安全的，可以用于PRRS驯化。

The NADC30 GX-R18 strain is safe and can be used for PRRS acclimation.

02

驯化剂量：疫苗免疫可确保每头猪接触一样的病毒量且毒力稳定，自制血清病毒活力不稳定。

Domestication dose: Vaccine immunization can ensure that each pig is exposed to the same amount of virus with stable virulence, while the virus activity in self-made serum is unstable.

03

驯化影响：疫苗免疫对怀孕母猪产仔指标影响周期短，更快恢复到生产基线水平。

Domestication effect: The impact period of vaccine immunization on the litter production indicators of pregnant sows is short, and they can recover to the baseline production level more quickly.

勤读力耕 立已达人

谢谢大家！

Acknowledgements!

Thanks for your comments!