一例猪肺炎支原体不稳定农场的处置及经验总结

Management Strategies and Lessons Learned from a Mycoplasma hyopneumoniae-Unstable Sow Farm: A Case Study

刘源

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1.背景介绍 Background

- 商品化疫苗保护有限

Commercial vaccines exhibit restricted efficacy

- 后非瘟时代引种频繁

Frequent gilt's introductions in the post-ASF era

- 排毒期较长

Prolonged shedding period

- 行业对降本增效的极致追求

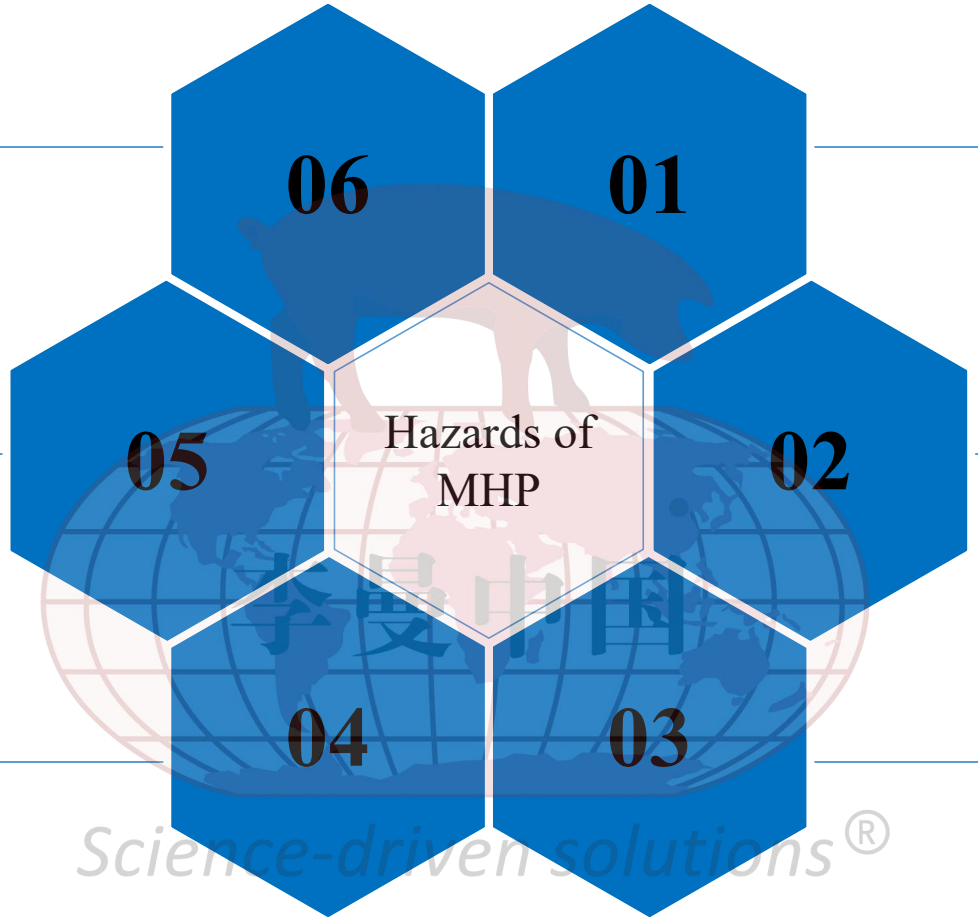
Maximum optimization of cost-efficiency dynamics in industrial operations

- 继发感染放大损失

Secondary infection magnifies production losses in livestock

- 全球流行，感染率极高

Global pandemic with an exceptionally high infection rate

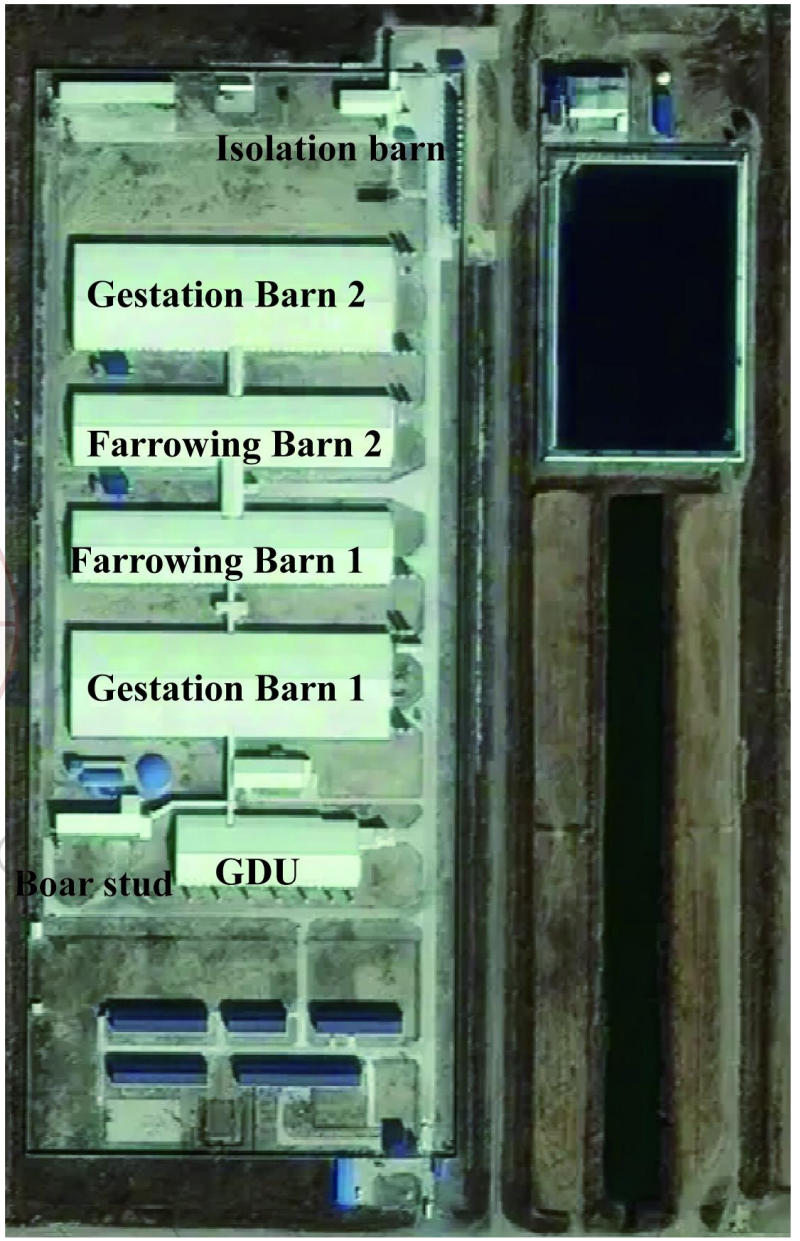


猪肺炎支原体是现代化、高密度、连续生产体系下持续放大损失的核心瓶颈

MHP is a core bottleneck that continuously amplifies losses in modern, high-density, continuous production systems.

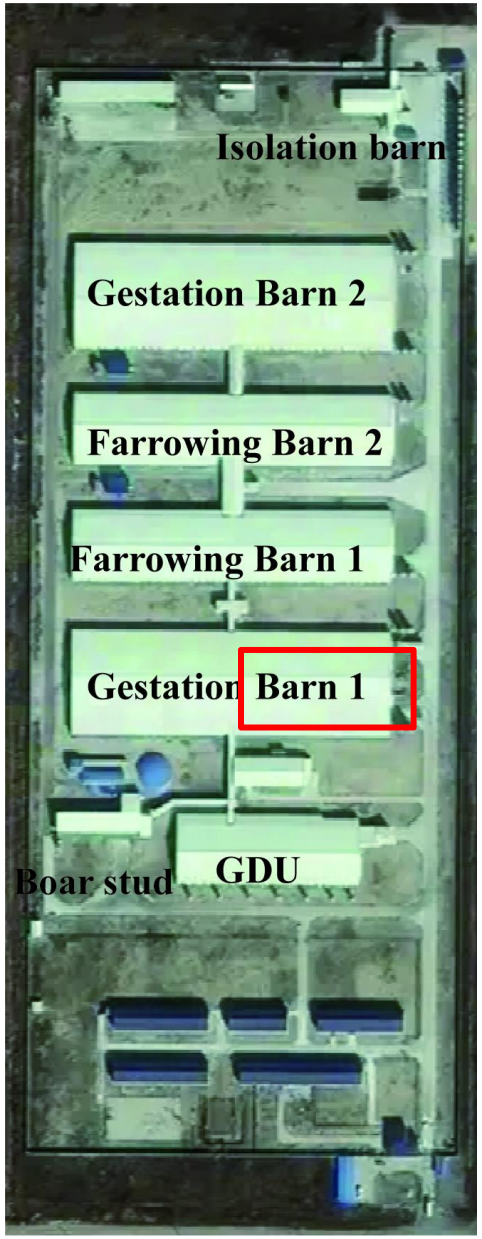
1.背景介绍 Background

- 猪场规模：6000头
- Sows Inventory: 6000
- 地址：山东省滨州市无棣县
- Location: Binzhou City, Shandong Province
- 硬件：亚高效空气过滤农场
- Facility: Negative pressure ventilation system with air filtration
- 健康状况：PRRS、PED、PRV阴性
- Health status: PRRS, PED, PRV negative
- 生产模式：分点式（母猪场、保育、断奶到育肥）
- Production mode: Multi-sites pig production (Sows, Nursery, Finisher)



1.背景介绍 Background

- 2023年2月2日- 3月4日：非瘟疫情处置 Elimination of ASFV via Precise Culling
- 2023年5月10日（19周）：将后备舍除两个保育房间的其他房间全部转到配怀舍1 Transfer all the gilts at GDU except for the two nursery rooms to G barn 1
- 2023年5月16-18日：引种，Gilts Introduction
- 2023年5月29日：隔离期间测到了NADC34毒株 During the quarantine period, the NADC34 strain was detected
- 2023年6月2日：后备舍引种猪只全部清群 Depopulating all gilts at GDU

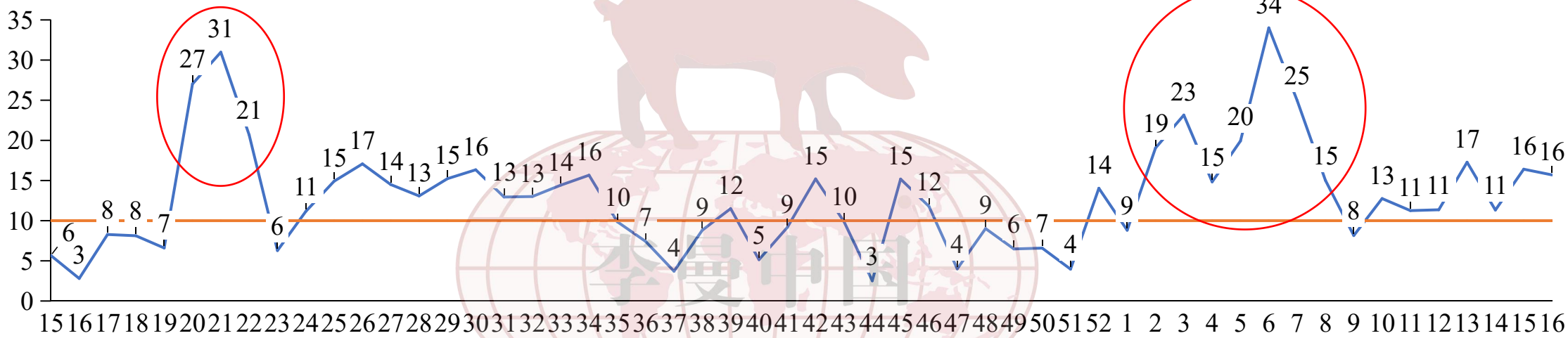


1.背景介绍 Background

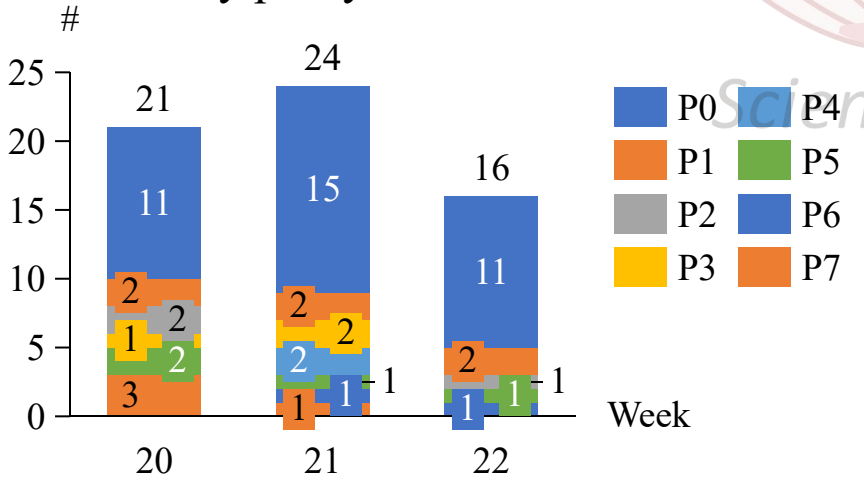
母猪场发病情况：大群持续干咳，呼吸道症状显著，出现周期性死亡高峰，增加疫苗免疫及保健效果不显著

Disease status: The herd exhibited persistent dry cough and significant respiratory symptoms, with periodic peaks in mortality. The effect of booster immunization (MHP and Pasteurella) is not significant

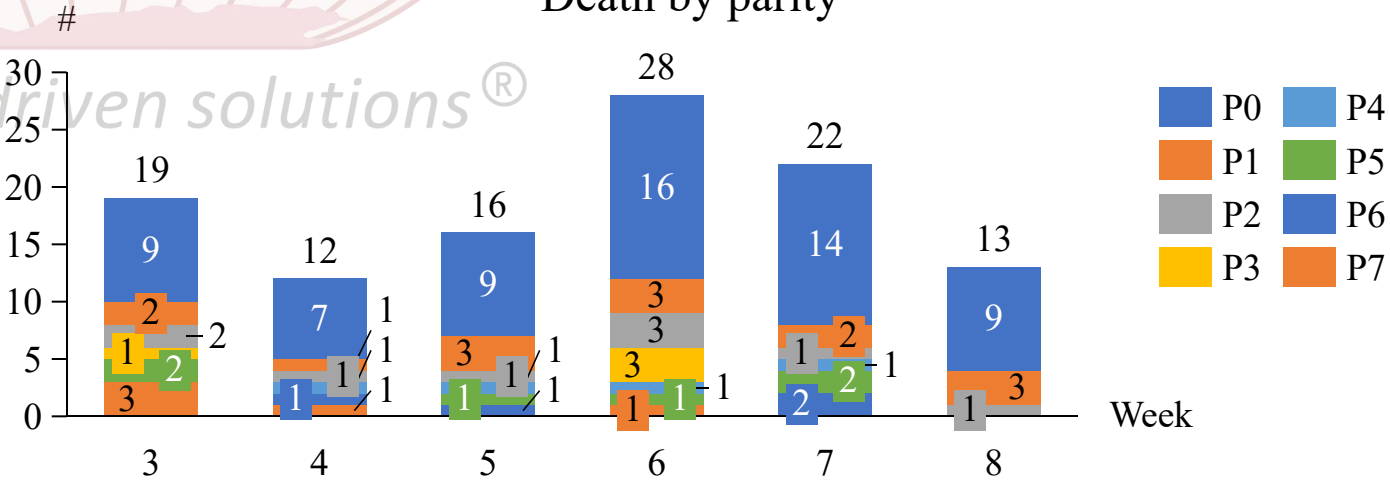
Sow mortality rate %



Death by parity



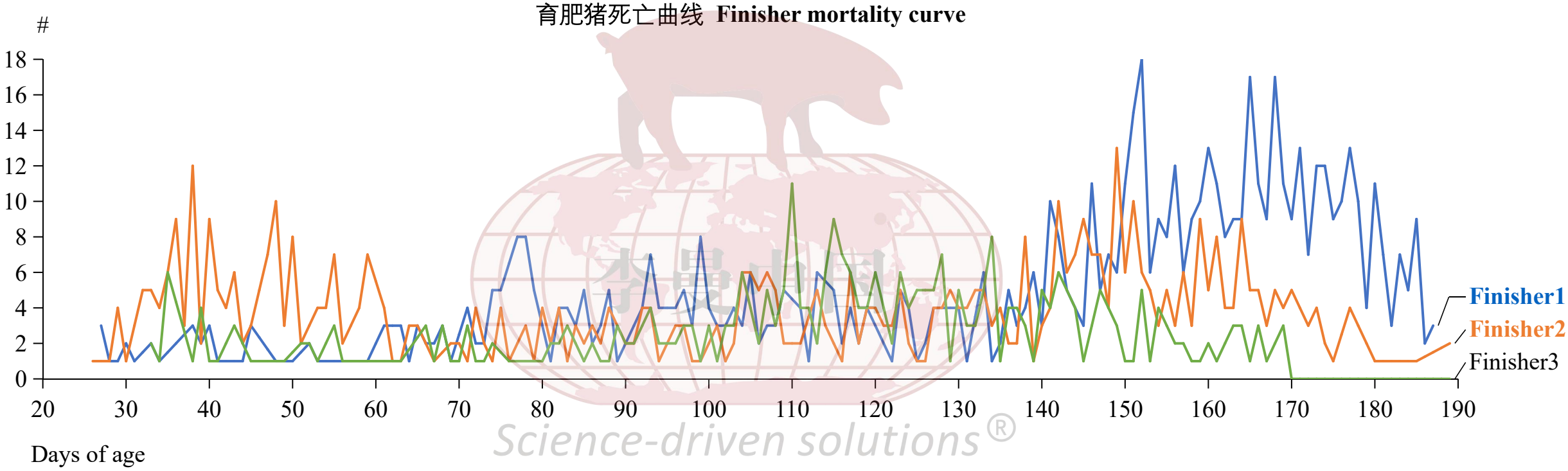
Death by parity



1.背景介绍 Background

育肥场发病情况：下游整个生长阶段持续干咳，呼吸道疾病频发，中大猪死亡增多

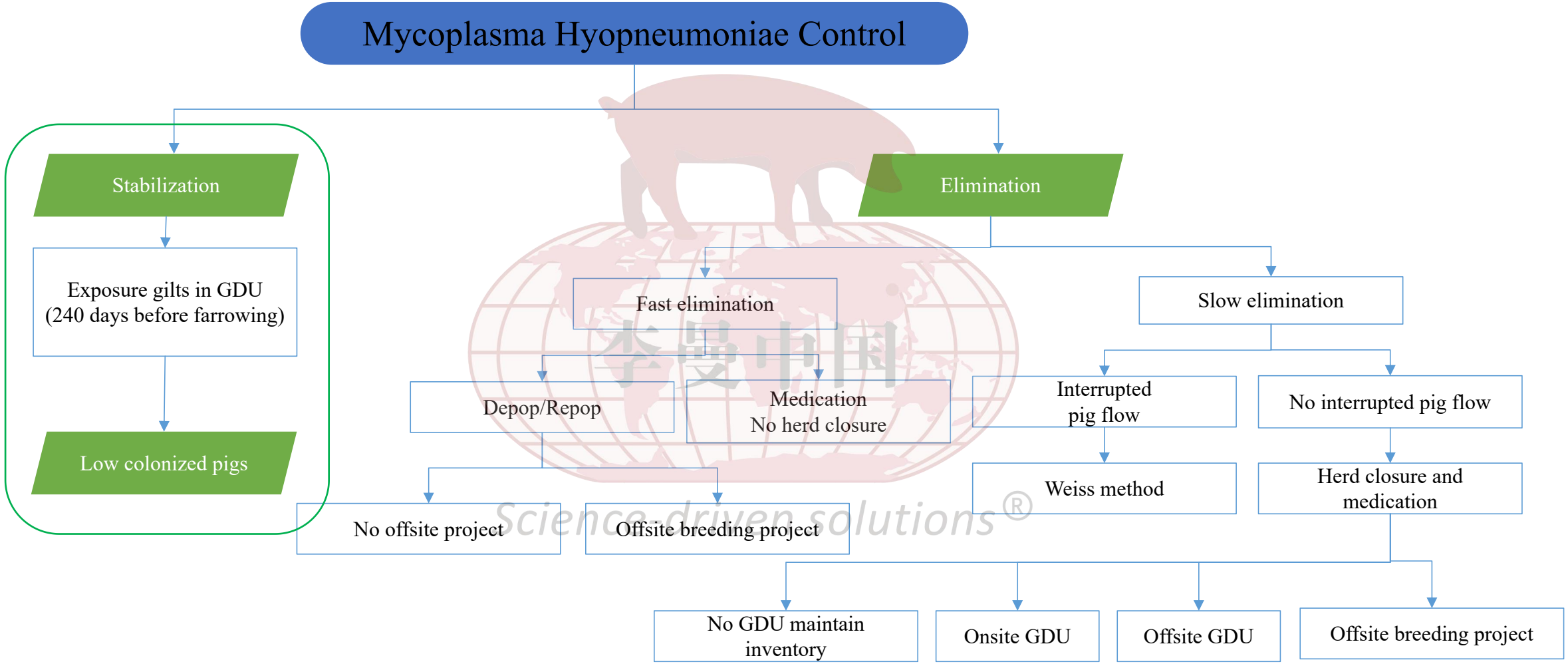
Disease status: Persistent dry cough throughout the downstream growth phase, with frequent respiratory disease and increased mortality in mid-to-late-stage finisher pigs.



批次Batch	死淘率Mortality %	FCR
Finisher1	8.2	2.75
Finisher2	8	2.51
Finisher3	6.8	2.4

1.背景介绍 Background

处置策略选择 Mycoplasma Management Strategies



Maes, D.; Sibila, M.; Pieters, M. Mycoplasmas in Swine

2.研究目的 Research Objective

- 对比驯化前后群体后备猪支原体感染动态模型，为支原体稳定农场的建立提供理论支持
- Compare the dynamic models of Mycoplasma infection before and after acclimation providing theoretical support for the establishment of Mycoplasma-stable farms.
- 确定后备猪支原体最适驯化日龄及驯化阳性肺脏的用量
- Determine the optimal acclimation age the dosage of Mycoplasma-positive lung tissue for acclimation
- 后备猪支原体驯化对相关生产指标（健康指标，分娩指标，配种性能，断奶性能）的影响
- Impact of mycoplasma hyopneumoniae exposure of gilts on production indicators (herd indicators, farrowing indicators, breeding performance, and weaning performance)
- 支原体驯化后对下游保育育肥的影响
- Impact of mycoplasma hyopneumoniae exposure of gilts on downstream farms

3.材料方法 Materials and Methods

- 实验农场：瑞东农牧处于支原体阳性不稳定的母猪场及下游育肥场；
- Experimental farm: A sow farm and its downstream finisher farms are in a Mycoplasma-positive, unstable state.
- 主要材料：支原体检测试剂盒、支原体阳性肺脏、深部输精管，开口器；
- Main materials: Mycoplasma PCR kit, Mycoplasma-positive lung tissue, PCAI catheter, mouth speculum
- 试验方法：深部支气管采样，后备猪支原体雾化驯化
- Methods: Deep bronchial sampling; aerosol exposure of Mycoplasma in gilts.

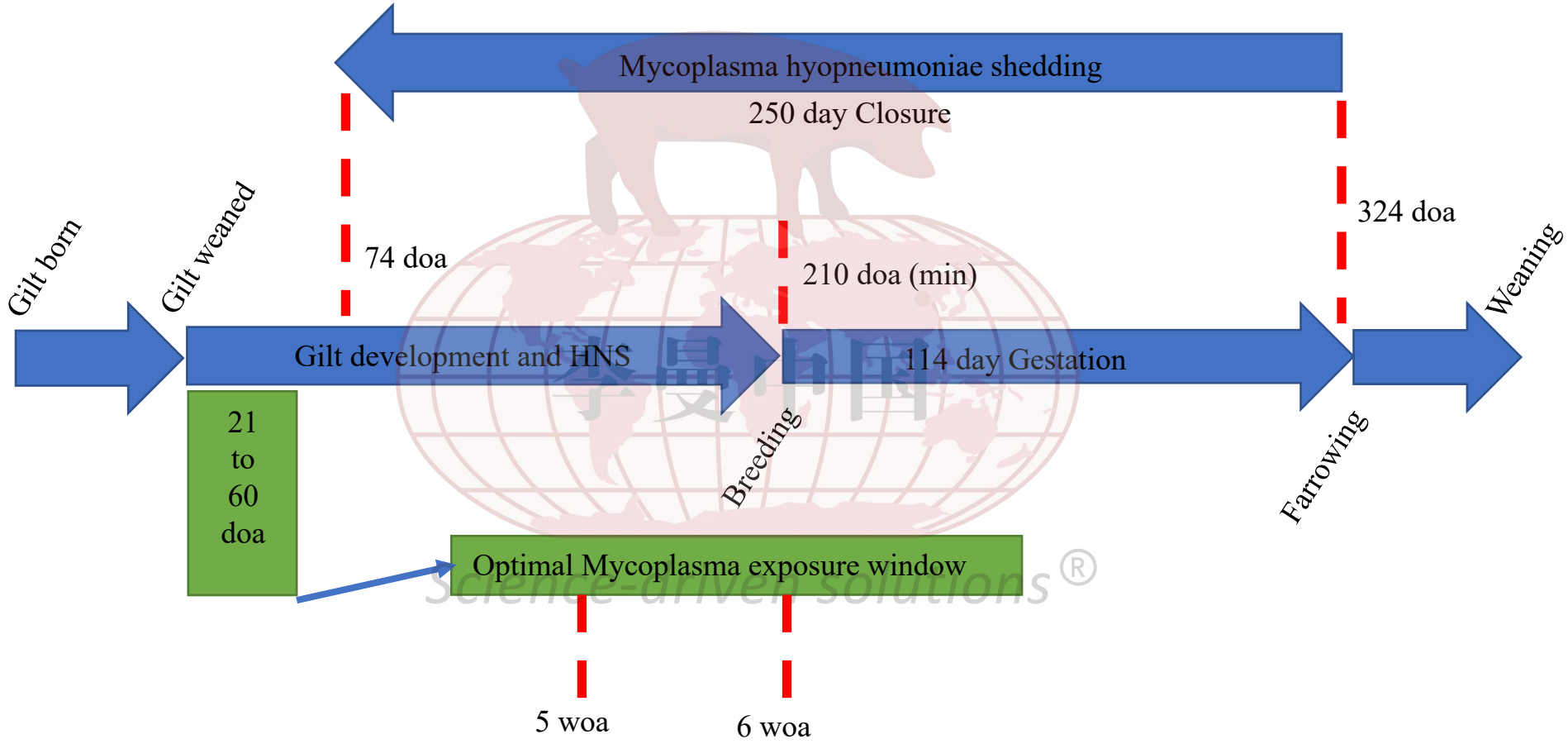
深部支气管采样
Deep bronchial sampling

肺脏匀浆液制备
Lung Homogenate

气溶胶雾化驯化
Aerosol exposure

4.结果与分析 Results and Analysis

4.1 支原体雾化驯化最适日龄及阳性肺脏使用量Determine the optimal acclimation age the dosage of Mycoplasma-positive lung tissue for acclimation



doa: days of age; woa: weeks of age

4.结果与分析 Results and Analysis

4.1 支原体雾化驯化最适日龄及阳性肺脏使用量Determine the optimal acclimation age the dosage of Mycoplasma-positive lung tissue for acclimation

驯化周龄 Age at exposure	驯化后两周的阳性率 Positivity rate 2 weeks afte rsxposure	到100日龄的死淘率 Death rate at 100 days old	临床症状持续时间 Duration of clinical symptoms
5 woa	65%	3.9%	6周
6 woa	100%	2.4%	6周

- 6周龄驯化后到100日龄的死亡率显著低于5周龄驯化 The group exposed at 6 weeks of age exhibited significantly lower mortality than the group exposed at 5 weeks.
- 6周龄驯化,两周后阳性率达到100%，显著高于5周龄驯化The group exposed at 6 weeks of age reached 100% positivity by day 14 post-exposure, significantly surpassing the 65% positivity rate observed in the 5-week exposure group.
- 5周龄驯化后，7周龄进行阳性率确定时猪只太小，深部支气管拭子采样非常困难Following 5 weeks of exposure, the small body size of pigs at 7 weeks of age significantly complicated deep bronchial swab sampling.

4.结果与分析 Results and Analysis

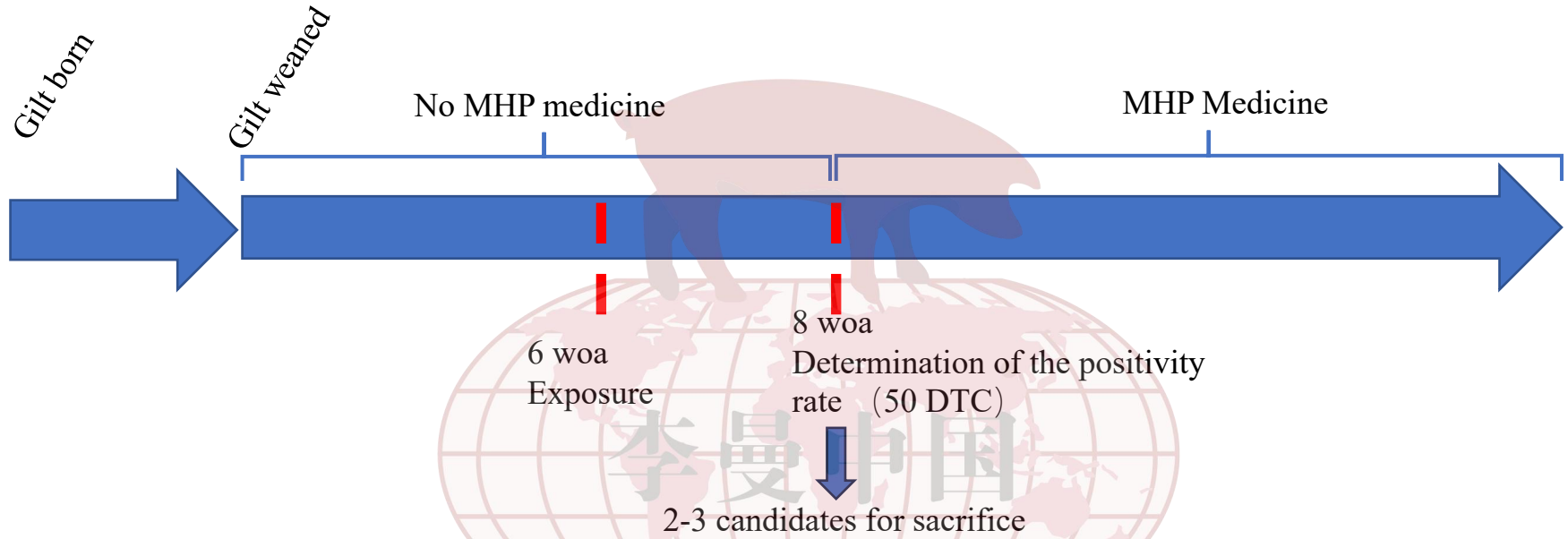
4.1 支原体雾化驯化最适日龄及阳性肺脏使用量Determine the optimal acclimation age the dosage of Mycoplasma-positive lung tissue for acclimation

时间 Date	房间 Room	出生周 Lot (Brith Week)	驯化日龄 Fogging Date	阳性率确定时间 Date of Comfirming Positive	驯化后开始咳嗽的时间 Time to Start Coughing	驯化后咳嗽持续时间 Duration of Coughing	驯化后死淘数量（截至到入群） Mortality Rate After Fogging (Up to Group Entry)	雾化器CT值 Fogging liquid CT	肺原液CT值 lung homogenate CT	批次利用率 Batch Utilization	感染率 Positive rate	批次 Batch	分娩周 Week of farrowing
2024/11/22	Room4	38	60	2024/12/6	11.29		7	24.71	22.27		100%		
2024/11/22	Room6	34	92	2024/12/6	11.29		2	25.6	22.27		100%	S03G062436	
2024/11/22	Room3	31	112	2024/12/6	11.29		6	25.6	22.27		100%	S03G032433	25w
2024/12/8	Room5	45	44	2024/12/22	12.19		6	22.65	19.7		100%	S03G052445	
2025/1/9	Room7	49	47	2025/1/23	1.16		4	24.53	20.98		100%	S03G022449	
2025/1/30	Room2	1	44	2025/2/13	2.3		23	22.46	16.58		100%	S03G022501	
2025/3/1	Room2	3	47	2025/3/15	3.11		1	24.61	18.37		100%	S03G022505	
2025/3/27	Room2	7	45	2025/4/10	4.1		3	27.77	23.6		100%	S03G022510	
2025/4/26	Room2	13	43	2025/5/10	5.1		2	27.88	31.88		100%	S03G022513	
2025/5/24	Room2	17	48	2025/6/8	5.31		1	24.23	17.18		100%	S03G022517	
2025/6/1	Whole herd			2025/6/15				26.18	20.49		97%		
2025/6/17	Room2	21	43	2025/7/1	6.25		5	22.05	17.51		100%	S03G022521	
2025/7/15	Room2	25	43	2025/7/29				27.31	22.85		100%	S03G022525	

- 6周龄驯化后，8周龄进行阳性率确定，经过长时间的实践，阳性率可以稳定100%左右. After acclimatization at 6 woa, the determination of positive rates is conducted at 8 woa. Through long-term practice, the positive rate can be consistently maintained at almost 100%.

4.结果与分析 Results and Analysis

4.2 支原体雾化驯化阳性肺脏使用量Determine the optimal dosage of Mycoplasma-positive lung tissue for acclimation



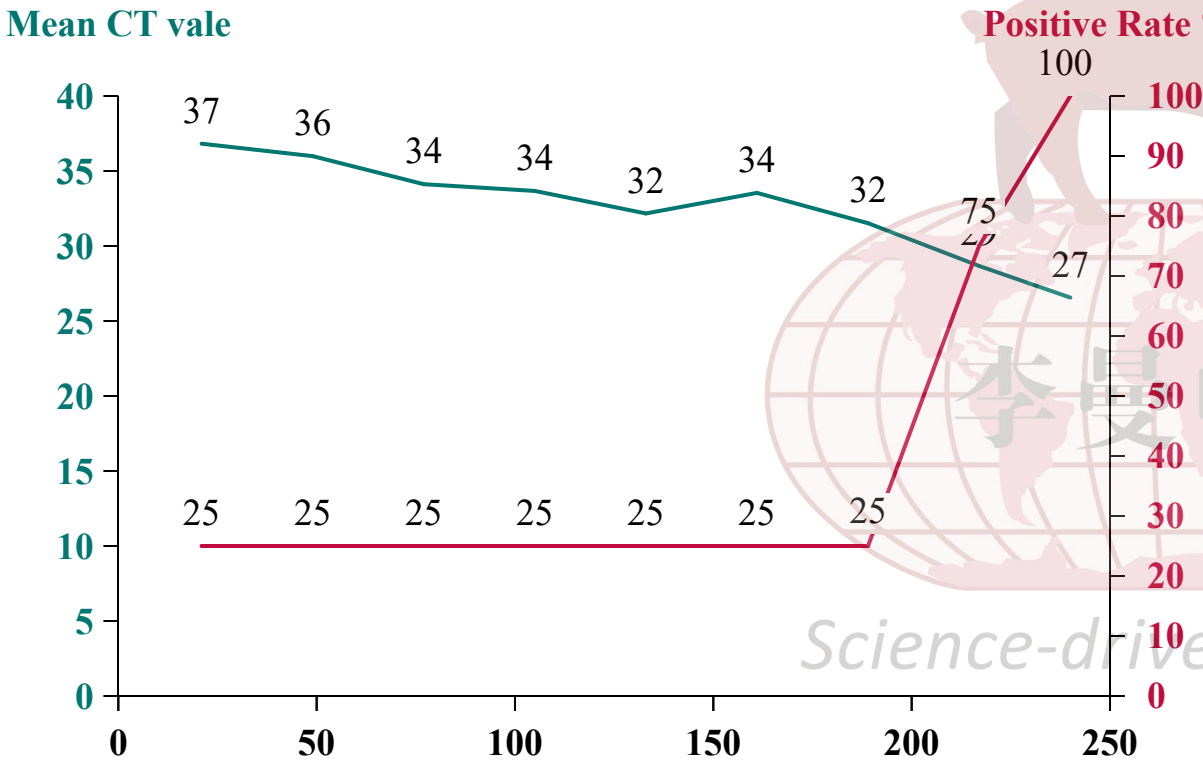
- 8周龄完成阳性确定后，从本批次挑选2-3头健康度较高，支原体CT值在20-22的猪只作为下一个批次驯化的种子猪 The candidate pigs are selected from the batch that was previously exposed, after we completed the positive confirmation with 2 to 3 pigs chosen with the CT values were between 20 and 22
- 驯化肺脏使用量很难精准确定，需要根据实际临床表现进行调整，一般为1/2-1个肺脏 The precise dosage of lung tissue is difficult to determine accurately and requires adjustment based on actual clinical manifestations, typically ranging from half to one whole lung.
- 在阳性率确定前，不使用针对支原体的药物，阳性率大于85%以上，确定驯化成功，开始使用针对支原体的药物进行保健 Medications specifically targeting Mycoplasma are withheld until the seropositivity rate is confirmed; once the rate exceeds 85 %, acclimation is deemed successful and targeted Mycoplasma prophylaxis is initiated.

4.结果与分析 Results and Analysis

4.3 后备猪驯化前MHP感染动态摸排MHP-infection dynamics mapping in gilts before exposure

A

后备猪配种前支原体感染动态图
MHP Infection Kinetics in Gilts Before Breeding

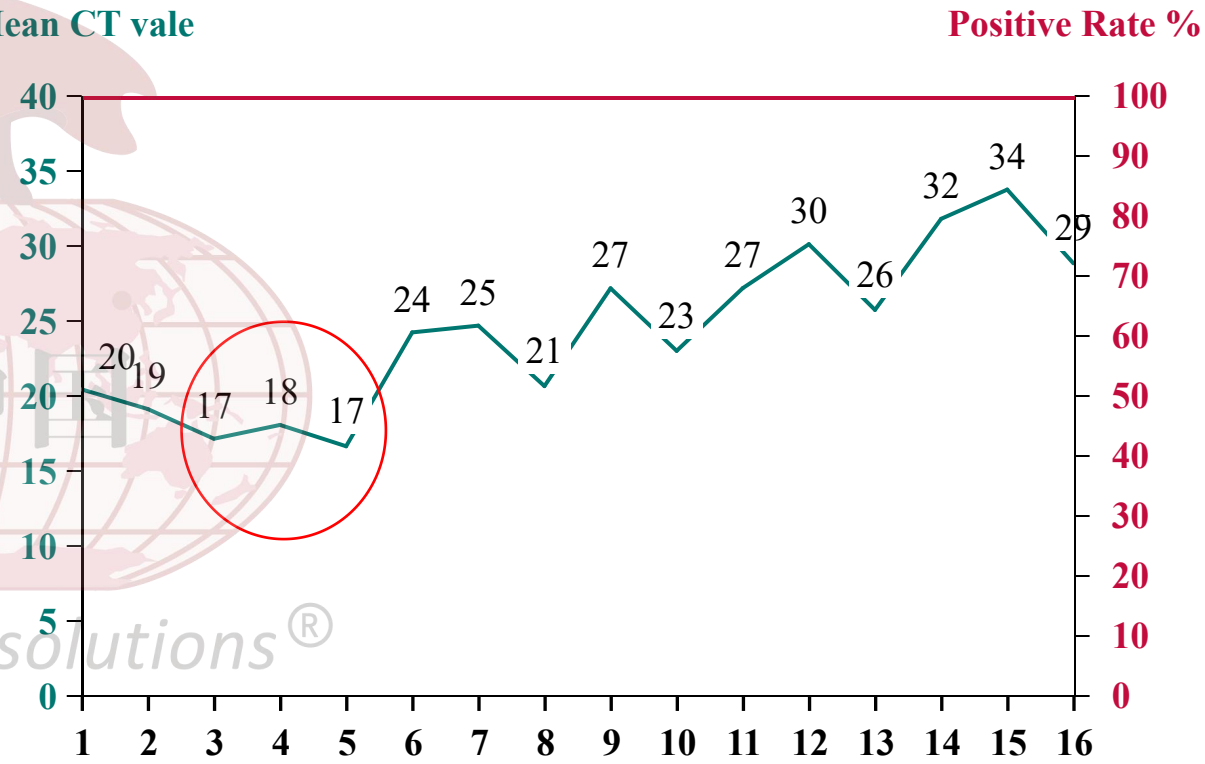


Days of Age

#每个日龄采集20头深部支气管拭子，5合1检测Collect 20 deep bronchial swabs per day of age, pooled by 5.

B

后备猪配种后支原体感染动态图
MHP Infection Kinetics in Gilts After Breeding



Weeks of Gestation

#每个妊娠周龄采集20头深部支气管拭子，5合1检测Collect 20 deep bronchial swabs per gestational week, pooled in sets of five for testing.

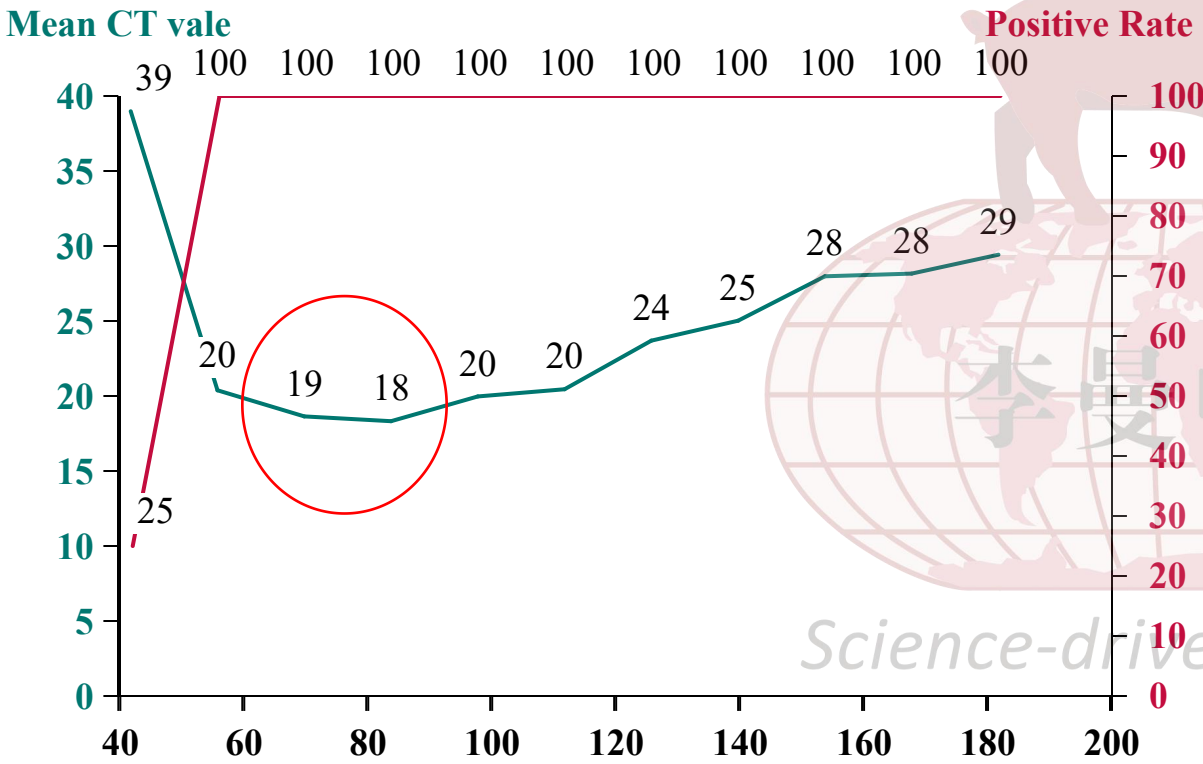
4.结果与分析 Results and Analysis

4.4 后备猪驯化后MHP感染动态摸排MHP-infection dynamics mapping in gilts before exposure

后备猪配种前支原体感染动态图

A

MHP Infection Kinetics in Gilts Before Breeding

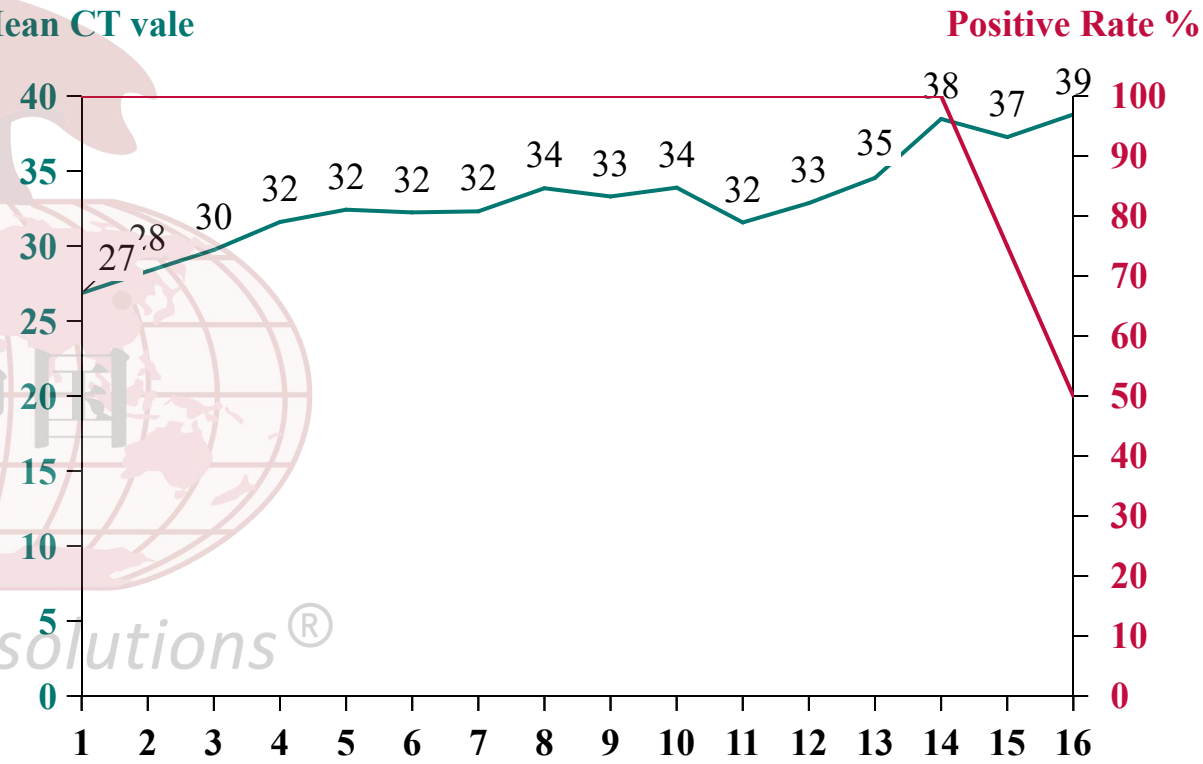


#每个日龄采集20头深部支气管拭子，5合1检测Collect 20 deep bronchial swabs per day of age, pooled by 5.

后备猪配种后支原体感染动态图

B

MHP Infection Kinetics in Gilts After Breeding

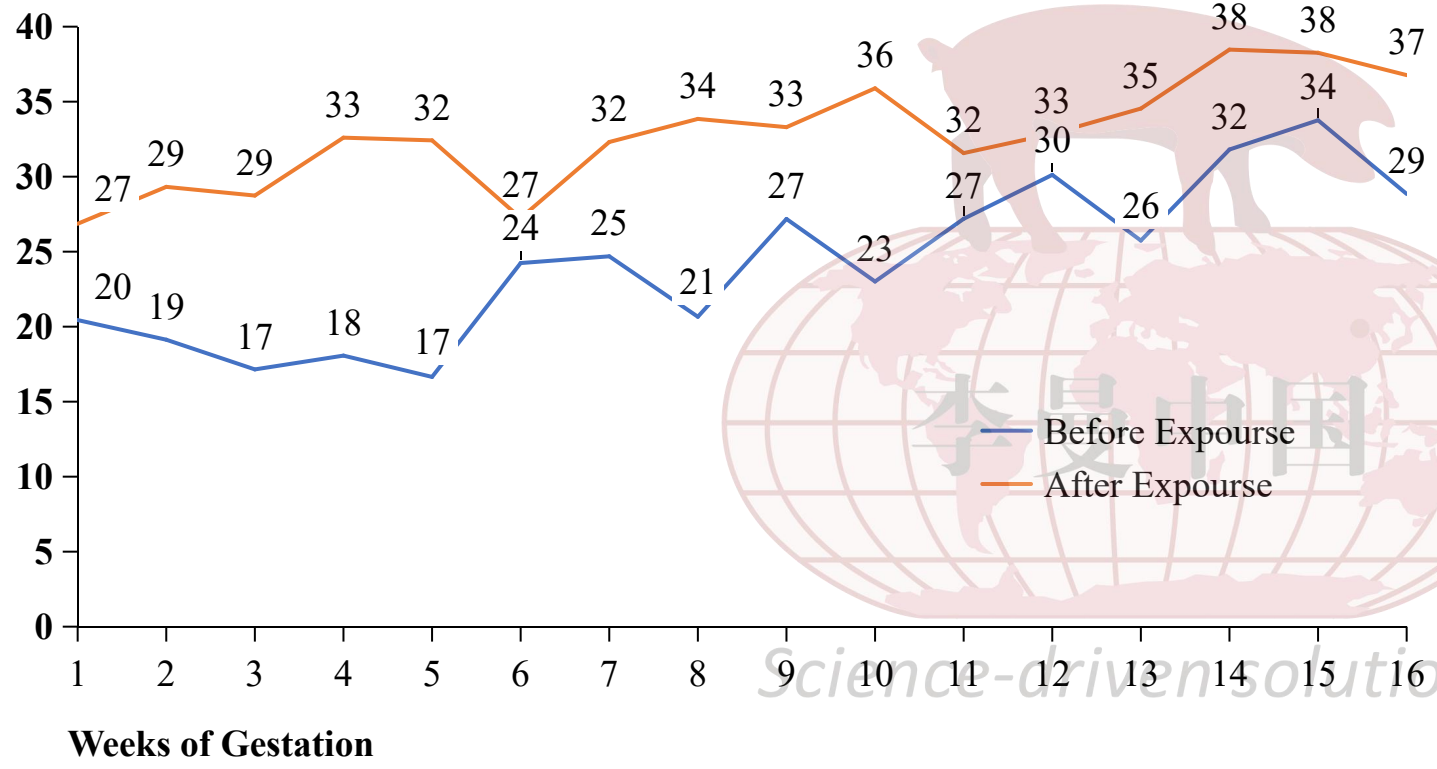


#每个妊娠周龄采集20头深部支气管拭子，5合1检测Collect 20 deep bronchial swabs per gestational week, pooled in sets of five for testing.

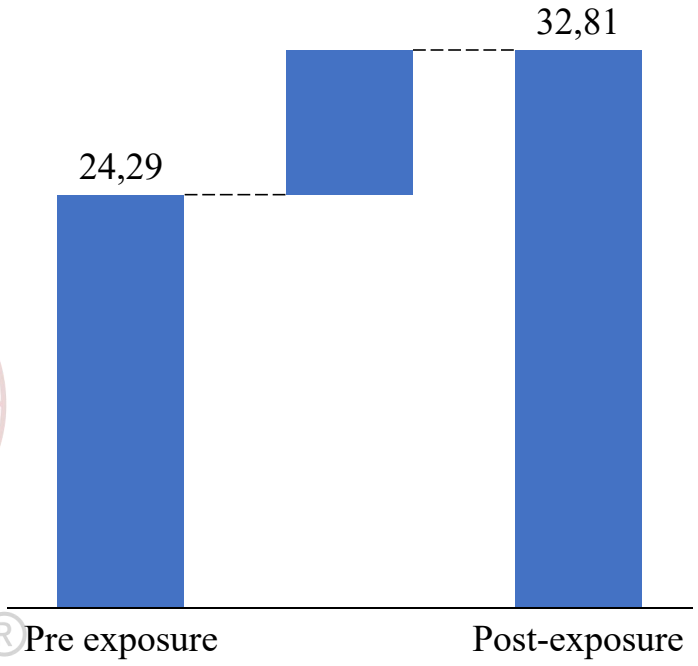
4.结果与分析 Results and Analysis

4.3驯化前后后备猪支原体感染动态差异Dynamic differences in MHP infection in gilts before and after exposure

后备猪配种后支原体感染动态图
MHP Infection Kinetics in Gilts Before and After Exposure



后备猪驯化前后平均CT值变化
MHP CT value in Gilts Before and After Exposure

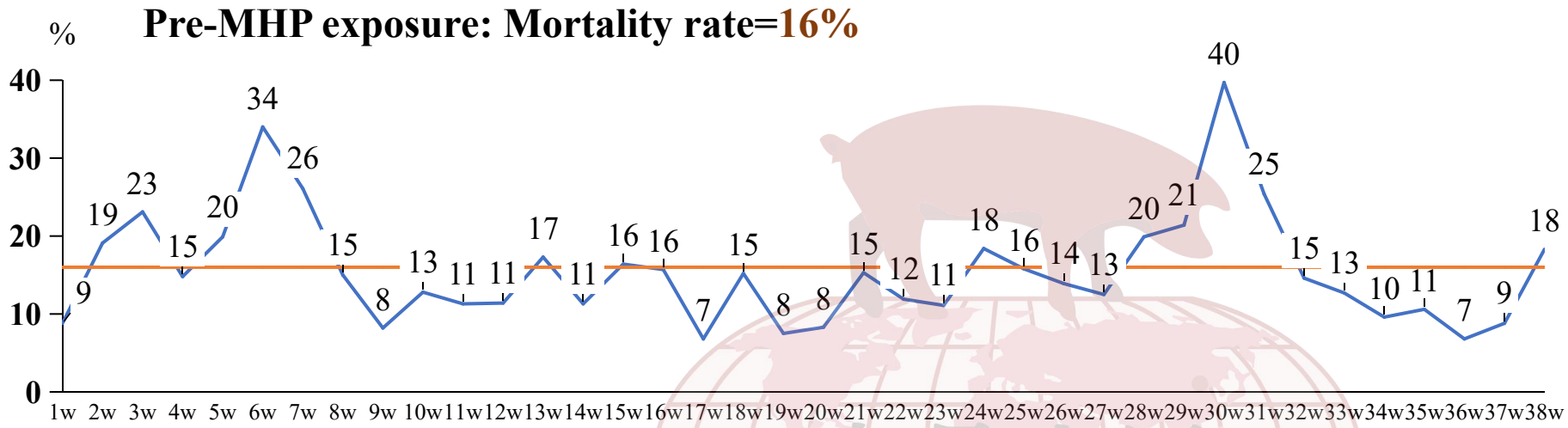


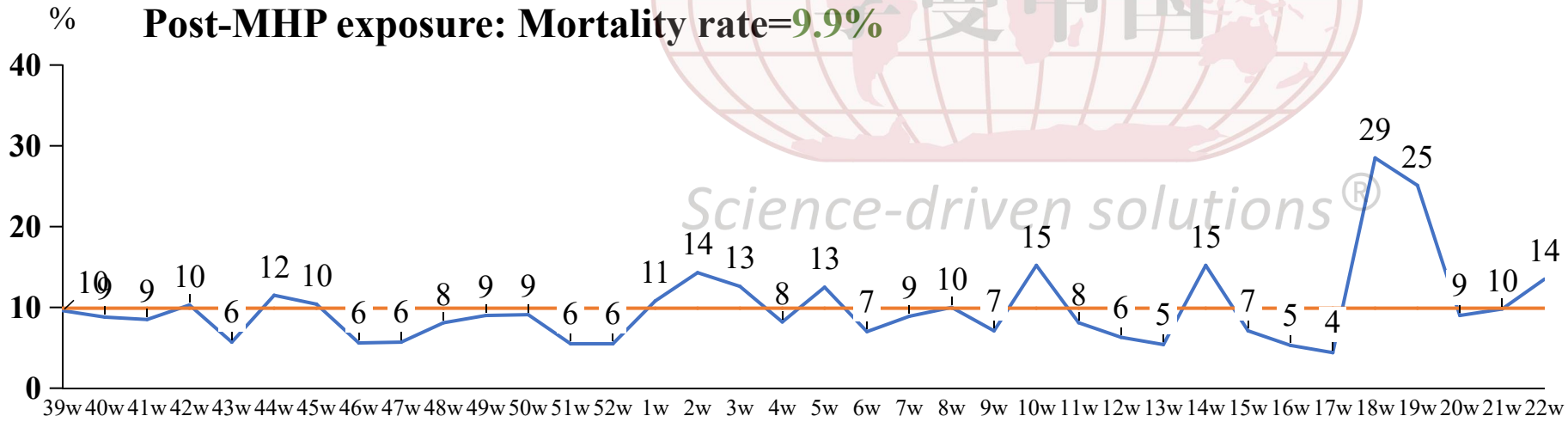
#每个妊娠周龄采集20头深部支气管拭子，5合1检测Collect 20 deep bronchial swabs per gestational week, pooled in sets of five for testing.

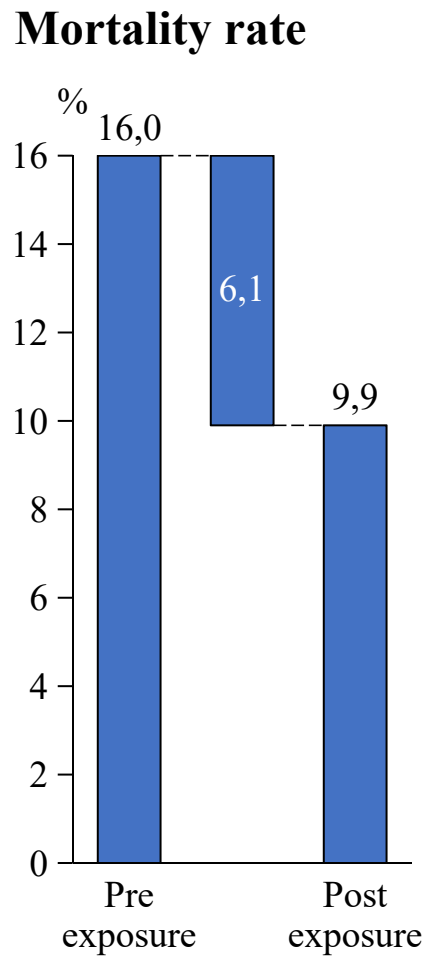
后备猪驯化后平均病原载量下降了362倍
The average pathogen load in gilts decreased by 362 times after exposure

4.结果与分析 Results and Analysis

4.4驯化前后母猪死亡率 Death rate before and after exposure

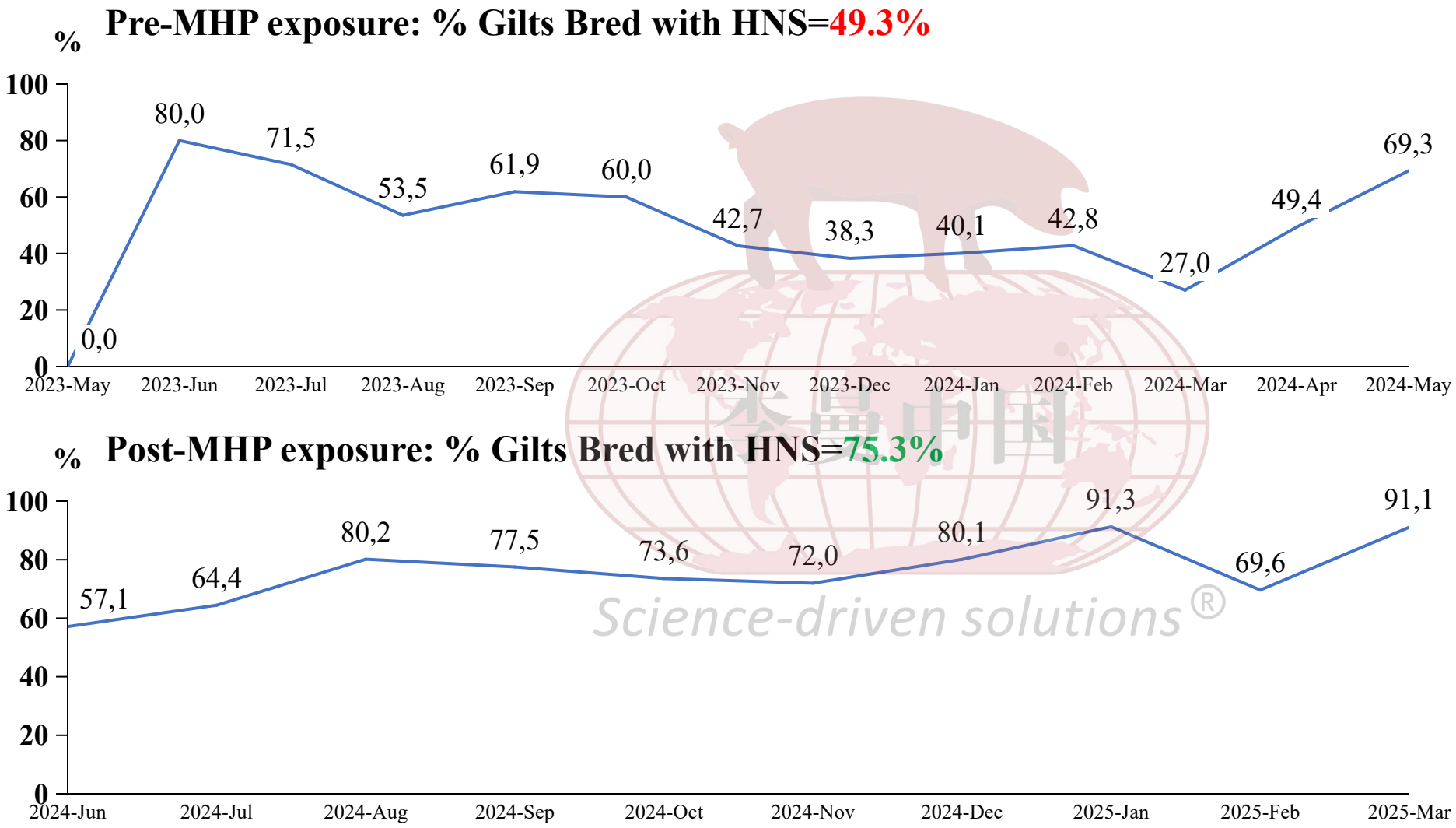


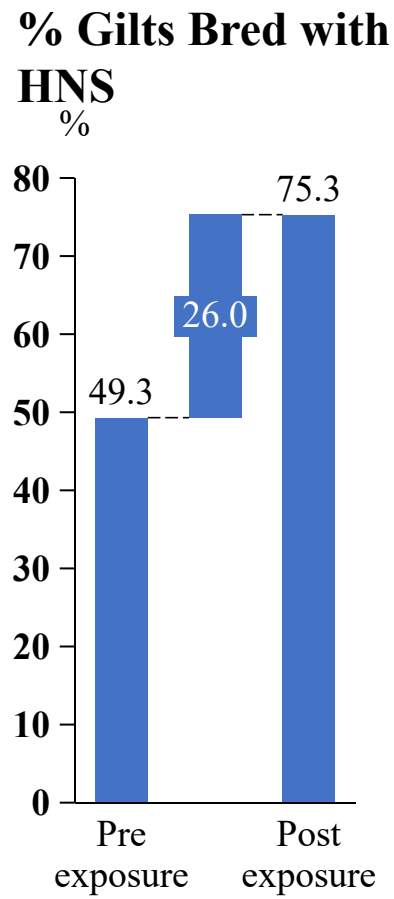




4.结果与分析 Results and Analysis

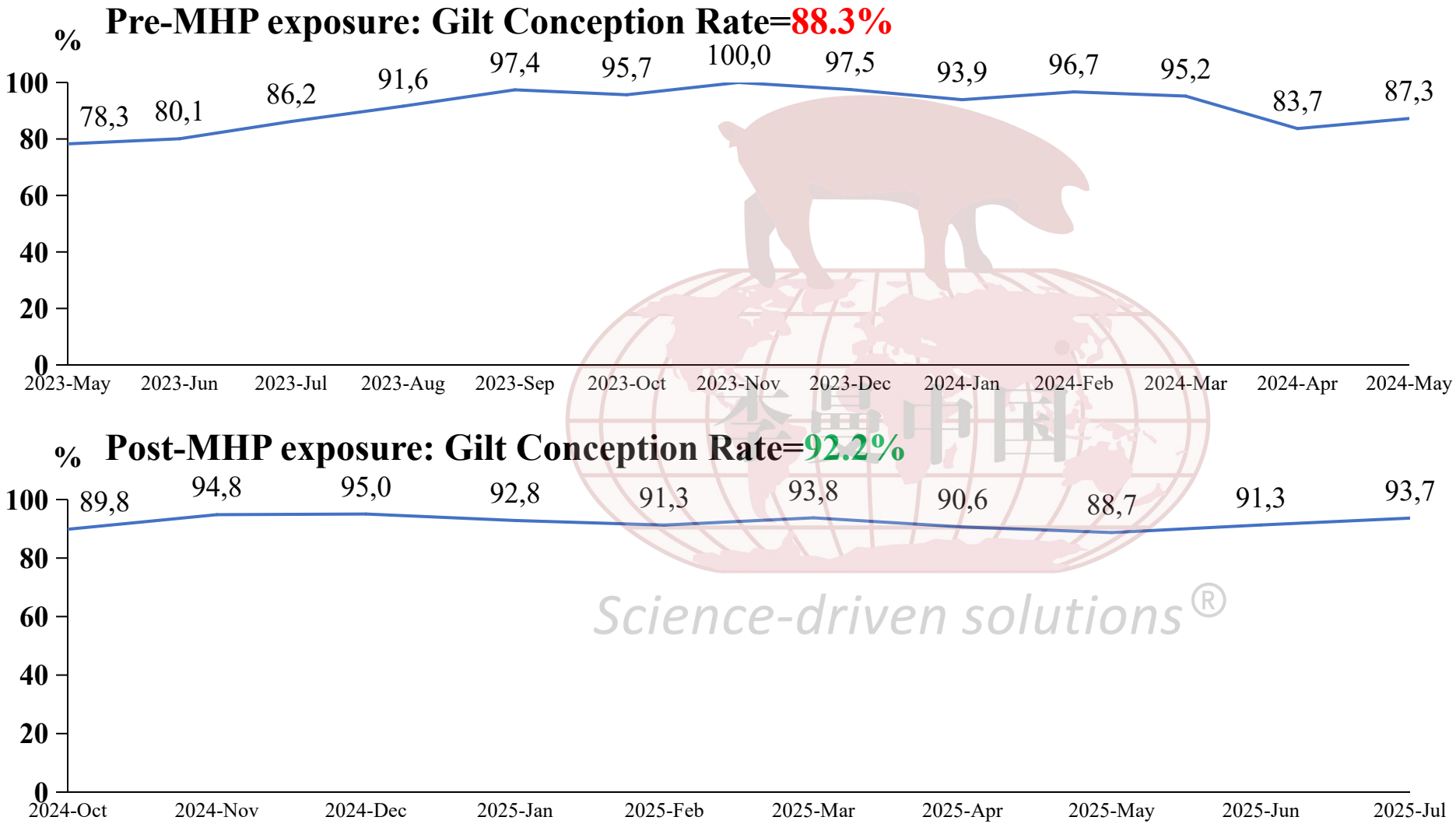
4.5驯化前后后备猪HNS HNS before and after exposure

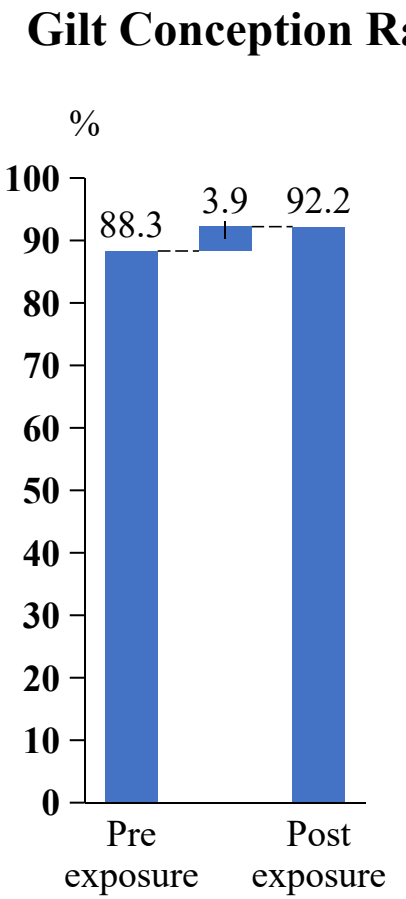




4.结果与分析 Results and Analysis

4.6驯化前后后备猪受胎率 Gilt conception rate before and after exposure

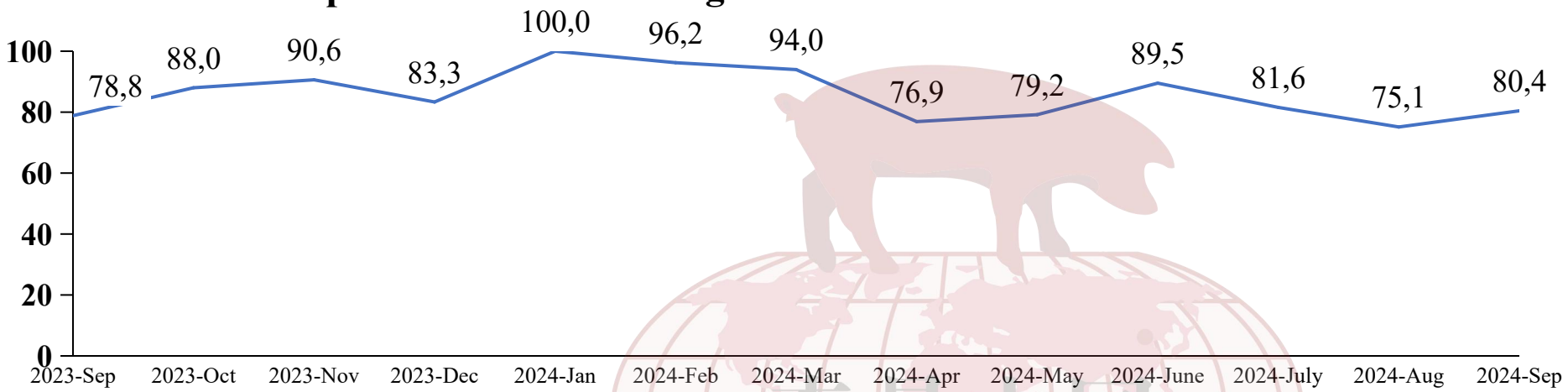




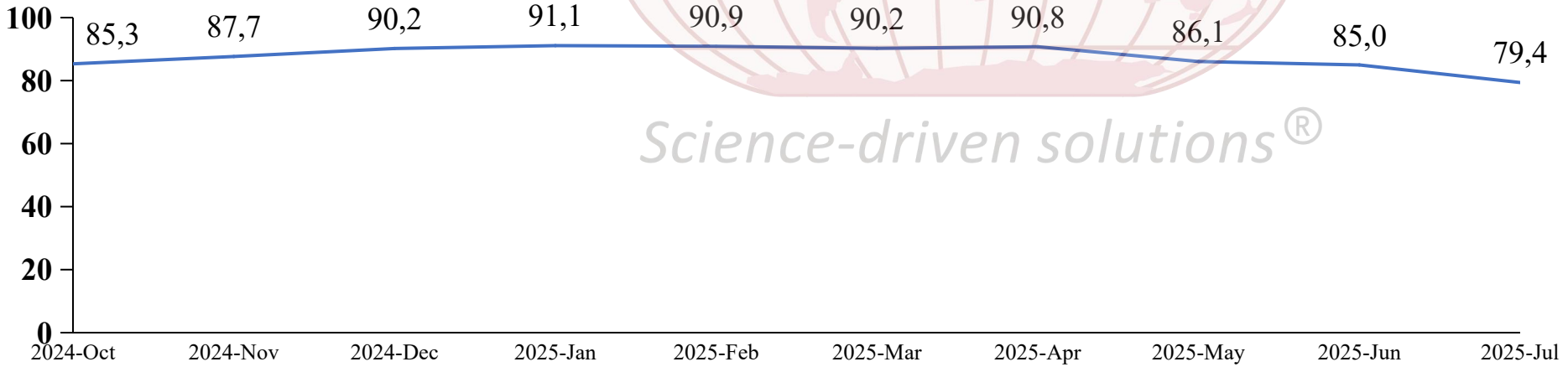
4.结果与分析 Results and Analysis

4.7驯化前后后备猪分娩率 Gilt farrowing rate before and after exposure

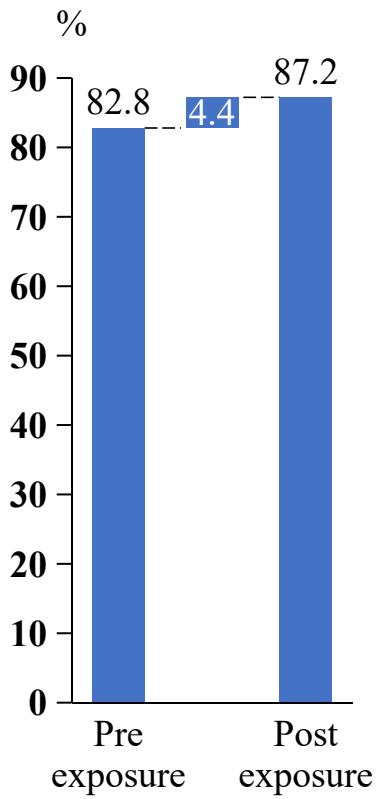
Pre-MHP exposure: Gilt Farrowing Rate=82.8%



Post-MHP exposure: Gilt Farrowing Rate=87.2%



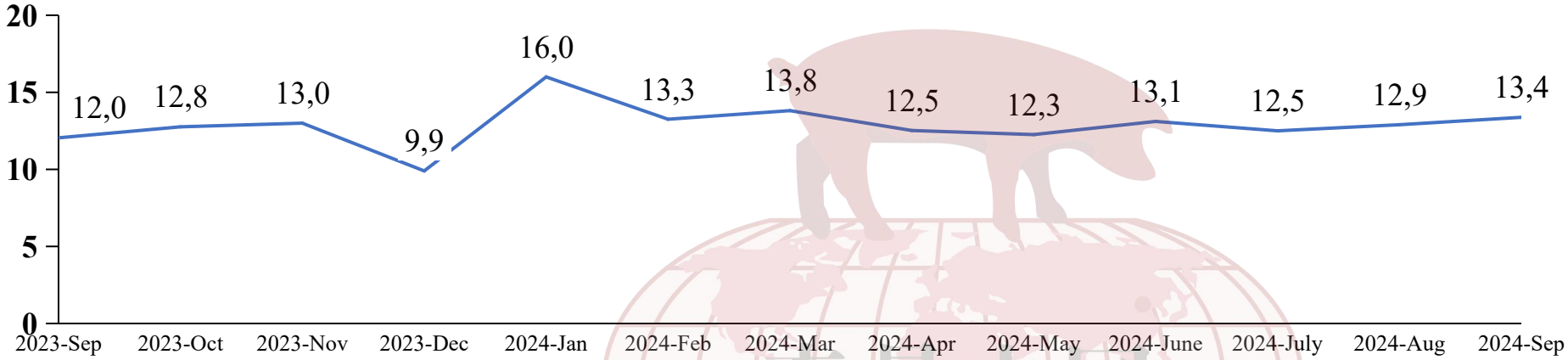
Gilt Farrowing Rate



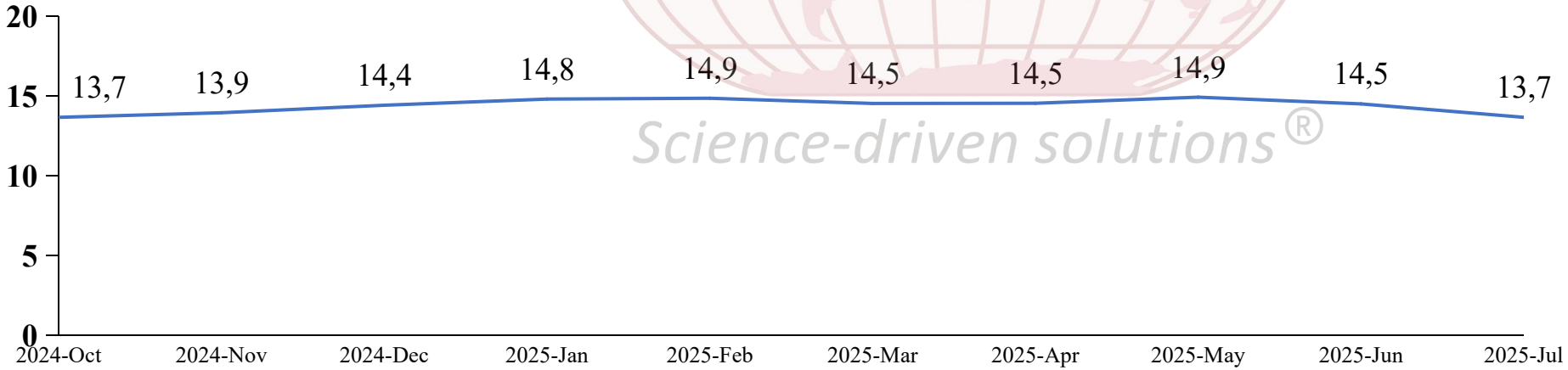
4.结果与分析 Results and Analysis

4.8驯化前后后备猪总产仔 Gilt total born before and after exposure

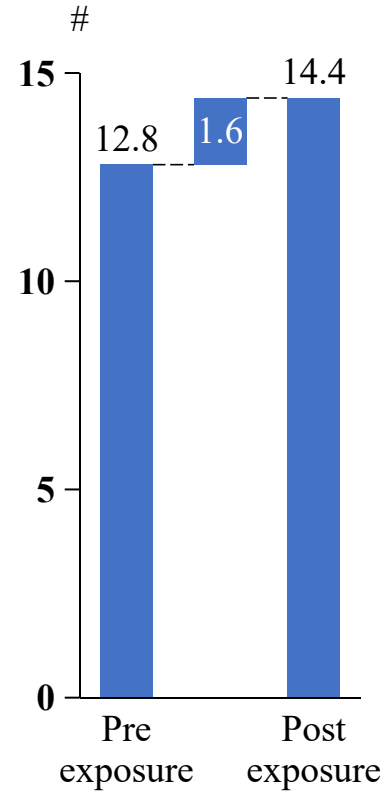
Pre-MHP exposure: Gilt Total Born=12.8



Post-MHP exposure: Gilt Total Born=14.4



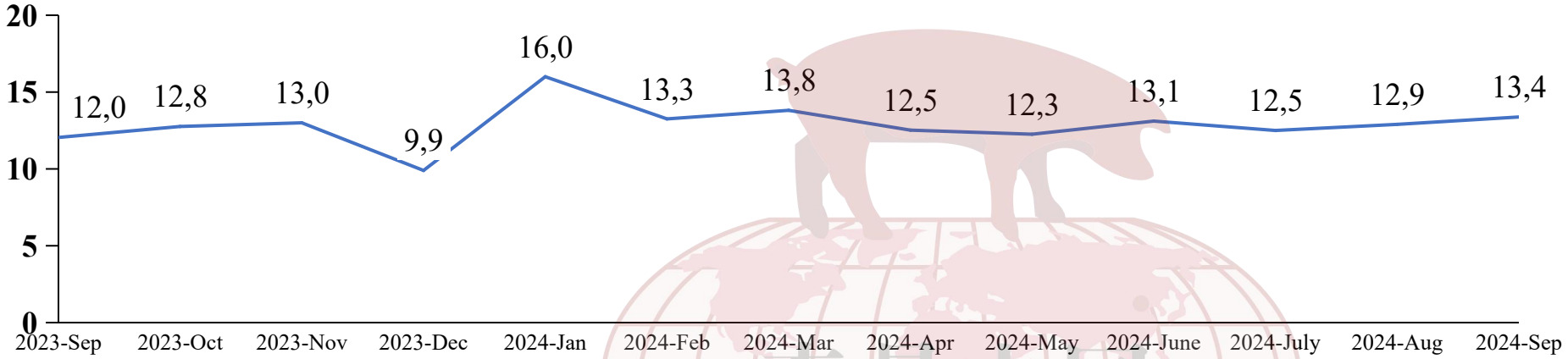
Gilt Total Born



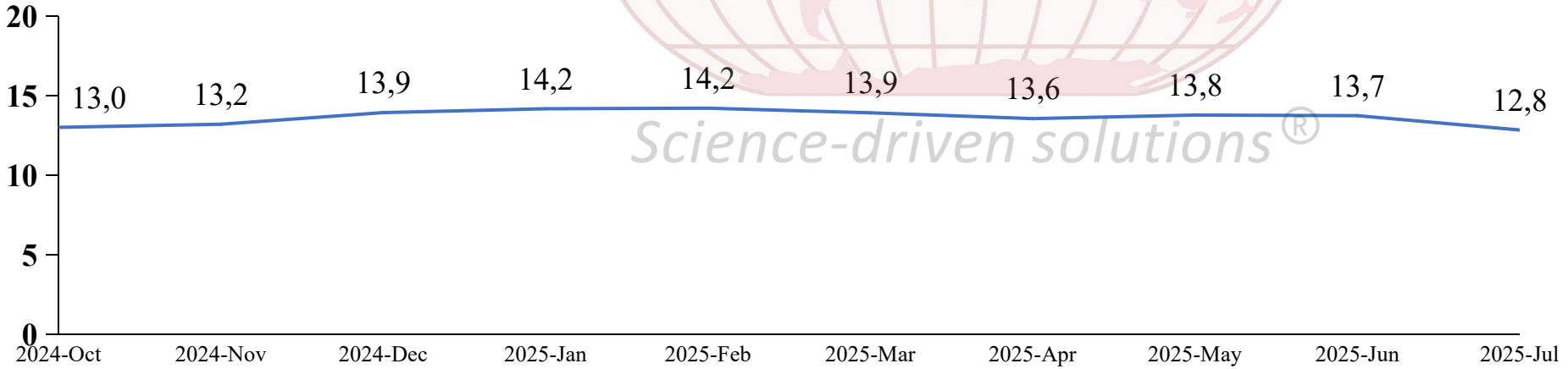
4.结果与分析 Results and Analysis

4.9驯化前后后备猪活产仔 Gilt live born before and after exposure

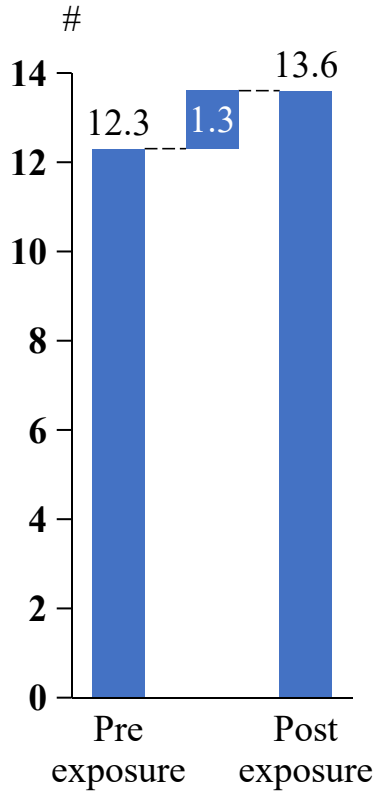
Pre-MHP exposure: Gilt Live Born=12.3



Post-MHP exposure: Gilt Live Born=13.6

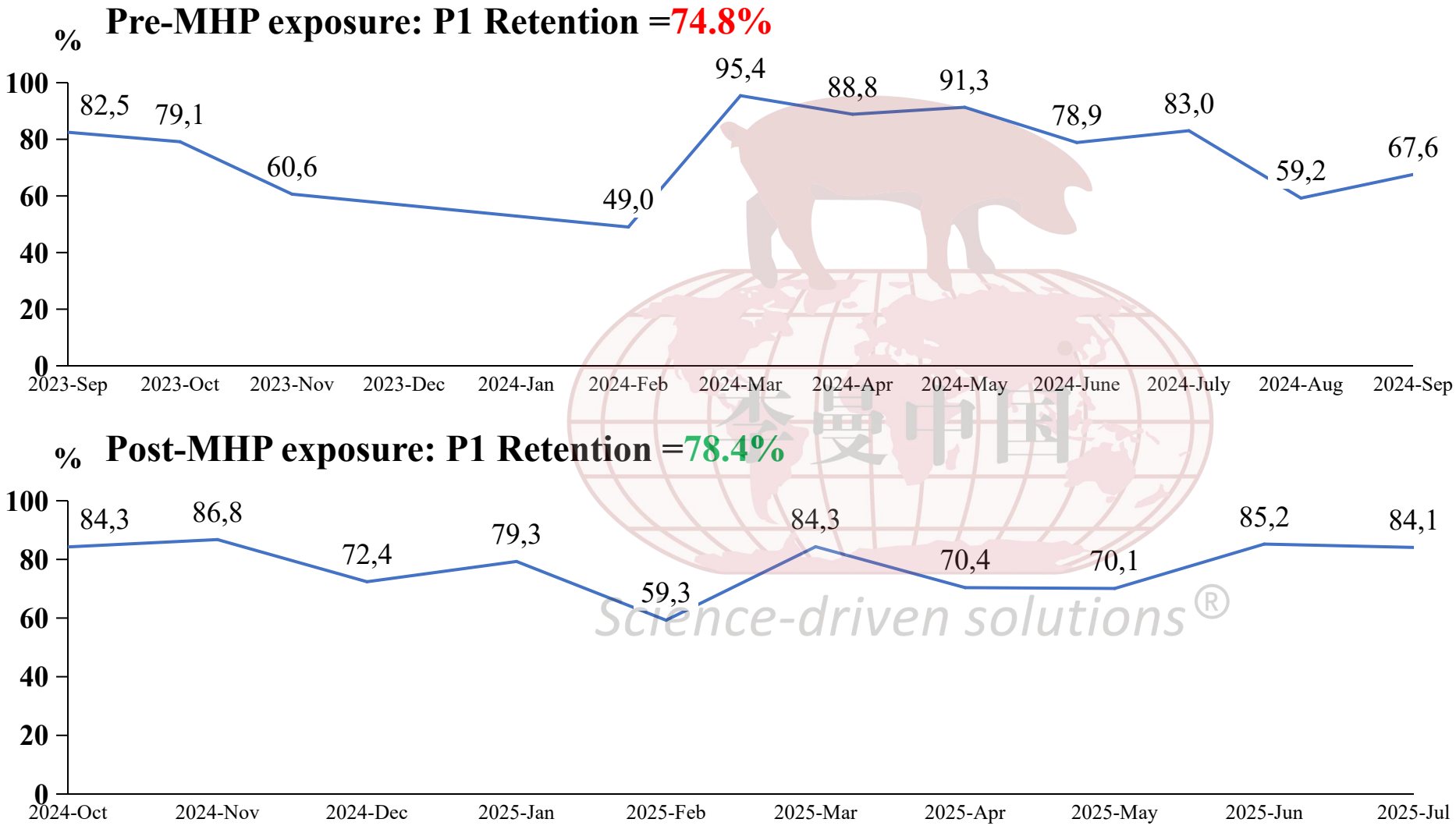


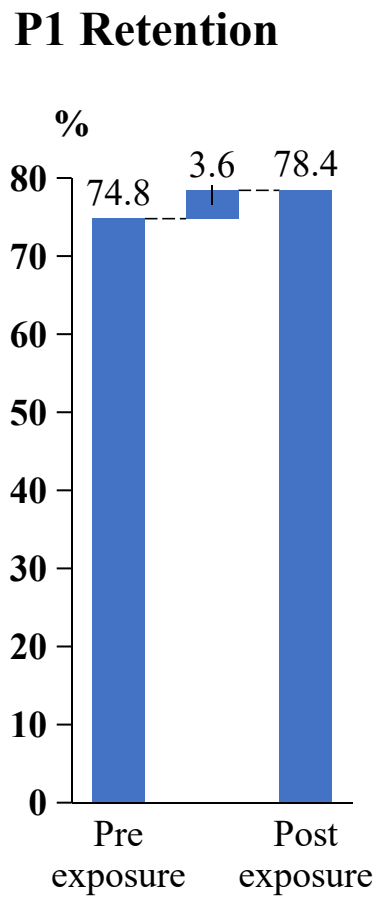
Gilt Live Born



4.结果与分析 Results and Analysis

4.10驯化前后P1留存率 P1 retention rate before and after exposure

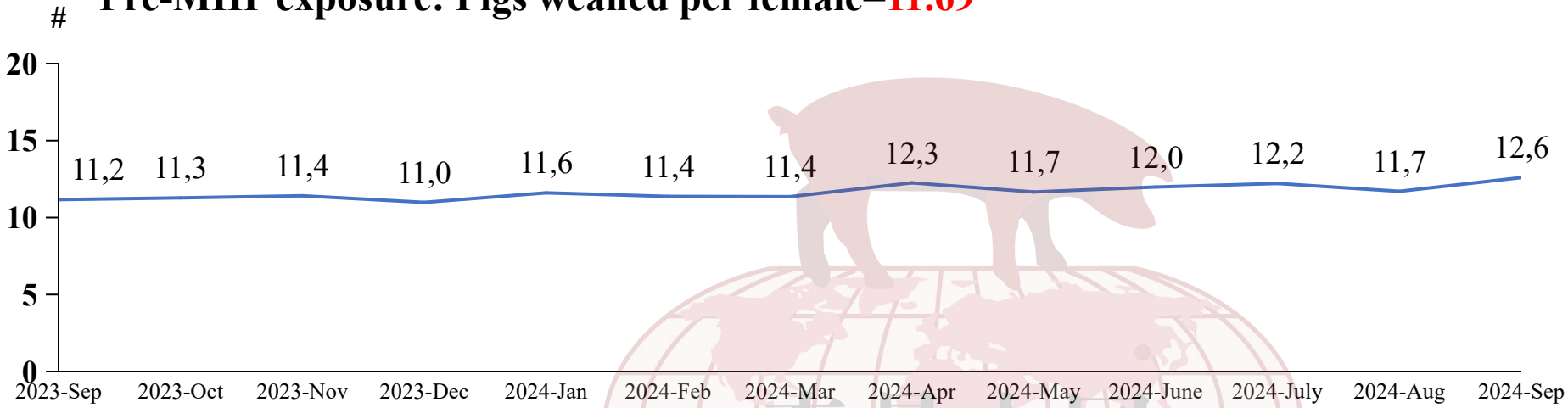




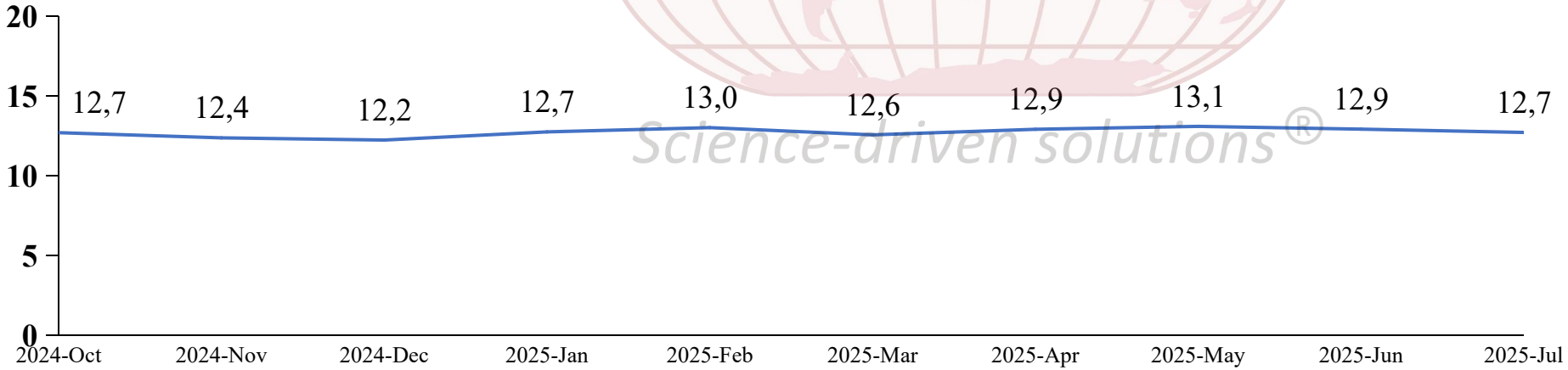
4.结果与分析 Results and Analysis

4.11驯化前后窝均断奶 Pigs weaned per female before and after exposure

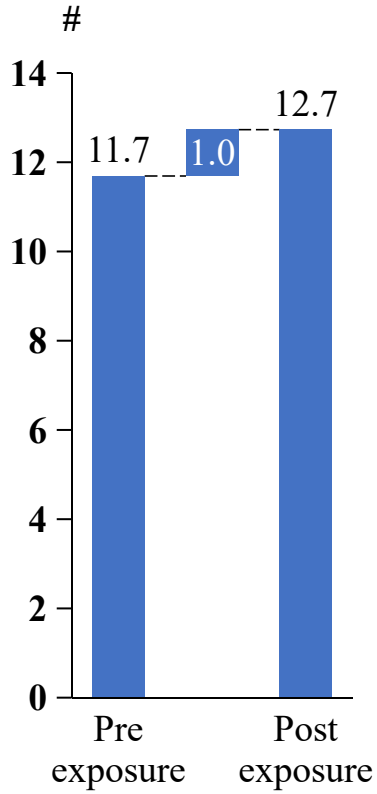
Pre-MHP exposure: Pigs weaned per female=11.69



Post-MHP exposure: Pigs weaned per female=12.73



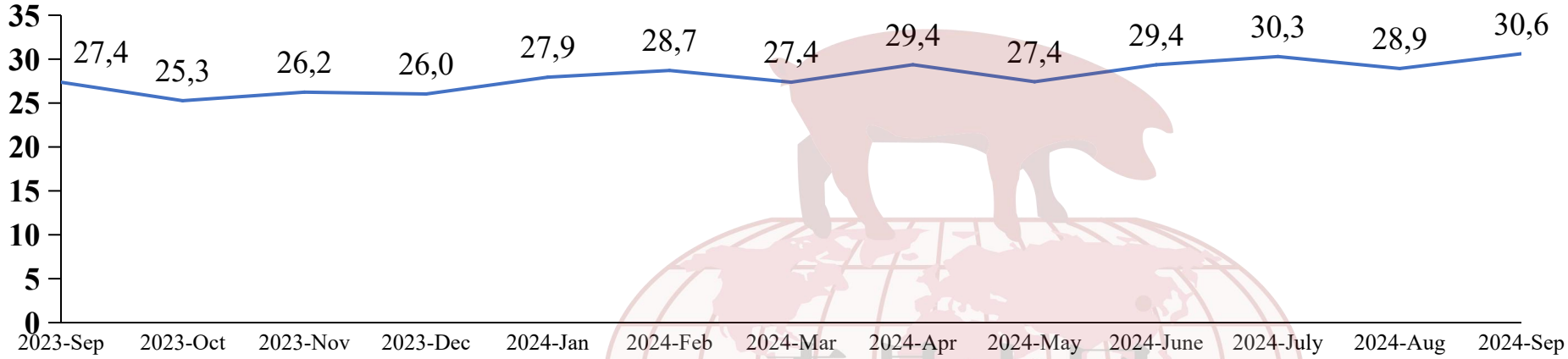
Pigs weaned per female



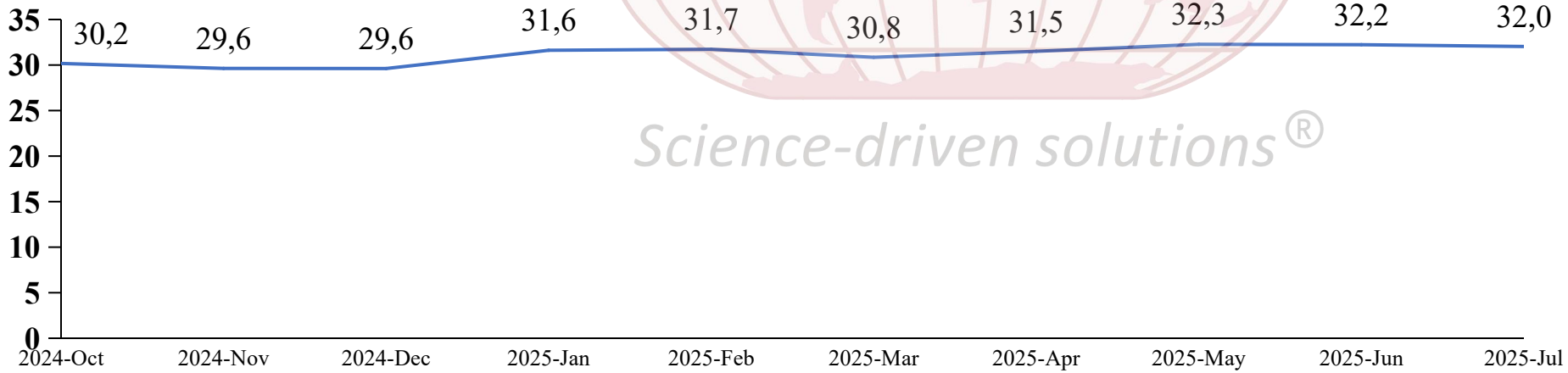
4.结果与分析 Results and Analysis

4.12驯化前后PSY PSY before and after exposure

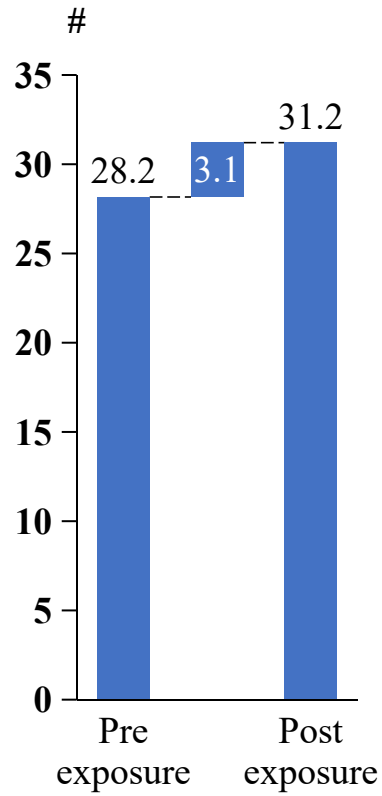
Pre-MHP exposure: PSY=28.16



Post-MHP exposure: PSY=31.21

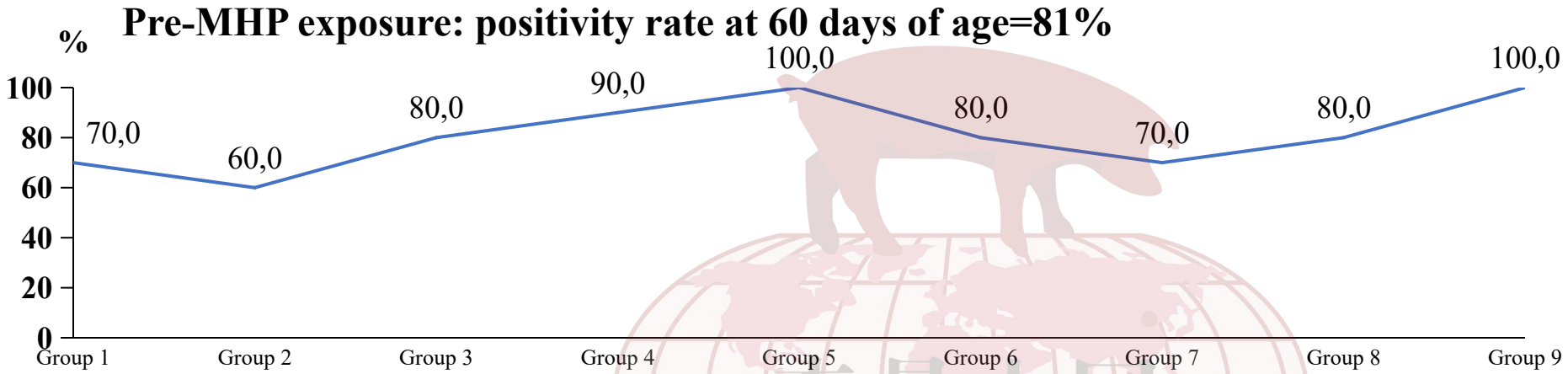


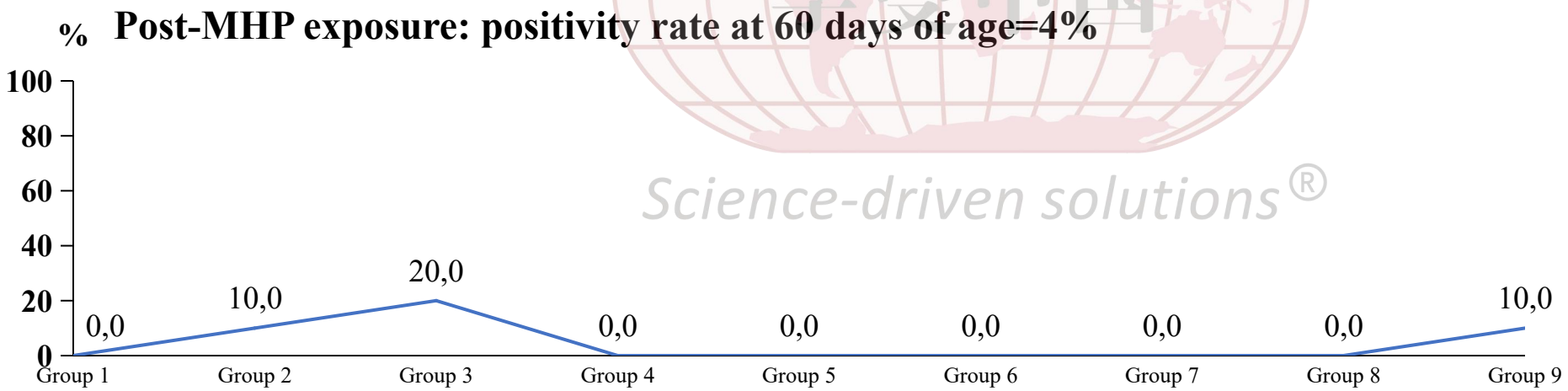
PSY

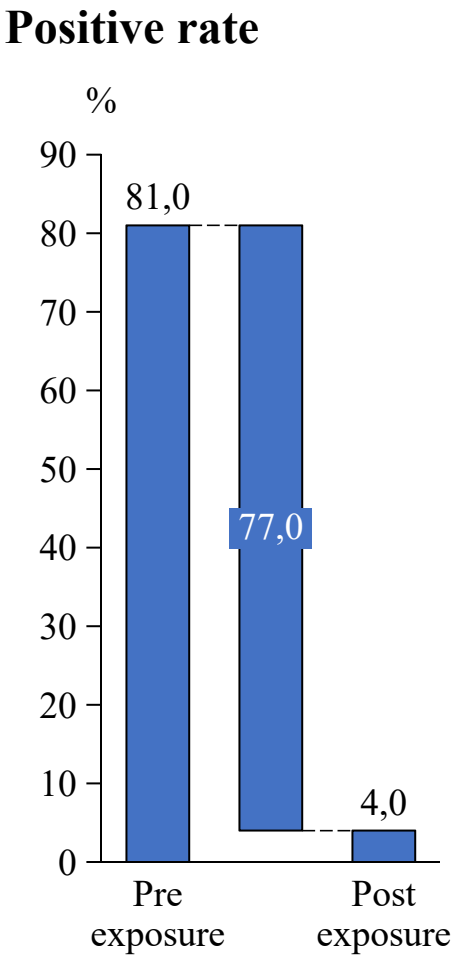


4.结果与分析 Results and Analysis

4.12 驯化前后下游猪只（60 日龄）支原体阳性率 MHP positive rate in downstream pigs (60 days old) before and after acclimation.







#每个批次采集30头深部支气管拭子，3合1检测Collect 30 deep bronchial swabs per group, pooled in sets of three for testing.

5.结论与讨论 Conclusion and Discussion

1.后备猪支原体感染的滞后性，是造成母猪场及下游保育育肥场健康不稳定的关键原因
The delayed onset of Mycoplasma infection in replacement gilts is the key driver of health instability in the sow herd and downstream nursery-to-finisher stages.
2.通过绘制后备猪支原体感染动态模型，可明确农场是否存在支原体影响
By establishing a dynamic model of Mycoplasma infection in gilts, the presence of Mycoplasma impact on the farm can be definitively identified.
3. 通过早期驯化（6周驯化，8周阳性确定）可以使后备猪的支原体感染限制在后备舍，减少对大群的健康影响，显著提升母猪场的健康水平
Early acclimation (6-woa exposure, 8-woa positive confirmation) confines Mycoplasma infection to GDU, minimizing its impact on the main herd and markedly elevating sow-farm health.
4. 通过早期驯化（6周驯化，8周阳性确定）可以使后备猪在分娩时结束排毒期，减少支原体在产房的水平传播，降低下游支原体阳性率，从而极大提高健康水平
Early acclimation (6-woa exposure followed by 8-woa positive confirmation) enables gilts to complete the Mycoplasma shedding period before farrowing, curbing horizontal transmission in the farrowing house, lowering downstream Mycoplasma prevalence, and markedly improving overall herd health.

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