



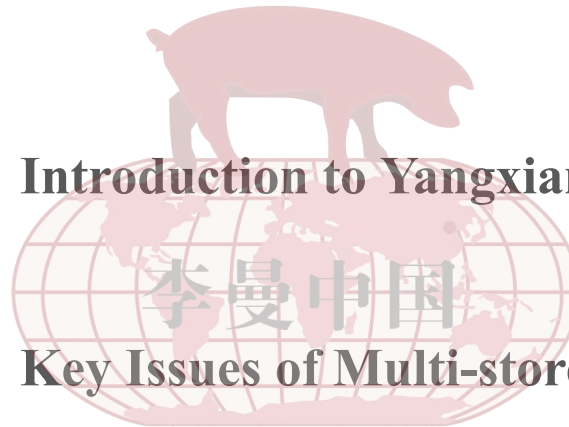
Disease Prevention and Control in Smart Multi-storey Pig Farms at Yangxiang



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Oct. 20, 2023



- **Introduction to Yangxiang Smart Multi-storey Pig Farms**
- **Key Issues of Multi-storey Pig Farming Systems**
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- **Disease Prevention and Control in Multi-storey Pig Farms at Yangxiang**

Part I

Introduction to

Yangxiang Smart

Multi-storey Pig Farms



1. Distribution of Yangxiang Multi-storey Pig Farms

**Multi-storey boar studs: Guigang,
Shenyang, Yuzhou**



**Multi-storey sow farms: Guifeishan,
Nansha**



Full view of clustered multi-storey sow farm at Guifeishan



Guifeishan Pig Farm is in Yajishan forest land, covering an area of 200 mu. Each single building covers an area of 11.4 mu. The farm has a total of 4 multi-storey pig houses and 32 production lines, including 26 sow lines, 6 nursery-gilt lines, with 28,000 production sows in stock, and over 800,000 weaned piglets produced every year.

2. Features of Yangxiang Multi-Storey Pig Farms

- ❑ High biosecurity barrier
- ❑ High land resource efficiency
- ❑ Highly intelligent pig production
- ❑ High efficiency and safe operation
- ❑ High-standard environmental protection

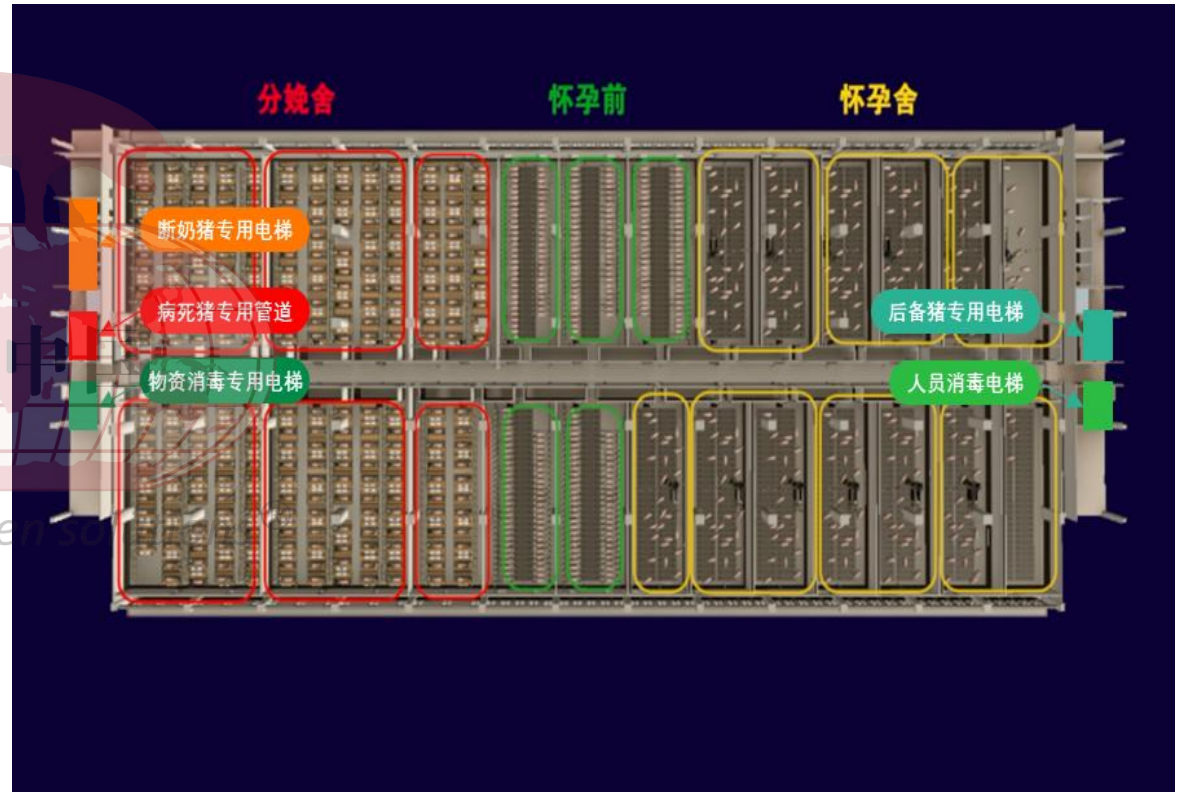
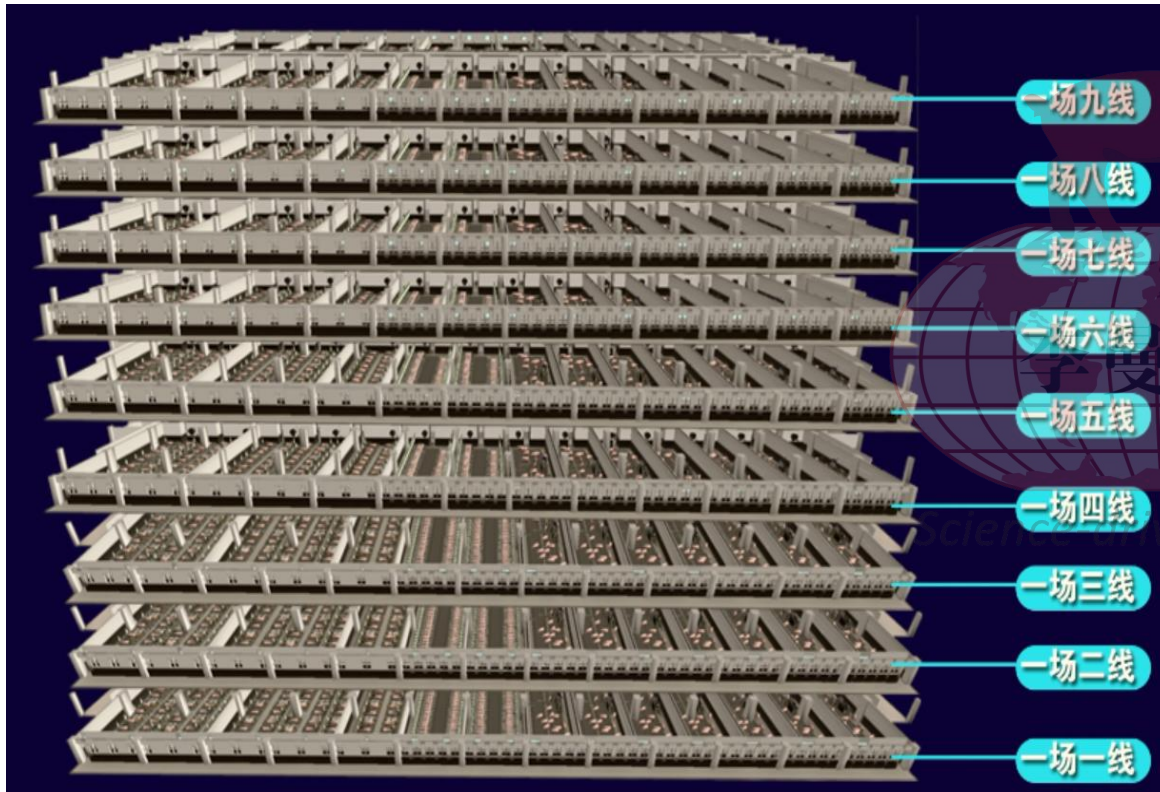


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2. Features of Yangxiang Multi-Storey Pig Farms

① Closed spaces of building + storey + unit block pathogen spread and cross contamination



2. Features of Yangxiang Multi-Storey Pig Farms

② Very high land use efficiency

Uses less than **1/10** of conventional pig farming



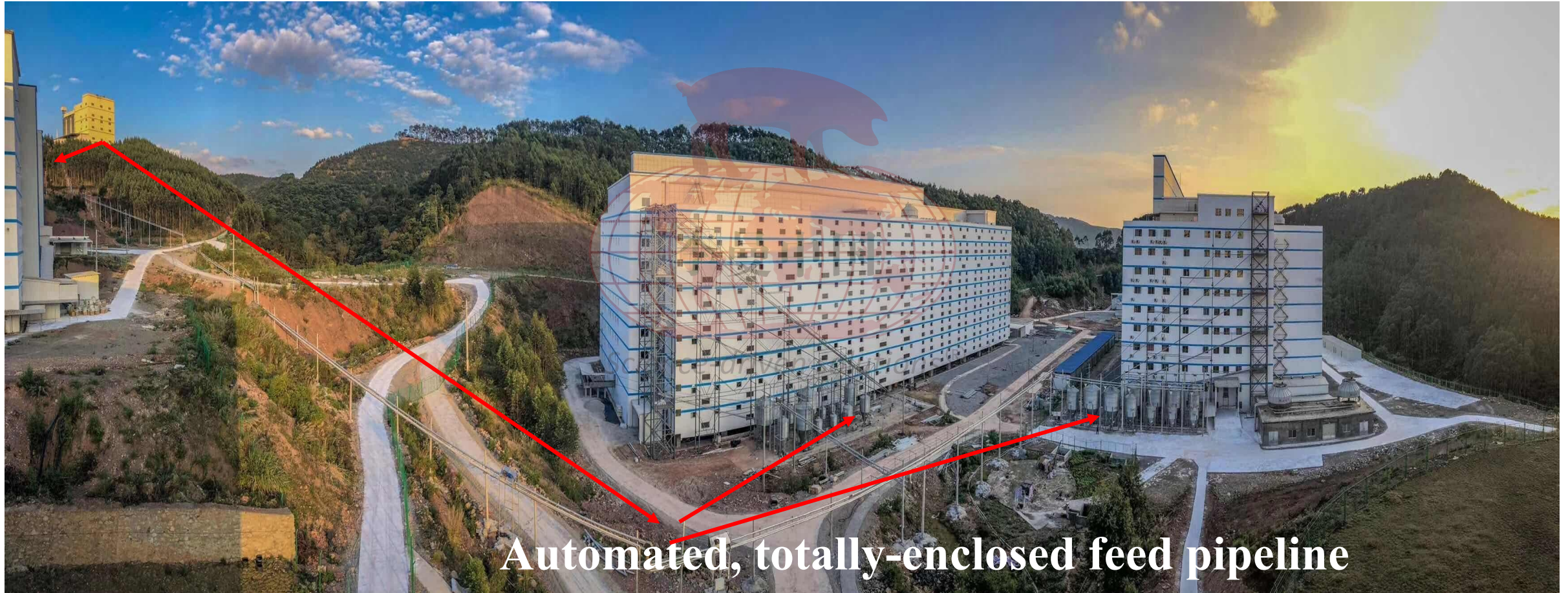
Multi-storey: individual building takes up 11.4 mu at Guifeishan



Flat housing: Tuanjie pig farm takes up 122.1 mu

2. Features of Yangxiang Multi-Storey Pig Farms

③ Efficient pig production through mechanization and automation



Automated, totally-enclosed feed pipeline

2. Features of Yangxiang Multi-Storey Pig Farms

④ Intelligent systems enable pig production revolution



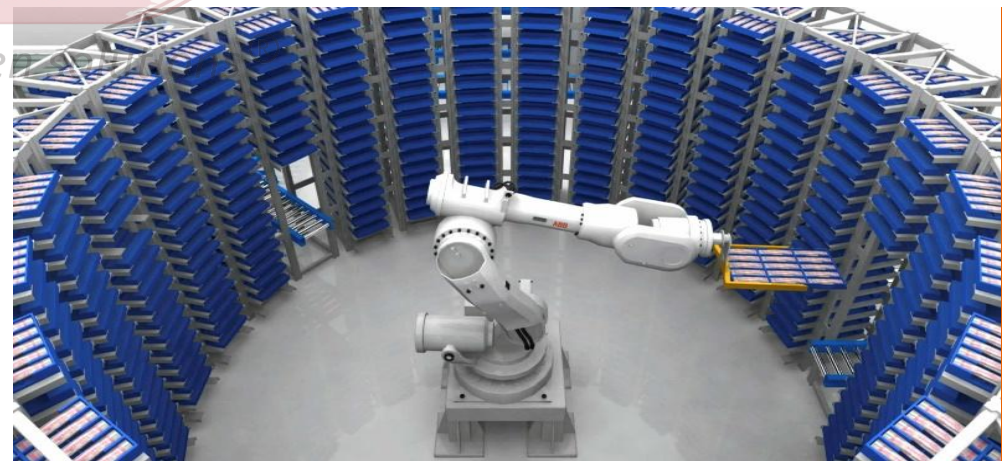
Precise feeding



Automated pig transport



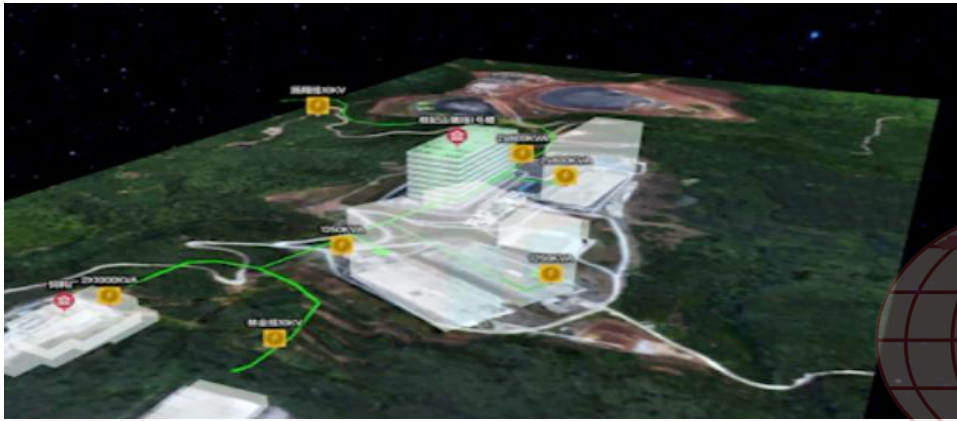
Intelligent environment control



Precise selection and breeding

2. Features of Yangxiang Multi-Storey Pig Farms

⑤ The highly concentrated space of multi-storey farm facilitates integration and saving of resources.



Power grid



Road system



Feed system



Water supply

2. Features of Yangxiang Multi-Storey Pig Farms

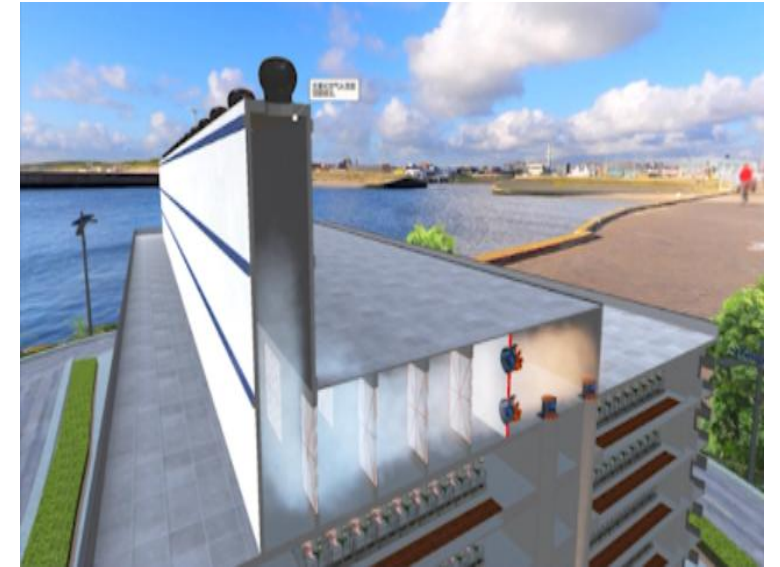
⑥ Three-layer wall air filtration, three-layer waste gas washing and unified discharge block pathogens and the four pests



Cooling pad



Air filtration



**Waste gas
washing**

3. Application at Guifeishan Multi-Storey Pig Farm

The farm started operation in Sep 2017 and has been operating in full capacity since Mar 2019. It has been operating stably for 6 years with better production indicators than most conventional pig farms!

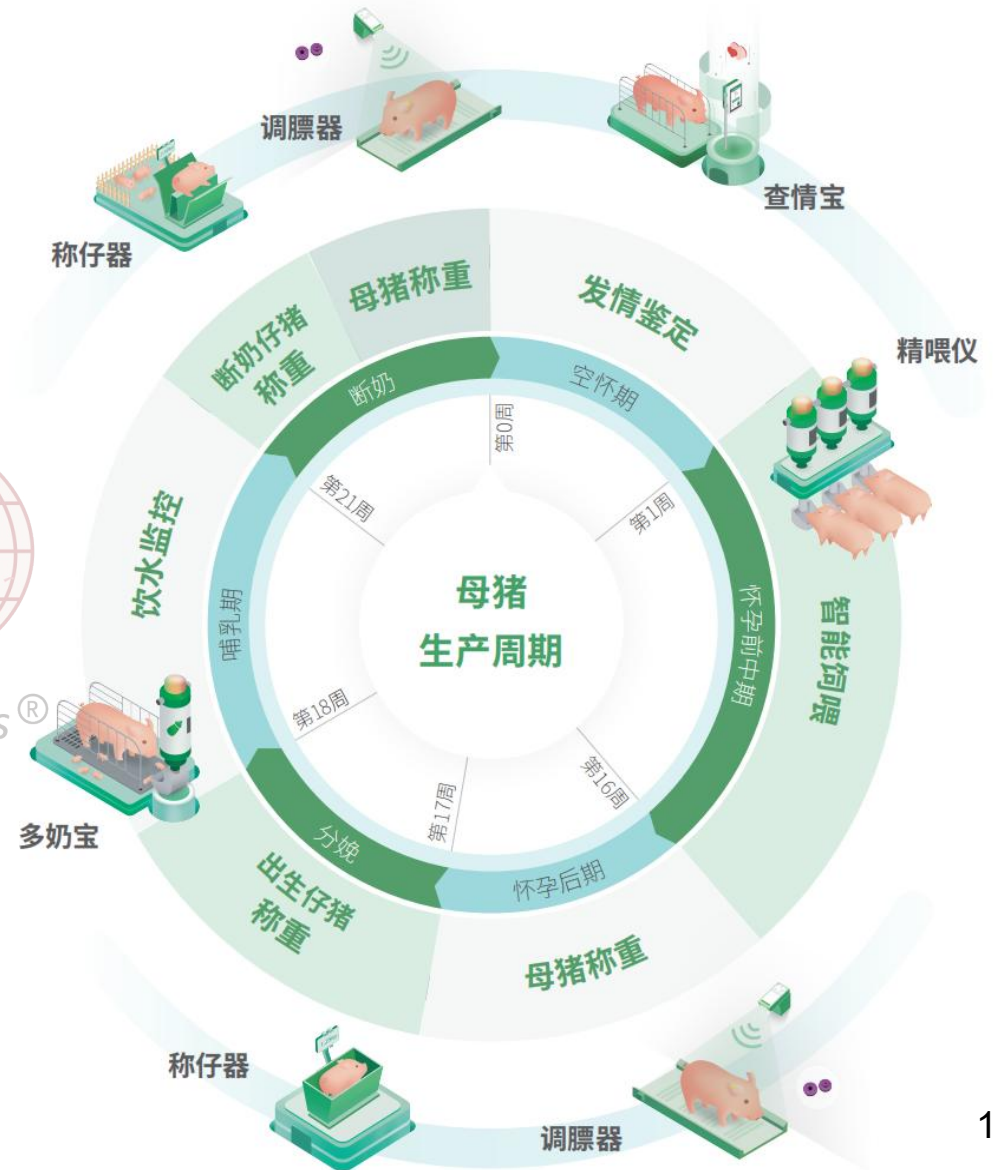


Sow farm at Guifeishan - crates

Sow farm at Guifeishan - farrowing room

4. Intelligent online system of Guifeishan multi-storey farm

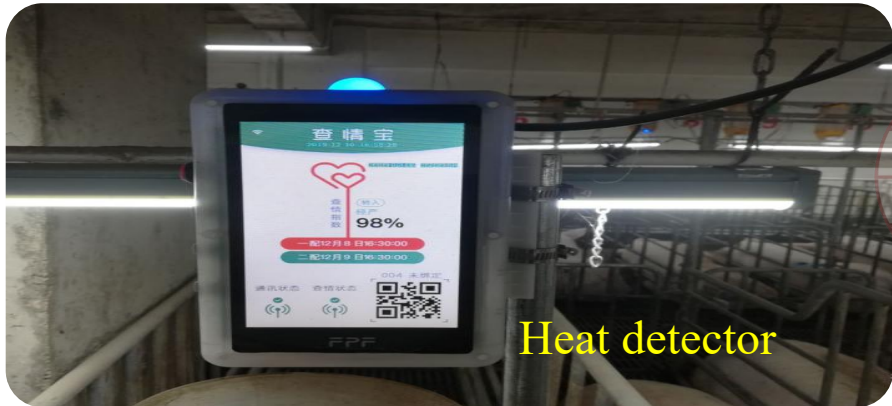
The multi-storey pig farm adopts the FPF future pig farm intelligent management platform and equipment to move "farms, pigs, things and people" to the Internet, and uses intelligent equipment such as intelligent ear tags, precise feeder, heat detectors, and fat adjusters to liberate workers' hands and brains and make raising pigs easier and smarter.



5. Snapshots of production at Guifeishan



Precise feeder



Heat detector



Mobile card reader



Part II

Key Issues of Multi- storey Pig Farming Systems



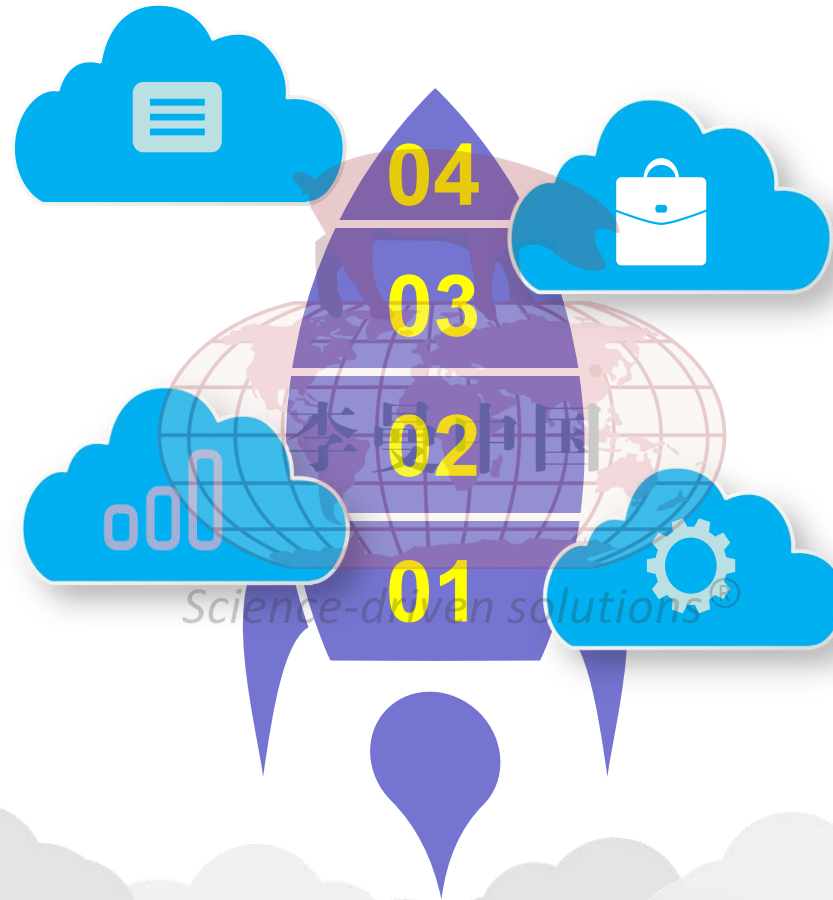
1. Difficulties in designing and building multi-storey pig farms

Technological design

- Intention of technological design
- Rationality in technological process
- Building safety issues
- Rationality in biosecurity

Building footprint

- Pig farm main floor area
- Supporting environment protection area
- Supporting living facilities area
- Supporting facilities area for water, power, road



Property right

- Nature of land
- Property ownership certificate and mortgage of the building

Building cost

- Building structure - multi-storage concreting
- Leakage prevention
- Equipment and facilities

2. Key difficulties in multi-storey pig production

01
Supplies transport

System: elevator, pipeline
Difficulty: difficult, high cost for high rises

04
Personnel management

High requirement for personnel quality
Scattered workers, hard to standardize

02
Herd transport

High cost for elevator transport and its maintenance
Difficulty in slope and corridor pig transport



05
Biosecurity

Horizontal crossing: people, pigs, materials
Vertical crossing: elevators, air

03
Harmless treatment of dead pigs

Pipeline treatment
Harmless treatment

06
Manure management

Large amount to be treated by manure submerged in water and manure scraper
Leakage prevention

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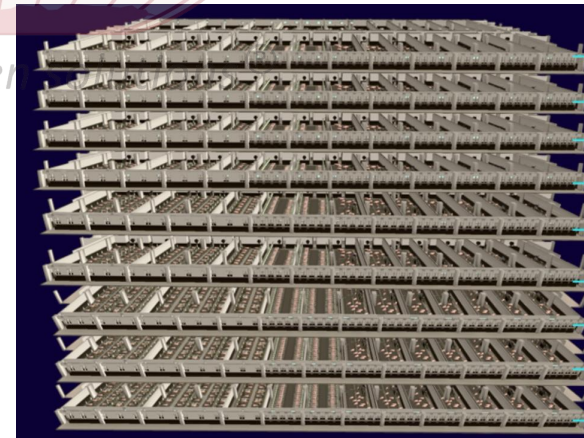
3. Disease prevention and control risk in multi-storey farming systems

❑ High rearing density, **high risk of aerosol contamination**

- ① Air flows one-way in the pig house with no crossing, yet air outside the house may be drawn in or return
- ② The supporting areas outside the pig house have cross-contamination risk, especially the elevators/corridors for moving pigs, pipelines/elevators for harmless treatments

❑ Limited space in buildings, **high crossing risks of people, pigs, and materials**

- ① **Horizontal crossing:** Only 1-2 public corridors in each line, with overlapping of pig movements, material and sick/dead pig transport and people movements
- ② **Vertical crossing:** Same elevators/pig driving corridors are used in both introducing pigs into and moving out of various lines, leading to cross-contamination; difficulty in cleaning



2023-12-12 Vertical ventilation

Traditional horizontal ventilation

Farming pattern of small units in buildings

Moving pigs by elevators

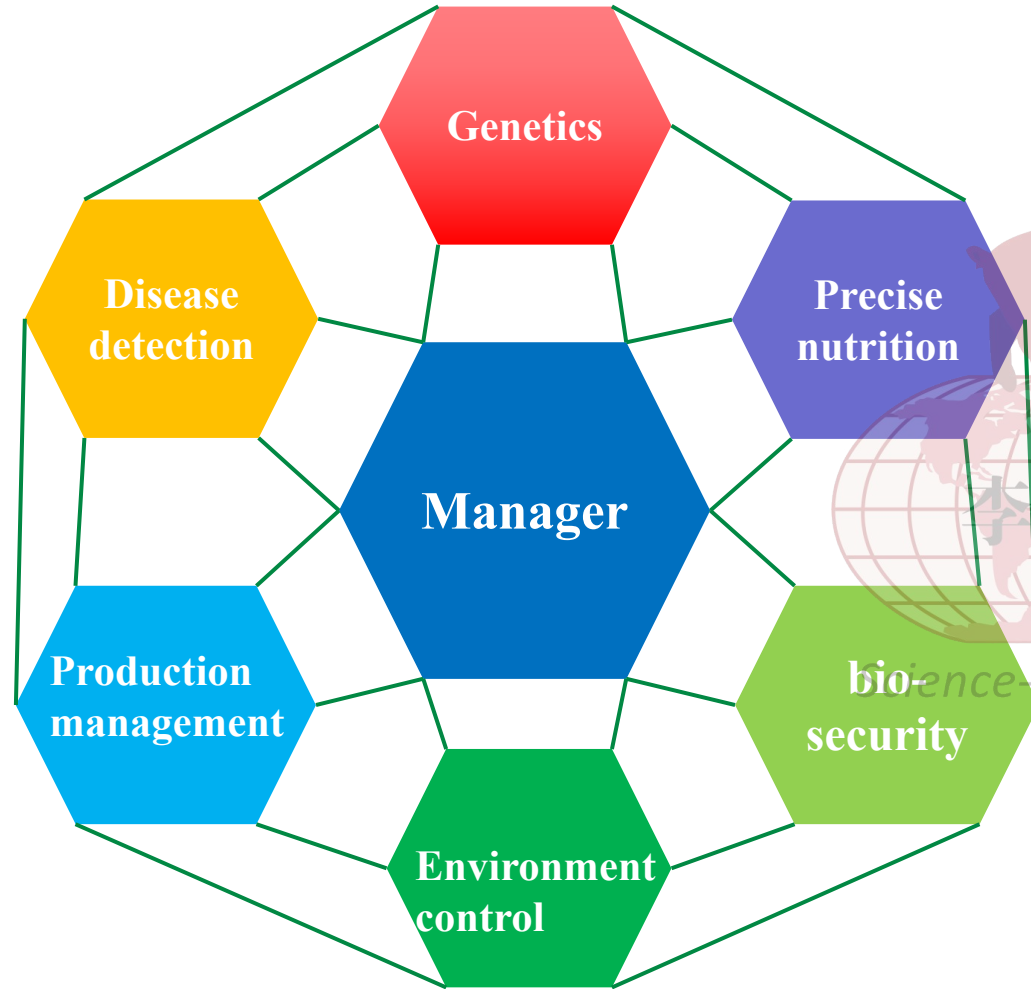
Part III

Disease Prevention and Control in Multi-storey

Pig Farms at Yangxiang



1. Pig farming value conception at Yangxiang



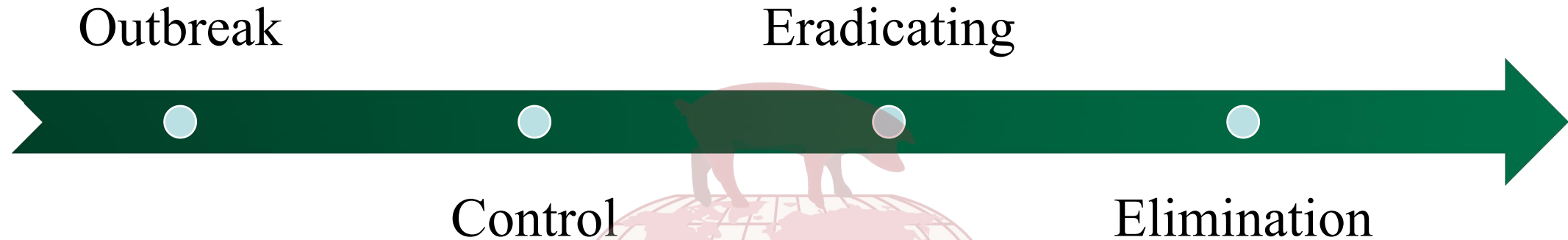
“6+1” Value management

Solution to pig farming efficiency and cost

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7 Key elements

Raising pigs well with low costs

2. Disease management strategy at Yangxiang



Caretaking is more important than prevention, prevention more important than treatment

Level by level, from points (eradicating farms) to plane (disease eradication demonstration zone)

From disease-free with vaccination to disease-free without vaccination

3. Disease control approach at Yangxiang Multi-storey pig farms

□ Objective:

Achieve prevention, control and elimination of major diseases by ‘**disease-free**’ with or without **vaccination** and create major disease eradication demonstration zones

□ Method:

- 1) Create robust biosecurity systems and biosecurity prevention and control barrier
- 2) Strict control on breeding stock sources and herd monitor, quality over quantity
- 3) Proper plan of gilt – P1 – sow production rhythm
- 4) Make prevention and control plan for major diseases like ASF, PRRS, Pseudorabies and diarrhoea, and emergency plans for major outbreaks
- 5) Strict implementation of immunization plans and health plans

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□ Monitor and evaluation:

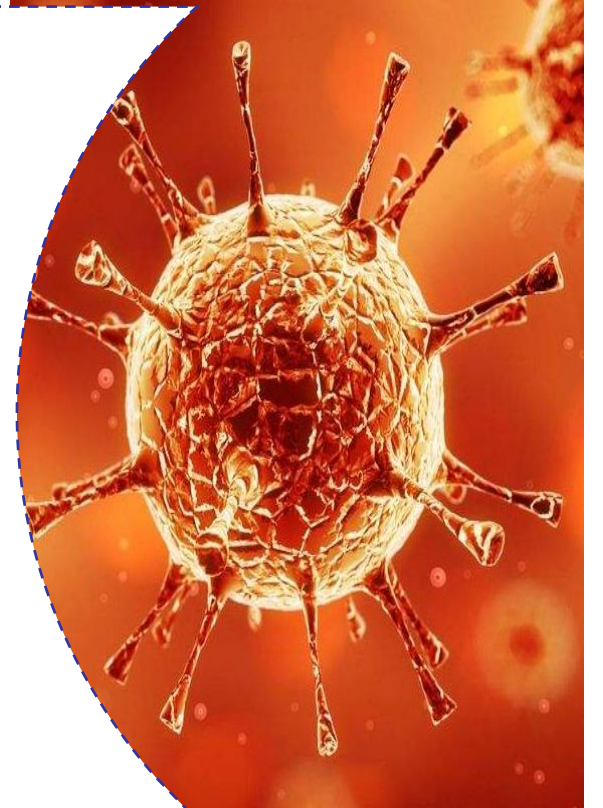
- 1) Monitor frequency: regular monitoring (regular tests) and real-time monitoring (dead/sick pigs)
- 2) Monitor objects: pig samples (blood, tissues, oral/nasal swabs, fecal swabs) and environmental samples (vehicles, air, dust)

3.1 Biosecurity as cornerstone



- ❑ Block out ‘enemies’, **avoiding introduction of external pathogens**
- ❑ Building structural systems to **stop internal pathogen from spreading**
- ❑ **Knowing yourself and your enemy, you will always win**

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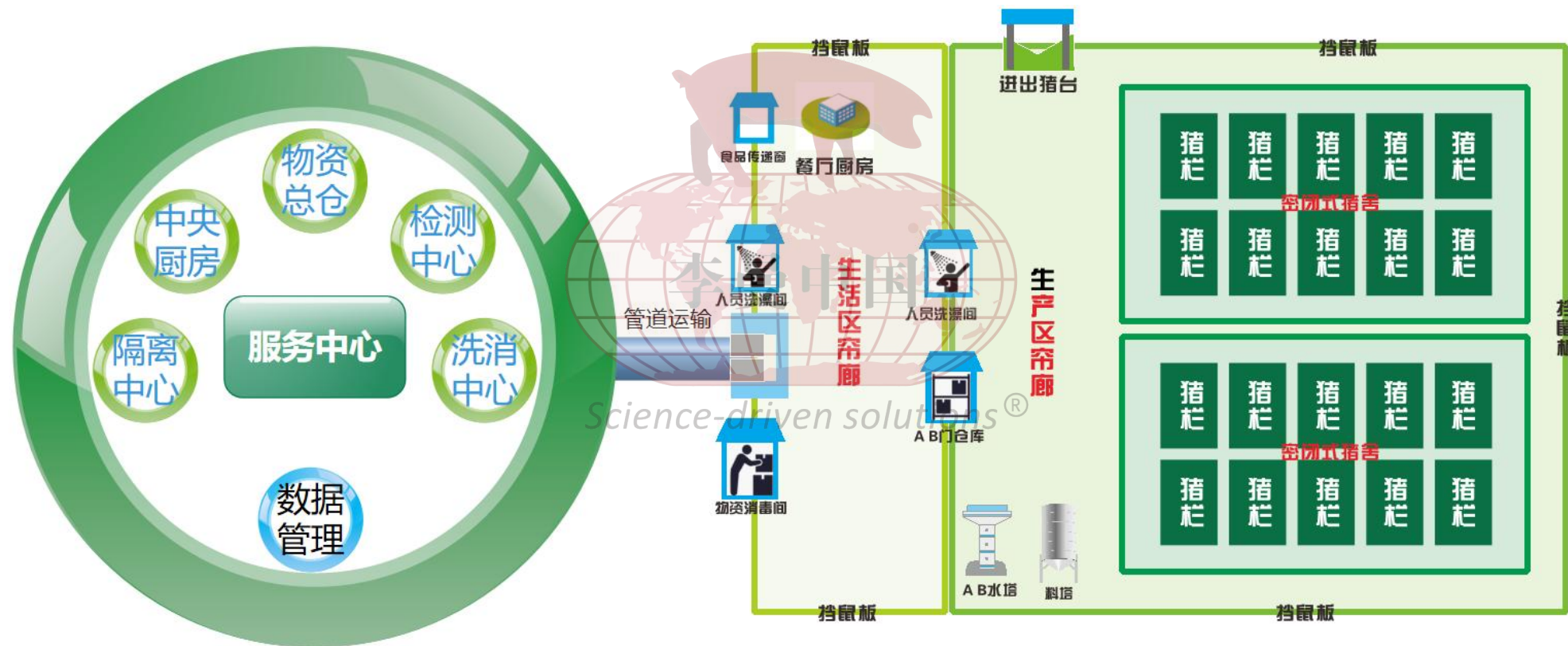


Biosecurity system is a series of comprehensive control measures taken to eliminate sources of infection, cut off transmission routes and protect susceptible animals!

3.1.1 Establishment of Yangxiang 'steel drum' biosecurity system

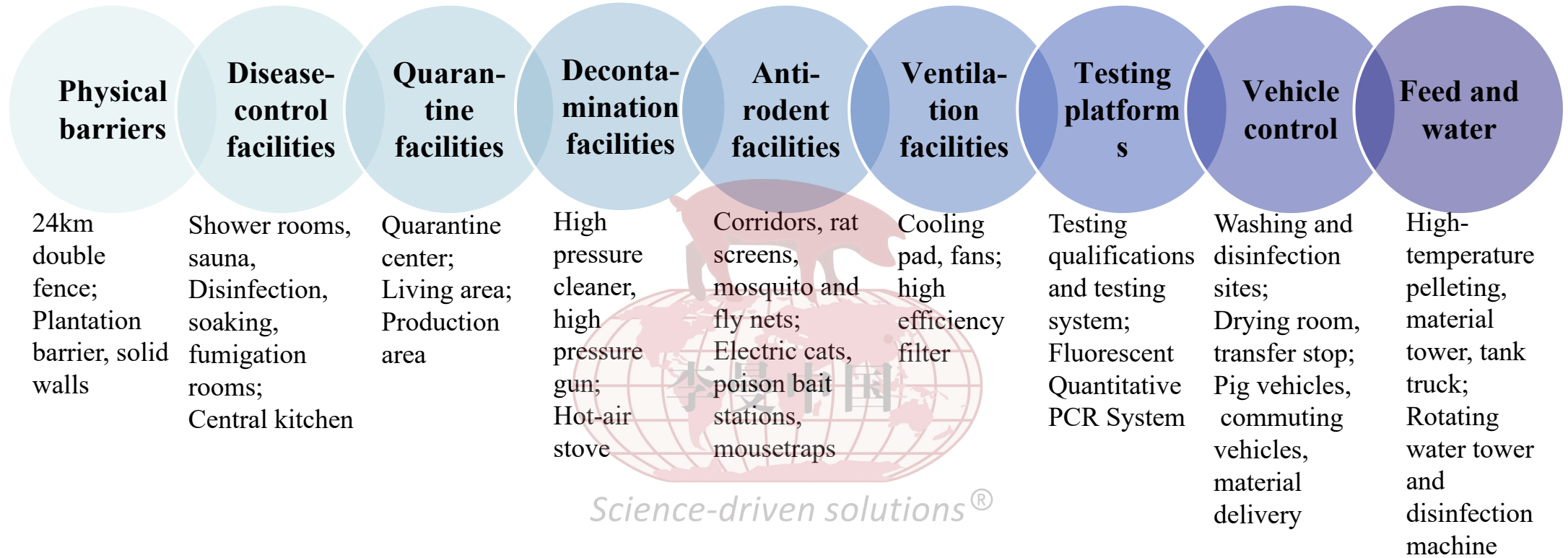
Yangxiang biosecurity system=service centre + 'steel drum' pig farms + special anti-

ASF system



Progressive management of clean/dirty partition

3.1.2 Basic disease control facilities in the biosecurity system



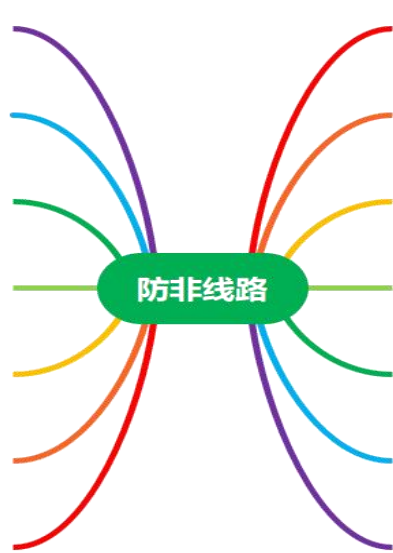
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3.1.3 Operational process management of the biosecurity system

- Clear standards:** Establish clear operating standards for the biosecurity system according to space and lines, with clear steps that are easy to understand and operate;
- Accountability:** Each space and line must be allocated to a person in charge who is capable
- Unit management:** People, items, tools, passages, etc. in each space must be completely independent as much as possible and must not intersect with other spaces at any time;
- Space control:** Establish control system quickly for a space with problems, including tests, reflection and rewards;
- Inspection and internal audit mechanism:** Regularly conduct follow-up inspections and closed-loop procedure on biosecurity hardware and software, and report to decision makers for revision and improvement

- People
- Vehicle
- Medicine, vaccination
- Sperm
- Air
- Water
- Tests



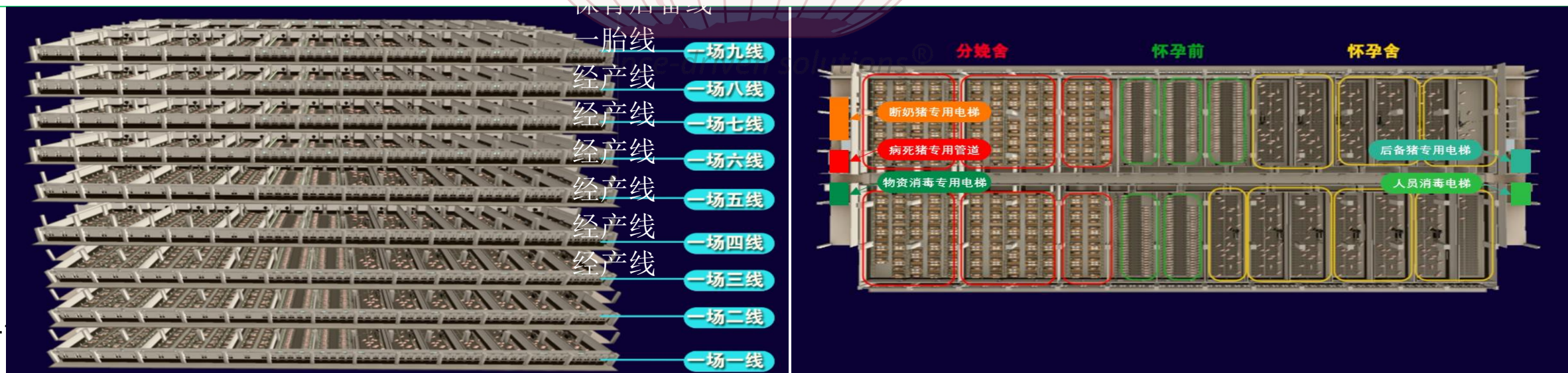
- Pests
- Human faults
- Pigs
- Food
- Feed
- Supplies
- Equipment

猪场空间防非管控一张表

编号	猪舍划分区域	区间管控通道	连通区间	生物安全风险等级 (按数量、风险性大)		每个区配备工具用具 (只列工具用具类, 不列生活用品类)	负责岗位	负责人	区间通道切断关键要求	管控处罚规则
				常规等级	复杂等级					
1	外圈区	进猪缓冲区大门	装猪台缓冲区	8级	6级	洗澡消毒间(洗浴用品、热水器、洗衣机)卫生可、量杯、消毒液、消毒机、手套	装猪员	梁业	1、缓冲区必须使用挡板封闭, 并使用防鼠板防鼠。 2、每次卸猪前后需进行场地消毒1次; 车辆消毒机、消毒桶、消毒机、手套 3、每次卸猪前后需进行场地消毒1次; 车辆消毒机、消毒桶、消毒机、手套 4、出猪口必须做密封连廊防蚊蝇, 顶上需要做挡雨板。 5、出猪口外侧必须硬化。 6、出猪口往外有坡地, 利于排水(防倒灌)	1、日常消毒频次及消毒记录未按要求执行, 罚款50元; 2、猪场外圈所管辖区域铁桶出现不合格项的, 罚款100元 3、所管辖区域进入的人员、物资等未按防非流程操作的, 罚监督不到位50元; 4、罚非流程操作的, 罚监督不到位50元; 5、最低100元起;
		出猪缓冲区大门	装猪台缓冲区			装猪员	梁业			
		大门口缓冲区传菜口	生活区			保安	梁业			
		应急出猪口	污道连廊区			应急小组	李雪峰			
		入环保区洗澡间	环保区			环保员	梁洪慧			
		小物品消毒间	环保区			环保员	梁洪慧			
		入环保区AB熏蒸消毒间	环保区			环保员	梁洪慧			
		入环保区AB物资浸泡间	环保区			环保员	梁洪慧			
		入环保区AB热烘消毒间	环保区			环保员	梁洪慧			
		环保区传菜口	环保区			环保员	梁洪慧			
		屋顶风机	猪舍生产区							
		垃圾口	生活区/隔离区							
烘房	装猪缓冲区									

3.2 control on breeding herd source and production rhythm

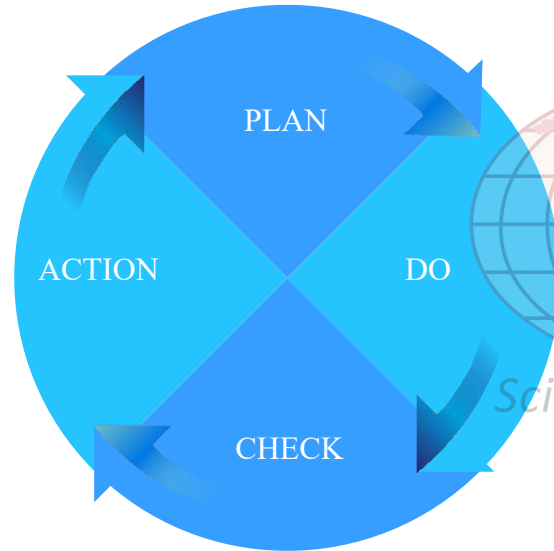
1. The health of the gilts that are introduced for the first time is very important, with 100% testing for the pathogens and antibodies of ASF, PRRS, pseudorabies, classic swine fever and other diseases;
2. Introducing safe and reliable pig semen is the key to ensuring stable production of subsequent pig herds. The pig sperm (original sperm) is 100% monitored to ensure that no specific pathogens are carried;
3. Carry out progressive disease control in strict accordance with the flow direction of the **core line - nursery/gilt line – P1 line - sow line**;
4. Implement a weekly-batch AIAO production system, to reduce the mixing of different batches and prevent active pathogens within a pig herd;
5. Establish a daily monitoring and inspection system for herds, and evaluate the health of herds through the detection of abnormal pigs, sentinel pigs, etc.



3.3 Make and implement major disease comprehensive prevention and control plans

✓ Documents on major disease comprehensive prevention and control systems

1. Draft major disease comprehensive prevention and control plan and emergency disease control plan



4. Update and revise major disease comprehensive prevention and control plan and emergency disease control plan

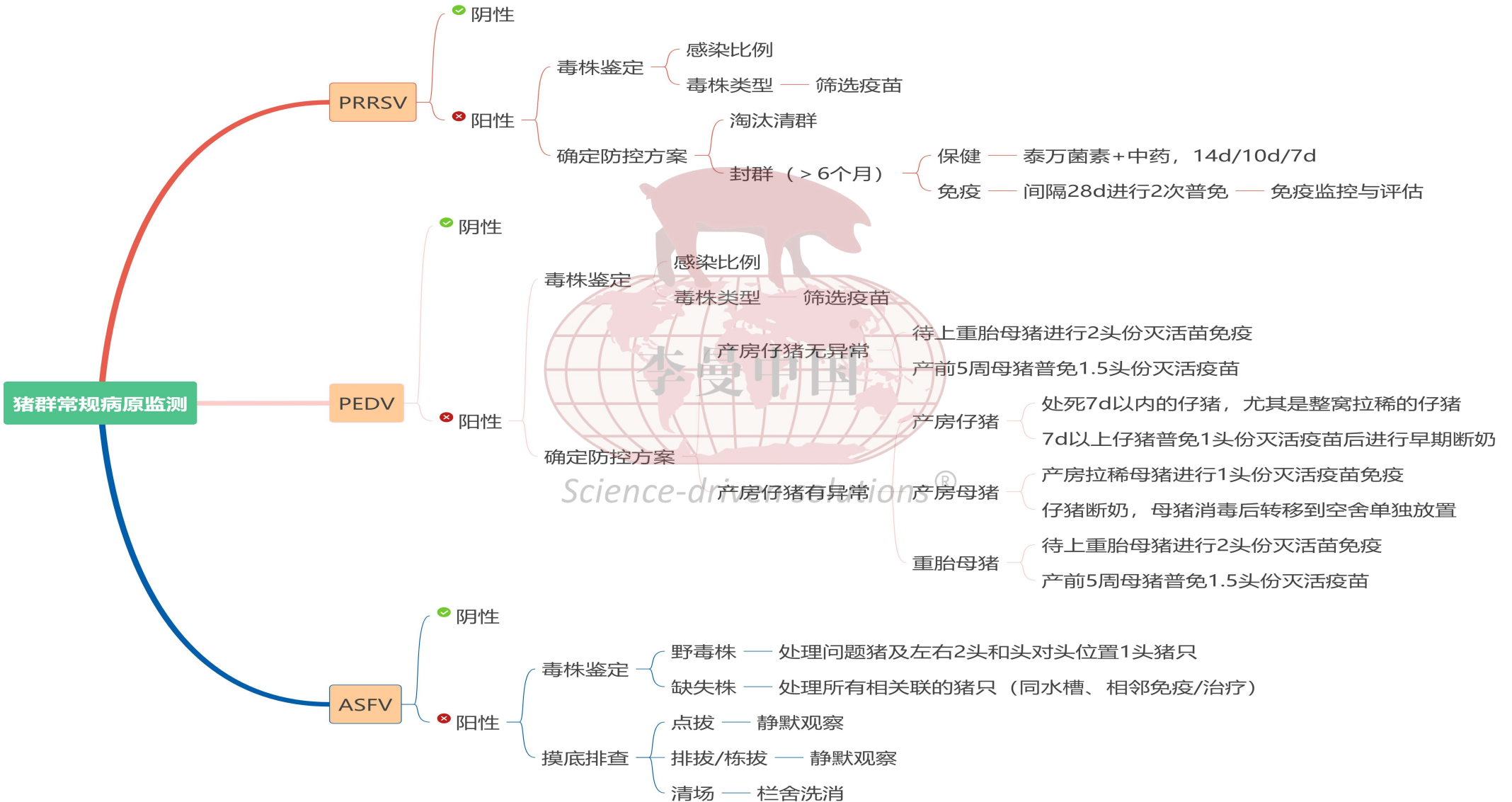
3. Implement major disease monitoring system and herd health evaluation

2. Carry out major disease comprehensive prevention and control trainings

YY.X	3 工作程序.....	3
YY.X	3.1 蓝耳病的流行特点.....	3
YY.X	3.2 猪场蓝耳感染状态分类.....	3
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	3.3.1 蓝耳免疫.....	4
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《蓝耳病的综合防控方案》

3.4 Emergency plan for pig farm major disease outbreaks



3.5 Necessary immunization and health care

Immuni- zation

1. Establish necessary acquired immune protection
2. When there is no risk of pathogenic infection, reduce or stop the use of live vaccines, and gradually move from disease-free with vaccination to disease-free without vaccination
3. Regularly check antibodies to identify immune effects

Health care

1. Control diseases through antibiotics, vitamins, probiotics, traditional Chinese medicine and microecological preparations
2. Regulate the host's non-specific immunity, increase resistance and improve health
3. Rotate medication to avoid long-term use of the same drug/type and the development of drug resistance

3.6 Routine monitoring of herd health

Monitoring objectives

- ✓ Assess the health status of pigs (feeding frequency, feed intake, body temperature changes)
- ✓ Identify pigs that are **currently ill**
- ✓ Identify existence of **vertical transmission** (aborted fetus/ embryonic membrane, birth canal swab/umbilical cord blood, castration fluids)
- ✓ Identify existence of **latent virus-carrying** pigs (tonsils, lymph nodes)

Environmental monitor objectives

- ✓ Pathogen shedding (aerosol, dust)
- ✓ Identify infection range of groups at risk
- ✓ Environment disinfection effects

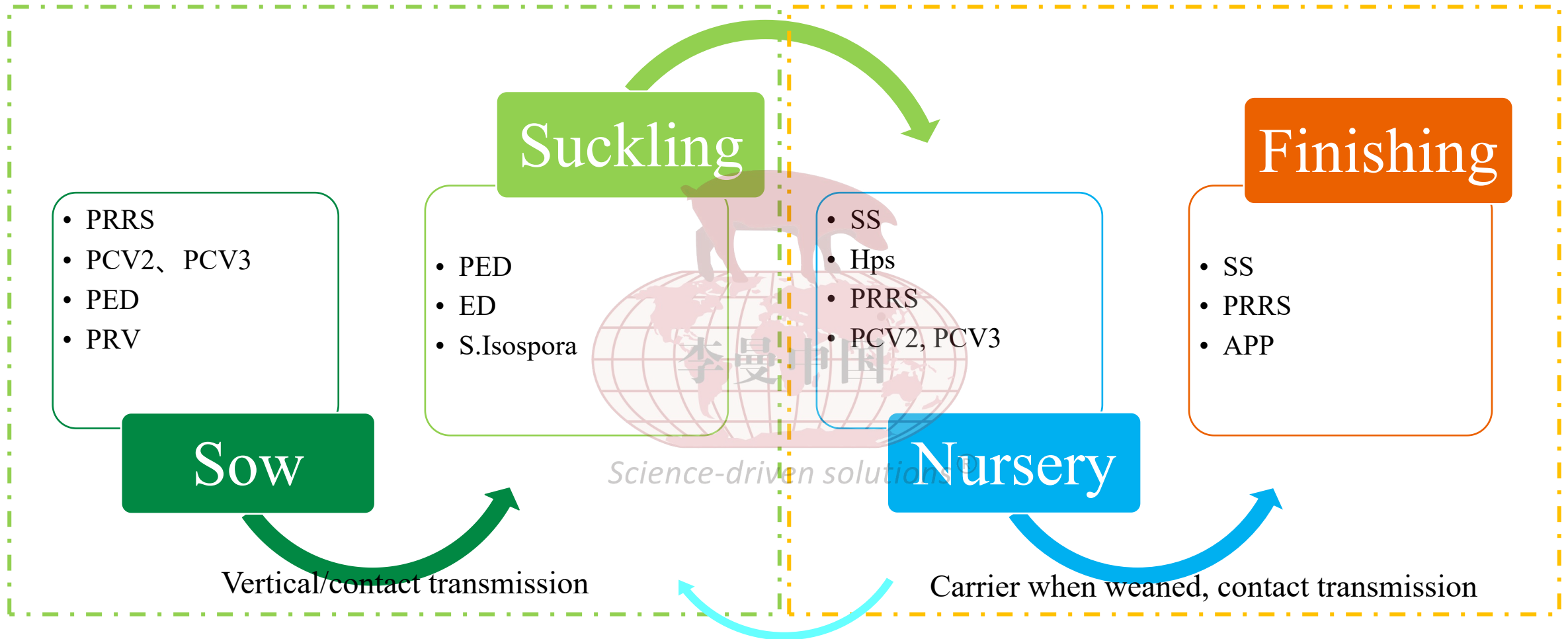


Intelligent devices (precise feeder, group feeder, water feeder, heat detector, etc): record feed intake frequency and amount, water intake amount and temperature change

采样对象	样品类型	采样频率	采样数 (份)	混样比例	抗原			抗体		
					PRRSV	PCV2/3	ASFV	PRRSV	ASFV	PRV
新生仔猪	脐带血	每周/批	10	10混1	✓	✓	✓			
	去势液	每周	2	2混1	✓	✓	✓			
	血液	每批次	5%		✓		✓	✓	✓	✓
哺乳母猪	扁桃体/淋巴结	死猪	5	5混1	✓	✓	✓			
	血液	批次	5		✓		✓	✓	✓	✓
	口腔液	批次	5		✓		✓			
哨兵猪	扁桃体/淋巴结	死猪	3份	单检	✓	✓	✓			
	血液	每月	5	5混1	✓			✓	✓	✓
环境	扁桃体/淋巴结	每月	5	5混1	✓	✓	✓			
	空气样本	每月	5	5混1	✓		✓			
	水帘拭子	每月	5	5混1	✓		✓			
	无动力风机拭子	每月	5	5混1	✓		✓			
	顶楼风机拭子	每月	5	5混1	✓		✓			
	电梯拭子	批次	5	5混1	✓		✓			
	中转车拭子	批次	5	5混1	✓		✓			

Sampling plan for major diseases

3.7 Health synergy of sow-piglet-finishing herds



Production indicators of different stages of market pigs (survival rate, growth rate, etc.) and slaughter evaluation (lungs, liver, etc.) **mirrors** the status of sow farm and indicates potential diseases.

4. Intelligent solution to disease control

Online

Digitalized

Intelligent

Ventilation

Water intake

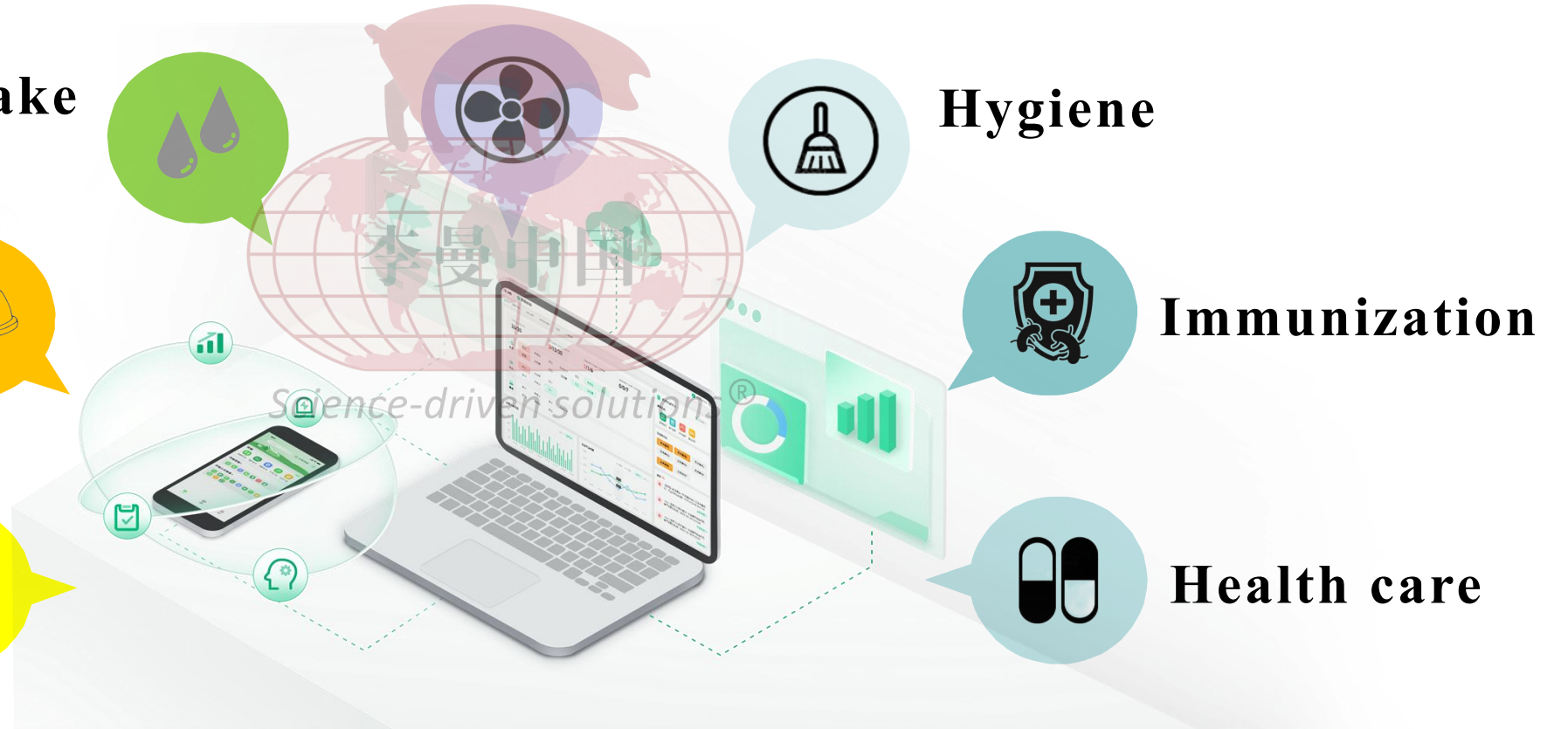
Hygiene

Feed intake

Immunization

Temperature

Health care



科技改变养猪业!

扬翔将不忘初心，砥砺前行，
为中国成为养猪强国竭尽所能!

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THANKS

谢谢

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