



ASF in China: Current Status, Control Measures and Experience

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3-5 April 2023

Maison de la Chimie, Paris, France



OUTLINE

- 1. Overview of ASF in China**
- 2. Recent epidemiology and surveillance**
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- 4. Control measures and experience**

1. Overview of pig industry in China

Data from national bureau of statistics

Number of pig in China in recent 10 years (in 100 million head)



Quantity of pork in China in recent 10 years (in 10k ton)



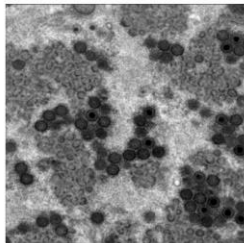
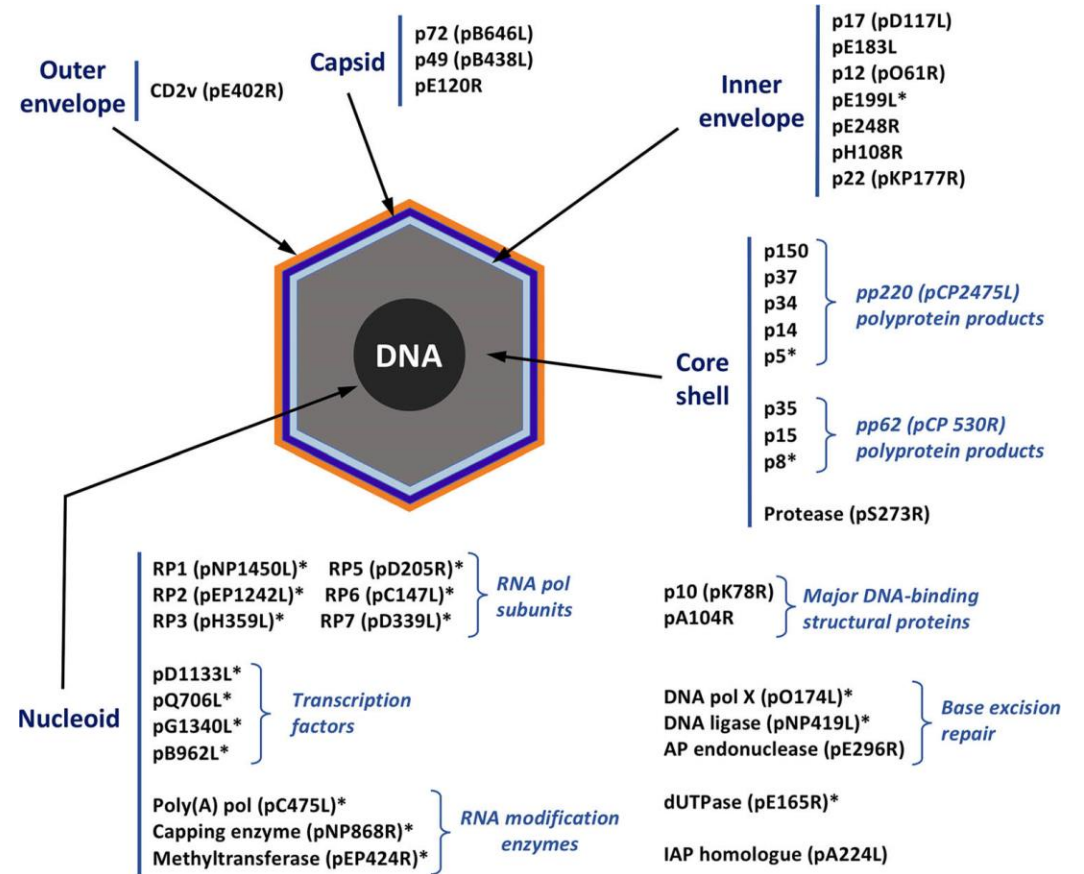
- The largest pork producing country worldwide
- Pork production about **125** millions tons in 2022, among which, **55.41** million tons were produced in China, as a proportion of **44.47%**

In the year of 2022 in China :

- Number of breeding sows: **43.90** million
- Quantity of slaughtering pigs: **699** million (increased 4.27% YOY)

1. Overview of pig industry in China: ASF is the first killer of pig industry world wide

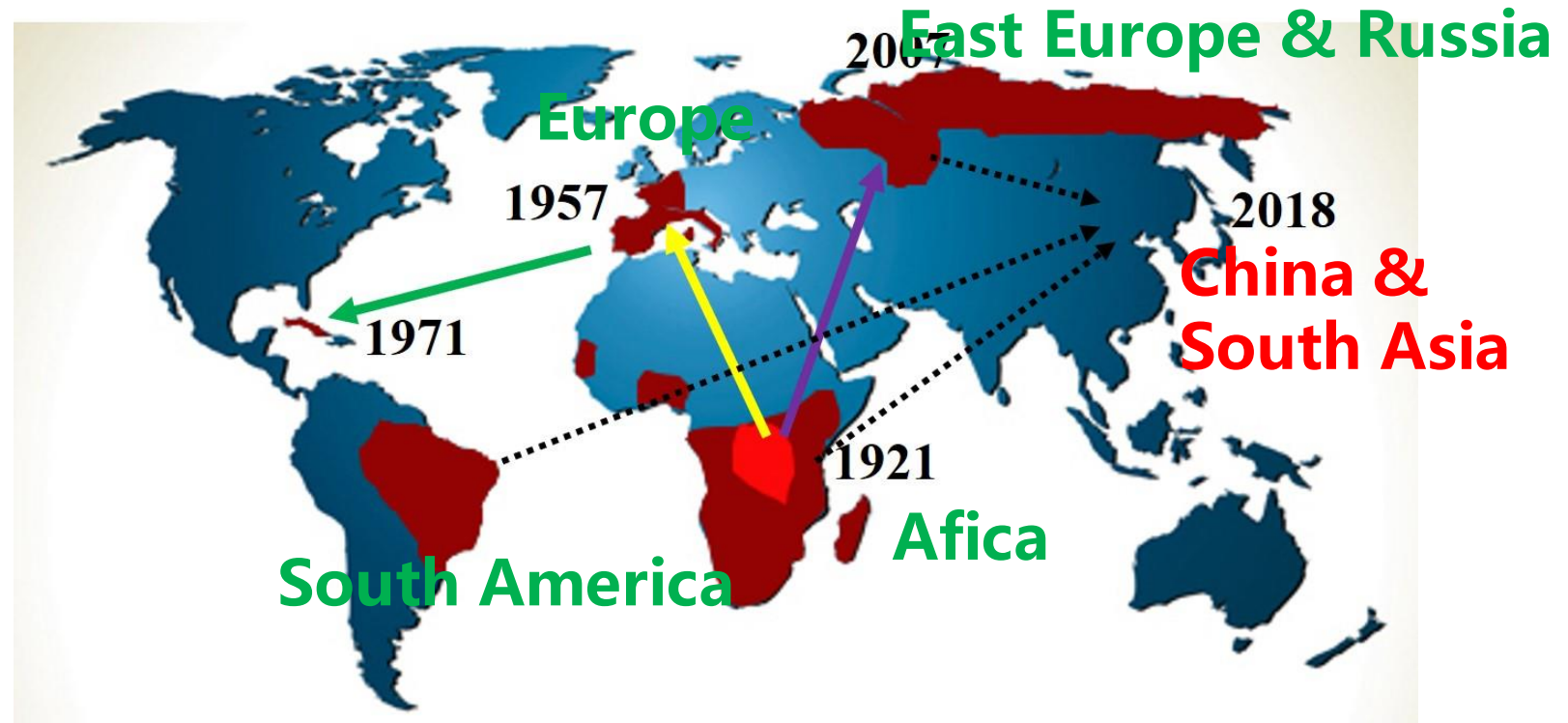
- ❑ Huge genome, complex structure
- ❑ WOAHA **notifiable disease**
- ❑ **Class 1** disease in China
- ❑ Hemorrhage, high mortality up to 100%
- ❑ **No vaccine or therapeutics currently**



1. Overview of pig industry in China: First outbreak in China

On 3rd 2018, the first outbreak of ASF, caused by genotype II ASFV was reported in a pig farm in Shenyang, China: 47 pigs out of 383 showed clinical syndroms and died.

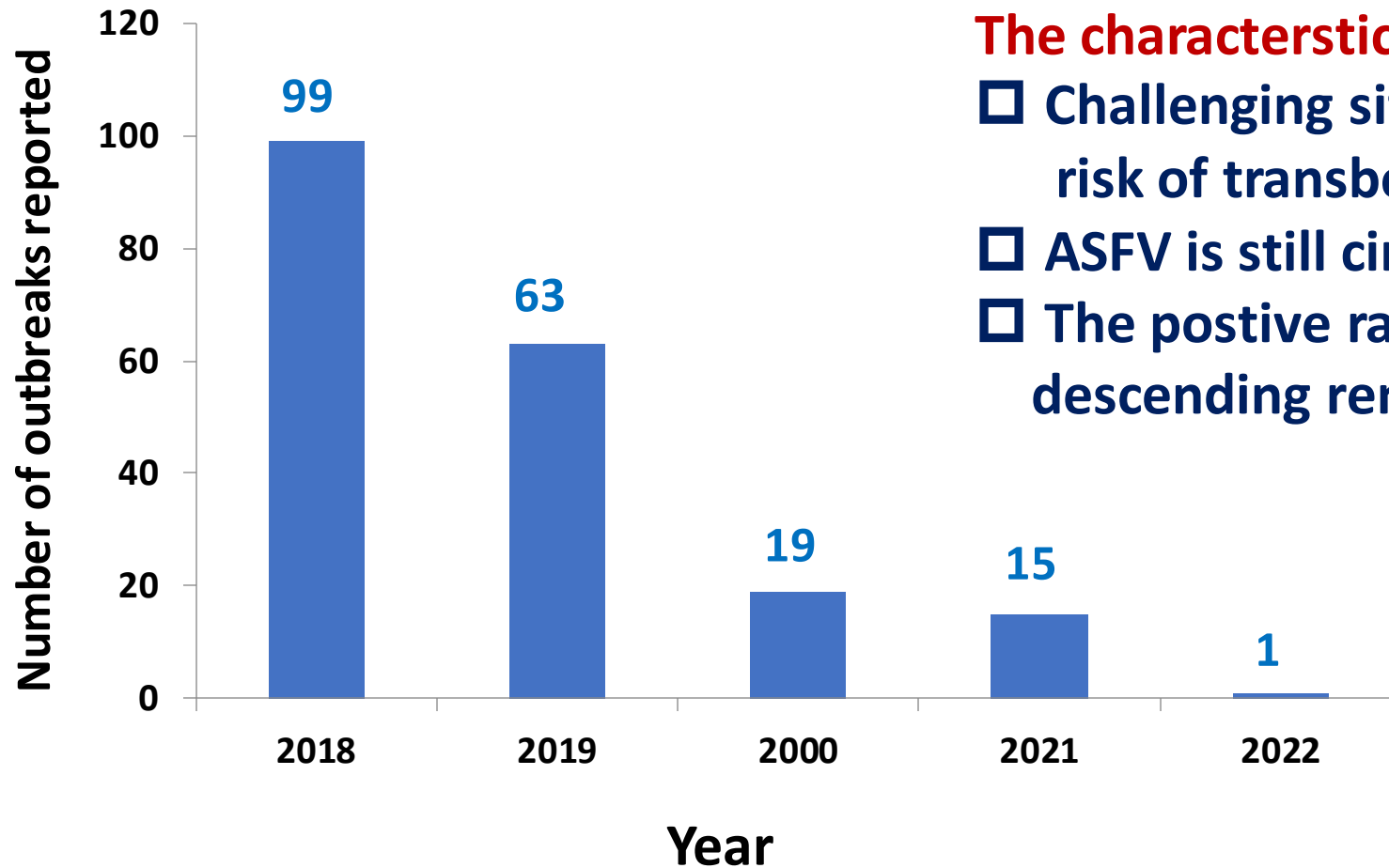
Although the vet authorities of China took control actions promptly, the disease spread to many provinces/regions of China.



1. Overview of pig industry in China: Threats to Chinese pig industry

- Although China is the biggest country in pig breeding and pork consumption in the world, the scale of pig breeding varies largely, given that a big proportion of **99%** farms are small-scale ones with number of pigs less than **500**. It should not be ignored that the biosafety level and ability of animal disease control of those kinds of pig farms are relatively low, compared to large-scale farms.
- Thus, ASFV transmitted rapidly to most provinces/regions of China right after the first outbreak, leading to a large number of pigs dead or being culled, and resulting in huge effect to the pig industry of China.

1. Overview of pig industry in China: Characteristic of current ASF in China



The characteristic of current ASF situation in China :

- ❑ Challenging situation of epidemic, with high risk of transboundary transmission.
- ❑ ASFV is still circulating ;
- ❑ The positive rate of farm and pig individual is descending remarkably over the years.

1. Overview of pig industry in China: possible transmission route to China



The first ASFV transmitted into China belonged to **genotype II**, which has as high as **99.95%** of homology in genomic sequence with strains isolated in Georgia, Russia, and Poland.

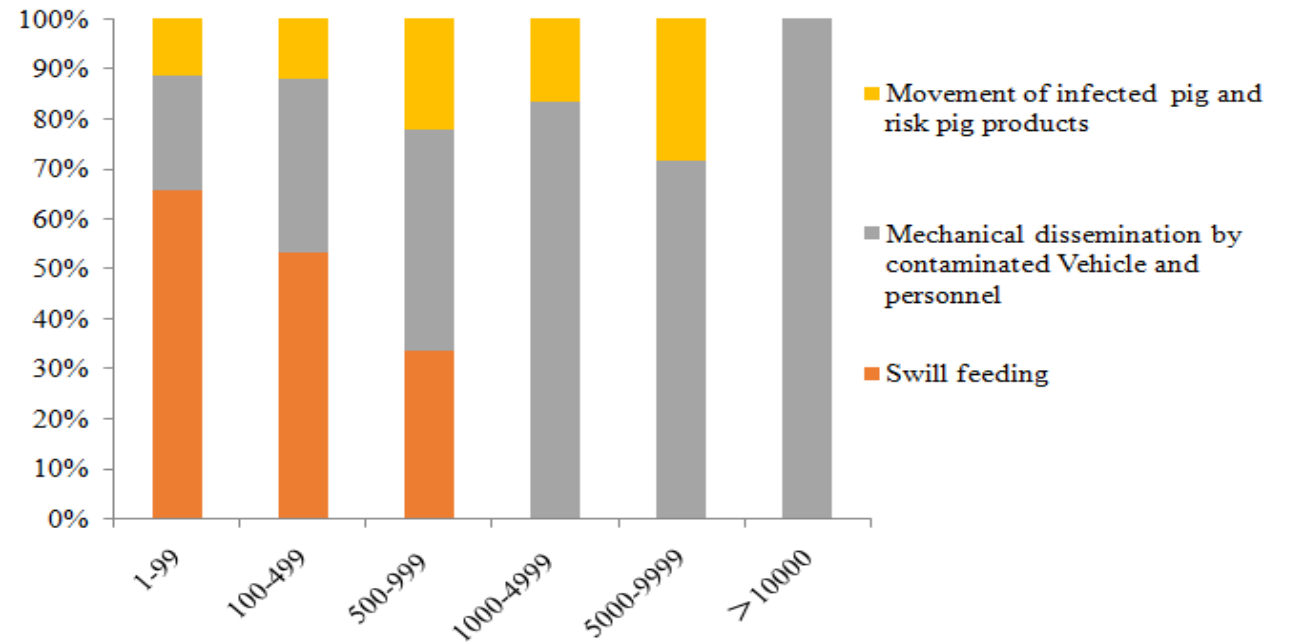
Results of studies indicated that there were **4** possible transmission routes for ASFV to China:

- International trade and smuggling in pig and pig products
- Pork and products carried by international passengers.
- Swill in international vehicles
- Boar movement

1. Overview of pig industry in China: possible transmission route in China

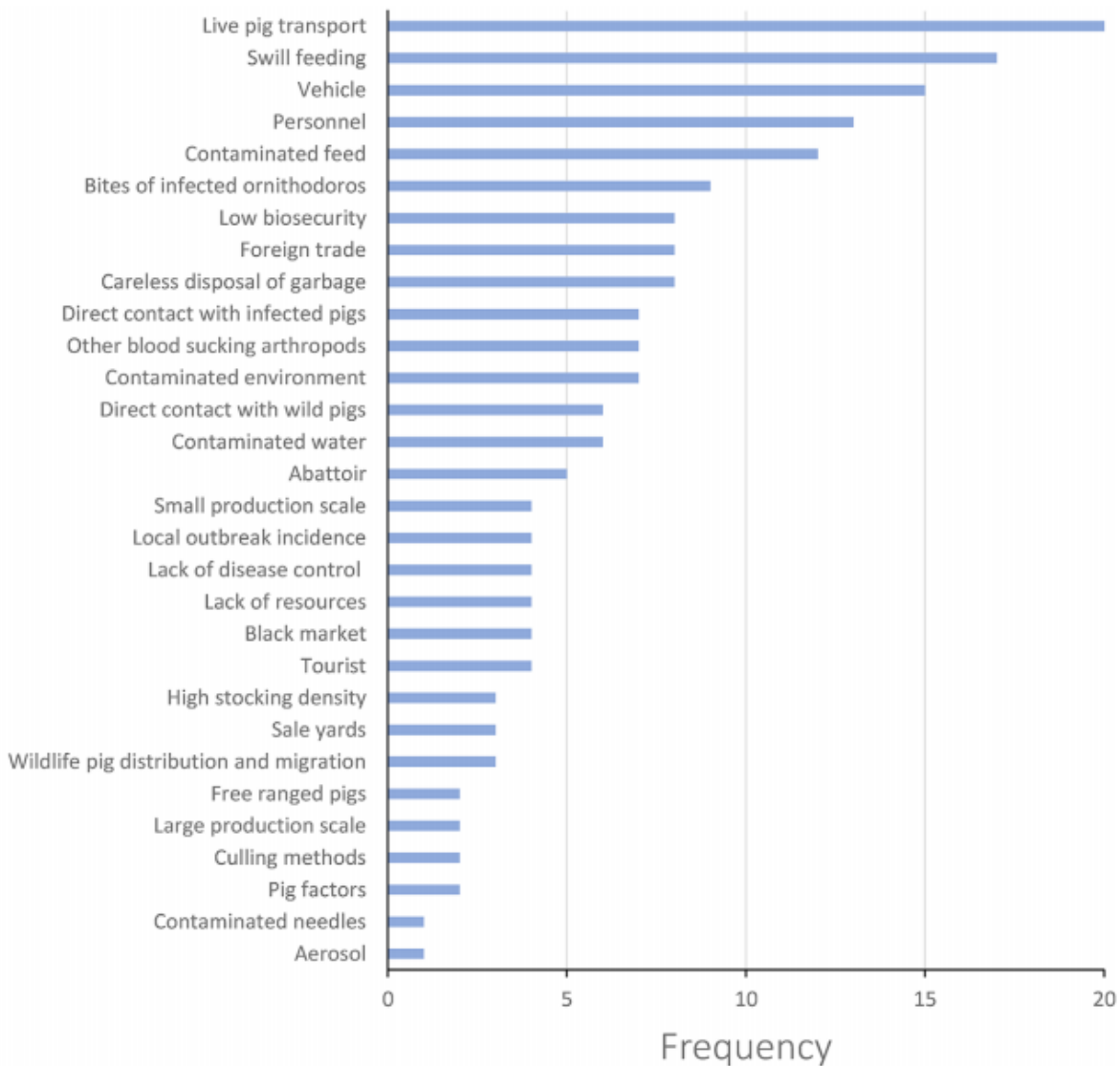
Three possible transmission routes:

- Pig and pig products movement among provinces
- Swilling feeding
- Mechanical dissemination by contaminated personnel and/or vehicle



1. Overview of pig industry in China: route and risk factors of transmission in China

Categories of risks that contribute to transmission of ASF virus



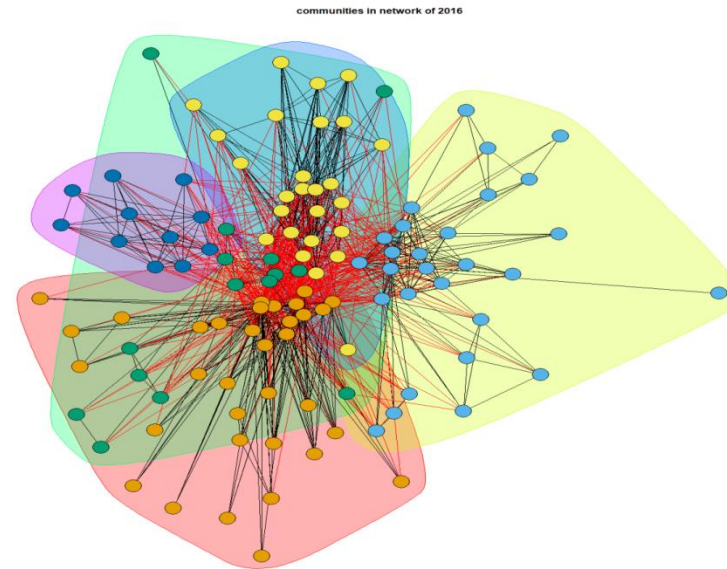
- **Live pig movement**
- **Swill feeding**
- **Vehicle**
- **Personnel**
- **Contaminated feed**
- **Tick biting**
- **Low level biosafety**
- **International trade**
- **Inappropriate disposal**
- **Direct contact**
- ...

E.g. in 2018, a total of **68** ASF epidemics were investigated, the result showed that **13 (19%)** epidemics were caused by pig movement; **23 (34%)** epidemics were caused by swill feeding; **31 (46%)** epidemics were caused by contaminated personnel and vehicle.

1. Overview of pig industry in China: live pig movement

Illegal pig movement is one of the key factors causing ASFV transmission in China.

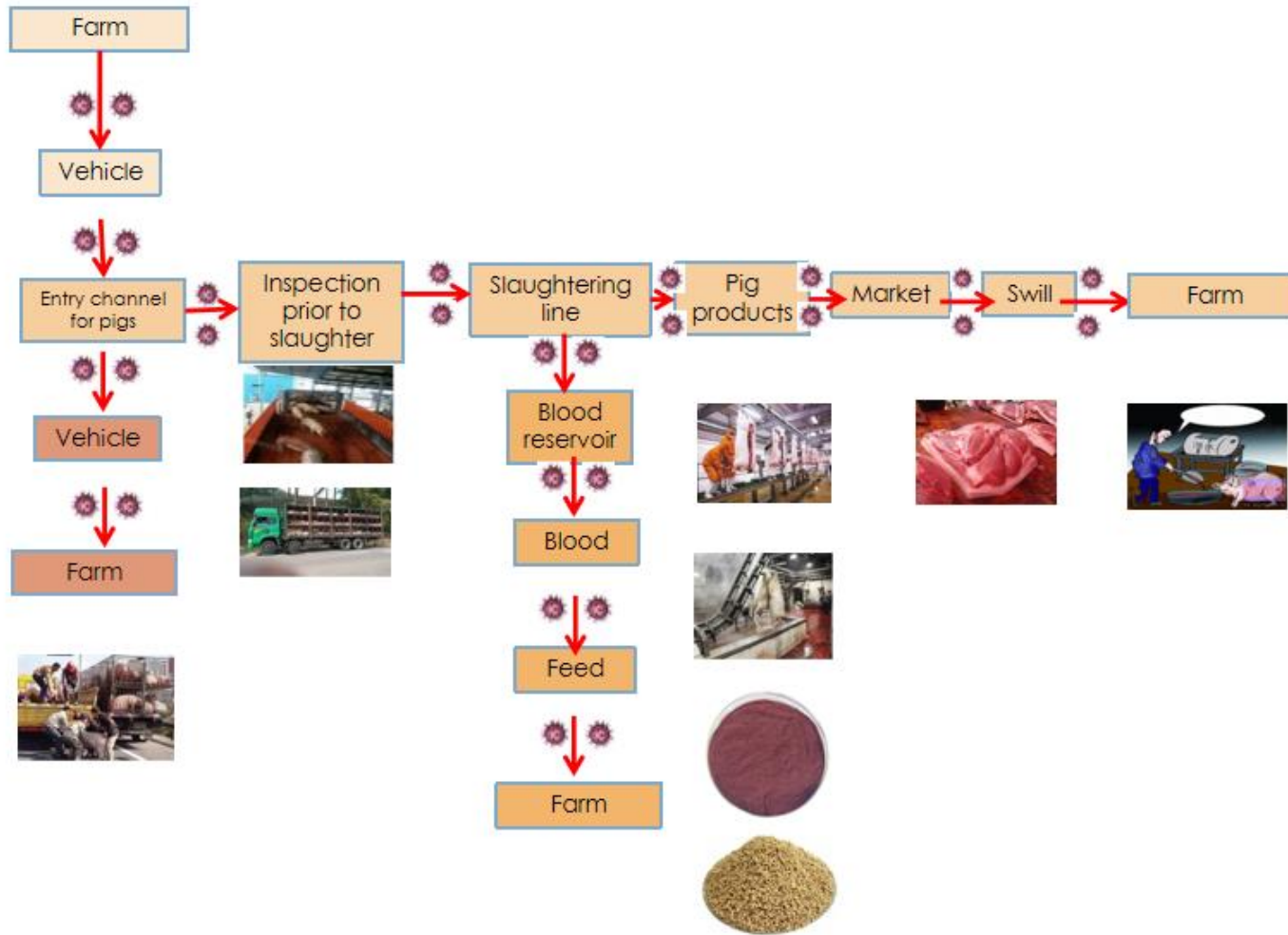
E.g., in 2019, a total of **32** ASF-related criminal cases were investigated by the Ministry of Public Security, in which **15** thousands pigs and **140** tons of pork and pork product were investigated.



1. Overview of pig industry in China:

value chain analysis

(data collected in 2019)



Influenced by the value chain, ASFV spreads in the important places, such as breeding farms, slaughtering house, market, etc, leading to a more difficult situation in control, if biosafety measures are ineffective.

2. Current epidemiology and surveillance: regulations released after June 2020

- Notice of the Bureau of Animal Husbandry and Veterinary Services, MARA, on **Adjusting the Surveillance of African Swine Fever in Some Provinces**
- Notice of the Bureau of Animal Husbandry and Veterinary Services, MARA, on **Adjusting the Assignment of Sampling and Testing Tasks for African Swine Fever in Pig Farms and Other Places** (No. 670 in the year 2020)
- Notice of the Bureau of Animal Husbandry and Veterinary Services, MARA, on **Continuing to Conduct Sampling and Detection of African Swine Fever in Large-Scale Pig Farms and Other Places** (No. 14, in the year 2021)
- Notice of Bureau of Animal Husbandry and Veterinary Services, MARA, on **the National Plan of Animal Disease Surveillance and Epidemiology** (No. 11, in the year 2021)

➤



2. Current epidemiology and surveillance: outbreak in 2022

Current overall situation of ASF in China is steady. ASF is now well controlled, and the number of epidemics decreased significantly compared to previous years.

In 2022, **only one outbreak** was reported in Xijing of China, in which a total of 16 pigs dead and 134 pigs culled.

2. Current epidemiology and surveillance: **attenuated and naturally mutant ASFV strains**

- the natural variants of genotype II and genotype I viruses have lower pathogenicity, but still have significant residual virulence compared to typical virulent strains;
- Longer incubation period
- Able to cause persistent infection and chronic disease progression;
- Having ability of horizontal transmission;
- Different clinical syndromes and morbidity between pigs

The clinical manifestations of mutant strains and low-virulence strains are hard to be identified, making early diagnosis more difficult, posing a new challenge for the prevention and control of ASF in China!

3. Research of diagnostic technology for ASF

Early rapid and reliable diagnosis is very important, as no vaccine against ASF at the present time!



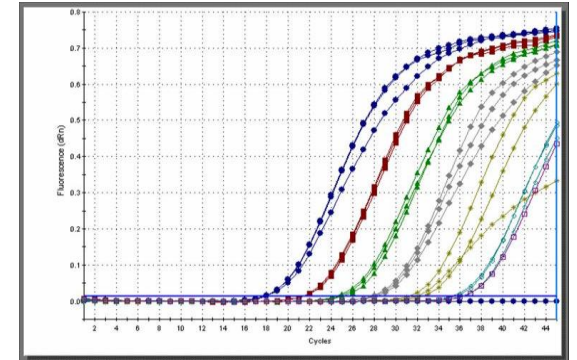
3. Research of diagnostic technology for ASF control



3. Research of diagnostic technology for ASF control

The molecular biology diagnostic technology is the main methods for ASF diagnosis, in which PCR and real-time PCR was recommended by WOA and FAO.

- ✧ In situ hybridization (ISH)
- ✧ **PCR**
- ✧ Real-time **PCR**
- ✧ **Digital PCR**
- ✧ LAMP
- ✧ Sequencing, genotyping
- ✧ Colloidal gold test strip



Real-time PCR kit developed by CADC for ASFV detection:
the first registered Veterinary New Drug Certificate

3. Research of diagnostic technology for ASF control

In November 2018, June 2019, and March 2021, the MARA performed evaluations on on-site rapid detection kits and antibody detection kits for ASF. A total of **36** nucleic acid detection kits and **33** antibody detection kits were recommended by MARA, and those kits played an important role in ASF diagnosis!

On-site rapid detection kit

- qPCR
- LAMP
- Strip
- Micro-chip
- RAA qPCR

Antibody detection kit

- Indirect ELISA
- Blocking ELISA
- Sandwich ELISA

In November 2018 and June 2019, the MARA organized evaluation of two batches of ASF rapid detection kits for recommendation to use.

A total of **43** (1st batch) and **93** (2nd batch) kits were evaluated, and **11** and **34** kits were recommended, including:

- 1st batch { **8** Real-time PCR kits
1 LAMP kit
2 test strips
- 2nd batch { **26** real-time PCR kits
6 LAMP kits

- Detection limit
- Specificity
- Sensitivity
- Repeatability
- Detection time
- Simplicity
- Practicability



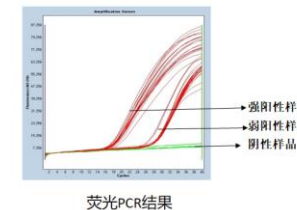
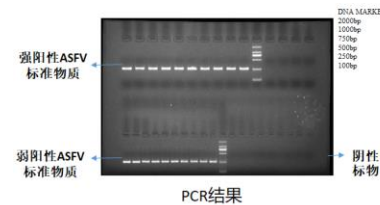
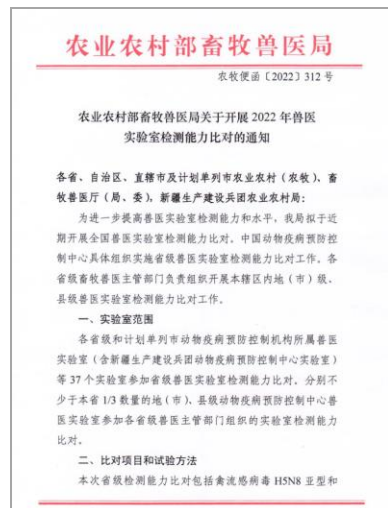
第一批非洲猪瘟现场快速检测试剂评价结果 (按生产企业名称首字母顺序排列, 不分先后)

类型	生产企业	试剂名称	诊断敏感性	诊断特异性	应用范围
PCR类	北京明日达科技发展有限公司	非洲猪瘟病毒实时荧光 PCR 快速检测试剂盒	96.47%	100%	猪血液、脾脏、淋巴结、扁桃体、肾脏组织样品快速检测, 具体试剂说明书。
	北京亿森宝生物科技有限公司	非洲猪瘟病毒实时荧光 PCR 快速检测试剂盒	100%	100%	
	哈尔滨北方生物药业有限公司	非洲猪瘟病毒实时荧光 PCR 快速检测试剂盒	93.33%	100%	
	洛阳聚普生信息科技有限公司	非洲猪瘟病毒实时荧光 PCR 快速检测试剂盒	96.47%	100%	
	青岛立思诊断科技发展有限公司	非洲猪瘟病毒实时荧光 PCR 快速检测试剂盒	100%	100%	
	深圳真福生物科技有限公司	非洲猪瘟病毒实时荧光 PCR 快速检测试剂盒	93.33%	100%	
	唐山安生生物工程有限公司	非洲猪瘟病毒实时荧光 PCR 快速检测试剂盒	93.33%	100%	
	郑州中道生物技术有限公司	非洲猪瘟病毒实时荧光 PCR 快速检测试剂盒	100%	100%	
核酸扩增仪类	北京森康生物技术开发有限公司	非洲猪瘟病毒 LAMP 检测试剂盒	100%	100%	仅用于猪(类)组织样品快速检测, 具体试剂说明书。
试剂类	北京森康生物技术开发有限公司	非洲猪瘟病毒抗原检测试剂盒	66.47%	100%	
试剂类	哈尔滨北方生物科技股份有限公司	非洲猪瘟病毒抗原检测试剂盒	70%	100%	



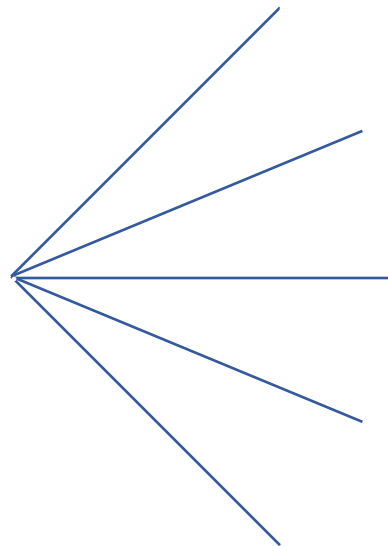
3. Research of diagnostic technology for ASF control

The reference materials (RM), "Reference Material for African Swine Fever Virus B646L Gene Plasmid" and the "Reference Material for African Swine Fever Virus (ASF Type II) Genomic DNA" have been developed by CADC and CAHEC respectively for the first time, providing standards and basis for the quality control of African Swine Fever laboratory testing. These RMs have been used for comparison and evaluation of capacity of veterinary laboratory testing.



1) Strict biosafety management

- **Encourage large-scale breeding style** and reduce small-scale breeding style, giving that number of ASF outbreak large-scale farm is much less than small-scale farms.
- **Strict disinfection and hygiene, and apply acaricide to eliminate ticks**
- **Strengthen pig breeding and movement management, considering pig movement, especially long-distance movement, is a significant factor causing ASFV transmission.**
- **Prohibit swill feeding.**
- **Enhance capability of protection against rodents, mosquitoes, and birds.**



4. Control measures and experience

2) Surveillance and monitoring system for early diagnosis

Four-word policy: **early, rapid, strict, minimal**

Only kits recommended by MARA or those validated by CADC can be used for ASF diagnosis.

The National Animal Disease Surveillance and Epidemiology Survey Plan (2021-2025)



中华人民共和国农业农村部
Ministry of Agriculture and Rural Affairs of the People's Republic of China

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农业农村部关于印发《国家动物疫病监测与流行病学调查计划（2021—2025年）》的通知

日期: 2021-10-21 15:49 作者: 来源: 农业农村部 【字号: 大 中 小】 打印本页

各省、自治区、直辖市及计划单列市农业农村（农牧、畜牧兽医）厅（局、委），新疆生产建设兵团农业农村局，部属有关事业单位，各有关单位：

为做好非洲猪瘟等动物疫病防控，持续加强监测和流行病学调查工作，我部组织制定了《国家动物疫病监测与流行病学调查计划（2021—2025年）》，现印发你们，请遵照执行。

农业农村部
2021年4月13日

国家动物疫病监测与流行病学调查计划（2021—2025年）



中华人民共和国农业农村部
Ministry of Agriculture and Rural Affairs of the People's Republic of China

政府信息公开

请输入关键字 高级检索

索引号	078261212202100115	信息所属单位	畜牧兽医局	
信息名称	养猪场非洲猪瘟变异株监测技术指南			
文号	生效日期	2021年03月22日	发布日期	2021年03月22日
内容概述	养猪场非洲猪瘟变异株监测技术指南			

养猪场非洲猪瘟变异株监测技术指南

发布时间: 2021年03月22日 字体: [大 中 小]

4. Control measures and experience

3) Strict movement management

- **Cross region movement:** approval of quarantine be authorized.
- **Marketing:** pig or port is prohibited to be sold without approval of quarantine.
- **Vehicle:** vehicles for live pig or pig product transportation should meet national standards in terms of hygiene and epidemic control.
- **Slaughtering house:** registrations and managements are required for moved-in pig, slaughtering, quarantine and disposal of diseased/dead animals.



农业农村部办公厅文件

农办医〔2018〕38号

农业农村部办公厅关于防治非洲猪瘟 加强生猪移动监管的通知

各省、自治区、直辖市畜牧兽医（农牧、农业）厅（局、委、办），新疆生产建设兵团畜牧兽医局：

为切实做好非洲猪瘟防治工作，严防因生猪移动导致疫情扩散蔓延，根据《中华人民共和国动物防疫法》《重大动物疫情应急条例》等法律法规和《农业农村部第2号公告》《非洲猪瘟疫情应急预案》等文件要求，现就加强生猪等易感动物移动监管有关事宜通知如下。



4. Control measures and experience

4) Implement of timely, effective and accurate emergency response

- The emergency implementation plan were revised the disposal measures were optimed for **four times**.
- Accurate culling and strict blocking management once epidemic occurred.
- Strict disposal management, deep burial or incineration for dead pigs.
- Encourage farms to report epidemic case, avoiding wider spread of disease.



4. Control measures and experience

5) Strengthen main responsibilities of breeding farms/households

Mian
responsibility

“Five doing”

- Reduce personnel and vehicle entering into farm;
- Thoroughly disinfect personnel and vehicles before entering the site;
- All-in and all-out management;
- Isolation of new pigs introduced;
- Quantine application based on rules.



“Four not doing”

- No swill feeding of pigs
- Do not breed in a scattered manner to avoid contact with wild pigs ;
- Do not introduce pigs from epidemic region
- Do not stop reporting of suspicious cases.

4. Control measures and experience

6) Cooperating prevention and control mechanism



- Bureau of Animal Husbandry and Vet Services, MARA
- Provincial Agricultural and Animal Husbandry and Veterinary Department/Bureau)
- China Animal Disease Control Center
- China Animal Animal Health and Epidemiology Center
- China Institute of Vet Drug Control
- Provincial/city/county animal disease control center
- Porvincial/city/county animal health inspection institution
- University & institute
- National ASF Ref Lab
- Professional ASF Lab
- Food and Drug Administration Departments
- at different levels
- Forestry and grassland bureaus at different levels
- Security units
- Traffic units
-

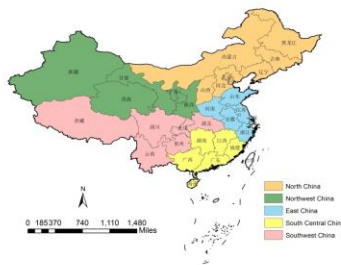


4. Control measures and experience

7) exploring zoning control strategy

Initiation

- In 2021, the No. 1 document of the MARA clearly stated that the prevention and control of major animal epidemics such as ASF should be comprehensively promoted.



China has a vast territory and significant regional differences. Implementing zoning management and strengthening classification guidance can effectively prevent and control animal epidemics, which has been repeatedly proven by prevention and control practices over the past years, and is also a mature international experience and common practice.

The MARA attached great importance to the pilot work of zoning control. Since the launch of the pilot work in the Central South District in March 2019, the former ministerial leaders have conducted multiple thematic studies and deployments, conducted on-site investigation and guided the district prevention and control work, and dispatched a guidance team from the Central South District to Guangzhou to guide the work.

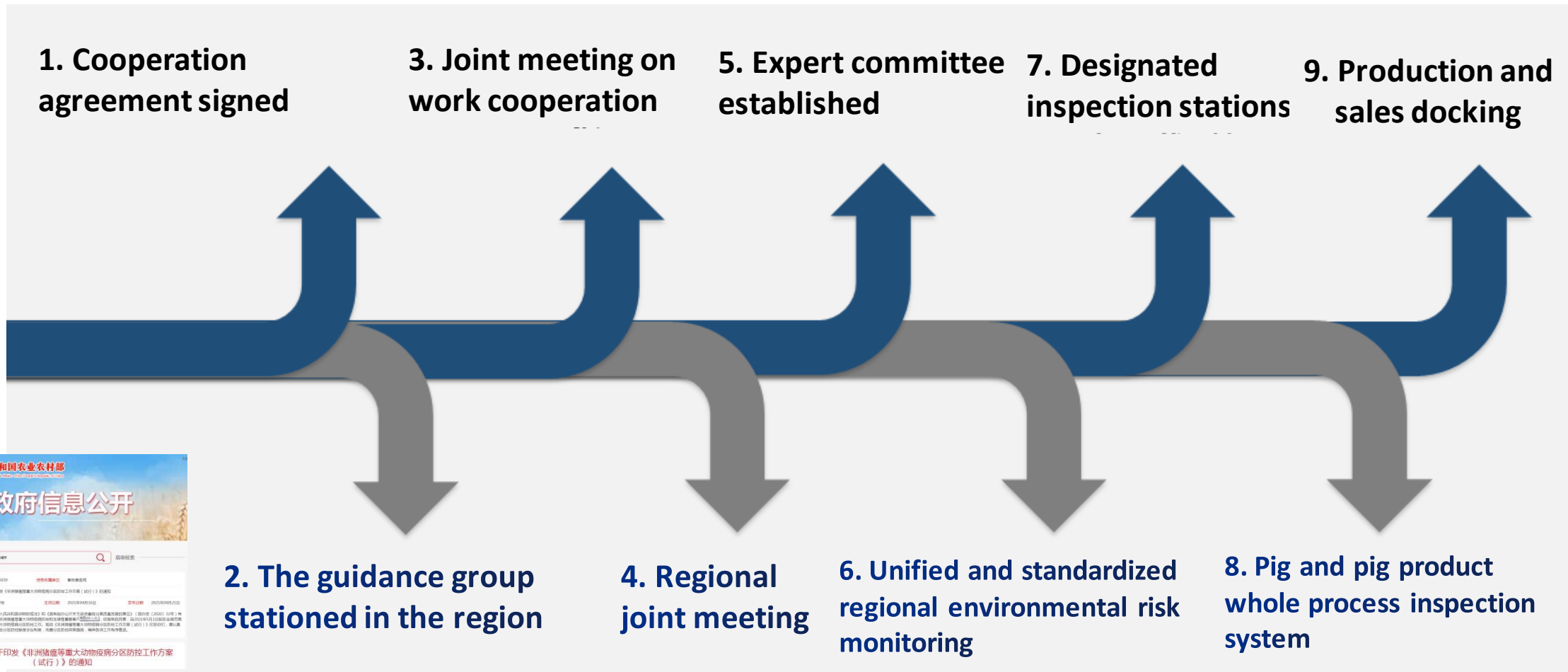
What is zoning control?

a risk management model that effectively prevents and controls major animal epidemics such as ASF, comprehensively considers factors such as administrative divisions, the layout of the breeding and slaughtering industry, and risk assessment, divides provinces (cities, districts) within the mainland of China into several regions, establishes and improves a joint meeting mechanism for regional prevention and control, and plans for regional animal epidemic prevention and control, pig transportation supervision, and production and marketing linkage.



4. Control measures and experience

7) exploring zoning control strategy



4. Control measures and experience

7) exploring zoning control strategy



4. Control measures and experience

8) ASF-free compartment

Construction and evaluation work on ASF-free compartment in accordance with laws and regulations



4. Control measures and experience

8) ASF-free compartment

- ✓ A total of **216** ASF-free zones have so far been established.
- ✓ The construction was mainly based on breeding pig farms, including multiple sites and links such as breeding pigs, commercial pigs, feed, washing and disinfection, etc.
- ✓ Infrastructure upgraded, building multiple barrier systems such as physical barriers, personnel isolation, and multi-level decontamination.
- ✓ Strengthen measures such as feed maturation, multi-level washing and decontamination, vehicle specific use. A scientific biosafety management system established
- ✓ Standardized the official and effective supervision of "process supervision, risk control, and traceability management".



4. Control measures and experience

SUMMARY in ASF control

- ✓ Strengthen the **biosafety management** of livestock farms/households, improving the hygiene and biosafety level of pig farms to reduce the spread of viruses;
- ✓ Enhance the implementation of territorial **management responsibilities**, aquaculture and business entity responsibilities;
- ✓ Strengthen **epidemiological surveillance** and screening, and **early monitoring and warning**;
- ✓ Effectively implement the **culling and subsidy** policy;
- ✓ Strict **disposal** treatment of dead pigs;
- ✓ Pig **movement** management;
- ✓ Standardize transportation and **slaughtering** procedures, and effectively wash and disinfect vehicles;
- ✓ Prohibit the **import** of live pigs from high-risk areas, and strictly quarantine pork products;
- ✓ Implement **zoning control strategy** and **ASF-free community construction**, and strengthen regional management;
- ✓ Enhance **joint cooperation** for ASF control;
- ✓ Illegal **vaccine** producing, selling and using are prohibited;
- ✓ Strengthen support for **basic research** on ASF, explore the molecular mechanisms of infection, pathogenesis, and immunity, and steadily work on the development of ASF vaccine through multiple technical routes.



Thank you

Gongmin WANG

Deputy Director General, MARA, China

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This event is supported by funding from:



Canada 



Counter Proliferation
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Co-funded by
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