

Member's update on FMD, PPR and LSD

P.R. China

Jinming LI

Research fellow, CAHEC

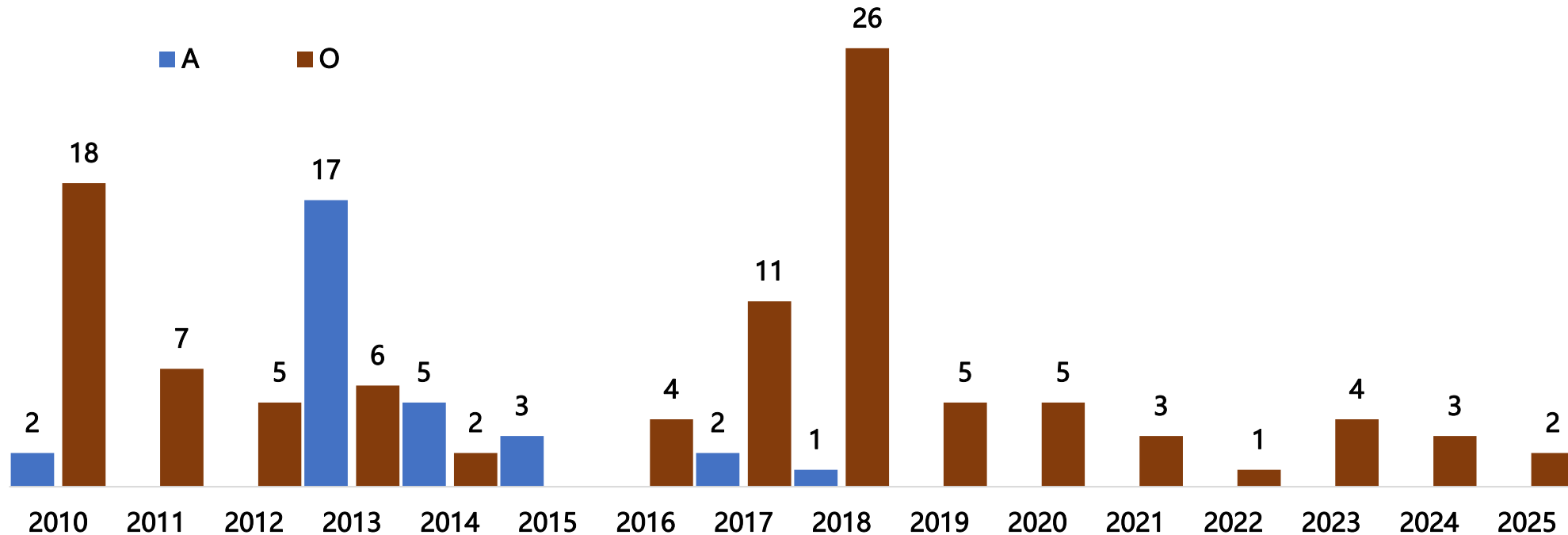
22 – 23 July 2025

Tokyo, Japan

OUTLINE

- **Disease situations**
- **Disease prevention and control**
- **Laboratory capacity**
- **Challenge and possible solutions**
- **Proposal for future activities**

Disease situations - FMD



- Generally, total number of clinical cases is decreasing
- Field strains are also decreasing
- Type A is not detected since 2019
- Type O is currently the main prevalent strain

Disease situations - FMD

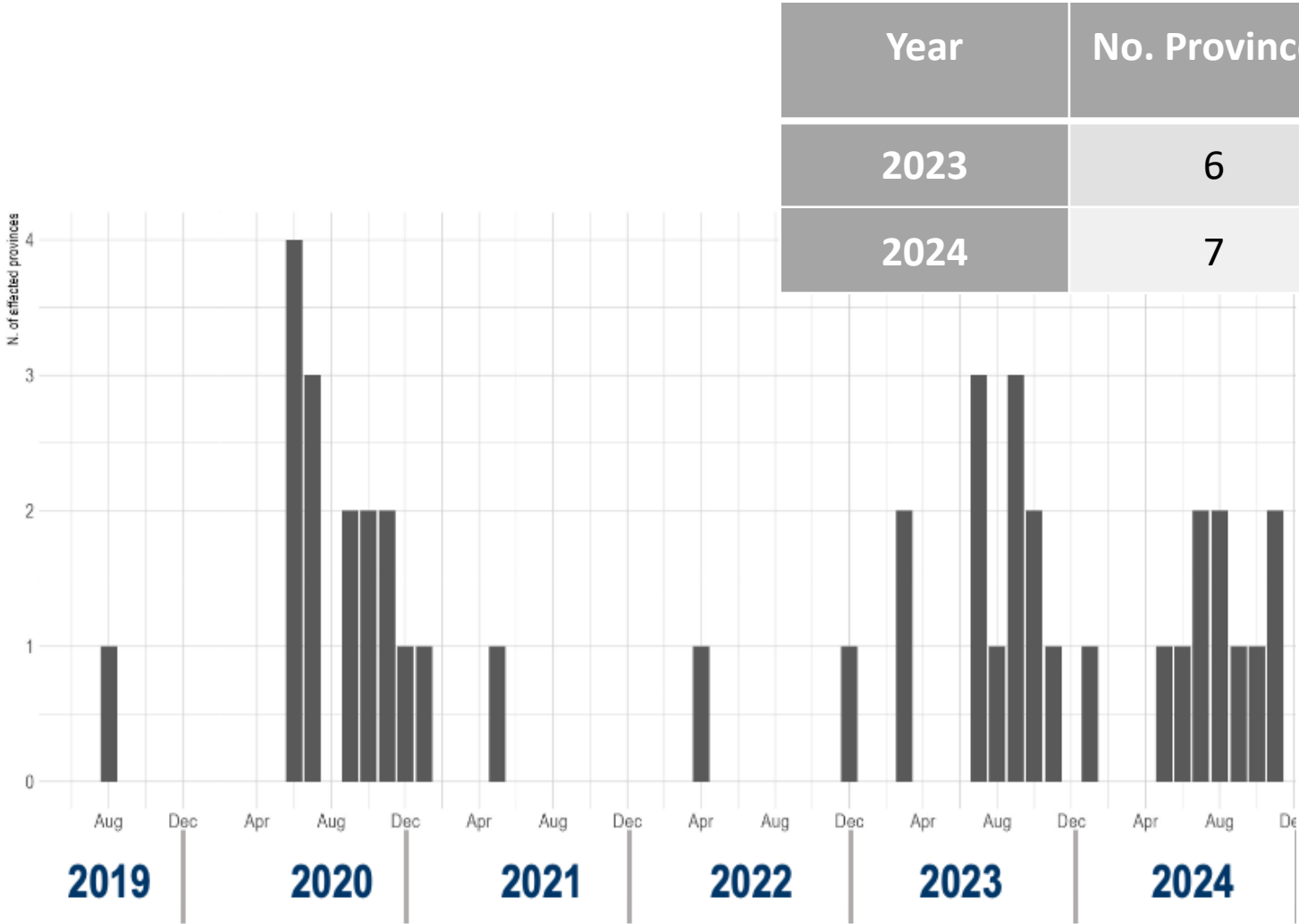
Year	Province	No. of outbreaks	Location Type	Animal Species	Virus strain
2023	Guangxi	1	Road Inspection Spot	Cattle	O/Ind-2001
2023	Xinjiang	2	Road Inspection Spot	Cattle	O/Ind-2001
2023	Chongqiong	1	Slaughterhouse	Swine	O/CATHAY
2024	Xinjiang	2	Road Inspection Spot	Cattle	O/Ind-2001
2024	Guangxi	1	Road Inspection Spot	Swine	O/CATHAY
2025	Xinjiang	2	Slaughterhouse	Cattle	O/Ind-2001

Disease situations - FMD

FMD Overall Epidemiological Situation Assessment

- The epidemic situation of FMD remains generally low, with sporadic cases of genotype O observed
- The risk of regional genotype A outbreaks is low, but potential spread of genotype A cannot be ruled out
- A subset of diversified genotype O (3 or more) epidemic strains still exists
- Antigen variation has been observed in genotype O strains (especially the CATHAY strain in pigs)

Disease situations - LSD



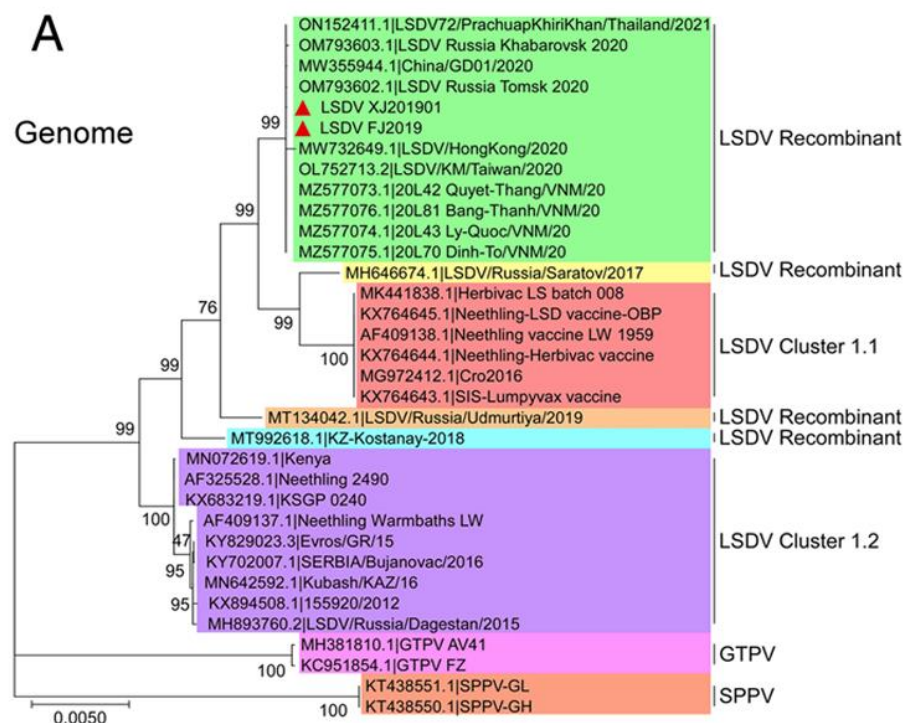
Year	No. Provinces	No. Cases	No. Death
2023	6	86	10
2024	7	49	0



Disease situations - LSD

Circulating strains

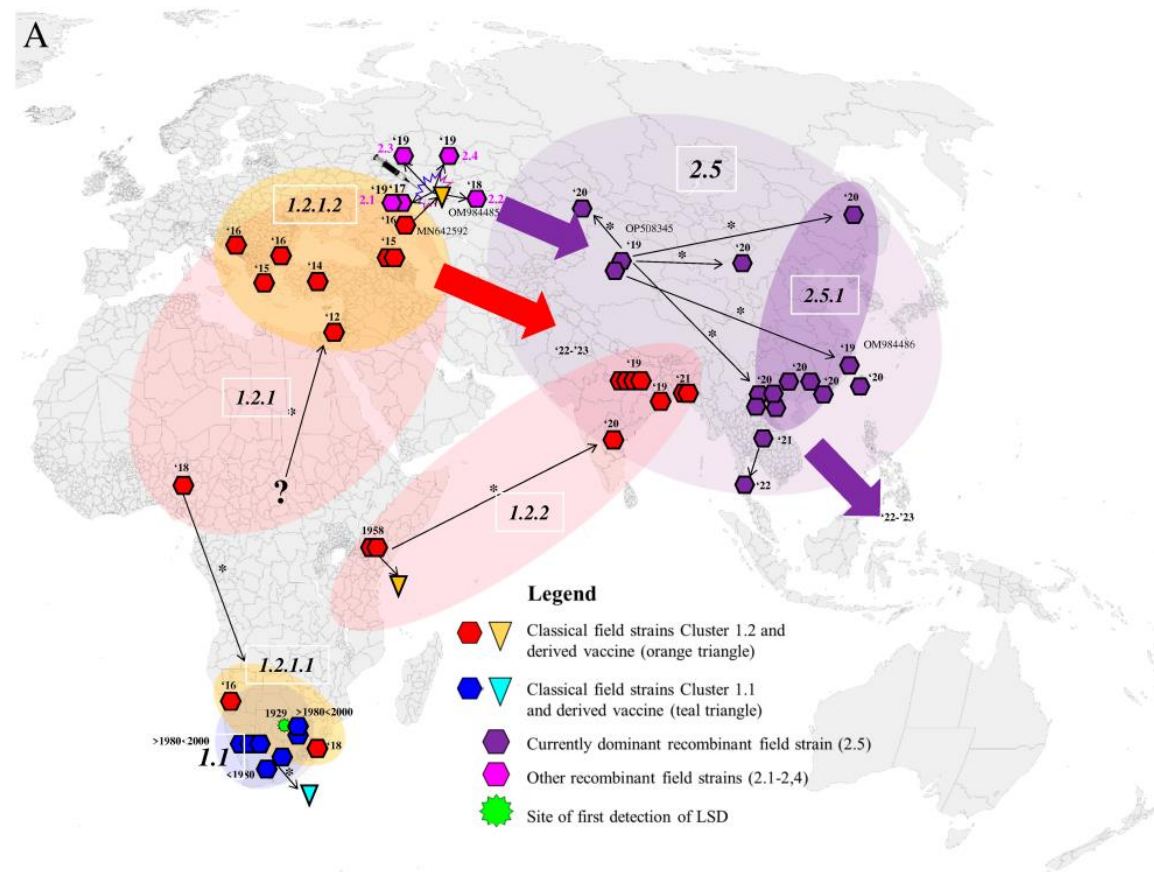
- Recombinant strains, Clade 2.5
- Confirmed by CAHEC



Article

Lumpy Skin Disease Virus Genome Sequence Analysis: Putative Spatio-Temporal Epidemiology, Single Gene versus Whole Genome Phylogeny and Genomic Evolution

Floris C. Breman , Andy Haegeman , Nina Krešić, Wannes Philips and Nick De Regge



Disease situations - PPR

- PPR was first introduced into Tibet, China in 2007.
- PPR was re-introduced into Xinjiang, China in 2013. Widely spread in the country.
- PPR has been under good control, with only sporadic outbreaks since 2016.
- In 2024, there were 2 outbreaks, both involving wild animals in Tibet.
- In 2025, there was 1 outbreak, detected at an animal transport inspection spot in Xinjiang.

Disease situations - PPR

- Diverse species of susceptible wildlife species
- PPR reported in Blue sheep, Goitered Gazelle, Siberian ibex, Przewalski's Gazelle and Argali in China



岩羊

Pseudois nayaur
Bharal



鹅喉羚

Gazella subgutturosa
Goitered Gazelle



北山羊

Capra sibirica
Siberian Ibex



盘羊

Ovis ammon
Argali



普氏原羚

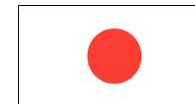
Przewalski's Gazelle
Procapra przewalskii



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for Animal Health

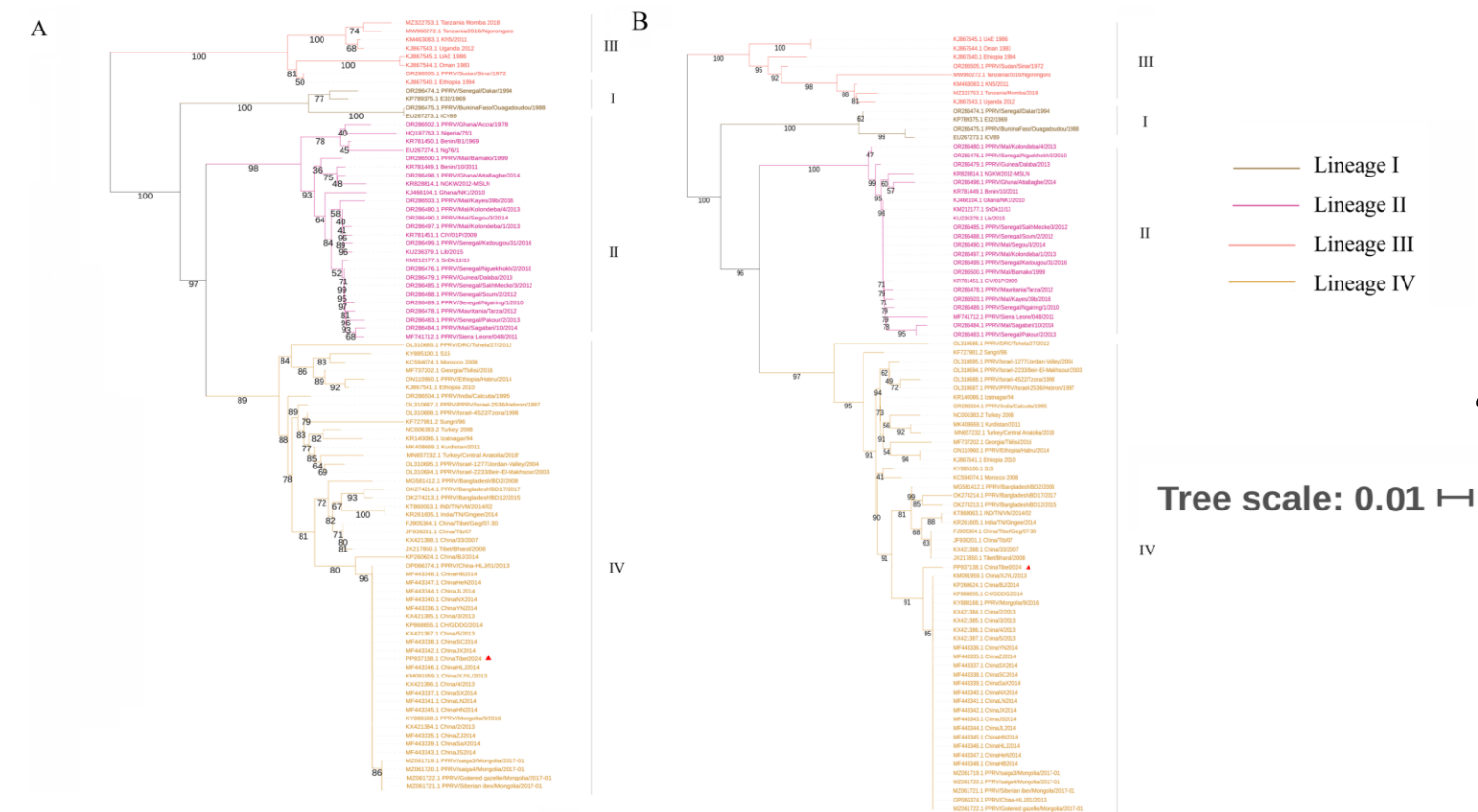
中华人民共和国农业农村部

Ministry of Agriculture and Rural Affairs of the People's Republic of China



Ministry of Agriculture,
Food and Rural Affairs

Disease situations - PPR



- PPRV strains currently circulating in China belong to **Central Asia/Eastern Asia Cluster** in Lineage IV
- Bharal/China/XZ/2024 shared 99.0% genome sequence similarity with China/XJYL/2013



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Ministry of Agriculture and Rural Affairs of the People's Republic of China



Ministry of Agriculture,
Food and Rural Affairs

Disease **prevention and control** - FMD

Compulsory vaccination

Based on the FMD epidemiology and surveillance results, in China:

- **all pigs shall be vaccinated against FMD Type O**
- **all cattle, sheep/goats, camels shall be vaccinated against Type O and A**

Post-vaccination Monitoring

- **The overall population immunity was > 80%**

农业农村部文件

农牧发〔2021〕11号

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

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：

为作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

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Disease prevention and control - LSD

- Emergency Preparedness (2019)
- Technical Specification for Prevention and Control (2020)
- National Surveillance Plan (2021 ~ 2025)

农业农村部文件

农牧发〔2019〕26号

农业农村部关于做好牛结节性皮肤病 防控工作的紧急通知

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:

8月12日,经中国动物卫生与流行病学中心国家外来动物疫病研究中心确诊,新疆维吾尔自治区伊犁州发生牛结节性皮肤病疫情,这是我国首次确诊发生该病。经当地畜牧兽医部门排查,截至目前,共在伊犁州察布查尔县、霍城县、伊宁市发现病牛218头,死亡1头。为做好牛结节性皮肤病防控工作,现将有关事宜通知如下。

一、高度重视牛结节性皮肤病防控工作

牛结节性皮肤病是由山羊痘病毒属结节性皮肤病病毒引起的

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农业农村部文件

农牧发〔2020〕30号

农业农村部关于印发《牛结节性皮肤病防治 技术规范》的通知

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:

为做好牛结节性皮肤病防控工作,保障养牛业持续健康发展,我部组织制定了《牛结节性皮肤病防治技术规范》。现印发给你们,请遵照执行。



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农业农村部文件

农牧发〔2021〕11号

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

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

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Disease prevention and control - LSD

- Live-attenuated vaccines against goat pox (AV41 strain)
- Producers: 34



<input type="checkbox"/>	企业名称	通用名	规格
1	<input type="checkbox"/> 武汉科前生物股份有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
2	<input type="checkbox"/> 北京华信农威生物科技有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
3	<input type="checkbox"/> 江西博美莱生物科技有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
4	<input type="checkbox"/> 金宇保灵生物制品有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
5	<input type="checkbox"/> 山西隆克尔生物制药有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
6	<input type="checkbox"/> 中海生物制药(泰州)有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
7	<input type="checkbox"/> 申联生物医药(上海)股份有限公司兰州分	牛结节性皮肤病灭活疫苗 (山羊痘病毒AV41株, 悬浮培养)	
8	<input type="checkbox"/> 辽宁益康生物股份有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
9	<input type="checkbox"/> 华派生物技术(集团)股份有限公司	小反刍兽疫、山羊痘二联活疫苗 (Clone9株+AV41株)	25头份/瓶; 50头份/瓶; 100头份/瓶
10	<input type="checkbox"/> 中牧实业股份有限公司江西生物药厂	牛结节性皮肤病灭活疫苗 (山羊痘病毒AV41株, 悬浮培养)	
11	<input type="checkbox"/> 哈尔滨维科生物技术有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
12	<input type="checkbox"/> 国药集团扬州威克生物工程股份有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
13	<input type="checkbox"/> 中牧实业股份有限公司江西生物药厂	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
14	<input type="checkbox"/> 云南生物制药有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
15	<input type="checkbox"/> 国药集团扬州威克生物工程股份有限公司	小反刍兽疫、山羊痘二联活疫苗 (Clone9株+AV41株)	25头份/瓶; 50头份/瓶; 100头份/瓶
16	<input type="checkbox"/> 吉林特研生物技术有限责任公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
17	<input type="checkbox"/> 齐鲁动物保健品有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
18	<input type="checkbox"/> 瑞普(保定)生物药业有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
19	<input type="checkbox"/> 华威特(江苏)生物制药有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
20	<input type="checkbox"/> 吉林和元生物工程股份有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
21	<input type="checkbox"/> 吉林正业生物制品股份有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
22	<input type="checkbox"/> 山东绿都生物科技有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
23	<input type="checkbox"/> 四川海林格生物制药有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
24	<input type="checkbox"/> 天康生物制药有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
25	<input type="checkbox"/> 青海生物药品厂有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
26	<input type="checkbox"/> 北京信得威特科技有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
27	<input type="checkbox"/> 哈药集团生物疫苗有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
28	<input type="checkbox"/> 北京华夏兴洋生物科技有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
29	<input type="checkbox"/> 重庆澳龙生物制品有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
30	<input type="checkbox"/> 山东华宏生物工程股份有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶
31	<input type="checkbox"/> 江苏南农高科技股份有限公司	山羊痘活疫苗	25头份/瓶; 50头份/瓶; 100头份/瓶

Disease prevention and control - LSD

- 2 inactivated vaccines were approved and will soon be available on the market

Manufacturer	Virus strain	Titre	Dose	booster Administration	Immunity duration
Jinyu Baoling Bio-Pharmaceutica Co.,Ltd.	LSDV NMG strain	$10^{6.5}\text{TCID}_{50}$	2.0mL	21d	6 months
China Animal Husbandry Industry Co.,Ltd.	GPTV AV41 strain	$10^{6.2}\text{TCID}_{50}$	2.0mL	14	6 months

Disease **prevention and control** - PPR

- **The PPR National Strategic Plan**

- Farm biosecurity and management
- Vaccination
- Surveillance and early warning
- Movement control
- Emergency management
- Cross border control
- Public awareness

Disease **prevention and control** - PPR

- National-wide Compulsory Mass Vaccination Campaign of PPR has been implemented since 2014
- Objective of the vaccination campaign is to reach a post-vaccination level of 70% immunity at flock, geographical area, or farming system level to break the epidemiological virus maintenance and spread cycle
- Live attenuated vaccine prepared with the Nigeria 75/1 like vaccine strain
- Commercial PPR vaccines have been produced by local companies in China
 - PPR monovalent vaccine
 - PPR and goatpox bivalent vaccine



Disease **prevention and control** - PPR

- Vaccines are provided by the government free of charge
- The local government covers all the operational costs incurred from vaccination
- Vaccination is supervised by the public VS
- Cold chain system have been developed throughout the vaccine delivery chain

County VS stations → Town VS stations → Village VS stations → Vaccinators



Walk-in Freezer



refrigerated truck



Freezer



Refrigerator



Disease **prevention and control** - PPR

Active surveillance

- **Clinical/syndromic surveys**
 - Local vet/para-vet & community animal health workers regularly conduct clinical monitoring of susceptible animals
 - The veterinary services carry out pre-sale inspection for the issuance of veterinary documents.
- **Abattoir specific surveys**
 - The veterinary services carry out pre-mortem inspection and post-mortem sanitary examination for the issuance of veterinary documents
- **Markets specific surveys**
 - Animals must carry ear tags and to be accompanied by a veterinary health certificate
- **Wildlife monitoring**
 - Wildlife Disease Monitoring Station workers regularly conduct clinical monitoring of wildlife
- **Border VS inspection**
 - Customs veterinarians conduct inspection for imported live small ruminants during quarantine

Passive surveillance

- **During 2007-2024**
- **Reporting systems from vet/para-vet & community animal health workers: 351 cases**
- **Wildlife (reported cases): 20 cases**
- **Markets (reported cases): None**
- **Border VS inspection reports: None**

Disease **prevention and control** - PPR

- Biosecurity and management improved in farms (households), livestock trading markets and abattoirs
- Mass Vaccination implemented national wide, in 2024 the national immunity level was 85.44%
- Surveillance and early warning were in place
- Live animal transportation supervision was in good practice, with effective origin quarantine implementation
- Emergency management improved and outbreak investigation was conducted for each outbreak
- The joint-effort on cross-border control was well implemented
- Public awareness improved by regular training on PPR epidemiology, vaccination and diagnostics

Laboratory capacity - FMD

Key Diagnostic Tests Available

- **FMD(V) diagnosis**
 - National veterinary labs
 - techniques

OIE Diagnosis and Vaccine Manual, 2021

FMD diagnosis methods

- Establish testing methods and technical processes in line with WOAH standards
- Establish a series of diagnostic products (kits)

Diagnostic detection capability

- Quality management system: CNAS accreditation and CMA certification
- All 10 detection methods/parameters of FMD approved
- Participated in international and domestic ability verification, satisfactory

Method	Purpose					
	Population freedom from infection	Individual animal freedom from infection prior to movement	Contribute to eradication policies	Confirmation of clinical cases	Prevalence of infection – surveillance	Immune status in individual animals or populations post-vaccination
CFT	–	–	+	+	–	–
LFD	–	–	+++	+++	–	–
Real-time RT-PCR	+	+	+++	+++	+	–
RT-PCR	+	+	+++	+++	+	–
Detection of immune response						
NSP Ab ELISA	+++	++	+++	+++	+++	–
SP Ab ELISA ^(a)	++	++	+++	+++	++	+++
VNT ^(a)	++	++	+++	+++	++	+++
AGID	+	+	+	+	+	–



Laboratory capacity - LSD

- **Agent test**

- Real-time PCR
- DNA sequencing
- Whole genome sequencing
- Virus isolation

- **Antibody test**

- ELISA
- VNT

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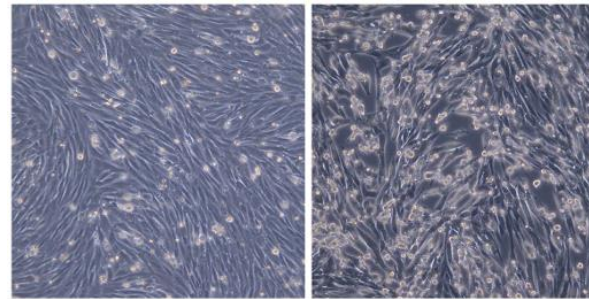


中华人民共和国国家标准

GB/T 39602—2020

牛结节性皮肤病诊断技术

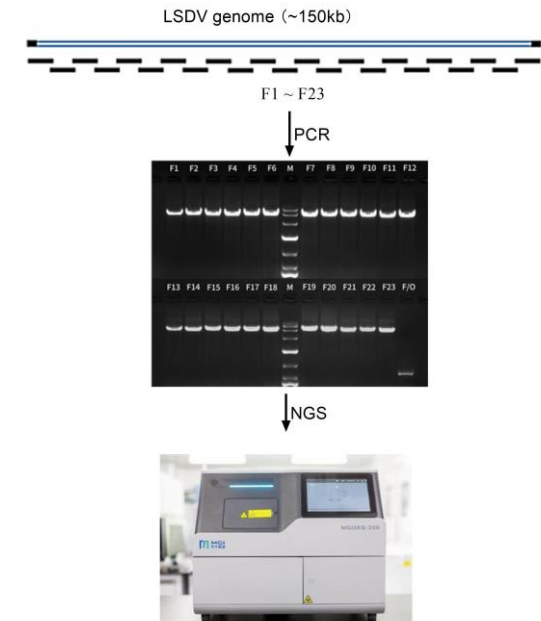
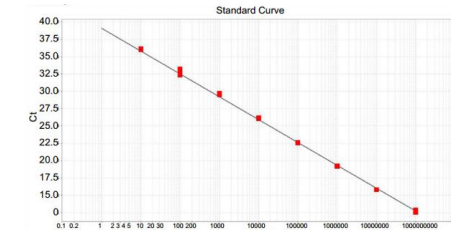
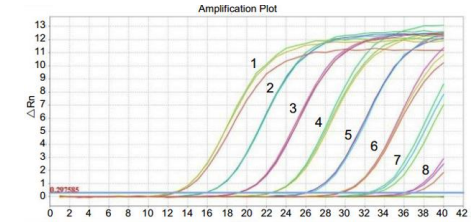
Diagnostic techniques for Lumpy skin disease



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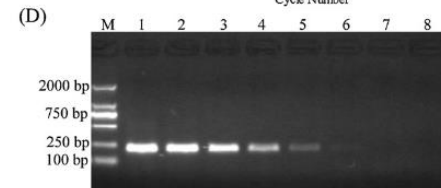
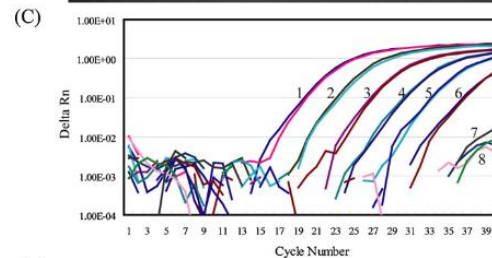
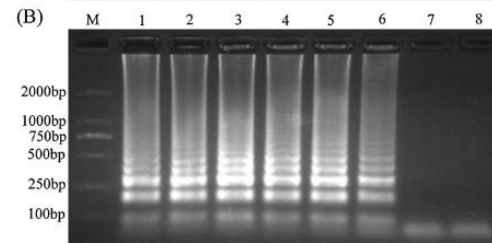
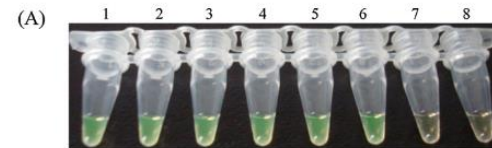
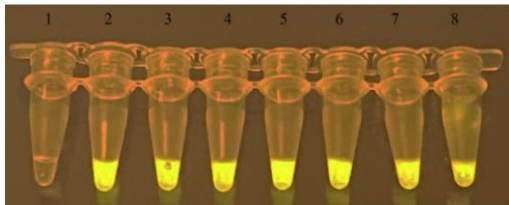
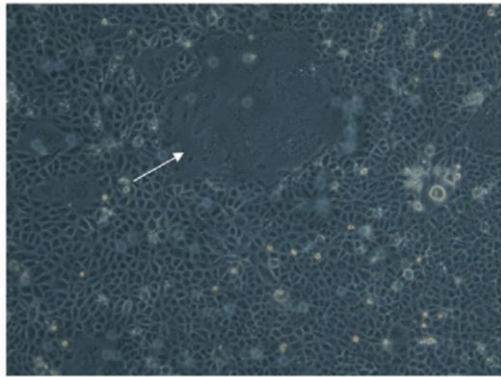
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国家市场监督管理总局 发布
国家标准化管理委员会



Laboratory capacity - PPR

- WOAHPPR Laboratory Network
- National Reference Laboratory for PPR



- PPR diagnostic techniques developed
- **Virus isolation**
- **Molecular techniques**
 - Real-time RT-PCR
 - RT-PCR
 - RT-RPA/LAMP
 - RT-RAA-CRISPR/Cas12a
 - Droplet digital RT-PCR
- **Immunological techniques**
 - Antibody ELISA
 - Virus neutralization assay
 - Lateral flow test
- **Genome sequencing**
 - First-generation sequencing
 - Next-generation sequencing
 - Third-generation sequencing

Challenge and possible solutions

Main challenges

- Risk of sporadic cases, esp. in small and medium-sized farms
- Risk of cross-border transmission from neighbor countries

Possible solutions

- Public awareness campaign, increasing the vaccination coverage
- Border control: construction of border vaccination protection barriers

Proposal for future activities

- Strengthen Regional Coordination
- Develop and Align National Strategic Plans (NSPs) with the regional Blueprint
- Organize regular training courses for diagnosis and epidemiology

Thank you

Jinming LI

Research fellow, CAHEC

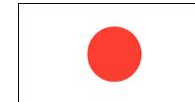
lijinming#cahec.cn



World Organisation
for Animal Health

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Ministry of Agriculture and Rural Affairs of the People's Republic of China



Ministry of Agriculture,
Food and Rural Affairs