

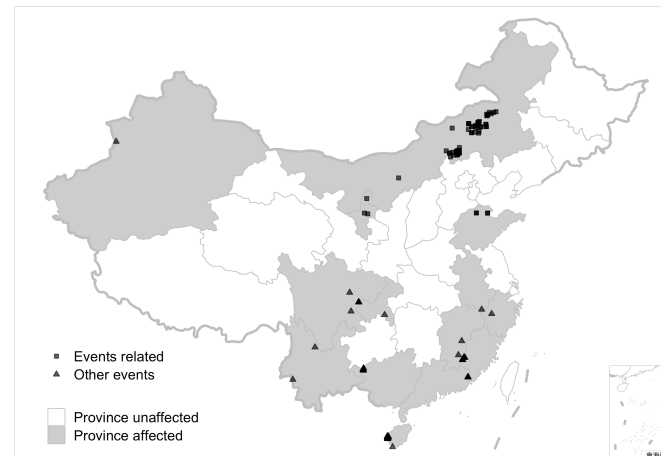
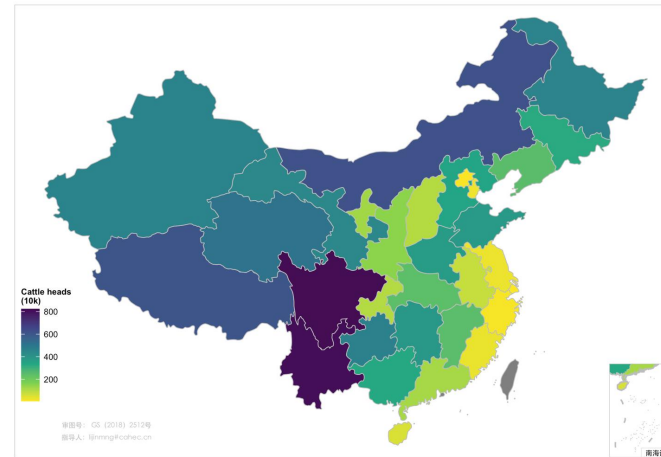


# Lumpy Skin Disease in China

Jinming LI | CAHEC

# Outline

- Cattle industry in China
- LSD Reported outbreaks
- Control measures




## 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。



2020年7月10日

— 1 —



# 1. Cattle industry in China

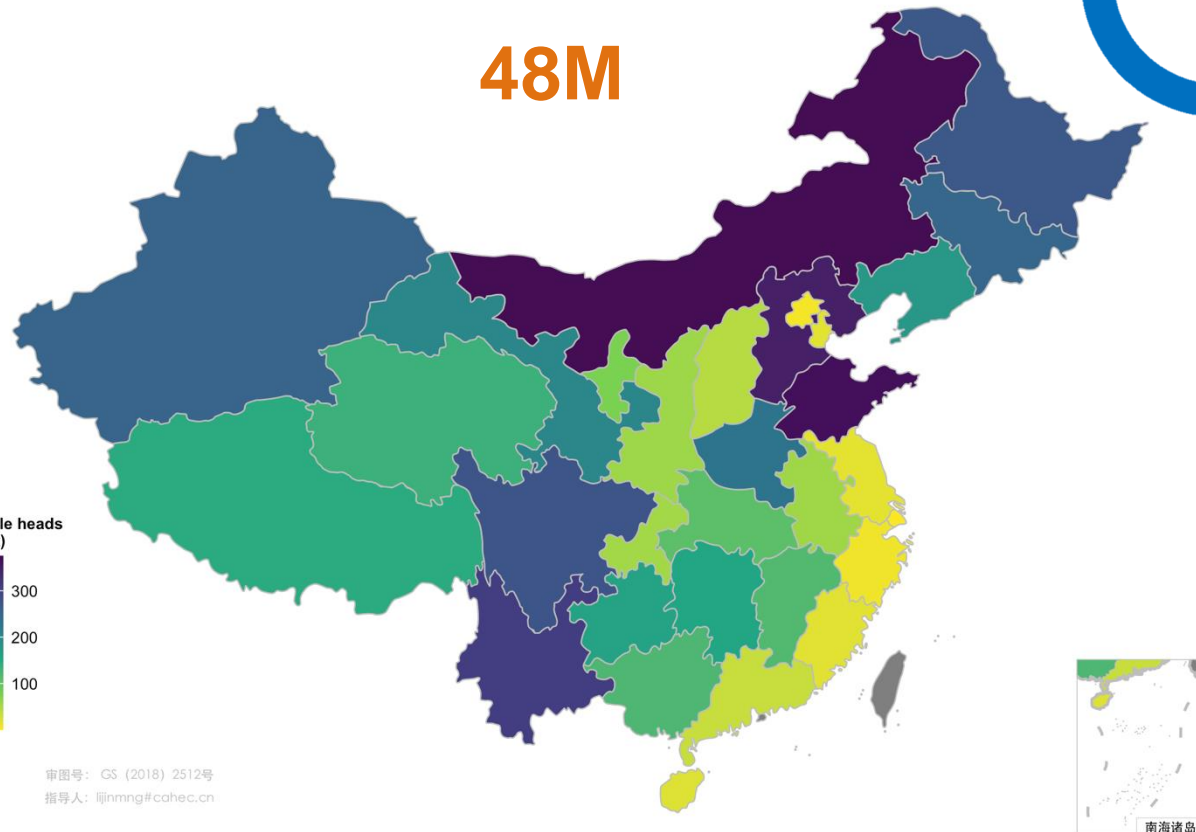


# Cattle Industry in China



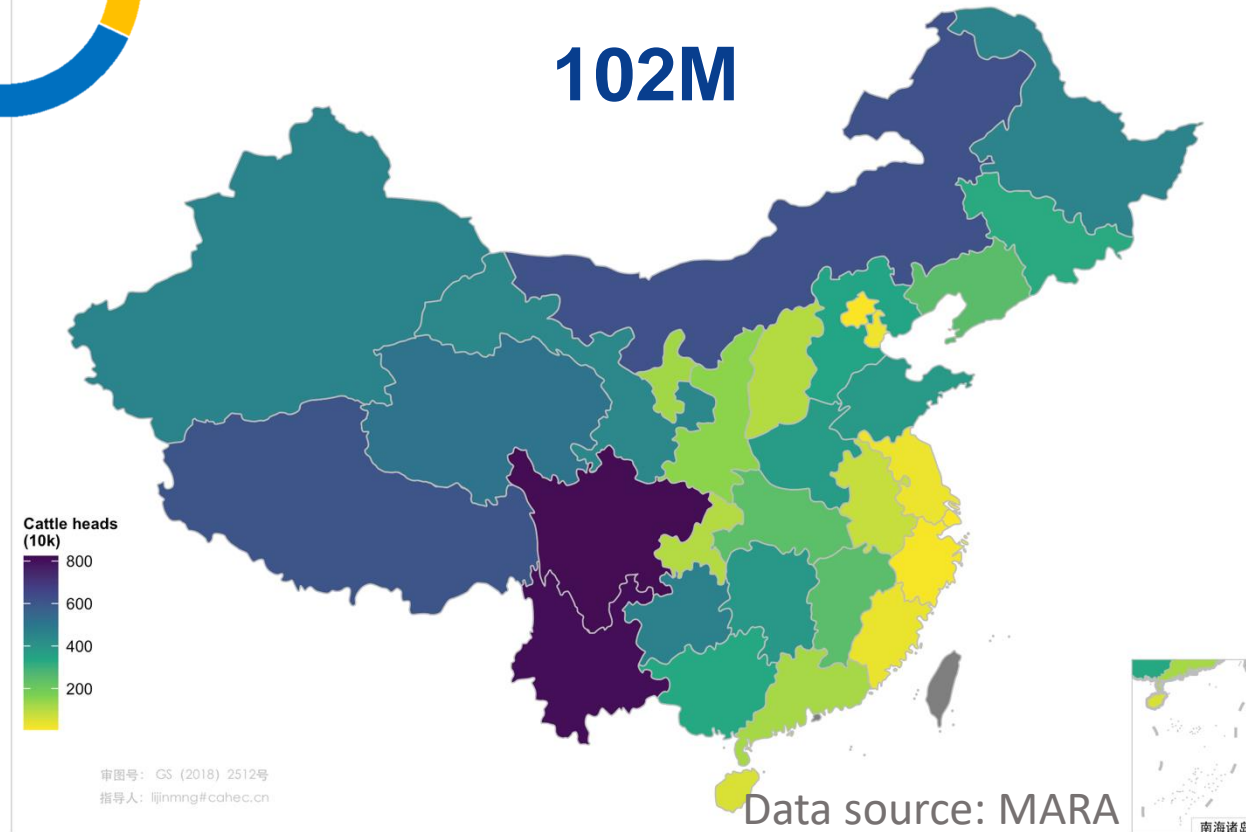
## Marketing

48M



## Stocking

102M



Data source: MARA

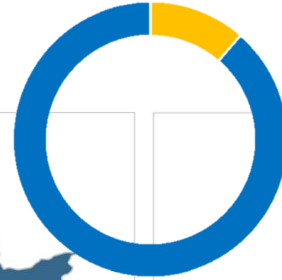
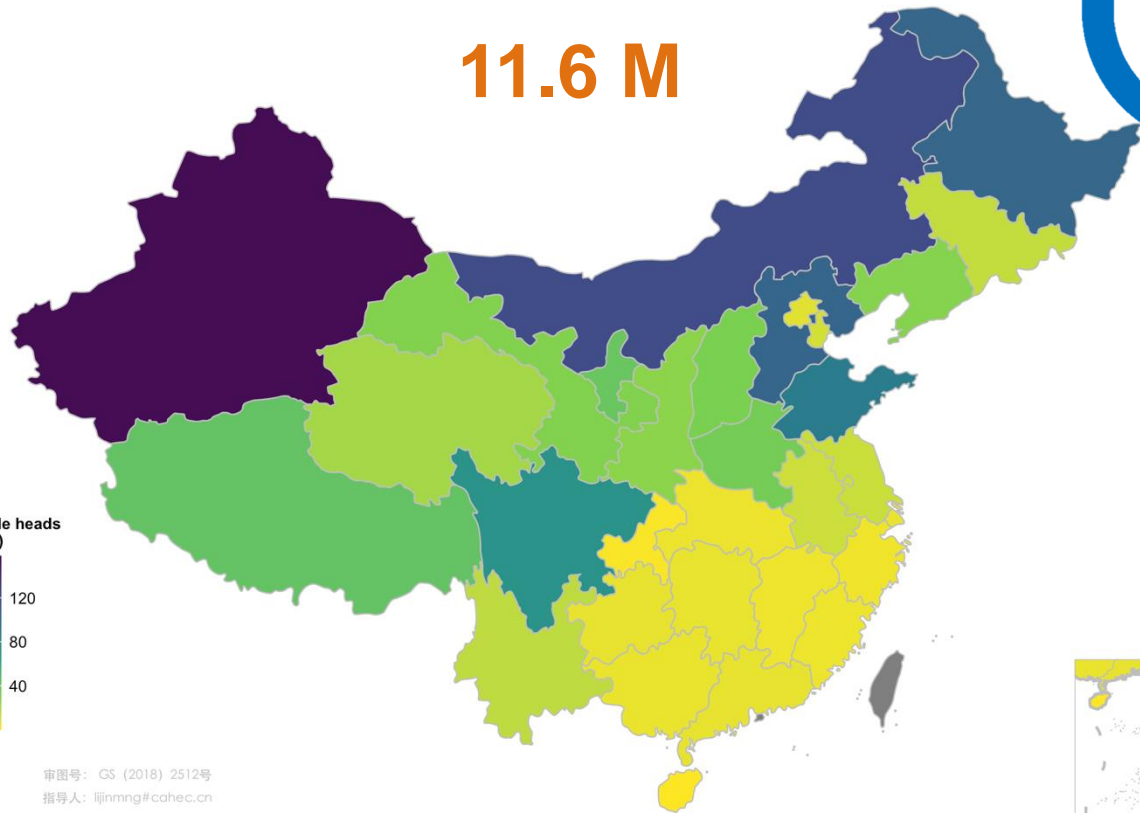


# Cattle Industry in China



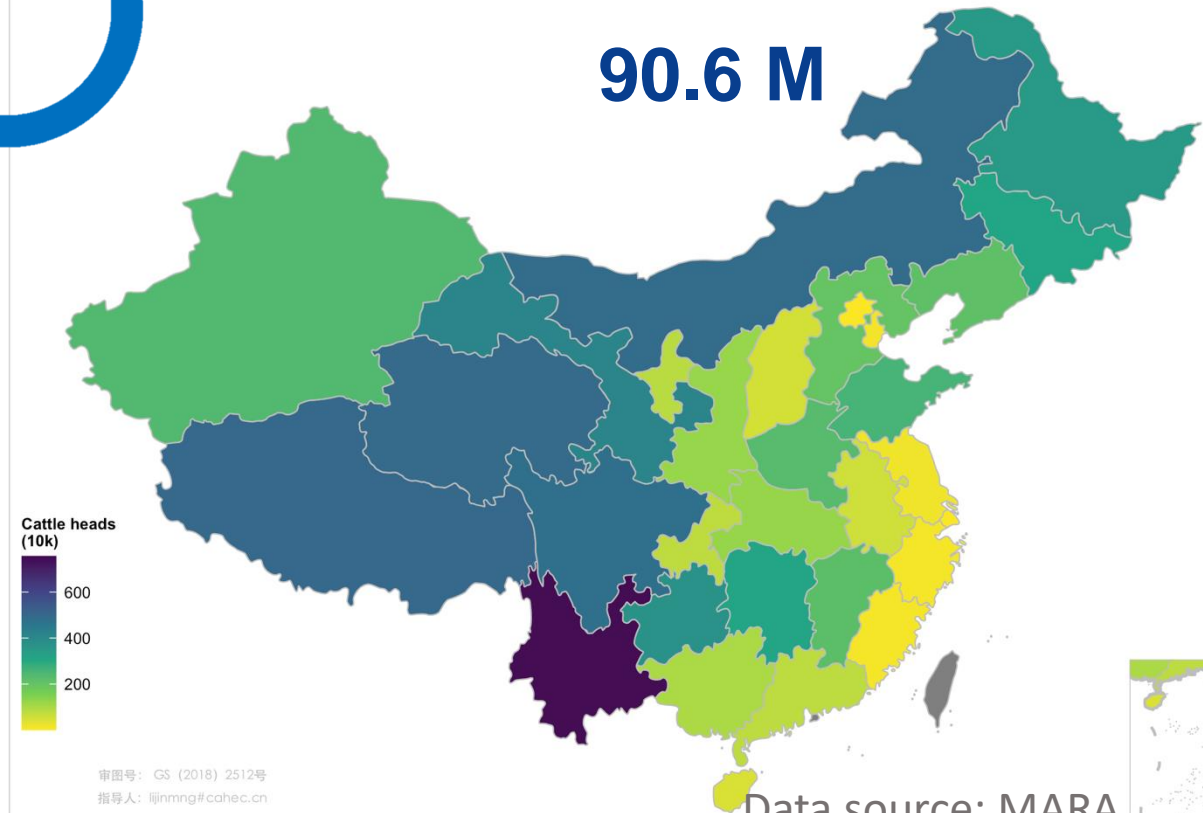
## Stocking : dairy cattle

11.6 M



## Stocking : beef cattle

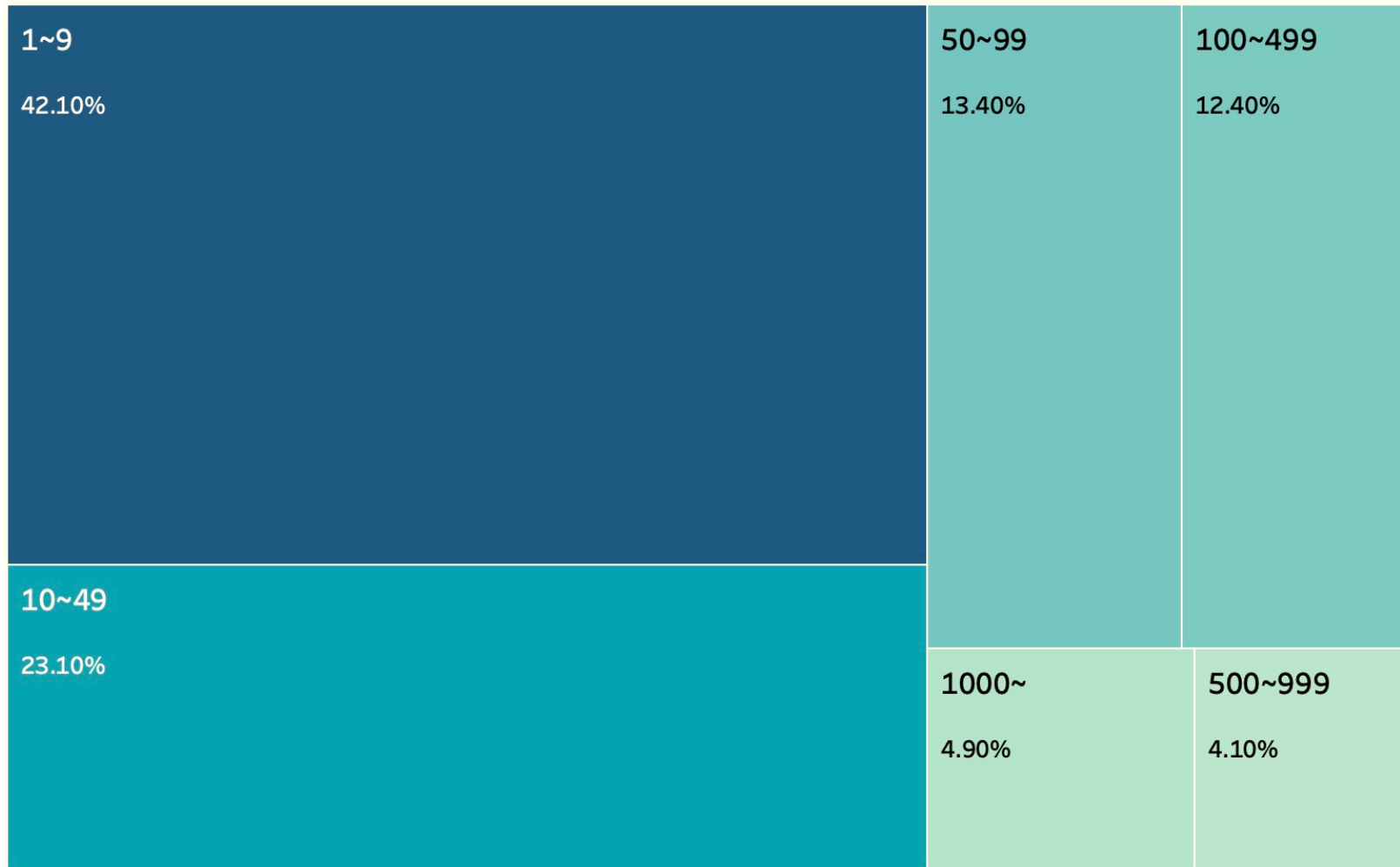
90.6 M



Data source: MARA



# Cattle Industry in China



**7.8 M** farms

**90%** 1-9



Data source: MARA

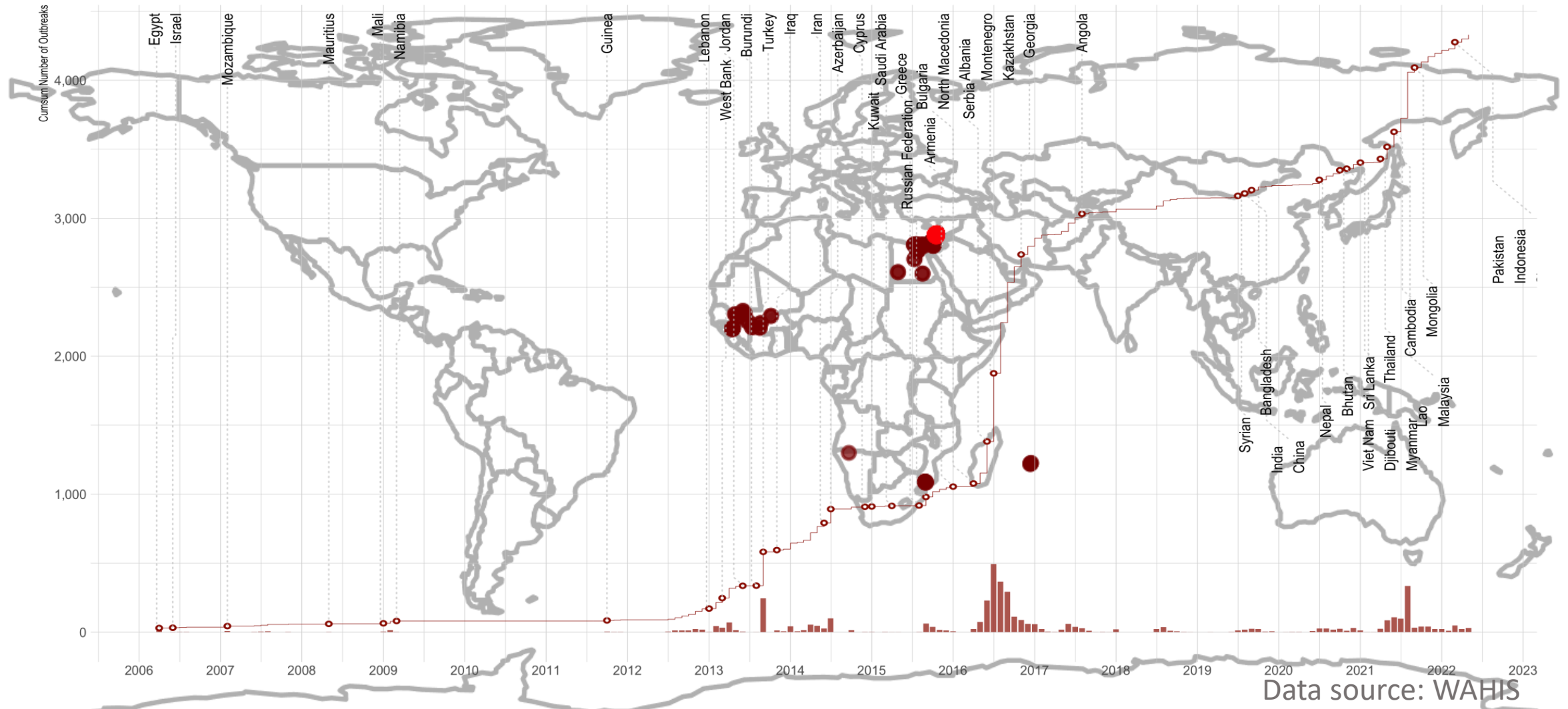


## 2. LSD Reported Outbreaks



# World Map of Lumpy skin disease

Jan 2013



Data source: WAHIS

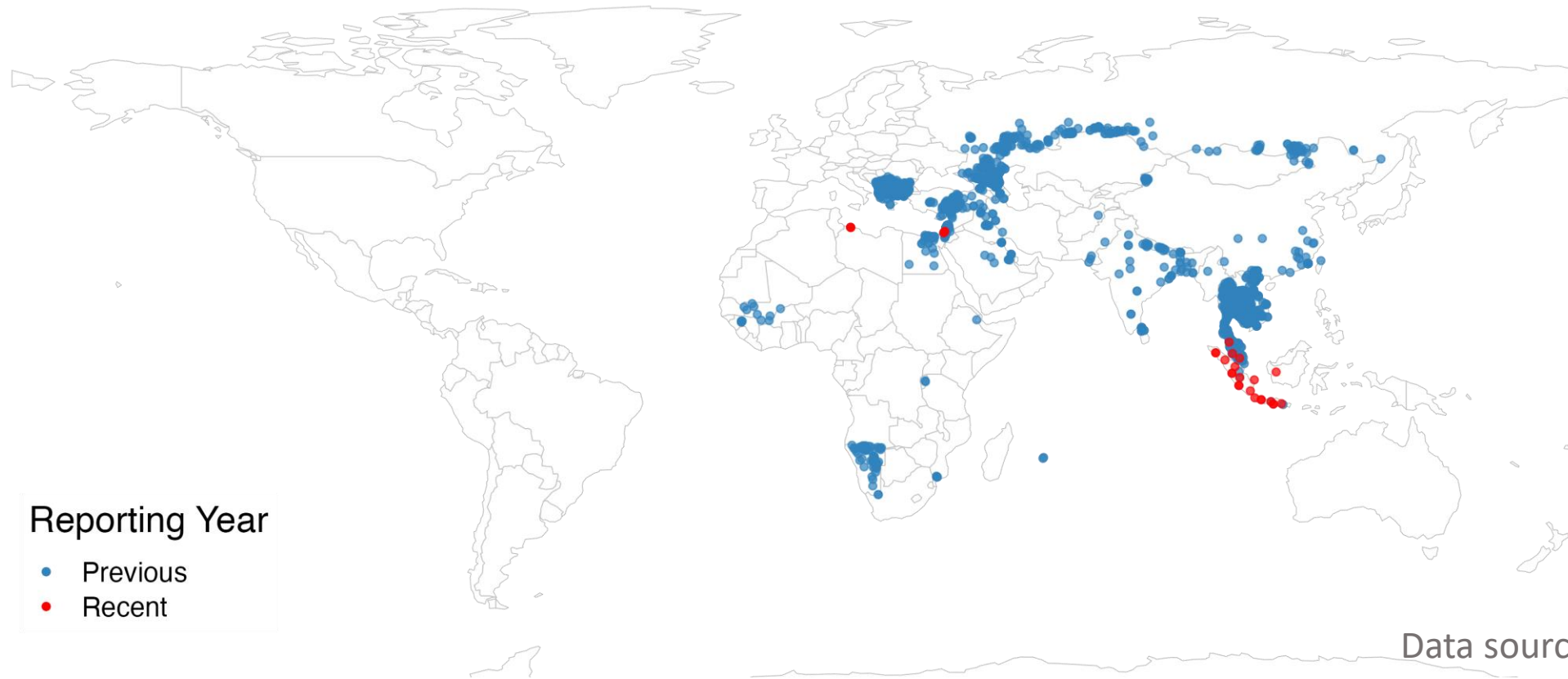




# LSD Reported Outbreaks



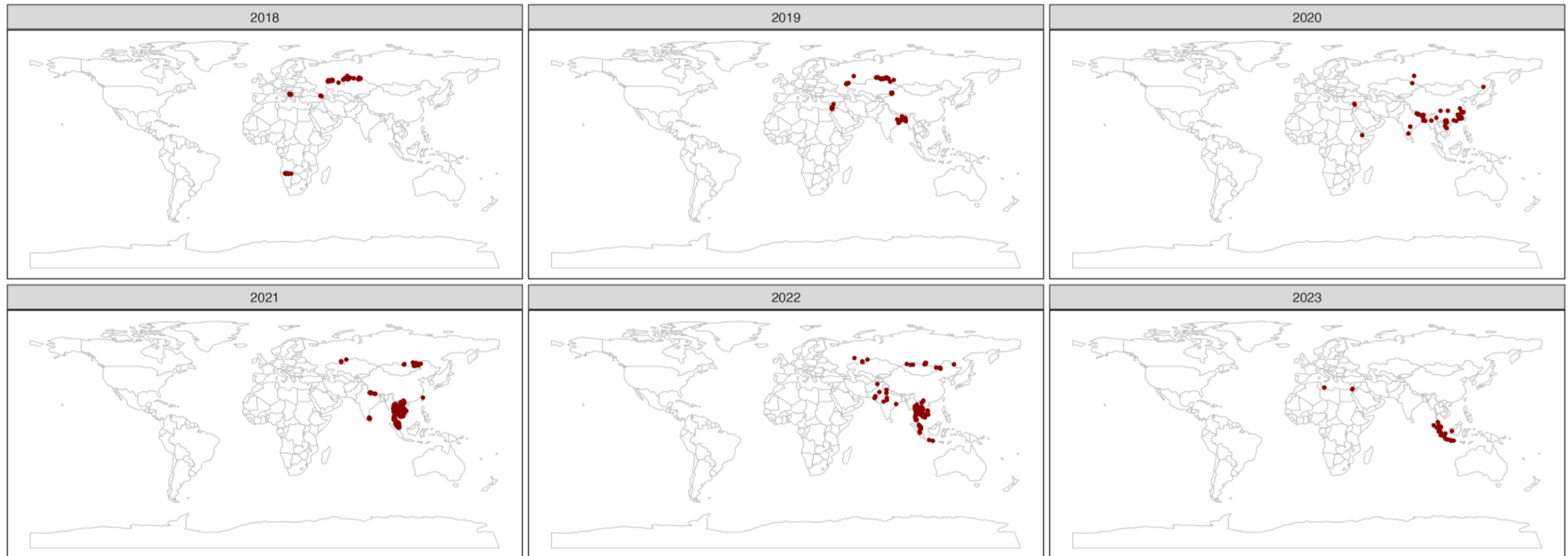
## World Map of Lumpy skin disease *as of 24 Jul, 2023*

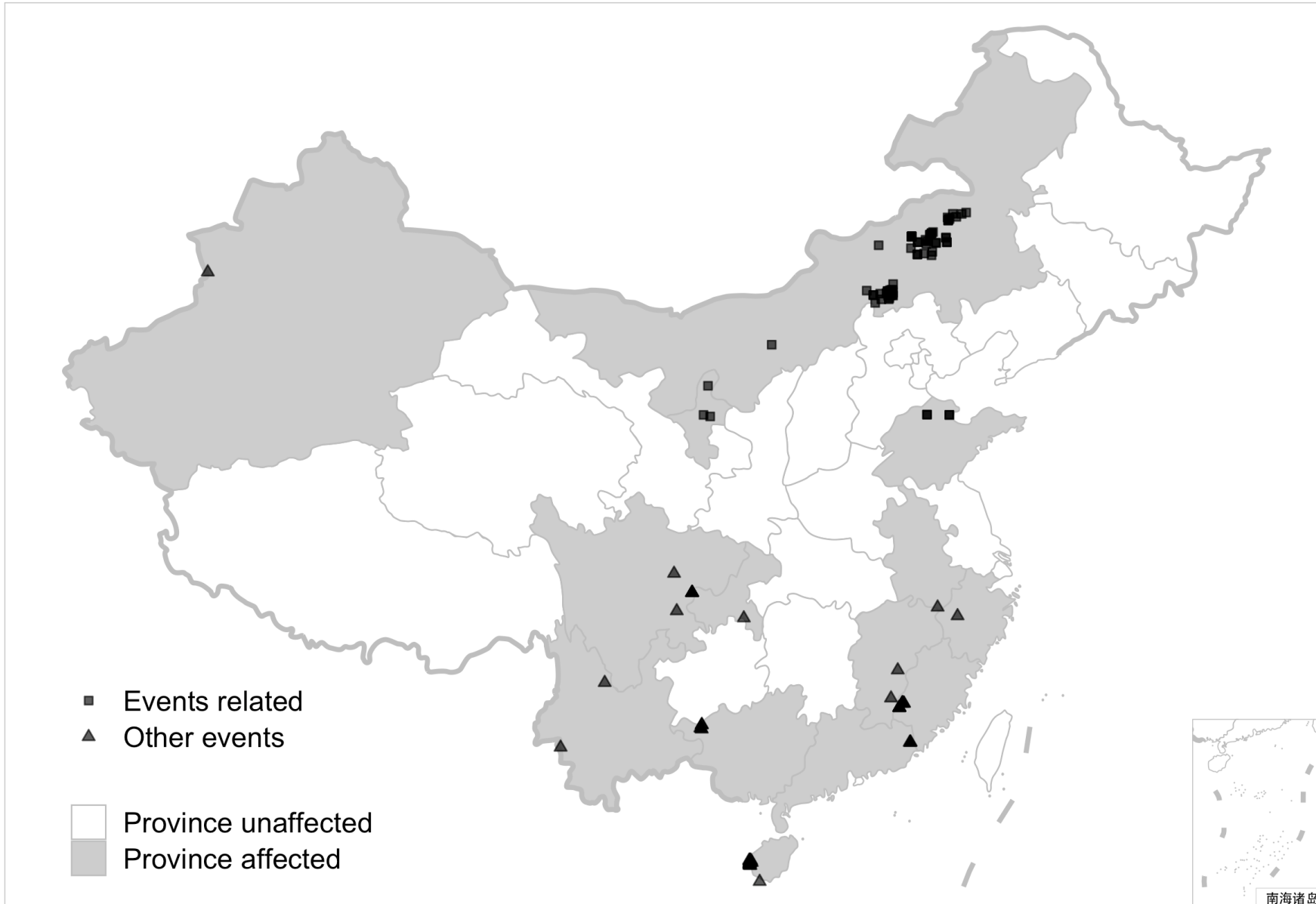


# LSD Reported Outbreaks



## New Outbreaks of Lumpy Skin Disease (WAHIS) 2018 ~ 2023





**14** Provinces Confirmed

Aug, 2019, Xinjiang, 1<sup>st</sup>

Summer, 2020, sporadic in Fujian, Jiangxi, Guangong, Anhui, Zhejiang, Yunnan, Guangxi, Chongqing, Sichuan

Nov, 2020, 3 events related with the same quarantine station in Jiangsu

Dec, 2020, Hainan

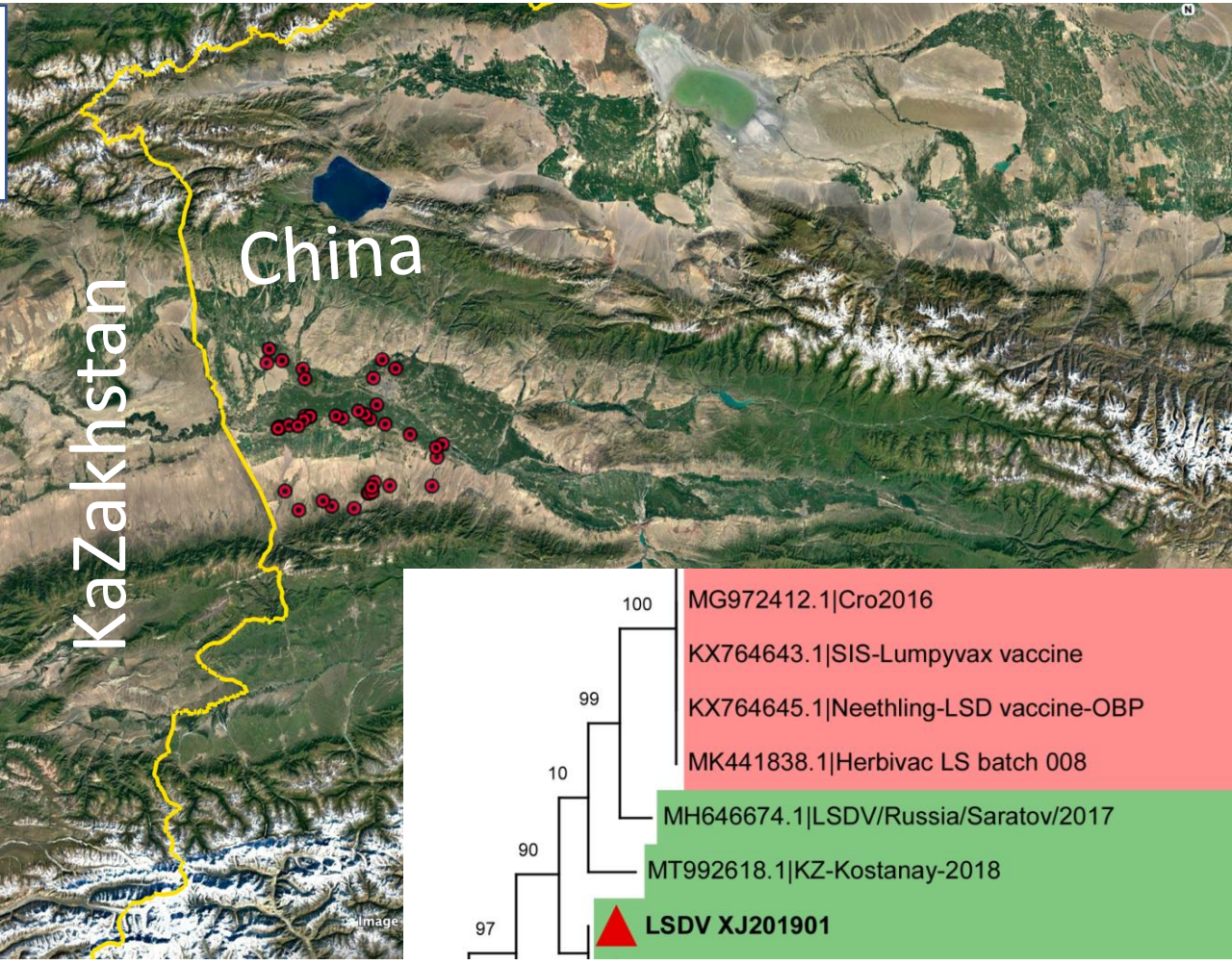
Data source: MARA



# LSD Reported Outbreaks



# LSD Reported Outbreaks



# LSD Reported Outbreaks



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

畜牧兽医局

请输入关键字

搜索

机构职能

工作动态

政策解读

政务服务

疫情发布

监测预警

国际合作

当前位置: 首页 > 机构 > 畜牧兽医局 > 疫情发布

## 农业农村部畜牧兽医局关于浙江发生牛结节性皮肤病疫情有关情况的通报

日期: 2020-07-15

作者:

来源: 农业农村部畜牧兽医局

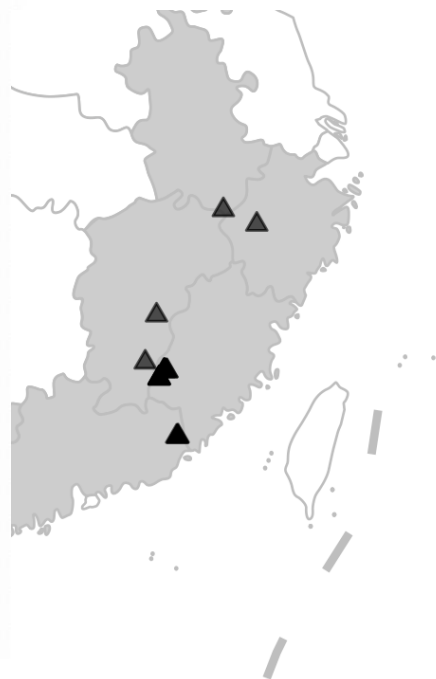
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打印本页

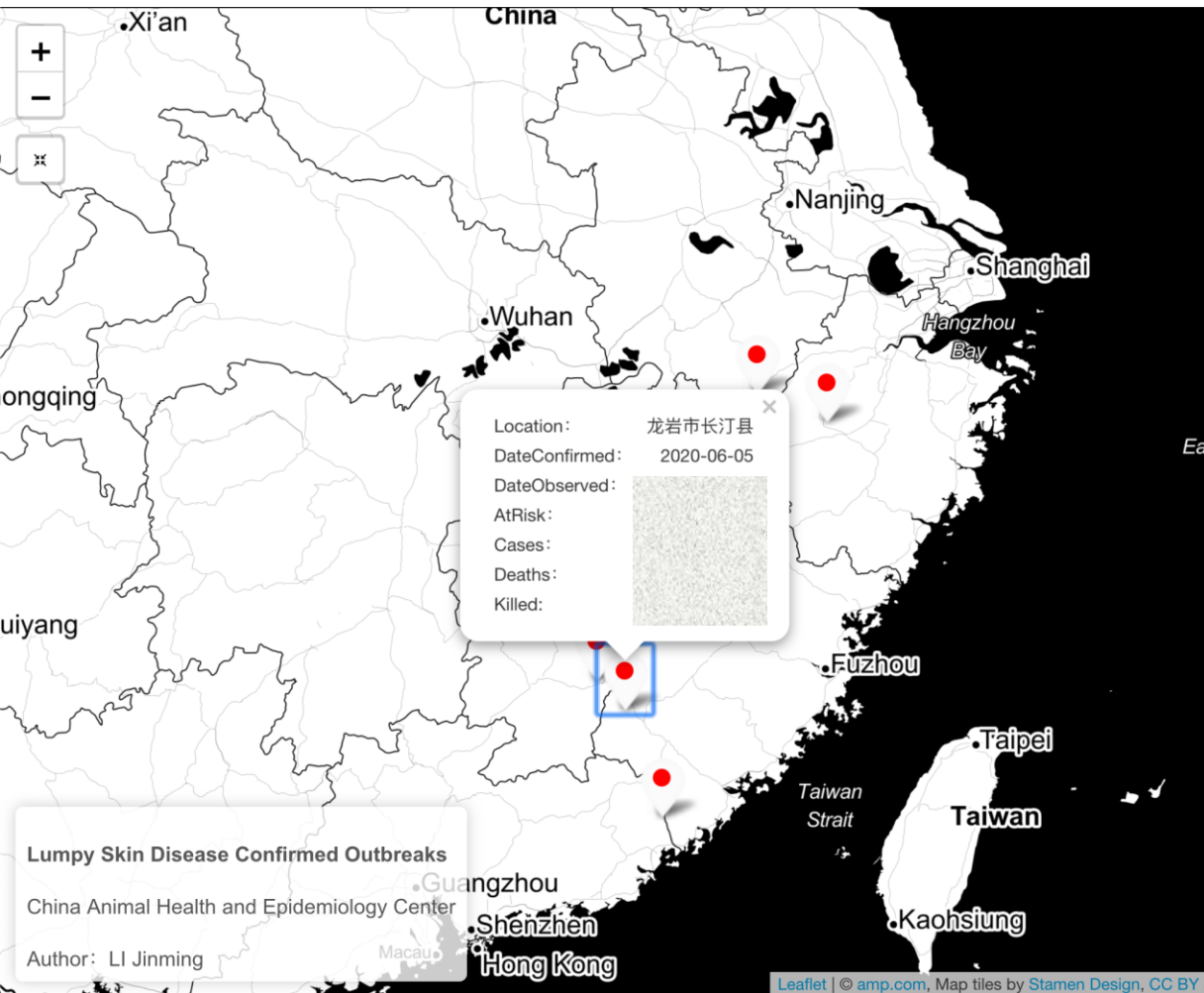
7月13日,农业农村部接到中国动物疫病预防控制中心报告,经中国动物卫生与流行病学中心确认,浙江省金华市婺城区发生一起牛结节性皮肤病疫情。该批牛共26头,发病3头,死亡1头。疫情发生后,当地按照有关预案和防治技术规范要求,切实做好疫情处置工作,已扑杀2头发病牛且无害化处理,并进行全面彻底消毒。截至目前,今年以来,全国共有福建长汀、江西赣州、广东潮州、安徽黄山、浙江金华等地确诊发生牛结节性皮肤病疫情(汇总表附后)。请各地按照我部前期通知要求,切实做好牛结节性皮肤病防控工作。

附件

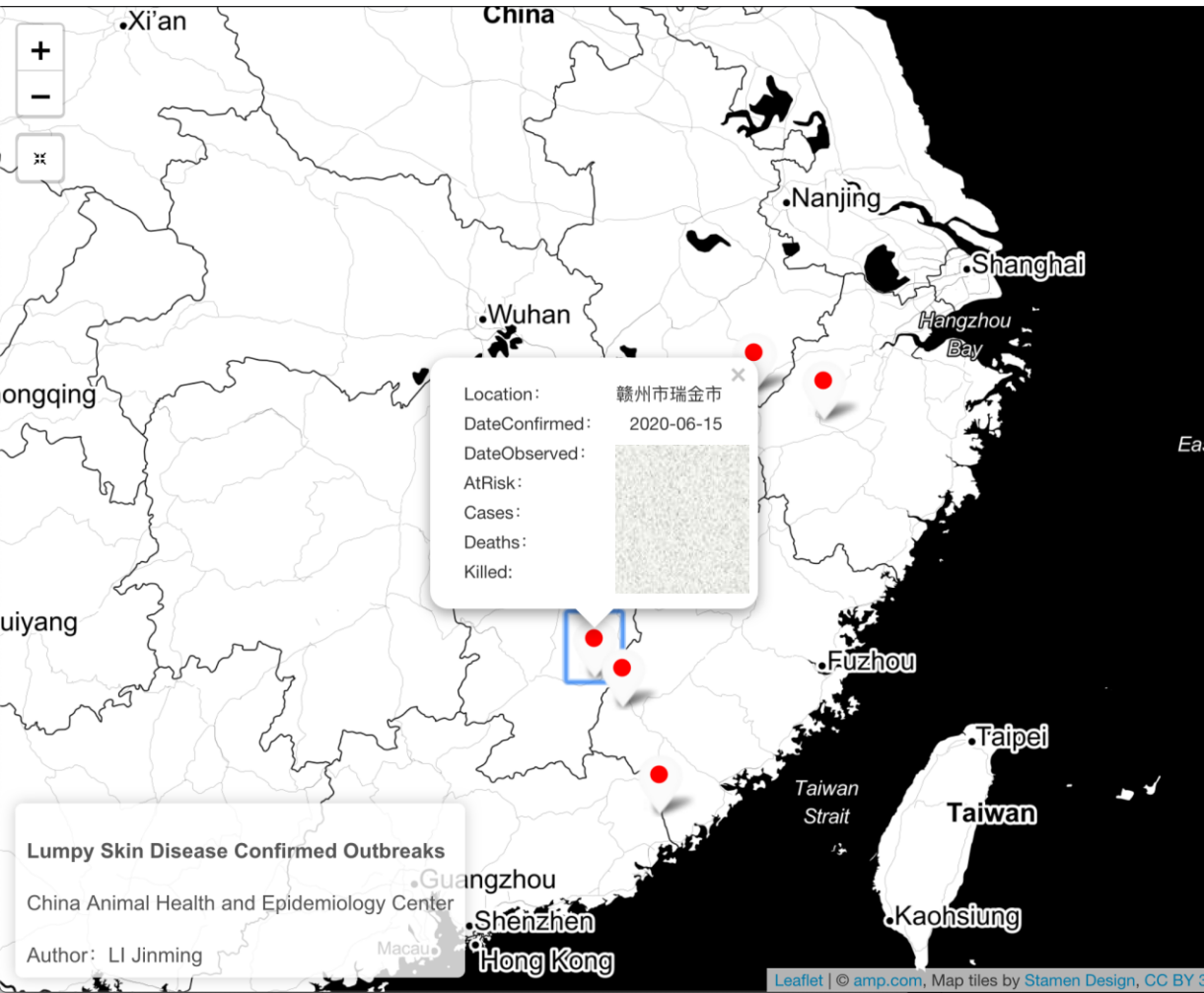
2020年牛结节性皮肤病疫情统计表



# LSD Reported Outbreaks

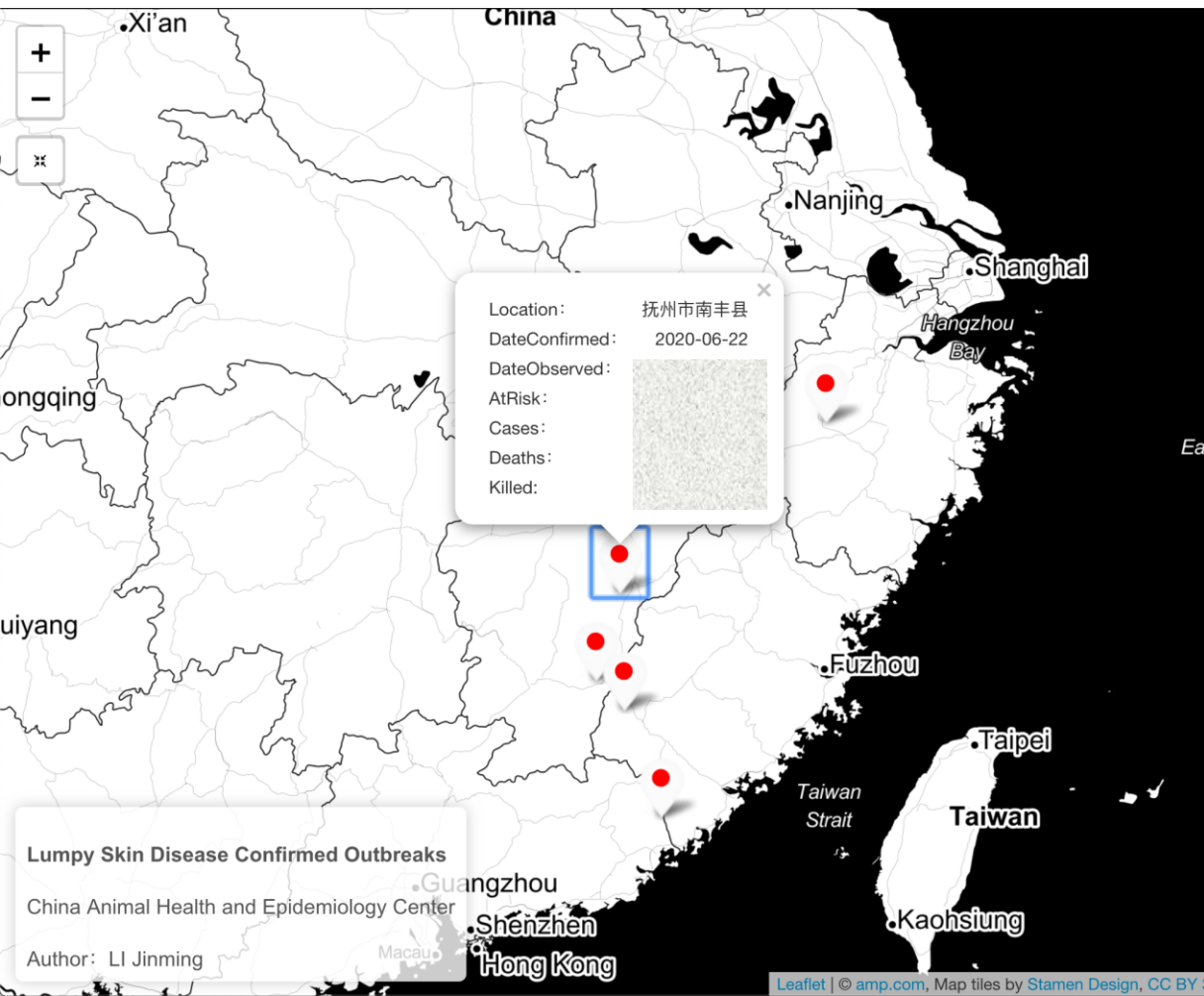


# LSD Reported Outbreaks

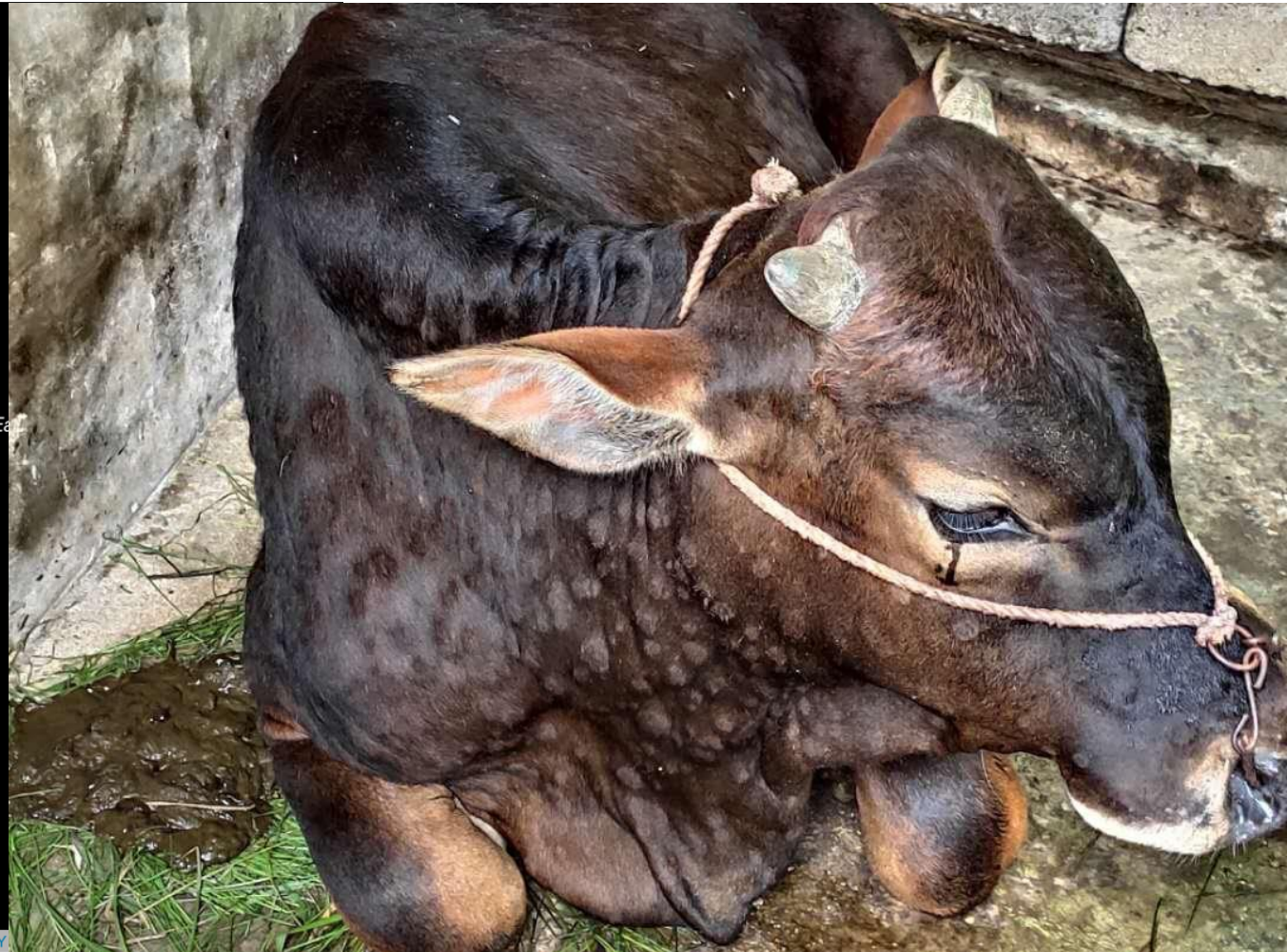
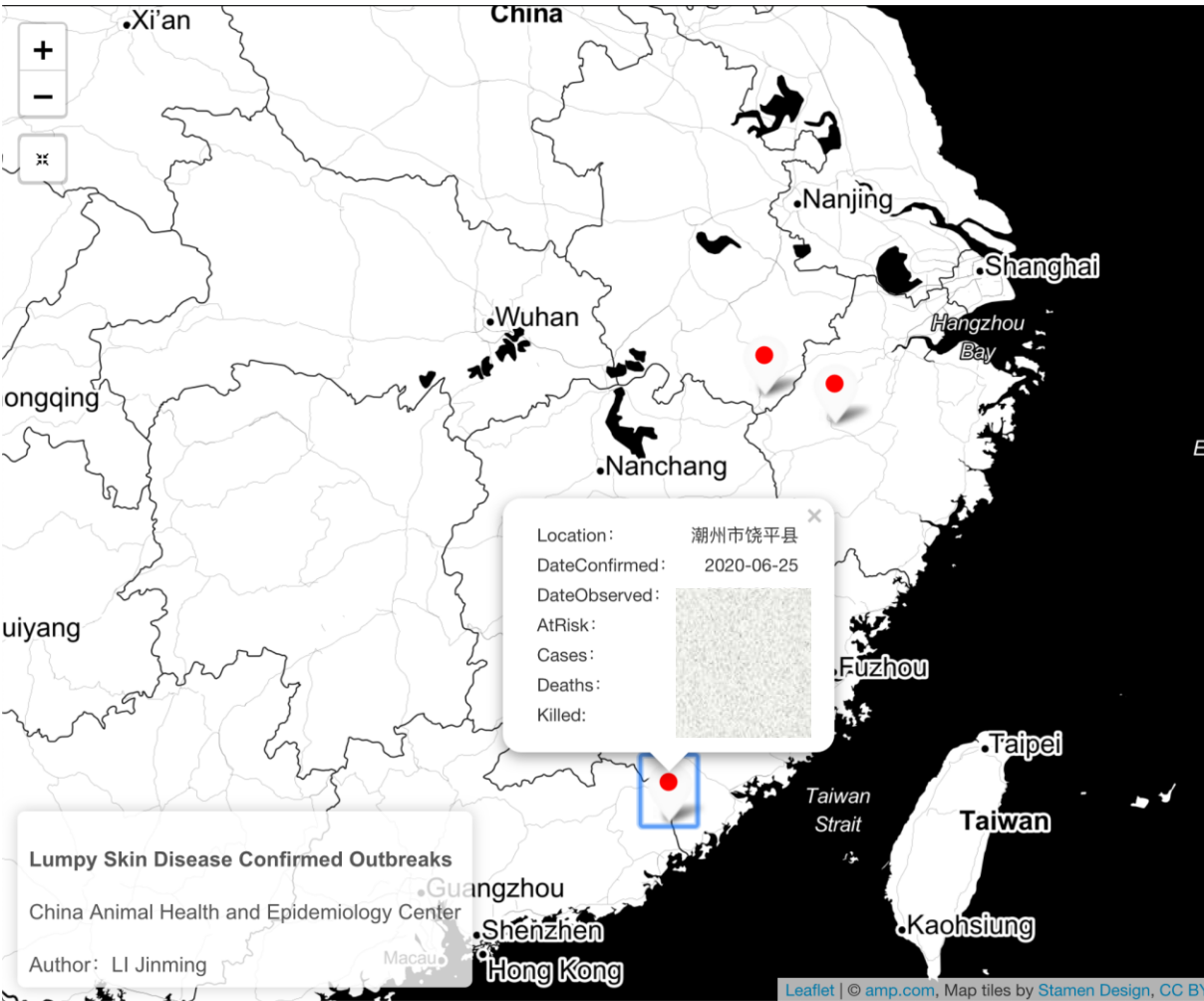




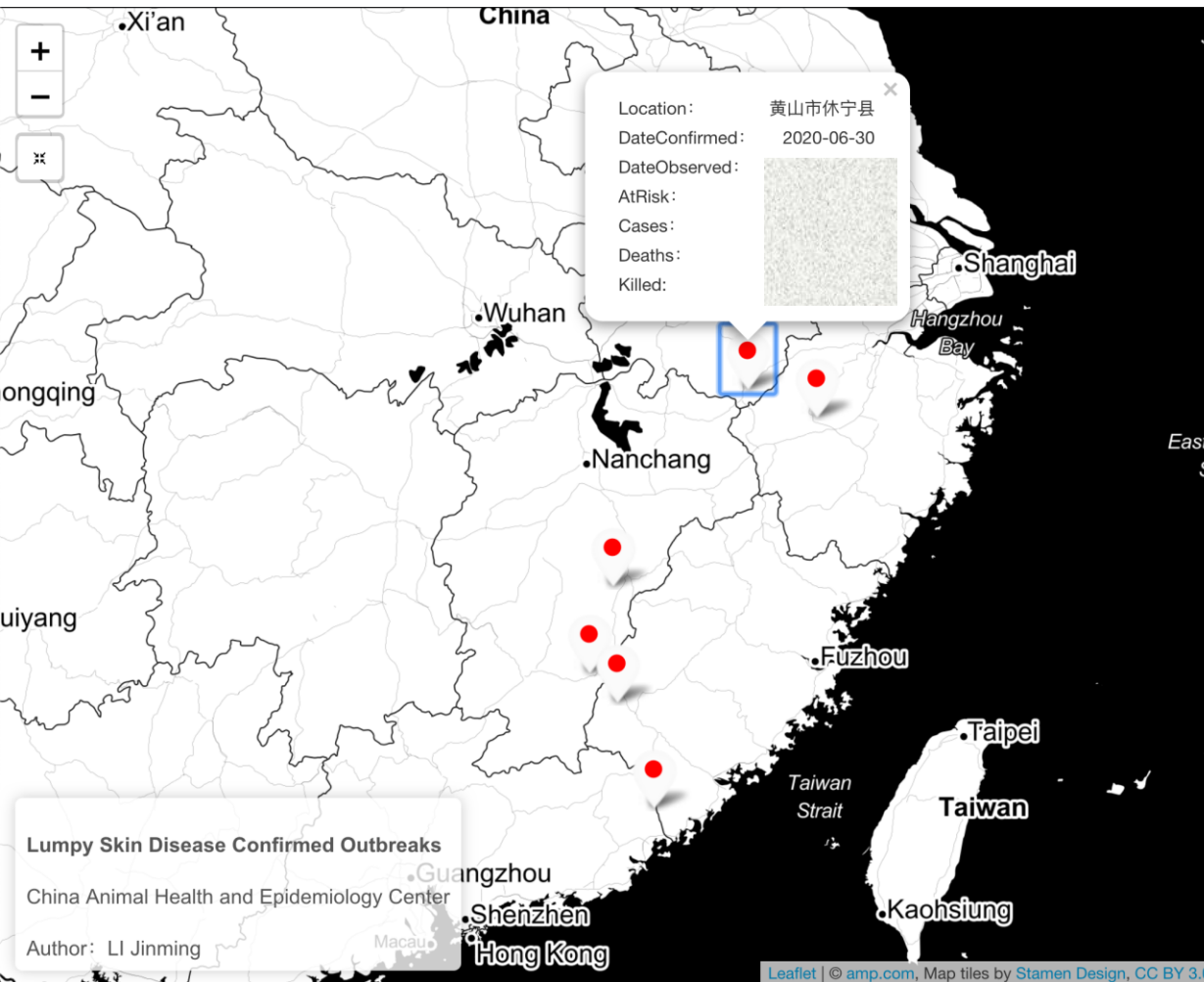
# LSD Reported Outbreaks



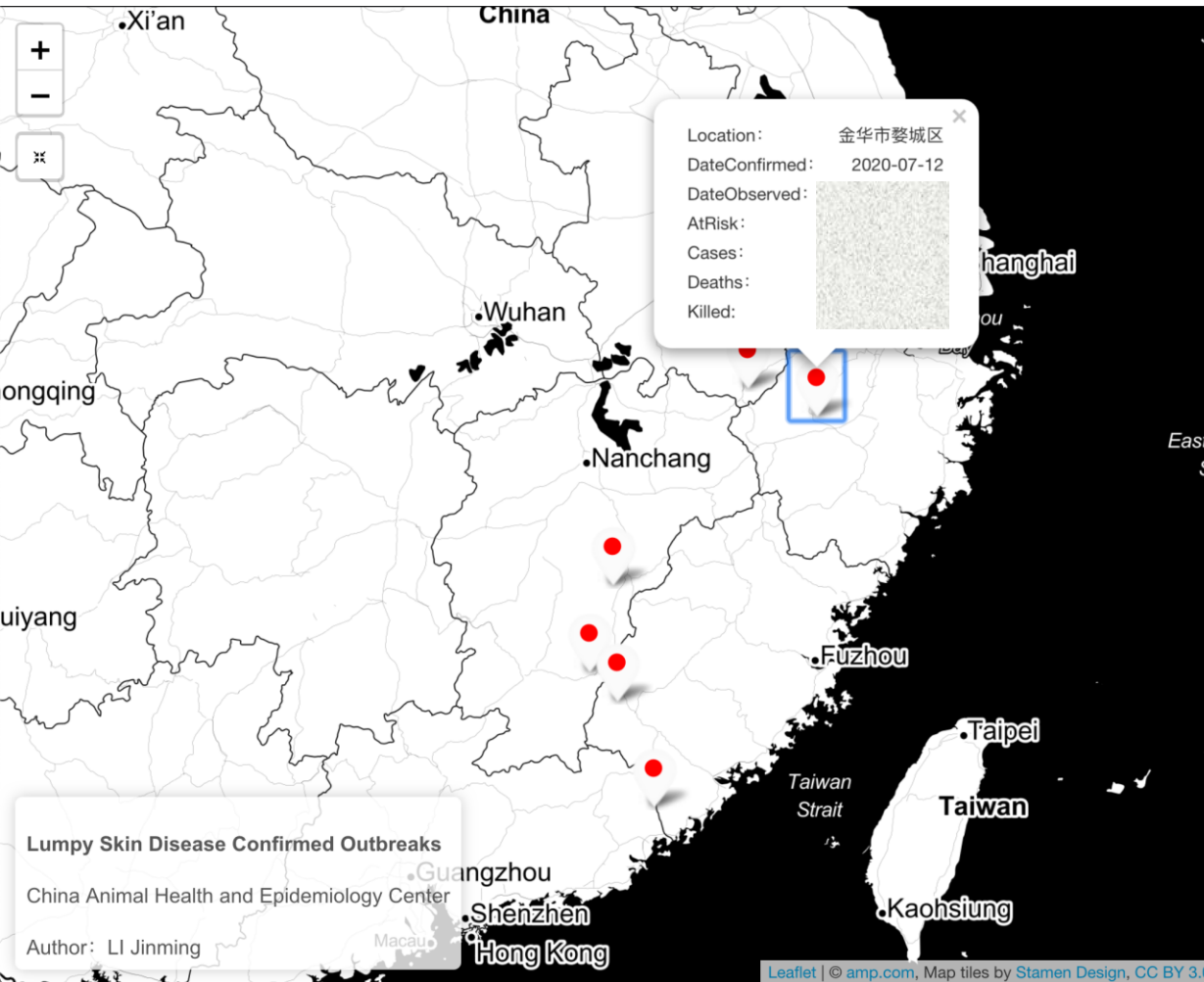
# LSD Reported Outbreaks



# LSD Reported Outbreaks

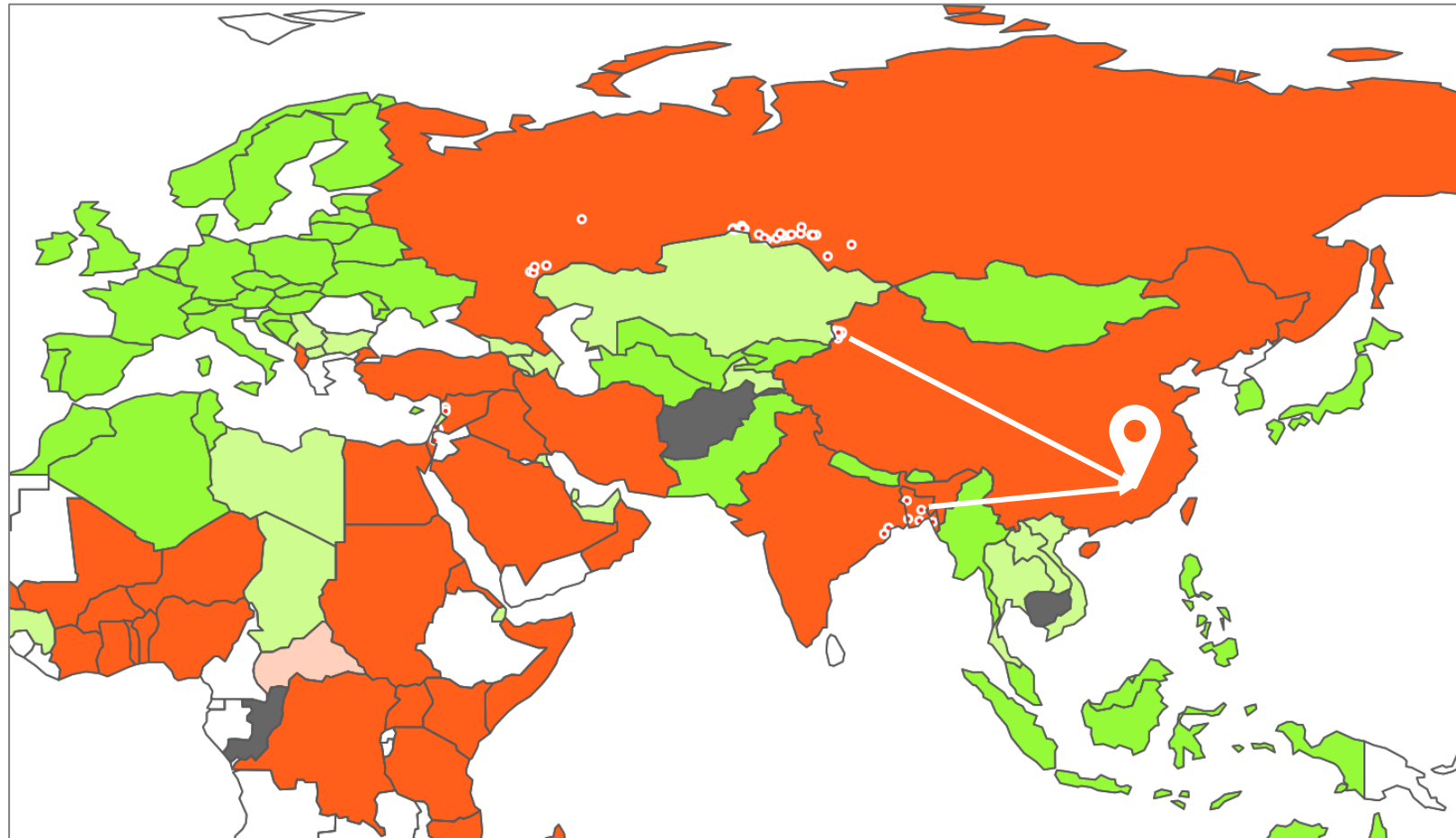
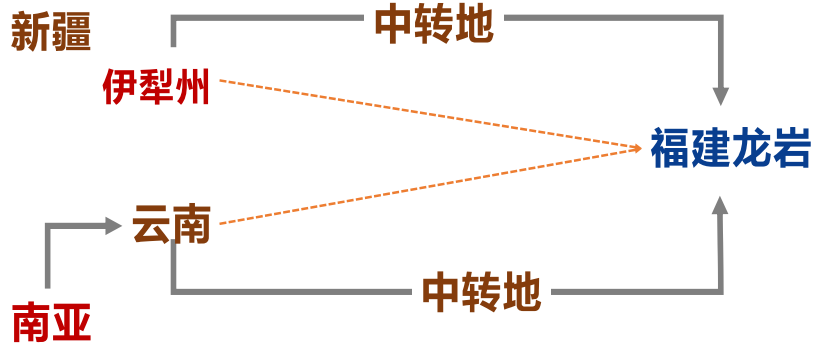


# LSD Reported Outbreaks





# LSD Reported Outbreaks



检疫证明系统生成编号

NO. 11074191000012

检疫证明印刷编号

№ 6200000849

动物检疫合格证明 (动物A)

货主		联系电话	
动物种类		数量及单位	
启运地点	省 市(州) 县(市、区) 乡(镇) 村(养殖场、交易市场)		
到达地点	省 市(州) 县(市、区) 乡(镇) 村(养殖场、交易市场)		

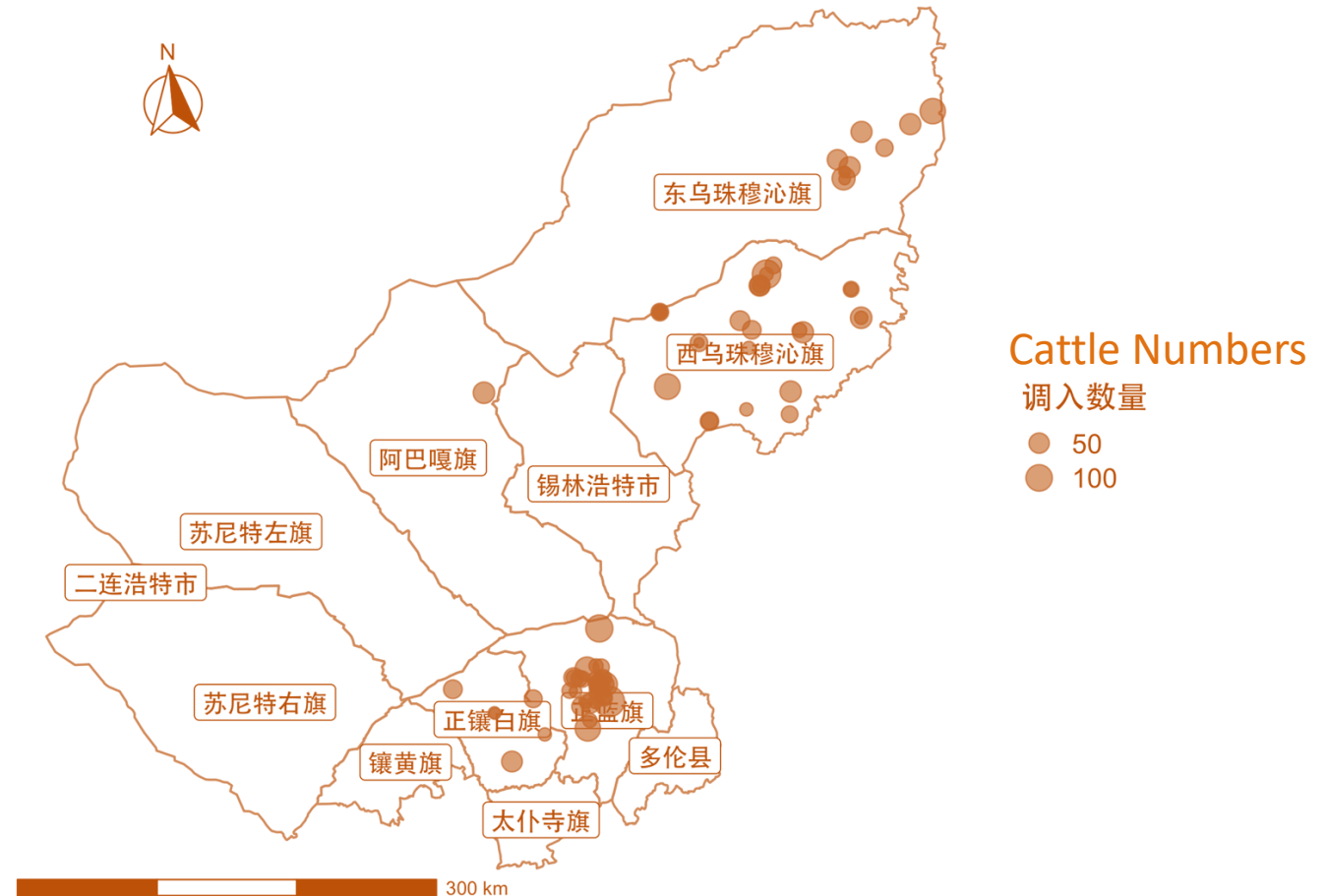
Animal certificate



# Reported Outbreaks



# LSD Reported Outbreaks

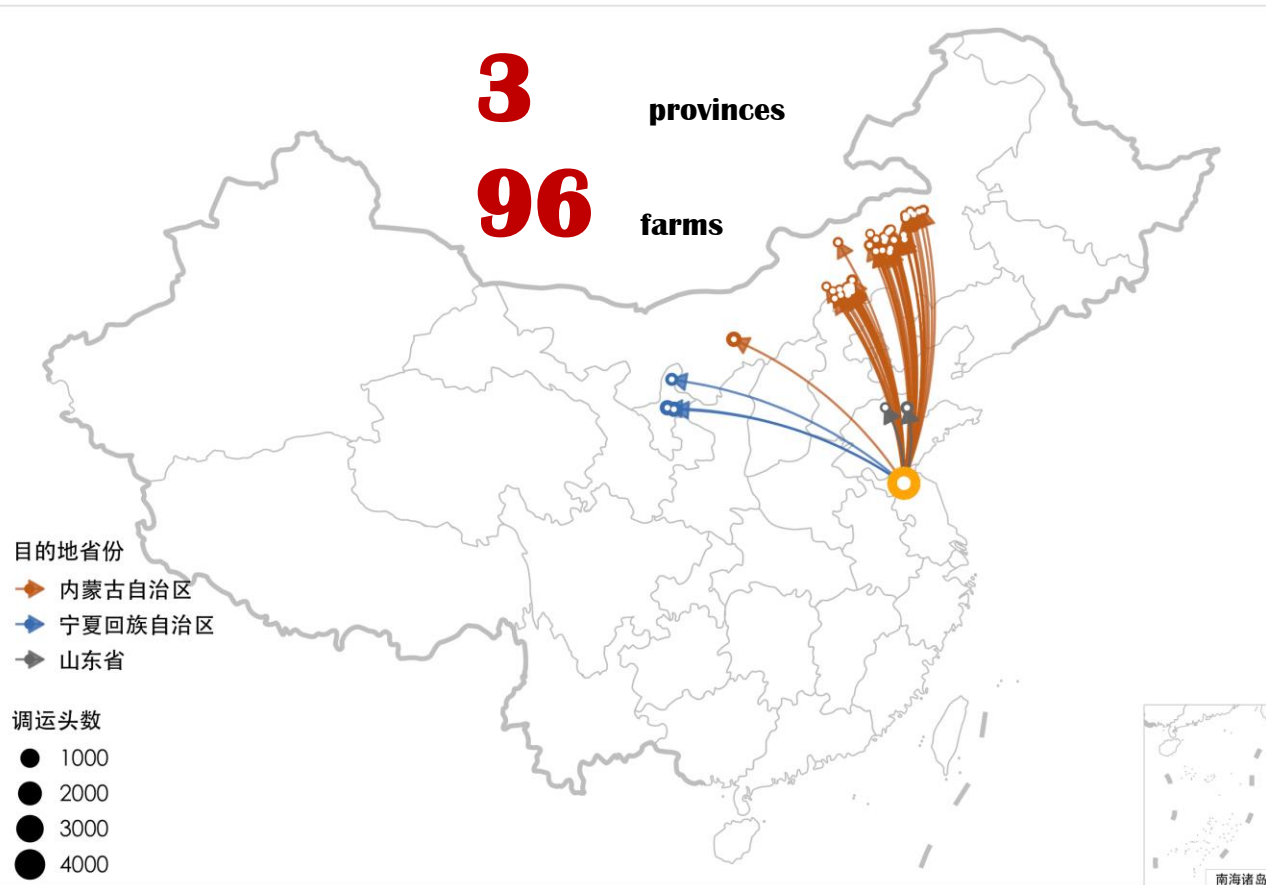




# LSD Reported Outbreaks



**3** provinces  
**96** farms



# 3. Control measures



# Control Measures



## 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

— 1 —

## 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。



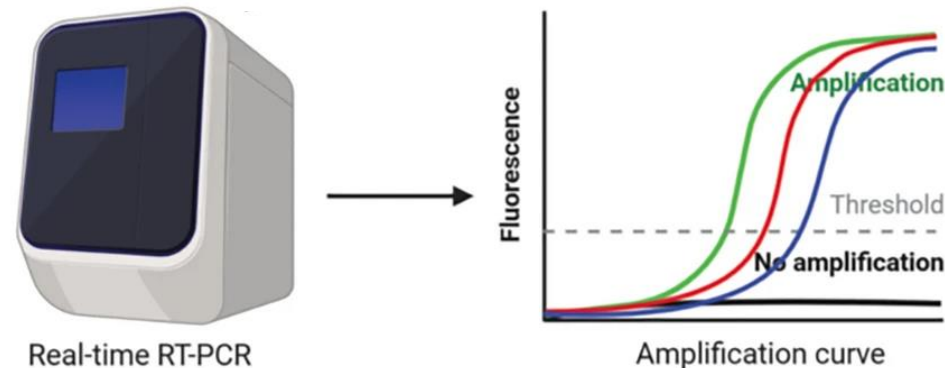
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# Control Measures



- LSDV specific Real-time PCR
- LSDV, GTPV, SPPV differential triplex Real-time PCR
- OIE recommended methods: PCR, Real-time PCR, ...

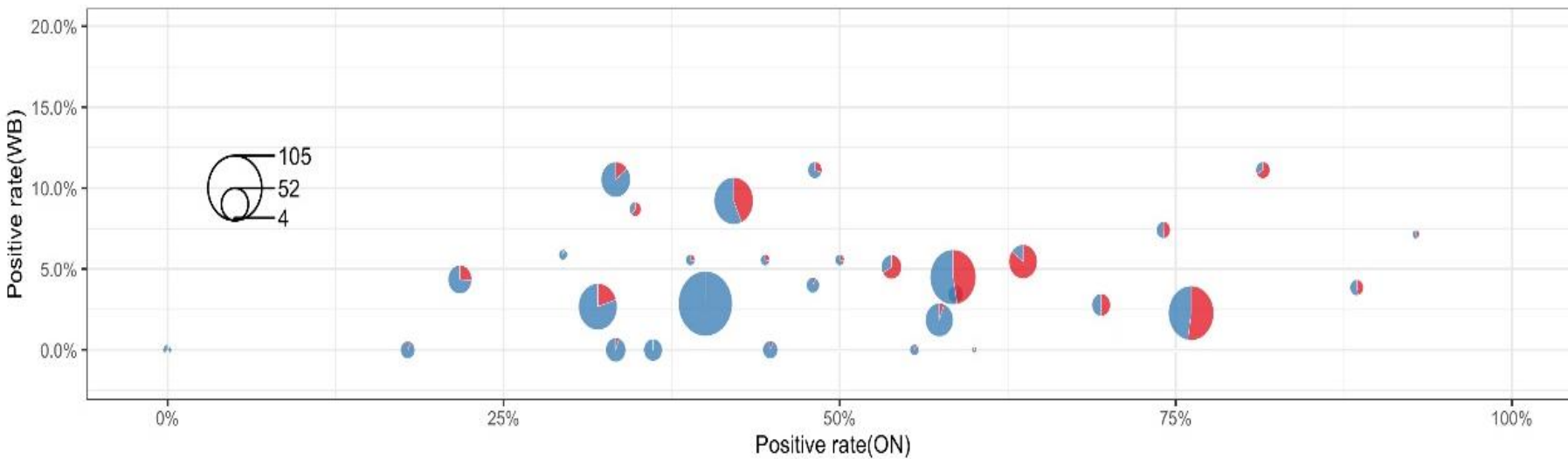


# Control Measures



A total of 1206 cattle in 36 farms, 355 cattle with skin scabs

Clinical Sign ■ With Scab ■ No Scab



frontiers | Frontiers in Veterinary Science

TYPE: Brief Research Report  
PUBLISHED: 26 July 2022  
DOI: 10.3389/fvets.2022.936581

Check for updates

#### OPEN ACCESS

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## Quantitative real-time PCR detection and analysis of a lumpy skin disease outbreak in Inner Mongolia Autonomous Region, China

Lin Li<sup>1†</sup>, Chuanxiang Qi<sup>1,2†</sup>, Jinming Li<sup>1</sup>, Wentong Nan<sup>1</sup>, Ying Wang<sup>1</sup>, Xing Chang<sup>1</sup>, Tianying Chi<sup>1</sup>, Mingxia Gong<sup>1</sup>, Da Ha<sup>3</sup>, Jide De<sup>3</sup>, Lifeng Ma<sup>4</sup> and Xiaodong Wu<sup>1\*</sup>

<sup>1</sup>China Animal Health and Epidemiology Center, Qingdao, China, <sup>2</sup>MOE Joint International Research Laboratory of Animal Health and Food Safety, MOA Key Laboratory of Animal Bacteriology, College of Veterinary Medicine, Nanjing Agricultural University, Nanjing, China, <sup>3</sup>Xilingol League Animal Disease Prevention and Control Center, Inner Mongolia, China, <sup>4</sup>Inner Mongolia Animal Disease Prevention and Control Center, Inner Mongolia, China

Lumpy skin disease (LSD) is a severe disease of bovine characterized by nodules on the skin, mucous membranes, and profuse nasal discharge which causes severe economic losses. In October 2020, an LSD outbreak case was found in Inner Mongolia Autonomous Region, China. A total of 1,206 cattle were sold from the same imported animal quarantine field to 36 farms after the quarantine period finished, and over 30 farmers reported symptoms such as skin scabs found in newly arrived cattle shortly after that. A large-scale LSD outbreak investigation was launched after laboratory diagnosis confirmed LSD. The clinical samples of 1,206 cattle from 36 farms, including 1,206 whole blood, 1,206 oral and nose swabs, and 355 scabs, were collected for the qRT-PCR test. The result showed that 51 whole blood samples (4.23%), 580 swab samples (48.09%), and 350 skin scabs (98.59%) were lumpy skin disease virus (LSDV) positive, 33 of 36 farms were affected. This study aims to provide a basis for LSD epidemiological traceability, movement control, and measures for prevention and control.

KEYWORDS  
LSDV, quantitative real-time PCR (qPCR), China, outbreak, Inner Mongolia Autonomous Region, 2020

### Introduction

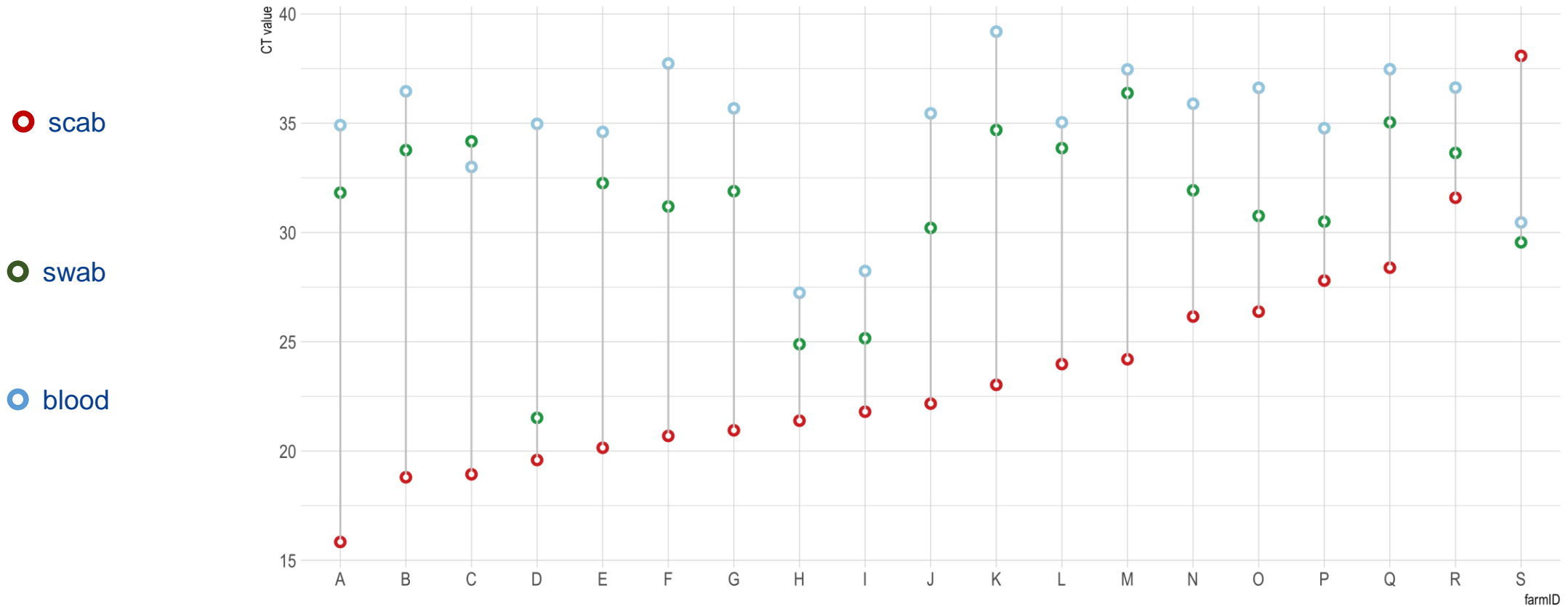
Lumpy skin disease (LSD) is a severe disease of bovine characterized by multifocal cutaneous nodules which were caused by the lumpy skin disease virus (LSDV). LSDV is classified into the genus *Capripoxvirus* of the family *Poxviridae*. As a large double-stranded DNA virus, LSDV encodes 156 putative viral genes with a genome of 151 kb (1). Unlike other *Capripoxvirus* which infect sheep and goats, LSDV is highly host-specific and mainly infects cattle and buffalo under natural conditions. The severity of clinical signs of LSD varies from subclinical to fatal depending on the virulence of the strains and the host susceptibility.



# Control Measures



19 cattle were confirmed as scab-swab-blood samples positive



# Control Measures



Li et al. BMC Veterinary Research (2022) 18:426  
https://doi.org/10.1186/s12917-022-03525-9

BMC Veterinary Research

RESEARCH Open Access

## Genetic analysis of genome sequence characteristics of two lumpy skin disease viruses isolated from China

Lin Li<sup>1†</sup>, Zhenzhong Wang<sup>1,2†</sup>, Chuanxiang Qi<sup>1,2</sup>, Shan Liu<sup>1</sup>, Mingxia Gong<sup>1</sup>, Jinming Li<sup>1</sup>, Xiaodong Wu<sup>1\*</sup> and Zhiliang Wang<sup>1\*</sup>

### Abstract

**Background:** Lumpy skin disease (LSD) is an acute or subacute infectious disease caused by lumpy skin disease virus (LSDV) of genus *Capripoxvirus*. The outbreaks of LSD were confirmed in the Yili area of the Xinjiang autonomous region in August 2019 and the Fujian province in June 2020. We detected LSDV in our daily monitoring work, then isolated, identified and sequenced the virus, and analyzed the whole genome characteristics of the isolated strain.

**Results:** Whole genome sequencing revealed that the strains isolated were all LSDV and were named as LSDV XJ201901 and LSDV FJ2019. The results showed that the identity based on whole genome sequences between LSDV XJ201901 and LSDV FJ2019 was 100% and the identity based on whole genome sequences between the two isolated strains and the global LSDV strains was 97.28%–99.99%, with the strain LSDV2/PrachuapKhiriKhan/Thailand/2021 (99.99%) having the highest sequence identity. Analysis of potential recombination events revealed that a total of 18 potential recombination events were identified in strains LSDV XJ201901 and LSDV FJ2019. The two strains are a recombination of Neethling vaccine LW 1959 (GeneBank: AF409138.1) with KSGP 0240 (GeneBank: KX683219.1). It was observed that Neethling vaccine LW 1959 (1/178) and KSGP 0240 (10/18) are involved in most of the potential recombination events.

**Conclusions:** The virus isolate in this study was LSDV and was identified as a vaccine recombinant strain. The most likely potential parent strains of the two strains in this study are Neethling vaccine LW 1959 and KSGP 0240. The strains in this study are very similar to those isolated in East and Southeast Asia since 2019.

**Keywords:** China, Genome sequence, Genetic analysis, LSDV

### Background

Lumpy skin disease (LSD) is an acute or subacute infectious disease caused by lumpy skin disease virus (LSDV) of genus *Capripoxvirus* in *Poxviridae*. Cattle are the natural host of LSDV, and all kinds of cattle are susceptible

to LSDV [1]. LSDV infection can lead to weight loss, significant reduction of milk production and even death in cattle. The mortality rate of cattle infected with LSDV was up to 10% and even 20%, causing serious economic losses and affecting international trade [2]. Water buffaloes [3], antelope [4] and giraffe can also be infected with LSDV. LSD is a notifiable disease stipulated by the World Organization for Animal Health (OIE, 2017) and 1 of the 15 class I infectious diseases stipulated by List of imported animal quarantine diseases of the China. LSD was first observed in 1929 in Zambia in East Africa [5],

<sup>†</sup>Lin Li and Zhenzhong Wang contributed equally to this work.

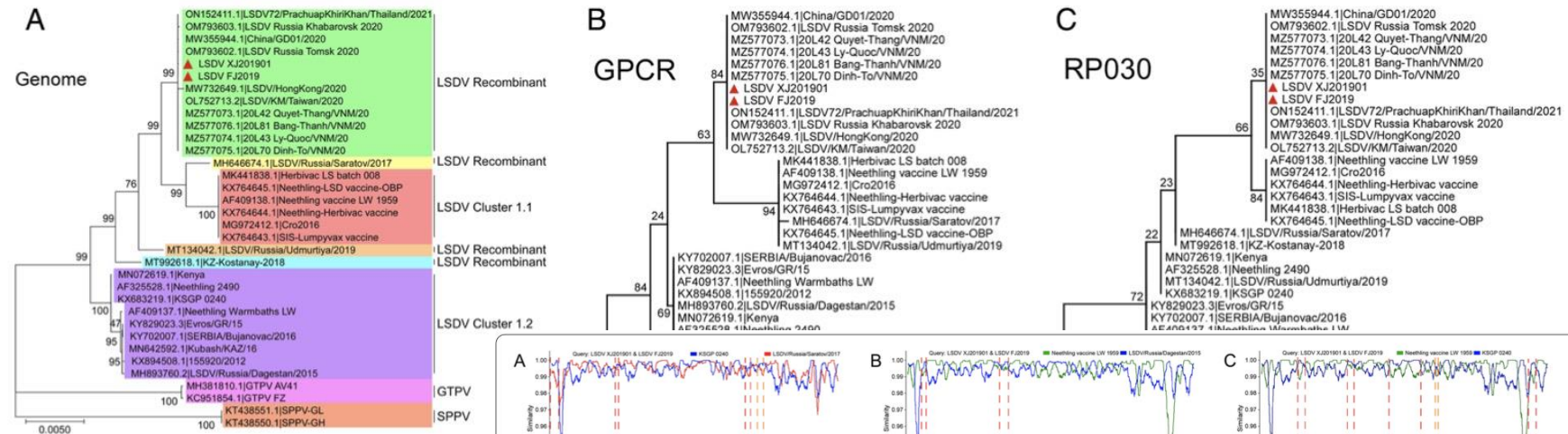
\*Correspondence: wuxiaodong@cahecc.cn; wangzhiliang@cahecc.cn

<sup>1</sup>China Animal Health and Epidemiology Center, Qingdao 266032, Shandong, China

Full list of author information is available at the end of the article

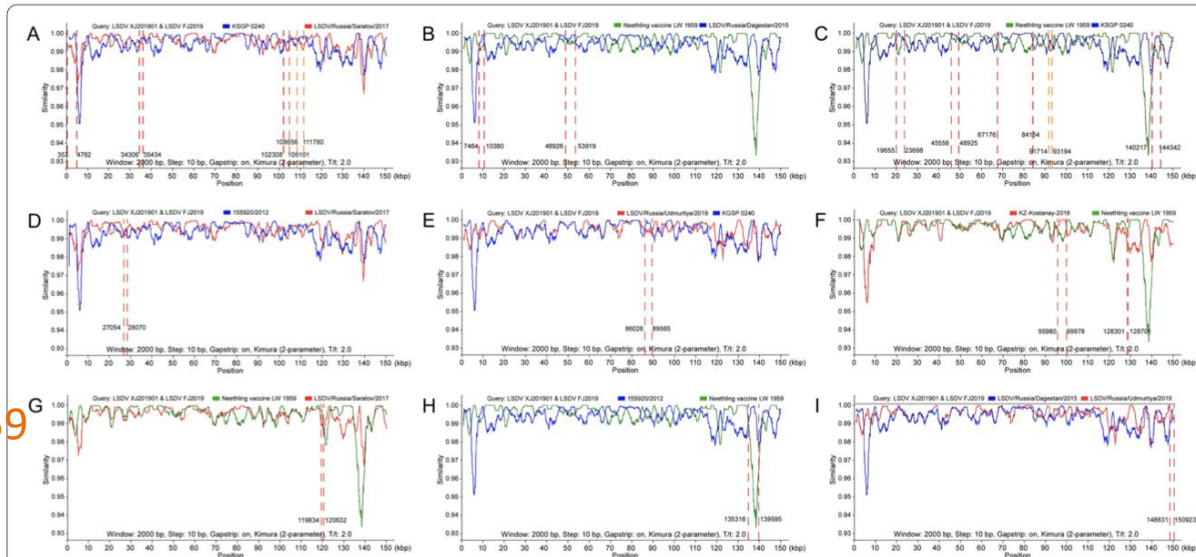


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**Fig. 3** Phylogenetic analysis between isolate and RP030 gene (C). The isolated strain LSDV; Maximum likelihood method using Mega X. T suitable for them are GTR (General Time Reversal)

Neethling vaccine LW 1959  
↓↑↓↑  
KSGP0240



**Fig. 4** Potential gene recombination events. All global LSDV strains were divided into 3 groups to analyse the gene recombination events involved in LSDV isolates using RDP4 and Simplot. Possible reorganization events and locations are marked in the figure



# Control Measures



- Emerging treatment for the infected farm:
  - Stamping out the affected cattle : clinical signs, LSDV positive.
  - Separate and quarantine other cattle.
  - Cleaning and disinfection.
  - Insecticide treatment.





# Control Measures



- Emerging response for the affected county:
  - Live cattle movement is restricted for 30 days.
  - Separate and quarantine the introduced cattle.
  - Vaccination campaigns for unaffected herds.
  - Outbreak investigation, traceability forward/backward for last 30 days.
  - Vector control.



# Control Measures



- Emerging response for other counties:
  - Enhance surveillance, especially for related counties and neighbor counties.
  - Enhance quarantine inspection for animal movements.
  - Awareness campaigns.
  - **Vaccination is required for animal movement at least 30 days before the date of departure.**



# Control Measures



批准文号: 兽药生字 151824003

**兽用**

**山羊痘活疫苗**  
Goat Pox Vaccine, Live

【作用与用途】用于预防山羊痘及绵羊痘。 【生产批号】  
接种后4~5日产生免疫力, 免疫期为12个月。  
用法用量及注意事项见说明书。 【生产日期】  
【贮藏与有效期】2~8℃保存, 有效期为18个月。 【规格】 头份

山东绿都生物科技有限公司



Zybio A 正业生物

**山羊痘活疫苗**  
Goat Pox Vaccine, Live

批准文号: 兽药生字070224003 10瓶/盒

【作用与用途】用于预防山羊痘及绵羊痘。  
【用法与用量】尾根内侧面或颌内侧面注射, 详见说明书。  
【贮藏与有效期】-15℃以下保存, 有效期为24个月。  
吉林正业生物制品股份有限公司  
JILIN ZHENGYE BIOLOGICAL PRODUCTS CO., LTD.  
地址: 吉林省吉林经济开发区聚源街1号  
客服热线: 400-678-1970 电话: 0432-63041136  
传真: 0432-63451620 网址: www.jlzybio.com



AV41

AULEON Biologicals

批准文号: 兽药生字 (2016) 230244003

**兽用**

**山羊痘活疫苗**  
Goat Pox Vaccine, Live

【规格】 25 头份  
【生产批号】 2020003  
【生产日期】 2020#02  
【有效期至】 2022#02

重庆澳龙生物制品有限公司  
CHONGQING AULEON BIOLOGICALS CO., LTD.

10瓶/盒



GUANGWEI 广力®

**痘必应**  
山羊痘活疫苗  
Goat Pox Vaccine, Live

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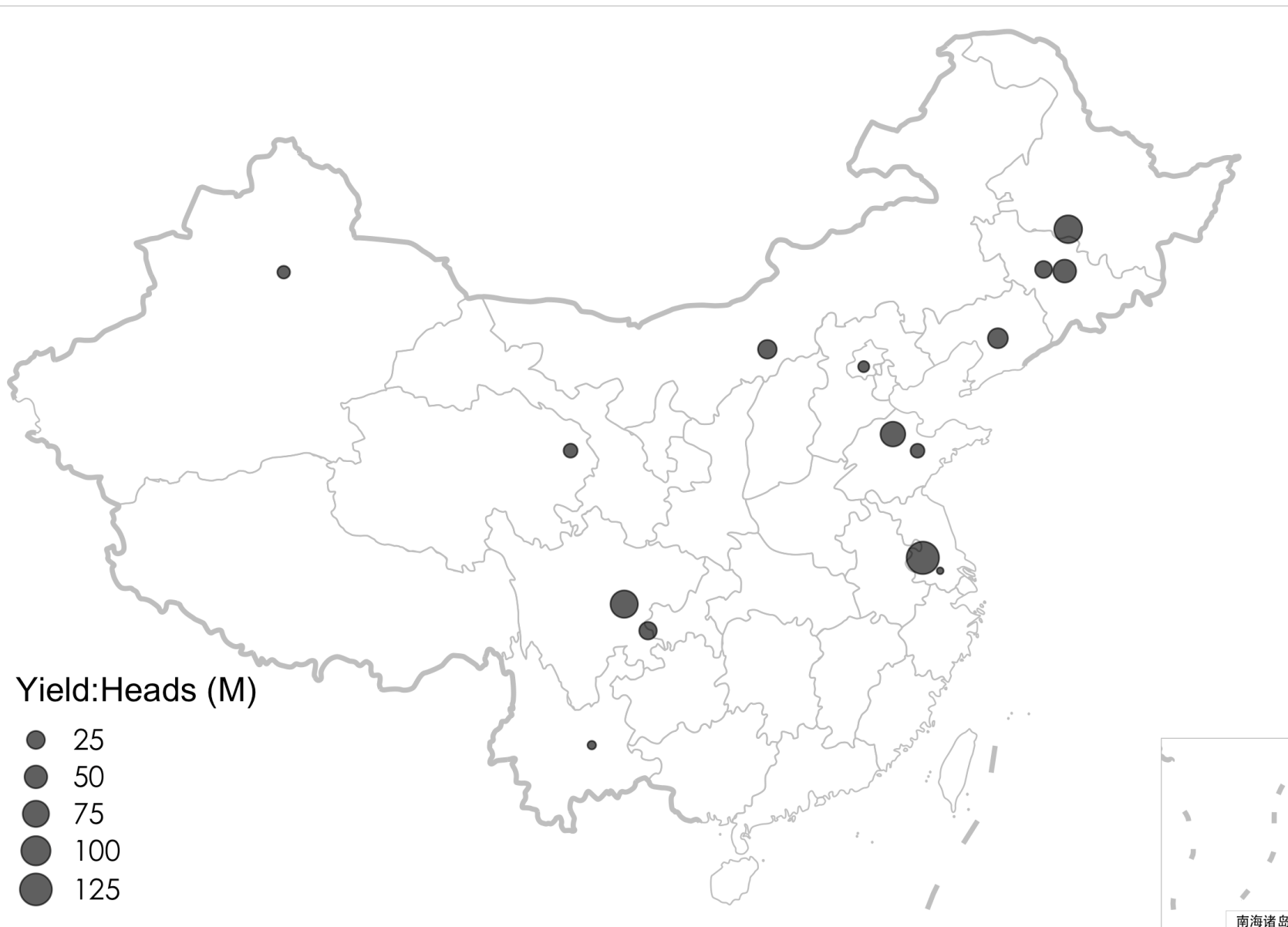
国药集团生物疫苗有限公司





## Goat Pox Vaccine Manufacture

- 哈药集团生物疫苗有限公司
- 山东绿都生物科技有限公司
- 吉林正业生物制品股份有限公司
- 辽宁益康生物股份有限公司
- 金宇保灵生物药品有限公司
- 重庆澳龙生物制品有限公司
- 吉林和元生物工程股份有限公司
- 青海生物药品厂有限公司
- 山东华宏生物工程有限公司
- 天康生物制药有限公司
- 北京华信农威生物科技有限公司
- 云南生物制药有限公司
- 江苏南农高科技股份有限公司



# Control Measures



## National Surveillance Plan 2022

Provinces: 27

Samples: 9498

swabs: 4423

serum: 4434

Farms: 427

Data source: CAHEC



# Control Measures



## Post Vaccination Evaluation 2022

- 913 samples, 95 farms (vaccinated)
- ID Screen Capripox double antigen  
Multi-species **ELISA** kit ( ID Vet,  
Montpellier, France )
- Positive rate 28.4% ( 259/913 )

Data source: CAHEC



# Thank You



lijinming@cahec.cn



**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

- African Swine Fever
- Bovine Spongiform Encephalopathy
- Newcastle Disease



World Organisation  
for Animal Health  
Founded as OIE

- African Swine Fever
- Newcastle Disease
- Peste des petits ruminants



Food and Agriculture  
Organization of the  
United Nations

- Peste des petits ruminants

