

FMD situation & Control Strategy in Korea

November 13th 2014
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Contents

1. FMD SITUATION
2. FMD CONTROL STRATEGY



SEOUL

ADMINISTRATIVE DIVISION

Capital : Seoul(10 million)

7 metropolitan cities,

1 self-government city,

9 provinces

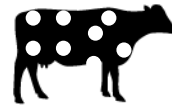


50 MILLION



2.8 MILLION

110 THOUSAND FARMS



43 THOUSAND

5.7 THOUSAND FARMS



10 MILLION

5.2 THOUSAND FARMS



1.5 HUNDRED MILLION

3 THOUSAND FARMS



8.2 MILLION

7 HUNDRED FARMS

FMD SITUATION

2000~2014

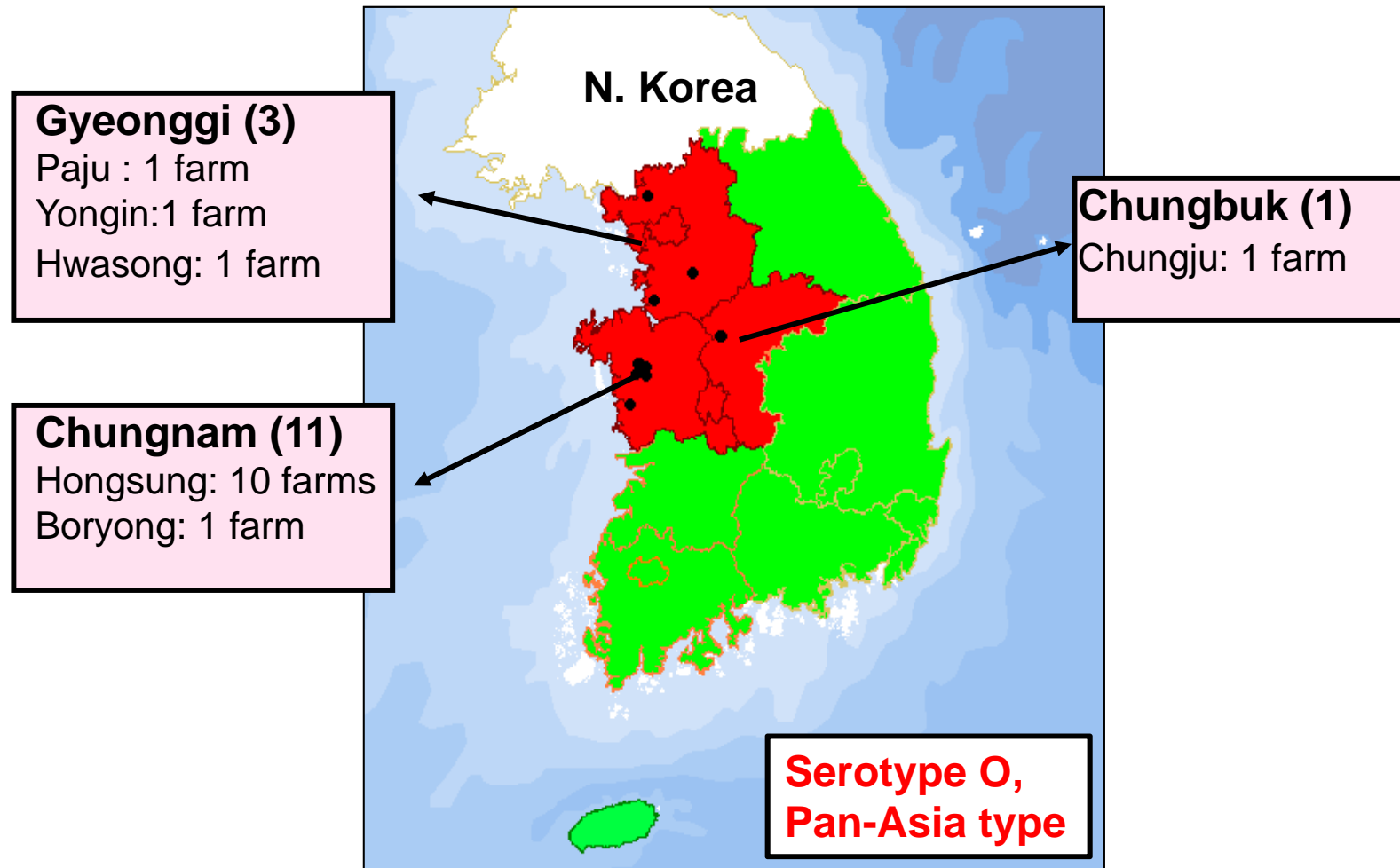
FMD EPIDEMICS IN KOREA

1st	<ul style="list-style-type: none">• Mar 2000, 15 Cattle farms, Ring Vaccination, O Pan-Asia• Sep. 2001, FMD-free country without vaccination
2nd	<ul style="list-style-type: none">• May 2002, 15 Pig+1 Cattle farms, O Pan-Asia type• Nov. 2002, FMD-free country without vaccination
3rd	<ul style="list-style-type: none">• Jan 2010, 6 Cattle+1 Deer farms, A type
4th	<ul style="list-style-type: none">• April 2010, 8 Cattle+5 Pig farms, O type• Sep. 2010, FMD-free country without vaccination
5th	<ul style="list-style-type: none">• Nov 2010, 153 Cases (3,743 farms), Nationwide, O type Vacc.• May. 2014, FMD-free country with vaccination
6th	<ul style="list-style-type: none">• Jul 2014, 3 pig farms, O type Vacc.(trivalent : O + A + Asia1)

OVERVIEW OF FMD OUTBREAKS IN 2000

No of infected farms		15 (all cattle)
Duration		23 days (Mar 24 - Apr 15)
Region		3 Provinces (6 Cities/Counties)
No of culled (500 m radius)	Cattle	2,021
	Pig	63
	Others	132
	Total	2,216
Eradication policy		Stamping out (Ring vaccination, 10km radius)
Vaccinated heads		1 st - 860,700, boost - 661,700
Economic losses (USD)		Approximately 300 million
Causes of FMD invasion (presumed)		Imported hay, Tourist
FMD-free status		Sep 16, 2001

Regional Distribution of FMD outbreaks in 2000

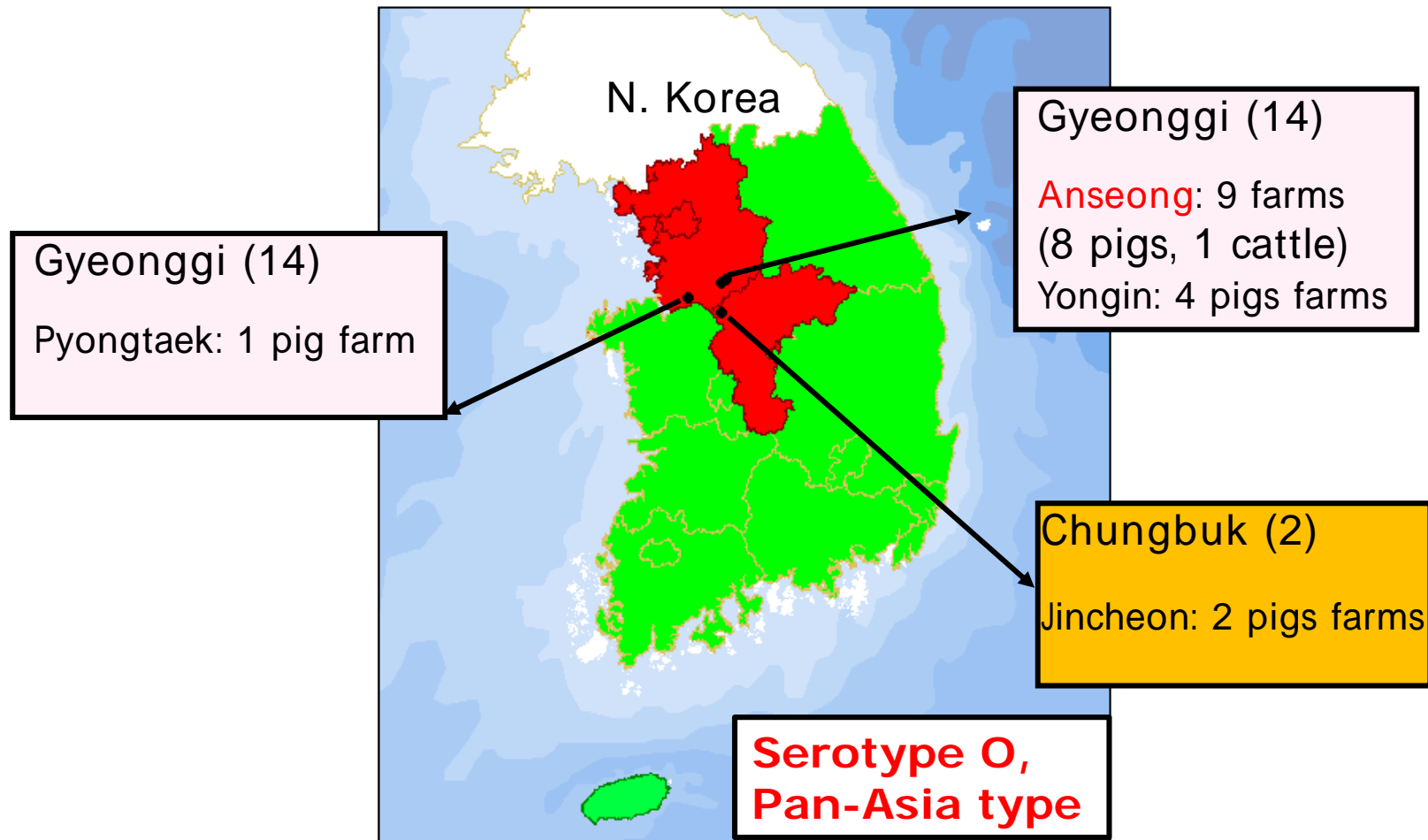


- **FMD positive : 15 outbreaks**
- **Total 182 farms ; 2,216 heads destroyed**

Overview of FMD outbreaks in 2002

No of infected farms		16 (15 pigs, 1 cattle)
Duration		53 days (May 2 – June 23)
Region		2 Provinces (4 Cities/Counties)
No of culled (500 m radius, 3 km - pigs)	Cattle	1,372
	Pig	158,708
	Others	75
	Total	160,155
Eradication policy		Stamping out (No vaccination)
Economic losses(USD)		Approximately 143 million
Causes of FMD invasion (presumed)		Foreign worker, Tourist
FMD-free status		Nov 29, 2002

Regional Distribution of FMD outbreaks in 2002

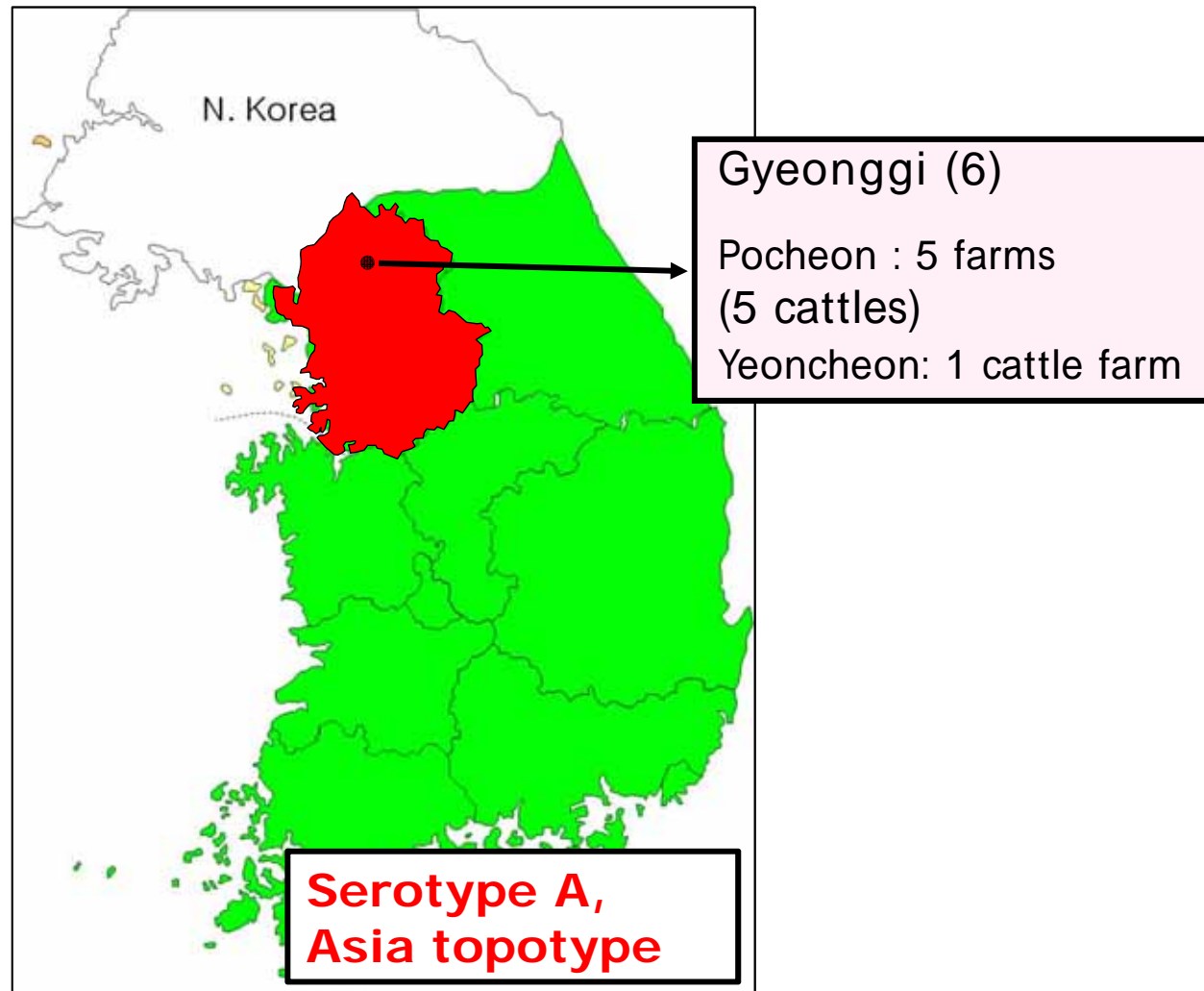


- FMD positive : 16 outbreaks
- Total 162 farms ; 160,155 heads destroyed

Overview of FMD A type outbreak in 2010

No of infected farms		6 (all cattle)
Duration		28 days (Jan 2 – Jan 29)
Region		Gyeonggi Province (2 Counties ; Pocheon, Yeoncheon)
No of culled	Cattle	2,905
	Pig	2,953
	Others	98
	Total	5,956
Eradication policy		Stamping out (No vaccination)
Economic losses (USD)		Approximately 29 million
Causes of FMD invasion (presumed)		Foreign worker, Intl. parcel, Tourist
FMD-free status		Sep 27, 2010

Regional Distribution of FMD outbreaks in Jan, 2010

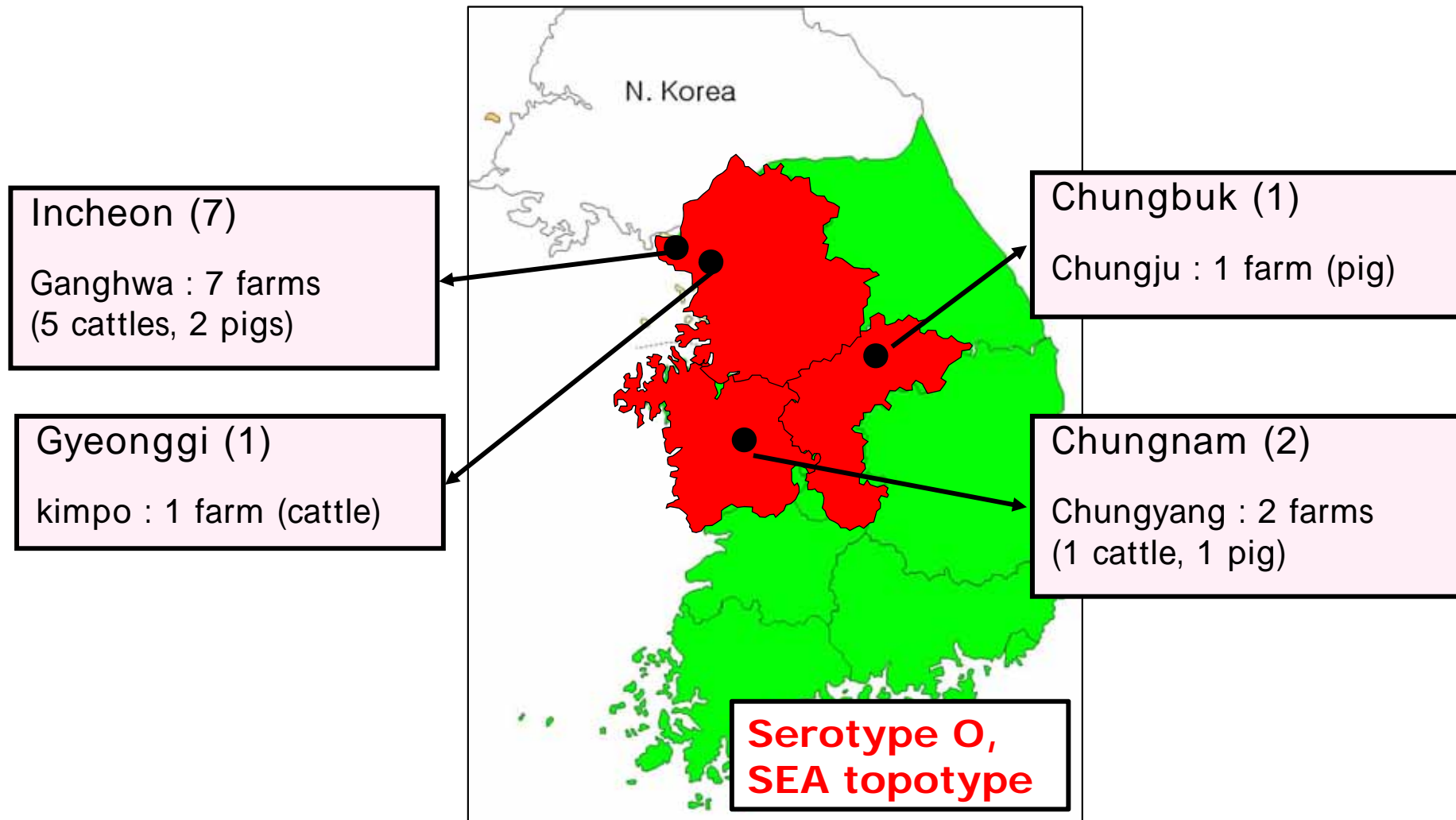


- FMD positive : 6 outbreaks
- Total 5,956 heads destroyed

Overview of Ganghwa FMD outbreak in 2010

No of infected farms		11 (7 cattle, 4 pigs)
Duration		29 days (Apr 8 – May 6)
Region		4 Provinces (4 Cities/Counties)
No of culled	Cattle	10,858
	Pig	38,274
	Others	742
	Total	49,874
Eradication policy		Stamping out (No vaccination)
Economic losses (USD)		Approximately 124 million
Causes of FMD invasion (presumed)		Tourist
FMD-free status		Sep 27, 2010

Regional Distribution of FMD outbreaks in Apr, 2010



- FMD positive : 11 outbreaks
- Total 49,874 heads destroyed

Overview of massive FMD epidemic in 2010/2011

No of infected farms		153 farms (3,748 heads)
Duration		145 days (Nov 28 – April 21)
Region		11 Provinces (75 Cities/Counties)
No of culled	Cattle	150,864
	Pig	3,318,298
	Goat+Deer	10,800
	Total	3,479,962
Eradication policy		Stamping out Vaccination
Economic losses (KRW)		Approximately 2.5 trillion (1.7 bil. for animal compensation)
Causes of FMD invasion (presumed)		Tourist, Foreign worker, Livestock product

FMD Transmission route and alert levels



- 2010.11.28. FMD occur in Gyeongbuk

11.29. Alert level "Caution"

* **Case confirmed**

- 12.14. Spread to Gyeonggi

12.15. Alert level "Warning"

* **Transmission**

- 12.21. Spread to Gwangwon

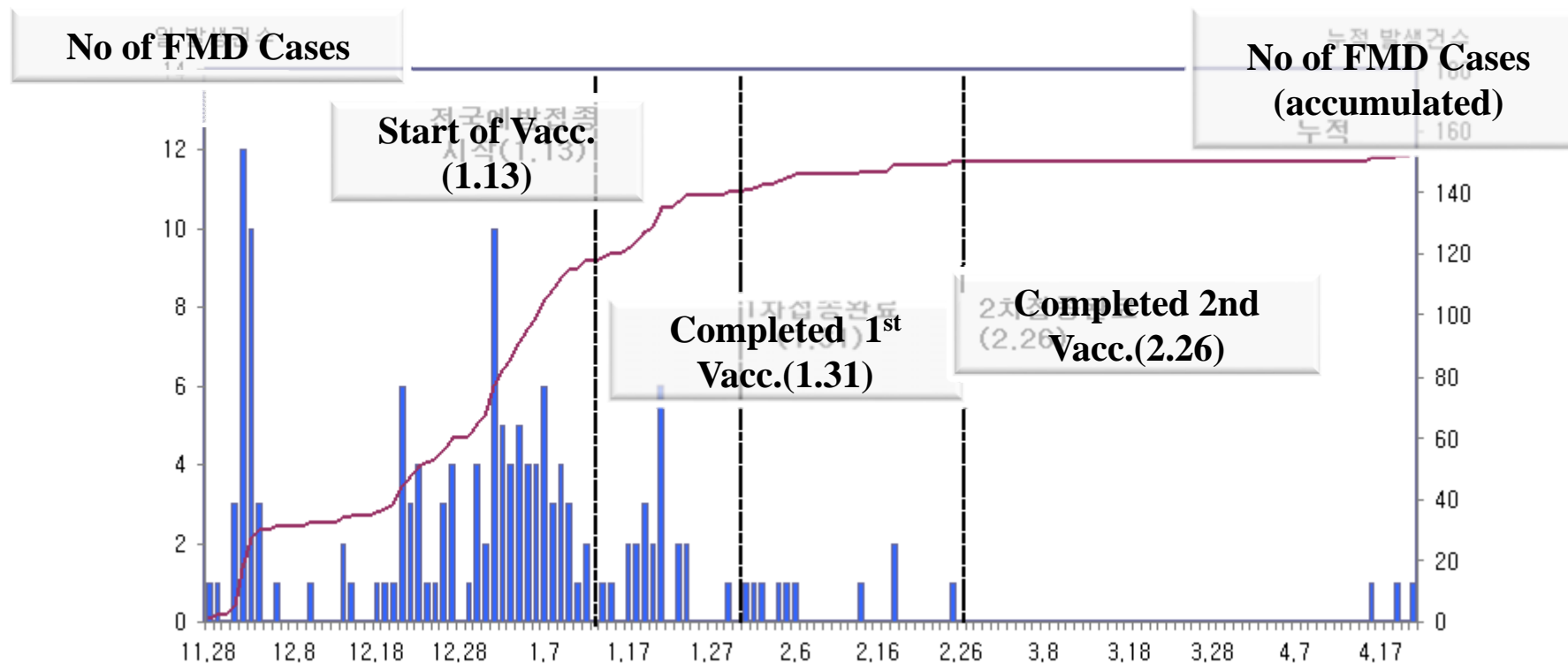
- 12.23. Spread to Incheon

12.29. Alert level "Critical"

- Spread to Chungnam-buk, Daegu,

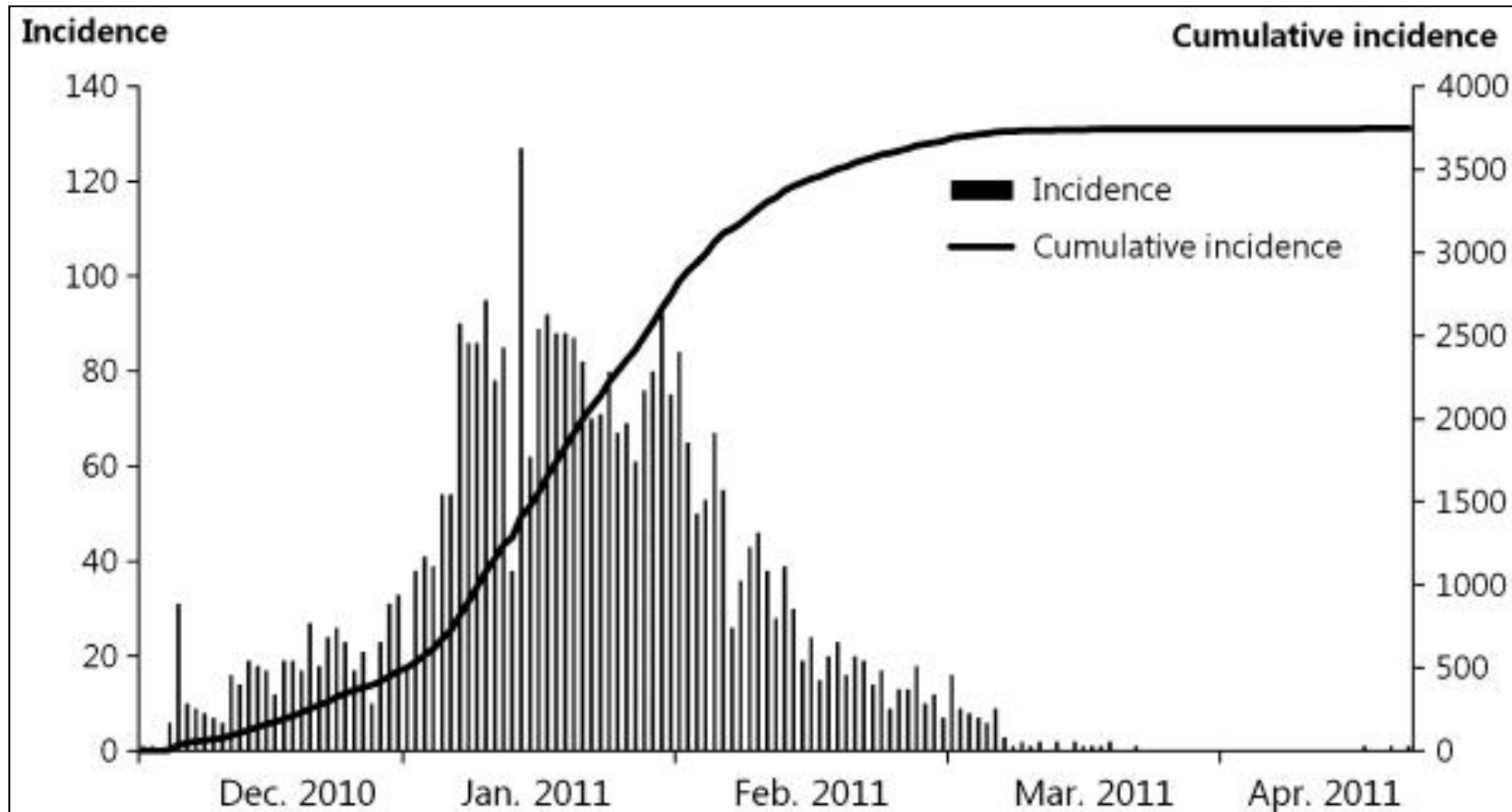
Gyeongnam, Busan, Ulsan in serial order

FMD Outbreaks Situation after blanket Vaccination



- **O Manisa Monovalent vaccination : Jan 13, 2011**
- **Trivalent vaccination (O+A+Asia 1) : After September, 2011**
- **Outbreaks reduced after vaccination**

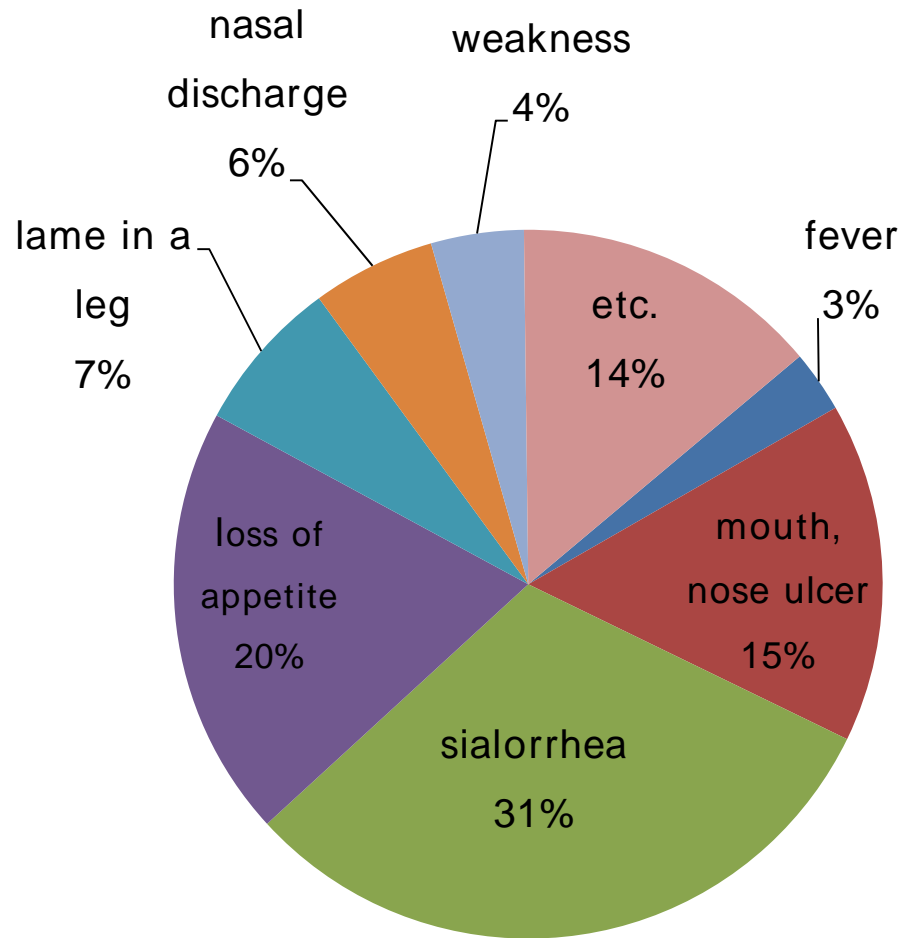
Dairy Number of FMD case farms



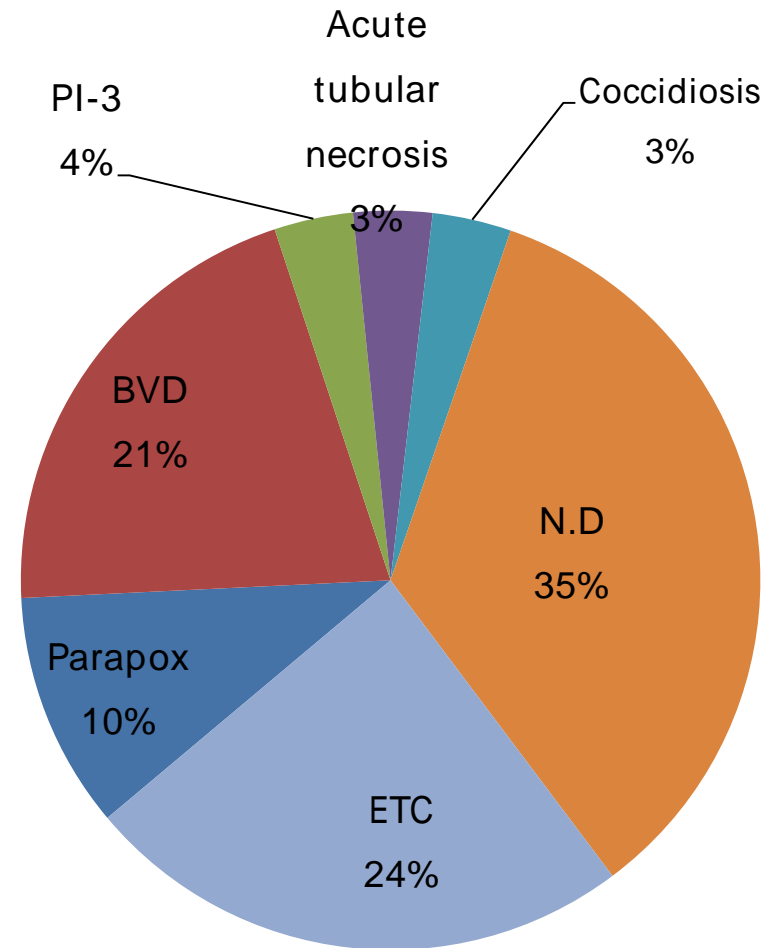
* Incidence : Number of newly detected farms by day

* Cumulative incidence : cumulative number of newly detected farms

FMD clinical symptom reports & diagnostic results



Clinical symptoms



Differential diagnosis

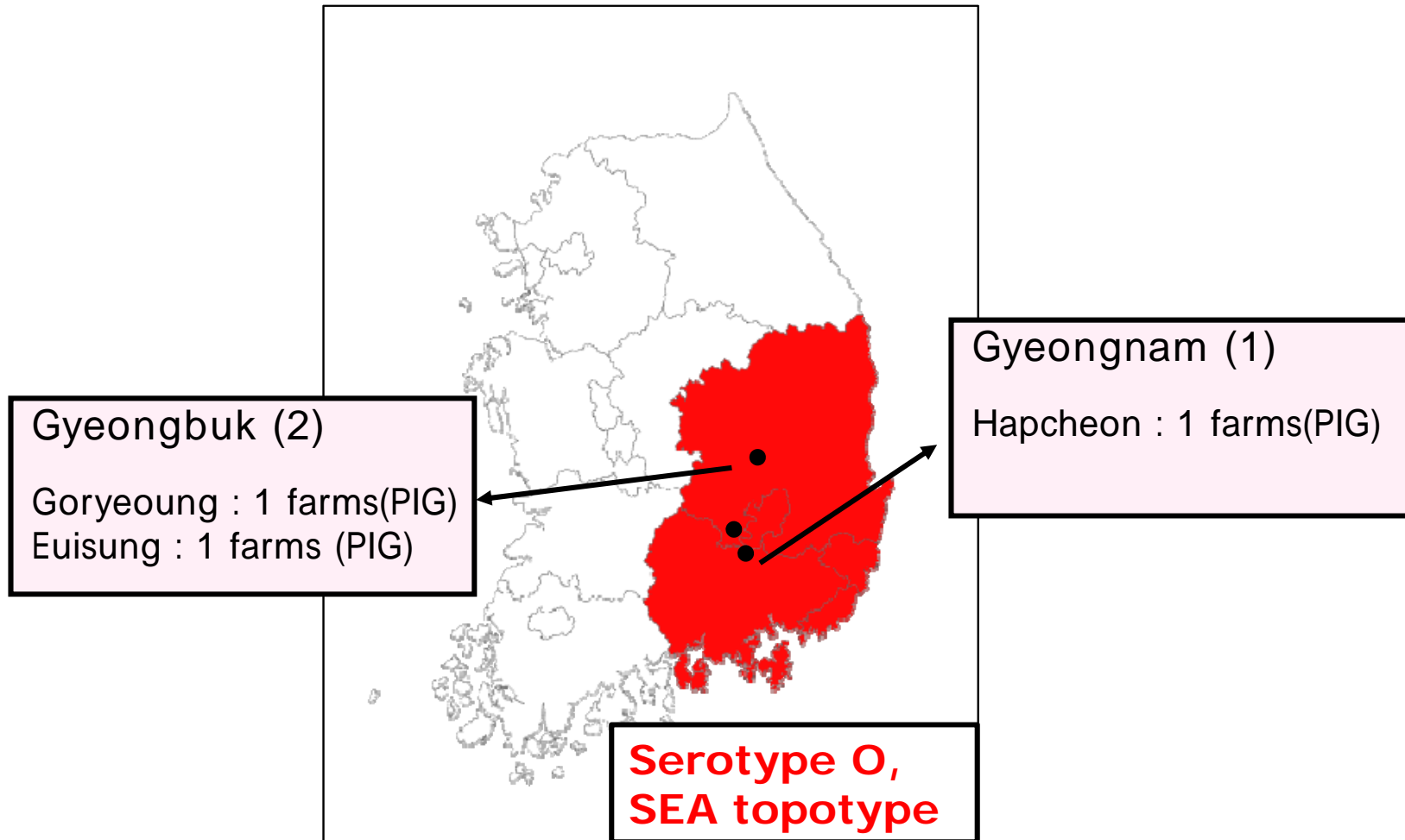
29 suspected FMD cases were reported (2011.4~2013.11)

all negative 18

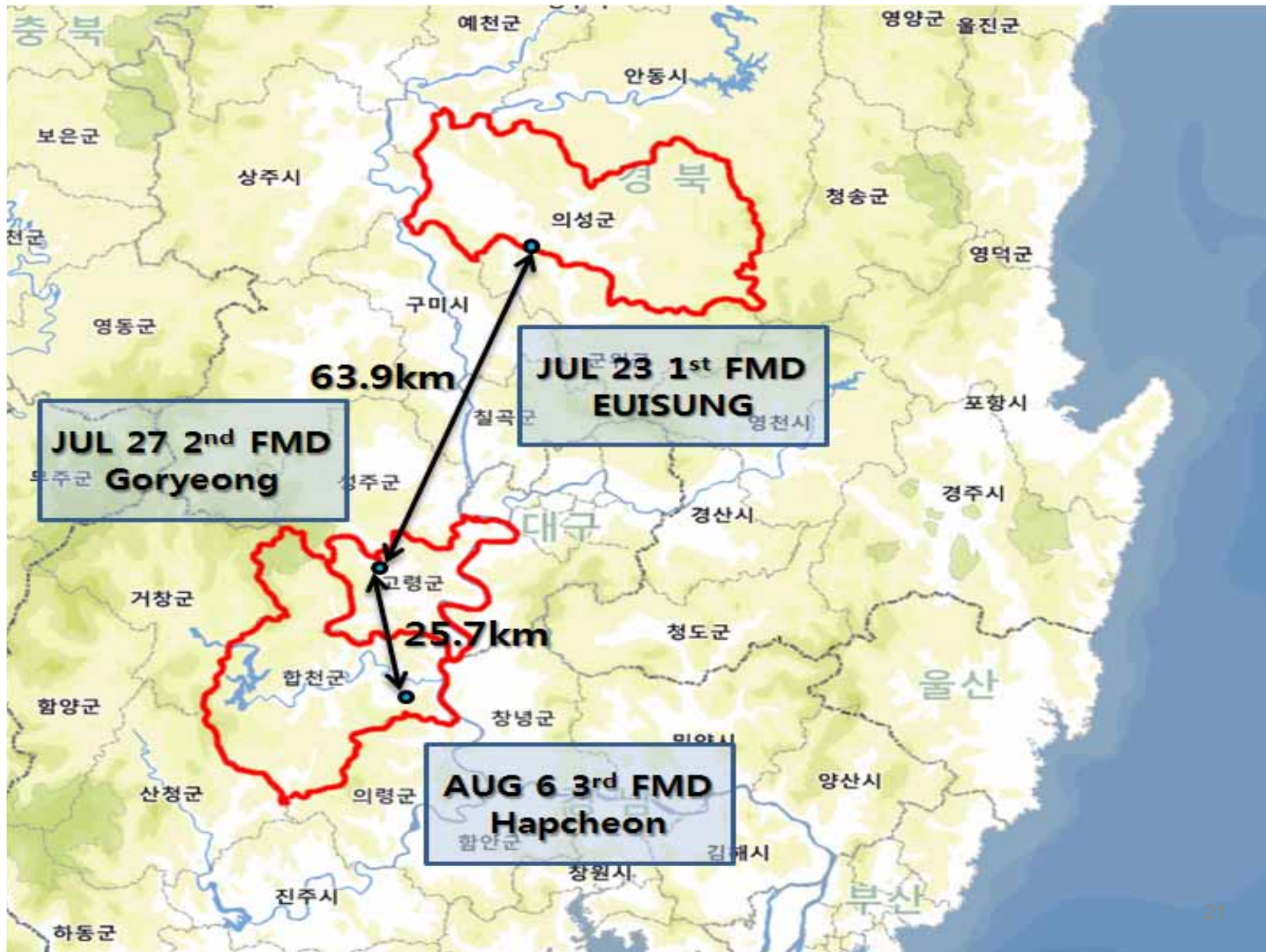
Overview of FMD outbreaks in 2014

No of infected farms		3 (all PIG)
Duration		15 days (JUL 23 – AUG 6)
Region		2 Provinces (3 Cities/Counties)
No of culled (500 m radius)	Cattle	-
	Pig	2,009
	Others	-
	Total	2,009
Eradication policy		Stamping out
Causes of FMD invasion (presumed)		Foreign Workers, Imported hay

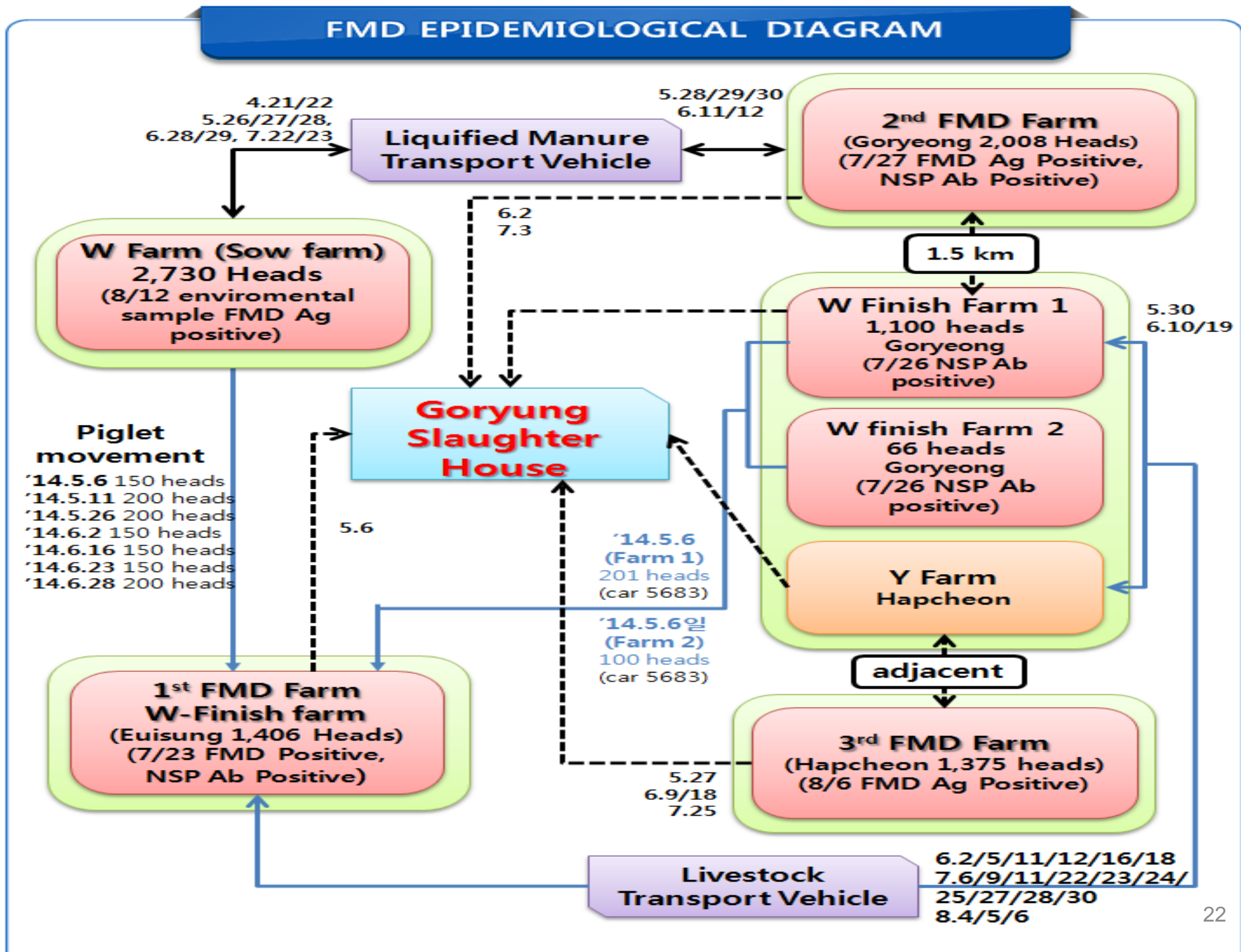
Regional Distribution of FMD outbreaks in 2014



- FMD positive : 3 outbreaks
- Total 2,009 heads destroyed



FMD EPIDEMIOLOGICAL DIAGRAM

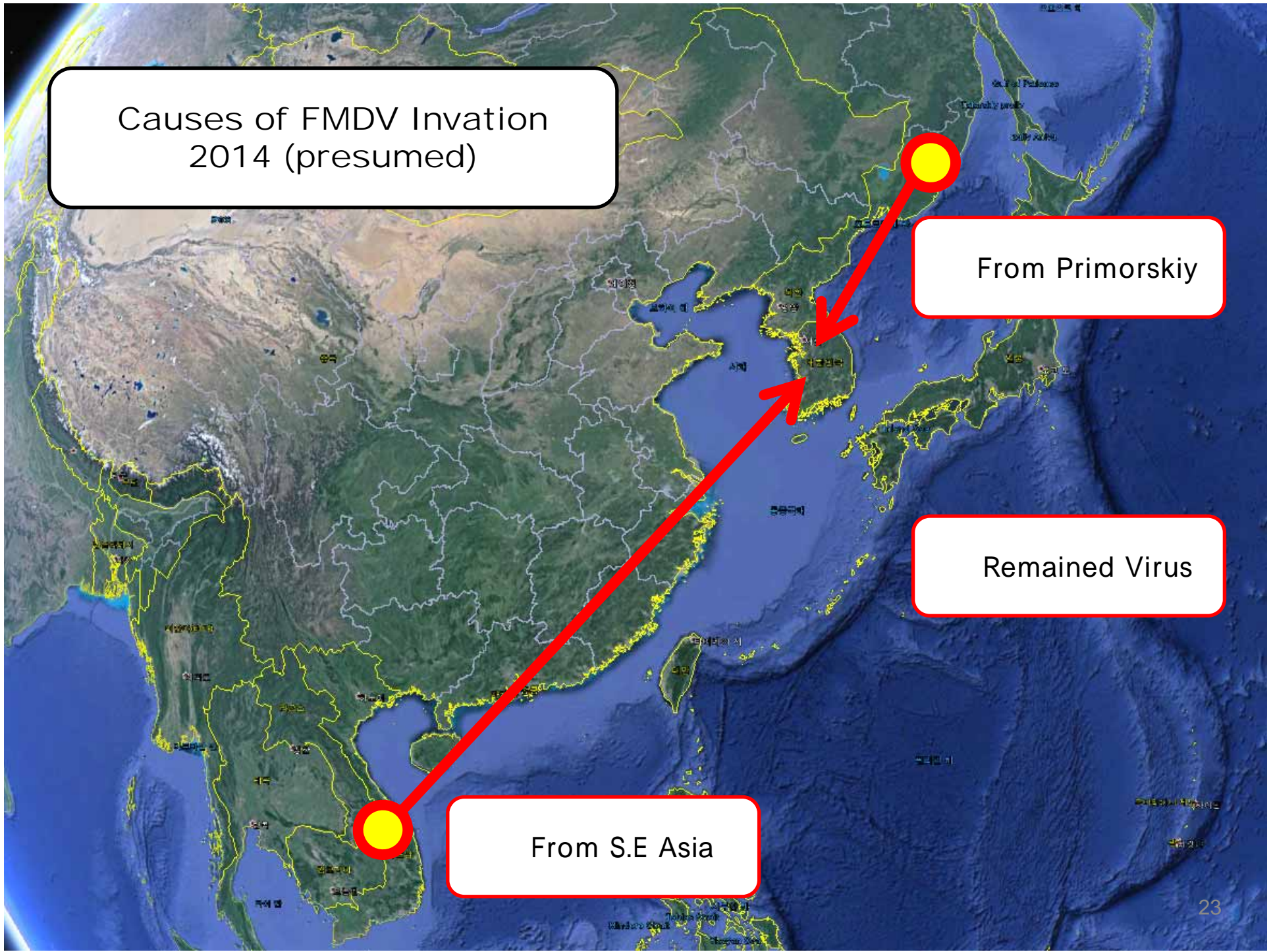


Causes of FMDV Inivation
2014 (presumed)

From Primorskiy

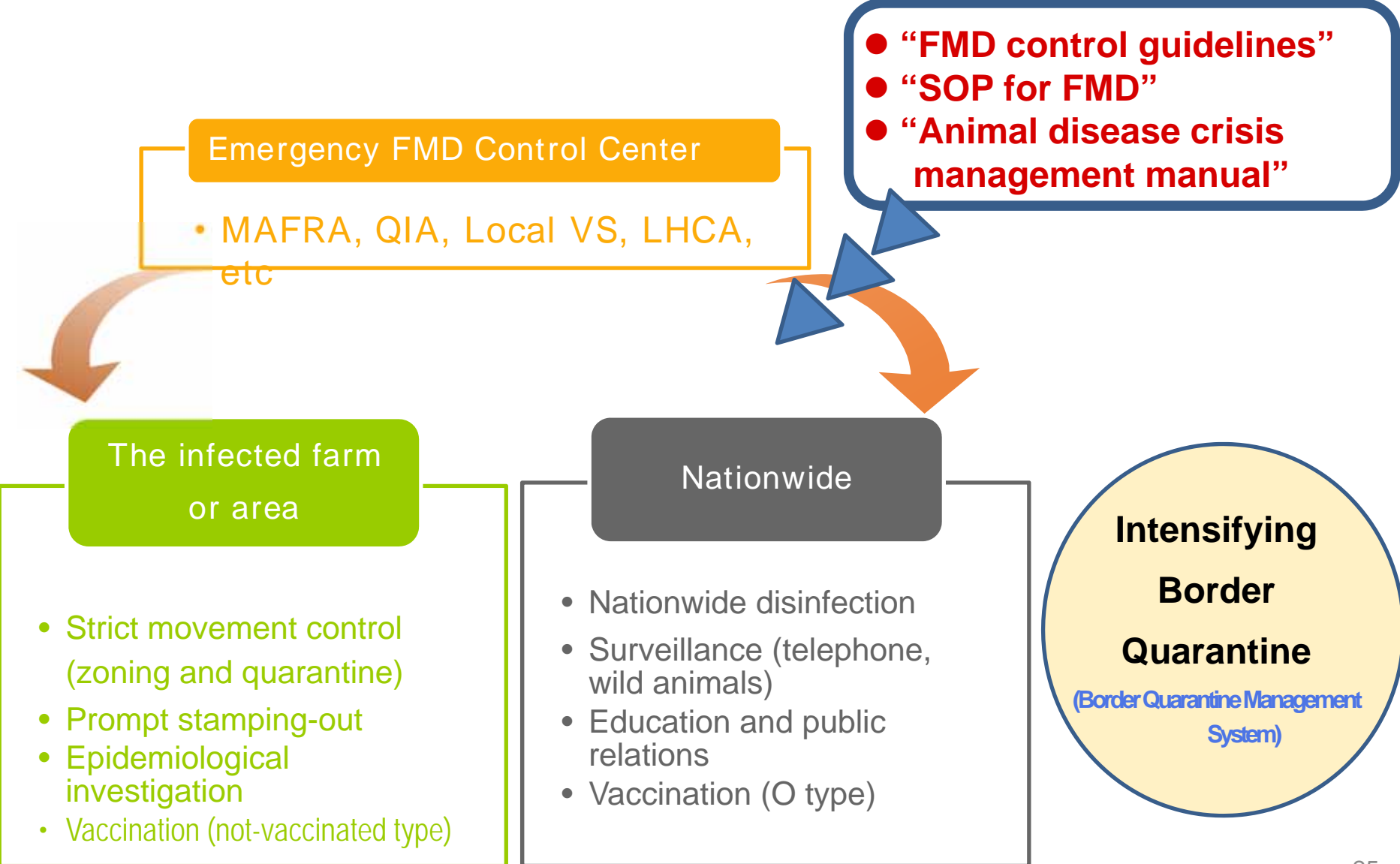
Remained Virus

From S.E Asia

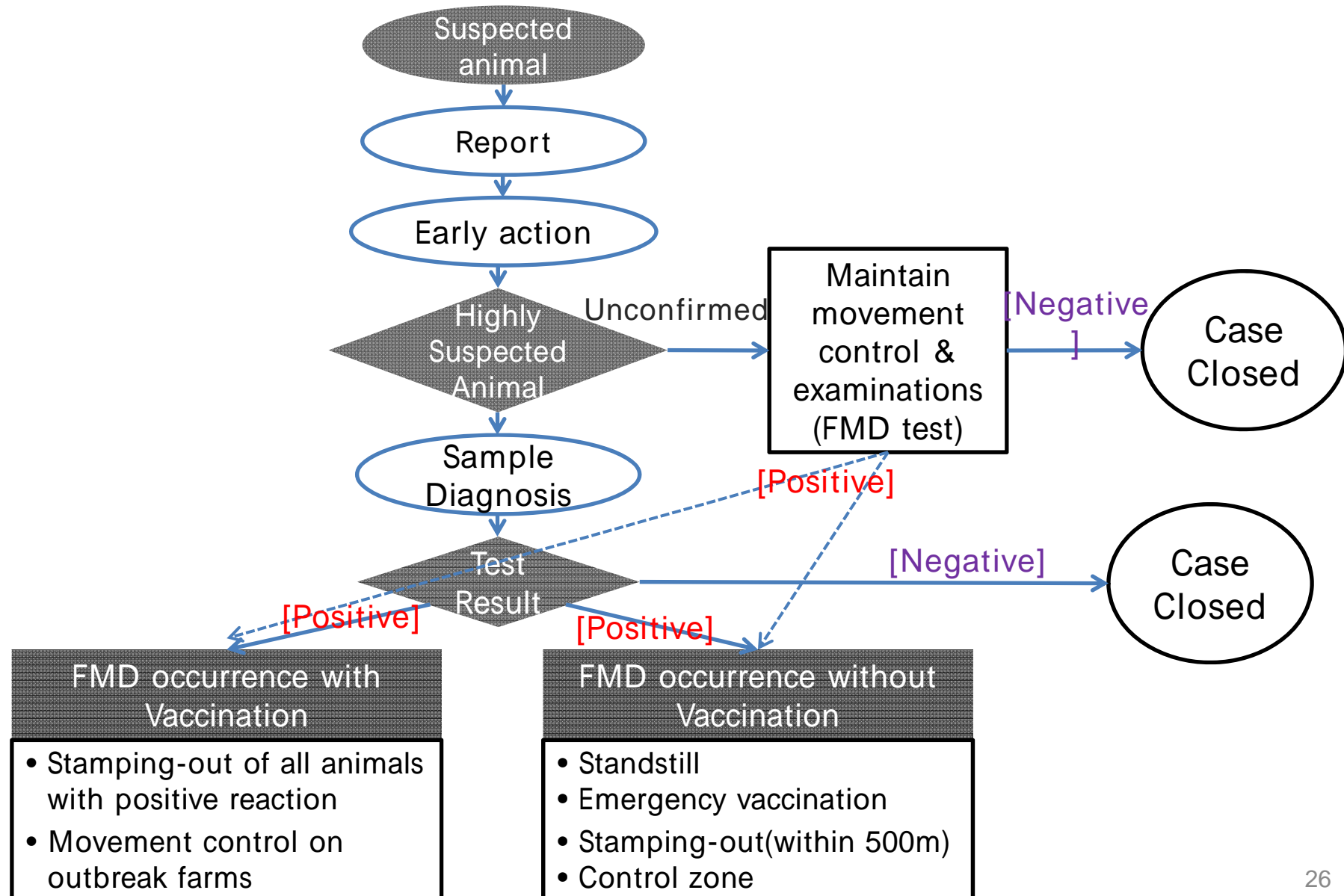


FMD CONTROL STRATEGY

FMD CONTROL POLICY



Management Process when a suspected animal is discovered



FMD vaccines and vaccination

Types of FMD vaccines used in Korea by period

Vaccinated periods	Serotype & strains of FMD vaccine
Dec. 25 2010 ~ Aug. 2011	Monovalent vaccine (O1 Manisa)
Sep. 2011 ~ Dec. 2011	Trivalent vaccine (O1 Manisa, A22 Iraq, Asia1 Shamir)
Jan. 2012 ~ until now	Trivalent vaccine (O1 Manisa, A Malaysia, Asia1 Shamir)

Dose & strain of Korean Antigen Bank (Merial Animal Health Ltd., UK)

Dose & strain OF Korean Antigen Bank(stored in Merial Animal Health, UK)

A22 Iraq (400)	C Oberbayern (300)	SAT1 Southern Africa (300)	SAT2 Southern Africa (300)	SAT3 Southern Africa (300)

* Unit : thousand doses

FMD vaccination program in Korea

Species	Ages	Dose	Remark
Cattle	Calf : 2 months(1 st), 3 months(2 nd) Adult : every 4-7 months interval	2 ml	Compulsory
Pig	Sow : 3-4 wks before delivery Boar : every 4-7 months interval Piglet : once in 8-12 weeks Gilt : 2 months(1 st), 3 months(2 nd)	2 ml	
Goat	Young : 2 months(1 st), 3 months(2 nd) Adult : every 1 year interval	1 ml	
Deer	Young : 2 months(1 st), 3 months(2 nd) Old : every 4-7 months interval	2 ml	Autonomous

FMD vaccination management

- FMD **vaccination certificate** required for trade and slaughter
- Active serological surveillance : SP/NSP antibody tests
- Strengthen FMD **vaccination compliance by farm visits**
- **Fines for non-compliance** : up to 5 million won
- **Civil servants (28,000) in charge of compliance of farms**

Production and R&D of FMD vaccine

Main Direction

Complete products after Ag import, Research and verification of seed virus

(2011~2014)

Set up Vaccine Research Center (2013~2016) & domestic production facility

(2015~2017)

Progress

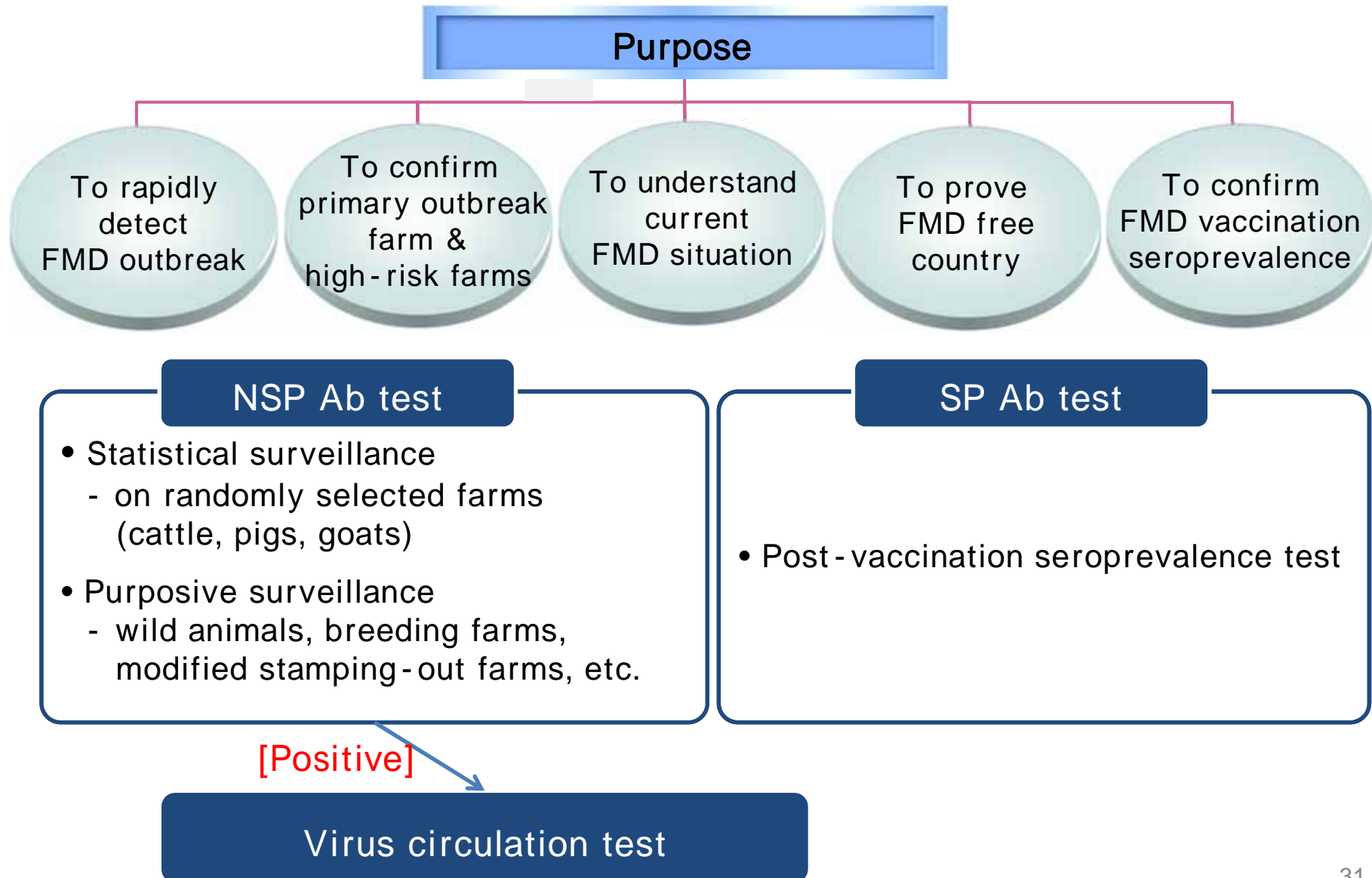
(Step 1) Domestic production after Ag import (2013~2014)

- Selection of industry and preparation of method for vaccine verification (2011)
- Field survey of foreign FMD vaccine verification system (England, etc, Sep 2011)

(Step 2) Domestic production after developing seed Ag (2011~2015)

- Set up a road map for R&D (2011~2014)
- Set up vaccine research center (2013~2016, 41.8 billion won)
- Set up domestic vaccine production facility & vaccine verification method (2013~2017. 41.7 billion won)

National FMD Surveillance



NSP Antibody test in 2012

Records of NSP Ab test in 2012

	Cattle	Pigs	Goats	Wild animals	Total
Purposive S.	2,132 42,260	1,264 70,162	11 512	66 1,666	3,473 farms 114,600 animals
Statistical S.	3,601 42,709	2,498 30,313	793 3,289	-	6,892 farms 76,311 animals
Total	5,733 84,969	3,762 100,475	804 3,801	66 1,666	10,365 farms 190,911 animals



NSP Ab Positive

	Cattle	Pigs	Goats	Wild animals	Total
Total	153 871	149 978	1 18	-	303 farms 1,867 animals

NSP Antibody test in 2013

Records of NSP Ab test in 2013

	Cattle	Pigs	Goats	Wild animals	Total
Purposive S.	3,449 32,832	856 37,837	19 330	119 643	4,443 farms 71,642 animals
Statistical S.	3,630 14,639	1,988 15,976	774 3,093	-	6,392 farms 33,708 animals
Total	7,079 47,471	2,844 53,813	793 3,423	119 643	10,835 farms 105,350 animals



NSP Ab Positive

	Cattle	Pigs	Goats	Wild animals	Total
Total	27 54	2 3	1 7	-	30 farms 64 animals

NSP Antibody test in 2014(Jan~Sep)

Records of NSP Ab test in 2014 (Jan~Sep)

	Cattle	Pigs	Goats,Deer	Wild animals	Total
Purposive S.	1,485 28,008	1,775 37,963	21 159	49 581	3,330 farms 66,711 animals
Statistical S.	2,880 11,531	1,635 13,506	514 2,053	-	5,029 farms 27,090 animals
Total	4,365 39,539	3,410 51,469	535 2,212	49 581	8,359 farms 93,801 animals

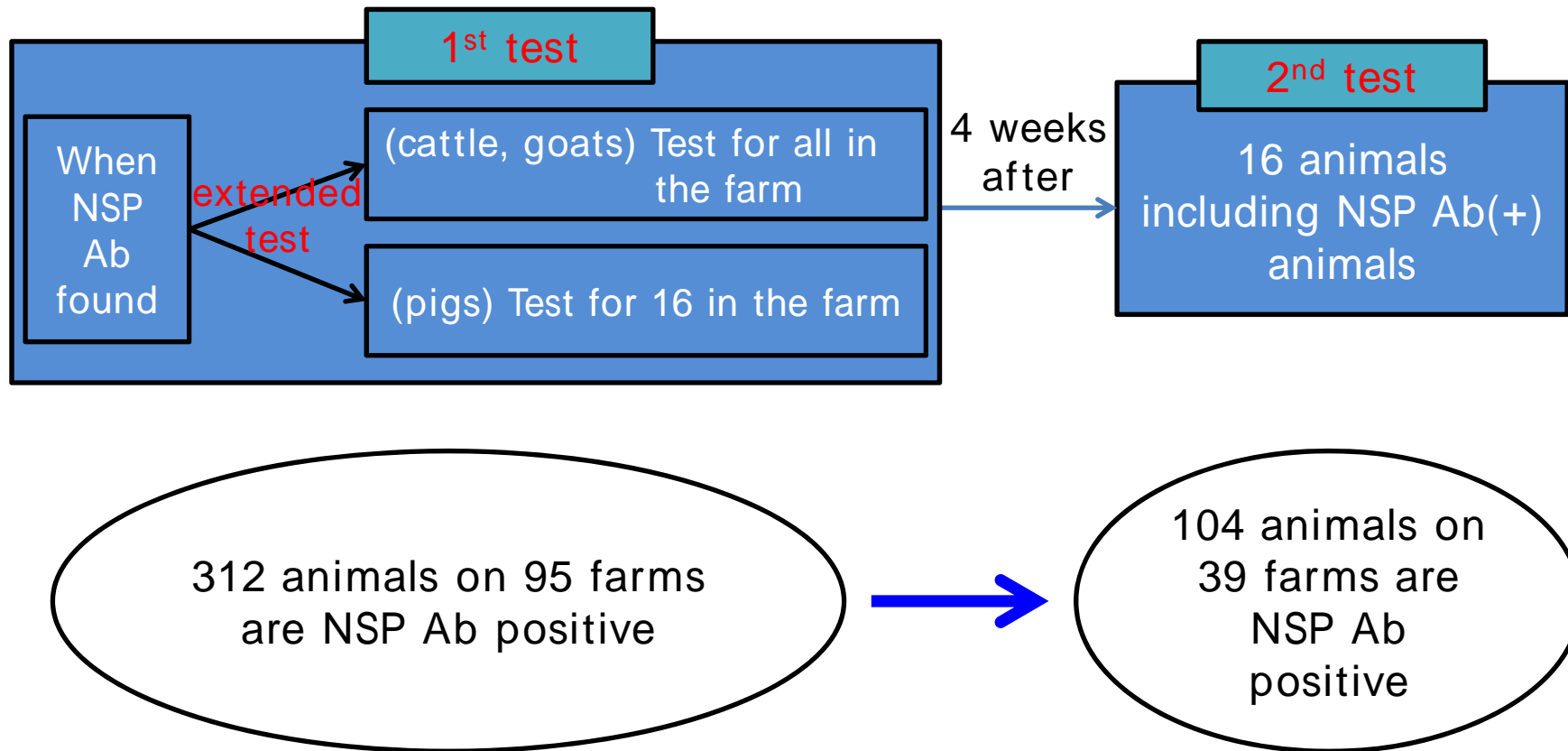


NSP Ab Positive

	Cattle	Pigs	Goats,Deer	Wild animals	Total
Total	15 73	12 67	-	-	27 farms 140 animals

Virus circulation (August, 2012 ~ July, 2013)

Virus circulation test for the NSP Ab (+) farm



Thank you for your attention

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