Porcine Epidemic Diarrhea (PED) in Japan

Toshiro KAWASHIMA
CVO, Director of Animal Health Division
Ministry of Agriculture, Forestry and Fisheries of Japan
History of PED in Japan

1980s    Sporadic outbreaks

1990s    Large outbreaks
          (Jan.1996- 80,000 cases and 40,000 piglets dead)

Oct. 1996   Designated notifiable under the Act

Nov.1996   Vaccine (Live) approved by MAFF

2000s    Sporadic outbreaks
          (Latest case found in 2006)
<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
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<tbody>
<tr>
<td>Oct. 2013</td>
<td>New cases in Okinawa pref. after absence of 7 years</td>
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<tr>
<td>Dec. 2013</td>
<td>Cases increased in the Southern Kyushu area</td>
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<td>Feb. 2014</td>
<td>Cases temporarily decreased in the Southern Kyushu area</td>
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<td>Mar. 2014</td>
<td>Cases increased again in the Southern Kyushu area</td>
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<td>Has spread to the Northern Kyushu area and other prefectures across Japan</td>
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<td>Apr. 2014</td>
<td>Peak of outbreaks</td>
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<tr>
<td>Jun. 2014</td>
<td>Decreased</td>
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</table>
Confirmed cases of PED (Oct 2013 – Aug 2014)

as of Nov 19, 2013
Confirmed cases of PED (Oct 2013 – Aug 2014)

as of Dec 17, 2013
Confirmed cases of PED (Oct 2013 – Aug 2014)
Confirmed cases of PED (Oct 2013 – Aug 2014)

as of Jan 28, 2014
Confirmed cases of PED (Oct 2013 – Aug 2014)

as of Mar 11, 2014
Confirmed cases of PED (Oct 2013 – Aug 2014)

as of Apr 22, 2014
Confirmed cases of PED (Oct 2013 – Aug 2014)

as of May 6, 2014
Confirmed cases of PED (Oct 2013 – Aug 2014)

as of Jun 3, 2014
Confirmed cases of PED (Oct 2013 – Aug 2014)

as of Jun 17, 2014
Confirmed cases of PED (Oct 2013 – Aug 2014)
Confirmed cases of PED (Oct 2013 – Aug 2014)
Confirmed cases of PED (Oct 2013 – Aug 2014)

as of Aug 17, 2014
Summary of outbreaks

Affected prefectures: 38 / 47

Affected farms: 817 / 5,270

Infected pigs: about 1,223,000 / 9,537,000

Death (*): about 371,000 / 16,931,000

*Death: The total number of piglet death in affected farms.
Impact on the number of pigs to be slaughtered in Japan

Source: Statistics on Livestock Products Marketing, MAFF

Note 1) The estimated number of pigs to be slaughtered since July 2014 until December 2014 have already been published and the number in January 2015 is estimated in the same way.

Note 2) The estimated number of deaths caused by PED in each month is estimated that the total number of the death caused by PED is divided proportionally by the number of cases in each month.

Note 3) A decrease in number of pigs to be slaughtered since April 2014 is estimated that the number of deaths in the month that is 6 months before each month is multiplied by 80% that is the growth rate in growing pigs.

Note 4) Percentages in each month is that: (i) Before March 2014, an increase-decrease in the ratio the number of pigs slaughtered during the month of average for the last 5 years, (ii) After April 2014, a decrease in the ratio the estimated number of deaths caused by PED in each month of the estimated number of pigs to be slaughtered in each month.
Measures against PED

- Biosecurity practices strengthened
- Vaccination recommended
- Epidemiological investigations conducted
Biosecurity practices (1)

prevent introductions of the virus

Disinfection bath for vehicle wheel at entrance to a farm

Disinfection bath at entrance to a barn
Biosecurity practices (2)

prevent the virus transmission between farms

cleansing and disinfection of vehicle

Cleansing of livestock truck
Biosecurity practices (3)

prevent the virus transmission within regions

Installation of disinfection point
Measures taken for live pigs and semen

- Shipping for slaughter from affected farms
  - Pigs with clinical signs: voluntary suspension of shipping
  - Pigs without clinical signs: shipping at different time from pigs from unaffected farms

- Semen from affected farms subjected to PCR test as a precautionary measure
  - The virus genome was detected in a semen sample collected from affected farm.
Financial Support

To encourage regional control activities, financial support provided for disinfection agent and installing disinfection equipment at the entrance of farms and related facilities (slaughterhouses etc.)

3.5 million US dollar (100 yen = 1 US dollar)
PED vaccine

- Vaccination recommended to alleviate clinical symptoms and reduce loss of piglets

- The mortality rate be reduced from 80% to 30% (Experimental data with circulating strains provided by the manufacturers)

- However, expected effect not appear under poor biosecurity
Stable supply of PED vaccine

Vaccination coverage remained low at around 10%
(400,000 dose in previous year)

Since Autumn 2013
Increased cases caused a temporary shortage of the vaccine supply

MAFF requested manufactures to increase production

FY 2013 (Apr-Mar) One million doses distributed
FY 2014 (Apr-Mar) Three million doses distributed
Epidemiological investigation

- Investigation has been conducted at every affected farms to identify any risk factors for introduction and transmission:
  - Introduction
    Importation of live pig, feed including porcine blood plasma, semen, movement of people (including workers with travel history, visitors from affected countries), etc.
  - Transmission
    Movement of animals, feed, semen, personnel, vehicles, equipment, manure handling, etc.

- Interim report to be published in September 2014
Characteristic of PED viruses isolated in Japan

- The viruses isolated in Japan were closely related to the strains prevalent in the U.S. and some Asian countries in recent years.
Potential risk factors of introduction of PED virus from abroad to Japan

- **Fecal samples from pigs with diarrhea**
  - RT-PCR test: 53 Fecal and tissue samples from 2009 to 2012
  - Neutralization test: 49 Serum samples before 2009
  - **Negative**

- **Serum samples from the U.S. pigs**
  - Neutralization test: 438 serum samples from the U.S. pigs from 2010 to 2013 with **ten positive results** (one lot imported in May 2013)
  - Not observed increase of neutralizing antibody titers
  - Not observed clinical presentation of live pigs by follow-up check

- **Porcine blood plasma from the U.S.**
  - PCR test: 8 samples imported since Mar. 2014 with **7 positive results**
  - Virus isolation: One sample tested out of 7 positive samples: Negative
  - Bioassay: 3 samples tested out of 7 positive samples: Negative
Potential risk factors in the transmission of PED virus in Japan (1)

- Potential factors suggested include:
  - animals; breeding, piglets for fattening
  - personnel / vehicles; feed distribution, shipping to slaughterhouses, fallen stock collection, facility repair etc.
  - others; manure facilities / spreading

- Detailed investigation conducted at one affected public research center with high biosecurity concluded; the virus was likely to be introduced by wild animals such as mice, rats or protective clothing
Potential risk factors in the transmission of PED virus in Japan (2)

PCR test on environmental swab samples in affected farms

- **Tested positive**: walls & floors of affected pigpen, doorknob of pigpen, walls of office in farm, parking area, feed left in pigpen, drinking water, pre-fermented manure, sewage, doorknob / driving seat / gas pedal / tires of shipping truck, shipping truck box, working wear and high boots

- **Tested negative**: walls & floors of non-affected pigpen, post-fermented manure and steering wheel / floor mats of shipping truck
“Under control of affected farm” defined temporarily as a farm in which no clinical symptoms of pigs has been observed for more than two weeks.

In most cases, 1-2 months needed until no clinical symptoms observed.

As of 8 August, 8% (out of 815 farms) are not under control.

Barriers to under control:
- Difficulty with all-out farrowing house
- Difficulty with workers in each pighouse
- Lack of workers’ awareness of biosecurity
- Inappropriate feedback exposure
- Other diseases
- Common facility and equipment in high-density pig farm area
Field survey of elimination of PED virus in affected farms

- **Investigated farm:**
  Two farrow-to-finish operations

- **Methods:**
  PCR test on rectal swab samples from finished pigs

- **Results:**
  For both farms, negative test results around one month after clinical symptoms disappeared
Further actions

- Comprehensive guidelines to be available in September 2014:
  - sharing information among stakeholders
  - biosecurity measures (farms, visitors, slaughterhouses etc.)
  - regional collective activities (regular reporting, emergency disinfection)
  - vaccination

- An interim report of the epidemiological investigation to be published in September 2014

- Budget for next fiscal year to encourage vaccine manufactures to store emergency stocks for sharp demand increase as preparedness
Further actions

- Active surveillance for PEDv circulation

- Full genome sequencing, analysis of the molecular epidemiology of PEDv, experimental infection etc. by the National Institute of Animal Health (NIAH)

- Investigation for introduction of porcine deltacoronavirus (PDCoV) (NIAH)

- Research for more effective PED vaccine (NIAH)
Thank you for your attention
Reference material
# Number of Pig Farm households and pigs in Japan on 1 February

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<tbody>
<tr>
<td><strong>Number of pig farm households</strong></td>
<td>6,890</td>
<td>…</td>
<td>6,010</td>
<td>5,840</td>
<td>5,570</td>
<td>5,270</td>
<td>94.6</td>
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<tr>
<td><strong>Number of pigs (1,000 heads)</strong></td>
<td>9,899</td>
<td>…</td>
<td>9,768</td>
<td>9,735</td>
<td>9,685</td>
<td>9,537</td>
<td>98.5</td>
</tr>
<tr>
<td>For breeding pigs (female) (1,000 heads)</td>
<td>937</td>
<td>…</td>
<td>902</td>
<td>900</td>
<td>900</td>
<td>885</td>
<td>98.4</td>
</tr>
<tr>
<td><strong>Average number of pigs per farm</strong></td>
<td>1,436.7</td>
<td>…</td>
<td>1,625.3</td>
<td>1,667.0</td>
<td>1,738.8</td>
<td>1,809.7</td>
<td>-</td>
</tr>
<tr>
<td>Average number of breeding pigs per farm</td>
<td>158.0</td>
<td>…</td>
<td>176.5</td>
<td>183.7</td>
<td>194.7</td>
<td>206.4</td>
<td>-</td>
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Source: Statistical Survey on Livestock, MAFF
* As 2010 was a Census reference year, surveys of pigs based on the "Statistical Survey on Livestock" were not conducted.

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# Number of Pig Slaughtered in Japan

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</thead>
<tbody>
<tr>
<td><strong>Number of pig slaughtered (1,000 heads)</strong></td>
<td>17,077</td>
<td>16,621</td>
<td>16,508</td>
<td>16,751</td>
<td>16,931</td>
<td>3,955</td>
<td>101.1</td>
</tr>
</tbody>
</table>

Source: Statistics on Meat Marketing, MAFF
Animal Health System in Japan

**Producers**
- Beef cattle: 57,500 farms (2.57 M head)
- Dairy cattle: 18,600 farms (1.40 M head)
- Pigs: 5,270 farms (9.54 M head)
- Layers: 2,560 farms (172 M hens)
- Broilers: 2,380 farms (136 M broilers)
(as of Feb. 1, 2014)

**Prefectural Gov’ts**
- **Livestock Hygiene Service Centers**
  - 170 centers (including disease diagnosis centers)
  - with 2,102 veterinarians
  - (as of Mar. 31, 2014)
  - **(MHLW)**
  - 101 Meat Inspection Centers
  - with 2,580 veterinarians
  - (as of Mar. 31, 2013)

**MAFF**
- Animal Health Division, Food Safety and Consumer Affairs Bureau
- Animal Quarantine Service
  - Head office, 7 branches, 17 sub-branches with 376 animal quarantine officers
  - (as of Apr. 2014)

- National Veterinary Assay Laboratory
- National Institute of Animal Health

**Industrial associations for disease control**

**International organizations (e.g. OIE)**

**National Veterinary Assay Laboratory**

**National Institute of Animal Health**

Location of major facilities for domestic animal health services

- National Institute of Animal Health: 4
- Local Livestock Hygiene Service Centers: 171
  (as of Mar 31, 2014)