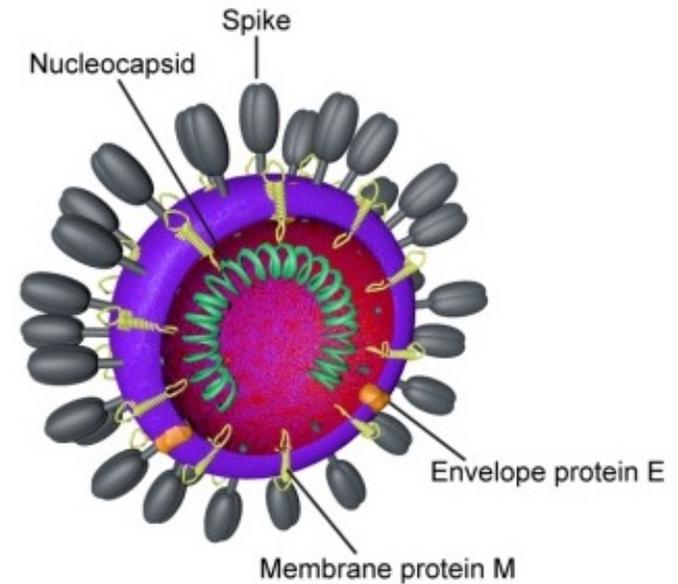


PORCINE EPIDEMIC DIARRRHEA IN SPAIN



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ETIOLOGY



- Family: Coronaviridae
- Enveloped RNA virus

HISTORY AND DISTRIBUTION

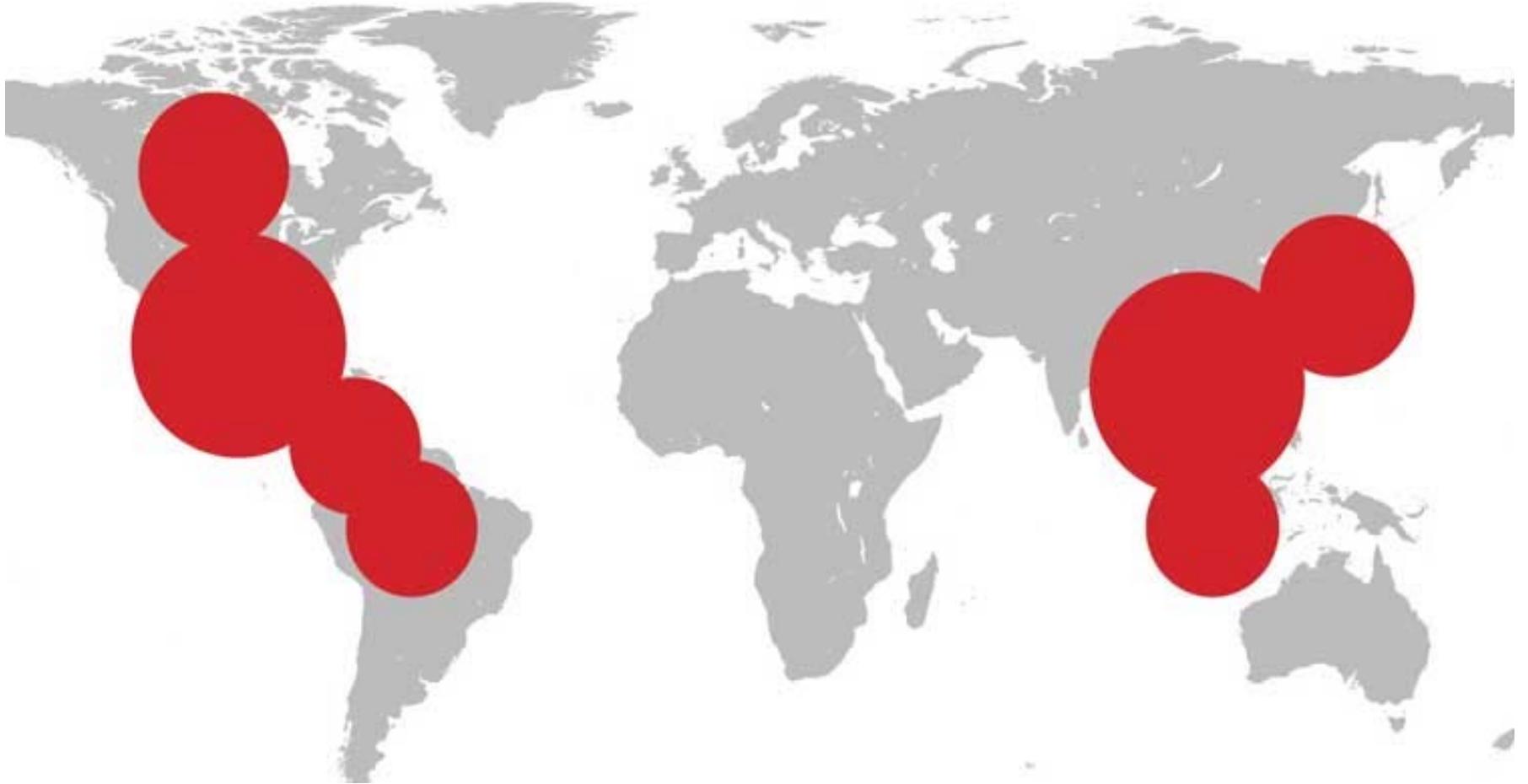
Year	Country	Description
1978	UK	First detection
1978	Belgium	CV777 (piglets mortality)
1983	Japan	Epidemic
1993	Czech Republic	2 farms
1993	Korea	Virus isolation
1994	Belgium	7 farms
1996	Hungary	5,5% detected
2000	Korea	304 cases / 639 farms
2005	China	Isolation LJB/03
2007	Thailand	Epidemic
2008	China	6 viruses isolated
2008	Italy	63 farms
2011	China	Isolation CH/S
2013	USA	Detection April 2013
2013	México	Detection July 2013
2013	Japan	Detection October 2013
2014	Canadá	Detection January 2014
2014	Colombia	Detection March 2014
2014	Dominican Rep.	Detection March 2014
2014	Ecuador	Detection September 2014



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DISTRIBUTION OF NEW VIRULENT STRAINS



PED EVOLUTION IN EUROPE

- The PED was first identified in Europe in the 70s and during the 80s and 90s became prevalent in almost all countries in the European continent.
- Outbreaks of the disease in Europe:
 - ✓ In Spain was observed in the 90s in fattening pigs with low mortality rate.
 - ✓ Since 2000 sporadic outbreaks.
 - ✓ Between 2005 and 2006 there was an outbreak in Italy.
 - ✓ Current events with clinical signs observed in breeder farms with mortalities of 10-25% in un-weaned piglets.
- Deltacoronavirus strain has never been reported in Europe so far.

PEDV IN SPAIN

- PEDV was first detected in 1985.
- In 1992-1994 PEDV was detected in 47% out of the total diarrhea outbreaks where a viral participation was suspected.
- A cross-sectional study for determining the sera-prevalence of porcine epidemic diarrhea virus (PEDV) infection among breeding farms in Spain was carried out during the 90,s (Carvajal et al., 1995. Prev. Vet. Med., 23: 33-40):
 - ✓ 55.9% of herds had at least one positive animal
 - ✓ 29.6% of sera were positive, indicating that the infection was widespread.
- In 2001 a prospective study to investigate the causes of diarrhea in pigs weighting more than 15 kg identified 9 positive farms out of 83 investigated (10.8%).

PED SITUATION IN SPAIN IN THE 00's

- Pigs of all ages affected
- From November to May (winter period)
- Two presentation patterns
 - ✓ most serious epizootic form with mortality in piglets up to 20% (2 weeks)
 - ✓ benign enzootic form
- Depending on the immune status of the herd the symptoms may be more or less evident as well as the economic impact.
- No genotyping studies were carried out



NEW VIRULENT STRAINS

1. Risk factors associated with the introduction of new virus virulent strains

- Imports (live porcine animals, plasma):
From USA y Canada since 2012
(81 / 240 pigs)



MEDIUM RISK

- Transports:
virus sensible to common disinfectants



LOW RISK



2. Possible interaction of new strains and the host

European strains could provide partial immunity to new strains but there is controversy in EU about this matter

COMMISSION IMPLEMENTING REGULATION (EU) No 483/2014 8 May 2014

on protection measures in relation to porcine diarrhoea caused by coronavirus as regards the animal health requirements for the introduction into the Union of spray dried blood and blood plasma of porcine origin intended for the production of feed for farmed porcine animals

- ✓ Porcine coronaviruses are inactivated in swine faeces if heated to 80°C or left at room temperature of 24°C for 2 weeks.
- ✓ In third countries the commonly applied temperature for spray drying of blood and blood plasma is 80°C throughout the substance.



**COMMISSION IMPLEMENTING REGULATION (EU) No 750/2014
10 July 2014**

on protection measures in relation to porcine epidemic diarrhea as regards the animal health requirements for the introduction into the Union of porcine animals

Animals should be accompanied by a health certificate in accordance with the model set out in Annex II to this Regulation which provides for specific guarantees:

- ✓ 40 days before dispatch in a holding with no case PED
- ✓ PCR with negative result within the 7 days before dispatch
- ✓ pigs have not been vaccinated against those viruses



- ✓ Current epidemiological situation PED.
- ✓ Characterization of a new disease caused by Delta coronavirus.
- ✓ Differences between European and other current Alfa coronavirus present in the world, especially the Chinese-American strain that has caused so much damage in USA and possible existence of cross-immunity between these strains.
- ✓ Impact of different strains of the PED (Alfa coronavirus and Delta coronavirus) in different immunological settings.
- ✓ Risk assessment of the different routes of entry of the new Alfa coronavirus and the Delta coronavirus in the EU.

PROTECTION MEASURES IN SPAIN

STRENGTHEN BIOSECURITY AT THE FARMS

- ✓ Limitation of the traffic of people and equipment into the farms
- ✓ Cleaning and disinfection of everything before entering into the farms
- ✓ Enforcing downtime periods after C&D (all in-all out routines)
- ✓ Maintaining a log of visitors and vehicles.
- ✓ Hygienic disposal of dead animals.
- ✓ Proper quarantine of new animals.
- ✓ Staff hygiene measures such as showering where applicable or changing into clean boots and overalls before entering the premises. Special precautions for risk visitors as veterinarians or transporters which should be very careful not to carry the virus between herds on their person, equipment and vehicles.



CLEANING AND DISINFECTION OF LIVESTOCK VEHICLES

- ✓ The cab of the truck, including floor-boards, pedals, steering wheel, gear shift handle, door handles, etc, must be cleaned and disinfected between loads.
- ✓ The trailer must be washed clean and free of any visible manure and disinfected with an appropriate disinfectant used at the correct concentration, during a proper contact time, applied so that all surfaces are covered and allowed to dry completely.



RESEARCHING

ONGOING EXPERIMENTAL STUDIES

➤ European strain *in vivo* experimental infection:



- ✓ BSL 3 facilities
- ✓ 2 Phases of 14 days each / 24 piglets (10 of them control group)
- ✓ Piglets 6 and 21 days of age / Oral inoculation
- ✓ Daily temperature and weight control / daily feces and blood samples
- ✓ 2nd phase inoculation of American strain of previously inoculated animals for the evaluation of the possible cross immunization
- ✓ Anatomopathology study of the surviving animals

➤ American strain *in vivo* experimental infection:



- ✓ BSL 3 facilities
- ✓ 1 Phase of 14 days / 24 piglets (10 of them control group)
- ✓ Piglets 6 and 21 days of age / Oral inoculation
- ✓ Daily temperature and weight control / daily feces and blood samples
- ✓ Anatomopathology study of the surviving animals

OTHER ONGOING STUDIES

- Past and current cases epidemiological assessment based on a epidemiological enquire designed to evaluate the impact of the disease in the farm, the dynamic of the infection and the risk factors involved in the disease presentation (CRESA / DIGES PORC)
- Economical impact assessment: Evaluation of the direct and indirect economical impacts for the pig sector in case the American strain reach our country (ANPROGAPOR)
- Spanish Isolates genotyping study to see similarities or differences among them and between them and the new strains circulating in the USA (DIGES PORC)
- Biosecurity protocol design and implementation for pig farms to prevent the disease entry and to control the disease once the farm has been affected (CRESA)

CONCLUSIONS



- PED is not a Notifiable Disease neither in the EU nor OIE
- PED is present in European farms since the 70s, but little is known about the current prevalence and characteristic of the strains circulating. However no as serious clinical events as the American cases has been reported in the EU.
- There is no information about cross-protection between different strains.
- Virus genotyping can determine the origin of the strains that affect a holding (ongoing studies), but phenotyping is also important.
- Two main goals, strengthen Biosecurity measures on the farms and improve laboratory diagnostic ability.
- Problems regarding trade with third countries: OIE discussion



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THANK YOU FOR YOUR ATTENTION

