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## Swine Vesicular Disease outbreaks in Umbria and Marche Regions (Italy) during 2008-2009 - Focolai di malattia vescicolare suina nelle Regioni Umbria e Marche dal 2008 al 2009

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**Abstract** Swine Vesicular Disease (SVD) Surveillance Plan in Italy is established by Commission Decision 2005/779/EC and its amendments. Main plan activities include serological monitoring using ELISA test. ELISA positive and doubtful samples have to be confirmed by the National Reference Laboratory. On October 17th 2008, based on the Surveillance Plan, a fattening farm located in Umbria Region (Central Italy) was found positive. Since then, 30 new outbreaks were recorded in Umbria and 6 in the near Marche Region. Due to this first outbreak, the Province of Perugia had the suspension of SVD free status. The suspension for an area interested by an SVD outbreak cannot exceed a period of 6 months, otherwise it is converted into a lost of the free status. Therefore Veterinary Services immediately undertook all necessary steps to regain free SVD status, as required by EC 2005/779. Unfortunately a new outbreak (31st) was identified in Umbria on March 24th 2009. For this reason the Regional Veterinary Service and the Ministry of Health agreed upon the possibility to categorize the farms by evaluating the biosecurity measures applied (Annex X of OM April 12th 2008); on these basis it was decided to monitor the high risk farms, only. Epidemiologic status and activities carried out during the epidemics are herein reported.

**Riassunto** Il Piano di Sorveglianza per la Malattia vescicolare dei suini (SVD), è stato istituito con la decisione della Commissione 2005/779/CE e successivi emendamenti. Una delle principali attività del piano comprende il monitoraggio sierologico mediante test ELISA. I campioni ELISA positivi e dubbi sono confermati dal laboratorio nazionale di riferimento. Il 17 ottobre 2008, sulla base del Piano di sorveglianza, un allevamento per l'ingrasso localizzato nella Regione Umbria, è stato trovato positivo. Da allora, 30 nuovi focolai sono stati registrati in Umbria e 6 nella vicina Regione Marche. A causa di questo primo focolaio, la Provincia di Perugia ha avuto la sospensione dello stato di zona indenne da SVD. La sospensione di un'area interessata da un focolaio SVD non può superare un periodo di 6 mesi, altrimenti è convertita in una perdita definitiva di questo stato. I servizi veterinari hanno quindi immediatamente intrapreso tutte le misure necessarie per restaurare lo status SVD free, come richiesto dalla Comunità europea (2005/779). Purtroppo un nuovo focolaio (il trentunesimo) è stato identificato in Umbria il 24 marzo 2009. Per questo motivo il Servizio Veterinario Regionale e il Ministero della Salute hanno concordato sulla possibilità di categorizzare le aziende suinicole, tramite una valutazione delle misure di biosicurezza applicate (allegato X del OM, 12 aprile 2008); su questa base è stata presa la decisione di monitorare solo le aziende ad alto rischio. Lo stato epidemiologico e le attività effettuate durante le epidemie sono di seguito riportate.

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### Introduction

Swine Vesicular Disease (SVD) Surveillance Plan in Italy is established by Commission Decision 2005/779/EC and its amendments (1, 2, 3) and according to the Ministerial Directive – O.M. April 12th, 2008 (4).

Main plan activities include serological monitoring using ELISA test (5), which is rapid and easy to standardize, carried out on all breeding farms, on dealers' premises and on 300 selected fattening farms, according to the National Surveillance Plan (4). ELISA kit is prepared and supplied to each regional laboratory by the National Reference Laboratory (NRL), Istituto Zooprofilattico Sperimentale Lombardia and Emilia Romagna. ELISA positive and doubtful samples have to be confirmed through virus neutralisation (VN) testing carried out by NRL according to the OIE Manual (5).

Information on herd and pig number, spatial distribution of herds and pigs as well as production systems are obtained from National Swine Registry Office. Further data on movement, environmental factors and bio-security measures are gathered during visits to the farms. Case definition, in accordance with the Plan, includes clinical signs and laboratory diagnosis (serological

tests and virus isolation tests). Umbria and Marche Regions are situated in the middle of Italy, between latitudes 42° and 44° N and longitudes 12° and 14° E. Umbria Region is divided in two geographical and administrative provinces: Perugia and Terni. Marche Region is divided in four provinces: Ancona, Ascoli Piceno, Macerata, Pesaro Urbino (Fig. 1).



Figure 1. In green Provinces constituting the Umbria Region and in orange the provinces of Marche Region, are showed

The latest episodes of SVD in Central Italy interested Umbria Region in 2004 and Marche Region in 2007. In the first case 2 outbreaks were reported and 4229 animals stamped out. In the second case one outbreak occurred and 729 pigs were eliminated. Between October 2008 and April 2009, 37 new SVD outbreaks affected both Regions.

The first SVD outbreak in Umbria was reported on October 17th 2008, during ordinary surveillance activities; it occurred in a fattening farm located in the area of Bettona, Province of Perugia. Based on the Surveillance Plan, 47 animals were tested, 31 resulted Elisa positive and were further confirmed by NLR. Faecal samples were PCR tested (5) and found positive. Due to this first outbreak, the Province of Perugia had the suspension of SVD free status. Since then, 30 new outbreaks were recorded in Umbria and 6 in Marche Region by ordinary surveillance activities and by the follow up. No clinical signs of SVD were ever seen in affected farms.

It is well known that the suspension of free status for an area interested by an SVD outbreak, cannot exceed 6 months otherwise it is converted into a lost of the free status. Therefore Veterinary Services in the Province of Perugia immediately undertook all necessary steps to regain free SVD status, as required by EC 2005/779.

Unfortunately a new outbreak (31st) was identified on March 24th 2009 in a fattening unit located in Tuoro, close to Trasimeno Lake (PG). Epidemiologic status and activities carried out during the epidemics are herein reported.

### Materials and methods

The measures immediately applied after the first outbreak are required by Commission Decision 2005/779/EC and its amendments, according to the Italian legislation (O.M. April 12th, 2008). Particularly:

- In the Protection and Surveillance Zone: application of the measures provided for by legislation (DPR 362/92 descending from European Union Council Directive 92/119/EEC);
- In non restriction areas: two serological negative tests in all farms, carried out at 28 – 40 days, on a number of pigs sufficient to establish a 5% prevalence (c.l. 95%);
- An epidemiological investigation, carried out in accordance with Directive 92/119/ EEC
- Communication of the undertaken measures to the European Commission.

On March 23<sup>th</sup>, 2009 the Regional Veterinary Services requested to Italian Ministry of Health to withdraw the suspension status for the Province of Perugia. To this purpose, results of the epidemiologic investigation, showing the lack of any risk of further spreading of the disease, were submitted to the Italian Authorities.

Unfortunately, due to the new outbreak occurred on March 29th 2009, it became necessary re-screening all farms but there was the risk of not testing all farms within the six months period. For this reason the Veterinary Service and Ministry of Health agreed on the possibility to evaluate the health risk of each farm based on the application of biosecurity measures (Annex X of OM 2008. 4.12) and decided to monitor the high risk farms, only.

The following items were considered for risk evaluation: health status for SVD, farm typology, location, adequacy of the structures, animal movements, handling and operation management (Fig 2a and Fig. 2b). Within each item several parameters were considered and a numerical score was assigned to each parameter. At the end, the maximum score for each considered item was the following:

- health status for SVD: 7;
- farm typology: 11;
- location: 30;
- adequacy of the structures: 25;
- animal movements: 51;
- handling and operation management: 76;

Finally, all farms in the Province were divided into 3 categories: low risk herds (score range: 45-120), medium risk herds (score range 121-160) and high risk herds (score range: 161-200).

It was decided to carry out serological surveys in all the pig farms in the new restricted area and in all high and medium risk farms in the rest of the province. By April 29th 2009 more than 7000 serological samples had been checked within one month.

At the end of the epidemic several factors were evaluated: duration, geographic extent, prevalence, attack rate and risk factors including number of animals per herd, farm typology, number of swine herds per 10 Km<sup>2</sup>, total number of pigs per 10 Km<sup>2</sup>. Univariate analysis was performed using Stata software, 9.1. Statistical significance was considered at  $p < 0.05$ .

Category	Criteria	Main Parameters	Score	Secondary Parameters	Score	Farm Score	
HEALTH STATUS for SVD - MAX	Health status pig farm for SVD	SVD free (1)					
		Not SVD free (2)					
		SVD outbreak within the previous 12 months (5)					
FARM TYPOLOGY FARM SCORE: 11	Farm Typology	Outdoor (1)		Weaner Production breeding farm			
				Complete cycle breeding farm			
				Weaner-finishing farm			
				Growing-finishing farm			
		Intensive pig farm (2)		Weaner Production breeding farm			
				Complete cycle breeding farm			
				Weaner-finishing farm			
				Growing-finishing farm			
			Intensive pig farm with external paddock (3)		Weaner Production breeding farm		
					Complete cycle breeding farm		
					Weaner-finishing farm		
					Growing-finishing farm		
Dealers' premises							

Figure 2a. Risk assessment form (an example)

Category	Criteria	Main Parameters	Score	Secondary Parameters	Score	Farm Score	
LOCATION - MAX SCORE: 30	Herd within 3 Km: N°	Up to 5 (1)					
		6-15 (3)					
		> 15 (5)					
	Pigs within 3 Km: N°	Up to 200 (1)					
		200-2000 (3)					
		> 2000 (5)					
	Herd size (n° pigs)	Up to 20 (1)					
		20-100 (2)					
		100-1000 (3)					
		> 1000 (4)					
	Main roads distance (meters)	Up to 50 (4)					
		50-200 (3)					
		200-1000 (2)					
		> 1000 (1)					
	More closed pig farm distance (meters)	Up to 50 (5)					
		50-200 (3)					
		> 200 (1)					
		> 1000 (1)					
Proximity to risk facilities (platform scales, animal dead disposal, ...)	Up to 100 (4)						
	100-500 (2)						
	> 500 (1)						
Proximity to risk plants	Yes (3)						
	No (1)						

Figure 2b. Risk assessment form (an example)

## Result and Discussion

By April 29th 2009 more than 7000 serological samples had been checked within one month. Regional Veterinary Services sent a report on activities carried out to the Ministry of Health, asking for the withdrawal of the suspension order.

On June 3th 2009, Ministerial experts carried out an inspection on the territories affected by the SVD epidemic. On June 9th 2009, Perugia granted again the SVD free status. At present, Regions of Umbria and Marche are considered SVD free. Outbreaks occurred in Umbria during 2008, interested Perugia Province only; 6 of these were primary outbreaks, while 24 were secondary outbreaks. The last outbreak was detected at the end of November 2008. A total of 6613 pig was stamped out. The epidemic curve showed a peak (8 outbreaks) in the 5th week of epidemic. Five of the 8 outbreaks occurred in the municipality of Bettona. The highest number of outbreaks (13/30) was reported in Gubbio municipality. These were all secondary outbreaks and were epidemiologically related to the first two outbreaks occurred in Bettona (animals purchased for home consumption). On the whole, the most affected herds were fattening units (76% of outbreaks). Six secondary outbreaks occurred in Marche Region, during 2008; three of them were recorded in the Province of Ascoli Piceno; two in the Province of Ancona, one in the Province of Pesaro-Urbino. A total of 72 animals was stamped out (see Table 1).

<b>Table 1. Primary and secondary outbreaks in Umbria and Marche Regions, recorded at year end 2008</b>							
Region	provincie	Primary outbreaks	Secondary outbreaks	Breeding herds	FU n.	D n.	Stamped out animals
UMBRIA	PG	6	24	2	25	3	6613
MARCHE	AP	-	3	-	3	-	55
	AN	-	2	-	2	-	13
	PU	-	1	-	1	-	4
Total	6	30	2	1	31	3	6685
PG= Perugia; AP= Ascoli Piceno; AN= Ancona; PU= Pesaro-Urbino; FU= fattening units; D= dealers' premises							

The last outbreak (31st) occurred in Umbria Region during 2009 was classified as a secondary outbreak derived by animal trading from another Italian region. All animals of the farm were stamped out.

Statistical analysis highlighted that the main risk factor associated with the disease was represented by dealers' premises. Number of pigs per herd (> 500 animals/herd), number of swine herds per 10 Km2 (> 5/10 Km2 ) and number of pigs per 10 Km2 (>1000) were statistically significant ( $p < 0.05$ ) (See Table 2a-b-c-d).

<b>Table 2a. Number of animals/herd. Odds ratios (lower and upper limits, LC 95%).</b>				
The affected pigs represented the dependent variable and swine's data represented the independent variables				
Number of animals/herd	OR	CI 95% Min	CI 95% Max	p
< 10	1	-	-	-
11-50	0.97	0.28	3.37	0.96
51-100	2.31	0.29	18.06	0.41
101-500	2.6	0.76	9.43	0.11
> 500	3.6	1.49	8.62	0.002

<b>Table 2b. Farm typology.</b>				
<b>Odds ratios (lower and upper limits, LC 95%).</b>				
The affected pigs represented the dependent variable and swine's data represented the independent variables				
<b>Farm typology</b>	<b>OR</b>	<b>CI 95% Min</b>	<b>CI 95% Max</b>	<b>p</b>
Breeding herds (weaner)	1	-	-	-
Fattening farms	1.82	0.55	6.09	-
Dealers'	122.67	12.84	1172.00	0.000

<b>Table 2c. Swine herds/10 Km<sup>2</sup>.</b>				
<b>Odds ratios (lower and upper limits, LC 95%).</b>				
The affected pigs represented the dependent variable and swine's data represented the independent variables				
<b>Swine herds/10 Km<sup>2</sup></b>	<b>OR</b>	<b>CI 95% Min</b>	<b>CI 95% Max</b>	<b>p</b>
< 5	1	-	-	-
> 5	5.94	2.26	15.64	0.000

<b>Table 2d. Pigs/10 Km<sup>2</sup>.</b>				
<b>Odds ratios (lower and upper limits, LC 95%).</b>				
The affected pigs represented the dependent variable and swine's data represented the independent variables				
<b>Pigs/10 Km<sup>2</sup></b>	<b>OR</b>	<b>CI 95% Min</b>	<b>CI 95% Max</b>	<b>p</b>
< 10	1	-	-	-
10-100	0.61	0.04	9.79	0.72
100-1000	4.42	0.58	33.71	0.12
> 1000	13.31	1.69	104.32	0.001

In Umbria Region, the first SVD outbreak was identified in a territory in-between the municipalities of Cannara, Bastia and Bettona. This area is known to be characterized by high pig farms density many of which breed more than 500 heads. The first positive samples were identified, as in other cases, just during ordinary SVD Surveillance Plan and not because of any clinical symptom referable to SVD. Statistical analysis confirmed that dealers' premises do represent an important critical point in disease spreading because of high and poorly traceable animals turnover. However, the origin of infection remained unknown. Most of positive farms in both the affected Regions, were fattening units.

Due to their role in the production cycle, fattening units should play a limited role in disease spreading. Instead, the traditional trend of some fattening farmers to sell animals not only to slaughterhouses but also to other fattening breeders increases the risk of infection spreading, due to animal movement or subclinical course of infection. The above factors and a general lack in adequate bio-security measures as well as a poor pig registration system are likely to compromise eradication activities.

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