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Lack of evidences supporting the pathogenic role of *Porcine circovirus 3:* an Italian survey.

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The recent discovery of *Porcine circovirus 3* (PCV3) has caused a certain concern among field veterinarians and gathered the attention of the scientific world, likely because of some similarities with *Porcine circovirus 2* (PCV2). Consequently, several manuscripts reporting the detection of PCV3 in presence of different clinical conditions have been published to date (Phan and others 2016; Palinski and others 2016; Shen and others 2017; Ku and others 2017; Faccini and others 2017). However, great *a priori* emphasis has been attributed to the association between PCV3 infections and clinic-pathological conditions, even if few evidences are currently present to sustain this association.
A brief exploratory study is summarized in the current letter: 116 samples (from 17 gilts, 8 sows, 5 foetuses, 13 lactating piglets, 41 weaners, 17 growers and 15 finishers) were collected between 2014 and 2017 from 54 farms located in Northern Italy, and investigated for the presence of PCV3. Specifically, samples (12 oral fluids, 39 lungs, 32 organ pools and 33 sera) from pigs showing clinical signs (n=49) and from healthy animals sampled for monitoring reasons (n=67) were studied. Sample types were equally distributed among asymptomatic and diseased animals with the sole exception of lungs, which were slightly over-represented in diseased pigs. To allow a more robust statistical analysis, clinical signs were classified as respiratory (n=28), systemic (n=14) and reproductive (n=7) problems. All samples were also routinely tested for *Porcine reproductive and respiratory syndrome virus* (PRRSV), PCV2 and *Mycoplasma hyopneumoniae* (Mhyo) using PCR or RT-PCR. PCV3 and PCV2 viral titres were also quantified by real time quantitative PCR.
Forty samples (34.4%) tested PCV3 PCR positive, equally distributed between healthy (n=20) and diseased animals (n=20). A certain trend was observed in the frequency of PCV3 infection among different age categories, with the number of positive detection increasing from piglets to weaners and then declining in older animals. The data analysis revealed no statistical association between PCV3 infection and any clinical condition (Table 1). Moreover, no difference was proven with respect to PCV3 viral titres between animals with and without clinical signs.
Although PCV3 was detected together with several pathogens (including PRRSV, PCV2, Mhyo, *Swine influenza virus*, *Streptococcus suis*, *Actinobacillus pleuropneumoniae*, *Trueperella pyogenes*, *Porcine epidemic diarrhea virus* and *Bordetella bronchiseptica*), no one of these co-infections resulted statistically significant (Table 2). Additionally, no difference in PCV3 titre was found between animals that tested positive or negative to PCV2, PRRSV or Mhyo. Finally, no correlation was demonstrated between PCV2 and PCV3 titres.
This exploratory study is not in line with the putative role of PCV3 as a major threat swine health. Consequently, although the convenience nature of the sampling impedes any definitive conclusion, particular caution should be deserved in claiming the pathogenic role of PCV3.

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Clinical Sign	Negative	Positive	Total
None (control)	47	20	67
Respiratory	15	13	28
Reproductive	5	2	7
Systemic	9	5	14
Total	**76**	**40**	**116**

Table 1. Summary table reporting the number of PCV3 positive and negative samples for each clinical sign category.

		PCV3		
		Negative	**Positive**	**Total**
Mhyo	**Negative**	63	32	95
	Positive	13	8	21
PCV2	**Negative**	2	2	4
	Positive	74	38	112
PRRSV	**Negative**	13	3	16
	Positive	63	37	100
Total		**76**	**40**	**116**

Table 2. Summary table reporting the number of PCV3 positive and negative samples with respect to other common swine pathogens.