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# Porcine circovirus type 2 antibody detection in backyard pigs from Mexico City

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**Abstract**

PCV2 antibodies have been found in pigs from all continents. However, this finding has been mainly studied in domestic swine reared under intensive production conditions. Mexico City, with a human population over 19 million in 2005, has both urban and rural areas. The pig production in its rural area is based on small family backyard farms. Taking into account this rather unique form of rearing pigs, the objective of this study was to determine the seroprevalence in backyard pigs from the rural area of Mexico City. A total of 695 backyard pig serum samples from 108 small family farms belonging to seven municipal areas were studied by immunoperoxidase monolayer assay technique. One hundred six out of the 108 family farms (98.14%) had at least one positive serum sample. On the other hand, 136 (19.57%), 264 (37.99%) and 248 (34.82%) pigs had low, intermediate and high titres to PCV2, respectively. Only 53 samples (7.63%) were negative for PCV2 antibodies. No apparent differences in antibody titre groups were observed among backyard pigs from the different municipal areas. In conclusion, the present study, the first one performed in this kind of extensively produced pigs, indicates that PCV2 is ubiquitous in backyard pigs from Mexico City.


*Keywords:* Porcine circovirus type 2; Backyard pigs; Serology; Mexico City; Extensive pig production

Porcine circovirus type 2 (PCV2) is an agent that infects domestic swine and wild boar, and has been demonstrated as the infectious cause of postweaning multisystemic wasting syndrome (PMWS) (Allan et al., 1998; Ellis et al., 1998; Segalés et al., 2005). PMWS is clinically characterized by growth retardation, respiratory distress, pallor of skin and, occasionally, diarrhoea and icterus (Harding and Clark, 1997). Histopathological analysis of affected pigs indicates lymphocyte depletion together with granulomatous inflammation of varying degrees in lymphoid tissues. PCV2 genome and/or antigen are closely associated to those microscopic lymphoid lesions (Rosell et al., 1999; Sorden, 2000). In fact, lesion severity is correlated with the amount of PCV2 present in lymphoid tissues (Segalés and Domingo, 2002).

PCV2 antibodies have been found in pigs from all continents, usually with very high seroprevalence (Segalés and Domingo, 2002). However, this finding has been mainly studied in domestic swine reared under intensive production (Larochelle et al., 2003; Rose et al., 2003; Sibila et al., 2004; López-Soria et al., 2005) as well as in wild boars under different management conditions (Vicente et al., 2004). Surprisingly, no studies have been performed in domestic pigs under extensive production conditions.

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Mexico City, with a human population over 19 million in 2005, has both urban and rural areas (http://www.infoplease.com/ipa/A0884418.html). The pig production in its rural area is based on small family farms; their size varies from one to twenty pigs in the backyard of the house. In some cases, when the backyard is large enough, the family owns 10 or more pigs. Taking into account this rather unique form of rearing pigs, the aim of this study was to determine whether antibodies to PCV2 were present or not in backyard pigs from the rural area of Mexico City and, in case of positivity, to assess its seroprevalence.

A total of 695 backyard pig serum samples from 108 small family farms belonging to seven municipal areas (Azcapotzalco, Coyoacan, Iztapalapa, Milpa Alta, Tlahuac, Tlalpan and Xochimilco) in the rural area of Mexico City were studied. Samples were taken from January to December of 2004.

PCV2 antibodies were detected by an immunoperoxidase monolayer assay (IPMA) technique (Rodríguez-Arrioja et al., 2000), using serial twofold dilutions (from 1:20 to 1:20,480). Serological results were grouped as negative or positive with a low titre (1:20 to 1:80), intermediate titre (1:320 to 1:1280), and high titre (1:5120 to 1:20,480 or higher) (Rodríguez-Arrioja et al., 2000). Farm size was categorized based on the total number of pigs per farm in small (1–10), medium (11–50) and large (>50) backyard herds. Based on these criteria, small, medium and large farms provided 31.4%, 45.3% and 23.3% of the studied sera, respectively. An independence Chi square statistical test (with SAS software, version 9.1., 2004. SAS Institute Inc., Cary, NC, USA) was used to assess titre differences among municipal areas versus the presence of positive or negative serological values and versus titre level (negative, low, medium or high). Relationships among family farm size versus positivity/negativity and versus titre level were also explored using the same statistical method.

Serological prevalence per municipal area and groups of serological titres are summarized in Table 1. As a whole, 642 out of 695 (92.37%) tested sera had PCV2 antibody titres, while only 53 samples (7.63%) were negative for PCV2 antibodies. No apparent differences in antibody titre groups were observed among backyard pigs from the different municipal areas. One hundred six out of the 108 family farms had at least one positive sample, indicating a farm prevalence of 98.14%. Farm size and its association with groups of PCV2 serological titres are summarized in Table 2. Obtained results indicated that most of the farms, regardless of its size, had mainly intermediate to high PCV2 serological titres. No statistical relationships between municipality area and PCV2 titre level ($P > 0.10$) and between farm size and PCV2 titre level ($P > 0.05$) were observed. Therefore, PCV2 seroprevalence was very similar in small, medium and large sized farms, and similar to those observed in other countries worldwide with pigs reared under intensive production systems (Segalés and Domingo, 2002).

Although PMWS and, therefore, PCV2 infection, has been described in pigs produced intensively in Mexico (Trujano et al., 2001), no information about its epizootiology is available in our country. In fact, the present study corresponds to the first large scale sero-survey for PCV2 in Mexico, and specifically oriented to this very unique production system which is the backyard pig in a very big urban area. Mexico produces 1.09 million tons of pig meat per year (in average), while Mexico City produces around 1.71 tons only (Gallardo et al., 2006). Therefore, taking into account the national pig production, the one produced

Table 1
Number (and percentage over municipality) of serum samples with different PCV2 serological titres in each studied municipal areas of Mexico City

| Municipality of Mexico City | PCV2 serological titre | | | | Total |
|---|---|---|---|---|---|
| | Low | Intermediate | High | Negative | |
| Azcapotzalco | 19 (25.0) | 26 (34.2) | 20 (26.3) | 11 (14.5) | 76 (100) |
| Coyoacan | 1 (8.33) | 5 (41.7) | 6 (50.0) | 0 (0.0) | 12 (100) |
| Iztapalapa | 6 (18.2) | 13 (39.4) | 11 (33.3) | 3 (9.1) | 33 (100) |
| Milpa Alta | 20 (18.4) | 37 (33.9) | 43 (39.4) | 9 (8.3) | 109 (100) |
| Tlahuac | 22 (17.9) | 49 (39.8) | 37 (30.1) | 15 (12.2) | 123 (100) |
| Tlalpan | 46 (21.0) | 87 (39.7) | 81 (37.0) | 5 (2.3) | 219 (100) |
| Xochimilco | 22 (17.9) | 47 (38.2) | 44 (35.8) | 10 (8.1) | 123 (100) |
| Total | 136 (19.6) | 264 (38.0) | 242 (34.8) | 53 (7.6) | 695 (100) |

Table 2
Number (and percentage over farm size) of serum samples with different PCV2 serological titres and different farm size

| Farm size | PCV2 serological titre | | | | Total |
|---|---|---|---|---|---|
| | Low | Intermediate | High | Negative | |
| Small | 46 (21.1) | 81 (37.2) | 83 (38.1) | 8 (3.6) | 218 (100) |
| Medium | 54 (17.1) | 119 (37.8) | 113 (35.9) | 29 (9.2) | 315 (100) |
| Large | 36 (22.2) | 64 (39.5) | 46 (28.4) | 16 (9.9) | 162 (100) |
| Total | 136 (19.6) | 264 (38.0) | 242 (34.8) | 53 (7.6) | 695 (100) |

by Mexico City is rather low, although the number of pigs and farms in this city is very large for an urban area.

Obtained results indicate that PCV2 is widespread among backyard pigs in Mexico City. Taking into account that familiar pig production in Mexico City is characterized by farms with small number of animals, high variation in age structure, different backyard production levels, and apparently minimal interactions among farms, we expected a lower PCV2 serological prevalence. On the other hand, it is currently unknown if PMWS also occurs in those backyard pigs.

In conclusion, the present study, the first one performed in this kind of extensively produced pigs, indicates that PCV2 is ubiquitous in backyard pigs from Mexico City.

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