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Detection of *Neospora caninum* antibodies in beef cattle in Tamaulipas, Mexico. Case report

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ABSTRACT. The objective of this study was to determine whether *Neospora caninum* is prevalent in beef cattle in Tamaulipas (Mexico), using a commercial enzyme-linked immunosorbent assay (ELISA) kit in 182 serum samples from six municipalities with different climates. The overall seroprevalence was 11.9% in animals and 78.6% in herds.

Key words: *Neospora caninum*, beef cattle, bovine abortion.

RESUMEN. El objetivo del presente estudio fue determinar si *Neospora caninum* está presente en bovinos de carne en Tamaulipas (México) usando una prueba comercial de análisis inmunoenzimático (ELISA) en 182 muestras de suero sanguíneo de seis municipios con climas diferentes. La seroprevalencia global fue de 11,9% en animales y 78,6% en hatos.

Palabras clave: *Neospora caninum*, bovinos de carne, aborto bovino.

Neosporosis is one of the major causes of abortion in cattle (Reichel *et al* 2013); it also affects calves (Dubey and Schares 2006). Infections by *Neospora caninum* in ruminants may be horizontally or vertically transmitted; the latter is apparently the most important in herds, although dogs, the definitive hosts, also play a role in its transmission (Regidor-Cerrillo *et al* 2010). This parasite is distributed around the world, affecting both dairy and beef cattle. Worldwide prevalence is high, especially in dairy cattle, with seroprevalence rates close to 100% (Dubey and Schares 2006). In Mexico, the parasite is present in both dairy (Sánchez-Castilleja *et al* 2012) and beef cattle (Morales 2011), in areas with high humidity (Morales 2011).

The state of Tamaulipas is located in Northern Mexico where the beef cattle industry provides a significant source of foreign income. Mexico annually exports over a million head of cattle to the United States, and Tamaulipas is the second cattle-exporting state in the country (Peel *et al* 2010). To our knowledge there are no reports on the prevalence of this parasite in beef cattle in the state; only Salinas-Meléndez *et al* (2005) reported *N. caninum* in dairy cattle in municipalities bordering with Texas.

The objective of this study was to determine whether *N. caninum* is present in beef cattle in the state of Tamaulipas, Mexico.

Blood serum samples were collected from beef cattle of different ages and breeds. Samples were not collected from the entire state, and a non-probabilistic sampling was used to perform the study. Fourteen herds were sampled, distributed in six municipalities in Tamaulipas belonging

to regions with diverse climates: four in the central region of the state (Jiménez, Llera, Soto la Marina and Victoria), one in the highland region (Palmillas), and in the southern region (González). These differences are noteworthy: the towns of Palmillas and Soto la Marina are located at altitudes of 1,290 and 12 meters, respectively, and receive 500-700 and 700-1,000 mm/year of rainfall, respectively.

Serum samples (n=184) were kept frozen (-20 °C) at the Veterinary College, University of Tamaulipas (FMVZ-UAT). A commercial enzyme-linked immunosorbent assay (ELISA) kit was used to detect antibodies against *N. caninum*¹ following the corresponding instructions.

The total number of animals seropositive to *N. caninum* was 22/184, with an overall seroprevalence of 11.9%. All the municipalities providing samples presented at least one seropositive animal (table 1), giving a seroprevalence to *N. caninum* by municipality of 100%, with values per municipality ranging from 7.1 to 21.4% (table 1). Eleven out of the fourteen herds had at least one seropositive case, which gives a prevalence of 78.6% by herd (table 2); the central region had a higher prevalence (77.8%) than the south and highlands (table 2). Seroprevalence by age exhibited different values; the group from 25 to 48 months was negative, whereas the other age groups showed between 11.2 and 50% positive cases (table 3).

In our study, seroprevalence was lower than the 16% found in dairy cows in Northern Mexico (Salinas-Meléndez *et al* 2005) or in other areas (Quintanilla-Gozalo *et al* 1999). The higher seroprevalence reported in dairy cows may be due to higher population density that facilitates oocyst viability and transmission (Anderson *et al* 1994).

The overall seroprevalence of 78.6% in herds and 11.9% in animals found in the present study is similar to other studies. In Uruguay, Bañales *et al* (2006) detected seroprevalences of 69.1% in herds and 13.9% in animals.

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Table 1. Seroprevalence (%) of *Neospora caninum* in beef cattle by municipality in Tamaulipas, Mexico.

	Region and Municipalities						Total
	Southern	Central				Highland	
	González	Victoria	Jiménez	Llera	Soto la Marina	Palmillas	
Samples analysed	53	14	18	14	72	13	184
Positive cases (n)	6	3	2	1	8	2	22
Negative cases (n)	46	11	16	14	64	11	162
Prevalence (%)	11.3	21.4	11.1	7.1	11.1	15.3	11.9

Table 2. Seroprevalence (%) of *Neospora caninum* in beef cattle in Tamaulipas, Mexico, by region and herd.

	Region and municipalities						Total
	Southern Central					Highland	
	González	Victoria	Jiménez	Llera	Soto la Marina	Palmillas	
Herds analysed	3	2	1	1	5	2	14
Positive herds (n)	3	1	1	1	4	1	11
Negative herds (n)	0	1	0	0	1	1	3
Herd Prevalence (%)	50	50	100	100	80	50	78.6
Herd prevalence (%) by region	50		77.8			50	

Table 3. Seroprevalence (%) of *Neospora caninum* by age (months) in beef cattle in Tamaulipas, Mexico.

	Age (months)				
	0-24	25-48	49-72	73-96	97-120
Total samples (n)	142	14	18	4	6
Positive samples (n)	16	0	3	2	1
Prevalence (%)	11.2	0	16.6	50	16.6

In Texas, USA, a state across the border with Tamaulipas, Barling *et al* (2000) reported 13% positive calves. In Southern Mexico, with remarkable climatic differences compared to this study, Garcia-Vazquez *et al* (2009) found 11.6% seropositive cattle.

The seroprevalence in animals up to 24 months of age was similar to that in older animals, suggesting a low risk of horizontal transmission in animals over 2 years old. In this regard, Sanderson *et al* (2000) reported a decrease of antibody titres in cows initially infected vertically, due to absence of later horizontal reinfection. In our case, results suggest that the seroprevalence is mainly due to vertical transmission. The role that this parasite plays in cattle abortions in Northern Mexico remains unknown, as well as its economic impact in the beef cattle industry.

In conclusion, this study establishes immunological evidence for the presence of *N. caninum* in beef cattle in Tamaulipas, suggesting that vertical transmission is the main route of infection. Although only six of 43 municipalities were studied, all of them showed seropositive

animals. Further epidemiological studies are required to expand the knowledge on this parasite and its impact in beef cattle production, and to examine other risk factors such as herd management and the presence of dogs.

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