

# Serological survey of *Neospora caninum* in small ruminants from Pernambuco State, Brazil

Inquérito sorológico de *Neospora caninum* em pequenos ruminantes do Estado de Pernambuco, Brasil

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## Abstract

*Neospora caninum* infection is an important cause of bovine abortion as well as neonatal mortality in goats and sheep. A serological survey for antibodies against *N. caninum* in goats and sheep was carried out in the municipality of Ibimirim, PE, Northeastern Brazil. The immunofluorescence antibody test showed that 26.6% (85/319) of the goats and 64.2% (52/81) of the sheep were positive. Serologic reactivity was associated with age in goats ( $p < 0.01$ ) and sheep ( $p > 0.05$ ), with increasing rates in older animals. These results indicate exposure to *N. caninum* among small ruminants in the study area.

**Keywords:** Coccidiosis, small ruminants, serology.

## Resumo

A infecção por *Neospora caninum* é uma importante causa de abortos em bovinos, assim como mortalidade neonatal em caprinos e ovinos. Uma pesquisa sorológica de anticorpos anti-*N. caninum* foi realizada no município de Ibimirim (PE, Brasil). Os resultados ao teste de imunofluorescência revelaram que 26,6% (85/319) dos caprinos e 64,2% (52/81) dos ovinos foram positivos. A reatividade à sorologia foi associada com a idade nos caprinos ( $p < 0,01$ ) e ovinos ( $p > 0,05$ ), com maior ocorrência nos animais mais velhos. Estes resultados indicam exposição a *N. caninum* entre pequenos ruminantes na área estudada.

**Palavras-chave:** Coccidiose, pequenos ruminantes, sorologia.

Neosporosis is an important parasitic disease caused by *Neospora caninum* (DUBEY, 2003). Intermediate hosts of this agent in its life cycle are goats, sheep and cattle, and definitive hosts are canids (GONDIM et al., 2004).

It is a common and an important cause of abortions, endemic and epidemic, in cattle raise (ANDERSON et al., 1995), but its occurrence in goats and sheep should also be considered, and the parasite has been described associated with births of weak and premature animals (CORBELLINI et al., 2001).

Epidemiological studies carried out in different geographic regions indicate varying prevalence rates in different species, for which the main means of transmission is vertical (DUBEY,

2003). Serological results in goats and sheep from Brazil indicate prevalence rates ranging from 9.2 to 29% (FIGLIUOLO et al., 2004a; ROMANELLI et al., 2007).

The aim of the present study was to determine the prevalence of anti-*N. caninum* antibodies in sheep and goats in the municipality of Ibimirim in the Moxotó Semi-Arid region in the State of Pernambuco, Northeastern Brazil.

Blood samples collected from 319 goats and 81 sheep from 23 properties were studied. Owners were interviewed to obtain information regarding sex, age, management, type of system used and presence of dogs. Age was estimated through the dental arcade when unknown by the owners. Ten percent of the females from each property were studied, including those animals under one year of age, using non-probabilistic convenience methodology (COSTA NETO, 1977). All properties raised goats and sheep.

The indirect fluorescence antibody test (IFAT) was performed to detect anti-*N. caninum* antibodies based on the methods

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**Table 1.** Absolute and relative frequencies of antibodies IgG anti-*Neospora caninum* by indirect fluorescence antibody test in goats and sheep from Ibirimir, State of Pernambuco, Northeastern Brazil, according to animal age.

Goat				Sheep			
Age (years)	Number of animals	Number of positive	Rate (%)	Age (years)	Number of animals	Number of positive	Rate (%)
≤1	86	17	19.8	≤1	12	5	41.7
1-4	132	28	21.2	1-4	49	31	63.3
>4	101	40	39.6	>4	20	16	80.0
Total	319	85	26.6	Total	81	52	64.2

described by Conrad et al. (1993) and Barr et al. (1995) using conjugate anti-goat IgG (Conjugate anti-IgG goat Sigma, USA), and anti-sheep IgG (Conjugate anti-IgG-sheep Sigma, USA), with a cut-off value of 1:50 (DUBEY; LINDSAY, 1996). A reaction was considered positive when tachyzoites showed total peripheral fluorescence (PARÉ et al., 1995).

The data analysis employed the chi-square ( $\chi^2$ ) test, with the level of significance set at 5% ( $p < 0.05$ ) to assess the association with age, sex and presence of anti-*N. caninum* antibodies.

The serological results revealed that 26.6% (85/319) of the goats were positive for anti-*N. caninum* antibodies. This rate is higher than 6.34% found by Figliuolo et al. (2004b) and 17.44% found by Stachissini (2005), both in the State of São Paulo, Southeastern Brazil. These differences may be explained by the use of different serological tests, survey periods, sample sizes and cut-off values. Climatic factors may also affect the abundance of viable parasitic stages in the environment for definitive and intermediate hosts and influence the overall prevalence (FARIA et al., 2007).

With respect to sheep 64.2% (52/81) were positive for anti-*N. caninum* antibodies. This rate is also higher than 9.2% found by Figliuolo et al. (2004a).

According to Dubey (2003), very few studies on the prevalence of infection in small ruminants have been carried out but the reason for a higher prevalence of sheep infection may be correlated to greater susceptibility of the species (DUBEY; LINDSAY, 1996).

It is important to mention that seropositive animals did not present clinical signs suggesting neosporosis. According to Dubey and Lindsay (1996), goats inoculated with *N. caninum* develop infection, but do not develop clinical disease and only protective antibodies are observed.

Despite the higher positive results seen among females, no statistically significant difference was found regarding sex, with 10 males and 127 females positive to *N. caninum*.

Regarding age, a statistically significant difference ( $\chi^2 = 12.82$ ) was found ( $p < 0.01$ ) among goats, with older presenting higher rates than younger animals (Table 1). The same pattern was found in sheep ( $\chi^2 = 4.83$ ), but with no statistically significant difference ( $p > 0.05$ ) (Table 1).

In the farms visited, 81.3% of them had dogs, which facilitates contamination of crops by oocysts eliminated through feces. However information regarding the serological status of the dogs was not available.

The results indicate that *N. caninum* is present in small ruminants of the study area, despite no clinical signs of the disease.

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