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### ***Neospora caninum* Antibodies and its Consequences for Reproductive Characteristics in Wandering Sows from Senegal, West Africa**

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**Abstract:** The aim of this study was to assay *Neospora caninum* antibodies and assess their consequences in terms of reproductive characteristics in wandering sows from Senegal, West Africa. Sera of 60 sows were assayed for antibodies against *N. caninum*. The associations between serostatus and reproductive characteristics were assessed over a period of 3 years (2006-2008). The 58.3% of sera were positive to *N. caninum* antibodies. Some reproductive disorders as age of sow at first birth, annual number of deliveries and stillbirths were significantly associated with serostatus of *N. caninum* ( $p < 0.05$ ). Results of this preliminary study indicate a higher prevalence of *N. caninum* in wandering sows from Senegal and there appeared to be an association between reproductive disorders and seropositivity. Thus, neosporosis may explain the lower reproductive performance in species from Africa. This has to be taken in account in epidemiology and impact of this new disease in African sows.

**Key words:** Wandering sows, *Neospora caninum*, reproductive characteristics, Senegal

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### **INTRODUCTION**

Neosporosis is a worldwide protozoan disease of marine and land mammal species, responsible for substantial reproductive disorders like abortion, neonatal mortality and stillbirth (Hall *et al.*, 2005; Dubey *et al.*, 2007). This protozoan has been misdiagnosed as *Toxoplasma gondii* and is now well described as a specific *Neospora caninum* (Dubey *et al.*, 1988). Many studies have been undertaken to understand the physiopathology of the disease on the foetal death (Almeria *et al.*, 2003; Buxton *et al.*, 1998; Dubey *et al.*, 2006; Williams *et al.*, 2000). The impact of the reproductive disorders has been evaluated on the economic losses in cattle (Reichel and Ellis, 2008).

For other species like domestic pigs (*Sus scrofa f. domestica*), there is now a great interest to investigate and evaluate the impact of this protozoonosis on reproductive performance. In West Africa, pig reproduction is very important for breeding and need to evaluate the prevalence of *N. caninum* and understand the consequences on the reproduction performance.

The aim of this study was to assay *N. caninum* antibodies and assess their consequences on reproductive characteristics in wandering sows from Senegal.

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## MATERIALS AND METHODS

The study was carried out at Kaolack (Latitude 14°08N, Longitude 16°04W), located in the Central-western region of Senegal in West Africa. It's in a tropical area with 2 seasons: dry from November to June and raining from July to October with an average rainfall of 650±50 mm.

Sixty local sows (*Sus scrofa f. domestica*) aged from 5 to 26 months were used for this study. The sows were identified and reared in a traditional manner with table scraps as feeds and drinks from the river. The animals were under veterinary control and any clinical signs of specific disease or pathology were registered.

The study was performed during 3 years (2006-2008) by recording the reproductive performances and parameters.

### Serological Sampling

Blood samples were collected by puncture of the auricular vein using vacutainer tubes without anticoagulant, stored for 1 to 2 h at room temperature and then centrifuged at 1500 x g for 10 min. The sera obtained were stored at -20°C. They were assayed using competitive ELISA Multi-species test (VMRD Inc., Pullman, WA 99163, USA) for *N. caninum* antibodies as previously described and tested by Baszler *et al.* (2001).

All sera were subjected to the same procedure at the Serology Laboratory of the Department of Reproductive Pathology of Nantes National Veterinary School in France.

### Reproductive Characteristics

Reproductive parameters were evaluated by annual number of deliveries, age of first service and age of first birth. All parameters were registered for each sow identified. The reproductive performances were defined from the number of piglets and number of stillbirths obtained annually per each sow.

### Statistical Analysis

The serology results and reproduction characteristics were analyzed by the Chi-square test, using the R-Commander software program (R version 2.6.2; Copyright (C) 2008). The correlation between seropositivity and age of sows or reproductive characteristics was considered statistically significant at  $p < 0.05$  (Ancelle, 2006).

## RESULTS

Sera analysis of 60 wandering sows indicated 58.3% of seropositivity against *N. caninum* antibodies (Table 1). The age of first service was more than 8 months in 61.7% of sows. Among infected females, 77.1% had an age at first birth greater than or equal to 12 months. In general, 82.9% of sows farrowed 1.7 times a year. The serostatus of the sows had an influence on age at first farrowing and on the annual number of deliveries ( $p < 0.05$ ) (Table 2).

The number of piglet per sow was less than 5 in 57.1% of females infected by *N. caninum*. More than two stillborn piglets were recorded in 62.8% of infected females. The stillbirth incidence was influenced by the serostatus of the sows ( $p < 0.05$ ) (Table 2).

Table 1: Seroprevalence of *N. caninum* antibodies among different age\* groups of wandering sows in Senegal

Age (Months)	Sero positive No.	Sero negative No.	Total	p-value
<10	15 (42.9%)	7 (28%)	22	
10-24	13 (37.1%)	10 (40%)	23	
>24	7 (20%)	8 (32%)	15	
Total (%)	35 (58.3%)	25 (41.7%)	60	>0.05

\*Age of sows in January 2006

Table 2: Relationships among seroprevalence of *N. caninum* antibodies and reproductive characteristics in wandering sows in Senegal

<i>N. caninum</i> antibodies	Reproductive parameters						Reproductive performances					
	First service (Month)		First birth (Month)		Annual No. of deliveries/sow		No. of Piglets/sow			Stillbirths/sow		
	<8	≥8	<12	≥12	≤1.7	>1.7	<5	5-7	>7	<1	1-2	>2
Positive (n=35)	13 (37.1%)	22 (62.9%)	8 (22.9%)	27 (77.1%)	29 (82.9%)	6 (17.1%)	20 (57.1%)	9 (25.7%)	6 (17.2%)	5 (14.3%)	8 (22.9%)	22 (62.8%)
Negative (n=25)	10 (40%)	15 (60%)	19 (76%)	6 (24%)	15 (60%)	10 (40%)	9 (36%)	7 (28%)	9 (36%)	7 (28%)	13 (52%)	5 (20%)
Total (n=60)	23 (38.3%)	37 (61.7%)	7 (45%)	33 (55%)	44 (73.3%)	16 (26.7%)	29 (48.3%)	16 (26.7%)	15 (25%)	12 (20%)	21 (35%)	27 (45%)
p-value	>0.05		<0.05		<0.05		>0.05			<0.05		

## DISCUSSION

*Neospora caninum* antibodies were found in sera sows from Senegal in West Africa. In another study, *N. caninum* was observed in 18.1% of wild boars (*Sus scrofa*) in the Czech Republic (Bártová *et al.*, 2006). In domestic pig (*Sus scrofa f. domestica*) breeding farms, *N. caninum* antibodies were observed in 3% of sows (Damriyasa *et al.*, 2004; Wyss *et al.*, 2000) and 8.8% of aborted sows (Helmick *et al.*, 2002). The higher seroprevalence (58.3%) in this study was probably related to the management of local sows such as wandering and drinking from rivers and using table scraps. In this mode of breeding, animals wander daily to research food and water to drink. Thus, they have a high probability of being in contact with parasitic forms of this protozoan which maintain its horizontal transmission. Ould-Amrouche *et al.* (1999) noted that, the use of ponds rather than well or public water supply for drinking water was found to be a risk factor for *N. caninum* infection in dairy cattle. *N. caninum* antibodies were highlighted in wandering dogs (17.1%) from Dakar, in the western region of Senegal (Kamga-Waladjo, personal observations). The infection by *Neospora* oocysts shed by wander dogs or other definitive hosts (Dubey *et al.*, 2007) may explain the transmission to these wandering sows.

The serostatus of the sows had an influence on age at first farrowing and on the annual number of deliveries. Furthermore, the stillbirth incidence was influenced by the serostatus of the sows. It's the first report of *N. caninum* antibodies detected in wandering sows in Senegal.

Although, the number of animals studied was small, results of this preliminary study indicate a higher prevalence of *N. caninum* in wandering sows in Senegal and there appeared to be an association between reproductive characteristics and *N. caninum* seropositivity. Further epidemiological studies are needed to better assess the impact of *N. caninum* on reproductive disorders in wandering and farms sows.

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