

EVIDENCE FOR POSTNATAL TRANSMISSION OF *NEOSPORA CANINUM* IN NINE DUTCH DAIRY HERDS

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Neospora caninum is a protozoan parasite with a worldwide distribution. In many countries *N. caninum* is the most frequently diagnosed cause of bovine abortion. In The Netherlands *N. caninum* is diagnosed in 15 to 20% of the aborted fetuses submitted¹¹. In cattle, congenital transmission of *N. caninum* is an important infection route^{1,3}. However, *N. caninum* infection should disappear eventually from cattle herds without some form of postnatal infection⁶. Few reports on postnatal transmission of *N. caninum* have been published^{3,6}. In two studies postnatal infection was based on the lack of association between dam and daughter seropositivity^{9,10}. In the present study complete herd serology was analyzed in combination with complete herd pedigrees in order to obtain more detailed information on the extent of congenital and postnatal *N. caninum* infection in the herds.

Materials & Methods

Nine dairy herds with a history of *N. caninum*-associated abortions are included in this study. To be selected, a high seroprevalence age group had to be present. Diagnosis of *N. caninum* infection was based on histopathological examination of aborted fetuses and the presence of *N. caninum* antibodies in post abortion sera. Mean number of animals per farm was 122, ranging from 84 to 198. In 8 herds all animals including the calves were sampled, whereas in 1 herd (herd 1) all animals older than 8 months were sampled. All animals were of the Holstein Friesian breed. Pedigrees and birth dates were available for all herds. All blood samples were tested for antibodies to *N. caninum* using an ELISA method developed at the Dutch Animal Health Service. This test had a sensitivity of 98% (95% CI 0.93-1.00) and a specificity of 92%. For each herd, all seropositive and seronegative animals were plotted against the month and year of birth. In addition, all daughter-dam relations were recorded by pedigree analysis. In case of embryo transfer the recipient dams were considered as dams. Association between *N. caninum* serology of daughter and dam was tested using Pearson's chi-square.

Results

Of the 1099 sampled animals 47.0% were seropositive for *N. caninum* ranging per herd from 27.4% to 65.4% (Table 1). In all herds a specific age group that showed a clustering of seropositive animals could be distinguished. This was clearly visualized in the serostatus-by-age graphs (Figure 1). In Table 1, the seroprevalence of the high prevalence age groups in each of these herds was compared with those of the other animals of the herd. From the genealogical analysis it was apparent that these age-clustered seropositive animals predominantly had seronegative dams (Table 2). However, in all herds seropositive dam-daughter pairs were present as well. An overall analysis of the high prevalent age groups in these nine herds showed a lack of association between daughter and dam serology (OR = 0.62, $P=0.28$), contrasting with that of the remaining age groups, in which a strong relationship existed between daughter and dam serology (OR = 11.8, $P<0.0001$).

Table 1. Seroprevalence of *Neospora caninum* for the total herd, the high prevalence group, and the other animals. Age groups are given for the high seroprevalence group.

Herd	Total herd		High prevalence group			Other animals	
	No. animals per herd	Prevalence (%)	No. seropositive animals	Prevalence (%)	Age (months)	No. seropositive animals	Prevalence (%)
1 ¹	84	65.4	17	100.0	23-34	38	56.7
2	106	27.4	13	86.7	32-38	16	17.6
3	110	52.7	51	63.0	>24	7	25.0
4	114	47.4	15	88.2	22-34	39	40.2
5	198	47.0	84	58.7	>9	9	16.4
6	104	58.7	43	79.6	>27	18	36.0
7	151	34.4	22	68.8	23-30	30	25.2
8	129	58.9	56	93.3	12-28	20	29.0
9	103	36.9	19	90.5	23-34	19	23.2
Total	1099	47.0	320	72.6		196	29.8

¹ In herd 1, all animals older than 8 months were sampled. Total herd size was 96 animals. In the other 8 herds all animals were sampled.

Table 2. Serology of *Neospora caninum* of daughter and dam for all nine dairy herds.

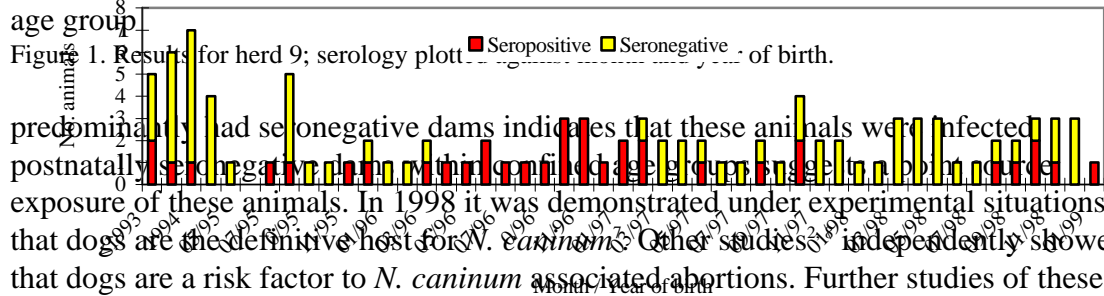
	Daughter + Dam - ¹		Daughter + Dam -		Daughter - Dam -		Daughter - Dam +	
	No.	%	No.	%	No.	%	No.	%
High prevalence group	48	38.4	52	41.6	10	8.0	15	12.0
Other animals	85	28.4	14	4.7	132	44.1	68	22.7

¹ + = *N. caninum* seropositive, - = *N. caninum* seronegative.

Discussion

In this study we present nine herds with neosporosis, which were subjected to a complete herd check for *N. caninum* antibodies. In all herds specific age groups were present that had a relatively high seroprevalence compared with that of the other

animals of the herd. The finding that the seropositive animals in the high prevalence



predominantly had seronegative dams indicates that these animals were infected postnatally seronegative dams in the high prevalence age groups. In 1998 it was demonstrated under experimental situations that dogs are the definitive host for *Neospora caninum*. Other studies independently showed that dogs are a risk factor to *N. caninum* associated abortions. Further studies of these nine herds are in progress and show that postnatal infection is most likely to happen after the introduction of (a) new dog(s)⁴. It is hypothesized that seropositive cattle infected these dogs. Subsequently, dogs may shed oöcysts in their feces. When these dogs defecate near or in the fodder of cattle, postnatal infection of cattle is possible.

References

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