



Neospora Abortion in Cattle

Neospora caninum is a protozoal parasite whose lifecycle includes both the dog (definitive host) and the cow (intermediate host).

Lifecycle

A suggested summary of the lifecycle of *Neospora* is shown in Figure 1 and is composed of definitive and intermediate hosts without both the lifecycle cannot complete, however vertical transmission (from infected dam to calf across the placenta) is thought to be a more significant route of propagation within a herd (Schaes, Peters et al. 1998; Dubey 1999).

The fox has also been demonstrated as acting as a definitive host (Buxton, Maley et al. 1997a; Almeria, Ferrer et al. 2002), however shedding through infected faeces has yet to be conclusively demonstrated – therefore it remains unclear as to whether they can pass infection to cattle.

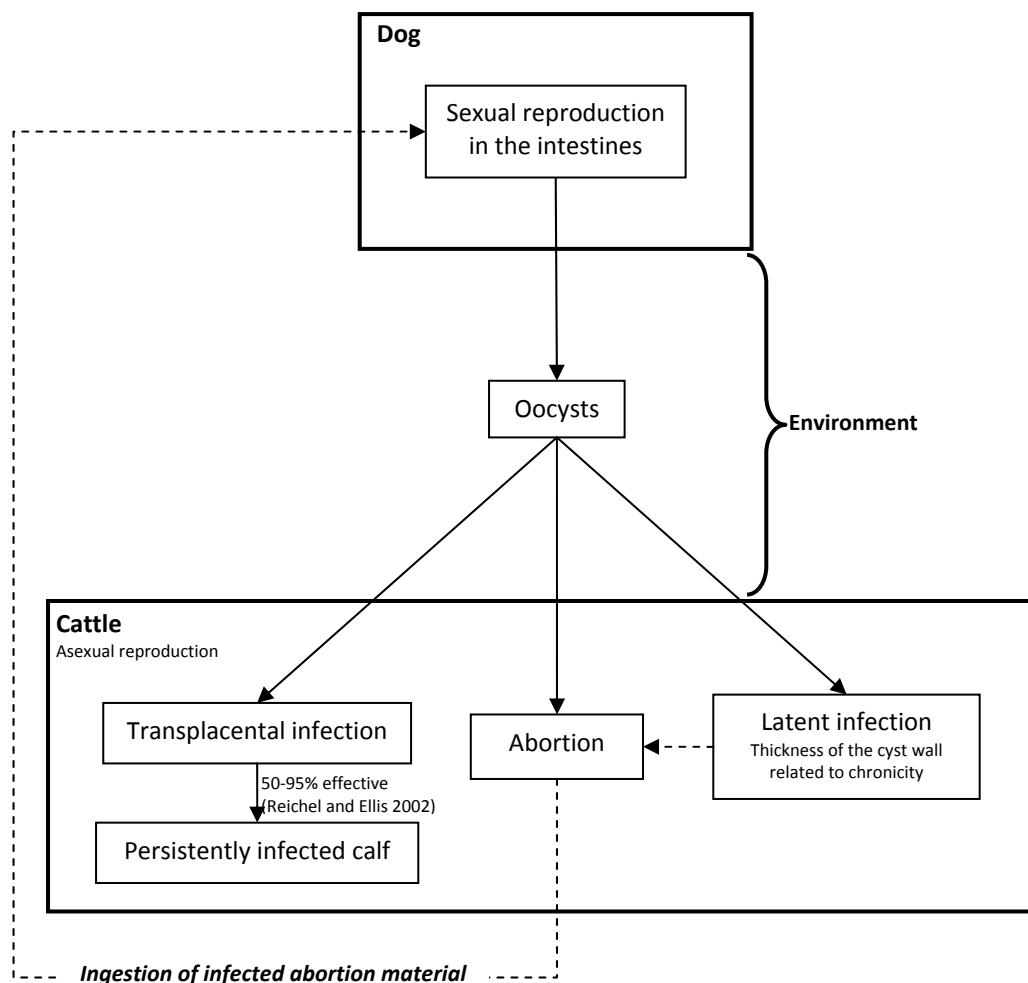


Figure 1 - Suggested lifecycle of *Neospora caninum*, adapted from (Conraths and Gottstein 2007)

Effects of infection

On cattle...

Approximately 15% of cattle infected with *Neospora* will abort (Buxton, Maley et al. 1997b) and it is thought to be more common in cows in their 1st or 2nd lactation, however relatively few animals (<5%) go on to abort for a second time (due to *Neospora*) (Anderson, Palmer et al. 1995).

More significant than this however is that offspring born alive are 50-95% likely to be infected themselves (Reichel and Ellis 2002) and will go on to have a higher risk of abortion themselves, as a result familial lines of *Neospora* infected, aborting animals can be created.

27% of abortions diagnosed in 2008 were attributable to infection with *Neospora* (VLA 2008).

On dogs...

Infection with *Neospora* in dogs is usually asymptomatic, and farm dogs have been shown to be more likely to be infected than urban (Antony and Williamson 2003), however occasionally infection can cause neurological symptoms (Jubb, Kennedy et al. 2007).

Diagnosis

Abortion

Diagnosing abortion due to *Neospora* is relatively accurate (blood sampling at the time of abortion is relatively specific, therefore we can have confidence in a positive, but positive animals do not always abort). To obtain a definitive diagnosis examination of the brain of the aborted calf using special stains is required.

Surveillance/screening

Detecting the number of infected animals (prevalence) is harder to do due to the absence of a complete understanding of the lifecycle of *Neospora* and accuracy varies according to the time of sampling in the lactation cycle.

A better solution for determining the level of infection within a herd is through the sampling of calves aged <2wks. Infection across the placenta is ~90% effective; therefore a positive result from a calf indicates that the dam is infected (to a 90% confidence interval).

Bulk tank sampling can also be used, however the sensitivity of the test makes it only useful in herds with >10-20% of cows infected (Bjorkman and Lunden 1998; Schares, Barwald et al. 2003; Schares, Barwald et al. 2004).

References

- Almeria, S., D. Ferrer, et al. (2002). "Red foxes (*Vulpes vulpes*) are a natural intermediate host of *Neospora caninum*." *Vet Parasitol* **107**(4): 287-94.
- Anderson, M. L., C. W. Palmer, et al. (1995). "Evaluation of abortions in cattle attributable to neosporosis in selected dairy herds in California." *J Am Vet Med Assoc* **207**(9): 1206-10.
- Antony, A. and N. B. Williamson (2003). "Prevalence of antibodies to *Neospora caninum* in dogs of rural or urban origin in central New Zealand." *N Z Vet J* **51**(5): 232-7.
- Bjorkman, C. and A. Lunden (1998). "Application of iscom antigen preparations in ELISAs for diagnosis of *Neospora* and *Toxoplasma* infections." *Int J Parasitol* **28**(1): 187-93.
- Buxton, D., S. W. Maley, et al. (1997a). "Examination of red foxes (*Vulpes vulpes*) from Belgium for antibody to *Neospora caninum* and *Toxoplasma gondii*." *Vet Rec*, **141**(12): 308-309.
- Buxton, D., S. W. Maley, et al. (1997b). "Neosporosis and bovine abortion in Scotland." *Vet Rec*, **141**(25): 649-651.
- Conraths, F. J. and B. Gottstein (2007). Aetiological diagnosis. *Protozoal Abortion in Farm Ruminants*. L. Ortega-Mora, B. Gottstein, F. J. Conraths and D. Buxton, CABI: 42-122.
- Dubey, J. P. (1999). "Neosporosis in cattle: biology and economic impact." *J. Am. Vet. Med. Assoc.* **214**: 1160-1163.
- Jubb, K., P. Kennedy, et al. (2007). *Pathology of Domestic Animals*, Saunders.
- Reichel, M. P. and J. T. Ellis (2002). "Control options for *Neospora caninum* infections in cattle--current state of knowledge." *N Z Vet J* **50**(3): 86-92.
- Schares, G., A. Barwald, et al. (2004). "Potential risk factors for bovine *Neospora caninum* infection in Germany are not under the control of the farmers." *Parasitology* **129**(Pt 3): 301-9.
- Schares, G., A. Barwald, et al. (2003). "Regional distribution of bovine *Neospora caninum* infection in the German state of Rhineland-Palatinate modelled by Logistic regression." *Int J Parasitol* **33**(14): 1631-40.
- Schares, G., M. Peters, et al. (1998). "The efficiency of vertical transmission of *Neospora caninum* in dairy cattle analysed by serological techniques." *Vet Parasitol* **80**(2): 87-98.
- VLA (2008). VIDA Diagnoses, Veterinary Laboratories Agency.