

Circulation: Unrestricted to NFU members

Date: 21/08/09

Ref: PS09/070

Contact: Catherine McLaughlin

Email: Catherine.mclaughlin@nfu.org.uk

Neosporosis

Neosporosis is a condition caused when susceptible animals become infected with a protozoan parasite called *Neospora caninum*. Neosporosis has been found to affect primarily dogs and cattle but can also affect sheep, goats, deer, horses and experimentally rodents, pigs, monkeys and cats. Neosporosis can cause abortion in cattle and dogs.

Neosporosis is an extremely complicated disease and has a complex transmission cycle as demonstrated in Figure 1.

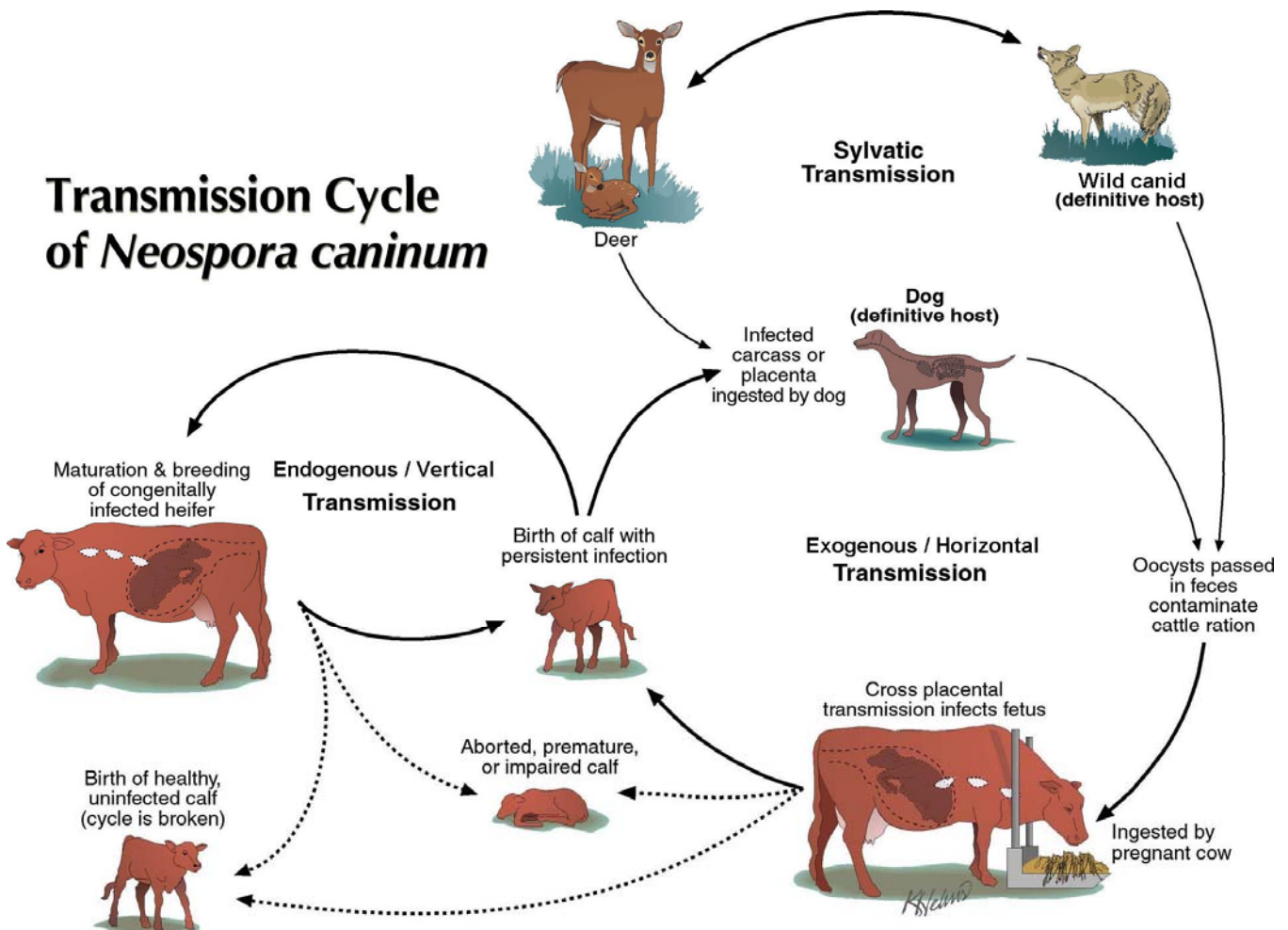


Fig 1: The transmission cycle of *Neospora caninum* (diagram courtesy of Milton McAllister and Kerry Helms)¹. Sylvatic Transmission just means 'of and affecting wild animals'.

¹ Kindly provided by Professor Milton McAllister and Kerry Helms <http://vetmed.illinois.edu/faculty/bath/mmmcalli.html>

The life cycle of *N. caninum* includes intermediate and definitive hosts. Dogs and other canids (such as coyotes) are the definitive hosts. That is, they are the animals in which the parasite becomes sexually mature and reproduces resulting in the shedding of infectious oocytes in the dog or other canids' faeces.

Other animals such as cattle are termed the intermediate hosts. The parasite becomes encapsulated in the intermediate hosts' tissues and can only undergo part of its life cycle in these hosts.

Dogs could become infected through eating *N. caninum* infected tissues such as aborted foetuses, placentas or infected, raw meats.

Cattle may become infected through the ingestion of oocytes that are shed in the faeces of infected dogs (Exogenous or Horizontal Transmission) or by congenital infection (Endogenous or Vertical Transmission) where the parasite passes from mother to foetus via the placenta. The infected cow can pass infection to generations of offspring.

Experimental infection of calves by artificially contaminated milk has also been demonstrated².

Abortion consequences of infection

The consequences of infection in a pregnant animal may be abortion of the foetus, birth of an infected weak or brain damaged calf or a clinically healthy but persistently (seropositive) infected calf. These persistently infected calves can later transmit the parasite to their own offspring, continuing the transmission cycle even in the absence of a definitive host. The parasite has also been identified in bovine semen samples from seropositive bulls but recent research concludes that venereal transmission is unlikely.

It is thought that seropositive animals are 3-7 times more likely to abort than seronegative animals, with congenitally infected heifers being of particularly high risk during their first pregnancy³. The abortion incidence decreases with subsequent pregnancies, suggesting development of maternal immunity in subsequent pregnancies⁴.

It has been estimated that 12.5% of abortions in dairy cattle in England and Wales, i.e. about 6000 per year, may be attributable to *N. caninum* although some abortions due to Neospora may go undetected⁵. Most abortions occur either sporadically on farms with annual abortion rates of less than 3% or as more frequent abortions on farms with annual abortion rates of 5-10%. Occasionally, abortion storms may occur, where rates may reach 60% of cows at risk and may be associated with introduction of infection (horizontal transmission) or by recrudescence of infection in endemically infected herds⁶.

Economic losses caused by Neosporosis in beef and dairy cattle

Besides abortions and infected calves, herds infected with Neosporosis experience losses through⁷:

1. Reduced milk production

There may be a direct loss of milk production associated with abortion but due to extended calving intervals the total milk yield during the production of the cow will also be reduced. Even

² 'The Cattle Compendium' The University of Reading

<http://www.veeru.reading.ac.uk/comp2/Cattleweb/disease/Neospora/neos1.htm>

³ Moredun Research Institute, Parasitology report: 'Neospora caninum: A fascinating relationship between parasite and host',

<http://www.mri.sari.ac.uk/parasitology-reports-12.asp>

⁴ Intervet/Schering-Plough Animal Health <http://www.neosporosis.com/immunology.asp>

⁵ 'The Cattle Compendium', The University of Reading

<http://www.veeru.reading.ac.uk/comp2/Cattleweb/disease/Neospora/neos1.htm>

⁶ 'The Cattle Compendium' The University of Reading

<http://www.veeru.reading.ac.uk/comp2/Cattleweb/disease/Neospora/neos1.htm>

⁷ Intervet/Schering-Plough Animal Health <http://www.neosporosis.com/economic-losses.asp>

in the absence of abortion a decreased milk production has been noted in seropositive cows. In some cases 3-4% reduction in milk yield has been observed.

2. Poor reproductive performance

Experimental infection with *N. caninum* has been shown to cause high levels of embryo mortality. There is no clear information about the extent of embryo losses in field conditions however due to *N. caninum*.

3. Increased culling rates

A higher culling rate of *N. caninum* seropositive cows is associated with abortion and decreased milk production.

4. Reduced post-weaning weight gain and feed conversion efficacy

Significant decreases in post-weaning weight gain, carcass weight and economic return has been associated with beef calves that are seropositive for Neosporosis.

Control and prevention of Neosporosis

There is no licensed vaccine available in the UK for use against Neosporosis and no medicinal cure.

It is important that farmers consult their vet to establish the status of their cattle herd regarding freedom from Neosporosis. This could involve blood testing and post-mortem investigations of any perinatal calf deaths or aborted fetuses. Blood sampling is most effective in young calves within their first 3 weeks of life as an indicator of the dam's infectivity status. Blood testing of the dams is often difficult to interpret.

With uninfected herds, strict biosecurity to prevent disease entry should be a priority. If farmers are buying in replacement breeding stock, the health status of the animals before purchase should be queried. The risk of horizontal transmission should be reduced as much as possible (see below).

With infected herds, the aims should be to prevent abortion and to reduce the risk of both horizontal and vertical transmission. To prevent vertical transmission, farmers could consider blood testing all breeding cows and heifers although as mentioned above, blood testing of the calf within the first 3 weeks of life is the best way to establish the infectivity of the dam. Whether you use any animals that you identify in this way as being seropositive for breeding purposes is a decision that you must take with your vet and in consideration of individual production factors such as availability of replacements, milk production potential, genetic merit, etc. One option that may be appropriate to a dairy farm for instance would be serving seropositive animals to a beef bull thereby lessening the infectivity potential of dairy replacements. Understanding the risk and knowing how to work with it, having identified these potential disease reservoirs, may be enough for an individual farm business.

Horizontal transmission can be prevented or controlled by following some basic rules:

- Keep dogs away from cattle feed and water, feed storage areas and feeding troughs
- Dispose of any aborted fetuses, placental tissue or dead calves which may be harbouring infection. Dogs should not be allowed to eat these.
- Do not feed raw bovine meat to farm dogs.

Whilst farmers cannot prevent dog walkers from using rights of way which may go through cattle or livestock grazing fields, signs asking dog owners to pick up after their dogs for disease control purposes could be posted at field entrances.