Parasite Control leaflet series

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Contributing to a profitable and sustainable farming and agri-food sector through improved animal health

Neospora caninum

A guide for Farmers and Vets

PARASITE CONTROL LEAFLET SERIES VETGUIDE V1.1 JULY 2017

PARASITE CONTROL PROGRAMME

Parasite Control
Animal Health Ireland.ie

Animal Health Ireland, 4-5 The Archways, Carrick-on-Shannon, Co. Leitrim, N41 WN27

AHI gratefully acknowledges the financial and other contributions of our stakeholders.

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Introduction / Economic importance

The microscopic parasite *Neospora caninum* is a major cause of abortion in both dairy and beef cattle in Ireland and worldwide. Ferris (2003, PhD thesis, University of Wales, Bangor) found that 15.5% of 5785 recently aborted Irish foetuses had been exposed to *Neospora* and he estimated that about 9% of all bovine abortions in Ireland were the result of neosporosis.

Neospora is particularly serious because infected animals remain infected for life. They may abort more than once; any live full term calves they produce may be born infected, allowing infection to be passed from generation to generation.

Economic losses due to infection with *Neospora* include the potential value of aborted calves, retention of barren suckler cows, premature culling of breeding animals and consequent increased replacement rates, reduced value of high genetic merit animals and loss of milk associated with abortion.

Life Cycle of *Neospora caninum*

Neospora caninum is a microscopic parasite that causes abortion in cattle. It is related to *Toxoplasma*, which causes abortion in sheep. The life cycle of *Neospora* involves stages in both cattle and dogs.

Cattle can become infected with *Neospora* in two ways:

1. **From their mothers[1]:** the offspring of an infected dam becomes infected while still in the womb.
2. **From dog faeces[2]:** Cattle may become infected by ingesting feed or water contaminated by *Neospora* oocysts (eggs) in the faeces of an infected dog. Once infected, a dog will remain infected for life, but typically it passes oocysts in its faeces (i.e. is capable of infecting cattle) for only a short period (up to a few weeks) after acquiring the initial infection.

About 90% of infected cattle contract the infection from their dams while only about 10% are infected by eating or drinking feed or water contaminated with infected dog faeces.

There is no evidence that cattle can be directly infected by contact with an animal aborting due to *Neospora* or by venereal spread from an infected bull.

Dogs can be infected by ingesting placental tissue, foetuses, uterine fluids or dead animals infected with *Neospora*.

Even if a calf is born alive and full term it may be already infected with the *Neospora* parasite and may abort in later life.

Bovine infection with *Neospora* usually results in either abortion or the birth of a full-term, apparently healthy calf that is congenitally infected with *Neospora*. When *Neospora*-infected calves are retained as replacement heifers, they are more likely to abort in subsequent pregnancies than uninfected heifers or cows. Occasionally, an infected animal gives birth to a normal, non-infected calf, thus breaking the transmission cycle. The *Neospora* parasite life cycle is summarised in Figure 1.

[1] Also known as congenital infection, transplacental transmission or vertical transmission.

[2] Also known as post-natal infection, oral transmission or horizontal transmission.

Simplified life-cycle of *Neospora*

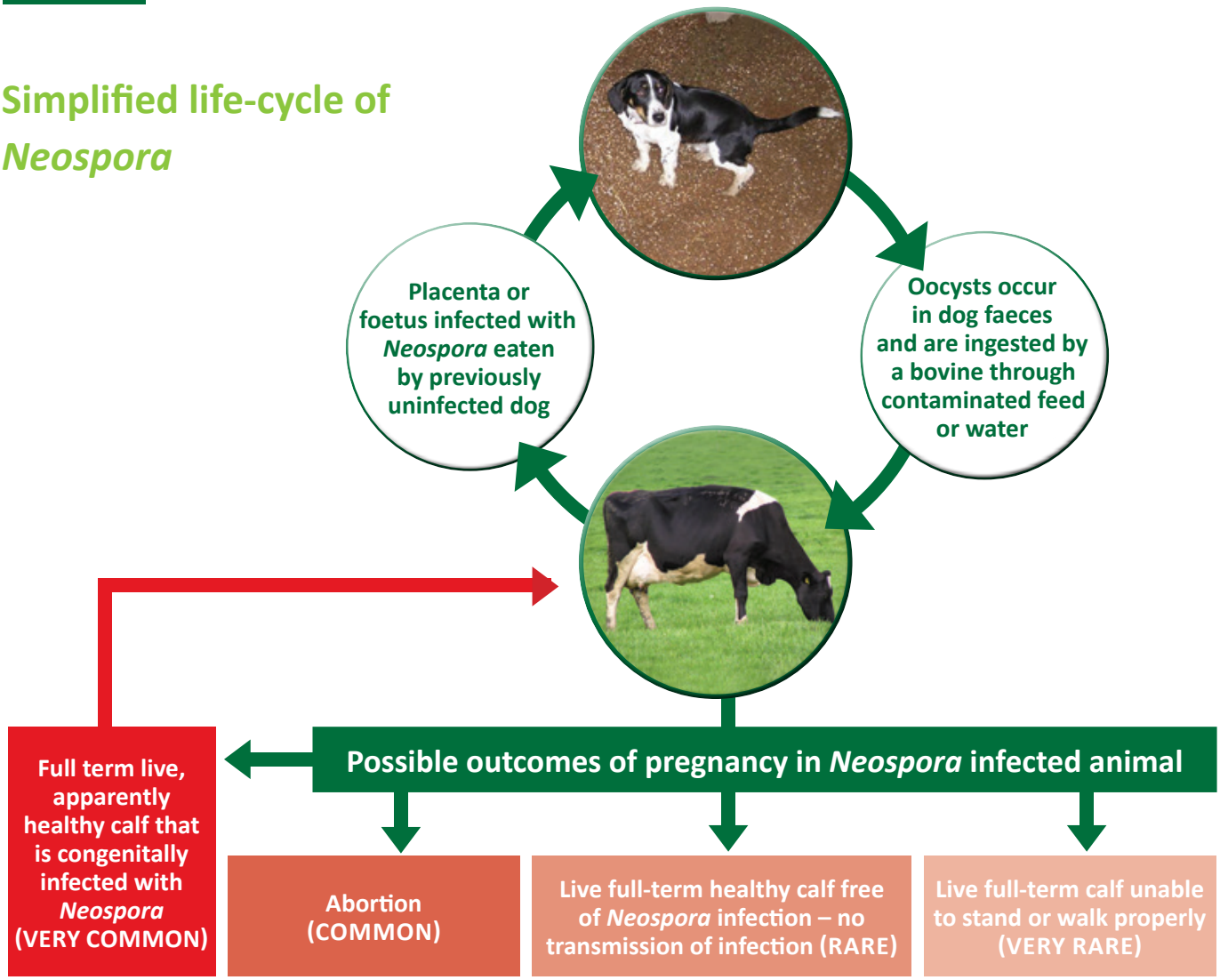

Figure 1. Simplified life-cycle of *Neospora*

Note: Dogs are the only recognised definitive host for *Neospora caninum* in Ireland and the U.K. There is no conclusive evidence that other species- including foxes- are involved in spreading infection.

Clinical signs of *Neospora* infection in cattle

- Abortion is the main clinical sign. It can occur at any stage of pregnancy but often peaks at 5 to 6 months of gestation. Aborting animals do not usually show any other clinical signs of disease.
- *Neospora* may be associated with sporadic abortions or occasionally with abortion storms in which up to a third of a group of pregnant animals abort over two to three weeks.
- Infected animals may abort more than once – not necessarily in consecutive pregnancies.
- Early abortions caused by *Neospora* may appear as service returns in animals thought to be in-calf, as the embryo/foetus is rarely found.
- Mummification – the birth of a shrivelled or dried-out foetus – can occur if the foetus dies in the womb but is not expelled for some time (weeks or months).
- If animals infected with *Neospora* do not abort, there is a high probability that their offspring, although full-term and appearing healthy, will be infected with *Neospora* when born (congenital infection).
- Rarely, infected calves may be born with nervous signs including flexion (contracted tendons) or hyperextension of joints, incoordination or inability to stand.

Diagnosis

Neosporosis can be suspected on clinical grounds but requires laboratory examination for confirmation.

- *Neospora* abortion may be suspected if abortions occur at 5 to 6 months gestation or if foetuses are mummified or if animals that were pregnant return to service some months after breeding.
- Suitable samples to submit to the laboratory for testing for *Neospora* infection include:
  - Aborted foetuses and placentas.
  - Blood samples from animals that aborted and from other non-aborting animals in the group.
  - Milk samples from bulk milk tank or from individual animals.
  - The more samples that are submitted, the greater the chance of a correct diagnosis.
- The interpretation of the results from neosporosis tests is complicated. Selection of tests used, samples to be submitted and interpretation of results should be done in conjunction with a veterinary practitioner and a diagnostic laboratory.
- Even if neosporosis has been previously diagnosed, it is vital that as many abortions as possible in each herd are investigated fully by a laboratory as agents other than *Neospora* may also cause abortions in an animal or herd infected with *Neospora.*
- Antibodies to *Neospora* fluctuate at various stages of the reproductive cycle and blood and milk tests may give negative results at certain times in infected animals. Antibodies are at their highest about 10 to 4 weeks before calving. The usefulness of individual milk testing is reduced as many cows are dry when antibodies are highest.
- A negative bulk milk test for neosporosis does not necessarily mean that the herd is free from infection as a negative result can be obtained when 10-20% of the animals contributing milk to the tank are *Neospora*-positive.
- Any animals negative on a pre-breeding or pre-purchase blood test should be retested 10 to 4 weeks before calving (ideally over two pregnancies) to confirm that they are free of infection.

Laboratory investigation of all abortions

In the investigation of any abortion, the foetus, placenta and a maternal blood sample should be submitted for laboratory examination.

There is a statutory obligation to check every bovine abortion for brucellosis by submitting a foetus or placenta for laboratory examination or by submitting a maternal blood sample for brucellosis testing.

Even when *Neospora* infection is known to be widespread in a herd, it cannot be assumed that all abortions are due to this agent. The cause of any abortions that occur in a herd should be investigated.

Treatment

At present, there is no practical treatment for infection with the *Neospora* parasite in cattle or dogs.

Vaccination

There is currently no cattle or dog vaccine against neosporosis licensed in the European Union.

Zoonotic importance

Neospora (unlike *Toxoplasma*) does not cause disease in humans.

Prevention

The following biosecurity precautions, designed to prevent the entry and spread of neosporosis, should be implemented on all farms, whether or not neosporosis has previously been diagnosed.

THE LINK BETWEEN DOGS AND CATTLE SHOULD BE BROKEN:

a) By minimising the risk of cattle ingesting dog faeces:

- Dog faeces should not be allowed to contaminate drinking water, concentrate feed, pasture or conserved forages used by cattle.
  - Dogs should not have access to areas where cattle feed is stored or where cattle are fed.
  - Farmers should seek assurance from feed suppliers that dogs have not had access to feed ingredients.
  - Dog faeces should be picked up and disposed of so that cattle are not exposed to them. This applies both to farm dogs and to any other dogs – pets, greyhounds, gundogs, packs of hounds or stray dogs- that may cross the land.

Dogs should be kept away from where cattle are fed in order to remove the possible risk of contamination of cattle feed with canine faeces.

b) By avoiding contact between dogs and placentas, foetuses, carcases:

- Foetuses and placentas should be collected and disposed of so that dogs cannot access them. Dogs should not be fed raw meat or allowed to scavenge carcases of animals of any age because animals that have not aborted could also be infected for life with ***Neospora***.

Note: There is no practical way of testing dogs to check if they are infectious and a risk to cattle.

PREVENT TRANSMISSION FROM MOTHER TO HER CALF IN THE WOMB (VERTICAL TRANSMISSION)

The purchase of female breeding stock infected with ***Neospora*** should be avoided

- By keeping either a completely closed herd, or
- By not purchasing any female breeding stock, or
- By purchasing cattle only from *Neospora*-negative herds.
- If female animals are being purchased, they should be blood tested for *Neospora* antibodies but a negative test does not guarantee freedom from infection. If the dam of a negative animal also tests negative, it increases the likelihood that the daughter is truly negative. Antibodies are at their highest about 10 to 4 weeks before calving so animals found negative when non-pregnant or in early pregnancy should be retested at this time to confirm negative status.

Control

- **The first step in controlling neosporosis in an infected herd is to follow the biosecurity measures listed above under "Prevention**".
- There is no need to get rid of existing farm dogs. Even if one of these had been the source of the *Neospora* infection, it should have stopped shedding oocysts by the time abortions started. Following infection, dogs will shed once for around three weeks, and do not usually shed oocysts again.
- If *Neospora* is diagnosed in a particular animal, at a minimum, any relatives remaining in the herd (grand-dam, dam, siblings and progeny-male or female) should be tested to see if vertical transmission has occurred.
- If blood testing all the breeding stock to establish the level of *Neospora* infection in the herd or to confirm freedom from infection, animals should be blood tested 10 to 4 weeks before calving. Negative animals need a second test 10 to 4 weeks before calving the following year to confirm freedom from disease.

Actions in positive herds

- In herds with a low prevalence of *Neospora*-positive animals, all positive animals should be culled. As neosporosis is not spread from cow to cow, culling of lactating animals may be delayed until the end of lactation.
- In herds with a high prevalence of *Neospora*-positive animals, positive animals may be culled over a few years, giving priority to removing positive animals that aborted.
  - Positive animals that are maintained in the breeding herd (dairy or suckler) should be put in calf to beef bulls and the progeny fattened and slaughtered and not used for breeding. **It is important that positive animals should not be sold to other breeding herds.**
  - Replacement heifers should be blood-tested for neosporosis before breeding and only negative animals should be used for breeding; positive animals should be fattened and slaughtered. Negative animals should be retested 10 to 4 weeks before expected calving date to confirm freedom from infection.

  Embryo Transfer: If embryos are obtained from *Neospora*-positive animals and transferred into *Neospora*-negative recipient animals, the progeny will be *Neospora*-negative.

Neospora is a leading cause of abortion in Ireland. Careful management is required to keep it out of uninfected herds and control measures should be implemented in infected herds.

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