Updates on Neospora caninum - Economical impact

Santos T.1, Simões R.1, Mateus T. 1,2,3,4, Lopes A. 1,5

1 Departamento de Medicina Veterinária, Escola Universitária Vasco da Gama, Coimbra, Portugal
2 Escola Superior Agrária de Ponte de Lima, Instituto Politécnico de Viana do Castelo, Ponte de Lima, Portugal
3 EpiUnit, Instituto de Saúde Pública da Universidade do Porto, Porto, Portugal
4 CECA V - Centro de Estudos em Ciência Animal e Veterinária, Universidade de Trás-os-Montes e Alto Douro, Vila Real, Portugal
5 Centro de Química da Universidade de Coimbra

Abstract

Neosporosis is a parasitic disease caused by Neospora caninum. This protozoosis has an elevated economic impact due its association with abortion in livestock species. The domestic and wild canids excrete infective forms over rural and urban environment, and the cattle become infected by grass feeding. During pregnancy the parasite crosses the placental barrier and infects fetus leading to abortion, neonatal death or weak calves. Animals with congenital infection are asymptomatic but still convey the parasite to the progeny which is a critical commercial issue when infected heifers are introduced on non-infected farms. This protozoozis has an economic relevance where infective oocyst from the canids are taken inside livestock activities. The theoretical asymmetries on economic losses between effective situated over different environments are not that perceptible. Wild life study and hygienic strategies are central on neosporosis impairment.

INTRODUCTION

Neosporosis is a worldwide protozoan infection with countless economic impact on livestock species especially of milk production, since it is a major cause of miscarriage. The dog is the definitive host of this disease. In these animals the parasite mainly affects the neuromuscular system (Schares and Dubey, 2011), and unlike what is observed in farm animals, clinical cases of canine Neosporosis tend to be sporadic (Reichel et al., 2007). Epidemiological and economic relevance stems from environmental contamination and infection of animals entering the food chain. Depending on the number of abortions per animal and effective, we can classify the magnitude of the disease in sporadic, epidemic and endemic. The epidemic neosporosis has a high economic impact, as it is associated with pregnancy loss higher than 10%. The endemic cases can also be translated into economic losses, however, in smaller scale (Hall et al., 2005). Cows infected with N. caninum manifest risk of miscarriage from 1.7 to 7.4 times higher compared to an uninfected female (Thurmond and Hietala, 1997b; Moen et al., 1998). This disease was portrayed for the first time in Portugal in 2001 and since then have been studies on dairy farms in the center and north of the country to assess the impact of neosporosis in abortion frequency. In 36% of abortions it was diagnosed N. caninum (Canada et al., 2004).

TRANSMISSION WITHIN THE CATTLE

It ay occurs vertical or horizontal transmission. In the horizontal transmission the intermediate host is infected by ingestion of oocysts, when exposed to environments contaminated by the definitive host (domestic canines and coyotes).

ECONOMIC IMPACT

The high economical losses are associated with direct and indirect costs. In direct costs we can include:

- Decrease of milk production (Thurmond and Hietala, 1997b), although there are some reports about seropositive animals with high milk production (Pfeiffer et al., 2002; Hall et al.- 2005);
- Loss of genetic material;
- Increase of the investment cost, related with purchase of replacement heifers, because of the high transmission of the parasite between the mother and the calves is efficient in 75-100% of the cases (Paré et al., 1996; Anderson et al., 1997; Schares et al., 1998; Björkman et al., 2003; Hall et al., 2005) and the objective is to recover an healthy effective. On the other hand, the neonatal transmission is efficient in 10% of the cases (Paré et al., 1996, 1997; Davison et al., 1999b; Hietala and Thurmond, 1999; Hall et al., 2005); Possibility of early fetal death, that might cause an increase of time to conception (that also reduce milk production) or permanent infertility; Increase in the number of abortions. Studies made at New Zealand and Australia concluded that the prevalence of abortions is three times higher in cattle with infected animals (Moen et al., 1998; Thurmond et al., 1997; Wounda et al., 1998). On the other hand the indirect costs are related with:
- Need for veterinary services;
- Definitive diagnosis of the cause of abortion;
- Need to make new inseminations;
• Slaughter of seropositive animals. Due to the increased costs with the veterinary services (Barling et al., 2000) and the reduction in growth ratios (Barling et al., 2000, 2001) has been implemented an early culling plan in seropositive bovines.

To avoid the direct costs, it was developed some strategies like treatment of infected animals and/or vaccination. Although there are the possibility of the treatment with toltrazuril, this strategy is not usually used, because is needed six administration (once a day), which has an estimated cost of 346,616€ for an animal of 500kg. In addition to the cost, which is no longer viable to the economical impact, the pharmacokinetics of this substance causes a decrease of milk production, which means an estimated loss of 10 to 18 cents per liter of milk. However, the treatment presents efficiency about 90% (Kritzner et al., 2002).

The vaccination might be done through a formulation that presents in composition live attenuated tachyzoites of Toxoplasma gondii, due to the close relationship between this one and N. caninum. However, T. gondii and N. caninum are different and, nowadays it was already proved that the vaccination is only effective with a mixture of parasite antigens, but there is no vaccination available yet to prevent with high efficacy the neosporosis (M. Thierry, D Karim, H. Andrew, 2011).

There are other costs related to diagnostic and control of infected animals. Regarding to the diagnostic, there costs because due to the serological tests that has to be done to gather epidemiological data and to control the impact of the infection at the cattle (Dubey et al., 1996). Since the vertical transmission is the most frequent (about 95%), and since is considered that the most newborn with congenital infection born alive and healthy, the diagnosis might be done through a research of antibody in this animals. In adults, there are some variations of the antibody title. On the other hand, the capacity of response is less specific and efficient, which occasionally can lead to a conversion of the results: infected cows might be seen as seronegatives.

The preferred diagnostic test is the ELISA, due to is high sensibility and specificity to detect antibodies (Parè et al., 1995; Osawa et al., 1998).

**CONCLUSION**

During this work was possible to conclude that the neosporosis is a disease that affects the urban and the rural animals. The urban neosporosis is demonstrated as a clinical disease in a definitive host, the dog. The treatment of the dogs is possible but expensive, and since the cases in dogs are occasional, there are no relevant economical risks, comparing to other infectious diseases. However, as definitive hosts they are mainly asymptomatic, which is a risk of contamination to cattle.

The rural neosporosis might be or not related to urban neosporosis and is demonstrated as a disease in intermediate hosts. The costs related to bovine infection can have some interpretations. If there is no treatment or prevention, there are no costs in this intervention, but, otherwise there will be a lot of economical losses due to abortion and the decrease of the reproductive productivity in infected cows. If there is treatment or prevention, there are costs related with this intervention and with the loss of selling milk, but the economical losses due to abortion and decrease of the reproductive productivity of the cows doesn’t exist.

**REFERENCES**

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