REFERENCES

Adler, B. and de la Pena Moctezuma, A. 2010. Leptospira and leptospirosis. *Vet Microbiol,* 140, 287-296.

Aguado-Martinez, A., Alvarez-Garcia, G., Arnaiz-Seco, I., Innes, E. and Ortega-Mora, L. M. 2005. Use of avidity enzyme-linked immunosorbent assay and avidity Western blot to discriminate between acute and chronic *Neospora caninum* infection in cattle. *J Vet Diagn Invest,* 17, 442-450.

_____, Alvarez-Garcia, G., Fernandez-Garcia, A., Risco-Castillo, V., Arnaiz-Seco, I., Rebordosa-Trigueros, X., Navarro-Lozano, V. and Ortega-Mora, L. M. 2008. Usefulness of rNcGRA7- and rNcSAG4-based ELISA tests for distinguishing primo-infection, recrudescence, and chronic bovine neosporosis. *Vet Parasitol,* 157, 182-195.

_____, Alvarez-Garcia, G., Fernandez-Garcia, A., Risco-Castillo, V., Marugan-Hernandez, V. and Ortega-Mora, L. M. 2009. Failure of a vaccine using immunogenic recombinant proteins rNcSAG4 and rNcGRA7 against neosporosis in mice. *Vaccine,* 27, 7331-7338.

Aguiar, D. M., Cavalcante, G. T., Rodrigues, A. A., Labruna, M. B., Camargo, L. M., Camargo, E. P. and Gennari, S. M. 2006. Prevalence of anti-*Neospora caninum* antibodies in cattle and dogs from Western Amazon, Brazil, in association with some possible risk factors. *Vet Parasitol,* 142, 71-77.

Akca, A., Gokce, H. I., Guy, C. S., McGarry, J. W. and Williams, D. J. 2005. Prevalence of antibodies to *Neospora caninum* in local and imported cattle breeds in the Kars province of Turkey. *Res Vet Sci,* 78, 123-126.

Al-Qassab, S., Reichel, M. P., Ivens, A. and Ellis, J. T. 2009. Genetic diversity amongst isolates of *Neospora caninum*, and the development of a multiplex assay for the detection of distinct strains. *Mol Cell Probes,* 23, 132-139.

Al-Qassab, S., Reichel, M. P. and Ellis, J. 2010. A second generation multiplex PCR for typing strains of *Neospora caninum* using six DNA targets. *Mol Cell Probes,* 24, 20-26.

Almeria, S., Ferrer, D., Pabon, M., Castella, J. and Manas, S. 2002. Red foxes *(Vulpes vulpes))* are a natural intermediate host of *Neospora caninum*. *Vet Parasitol,* 107, 287-294.

_____, Vidal, D., Ferrer, D., Pabon, M., Fernandez-de-Mera, M. I., Ruiz-Fons, F., Alzaga, V., Marco, I., Calvete, C., Lavin, S., Gortazar, C., Lopez-Gatius, F. and Dubey, J. P. 2007. Seroprevalence of *Neospora caninum* in non-carnivorous wildlife from Spain. *Vet Parasitol,* 143, 21-28.

_____, Lopez-Gatius, F., Garcia-Ispierto, I., Nogareda, C., Bech-Sabat, G., Serrano, B., Santolaria, P. and Yaniz, J. L. 2009. Effects of crossbreed pregnancies on the abortion risk of *Neospora caninum*-infected dairy cows. *Vet Parasitol,* 163, 323-329.

Anderson, M. L., Blanchard, P. C., Barr, B. C., Dubey, J. P., Hoffman, R. L. and Conrad, P. A. 1991. *Neospora*-like protozoan infection as a major cause of abortion in California dairy cattle. *J Am Vet Med Assoc,* 198, 241-244.

_____, Palmer, C. W., Thurmond, M. C., Picanso, J. P., Blanchard, P. C., Breitmeyer, R. E., Layton, A. W., McAllister, M., Daft, B., Kinde, H. and et al. 1995. Evaluation of abortions in cattle attributable to neosporosis in selected dairy herds in California. *J Am Vet Med Assoc,* 207, 1206-1210.

Anderson, T., DeJardin, A., Howe, D. K., Dubey, J. P. and Michalski, M. L. 2007. *Neospora caninum* antibodies detected in Midwestern white-tailed deer Odocoileus virginianus by Western blot and ELISA. *Vet Parasitol,* 145, 152-515.

Andrianarivo, A. G., Choromanski, L., McDonough, S. P., Packham, A. E. and Conrad, P. A. 1999. Immunogenicity of a killed whole *Neospora caninum* tachyzoite preparation formulated with different adjuvants. *Int J Parasitol,* 29, 1613-1625.

Antony, A. and Williamson, N. B. 2003. Prevalence of antibodies to *Neospora caninum* in dogs of rural or urban origin in central New Zealand. *N Z Vet J,* 51, 232-237.

Armengol, R., Pabon, M., Adelantado, C., Lopez-Gatius, F. and Almeria, S. 2006. First report of *Neospora caninum* abortion in a beef cow-calf herd from Andorra, Europe. *J Parasitol*, 92, 1361-1362.

_____, Pabon, M., Santolaria, P., Cabezon, O., Adelantado, C., Yaniz, J., Lopez-Gatius, F. and Almeria, S. 2007. Low seroprevalence of *Neospora caninum* infection associated with the limousin breed in cow-calf herds in Andorra, Europe. *J Parasitol,* 93, 1029-1032.

Baillargeon, P., Fecteau, G., Pare, J., Lamothe, P. and Sauve, R. 2001. Evaluation of the embryo transfer procedure proposed by the International Embryo Transfer Society as a method of controlling vertical transmission of *Neospora caninum* in cattle. *J Am Vet Med Asso,* 218, 1803-1806.

Baker, D. G., Morishita, T. Y., Brooks, D. L., Shen, S. K., Lindsay, D. S. and Dubey, J. P. 1995. Experimental oral inoculations in birds to evaluate potential definitive hosts of *Neospora caninum*. *J Parasitol,* 81, 783-578.

Banales, P., Fernandez, L., Repiso, M. V., Gil, A., Dargatz, D. A. and Osawa, T. 2006. A nationwide survey on seroprevalence of *Neospora caninum* infection in beef cattle in Uruguay. *Vet Parasitol,* 139, 15-20.

Barber, J. S. and Trees, A. J. 1996. Clinical aspects of 27 cases of neosporosis in dogs. *Vet Rec,* 139, 439-43.

_____, Gasser, R. B., Ellis, J., Reichel, M. P., McMillan, D. and Trees, A. J. 1997a. Prevalence of antibodies to *Neospora caninum* in different canid populations. *J Parasitol,* 83, 1056-1058.

_____, van Ham, L., Polis, I. and Trees, A. J. 1997b. Seroprevalence of antibodies to *Neospora caninum* in Belgian dogs. *J Small Anim Pract,* 38, 15-16.

_____. and Trees, A. J. 1998. Naturally occurring vertical transmission of *Neospora caninum* in dogs. *Int J Parasitol,* 28, 57-64.

Barling, K. S., McNeill, J. W., Thompson, J. A., Paschal, J. C., McCollum, F. T., Craig, T. M.. and Adams, L. G. 2000. Association of serologic status for *Neospora caninum* with postweaning weight gain and carcass measurements in beef calves. *J Am Vet Med Assoc,* 217, 1356-1360.

Barling, K. S., Lunt, D. K., Snowden, K. F. and Thompson, J. A. 2001. Association of serologic status for *Neospora caninum* and postweaning feed efficiency in beef steers. *J Am Vet Med Assoc,* 219, 1259-1262.

Barr, B. C. anderson, M. L., Dubey, J. P. and Conrad, P. A. 1991. *Neospora*-like protozoal infections associated with bovine abortions. *Vet Pathol,* 28, 110-116.

_____, Conrad, P. A., Breitmeyer, R., Sverlow, K. anderson, M. L., Reynolds, J., Chauvet, A. E., Dubey, J.P. and Ardans, A. A. 1993. Congenital *Neospora* infection in calves born from cows that had previously aborted *Neospora*-infected fetuses: Four cases 1990-1992. *J. Am. Vet. Med. Assoc,* 202, 113-117.

_____, Conrad, P. A., Sverlow, K.W., Tarantal, A.F. and A.G.Hendrickx. 1994a. Experimental fetal and transplacental *Neospora* infection in the nonhuman primate. *Lab.Investtig,* 71, 236-242.

_____, Rowe, J. D., Sverlow, K. W., BonDurant, R. H., Ardans, A. A., Oliver, M. and Conrad, P. A. 1994b. Experimental reproduction of bovine fetal *Neospora* infection and death with a bovine *Neospora* isolate. *J Vet Diagn Invest,* 6, 207-215.

_____. 1998. Neosporosis: its prevalence and economic impact. *Comp.Cont.Edu.Pract,* 20, 1-16

Barratt, J., Al Qassab, S., Reichel, M. and Ellis, J. T. 2008. The development and evaluation of a nested PCR assay for detection of *Neospora caninum* and *Hammondia heydorni* in feral mouse tissues. *Mol Cell Probes,* 22, 228-233.

Bartels, C. J., Wouda, W. and Schukken, Y. H. 1999. Risk factors for *Neospora caninum*-associated abortion storms in dairy herds in The Netherlands 1995 to 1997. *Theriogenology,* 52, 247-257.

_____, Arnaiz-Seco, J. I., Ruiz-Santa-Quitera, A., Björkman, C., Frössling, J., von Blumroder, D., Conraths, F. J., Schares, G., van Maanen, C., Wouda, W. and Ortega-Mora, L. M. 2006a. Supranational comparison of *Neospora caninum* seroprevalences in cattle in Germany, The Netherlands, Spain and Sweden. *Vet Parasitol,* 137, 17-27.

Bartels, C. J., van Schaik, G., Veldhuisen, J. P., van den Borne, B. H., Wouda, W. and Dijkstra, T. 2006b. Effect of *Neospora caninum*-serostatus on culling, reproductive performance and milk production in Dutch dairy herds with and without a history of *Neospora caninum*-associated abortion epidemics. *Prev Vet Med,* 77, 186-198.

_____, Huinink, I., Beiboer, M. L., van Schaik, G., Wouda, W., Dijkstra, T. and Stegeman, A. 2007a. Quantification of vertical and horizontal transmission of *Neospora caninum* infection in Dutch dairy herds. *Vet Parasitol,* 148, 83-92.

_____, van Schaik, G., van Maanen, K., Wouda, W. and Dijkstra, T. 2007b. Factors associated with variation in *Neospora caninum* bulk-milk S/P ratios in initially bulk-milk negative testing Dutch dairy herds. *Prev Vet Med,* 81, 265-273.

Bartley, P. M., Wright, S., Sales, J., Chianini, F., Buxton, D. and Innes, E. A. 2006. Long-term passage of tachyzoites in tissue culture can attenuate virulence of *Neospora caninum* in vivo. *Parasitology,* 133, 421-432.

Basso, W., Venturini, L., Venturini, M. C., Hill, D. E., Kwok, O. C., Shen, S. K. and Dubey, J. P. 2001a. First isolation of *Neospora caninum* from the feces of a naturally infected dog. *J Parasitol,* 87, 612-618.

_____, Venturini, L., Venturini, M. C., Moore, P., Rambeau, M., Unzaga, J. M., Campero, C., Bacigalupe, D. and Dubey, J. R. 2001b. Prevalence of *Neospora caninum* infection in dogs from beef-cattle farms, dairy farms, and from urban areas of Argentina. *J Parasitol,* 87, 906-907.

_____, Venturini, M. C., Bacigalupe, D., Kienast, M., Unzaga, J. M., Larsen, A., Machuca, M. and Venturini, L. 2005. Confirmed clinical *Neospora caninum* infection in a boxer puppy from Argentina. *Vet Parasitol,* 131, 299-303.

_____, Herrmann, D. C., Conraths, F. J., Pantchev, N., Vrhovec, M. G. and Schares, G. 2009. First isolation of *Neospora caninum* from the faeces of a dog from Portugal. *Vet Parasitol,* 159, 162-166.

Baszler, T. V., Long, M. T., McElwain, T. F. and Mathison, B. A. 1999. Interferon-gamma and interleukin-12 mediate protection to acute *Neospora caninum* infection in BALB/c mice. *Int J Parasitol,* 29, 1635-1646.

Bech-Sabat, G., Lopez-Gatius, F., Santolaria, P., Garcia-Ispierto, I., Pabon, M., Nogareda, C., Yaniz, J. L. and Almeria, S. 2007. Progesterone supplementation during mid-gestation increases the risk of abortion in *Neospora*-infected dairy cows with high antibody titres. *Vet Parasitol,* 145, 164-167.

Bergeron, N., Fecteau, G., Pare, J., Martineau, R. and Villeneuve, A. 2000. Vertical and horizontal transmission of *Neospora caninum* in dairy herds in Quebec. *Can Vet J,* 41, 464-467.

_____, Fecteau, G., Villeneuve, A., Girard, C. and Pare, J. 2001. Failure of dogs to shed oocysts after being fed bovine fetuses naturally infected by *Neospora caninum. Vet Parasitol,* 97,145-152.

Bjerkås, I., Mohn, S. F. and al., E. 1984. Unidentified cyst-forming sporozoon causing encephalomyelitis and myositis in dogs. *Z Parasitenkd,* 2, 271-274.

Björkman, C., Lunden, A., Holmdahl, J., Barber, J., Trees, A. J. and Uggla, A. 1994. Neospora caninum in dogs: detection of antibodies by ELISA using an iscom antigen. *Parasite Immunol,* 16, 643-648.

_____, Johansson, O., Stenlund, S., Holmdahl, O. J. and Uggla, A. 1996. *Neospora* species infection in a herd of dairy cattle. *J Am Vet Med Assoc,* 208, 1441-4.

_____, Holmdahl, O. J. and Uggla, A. 1997. An indirect enzyme-linked immunoassay ELISA for demonstration of antibodies to *Neospora caninum* in serum and milk of cattle. *Vet Parasitol,* 68, 251-260.

_____, Naslund, K., Stenlund, S., Maley, S. W., Buxton, D. and Uggla, A. 1999. An IgG avidity ELISA to discriminate between recent and chronic *Neospora caninum* infection. *J Vet Diagn Invest,* 11, 41-44.

_____. and Uggla, A. 1999. Serological diagnosis of *Neospora caninum* infection. *Int J Parasitol,* 29, 1497-1507.

Björkman, C., McAllister, M. M., Frössling, J., Naslund, K., Leung, F. and Uggla, A. 2003. Application of the *Neospora caninum* IgG avidity ELISA in assessment of chronic reproductive losses after an outbreak of neosporosis in a herd of beef cattle. *J Vet Diagn Invest,* 15, 3-7.

_____, Gondim, L. F., Naslund, K., Trees, A. J. and McAllister, M. M. 2005. IgG avidity pattern in cattle after ingestion of *Neospora caninum* oocysts. *Vet Parasitol,* 128, 195-200.

Blander, J. M., Sant'Angelo, D. B., Bottomly, K. and Janeway, C. A., Jr. 2000. Alteration at a single amino acid residue in the T cell receptor alpha chain complementarity determining region 2 changes the differentiation of naive CD4 T cells in response to antigen from T helper cell type 1 (Th1) to Th2. *J Exp Med,* 191, 2065-2074.

Bodhipaksha, P., Chantaraprateep, P., Lohachit, C. and Kunawongkrit, A. 1984. Swamp buffalo reproduction research in Thailand. *Buff. Bull., IBTC,* 3, 11.

Boger, L. A. and Hattel, A. L. 2003. Additional evaluation of undiagnosed bovine abortion cases may reveal fetal neosporosis. *Vet Parasitol,* 113, 1-6.

Boyd, S. P., Barr, P. A., Brooks, H. W. and Orr, J. P. 2005. Neosporosis in a young dog presenting with dermatitis and neuromuscular signs. *J Small Anim Pract,* 46, 85-88.

Bragulla, H., Budras.K.D., Forstenpointer.G., Konig.H.E., Liebich.H.G., Maierl.J., Mulling.Chr., Probst.A., Reese.S. and Ruberte, J. 2007. *Veterinary Anatomy of Domestic Mammals.* 3rd ed. Stuttgart: Schattauer.

Buxton, D., Maley, S. W., Wright, S., Thomson, K. M., Rae, A. G. and Innes, E. A. 1998. The pathogenesis of experimental neosporosis in pregnant sheep. *J Comp Pathol,* 118, 267-79.

_____, Wright, S., Maley, S. W., Rae, A. G., Lunden, A. and Innes, E. A. 2001. Immunity to experimental neosporosis in pregnant sheep. *Parasite Immunol,* 23, 85-91.

Cabral, A. D., Camargo, C. N., Galleti, N. T., Okuda, L. H., Pituco, E. M. and Fava, C. D. 2009. Diagnosis of *Neospora caninum* in bovine fetuses by histology, immunohistochemistry, and nested-PCR. *Rev Bras Parasitol Vet,* 18, 14-19.

Caetano-da-Silva, A., Ferre, I., Collantes-Fernandez, E., Navarro, V., Aduriz, G., Ugarte-Garagalza, C. and Ortega-Mora, L. M. 2004. Occasional detection of *Neospora caninum* DNA in frozen extended semen from naturally infected bulls. *Theriogenology,* 62, 1329-1336.

Campero, C. M., Moore, D. P., Lagomarsino, H., Odeon, A. C., Castro, M. and Visca, H. 2003. Serological status and abortion rate in progeny obtained by natural service or embryo transfer from *Neospora caninum*-seropositive cows. *J Vet Med B Infect Dis Vet Public Health,* 50, 458-460.

_____, Perez, A., Moore, D. P., Crudeli, G., Benitez, D., Draghi, M. G., Cano, D., Konrad, J. L. and Odeon, A. C. 2007. Occurrence of antibodies against *Neospora caninum* in water buffaloes *(Bubalus bubalis)* on four ranches in Corrientes province, Argentina. *Vet Parasitol,* 150, 155-158.

Canada, N., Carvalheira, J., Meireles, C. S., Correia da Costa, J. M. and Rocha, A. 2004a. Prevalence of *Neospora caninum* infection in dairy cows and its consequences for reproductive management. *Theriogenology,* 62, 1229-1235.

_____, Meireles, C. S., Mezo, M., Gonzalez-Warleta, M., Correia da Costa, J. M., Sreekumar, C., Hill, D. E., Miska, K. B. and Dubey, J. P. 2004b. First isolation of *Neospora caninum* from an aborted bovine fetus in Spain. *J Parasitol,* 90, 863-864.

Carvalho Neta, A. V., Mol, J. P., Xavier, M. N., Paixao, T. A., Lage, A. P. and Santos, R. L. 2010. Pathogenesis of bovine brucellosis. *Vet J,* 184, 146-155.

Cedillo, C. J., Martinez, M. J., Santacruz, A. M., Banda, R. V. and Morales, S. E. 2008. Models for experimental infection of dogs fed with tissue from fetuses and neonatal cattle naturally infected with *Neospora caninum. Vet Parasitol,* 154, 151-155.

Chaikhun, T., Tharasanit, T. and Techakumphu, M. 2009. *Efficiency of ovulation synchronization and fixed-time artificial insemination program in swamp buffalo in small holder farms.* In: Proceeding of the Second FASAVA Congress, Bangkok, Thailand, 532-533.

Chanlun, A., Naslund, K., Aiumlamai, S. and Björkman, C. 2002. Use of bulk milk for detection of *Neospora caninum* infection in dairy herds in Thailand. *Vet Parasitol,* 110, 35-44.

_____, Emanuelson, U., Aiumlamai, S. and Björkman, C. 2006a. Variations of *Neospora caninum* antibody levels in milk during lactation in dairy cows. *Vet Parasitol,* 141, 349-355.

_____, Emanuelson, U., Chanlun, S., Aiumlamai, S. and Björkman, C. 2006b. Application of repeated bulk milk testing for identification of infection dynamics of *Neospora caninum* in Thai dairy herds. *Vet Parasitol,* 136, 243-250.

_____, Emanuelson, U., Frössling, J., Aiumlamai, S. and Björkman, C. 2007. A longitudinal study of seroprevalence and seroconversion of *Neospora caninum* infection in dairy cattle in northeast Thailand. *Vet Parasitol,* 146, 242-248.

_____, Pongul, J., Aiumlamai, S. and Chaiyotwittayakul, A. 2008. *The effect of Neospora caninum infection on the reproductive performance of dairy cows in Thailand.* In: Proceeding of the 15th Congress of FAVA, 129-130.

Charoenchai, A., Pholpark, M. and Kashiwazaki, Y. 2000. Seroprevalent study on bovine neosporosis in Northeast Thailand. *J. Thai Vet. Med. Assoc* 51 No.1-2 April-August 2000, p.17, Abstract.

Cheah, T. S., Mattsson, J. G., Zaini, M., Sani, R. A., Jakubek, E. B., Uggla, A. and Chandrawathani, P. 2004. Isolation of *Neospora caninum* from a calf in Malaysia. *Vet Parasitol,* 126, 263-269.

Chi, J., VanLeeuwen, J. A., Weersink, A. and Keefe, G. P. 2002. Direct production losses and treatment costs from bovine viral diarrhoea virus, bovine leukosis virus, Mycobacterium avium subspecies paratuberculosis, and *Neospora caninum. Prev Vet Med,* 55, 137-153.

Cole, R. A., Lindsay, D. S., Blagburn, B. L., Sorjonen, D. C. and Dubey, J. P. 1995. Vertical transmission of *Neospora caninum* in dogs. *J Parasitol,* 81, 208-211.

Collantes-Fernandez, E., Zaballos, A., Alvarez-Garcia, G. and Ortega-Mora, L. M. 2002. Quantitative detection of *Neospora caninum* in bovine aborted fetuses and experimentally infected mice by real-time PCR. *J Clin Microbiol,* 40, 1194-1198.

_____, Arnaiz-Seco, I., Burgos, B. M., Rodriguez-Bertos, A., Aduriz, G., Fernandez-Garcia, A. and Ortega-Mora, L. M. 2006a. Comparison of *Neospora caninum* distribution, parasite loads and lesions between epidemic and endemic bovine abortion cases. *Vet Parasitol,* 142, 187-191.

_____, Rodriguez-Bertos, A., Arnaiz-Seco, I., Moreno, B., Aduriz, G. and Ortega-Mora, L. M. 2006b. Influence of the stage of pregnancy on *Neospora caninum* distribution, parasite loads and lesions in aborted bovine foetuses. *Theriogenology,* 65, 629-641.

Corbellini, L. G., Colodel, E. M. and Driemeier, D. 2001. Granulomatous encephalitis in a neurologically impaired goat kid associated with degeneration of *Neospora caninum* tissue cysts. *J Vet Diagn Invest,* 13, 416-419.

_____, Smith, D. R., Pescador, C. A., Schmitz, M., Correa, A., Steffen, D. J. and Driemeier, D. 2006. Herd-level risk factors for *Neospora caninum* seroprevalence in dairy farms in southern Brazil. *Prev Vet Med,* 74, 130-141.

Costa, K. S., Santos, S. L., Uzeda, R. S., Pinheiro, A. M., Almeida, M. A., Araujo, F. R., McAllister, M. M. and Gondim, L. F. 2008. Chickens Gallus domesticus are natural intermediate hosts of *Neospora caninum. Int J Parasitol,* 38, 157-159.

Crawshaw, W. M. and Brocklehurst, S. 2003. Abortion epidemic in a dairy herd associated with horizontally transmitted *Neospora caninum* infection. *Vet Rec,* 152, 201-206.

Cringoli, G., Rinaldi, L., Capuano, F., Baldi, L., Veneziano, V. and Capelli, G. 2002. Serological survey of *Neospora caninum* and *Leishmania infantum* co-infection in dogs. *Vet Parasitol,* 106, 307-313.

Crookshanks, J. L., Taylor, S. M., Haines, D. M. and Shelton, G. D. 2007. Treatment of canine pediatric *Neospora caninum* myositis following immunohistochemical identification of tachyzoites in muscle biopsies. *Can Vet J,* 48, 506-508.

Cruz-Vazquez, C., Medina-Esparza, L., Marentes, A., Morales-Salinas, E. and Garcia-Vazquez, Z. 2008. Seroepidemiological study of *Neospora caninum* infection in dogs found in dairy farms and urban areas of Aguascalientes, Mexico. *Vet Parasitol,* 157, 139-143.

Cunningham, G. L., Campbell, J. R., Waldner, C. L., Polley, L. and Janzen, E. D. 2000. *Survey of Neospora caninum serological status and management factors for its control in Western Canadian beef herds.* In: Proceedings of the Conference of Research Workers in Animal Diseases, Chicago.

Damriyasa, I. M., Schares, G. and Bauer, C. 2010. Seroprevalence of antibodies to *Neospora caninum* in Bos javanicus 'Bali cattle' from Indonesia. *Trop Anim Health Prod,* 42, 95-98.

Davison, H. C., Otter, A. and Trees, A. J. 1999. Estimation of vertical and horizontal transmission parameters of *Neospora caninum* infections in dairy cattle. *Int J Parasitol,* 29, 1683-1689.

De Meerschman, F., Speybroeck, N., Berkvens, D., Rettignera, C., Focant, C., Leclipteux, T., Cassart, D. and Losson, B. 2002. Fetal infection with *Neospora caninum* in dairy and beef cattle in Belgium. *Theriogenology,* 58, 933-945.

Debache, K., Alaeddine, F., Guionaud, C., Monney, T., Muller, J., Strohbusch, M., Leib, S. L., Grandgirard, D. and Hemphill, A. 2009. Vaccination with recombinant NcROP2 combined with recombinant NcMIC1 and NcMIC3 reduces cerebral infection and vertical transmission in mice experimentally infected with *Neospora caninum* tachyzoites. *Int J Parasitol,* 39, 1373-1384.

Dijkstra, T., Barkema, H. W., Eysker, M. and Wouda, W. 2001a. Evidence of post-natal transmission of *Neospora caninum* in Dutch dairy herds. *Int J Parasitol,* 31, 209-215.

_____, Eysker, M., Schares, G., Conraths, F. J., Wouda, W. and Barkema, H. W. 2001b. Dogs shed *Neospora caninum* oocysts after ingestion of naturally infected bovine placenta but not after ingestion of colostrum spiked with *Neospora caninum* tachyzoites. *Int J Parasitol,* 31, 747-752.

Dijkstra, T., Barkema, H. W., Björkman, C. and Wouda, W. 2002. A high rate of seroconversion for *Neospora caninum* in a dairy herd without an obvious increased incidence of abortions. *Vet Parasitol,* 109, 203-211.

_____, Barkema, H. W., Eysker, M., Beiboer, M. L. and Wouda, W. 2003. Evaluation of a single serological screening of dairy herds for *Neospora caninum* antibodies. *Vet Parasitol,* 110, 161-169.

Ding, Y., Qin, L., Kotenko, S. V., Pestka, S. and Bromberg, J. S. 2000. A single amino acid determines the immunostimulatory activity of interleukin 10. *J Exp Med,* 191, 213-224.

DLD. 2004. *Department of Livestock Development, Ministry of Agriculture and Cooperatives.* Retrieved March 10, 2010, from: http://www.dld.go.th/ict/yearly/yearly47/stat47/table9-47.xls

_____.2005. *Department of Livestock Development, Ministry of Agriculture and Cooperatives.* Retrieved June 10, 2010, from: http://www.dld.go.th/ict/yearly/yearly48/gp_stat/graph _stock.html.

_____. 2006. *Department of Livestock Development, Ministry of Agriculture and Cooperatives.* Retrieved May 19, 2010, from: http://www.dld.go.th/ict/yearly/yearly49/imex/imex04.xls.

_____. 2007. *Department of Livestock Development, Ministry of Agriculture and Cooperatives.* Retrieved March 10, 2010, from: http://www.dld.go.th/ict/yearly/yearly50/index.html.

_____. 2008. *Department of Livestock Development, Ministry of Agriculture and Cooperatives.* Retrieved April 27, 2010, from: http://www.dld.go.th/ict/yearly/yearly51/index51.html.

_____. 2009. *Department of Livestock Development, Ministry of Agriculture and Cooperatives.* Retrieved April 27, 2010, from: http://www.dld.go.th/ict/statweb/yearly/yearly52/index52.html

Dubey, J. P., Carpenter, J. L., Speer, C. A., Topper, M. J. and Uggla, A. 1988. Newly recognized fatal protozoan disease of dogs. *J Am Vet Med Assoc,* 192, 1269-1285.

Dubey, J. P. and Lindsay, D. S. 1989a. Transplacental *Neospora caninum* infection in cats. *J Parasitol,* 75, 765-771.

_____. and Lindsay, D. S. 1989b. Transplacental *Neospora caninum* infection in dogs. *Am J Vet Res,* 50, 1578-1579.

_____, Koestner, A. and Piper, R. C. 1990. Repeated transplacental transmission of *Neospora caninum* in dogs. *J Am Vet Med Assoc,*197, 857-860.

_____, Lindsay, D. S. anderson, M. L., Davis, S. W. and Shen, S. K. 1992. Induced transplacental transmission of *Neospora caninum* in cattle. *J Am Vet Med Assoc,* 201, 709-713.

_____.and Lindsay, D. S. 1996. A review of *Neospora caninum* and neosporosis. *Vet Parasitol,* 67, 1-59.

_____, Lindsay, D. S., Adams, D. S., Gay, J. M., Baszler, T. V., Blagburn, B. L. and Thulliez, P. 1996a. Serologic responses of cattle and other animals infected with *Neospora caninum. Am J Vet Res,*57, 329-336.

_____, Morales, J. A., Villalobos, P., Lindsay, D. S., Blagburn, B. L. and Topper, M. J. 1996b. Neosporosis-associated abortion in a dairy goat. *J Am Vet Med Asso,* 208, 263-265.

_____, Romand, S., Hilali, M., Kwok, O. C. and Thulliez, P. 1998. Seroprevalence of antibodies to *Neospora caninum* and *Toxoplasma gondii* in water buffaloes *(Bubalus bubalis)* from Egypt. *Int J Parasitol,* 28, 527-529.

_____, Hollis, K., Romand, S., Thulliez, P., Kwok, O. C., Hungerford, L., Anchor, C. and Etter, D. 1999. High prevalence of antibodies to *Neospora caninum* in white-tailed deer Odocoileus virginianus. *Int J Parasitol,* 29, 1709-1711.

_____, Barr, B. C., Barta, J. R., Bjerkås, I., Björkman, C., Blagburn, et al. 2002a. Redescription of *Neospora caninum* and its differentiation from related coccidia. *Int J Parasitol,* 32, 929-946.

_____, Lindsay, D. S., Hill, D., Romand, S., Thulliez, P., Kwok, O. C., Silva, J. C., Oliveira-Camargo, M. C. and Gennari, S. M. 2002b. Prevalence of antibodies to *Neospora caninum* and Sarcocystis neurona in sera of domestic cats from Brazil. *J Parasitol,* 88, 1251-1252.

Dubey, J. P. 2003. Review of *Neospora caninum* and neosporosis in animals. *Korean J Parasitol,* 41, 1-16.

_____. and Thulliez, P. 2005. Prevalence of antibodies to *Neospora caninum* in wild animals. *J Parasitol,* 91, 1217-1218.

_____. 2005. Neosporosis in cattle. *Vet Clin North Am Food Anim Pract,* 21, 473-483.

_____.and Schares, G. 2006. Diagnosis of bovine neosporosis. *Vet Parasitol,* 140, 1-34.

_____, Buxton, D. and Wouda, W. 2006. Pathogenesis of bovine neosporosis. *J Comp Pathol,* 134, 267-289.

_____, Schares, G. and Ortega-Mora, L. M. 2007a. Epidemiology and control of neosporosis and *Neospora caninum. Clin Microbiol Rev,* 20, 323-367.

_____, Vianna, M. C., Kwok, O. C., Hill, D. E., Miska, K. B., Tuo, W., Velmurugan, G. V., Conors, M. and Jenkins, M. C. 2007b. Neosporosis in Beagle dogs: clinical signs, diagnosis, treatment, isolation and genetic characterization of *Neospora caninum. Vet Parasitol,* 149, 158-166.

_____, Mansfield, K., Hall, B., Kwok, O. C. and Thulliez, P. 2008. Seroprevalence of *Neospora caninum* and *Toxoplasma gondii* in black-tailed deer (*Odocoileus hemionus columbianus)* and mule deer (*Odocoileus hemionus hemionus). Vet Parasitol,* 156, 310-313.

Dwinger, R. H., Grootenhuis, J. G., Murray, M., Moloo, S. K. and Gettinby, G. 1986. Susceptibility of buffaloes, cattle and goats to infection with different stocks of *Trypanosoma vivax* transmitted by *Glossina morsitans centralis. Res Vet Sci,* 41, 307-315.

Dyce, K. M., Wensing, C. J. G. and Sack,W.O 1996. *Textbook of Veterinary Anatomy.* 2nd ed. Philadelphia: W.B. Saunders Company.

Dyer, R. M., Jenkins, M. C., Kwok, O. C., Douglas, L. W. and Dubey, J. P. 2000. Serologic survey of *Neospora caninum* infection in a closed dairy cattle herd in Maryland: risk of serologic reactivity by production groups. *Vet Parasitol,* 90, 171-181.

Eleni, C., Crotti, S., Manuali, E., Costarelli, S., Filippini, G., Moscati, L. and Magnino, S. 2004. Detection of *Neospora caninum* in an aborted goat foetus. *Vet Parasitol,* 123, 271-24.

Ellis, J. T. 1998. Polymerase chain reaction approaches for the detection of *Neospora caninum* and *Toxoplasma gondii*. *Int J Parasitol,*28, 1053-1060.

_____, Miller, C., Quinn, H., Ryce, C. and Reichel, M. P. 2008. Evaluation of recombinant proteins of *Neospora caninum* as vaccine candidates in a mouse model. *Vaccine,* 26, 5989-5996.

Esposito, M., Stettler, R., Moores, S. L., Pidathala, C., Muller, N., Stachulski, A., Berry, N. G., Rossignol, J. F. and Hemphill, A. 2005. In vitro efficacies of nitazoxanide and other thiazolides against *Neospora caninum* tachyzoites reveal antiparasitic activity independent of the nitro group. *Antimicrob Agents Chemother,* 49, 3715-3723.

_____, Moores, S., Naguleswaran, A., Muller, J. and Hemphill, A. 2007a. Induction of tachyzoite egress from cells infected with the protozoan *Neospora caninum* by nitro- and bromo-thiazolides, a class of broad-spectrum anti-parasitic drugs. *Int J Parasitol,* 37, 1143-1152.

_____, Muller, N. and Hemphill, A. 2007b. Structure-activity relationships from in vitro efficacies of the thiazolide series against the intracellular apicomplexan protozoan *Neospora caninum*. *Int J Parasitol,* 37, 183-190.

Ezio, F. and Anna, T. 2003. Antibodies to *Neospora caninum* in European brown hare Lepus europaeus. *Vet Parasitol,* 115, 75-78.

Faria, E., Cavalcanti, E., Madeiros, E., Pinheiro-Junior, J., Azevedo, S., Athayde, A. and Mota, R. 2010. Risk factors associated with *Neospora caninum* seropositivity in sheep from the State of Alagoas, in the Northeast Region of Brazil. *J Parasitol,* 96, 197-199.

Ferre, I., Aduriz, G., Del-Pozo, I., Regidor-Cerrillo, J., Atxaerandio, R., Collantes-Fernandez, E., Hurtado, A., Ugarte-Garagalza, C. and Ortega-Mora, L. M. 2005. Detection of *Neospora caninum* in the semen and blood of naturally infected bulls. *Theriogenology,* 63, 1504-1518.

Ferre, I., Serrano-Martinez, E., Martinez, A., Osoro, K., Mateos-Sanz, A., Del-Pozo, I., Aduriz, G., Tamargo, C., Hidalgo, C. O. and Ortega-Mora, L. M. 2008. Effects of re-infection with *Neospora caninum* in bulls on parasite detection in semen and blood and immunological responses. *Theriogenology,* 69, 905-911.

Ferroglio, E., Pasino, M., Romano, A., Grande, D., Pregel, P. and Trisciuoglio, A. 2007a. Evidence of *Neospora caninum* DNA in wild rodents. *Vet Parasitol,* 148, 346-349.

_____, Pasino, M., Ronco, F., Bena, A. and Trisciuoglio, A. 2007b. Seroprevalence of antibodies to *Neospora caninum* in urban and rural dogs in north-west Italy. *Zoonoses Public Health,* 54, 135-139.

Fischer, I., Furrer, K., Audige, L., Fritsche, A., Giger, T., Gottstein, B. and Sager, H. 2003. The importance of bovine neosporosis for abortion in Switzerland. *Schweiz Arch Tierheilkd,* 145, 114-123.

Fish, L., Mazuz, M., Molad, T., Savitsky, I. and Shkap, V. 2007. Isolation of *Neospora caninum* from dairy zero grazing cattle in Israel. *Vet Parasitol,*149, 167-171.

French, N. P., Clancy, D., Davison, H. C. and Trees, A. J. 1999. Mathematical models of *Neospora caninum* infection in dairy cattle: transmission and options for control. *Int J Parasitol,* 29, 1691-1704.

Frisch, J. E. and Vercoe, J. E. 1979. Adaptive and productive of cattle growth in the tropics: their relevance to buffalo production. *Trop.Anim.Prod,* 4, 3.

Frössling, J., Bonnett, B., Lindberg, A. and Björkman, C. 2003. Validation of a *Neospora caninum* iscom ELISA without a gold standard. *Prev Vet Med,* 57, 141-153.

_____, Lindberg, A. and Björkman, C. 2006. Evaluation of an iscom ELISA used for detection of antibodies to *Neospora caninum* in bulk milk. *Prev Vet Med,* 74, 120-129.

Fujii, T. U., Kasai, N., Nishi, S. M., Dubey, J. P. and Gennari, S. M. 2001. Seroprevalence of *Neospora caninum* in female water buffaloes *(Bubalus bubalis)* from the southeastern region of Brazil. *Vet Parasitol,* 99, 331-334.

Furuta, P. I., Mineo, T. W., Carrasco, A. O., Godoy, G. S., Pinto, A. A. and Machado, R. Z. 2007. *Neospora caninum* infection in birds: experimental infections in chicken and embryonated eggs. *Parasitology,*134, 1931-1939.

Garcia-Ispierto, I., Lopez-Gatius, F., Almeria, S., Yaniz, J., Santolaria, P., Serrano, B., Bech-Sabat, G., Nogareda, C., Sulon, J., de Sousa, N. M. and Beckers, J. F. 2009. Factors affecting plasma prolactin concentrations throughout gestation in high producing dairy cows. *Domest Anim Endocrinol,* 36, 57-66.

Garcia-Vazquez, Z., Rosario-Cruz, R., Ramos-Aragon, A., Cruz-Vazquez, C. and Mapes-Sanchez, G. 2005. *Neospora caninum* seropositivity and association with abortions in dairy cows in Mexico. *Vet Parasitol,* 134, 61-65.

_____, Rosario-Cruz, R., Mejia-Estrada, F., Rodriguez-Vivas, I., Romero-Salas, D., Fernandez-Ruvalcaba, M. and Cruz-Vazquez, C. 2009. Seroprevalence of *Neospora caninum* antibodies in beef cattle in three southern states of Mexico. *Trop Anim Health Prod,* 41, 749-753.

Gennari, S. M., Yai, L. E., D'Auria, S. N., Cardoso, S. M., Kwok, O. C., Jenkins, M. C. and Dubey, J. P. 2002. Occurrence of *Neospora caninum* antibodies in sera from dogs of the city of Sao Paulo, Brazil. *Vet Parasitol,* 106, 177-179.

_____, Rodrigues, A. A., Viana, R. B. and Cardoso, E. C. 2005. Occurrence of anti-*Neospora caninum* antibodies in water buffaloes *(Bubalus bubalis)* from the Northern region of Brazil. *Vet Parasitol,* 134, 169-171.

Ghanem, M. E., Suzuki, T., Akita, M. and Nishibori, M. 2009. *Neospora caninum* and complex vertebral malformation as possible causes of bovine fetal mummification. *Can Vet J,* 50, 389-392.

Gibney, E. H., Kipar, A., Rosbottom, A., Guy, C. S., Smith, R. F., Hetzel, U., Trees, A. J. and Williams, D. J. 2008. The extent of parasite-associated necrosis in the placenta and foetal tissues of cattle following *Neospora caninum* infection in early and late gestation correlates with foetal death. *Int J Parasitol,* 38, 579-588.

Gondim, L. F., Pinheiro, A. M., Santos, P. O., Jesus, E. E., Ribeiro, M. B., Fernandes, H. S., Almeida, M. A., Freire, S. M., Meyer, R. and McAllister, M. M. 2001. Isolation of *Neospora caninum* from the brain of a naturally infected dog, and production of encysted bradyzoites in gerbils. *Vet Parasitol,* 101, 1-7.

Gondim, L. F., Gao, L. and McAllister, M. M. 2002. Improved production of *Neospora caninum* oocysts, cyclical oral transmission between dogs and cattle, and in vitro isolation from oocysts. *J Parasitol,* 88, 1159-1163.

_____, McAllister, M. M. anderson-Sprecher, R. C., Björkman, C., Lock, T. F., Firkins, L. D., Gao, L. and Fischer, W. R. 2004a. Transplacental transmission and abortion in cows administered *Neospora caninum* oocysts. *J Parasitol,* 90, 1394-1400.

_____, McAllister, M. M., Pitt, W. C. and Zemlicka, D. E. 2004b. Coyotes *(Canis latrans)* are definitive hosts of *Neospora caninum. Int J Parasitol,* 34, 159-161.

_____, McAllister, M. M. and Gao, L. 2005. Effects of host maturity and prior exposure history on the production of *Neospora caninum* oocysts by dogs. *Vet Parasitol,* 134, 33-39.

Gonzalez, L., Buxton, D., Atxaerandio, R., Aduriz, G., Maley, S., Marco, J. C. and Cuervo, L. A. 1999. Bovine abortion associated with *Neospora caninum* in northern Spain. *Vet Rec,* 144, 145-150.

Gonzalez-Warleta, M., Castro-Hermida, J. A., Carro-Corral, C., Cortizo-Mella, J. and Mezo, M. 2008. Epidemiology of neosporosis in dairy cattle in Galicia NW Spain. *Parasitol Res,* 102, 243-249.

Gordon, I. 1996. *Controlled Reproduction in Cattle and Buffaloes*. Wallingford: CAB International.

Gottstein, B., Hentrich, B., Wyss, R., Thur, B., Bruckner, L., Muller, N., Kaufmann, H. and Waldvogel, A. 1999. Molecular and immunodiagnostic studies of bovine neosporosis in Switzerland. *Schweiz Arch Tierheilkd,* 141, 59-68.

_____, Eperon, S., Dai, W. J., Cannas, A., Hemphill, A. and Greif, G. 2001. Efficacy of toltrazuril and ponazuril against experimental *Neospora caninum* infection in mice. *Parasitol Res,* 87, 43-48.

_____, Razmi, G. R., Ammann, P., Sager, H. and Muller, N. 2005. Toltrazuril treatment to control diaplacental *Neospora caninum* transmission in experimentally infected pregnant mice. *Parasitology,* 130, 41-48.

Graham, D. A., Calvert, V., Whyte, M. and Marks, J. 1999. Absence of serological evidence for human *Neospora caninum* infection. *Vet Rec,* 144, 672-673.

Guarino, A., Fusco, G., Savini, G., Di Francesco, G. and Cringoli, G. 2000. Neosporosis in water buffalo *(Bubalus bubalis)* in Southern Italy. *Vet Parasitol,* 91, 15-21.

Haddadzadeh, H. R., Sadrebazzaz, A., Malmasi, A., Talei Ardakani, H., Khazraii Nia, P. and Sadreshirazi, N. 2007. Seroprevalence of *Neospora caninum* infection in dogs from rural and urban environments in Tehran, Iran. *Parasitol Res,* 101, 1563-1565.

Haerdi, C., Haessig, M., Sager, H., Greif, G., Staubli, D. and Gottstein, B. 2006. Humoral immune reaction of newborn calves congenitally infected with *Neospora caninum* and experimentally treated with toltrazuril. *Parasitol Res,* 99, 534-540.

Haldorson, G. J., Mathison, B. A., Wenberg, K., Conrad, P. A., Dubey, J. P., Trees, A. J., Yamane, I. and Baszler, T. V. 2005. Immunization with native surface protein NcSRS2 induces a Th2 immune response and reduces congenital *Neospora caninum* transmission in mice. *Int J Parasitol,* 35, 1407-1415.

Hall, C. A., Reichel, M. P. and Ellis, J. T. 2005. *Neospora* abortions in dairy cattle: diagnosis, mode of transmission and control. *Vet Parasitol,* 128, 231-241.

Harada, Y., Ohgai, D., Watanabe, R., Okano, K., Koiwai, O., Tanabe, K., Toma, H., Altman, A. and Abe, R. 2003. A single amino acid alteration in cytoplasmic domain determines IL-2 promoter activation by ligation of CD28 but not inducible costimulator (ICOS). *J Exp Med,* 197, 257-262.

Harkins, D., Clements, D. N., Maley, S., Marks, J., Wright, S., Esteban, I., Innes, E. A. and Buxton, D. 1998. Western blot analysis of the IgG responses of ruminants infected with *Neospora caninum* and with *Toxoplasma gondii. J Comp Pathol,* 119, 45-55.

Hasler, B., Regula, G., Stark, K. D., Sager, H., Gottstein, B. and Reist, M. 2006a. Financial analysis of various strategies for the control of *Neospora caninum* in dairy cattle in Switzerland. *Prev Vet Med,* 77, 230-253.

Hasler, B., Stark, K. D., Sager, H., Gottstein, B. and Reist, M. 2006b. Simulating the impact of four control strategies on the population dynamics of *Neospora caninum* infection in Swiss dairy cattle. *Prev Vet Med,* 77, 254-283.

Hemphill, A., Muller, N., Sager, H. and Gottstein, B. 2000. *Neospora caninum* and neosporosis--basic science at the Institute of Parasitology and possible implications. *Schweiz Arch Tierheilkd,* 142, 257-261.

Hernandez, J., Risco, C. and Donovan, A. 2001. Association between exposure to *Neospora caninum* and milk production in dairy cows. *J Am Vet Med Assoc,* 219, 632-635.

_____, Risco, C. and Donovan, A. 2002. Risk of abortion associated with *Neospora caninum* during different lactations and evidence of congenital transmission in dairy cows. *J Am Vet Med Assoc,* 221, 1742-1746.

Heuer, C. 2003. *Efficacy of vaccination against Neospora caninum for the prevention of abortion in New Zealand dairy cattle.* The 19th International Conference of the World Association for the Advancement of Veterinary Parasitology. New Orleans, USA.

Hietala, S. K. and Thurmond, M. C. 1999. Postnatal *Neospora caninum* transmission and transient serologic responses in two dairies. *Int J Parasitol,* 29, 1669-1676.

Hilali, M., Romand, S., Thulliez, P., Kwok, O. C. and Dubey, J. P. 1998. Prevalence of *Neospora caninum* and *Toxoplasma gondii* antibodies in sera from camels from Egypt. *Vet Parasitol,* 75, 269-271.

Hobson, J. C., Duffield, T. F., Kelton, D., Lissemore, K., Hietala, S. K., Leslie, K. E., McEwen, B., Cramer, G. and Peregrine, A. S. 2002. *Neospora caninum* serostatus and milk production of Holstein cattle. *J Am Vet Med Assoc,* 221, 1160-1164.

_____, Duffield, T. F., Kelton, D., Lissemore, K., Hietala, S. K., Leslie, K. E., McEwen, B. and Peregrine , A. S. 2005. Risk factors associated with *Neospora caninum* abortion in Ontario Holstein dairy herds. *Vet Parasitol,* 127, 177-188.

Holmdahl, J., Björkman, C., Stenlund, S., Uggla, A. and Dubey, J. P. 1997. Bovine *Neospora* and *Neospora caninum*: One and the same. *Parasitol Today* 13, 40-41.

Hornok, S., Edelhofer, R., Fok, E., Berta, K., Fejes, P., Repasi, A. and Farkas, R. 2006a. Canine neosporosis in Hungary: screening for seroconversion of household, herding and stray dogs. *Vet Parasitol,* 137, 197-201.

_____, Edelhofer, R. and Hajtos, I. 2006b. Seroprevalence of neosporosis in beef and dairy cattle breeds in Northeast Hungary. *Acta Vet Hung,* 54, 485-491.

Huang, C. C., Ting, L. J., Shiau, J. R., Chen, M. C. and Ooi, H. K. 2004. An abortion storm in cattle associated with neosporosis in Taiwan. *J Vet Med Sci,* 66, 465-467.

Hughes, J. M., Thomasson, D., Craig, P. S., Georgin, S., Pickles, A. and Hide, G. 2008. *Neospora caninum*: detection in wild rabbits and investigation of co-infection with *Toxoplasma gondii* by PCR analysis. *Exp Parasitol,* 120, 255-260.

Hung, N. H. 1985. *Survey on blood-parasite diseases of buffalo and cattle of industrial and rural farms in the southern provinces of Vietnam.* In: Proceedings of the Research of Animal Husbandry and Veterinary Medicine, vol.1. Faculty of Animal Husbandry and Veterinary Medicine of University of Cantho, (Vietnamese), 9.

Huong, L. T., Ljungstrom, B. L., Uggla, A. and Björkman, C. 1998. Prevalence of antibodies to *Neospora caninum* and *Toxoplasma gondii* in cattle and water buffaloes in southern Vietnam. *Vet Parasitol,* 75, 53-57.

Ica, A., Yildirim, A., Duzlu, O. and Inci, A. 2006. Seroprevalence of *Neospora caninum* in cattle in the region of Kayseri. *Turkiye Parazitol Derg,* 30, 92-94.

Indramangala 2001. *Buffaloes development in Thailand.* Retrieved March 10, *2010,* from http://breedplan.une.edu.au/thailand/

Innes, E. A., Panton, W. R., Marks, J., Trees, A. J., Holmdahl, J. and Buxton, D. 1995. Interferon gamma inhibits the intracellular multiplication of *Neospora caninum*, as shown by incorporation of 3H uracil. *J Comp Pathol,* 113, 95-100.

_____, Wright, S. E., Maley, S., Rae, A., Schock, A., Kirvar, E., Bartley, P., Hamilton, C., Carey, I. M. and Buxton, D. 2001. Protection against vertical transmission in bovine neosporosis. *Int J Parasitol,* 31, 1523-1534.

Jakubek, E. B., Brojer, C., Regnersen, C., Uggla, A., Schares, G. and Björkman, C. 2001. Seroprevalences of *Toxoplasma gondii* and *Neospora caninum* in Swedish red foxes *(Vulpes vulpes)*. *Vet Parasitol,* 102, 167-172.

Jenkins, M. C., Caver, J. A., Björkman, C. anderson, T. C., Romand, S., Vinyard, B., Uggla, A., Thulliez, P. and Dubey, J. P. 2000. Serological investigation of an outbreak of *Neospora caninum*-associated abortion in a dairy herd in southeastern United States. *Vet Parasitol,* 94, 17-26.

_____, Baszler, T., Björkman, C., Schares, G. and Williams, D. 2002. Diagnosis and seroepidemiology of *Neospora caninum*-associated bovine abortion. *Int J Parasitol,* 32, 631-636.

_____, Tuo, W. and Dubey, J. P. 2004. Evaluation of vaccination with *Neospora caninum* protein for prevention of fetal loss associated with experimentally induced neosporosis in sheep. *Am J Vet Res,* 65, 1404-1408.

_____, Parker, C., Hill, D., Pinckney, R. D., Dyer, R. and Dubey, J. P. 2007. *Neospora caninum* detected in feral rodents. *Vet Parasitol,* 143, 161-165.

Jensen, L., Jensen, T. K., Lind, P., Henriksen, S. A., Uggla, A. and Bille-Hansen, V. 1998. Experimental porcine neosporosis. *Apmis,* 106, 475-482.

Jensen, A. M., Björkman, C., Kjeldsen, A. M., Wedderkopp, A., Willadsen, C., Uggla, A. and Lind, P. 1999. Associations of *Neospora caninum* seropositivity with gestation number and pregnancy outcome in Danish dairy herds. *Prev Vet Med,* 40, 151-163.

Jolley, W. R., McAllister, M. M., McGuire, A. M. and Wills, R. A. 1999. Repetitive abortion in *Neospora*-infected ewes. *Vet Parasitol,* 82, 251-257.

Kamonpatana, K., Chantaraprateep, P., Verakul, P., Ngramsuriyaroj, C., Na Puket, R. S., Pikulthong, P. and Srizan, Y. 1982. *The use of progesterone essay in an oestrus synchronization program for the swamp buffalo.* In: Proceeding of the Animal production and Health in the Tropics, 445-447.

Kamonpatana, K., Pansin, C., Sophon, S., Jetana, T., Timsad, V., Limsakul, A. and Onwan, N. 1984a. *Plasma progesteroe and oestrone Sulphate Ratio, a comparison between Observed oestrus and induced oestrus in swamp buffalo.* In: Proceeding 10th International congress on animal reproduction and artificial insemination, 328.

_____, Parnpai, C. and Pansin, C. 1984b. Dose response of PGF2-alpha lutalyse-Luteolytic effect as related to pertility in swamp buffaloes. *Buff. Bull,* 3, 13-19.

Kashiwazaki, Y., Pholpark, S., Charoenchai, A., Polsar, C., Teeverapanya, S. and Pholpark, M. 2001. Postnatal neosporosis in dairy cattle in northeast Thailand. *Vet Parasito,* 94, 217-20.

_____, Gianneechini, R. E., Lust, M. and Gil, J. 2004. Seroepidemiology of neosporosis in dairy cattle in Uruguay. *Vet Parasito,* 120, 139-144.

Kaufmann, H., Yamage, M., Roditi, I., Dobbelaere, D., Dubey, J. P., Holmdahl, O. J., Trees, A. and Gottstein, B. 1996. Discrimination of *Neospora caninum* from *Toxoplasma gondii* and other apicomplexan parasites by hybridization and PCR. *Mol Cell Probe,* 10, 289-97.

Khan, I. A., Schwartzman, J. D., Fonseka, S. and Kasper, L. H. 1997. *Neospora caninum*: role for immune cytokines in host immunity. *Exp Parasito,* 85, 24-34.

Kim, J. H., Sohn, H. J., Hwang, W. S., Hwang, E. K., Jean, Y. H., Yamane, I. and Kim, D. Y. 2000. In vitro isolation and characterization of bovine *Neospora caninum* in Korea. *Vet Parasitol,* 90, 147-154.

_____, Kang, M. S., Lee, B. C., Hwang, W. S., Lee, C. W., So, B. J., Dubey, J. P. and Kim, D. Y. 2003. Seroprevalence of antibodies to *Neospora caninum* in dogs and raccoon dogs in Korea. *Korean J Parasitol,* 41, 243-245.

King, J. S., Slapeta, J., Jenkins, D. J., Al-Qassab, S. E., Ellis, J. T. and Windsor, P. A. 2010. Australian dingoes are definitive hosts of *Neospora caninum. Int J Parasitol,* 40, 945-950.

Kobayashi, Y., Yamada, M., Omata, Y., Koyama, T., Saito, A., Matsuda, T., Okuyama, K., Fujimoto, S., Furuoka, H. and Matsui, T. 2001. Naturally-occurring *Neospora caninum* infection in an adult sheep and her twin fetuses. *J Parasitol,* 87, 434-436.

Koiwai, M., Hamaoka, T., Haritani, M., Shimizu, S., Kimura, K. and Yamane, I. 2005a. Proportion of abortions due to neosporosis among dairy cattle in Japan. *J Vet Med Sci,* 67, 1173-1175.

_____, Hamaoka, T., Haritani, M., Shimizu, S., Tsutsui, T., Eto, M. and Yamane, I. 2005b. Seroprevalence of *Neospora caninum* in dairy and beef cattle with reproductive disorders in Japan. *Vet Parasitol,* 130, 15-18.

Konnai, S., Mingala, C. N., Sato, M., Abes, N. S., Venturina, F. A., Gutierrez, C. A., Sano, T., Omata, Y., Cruz, L. C., Onuma, M. and Ohashi, K. 2008. A survey of abortifacient infectious agents in livestock in Luzon, the Philippines, with emphasis on the situation in a cattle herd with abortion problems. *Acta Trop,* 105, 269-273.

Koyama, T., Kobayashi, Y., Omata, Y., Yamada, M., Furuoka, H., Maeda, R., Matsui, T., Saito, A. and Mikami, T. 2001. Isolation of *Neospora caninum* from the brain of a pregnant sheep. *J Parasitol,* 87, 1486-1488.

Kritzner, S., Sager, H., Blum, J., Krebber, R., Greif, G. and Gottstein, B. 2002. An explorative study to assess the efficacy of toltrazuril-sulfone ponazuril in calves experimentally infected with *Neospora caninum. Ann Clin Microbiol Antimicrob,* 1, 4.

Kul, O., Kabakci, N., Yildiz, K., Ocal, N., Kalender, H. and Ilkme, N. A. 2009. *Neospora caninum* associated with epidemic abortions in dairy cattle: the first clinical neosporosis report in Turkey. *Vet Parasitol,* 159, 69-72.

Kumar, S., Nagarajan, M., Sandhu, J. S., Kumar, N., Behl, V. and Nishanth, G. 2007. Mitochondrial DNA analyses of Indian water buffalo support a distinct genetic origin of river and swamp buffalo. *Anim Genet,* 38, 227-232.

Kyaw, T., Virakul, P., Muangyai, M. and Suwimonteerabutr, J. 2004. *Neospora caninum* seroprevalence in dairy cattle in central Thailand. *Vet Parasitol,* 121, 255-263.

Kyaw, T., Suwimonteerabutr, J., Virakul, P., Lohachit, C. and Kalpravidh, W. 2005. Seronegative conversion in four *Neospora caninum*-infected cows, with a low rate of transplacental transmission. *Vet Parasitol,* 131, 145-150.

La Perle, K. M., Del Piero, F., Carr, R. F., Harris, C. and Stromberg, P. C. 2001. Cutaneous neosporosis in two adult dogs on chronic immunosuppressive therapy. *J Vet Diagn Invest,* 13, 252-255.

Landmann, J. K., Jillella, D., O'Donoghue, P. J. and McGowan, M. R. 2002. Confirmation of the prevention of vertical transmission of *Neospora caninum* in cattle by the use of embryo transfer. *Aust Vet J,* 80, 502-503.

Larson, R. L., Hardin, D. K. and Pierce, V. L. 2004. Economic considerations for diagnostic and control options for *Neospora caninum*-induced abortions in endemically infected herds of beef cattle. *J Am Vet Med Assoc,* 224, 1597-1604.

Lasri, S., De Meerschman, F., Rettigner, C., Focant, C. and Losson, B. 2004. Comparison of three techniques for the serological diagnosis of *Neospora caninum* in the dog and their use for epidemiological studies. *Vet Parasitol,* 123, 25-32.

Liao, M., Zhang, S., Xuan, X., Zhang, G., Huang, X., Igarashi, I. and Fujisaki, K. 2005. Development of rapid immunochromatographic test with recombinant NcSAG1 for detection of antibodies to *Neospora caninum* in cattle. *Clin Diagn Lab Immunol,* 12, 885-887.

Lindsay, D. S. and Dubey, J. P. 1989. Immunohistochemical diagnosis of *Neospora* caninum in tissue sections. *Am J Vet Res,* 50, 1981-1983.

_____, Dubey, J. P. and Duncan, R. B. 1999a. Confirmation that the dog is a definitive host for *Neospora caninum*. *Vet Parasitol,* 82, 327-333.

_____, Upton, S. J. and Dubey, J. P. 1999b. A structural study of the *Neospora caninum* oocyst. *Int J Parasitol,* 29,1521-1523.

_____, Ritter, D. M. and Brake, D. 2001a. Oocyst excretion in dogs fed mouse brains containing tissue cysts of a cloned line of *Neospora caninum*. *J Parasitol,* 87, 909-911.

_____, Spencer, J., Rupprecht, C. and Blagburn, B. L. 2001b. Prevalence of agglutinating antibodies to *Neospora caninum* in raccoons, Procyon lotor. *J Parasitol,* 87, 1197-1198.

Lista-Alves, D., Palomares-Naveda, R., Garcia, F., Obando, C., Arrieta, D. and Hoet, A. E. 2006. Serological evidence of *Neospora caninum* in dual-purpose cattle herds in Venezuela. *Vet Parasitol,* 136, 347-349.

Lobato, J., Silva, D. A., Mineo, T. W., Amaral, J. D., Segundo, G. R., Costa-Cruz, J. M., Ferreira, M. S., Borges, A. S. and Mineo, J. R. 2006. Detection of immunoglobulin G antibodies to *Neospora caninum* in humans: high seropositivity rates in patients who are infected by human immunodeficiency virus or have neurological disorders. *Clin Vaccine Immunol,* 13, 84-89.

Lopez-Gatius, F., Lopez-Bejar, M., Murugavel, K., Pabon, M., Ferrer, D. and Almeria, S. 2004a. *Neospora*-associated abortion episode over a 1-year period in a dairy herd in north-east Spain. *J Vet Med B Infect Dis Vet Public Health,* 51, 348-352.

_____, Pabon, M. and Almeria, S. 2004b. *Neospora caninum* infection does not affect early pregnancy in dairy cattle. *Theriogenology,* 62, 606-613.

_____,Santolaria, P. and Almeria, S. 2005a. *Neospora caninum* infection does not affect the fertility of dairy cows in herds with high incidence of *Neospora*-associated abortions. *J Vet Med B Infect Dis Vet Public Health,* 52, 51-53.

_____, Santolaria, P., Yaniz, J. L., Garbayo, J. M. and Almeria, S. 2005b. The use of beef bull semen reduced the risk of abortion in *Neospora*-seropositive dairy cows. *J Vet Med B Infect Dis Vet Public Health,* 52, 88-92.

_____, Almeria, S., Donofrio, G., Nogareda, C., Garcia-Ispierto, I., Bech-Sabat, G., Santolaria, P., Yaniz, J. L., Pabon, M., de Sousa, N. M. and Beckers, J. F. 2007a. Protection against abortion linked to gamma interferon production in pregnant dairy cows naturally infected with *Neospora caninum*. *Theriogenology,* 68, 1067-1073.

_____, Garbayo, J. M., Santolaria, P., Yaniz, J. L., Almeria, S., Ayad, A., de Sousa, N. M. and Beckers, J. F. 2007b. Plasma pregnancy-associated glycoprotein-1 PAG-1 concentrations during gestation in *Neospora*-infected dairy cows. *Theriogenology,* 67, 502-508.

Lorenzo, V., Pumarola, M. and Siso, S. 2002. Neosporosis with cerebellar involvement in an adult dog. *J Small Anim Pract,* 43, 76-79.

Maley, S. W., Buxton, D., Thomson, K. M., Schriefer, C. E. and Innes, E. A. 2001. Serological analysis of calves experimentally infected with Neospora caninum: a 1-year study. *Vet Parasitol,* 96, 1-9.

Malmasi, A., Hosseininejad, M., Haddadzadeh, H., Badii, A. and Bahonar, A. 2007. Serologic study of anti-*Neospora caninum* antibodies in household dogs and dogs living in dairy and beef cattle farms in Tehran, Iran. *Parasitol Res,* 100, 1143-1145.

Mansourian, M., Khodakaram-Tafti, A. and Namavari, M. 2009. Histopathological and clinical investigations in *Neospora caninum* experimentally infected broiler chicken embryonated eggs. *Vet Parasitol,* 166, 185-190.

Marsh, A. E., Barr, B. C., Madigan, J., Lakritz, J., Nordhausen, R. and Conrad, P. A. 1996. Neosporosis as a cause of equine protozoal myeloencephalitis. *J Am Vet Med Assoc,* 209, 1907-1913.

Mayhew, P. D., Bush, W. W. and Glass, E. N. 2002. Trigeminal neuropathy in dogs: a retrospective study of 29 cases 1991-2000. *J Am Anim Hosp Assoc,* 38, 262-270.

McAllister, M. M., Huffman, E. M., Hietala, S. K., Conrad, P. A. anderson, M. L. and Salman, M. D. 1996a. Evidence suggesting a point source exposure in an outbreak of bovine abortion due to neosporosis. *J Vet Diagn Invest,* 8, 355-357.

_____, McGuire, A. M., Jolley, W. R., Lindsay, D. S., Trees, A. J. and Stobart, R. H. 1996b. Experimental neosporosis in pregnant ewes and their offspring. *Vet Pathol,* 33, 647-655.

_____, Parmley, S. F., Weiss, L. M., Welch, V. J. and McGuire, A. M. 1996c. An immunohistochemical method for detecting bradyzoite antigen (BAG5) in *Toxoplasma gondii*-infected tissues cross-reacts with a *Neospora* caninum bradyzoite antigen. *J Parasitol,* 82, 354-355.

_____, Dubey, J. P., Lindsay, D. S., Jolley, W. R., Wills, R. A. and McGuire, A. M. 1998a. Dogs are definitive hosts of *Neospora* caninum. *Int J Parasitol,* 28, 1473-1478.

_____, Jolley, W. R., Wills, R. A., Lindsay, D. S., McGuire, A. M. and Tranas, J. D. 1998b. Oral inoculation of cats with tissue cysts of *Neospora caninum. Am J Vet Res,* 59, 441-4.

McAllister, M. M., Björkman, C. anderson-Sprecher, R. and Rogers, D. G. 2000. Evidence of point-source exposure to *Neospora caninum* and protective immunity in a herd of beef cows. *J Am Vet Med Assoc,* 217, 881-887.

McCann, C. M., McAllister, M. M., Gondim, L. F., Smith, R. F., Cripps, P. J., Kipar, A., Williams, D. J. and Trees, A. J. 2007. *Neospora caninum* in cattle: experimental infection with oocysts can result in exogenous transplacental infection, but not endogenous transplacental infection in the subsequent pregnancy. *Int J Parasitol,* 37, 1631-1639.

McGarry, J. W., Stockton, C. M., Williams, D. J. and Trees, A. J. 2003. Protracted shedding of oocysts of *Neospora caninum* by a naturally infected foxhound. *J Parasitol,* 89, 628-630.

McGuire, A. M., McAllister, M., Wills, R. A. and Tranas, J. D. 1999. Experimental inoculation of domestic pigeons Columbia livia and zebra finches Poephila guttata with *Neospora caninum* tachyzoites. *Int J Parasitol,* 29, 1525-1529.

McInnes, L. M., Irwin, P., Palmer, D. G. and Ryan, U. M. 2006a. In vitro isolation and characterisation of the first canine *Neospora caninum* isolate in Australia. *Vet Parasitol,* 137, 355-363.

_____, Ryan, U. M., O'Handley, R., Sager, H., Forshaw, D. and Palmer, D. G. 2006b. Diagnostic significance of *Neospora caninum* DNA detected by PCR in cattle serum. *Vet Parasitol,* 142, 207-213.

Medina, L., Cruz-Vazquez, C., Quezada, T., Morales, E. and Garcia-Vazquez, Z. 2006. Survey of *Neospora caninum* infection by nested PCR in aborted fetuses from dairy farms in Aguascalientes, Mexico. *Vet Parasitol,* 136, 187-191.

Meenakshi, Sandhu, K. S., Ball, M. S., Kumar, H., Sharma, S., Sidhu, P. K., Sreekumar, C. and Dubey, J. P. 2007. Seroprevalence of *Neospora caninum* antibodies in cattle and water buffaloes in India. *J Parasitol,* 93, 1374-7137.

Miller, C., Quinn, H., Ryce, C., Reichel, M. P. and Ellis, J. T. 2005. Reduction in transplacental transmission of *Neospora caninum* in outbred mice by vaccination. *Int J Parasitol,* 35, 821-828.

Mineo, T. W., Carrasco, A. O., Marciano, J. A., Werther, K., Pinto, A. A. and Machado, R. Z. 2009. Pigeons Columba livia are a suitable experimental model for *Neospora caninum* infection in birds. *Vet Parasitol,* 159, 149-153.

Minervino, A. H., Ragozo, A. M., Monteiro, R. M., Ortolani, E. L. and Gennari, S. M. 2008. Prevalence of *Neospora caninum* antibodies in cattle from Santarem, Para, Brazil. *Res Vet Sci,* 84, 254-256.

Mingala, C. N., Odbileg, R., Konnai, S., Ohashi, K. and Onuma, M. 2006. Comparative assessment of Th1 and Th2 cytokines of swamp type buffalo and other bubaline breeds by molecular cloning, sequencing and phylogenetics. *Vet Immunol Immunopathol,* 113, 348-356.

_____, Odbileg, R., Konnai, S., Ohashi, K. and Onuma, M. 2007. Molecular cloning, sequencing and phylogenetic analysis of inflammatory cytokines of swamp type buffalo contrasting with other bubaline breeds. *Comp Immunol Microbiol Infect Dis,* 30, 119-131.

Moen, A. R., Wouda, W., Mul, M. F., Graat, E. A. and van Werven, T. 1998. Increased risk of abortion following *Neospora caninum* abortion outbreaks: a retrospective and prospective cohort study in four dairy herds. *Theriogenology,* 49,1301-1309.

Mohamad, R. H. H., Saad, G., Hosain, H., Masood, G. and Rahim, P. 2007. Occurence of *Neospora caninum* antibodies in water buffaloes *(Bubalus bubalis)* form the south-western region of Iran. *Bull Vet Inst Pulawy,* 51 233-235.

Molina, E. C., Gonzaga, E. A., Sinolinding, E. O., Lumbao, L. A., Peralta, A. A. and Barraca, A. P. 2005. Differences in susceptibility between cattle and swamp buffaloes to infection with Fasciola gigantica. Tropical Animal Health and Production, 611–616.

Moore, D. P., Campero, C. M., Odeon, A. C., Posso, M. A., Cano, D., Leunda, M. R., Basso, W., Venturini, M. C. and Spath, E. 2002. Seroepidemiology of beef and dairy herds and fetal study of *Neospora caninum* in Argentina. *Vet Parasitol,* 107, 303-316.

Moore, D. P., Perez, A., Agliano, S., Brace, M., Canton, G., Cano, D., Leunda, M. R., Odeon, A. C., Odriozola, E. and Campero, C. M. 2009. Risk factors associated with *Neospora caninum* infections in cattle in Argentina. *Vet Parasitol,* 161, 122-125.

More, G., Bacigalupe, D., Basso, W., Rambeaud, M., Beltrame, F., Ramirez, B., Venturini, M. C. and Venturini, L. 2009. Frequency of horizontal and vertical transmission for *Sarcocystis cruzi* and *Neospora caninum* in dairy cattle. *Vet Parasitol,* 160, 51-54.

Moskwa, B., Pastusiak, K., Bien, J. and Cabaj, W. 2007. The first detection of *Neospora caninum* DNA in the colostrum of infected cows. *Parasitol Res,* 100, 633-636.

_____, Gozdzik, K., Bien, J. and Cabaj, W. 2008. Studies on *Neospora caninum* DNA detection in the oocytes and embryos collected from infected cows. *Vet Parasitol,* 158, 370-375.

Muller, J., Naguleswaran, A., Muller, N. and Hemphill, A. 2008. *Neospora caninum*: functional inhibition of protein disulfide isomerase by the broad-spectrum anti-parasitic drug nitazoxanide and other thiazolides. *Exp Parasitol,* 118, 80-88.

Munoz-Zanzi, C. A., Thurmond, M. C. and Hietala, S. K. 2004. Effect of bovine viral diarrhea virus infection on fertility of dairy heifers. *Theriogenology,* 61, 1085-1099.

Nam, H. W., Kang, S. W. and Choi, W. Y. 1998. Antibody reaction of human anti-*Toxoplasma gondii* positive and negative sera with *Neospora caninum* antigens. *Korean J Parasitol,* 36, 269-275.

O'Handley, R. M., Morgan, S. A., Parker, C., Jenkins, M. C. and Dubey, J. P. 2003. Vaccination of ewes for prevention of vertical transmission of *Neospora caninum*. *Am J Vet Res,* 64, 449-452.

Okeoma, C. M., Williamson, N. B., Pomroy, W. E., Stowell, K. M. and Gillespie, L. 2004a. The use of PCR to detect *Neospora caninum* DNA in the blood of naturally infected cows. *Vet Parasitol,* 122, 307-315.

_____, Williamson, N. B., Pomroy, W. E., Stowell, K. M. and Gillespie, L. M. 2004b. Isolation and molecular characterisation of *Neospora caninum* in cattle in New Zealand. *N Z Vet J,* 52, 364-370.

Okeoma, C. M., Stowell, K. M., Williamson, N. B. and Pomroy, W. E. 2005. *Neospora caninum*: quantification of DNA in the blood of naturally infected aborted and pregnant cows using real-time PCR. *Exp Parasitol,* 110, 48-55.

Ooi, H. K., Huang, C. C., Yang, C. H. and Lee, S. H. 2000. Serological survey and first finding of *Neospora caninum* in Taiwan, and the detection of its antibodies in various body fluids of cattle. *Vet Parasitol,* 90, 47-55.

Ortega-Mora, L. M., Ferre, I., del-Pozo, I., Caetano-da-Silva, A., Collantes-Fernandez, E., Regidor-Cerrillo, J., Ugarte-Garagalza, C. and Aduriz, G. 2003. Detection of *Neospora caninum* in semen of bulls. *Vet Parasitol,* 117, 301-308.

Osawa, T., Wastling, J., Maley, S., Buxton, D. and Innes, E. A. 1998. A multiple antigen ELISA to detect *Neospora*-specific antibodies in bovine sera, bovine foetal fluids, ovine and caprine sera. *Vet Parasitol,* 79, 19-34.

_____, Wastling, J., Acosta, L., Ortellado, C., Ibarra, J. and Innes, E. A. 2002. Seroprevalence of *Neospora caninum* infection in dairy and beef cattle in Paraguay. *Vet Parasitol,* 110, 17-23.

Osburn, B. I., MacLachlan, N. J. and Terrell, T. G. 1982. Ontogeny of the immune system. *J Am Vet Med Assoc,* 181, 1049-1052.

Oshiro, L. M., Matos Mde, F., de Oliveira, J. M., Monteiro, L. A. and Andreotti, R. 2007. Prevalence of anti-*Neospora caninum* antibodies in cattle from the state of Mato Grosso do Sul, Brazil. *Rev Bras Parasitol Vet,* 16, 133-138.

Osoro, K., Ortega-Mora, L. M., Martinez, A., Serrano-Martinez, E. and Ferre, I. 2009. Natural breeding with bulls experimentally infected with *Neospora caninum* failed to induce seroconversion in dams. *Theriogenology,* 71, 639-642.

Otranto, D., Llazari, A., Testini, G., Traversa, D., Frangipane di Regalbono, A., Badan, M. and Capelli, G. 2003. Seroprevalence and associated risk factors of neosporosis in beef and dairy cattle in Italy. *Vet Parasitol,* 118, 7-18.

Otter, A., Jeffrey, M., Griffiths, I. B. and Dubey, J. P. 1995. A survey of the incidence of *Neospora* caninum infection in aborted and stillborn bovine fetuses in England and Wales. *Vet Rec,* 136, 602-606.

Ould-Amrouche, A., Klein, F., Osdoit, C., Mohammed, H. O., Touratier, A., Sanaa, M. and Mialot, J. P. 1999. Estimation of *Neospora caninum* seroprevalence in dairy cattle from Normandy, France. *Vet Res,* 30, 531-538.

Pabon, M., Lopez-Gatius, F., Garcia-Ispierto, I., Bech-Sabat, G., Nogareda, C. and Almeria, S. 2007. Chronic *Neospora caninum* infection and repeat abortion in dairy cows: a 3-year study. *Vet Parasitol,* 147, 40-46.

Pace and Wakeman 1983. Determining age of cattle by their teeth. Retrieved January 20, 2010, from: http://edis.ifas.ufl.edu

Paciello, O., D'Orazi, A., Borzacchiello, G., Martano, M., Restucci, B., Maiolino, P. and Papparella, S. 2004. Expression of Major Histocompatibility Complex class I and II in a case of *Neospora caninum* myositis in a dog. *Acta Myol,* 23, 151-153.

Packham, A. E., Sverlow, K. W., Conrad, P. A., Loomis, E. F., Rowe, J. D. anderson, M. L., Marsh, A. E., Cray, C. and Barr, B. C. 1998. A modified agglutination test for *Neospora caninum*: development, optimization, and comparison to the indirect fluorescent-antibody test and enzyme-linked immunosorbent assay. *Clin Diagn Lab Immunol,* 5, 467-473.

Panadero, R., Painceira, A., Lopez, C., Vazquez, L., Paz, A., Diaz, P., Dacal, V., Cienfuegos, S., Fernandez, G., Lago, N., Diez-Banos, P. and Morrondo, P. 2009. Seroprevalence of *Toxoplasma gondii* and *Neospora caninum* in wild and domestic ruminants sharing pastures in Galicia Northwest Spain. *Res Vet Sci,* 88, 111-115.

Paradies, P., Capelli, G., Testini, G., Cantacessi, C., Trees, A. J. and Otranto, D. 2007. Risk factors for canine neosporosis in farm and kennel dogs in southern Italy. *Vet Parasitol,* 145, 240-244.

Pare, J., Thurmond, M. C. and Hietala, S. K. 1996. Congenital *Neospora caninum* infection in dairy cattle and associated calfhood mortality. *Can J Vet Res,* 60, 133-139.

Parish, S. M., Maag-Miller, L. and Besser, T. E., Weidner, J.P., McElwain, T., Knowles, D.P. and Leathers, C.W. 1987. Myelitis associated with protozoal infection in newborn calves. *J. Am. Vet. Med. Assoc,* 191,1599-1600.

Pasquali, P., Mandara, M. T., Adamo, F., Ricci, G., Polidori, G. A. and Dubey, J. P. 1998. Neosporosis in a dog in Italy. *Vet Parasitol,* 77, 297-299.

Patitucci, A. N., Alley, M. R., Jones, B. R. and Charleston, W. A. 1997. Protozoal encephalomyelitis of dogs involving *Neospora caninum* and *Toxoplasma gondii* in New Zealand. *N Z Vet J,* 45, 231-235.

Pedraza-Diaz, S., Marugan-Hernandez, V., Collantes-Fernandez, E., Regidor-Cerrillo, J., Rojo-Montejo, S., Gomez-Bautista, M. and Ortega-Mora, L. M. 2009. Microsatellite markers for the molecular characterization of *Neospora caninum*: application to clinical samples. *Vet Parasitol,* 166, 38-46.

Pena, H. F., Soares, R. M., Ragozo, A. M., Monteiro, R. M., Yai, L. E., Nishi, S. M. and Gennari, S. M. 2007. Isolation and molecular detection of *Neospora caninum* from naturally infected sheep from Brazil. *Vet Parasitol,* 147, 61-66.

Perl, S., Harrus, S., Satuchne, C., Yakobson, B. and Haines, D. 1998. Cutaneous neosporosis in a dog in Israel. *Vet Parasitol,* 79, 257-261.

Pescador, C. A., Corbellini, L. G., Oliveira, E. C., Raymundo, D. L. and Driemeier, D. 2007. Histopathological and immunohistochemical aspects of *Neospora caninum* diagnosis in bovine aborted fetuses. *Vet Parasitol,* 150, 159-163.

Peters, M., Wagner, F. and Schares, G. 2000. Canine neosporosis: clinical and pathological findings and first isolation of *Neospora caninum* in Germany. *Parasitol Res,* 86, 1-7.

_____, Lutkefels, E., Heckeroth, A. R. and Schares, G. 2001a. Immunohistochemical and ultrastructural evidence for *Neospora caninum* tissue cysts in skeletal muscles of naturally infected dogs and cattle. *Int J Parasitol,* 31, 1144-1148.

_____, Wohlsein, P., Knieriem, A. and Schares, G. 2001b. *Neospora caninum* infection associated with stillbirths in captive antelopes Tragelaphus imberbis. *Vet Parasitol,* 97, 153-157.

Pinitkiatisakul, S., Mattsson, J. G. and Lunden, A. 2008. Quantitative analysis of parasite DNA in the blood of immunized and naive mice after infection with *Neospora caninum*. *Parasitology*, 135, 175-182.

Pitel, P. H., Pronost, S., Romand, S., Thulliez, P., Fortier, G. and Ballet, J. J. 2001. Prevalence of antibodies to *Neospora caninum* in horses in France. *Equine Vet J*, 33, 205-207.

Pope, G. S., Gupta, S. K. and Munro, I. B. 1969. Progesterone levels in the systemic plasma of pregnant, cycling and ovariectomized cows. *J Reprod Fertil*, 20, 369-381.

Pumarola, M., Anor, S., Ramis, A. J., Borras, D., Gorraiz, J. and Dubey, J. P. 1996. *Neospora caninum* infection in a Napolitan mastiff dog from Spain. *Vet Parasitol*, 64, 315-317.

Quinn, H. E., Ellis, J. T. and Smith, N. C. 2002. *Neospora caninum*: a cause of immune-mediated failure of pregnancy? *Trends Parasitol*, 18, 391-394.

Quintanilla-Gozalo, A., Pereira-Bueno, J., Tabares, E., Innes, E. A., Gonzalez-Paniello, R. and Ortega-Mora, L. M. 1999. Seroprevalence of *Neospora caninum* infection in dairy and beef cattle in Spain. *Int J Parasitol*, 29, 1201-1208.

Rajkhowa, S., Rajkhowa, C., Dutta, P. R., Michui, P. and Das, R. 2008. Serological evidence of *Neospora caninum* infection in mithun Bos frontalis from India. *Res Vet Sci*, 84, 250-253.

Ramamoorthy, S., Lindsay, D. S., Schurig, G. G., Boyle, S. M., Duncan, R. B., Vemulapalli, R. and Sriranganathan, N. 2006. Vaccination with gamma-irradiated *Neospora caninum* tachyzoites protects mice against acute challenge with *N. caninum*. *J Eukaryot Microbiol*, 53, 151-156.

_____, Sanakkayala, N., Vemulapalli, R., Duncan, R. B., Lindsay, D. S., Schurig, G. S., Boyle, S. M., Kasimanickam, R. and Sriranganathan, N. 2007a. Prevention of lethal experimental infection of C57BL/6 mice by vaccination with Brucella abortus strain RB51 expressing *Neospora caninum* antigens. *Int J Parasitol*, 37, 1521-1529.

Ramamoorthy, S., Sanakkayala, N., Vemulapalli, R., Jain, N., Lindsay, D. S., Schurig, G. S., Boyle, S. M. and Sriranganathan, N. 2007b. Prevention of vertical transmission of *Neospora caninum* in C57BL/6 mice vaccinated with Brucella abortus strain RB51 expressing *N. caninum* protective antigens. *Int J Parasitol,* 37, 1531-1538.

Razmi, G. R., Maleki, M., Farzaneh, N., Talebkhan Garoussi, M. and Fallah, A. H. 2007. First report of *Neospora caninum*-associated bovine abortion in Mashhad area, Iran. *Parasitol Res,* 100, 755-757.

Regidor-Cerrillo, J., Gomez-Bautista, M., Pereira-Bueno, J., Aduriz, G., Navarro-Lozano, V., Risco-Castillo, V., Fernandez-Garcia, A., Pedraza-Diaz, S. and Ortega-Mora, L. M. 2008. Isolation and genetic characterization of *Neospora caninum* from asymptomatic calves in Spain. *Parasitology,* 135, 1651-1659.

Reichel, M. P., Thornton, R. N., Morgan, P. L., Mills, R. J. and Schares, G. 1998. Neosporosis in a pup. *N Z Vet J,* 46, 106-110.

_____. 2000. *Neospora caninum* infections in Australia and New Zealand. *Aust Vet J,* 78, 258-61.

_____. and Ellis, J. T. 2006. If control of *Neospora caninum* infection is technically feasible does it make economic sense? *Vet Parasitol,* 142, 23-34.

Reiterova, K., Spilovska, S., Antolova, D. and Dubinsky, P. 2009. *Neospora caninum*, potential cause of abortions in dairy cows: the current serological follow-up in Slovakia. *Vet Parasitol,* 159, 1-6.

Rinaldi, L., Fusco, G., Musella, V., Veneziano, V., Guarino, A., Taddei, R. and Cringoli, G. 2005. *Neospora caninum* in pastured cattle: determination of climatic, environmental, farm management and individual animal risk factors using remote sensing and geographical information systems. *Vet Parasitol,* 128, 219-230.

_____, Pacelli, F., Iovane, G., Pagnini, U., Veneziano, V., Fusco, G. and Cringoli, G. 2007. Survey of *Neospora caninum* and bovine herpes virus 1 coinfection in cattle. *Parasitol Res,* 100, 359-364.

Roberts, C. W., Satoskar, A. and Alexander, J. 1996. Sex steroids, pregnancy-associated hormones and immunity to parasitic infection. *Parasitol Today,* 12, 382-8.

Rodrigues, A. A., Gennari, S. M., Aguiar, D. M., Sreekumar, C., Hill, D. E., Miska, K. B., Vianna, M. C. and Dubey, J. P. 2004. Shedding of *Neospora caninum* oocysts by dogs fed tissues from naturally infected water buffaloes *(Bubalus bubalis)* from Brazil. *Vet Parasitol,* 124, 139-150.

_____, Gennari, S. M., Paula, V. S., Aguiar, D. M., Fujii, T. U., Starke-Buzeti, W., Machado, R. Z. and Dubey, J. P. 2005. Serological responses to *Neospora caninum* in experimentally and naturally infected water buffaloes *(Bubalus bubalis). Vet Parasitol,* 129, 21-24.

Rojo-Montejo, S., Collantes-Fernandez, E., Regidor-Cerrillo, J., Alvarez-Garcia, G., Marugan-Hernandez, V., Pedraza-Diaz, S., Blanco-Murcia, J., Prenafeta, A. and Ortega-Mora, L. M. 2009. Isolation and characterization of a bovine isolate of *Neospora caninum* with low virulence. *Vet Parasitol,* 159, 7-16.

Romano, A., Trisciuoglio, A., Grande, D. and Ferroglio, E. 2009. Comparison of two PCR protocols for the detection of *Neospora caninum* DNA in rodents. *Vet Parasitol,* 159, 159-161.

Romero, J. J., Perez, E., Dolz, G. and Frankena, K. 2002. Factors associated with *Neospora caninum* serostatus in cattle of 20 specialised Costa Rican dairy herds. *Prev Vet Med,* 53, 263-273.

_____ and Frankena, K. 2003. The effect of the dam-calf relationship on serostatus to *Neospora caninum* on 20 Costa Rican dairy farms. *Vet Parasitol,* 114, 159-171.

_____, Perez, E. and Frankena, K. 2004. Effect of a killed whole *Neospora caninum* tachyzoite vaccine on the crude abortion rate of Costa Rican dairy cows under field conditions. *Vet Parasitol,* 123, 149-159.

_____, Breda, S. V., Vargas, B., Dolz, G. and Frankena, K. 2005. Effect of neosporosis on productive and reproductive performance of dairy cattle in Costa Rica. *Theriogenology,* 64, 1928-1939.

Rosbottom, A., Gibney, E. H., Guy, C. S., Kipar, A., Smith, R. F., Kaiser, P., Trees, A. J. and Williams, D. J. 2008. Upregulation of cytokines is detected in the placentas of cattle infected with *Neospora caninum* and is more marked early in gestation when fetal death is observed. *Infect Immun,* 76, 2352-2361.

Sadrebazzaz, A., Haddadzadeh, H., Esmailnia, K., Habibi, G., Vojgani, M. and Hashemifesharaki, R. 2004. Serological prevalence of *Neospora caninum* in healthy and aborted dairy cattle in Mashhad, Iran. *Vet Parasitol,* 124, 201-204.

Sager, H., Fischer, I., Furrer, K., Strasser, M., Waldvogel, A., Boerlin, P., Audige, L. and Gottstein, B. 2001. A Swiss case-control study to assess Neospora caninum-associated bovine abortions by PCR, histopathology and serology. *Vet Parasitol,* 102, 1-15.

_____, Moret, C. S., Muller, N., Staubli, D., Esposito, M., Schares, G., Hassig, M., Stark, K. and Gottstein, B. 2006. Incidence of *Neospora caninum* and other intestinal protozoan parasites in populations of Swiss dogs. *Vet Parasitol,* 139, 84-92.

Sanchez, G. F., Banda, R. V., Sahagun, R. A., Ledesma, M. N. and Morales, S. E. 2009. Comparison between immunohistochemistry and two PCR methods for detection of *Neospora caninum* in formalin-fixed and paraffin-embedded brain tissue of bovine fetuses. *Vet Parasitol,* 164, 328-332.

Sanderson, M. W., Gay, J. M. and Baszler, T. V. 2000. *Neospora caninum* seroprevalence and associated risk factors in beef cattle in the northwestern United States. *Vet Parasitol,* 90, 15-24.

Santolaria, P., Lopez-Gatius, F., Yaniz, J., Garcia-Ispierto, I., Nogareda, C., Bech-Sabat, G., Serrano, B. and Almeria, S. 2009. Early postabortion recovery of *Neospora*-infected lactating dairy cows. *Theriogenology,* 72, 798-802.

Sawada, M., Park, C. H., Kondo, H., Morita, T., Shimada, A., Yamane, I. and Umemura, T. 1998. Serological survey of antibody to *Neospora caninum* in Japanese dogs. *J Vet Med Sci,* 60, 853-854.

Sawada, M., Kondo, H., Tomioka, Y., Park, C., Morita, T., Shimada, A. and Umemura, T. 2000. Isolation of *Neospora caninum* from the brain of a naturally infected adult dairy cow. *Vet Parasitol,* 90, 247-252.

Schares, G., Peters, M., Wurm, R., Barwald, A. and Conraths, F. J. 1998. The efficiency of vertical transmission of *Neospora caninum* in dairy cattle analysed by serological techniques. *Vet Parasitol,* 80, 87-98.

_____, Conraths, F. J. and Reichel, M. P. 1999. Bovine neosporosis: comparison of serological methods using outbreak sera from a dairy herd in New Zealand. *Int J Parasitol,* 29, 1659-1667.

_____, Heydorn, A. O., Cuppers, A., Conraths, F. J. and Mehlhorn, H. 2001a. Cyclic transmission of *Neospora caninum*: serological findings in dogs shedding oocysts. *Parasitol Res,* 87, 873-877.

_____,Wenzel, U., Muller, T. and Conraths, F. J. 2001b. Serological evidence for naturally occurring transmission of *Neospora caninum* among foxes *(Vulpes vulpes). Int J Parasitol,* 31, 418-423.

_____, Barwald, A., Staubach, C., Sondgen, P., Rauser, M., Schroder, R., Peters, M., Wurm, R., Selhorst, T. and Conraths, F. J. 2002a. p38-avidity-ELISA: examination of herds experiencing epidemic or endemic *Neospora caninum*-associated bovine abortion. *Vet Parasitol,* 106, 293-305.

_____, Heydorn, A. O., Cuppers, A., Mehlhorn, H., Geue, L., Peters, M. and Conraths, F. J. 2002b. In contrast to dogs, red foxes *(Vulpes vulpes)* did not shed *Neospora caninum* upon feeding of intermediate host tissues. *Parasitol Res,* 88, 44-52.

_____, Barwald, A., Staubach, C., Ziller, M., Kloss, D., Schroder, R., Labohm, R., Drager, K., Fasen, W., Hess, R. G. and Conraths, F. J. 2004. Potential risk factors for bovine *Neospora caninum* infection in Germany are not under the control of the farmers. *Parasitology,* 129, 301-309.

_____, Pantchev, N., Barutzki, D., Heydorn, A. O., Bauer, C. and Conraths, F. J. 2005. Oocysts of *Neospora caninum, Hammondia heydorni, Toxoplasma gondii* and *Hammondia hammondi* in faeces collected from dogs in Germany. *Int J Parasitol,* 35, 1525-1537.

Schatzberg, S. J., Haley, N. J., Barr, S. C., deLahunta, A., Olby, N., Munana, K. and Sharp, N. J. 2003. Use of a multiplex polymerase chain reaction assay in the antemortem diagnosis of toxoplasmosis and neosporosis in the central nervous system of cats and dogs. *Am J Vet Res,* 64, 1507-1513.

Sedlak, K. and Bartova, E. 2006. Seroprevalences of antibodies to *Neospora caninum* and *Toxoplasma gondii* in zoo animals. *Vet Parasitol,* 136, 223-231.

Serrano-Martinez, E., Ferre, I., Martinez, A., Osoro, K., Mateos-Sanz, A., Del-Pozo, I., Aduriz, G., Tamargo, C., Hidalgo, C. O. and Ortega-Mora, L. M. 2007a. Experimental neosporosis in bulls: parasite detection in semen and blood and specific antibody and interferon-gamma responses. *Theriogenology,* 67, 1175-1184.

_____, Ferre, I., Osoro, K., Aduriz, G., Mota, R. A., Martinez, A., Del-Pozo, I., Hidalgo, C. O. and Ortega-Mora, L. M. 2007b. Intrauterine *Neospora caninum* inoculation of heifers and cows using contaminated semen with different numbers of tachyzoites. *Theriogenology,* 67, 729-737.

Sharma, S., Bal, M. S., Meenakshi, Kaur, K., Sandhu, K. S. and Dubey, J. P. 2008. Seroprevalence of *Neospora caninum* antibodies in dogs in India. *J Parasitol,* 94, 303-304.

Shin, Y. S., Lee, E. G. and Jung, T. S. 2005. Exploration of immunoblot profiles of *Neospora caninum* probed with different bovine immunoglobulin classes. *J Vet Sci,* 6, 157-1560.

Slapeta, J. R., Modry, D., Kyselova, I., Horejs, R., Lukes, J. and Koudela, B. 2002. Dog shedding oocysts of *Neospora caninum*: PCR diagnosis and molecular phylogenetic approach. *Vet Parasitol,* 109, 157-167.

Smith, B. P. 2002. *Large Animal Internal Medicine*.3rd ed. St. Louis: *Mosby*.

Soares, H. S., Ahid, S. M., Bezerra, A. C., Pena, H. F., Dias, R. A. and Gennari, S. M. 2009. Prevalence of anti-*Toxoplasma gondii* and anti-*Neospora caninum* antibodies in sheep from Mossoro, Rio Grande do Norte, Brazil. *Vet Parasitol,* 160, 211-214.

Sobrino, R., Dubey, J. P., Pabon, M., Linarez, N., Kwok, O. C., Millan, J., Arnal, M. C., Luco, D. F., Lopez-Gatius, F., Thulliez, P., Gortazar, C. and Almeria, S. 2008. *Neospora caninum* antibodies in wild carnivores from Spain. *Vet Parasitol,* 155, 190-197.

Soldati, S., Kiupel, M., Wise, A., Maes, R., Botteron, C. and Robert, N. 2004. Meningoencephalomyelitis caused by *Neospora caninum* in a juvenile fallow deer Dama dama. *J Vet Med A Physiol Pathol Clin Med,* 51, 280-283.

Sondgen, P., Peters, M., Barwald, A., Wurm, R., Holling, F., Conraths, F. J. and Schares, G. 2001. Bovine neosporosis: immunoblot improves foetal serology. *Vet Parasitol,* 102, 279-290.

Speer, C. A. and Dubey, J. P. 1989. Ultrastructure of tachyzoites, bradyzoites and tissue cysts of *Neospora caninum*. *J Protozool,* 36, 458-463.

Stahl, K., Björkman, C., Emanuelson, U., Rivera, H., Zelada, A. and Moreno-Lopez, J. 2006. A prospective study of the effect of *Neospora caninum* and BVDV infections on bovine abortions in a dairy herd in Arequipa, Peru. *Prev Vet Med,* 75, 177-188.

Staubli, D., Iten, C., Kneubuhler, J., Sager, H., Muller, N. and Gottstein, B. 2006a. Search for *Neospora* caninum DNA in bull semen using PCR *Schweiz Arch Tierheilkd,* 14, 483-489.

_____, Nunez, S., Sager, H., Schares, G. and Gottstein, B. 2006b. *Neospora* caninum immunoblotting improves serodiagnosis of bovine neosporosis. *Parasitol Res,* 99, 648-58

Steinman, A., Shpigel, N. Y., Mazar, S., King, R., Baneth, G., Savitsky, I. and Shkap, V. 2006. Low seroprevalence of antibodies to *Neospora caninum* in wild canids in Israel. *Vet Parasitol,* 13, 155-158.

Stenlund, S., Kindahl, H., Uggla, A. and Björkman, C. 2003. A long-term study of *Neospora caninum* infection in a Swedish dairy herd. *Acta Vet Scand,* 4, 63-71.

Strohbusch, M., Muller, N., Hemphill, A., Krebber, R., Greif, G. and Gottstein, B. 2009. Toltrazuril treatment of congenitally acquired *Neospora caninum* infection in newborn mice. *Parasitol Res,* 10, 1335-1343.

Suteeraparp, P., Pholpark, S., Pholpark, M., Charoenchai, A., Chompoochan, T., Yamane, I. and Kashiwazaki, Y. 1999. Seroprevalence of antibodies to *Neospora caninum* and associated abortion in dairy cattle from central Thailand. *Vet Parasitol,* 8, 49-57.

Suteu, O., Titilincu, A., Modry, D., Mihalca, A., Mircean, V. and Cozma, V. 2010. First identification of *Neospora caninum* by PCR in aborted bovine foetuses in Romania. *Parasitol Res,* 10, 719-722.

Taubert, A., Zahner, H. and Hermosilla, C. 2006. Dynamics of transcription of immunomodulatory genes in endothelial cells infected with different coccidian parasites. *Vet Parasitol,* 14, 214-222.

Thurmond, M. C. and Hietala, S. K. 1996. Culling associated with *Neospora caninum* infection in dairy cows. *Am J Vet Res,* 5, 1559-1562.

_____. and Hietala, S. K. 1997a. Effect of congenitally acquired *Neospora caninum* infection on risk of abortion and subsequent abortions in dairy cattle. *Am J Vet Res,* 58, 1381-1385.

_____. and Hietala, S. K. 1997b. Effect of *Neospora caninum* infection on milk production in first-lactation dairy cows. *J Am Vet Med Assoc,* 210, 672-674.

_____, Hietala, S. K. and Blanchard, P. C. 1997. Herd-based diagnosis of *Neospora caninum*-induced endemic and epidemic abortion in cows and evidence for congenital and postnatal transmission. *J Vet Diagn Invest,* 9, 44-49.

_____, Hietala, S. K. and Blanchard, P. C. 1999. Predictive values of fetal histopathology and immunoperoxidase staining in diagnosing bovine abortion caused by *Neospora caninum* in a dairy herd. *J Vet Diagn Invest,* 11, 90-94.

Tiwari, A., VanLeeuwen, J. A., Dohoo, I. R., Stryhn, H., Keefe, G. P. and Haddad, J. P. 2005. Effects of seropositivity for bovine leukemia virus, bovine viral diarrhoea virus, Mycobacterium avium subspecies paratuberculosis, and *Neospora caninum* on culling in dairy cattle in four Canadian provinces. *Vet Microbiol,* 109, 147-158.

Tiwari, A., Vanleeuwen, J. A., Dohoo, I. R., Keefe, G. P., Haddad, J. P., Tremblay, R., Scott, H. M. and Whiting, T. 2007. Production effects of pathogens causing bovine leukosis, bovine viral diarrhea, paratuberculosis, and neosporosis. *J Dairy Sci,* 90, 659-669.

Tranas, J., Heinzen, R. A., Weiss, L. M. and McAllister, M. M. 1999. Serological evidence of human infection with the protozoan *Neospora caninum*. *Clin Diagn Lab Immunol,* 6, 765-767.

Trees, A. J., McAllister, M. M., Guy, C. S., McGarry, J. W., Smith, R. F. and Williams, D. J. 2002. *Neospora caninum*: oocyst challenge of pregnant cows. *Vet Parasitol,* 109, 147-154.

Ueno, T. E., Goncalves, V. S., Heinemann, M. B., Dilli, T. L., Akimoto, B. M., de Souza, S. L., Gennari, S. M. and Soares, R. M. 2009. Prevalence of *Toxoplasma gondii* and *Neospora caninum* infections in sheep from Federal District, central region of Brazil. *Trop Anim Health Prod,* 41, 547-552.

Utha, A., Jenpaobool, K., Puttipong, P. and Unchunpati, J. 2002. Effect of CIRD-B on oestrus synchronization in swamp buffaloes. KKU.Vet.J, 12, 8-12.

Vaclavek, P., Sedlak, K., Hurkova, L., Vodrazka, P., Sebesta, R. and Koudela, B. 2007. Serological survey of *Neospora caninum* in dogs in the Czech Republic and a long-term study of dynamics of antibodies. *Vet Parasitol,* 143, 35-41.

Vanleeuwen, J. A., Haddad, J. P., Dohoo, I. R., Keefe, G. P., Tiwari, A. and Tremblay, R. 2010. Associations between reproductive performance and seropositivity for bovine leukemia virus, bovine viral-diarrhea virus, Mycobacterium avium subspecies paratuberculosis, and *Neospora caninum* in Canadian dairy cows. *Prev Vet Med,* 94, 54-64.

Vianna, M. C., Sreekumar, C., Miska, K. B., Hill, D. E. and Dubey, J. P. 2005. Isolation of *Neospora caninum* from naturally infected white-tailed deer Odocoileus virginianus. *Vet Parasitol,* 129, 253-257.

Waldner, C. L., Janzen, E. D. and Ribble, C. S. 1998. Determination of the association between *Neospora caninum* infection and reproductive performance in beef herds. *J Am Vet Med Assoc,* 213, 685-690.

_____, Henderson, J., Wu, J. T., Breker, K. and Chow, E. Y. 2001a. Reproductive performance of a cow-calf herd following a *Neospora caninum*-associated abortion epidemic. *Can Vet J,* 42, 355-360.

_____, Henderson, J., Wu, J. T., Coupland, R. and Chow, E. Y. 2001b. Seroprevalence of *Neospora caninum* in beef cattle in northern Alberta. *Can Vet J,* 42, 130-132.

_____. 2005. Serological status for *N. caninum*, bovine viral diarrhea virus, and infectious bovine rhinotracheitis virus at pregnancy testing and reproductive performance in beef herds. *Anim Reprod Sci,* 90, 219-242.

Wang, C. R., Zhai, Y. Q., Zhao, X. C., Tan, Q. J., Chen, J., Chen, A. H. and Wang, Y. 2009. Preliminary application of PCR-based assay for the detection of *Neospora caninum* in bovine aborted fetus. *Zhongguo Ji Sheng Chong Xue Yu Ji Sheng Chong Bing Za Zhi,* 27, 140-143.

Wanha, K., Edelhofer, R., Gabler-Eduardo, C. and Prosl, H. 2005. Prevalence of antibodies against *Neospora caninum* and *Toxoplasma gondii* in dogs and foxes in Austria. *Vet Parasitol,* 128, 189-193.

Wapenaar, W., Jenkins, M. C., O'Handley, R. M. and Barkema, H. W. 2006. *Neospora caninum*-like oocysts observed in feces of free-ranging red foxes *(Vulpes vulpes)* and coyotes *(Canis latrans). J Parasitol,* 92, 1270-1274.

Wegmann, T. G., Lin, H., Guilbert, L. and Mosmann, T. R. 1993. Bidirectional cytokine interactions in the maternal-fetal relationship: is successful pregnancy a TH2 phenomenon? *Immunol Today,* 14, 353-356.

Weston, J. F., Williamson, N. B. and Pomroy, W. E. 2005. Associations between pregnancy outcome and serological response to *Neospora caninum* among a group of dairy heifers. *N Z Vet J,* 53, 142-148.

Wiedosari, H., H. and B., a. C. 2006. Host differences in response to trickle infection with Fasciola gigantica in buffalo, Ongole and Bali calves. *Tropical Animal Health and Production*, 43–53.

Williams, D. J., Guy, C. S., McGarry, J. W., Guy, F., Tasker, L., Smith, R. F., MacEachern, K., Cripps, P. J., Kelly, D. F. and Trees, A. J. 2000. *Neospora caninum*-associated abortion in cattle: the time of experimentally-induced parasitaemia during gestation determines foetal survival. *Parasitology,* 121 Pt 4, 347-358.

_____, Guy, C. S., Smith, R. F., Ellis, J., Björkman, C., Reichel, M. P. and Trees, A. J. 2007. Immunization of cattle with live tachyzoites of *Neospora caninum* confers protection against fetal death. *Infect Immun,* 75, 1343-1348.

Williams, J. H., Espie, I., van Wilpe, E. and Matthee, A. 2002. Neosporosis in a white rhinoceros Ceratotherium simum calf. *J S Afr Vet Assoc,* 73, 38-43.

Woodbine, K. A., Medley, G. F., Moore, S. J., Ramirez-Villaescusa, A., Mason, S. and Green, L. E. 2008. A four year longitudinal sero-epidemiology study of *Neospora caninum* in adult cattle from 114 cattle herds in south west England: associations with age, herd and dam-offspring pairs. *BMC Vet Res,* 4, 35.

Wouda, W., Moen, A. R., Visser, I. J. and van Knapen, F. 1997. Bovine fetal neosporosis: a comparison of epizootic and sporadic abortion cases and different age classes with regard to lesion severity and immunohistochemical identification of organisms in brain, heart, and liver. *J Vet Diagn Invest,* 9, 180-185.

_____, Bartels, C. J. and Moen, A. R. 1999a. Characteristics of *Neospora caninum*-associated abortion storms in diary herds in The Netherlands 1995 to 1997. *Theriogenology,* 52, 233-245.

_____, Dijkstra, T., Kramer, A. M., van Maanen, C. and Brinkhof, J. M. 1999b. Seroepidemiological evidence for a relationship between *Neospora caninum* infections in dogs and cattle. *Int J Parasitol,* 29, 1677-1682.

Yamane, I., Kitani, H., Kokuho, T., Shibahara, T., Haritani, M., Hamaoka, T., Shimizu, S., Koiwai, M., Shimura, K. and Yokomizo, Y. 2000. The inhibitory effect of interferon gamma and tumor necrosis factor alpha on intracellular multiplication of *Neospora caninum* in primary bovine brain cells. *J Vet Med Sci,* 62, 347-351.

Yaniz, J., Lopez-Gatius, F., Garcia-Ispierto, I., Bech-Sabat, G., Serrano, B., Nogareda, C., Sanchez-Nadal, J., Almeria, S. and Santolaria, P. 2010. Some Factors Affecting the Abortion Rate in Dairy Herds with High Incidence of *Neospora*-Associated Abortions are Different in Cows and Heifers. *Reprod Domest Anim,* 45, 699-705.

Yao, L., Yang, N., Liu, Q., Wang, M., Zhang, W., Qian, W. F., Hu, Y. F. and Ding, J. 2009. Detection of *Neospora caninum* in aborted bovine fetuses and dam blood samples by nested PCR and ELISA and seroprevalence in Beijing and Tianjin, China. *Parasitology,* 136, 1251-1256.

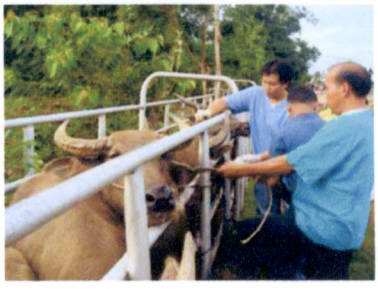
Yu, J., Xia, Z., Liu, Q., Liu, J., Ding, J. and Zhang, W. 2007. Seroepidemiology of *Neospora caninum* and *Toxoplasma gondii* in cattle and water buffaloes *(Bubalus bubalis)* in the People's Republic of China. *Vet Parasitol,* 143, 79-85.

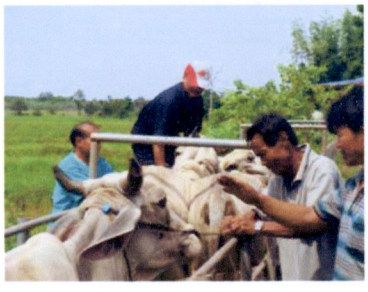
Zhang, W., Deng, C., Liu, Q., Liu, J., Wang, M., Tian, K. G., Yu, X. L. and Hu, D. M. 2007. First identification of *Neospora caninum* infection in aborted bovine foetuses in China. *Vet Parasitol,* 149, 72-76.

Zhao, Z., Ding, J., Liu, Q., Wang, M., Yu, J. and Zhang, W. 2009. Immunogenicity of a DNA vaccine expressing the *Neospora caninum* surface protein NcSRS2 in mice. *Acta Vet Hung,* 57, 51-62.

APPPENDICES

Appendix 1 Collection of samples





Appendix 2 ELISA technique

Materials for iscom ELISA test (Svanova Biotech AB, Sweden)

- Sera of swamp buffaloes
- *Neospora caninum* positive control serum - 0.05% merthiolate
- *Neospora caninum* negative control serum – 0.05 % merthiolate
- Neospora antigen coated microtiter strips
- Lyophilized HRP conjugate (horseradish peroxidase conjugated anti-bovine IgG monoclonal antibodies)
- PBS –Tween solution 20 x concentrate
- Substrate solution (tetramethyl-benzidine in substrate buffer containing H_2O_2)
- Stop solution- contains sulphuric acid

- Multi-channel micro pipette
- Plates for sera dilution
- Single channel micro pipette
- Disposable pipette tips
- Distilled water
- Containers: 1 liter for PBS-Tween, triangular bottomed containers for PBS-Tween, conjugate, substrate, stop solution
- Micro-plate photometer, 450 nm filter
- Racks, permanent pen, tissue, gloves, tip container

Iscom ELISA procedures

Step 1: All the reagents were equilibrated to room temperature before use.

Step 2: Preparation of PBS-Tween buffer: Dilute 25 ml of PBS-Tween solution 20 x concentrate in 475 ml distilled water and mix thoroughly.

Step 3: Dilution of controls and samples: Ninety-five µl PBS-Tween buffer was dispensed into each well of a plate then 5 µl of controls or samples was added and mixed thoroughly. Twenty µl of this solution was aspirated and put into an iscom ELISA plate. Eighty µl of PBS-Tween buffer was then added into each well of the iscom ELISA plate. Controls were tested in duplicates while samples were analyzed either in duplicates or singles. The plate was covered and shaked thoroughly and incubated for 1 hour at 37^0C.

Step 4: The plate was rinsed three times with PBS-Tween buffer. At each rinse cycle, all the wells were filled with 200 µl of PBS-Tween buffer and taped hard to remove the remains of fluids.

Step 5: One hundred µl of conjugate was added into each well and the plate was covered and incubated for 1 hour at 37^0C.

Step 6: The step 4 was then repeated.

Step 7: One hundred µl of substrate was added into each well. The plate was covered and incubated at room temperature for 10 minutes. Timing was begun when the first well was filled.

Step 8: The reaction was stopped by adding 50 µl of stop solution into each well in the same order as the substrate solution.

Step 9: The optical density (OD) was measured in a micro-plate photometer. This measurement was conducted within 15 minutes after the addition of the stop solution.

Calculation of percent positivity values (PP)

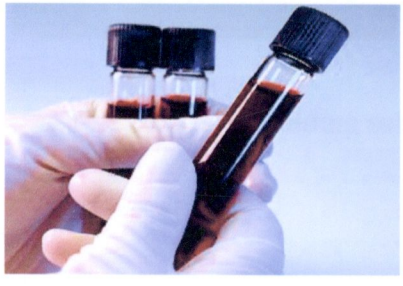
$$PP = \frac{\text{Mean OD value (Sample or Negative control)}}{\text{Mean OD value (Positive control)}} \times 100$$

Interpretation:

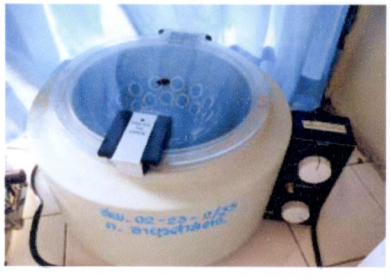
PP<20: Negative

PP≥20: Positive

Pictures illustrating ELISA technique

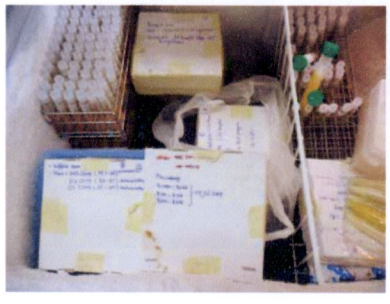


Blood samples

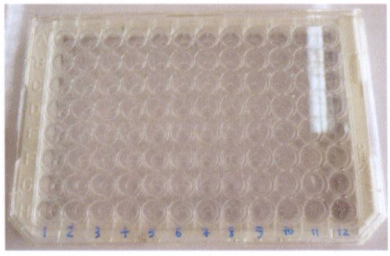


Centrifugation

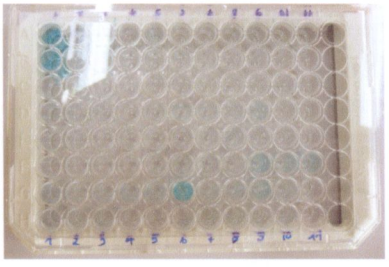
Sera



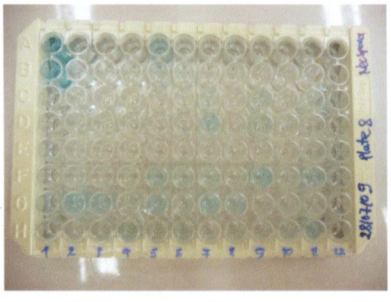
Store sera in freezer at -20^{0}C



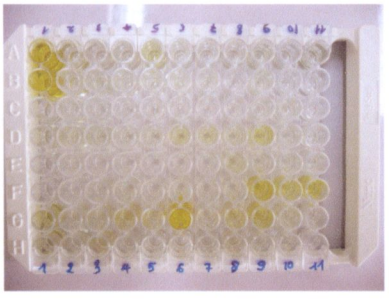
Neospora- ELISA plate



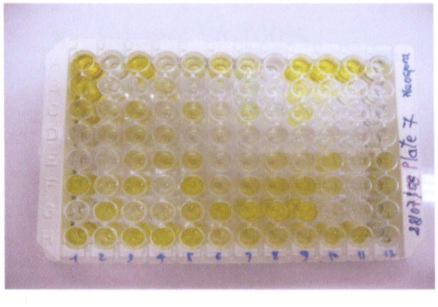
ELISA plate after adding substrate



ELISA plate after adding substrate

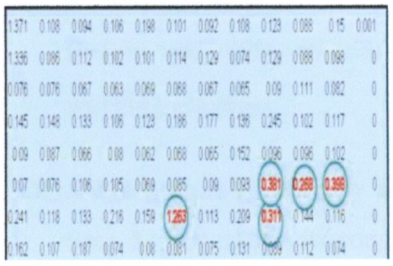


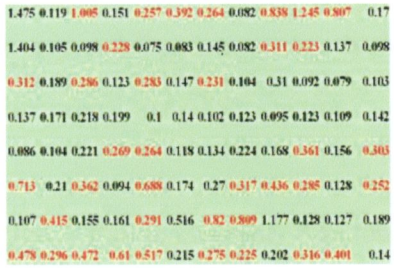
ELISA plate after adding stop solution



ELISA plate after adding stop solution

OD values reading





OD values

Appendix 3 Nested-PCR

Materials for DNA extraction by DNeasy kit (QIAGEN Group)

- DNeasy Mini Spin Columns in 2 ml collection tubes
- Collection tubes (2 ml)
- Buffer AL
- Buffer AW1 (concentrate).
- Buffer AW2 (concentrate)
- Buffer AE
- Proteinase K
- Ethanol 96-100%
- PBS solution
- 99% ethanol
- Micropipettes (20-200 µl)
- Ice box with ice
- Vortexer
- Micro-centrifuge
- Heater
- Collection tube containers

- Permanent pen

Before use, 99% ethanol was added to the AW1 and AW2 solutions to obtain working reagents.

DNA extraction by DNeasy Blood & Tissue Kit

Step 1: 100 µl of anti-coagulated blood were added into 1.5 ml micro-centrifuge tube which contained 20 µl of Proteinase K. Adjust the volume to 220 µl with PBS.

Step 2: Add 200 µl of buffer AL. Mix thoroughly by vortexing, and incubate at 56^0C for 10 minutes.

Step 3: Add 200 µm of 96% ethanol to each sample, and mix thoroughly by vortexing.

Step 4: Pipett the mixture from the step 3 into the DNeasy Mini spin column placed in a 2 ml collection tube. Centrifuge at ≥ 6,000 x *g* (8,000 rpm) for one minute. Discard flow-through and collection tube.

Step 5: Place the DNeasy Mini spin column into a new 2 ml collection tube, add 500 µl of AW1, and centrifuge for 1 minute at ≥ 6,000 x *g* (8,000 rpm). Discard flow-through and collection tube.

Step 6: Place the DNeasy Mini spin column into a new 2 ml collection tube, add of 500 µl AW2, and centrifuge for 3 minute at ≥ 2,0000 x *g* (14,000 rpm) to dry the DNeasy membrane. Discard flow-through and collection tube.

Step 7: Place the DNeasy Mini spin column into a clean 1.5 ml micro-centrifuge tube, and pipet 200 µl of buffer AE directly into the DNeasy membrane. Incubate at room temperature for 1 minute, and then centrifuge at ≥ 6,000 x *g* (8,000 rpm) for 1 minute to elute the DNA.

The DNA template was then kept at -20^0C until used in a nested-PCR.

Materials used for DNA extraction by TRIZOL

- Trizol LS reagent
- Chloroform
- Ethanol

- 0.1 M Sodium citrate in 10% ethanol
- 75% ethanol
- 8m M NaOH
- Centrifuge
- Pointed bottomed plastic tubes

DNA extraction by TRIZOL LS Reagent

Step 1-Homogenization: Dispense 0.25 ml of blood sample into each plastic tube followed by 0.75 ml of Trizol LS reagent. Incubate for 5 minutes at room temperature to permit the complete dissociation of nucleoprotein complexes.

Step 2-Phase *separation:* Add 0.2 ml of chloroform. Shake vigorously by hand for 15 seconds then incubate at room temperature for 15 minutes. Centrifuge at 12000 x *g* for 15 minutes at 4^0C. Following this step mixture separates into 3 phases, i.e. a lower red, phenol-chloroform phase, an interphase, and an colorless upper aqueous phase. DNA is in the interphase and organic-phase with ethanol.

Step 3-DNA *precipitation:* Remove aqueous phase. Add 0.3 ml of 100% ethanol, mix by inversion. Store samples at room temperature for 2 minutes, and sediment DNA by centrifugation at 2000 x *g* for 5 minutes at 4^0C.

Step 4-DNA *wash:* Remove the phenol-ethanol supernatant. Wash DNA pellet twice in a solution containing 0.1 M sodium citrate in 10% ethanol. At each wash, use 1 ml of this solution and store the DNA pellet at room temperature for 30 minutes and centrifuge at 2000 x *g* for 5 minutes at 4^0C. Following these two washes, suspend pellet DNA in 2 ml of 75% ethanol. Store for 10 minutes at room temperature, and centrifuge at 2000 x *g* for 5 minutes at 4^0C.

Step 5-Redissolving *the DNA:* Dry the pellet DNA for 5 minutes under vacuum and dissolve in 0.3 ml of 8 mM NaOH. Centrifuge at 5000 x *g* for 10 minutes at room temperature to remove insoluble materials. Transfer the supernatant containing DNA in to centrifuge tube and store at -20^0C.

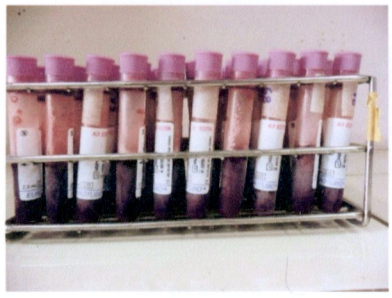
Materials used for Nested-PCR (QIAGEN Group)

- 10 x CoralLoad PCR
- 5 x Q-solution
- d NTP mix
- Primer Np21+ (5'CCCAGTGCGTCCAATCCTGTAAC3')
- Primer Np6+ (5'CTCGCAGTCAACCTACGTCTTCT3')
- Primer Np9 (5'GTTGCTCTGCTGACGTGTCGTTG3')
- Primer Np10 (5'CTCAACACA GAACACTGAACTCTCG3')
- Taq DNA polymerase
- Distilled water
- Template DNA
- Heater
- Micro-centrifuge
- Micropipettes (0.1-200 µl)
- PCR tubes
- Containers for PCR tubes
- Ice box
- Portable chill box to keep Taq DNA polymerase at -20^0C
- Permanent pen
- Micro-centrifuge tubes for Master mix.

Materials used for electrophoresis

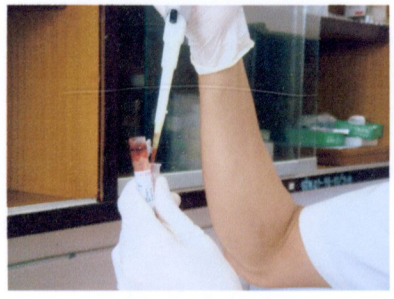
- TBE buffer
- 0.1% agarose 0.5 x TBE
- Microwave oven
- Chamber for agarose fixation
- Electrophoresis machine
- 1% ethidium bromide solution
- UV machine
- Camera

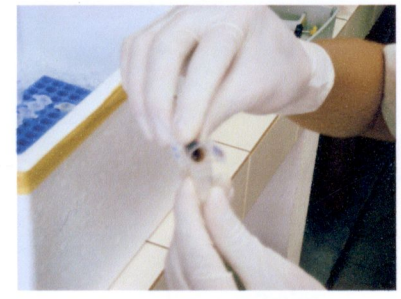
Pictures illustrating the PCR technique



Blood samples

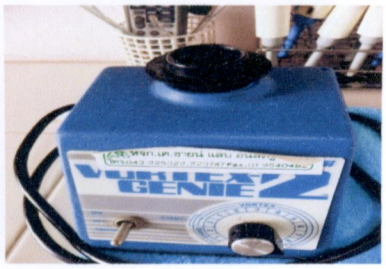
DNeasy extraction kit





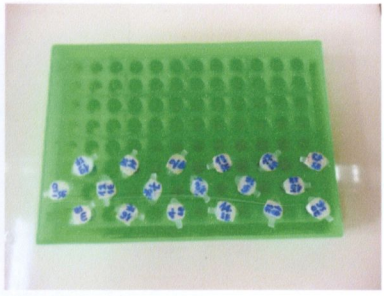
Extracting DNA

Heater and micro-centrifuge used in DNA extraction

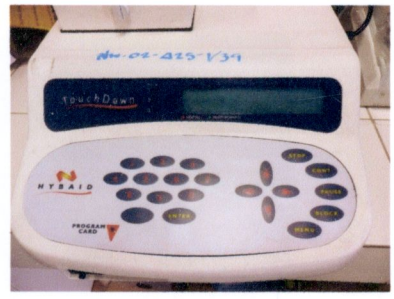


Vortexer

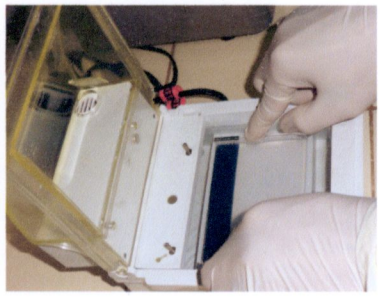
Nested-PCR reagents



PCR- tubes

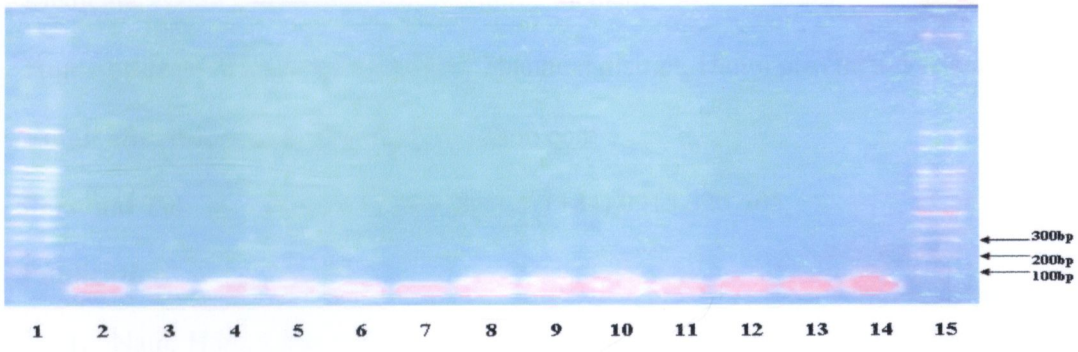


Thermocycler



Electrophoresis

Electrophoresis



Lane 1 and 15: ladder 100 bp, lane 2: negative control, lanes 3-4: seropositive samples, lanes 5-14 seronegative samples.

Viewing DNA band under ultraviolet light

CURRICULUM VITAE

Full name: Hoainam Nguyen

Date of birth: June 26th 1982

Place of birth: Thanhmai commune, Thanhoai district, Hatay province

Bachelor degree: The author obtained Bachelor degree of Doctor of Veterinary Medicine in 2005 from Hanoi University of Agriculture, Vietnam.

Place of work: Department of Animal Surgery and Reproduction, Faculty of Veterinary Medicine, Hanoi University of Agriculture, Vietnam.

Home address: Thanhmai commune, Thanhoai district, Hanoi province, Vietnam.

Email address: hoainam26061982@yahoo.com

Personal Tel: (+66) 874389148; (+84) 0915 325 505

Publication

1. Nam, H.N., Chanlun, A., Aiumlamai, S. and Kanistanon, K. 2009. Prevalence of *Neospora caninum* infection in swamp buffaloes in northeast Thailand. In the Proceedings of 2nd FASAVA 2009, Bangkok, Thailand, 3-5th November, 2009. p 566-567. Poster presentation.

2. Nam, H.N., Chanlun, A., Kanistanon, K. and Aiumlamai, S. 2010. Survey of *Neospora caninum* infection in swamp buffaloes and beef cattle in Khon Kaen, Thailand. In the Proceedings of 11th KKU Veterinary Annual Conference, Khon Kaen, Thailand, 10-11th June, 2010. p 41-47. Oral and poster presentation.