

A research on seroprevalence of *Neospora caninum* in cattle

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Summary: This study was carried out in order to determine the seroprevalence of *Neospora caninum* in cattle in the region of Afyonkarahisar in western Turkey. For this purpose, blood samples were collected from 109 cattle younger than 2-year-old and 376 cattle older than 2-year-old and sera were obtained from these samples. Sera were examined for antibodies against *N.caninum* using a commercial competitive ELISA (cELISA) kit. Accordingly, seroprevalence of *N.caninum* in Afyonkarahisar was found to be 21.03 %. Furthermore, no significant relationship was found between age and seropositivity, however, it was observed that 32 of 62 aborting cows (51.6 %) showed seropositivity. Moreover, the differences between aborting and nonaborting seropositive cattle was significant statistically ($p < 0.001$). In conclusion, the antibodies of *N. caninum* was determined in cattle of Afyonkarahisar province and it is suggested that *N.caninum* should be taken into consideration in abort cases of cattle, however, the isolation of *N.caninum* from aborted cow foetus has to be performed to confirm the diagnosis.

Key words: Afyonkarahisar, cattle, *Neospora caninum*, seroprevalence.

Sığırlarda *Neospora caninum* seroprevalansı üzerine bir araştırma

Özet: Bu çalışma Türkiye'nin batısında Afyonkarahisar yöresi sığırlarında *Neospora caninum* seroprevalansını belirlemek amacıyla yapılmıştır. Bu amaçla çalışmada 2 yaşından küçük 109, 2 yaşından büyük 376 sığırdan kan örnekleri alınmış ve serumları çıkarılmıştır. Serumlar ticari kompetatif ELISA (cELISA) kiti kullanılarak *N.caninum*'a karşı oluşan antikorlar yönünden incelenmiştir. Buna göre Afyonkarahisar'da *N.caninum* seroprevalansı % 21.03 olarak tespit edilmiştir. Ayrıca yaş ile seropozitiflik arasında bir ilişki belirlenmemiş ancak geçmişinde abort hikayesi bulunan 62 sığırın 32'sinin (% 51.6) seropozitif olduğu gözlenmiştir. Abort yapan ve yapmayan seropozitif sığırlar arasındaki farklılık istatistiksel olarak da anlamlı bulunmuştur ($p < 0.001$). Sonuç olarak bu çalışma ile Afyonkarahisar yöresi sığırlarında *N.caninum* antikorları tespit edilmiş, abort vakalarında hastalığın gözardı edilmemesi gerektiği ancak kesin tanı için fötustan etken izolasyonuna gidilmesinin uygun olacağı gözlenmiştir.

Anahtar sözcükler: Afyonkarahisar, *Neospora caninum*, seroprevalans, sığır.

Introduction

Cattle, which can be raised in almost all parts of the world, excluding the North and South poles, are used by mankind not only for the production of meat and milk as food, but also for their draught power and dung. Of the global milk production 86.3-89.5% and of the global meat production nearly 25% is obtained from cattle alone. Cattle are also of great economic significance in Turkey and according to data pertaining to the year 2011, the cattle population of the country is 11.369.800 (7). Despite the relatively high population of cattle in Turkey, it is evident that the maximum yield is not able to be obtained from these animals. One of the underlying reasons of low yields is parasitic diseases.

Neospora caninum is the primary protozoan cause of abortion in both beef and dairy cattle across the world (4, 10, 27). In cattle, it was first isolated from an aborted foetus (11).

Neosporosis is common across the world. It is estimated that approximately 42% of the global cattle population suffers from abortion due to neosporosis. The seroprevalence of the disease differs among countries and regions, and also varies with the serological tests used for diagnosis (15).

Serological tests aid as important tools for the determination of the epidemiology of bovine neosporosis. Based on the results of serological tests, it is indicated that the most effective route of transmission is vertical transmission (5).

The serological tests most commonly used for the serological diagnosis of *Neospora caninum* are ELISA (14) and IFAT (12, 14). ELISA is particularly advantageous for the monitoring of large-scale herds (1).

No information is available on the epidemiology of *N.caninum* in cattle raised in the vicinity of Afyonkarahisar province. For this reason, the present

study was undertaken with an aim to determine the seroprevalence of *N.caninum* in the vicinity of Afyonkarahisar province in western Turkey.

Materials and Method

The present study was conducted from March 2009 to March 2011 in dairy cattle farms with abortion problems, which were located in the Bolvadin, Çay, Sultandağı, İhsaniye, Çobanlar and İscehisar districts and the centre of Afyonkarahisar province. A hundred and nine animals younger than two years of age and 376 cattle older than two years of age were used in the study.

Blood samples were taken from the vena jugularis of the animals into syringes and were stored at -20°C until the extraction and analysis of sera.

The presence of antibodies against *Neospora caninum* in bovine serum samples was investigated using a commercial cELISA kit (VMRD Inc. Veterinary Medical Research and Development, Pullman, WA, USA). The test was performed according to the instructions of the manufacturer and the results were assessed at a wavelength of 620 nm using an ELISA reader (MWGT Lambda Scan 200, Bio-Tek Instruments, VT, USA). The chi-square test available with the SPSS software package was used for the statistical analyses of the results.

Results

At the end of the study, it was determined that, out of the 485 cattle 102 (21.03%) were positive for antibodies against *N.caninum*. The distribution of seropositivity according to the study locations is shown in Table 1, the distribution according to the age groups of the animals is shown in Table 2, and the distribution according to the animals that did and did not present with abortion is shown in Table 3.

Tablo 1. Seropozitifliğin çalışma alanlarına göre dağılımı.
Table 1. Distribution of seropositivity in Afyonkarahisar Province from which samples were collected.

Study area	Number of the examined cattle	Number of the positive cattle	Seropositivity (%)
Bolvadin	102	27	26.5
Çay	88	24	27.3
Sultandağı	41	3	7.3
İhsaniye	48	11	22.9
Çobanlar	80	11	13.8
İscehisar	37	9	24.3
Merkez	89	17	19.1

Tablo 2. Seropozitifliğin Yaş Gruplarına Göre Dağılımı.
Table 2. Distribution of seropositivity in different age groups.

Age	Number of the examined cattle	Number of the positive cattle	Seropositivity* (%)
< 2	109	29	26.6
> 2	376	73	19.4

* Difference of age groups was not significant (p>0.05).

Tablo 3. Seropozitifliğin Abort Yapan ve Yapmayan Sığırlara Göre Dağılımı.

Table 3. Distribution of seropositivity of aborting and non-aborting cattle.

	Number of the examined cattle	Number of the positive cattle	Seropositivity *(%)
Aborting cattle	62	32	51.6
Non-aborting cattle	423	70	16.5

* Difference of aborting and non-aborting cattle was found to be statistically significant (p<0.001)

Discussion and Conclusion

Bovine neosporosis, which emerged for the first time in 1987 in a cattle farm in Mexico in the form of an epidemic of abortion, is considered as a major reproductive problem of cattle across the globe. The disease is reported to be particularly prevalent in North America and is noted to have economic significance in all 6 continents due to the abortions and production losses it causes (6). According to various serological studies, seropositivity for neosporosis has been reported as 12.5% in Wales and England (13); 14.09% in Brazil (17); 36.8% in the dairy cattle and 17.9% in the beef cattle population of Spain (24); 10.5% in Iran (22); in Vietnam 5.5% (18); 34.6% in Romania (16) and in South Australia 2.5% of the beef cattle and 3.8% of the dairy cattle population (21). In a retrospective study conducted in cattle raised in the Central Anatolia Region of Turkey (8), seropositivity was found to range between 5.10-32.72%, whilst in another study conducted in different provinces of the same region seropositivity was determined as 13.96% (29). Furthermore, seropositivity has been reported as 2% in Kars province (2); 15% in Elazığ province, 4% in Malatya province, 4.86% in Muş province and 4.69% in Bingöl province (3); 9.2% in Sakarya province (23); 8.02% in Tekirdağ and Kırklareli provinces (9); 7.5% in Şanlıurfa province (26); and 7% in Kayseri province (19). In the present study, of the cattle population investigated in Afyonkarahisar province, 21.03% were determined to have antibodies against *N.caninum* in their serum and this rate was ascertained to be in parallel with the results of other studies conducted in Turkey and different parts of the world.

In previous research conducted on the epidemiology of neosporosis, different opinions have been expressed on the correlation between age and seroprevalence. While some researchers (20, 25, 28) have reported that seropositivity increases with age, some other researchers (13, 24) have indicated that no correlation exists between seropositivity and age. In the present study, it was demonstrated that the difference observed between the seroprevalence of animals younger than two years of age (26.6%) and animals older than two years of age (19%) was statistically insignificant (p>0.05). It was considered

that this difference may have arisen from differences in the housing and management of the animals or from animals included into the herd from other provinces.

In cattle, neosporosis leads to several economic losses, of which the primary is abortion. It is estimated that approximately 42% of the global cattle population suffers from abortion due to neosporosis (15). It has been reported that the risk of abortion is 3-7.4% greater in seropositive animals, in comparison to seronegative animals (13, 28, 30). Similarly, in the present study, it was determined that out of the 62 cattle with a history of abortion, 32 (51.6%) presented with antibodies against *N.caninum* in their blood serum, and this finding was found to be statistically significant ($p<0.001$). The findings obtained in the present study are in support of the findings of previously conducted studies, yet, in order to confirm the underlying reason of abortion, it is required that the infectious agent be isolated from the aborted foetus.

In conclusion, the present study reports for the first time the seroprevalence of *N.caninum* in cattle raised in the vicinity of Afyonkarahisar province as 21.03%. It was concluded that age had no effect on seropositivity, that the possibility of neosporosis should be taken into consideration in animals which abort, and that definitive diagnosis requires the isolation of the causative agent from aborted foetuses.

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