

## RESEARCH ARTICLE

Atanas D. Arnaudov

**Epizootical and epidemiological features of brucellosis in Bulgaria****Authors' address:**

Faculty of Biology,  
University of Plovdiv  
4000 Plovdiv, Bulgaria.

**Correspondence:**

Atanas D. Arnaudov  
Faculty of Biology,  
University of Plovdiv,  
24, Tsar Assen Str.,  
4000 Plovdiv, Bulgaria.  
Tel.: +359 884317309  
e-mail: arnaudov@uni-plovdiv.bg

**ABSTRACT**

The spread of brucellosis in domestic animals and humans was studied during the period 1988 - 2013. The study found that over a fixed period of time the disease in domestic animals was primarily manifested as an epizootic with *Brucella* which are non-pathogenic or low pathogenic to humans - *Brucella ovis*, *Brucella suis* and *Brucella canis*. During the period June 2006 - December 2008, infection of sheep and goats with *Brucella melitensis* was found in 16 villages of 4 districts. The infection has probably been imported from Greece in 2005 as a result of unauthorized transportation of goats.

During the period 2005-2008 in Bulgaria were found 120 cases of brucellosis in humans in 13 districts of the country. Most of the cases were registered in the Haskovo and Sliven districts. The disease has occurred among workers in animal farms in Greece; however, a connection between the epizootic and the epidemic process has been established in several areas of the country.

**Key words:** Brucellosis, Bulgaria, epidemiology, epizootology

**Introduction**

According to the World Health Organization, brucellosis is one of the most common zoonoses worldwide and is considered a reemerging infectious disease in many areas of the world. More than 500 000 cases are reported in humans each year. This pathogen is classified by the CDC as a category B (Russo et al., 2009).

From 1948 to the middle of 2006, the Republic of Bulgaria was considered a country free of brucellosis caused by *Brucella melitensis* and *Brucella abortus*. During this period were established epizootics on animals with brucella which are non-pathogenic or low pathogenic to humans – *Brucella ovis*, *Brucella canis* and *Brucella suis*.

In the period 2005 - 2009, in the country was recorded an outbreak of the disease among domestic animals and humans. This drew our attention to the epizootiology and epidemiology of the disease.

**Materials and Methods**

Assessment of the spread of brucellosis in animals and humans was performed based on the official epizootic records of the National Veterinary Service (or the Bulgarian

Food Safety Agency) and the records of the National Centre of Infectious and Parasitic Diseases for the period 1988 – 2013. In parallel, we did our own clinical, laboratory and epidemiological studies covering the period 1988-2001. The laboratory tests include standard serological methods (agglutination tests, a complement fixation test and immunodiffusion) (Sartmadzhiev, 1983), bacteriological examination of lymph nodes and sperm of seropositive animals (nutrient medium - Huddleson, pH-7.4, parameters: CO<sub>2</sub> demand, growth in the presence of fuchsine and thionin (1 : 50 000 and 1 : 25 000), formation of H<sub>2</sub>S) and immune electrophoretical study of ram semen (Gelev, 1987).

**Results****Brucellosis in animals**

During the study period, in Bulgaria have been diagnosed epizootics with non-pathogenic and low pathogenic for the human brucella species in domestic and wild animals.

*Brucella ovis* was widespread among sheep, the infection in rams causing large losses in the sheep breeding sector. According to Masalski et al. (1989), in the late 1980s 8% of all male breeding animals were infected. Our research in the late 1990s carried out in the Plovdiv, Pazardzhik and

## RESEARCH ARTICLE

Smolyan districts showed similar data for the spread of this disease (Arnaudov & Hvojnev, 2000). In approximately 25% of the seropositive rams the disease does not affect the reproductive system and 16.6% of them develop a clinical form (epididimitis). 56.6% of the tested sheep contain antibodies against *Brucella ovis* which indicates the role the sheep play in maintaining this infection. In our studies, antibodies against *Brucella ovis* are found in the blood serum of goats and muflones. The highest percentage of serological reagents is established among goats which have had a miscarriage. They are an epizootic risk to sheep herds when bred together with them (Arnaudov, 2012).

Infections with *Brucella suis* has been established sporadically in various parts of the country (Kostov and Martinov, 2001). On average for the country, 1.92% of the pigs tested were seropositive and the disease is the most widely spread among East Balkan pigs. According to Kostov (1995), the causative agent of the disease in the country - *Brucella suis*, v. *Danika*, is non-pathogenic for humans.

Brucellosis in dogs caused by *Brucella canis* is established for the first time in the country by Kostov in 1987 (Kostov and Martinov, 2001). The disease is spread mainly in the big cities in domestic and free-ranging dogs (Arnaudov, 1999; Gardevska, 2000; Kostov and Martinov, 2001). There is an epidemic risk of for people in close contact with infected animals.

In 2005, brucellosis caused by *Brucella melitensis* in sheep and goats in Bulgaria was measured (Russo et al., 2009). The disease was found in four districts - Haskovo, Stara Zagora, Yambol and Smolyan, a total of 16 locations (figure 1). The most affected district was Haskovo - 11 cases in the municipalities Harmanli, Liubimetz and Svilengrad. In an epizootiological study, it was established that the disease was imported together with goats coming from Greece in the suburbs of Harmanli. Infestation of goats was 7 times higher than of sheep (12.2% compared to 1.8%). During the epizootic process seven cattle and one donkey were also infected. Prevalence of brucellosis in the affected areas is a result of unregulated goat trading of infected goats from Harmanli.

As a consequence of the measures taken by the National Veterinary Service under the current EU legislation, the epizootic has been eliminated and since the beginning of 2009, no *Brucella melitensis* positive blood samples from sheep and goats have been found.



**Figure 1.** Districts affected by brucellosis in sheep and goats (2006-2008)

### Brucellosis in humans

Until the epizootic outbreak in 2006, in Bulgaria were registered only isolated cases of the disease in humans and none in animals. A total of 22 cases for the period 1988 - 2002 were identified, with an average incidence of 0.01% (Halova et al., 2012). Since 2007, the incidence among humans increased rapidly to 120 cases, residents of 13 districts (Russo et al., 2009) (figure 2).



**Figure 2.** Districts affected by human brucellosis (2005-2008)

Almost half of them are in the Haskovo district (59 cases). The peak of the disease was in 2007, when the incidence reached 0.89% (Halova et al., 2012). 71 of the

## RESEARCH ARTICLE

infected people (mainly in the Haskovo district) are either owners of goats and sheep, or have consumed unpasteurized dairy products from infected animals. In the remaining 49 cases the infection of people took place outside Bulgaria - mostly in Greece (45 cases) and single cases in Cyprus, Tanzania, Turkey and Italy. From infected people in the National Center of Infectious and Parasitic Diseases were isolated *Brucella melitensis*, biovar 3.

The relationship between the epizootic and epidemic process was measured in the Haskovo, Stara Zagora, Smolyan and Yambol districts. In the remaining areas of the country the infected people have worked in animal farms abroad, particularly in Greece. In only one sheep farm, located in Exohi, Greece, in 2005 were infected 19 people, 14 of which are from the Sliven district.

### Conclusion

Connection is established between the epizootic and epidemic process in several areas of the country.

The epidemic outbreak of brucellosis in Bulgaria in 2005 - 2008 is considered a negative effect on the free movement of goods and people between the EU countries. The result is the recurrence of the disease, which has been eliminated from the country a few decades ago.

### References

- Arnaudov At. 1999. A problematic heavy-running type of brucellosis on a dog. Veterinarna Sbirka, 3-4, 24.
- Arnaudov At, An Hvojnev. 2000. The spread of contagious epididymitis on rams in Plovdiv region. Veterinarna Sbirka, 1-2, 19-21.
- Arnaudov At. 2012. Serological survey for *Brucella ovis* dissemination among goats (*Capra aegagrus hircus*). Journal of Central European Agriculture. 13(1), 188-192.
- Gardevska I., 2000. The spread of *Brucella canis* infection in dogs in Varna, Proceedings of the National Scientific Conference of Young Scientists, Union of Scientists in Bulgaria-Plovdiv, B (1), 297-300.
- Gelev I. 1987. Discovery of rams, detaching *Brucella ovis* by means of immunochemical test of spermal plasm. Veterinarnomeditsinski nauki, 24(10), 14-19.
- Halova B, Georgiev P, & Y. Mitova. 2012. Impact of prevention and control on the spread of infectious diseases in Sofia and Bulgaria. Bulgarian Medical Journal. 1, 24-31.
- Kostov G. 1995. *Brucella suis* variety *Danika*, the causative agent of swine brucellosis in Bulgaria. Proceedings of scientific conference "40 years RVS- Shumen", 141-145.
- Kostov G, Martinov S. 2001. Epizootiology of brucellosis of animals in Bulgaria. Biotechnology & Biotechnological Equipment, 15(2), 136-139.
- Masalski K, G Kostov, L Dimitrov. 1989. Perspectives for eradicating infectious epididymitis in rams caused by *Br. ovis*. Veterinarna Sbirka, 8, 20-21.
- Russo G, Pasquali P, Nenova R, Alexandrov T, Ralchev S, Vullo V, Rezza G& Kantardjiev T. 2009. Reemergence of human and animal brucellosis, Bulgaria. Emerging infectious diseases, 15(2), 314-316.
- Sartmadzhiev Kr. 1983. Laboratory diagnosis of diseases in livestock. Methods for serological studies.- TSNIRD of Veterinary Services, Sofia, Bulgaria.