Journal of Animal and Veterinary Advances 12 (3): 402-405, 2013
ISSN: 1680-5593

Serological Survey of Q Fever in Small Ruminants and Cattle in Five Regions of Albania: An Update

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Abstract: The aim of this study was to examine the distribution of Q fever among the sheep, goats and cattle of five regions in Albania (Berat, Diber, Fier, Gramsh and Pogradec). The data taken in this study indicates for the presence of Q fever in the country. The infection is present in the three main category of animals: sheep, goats and cows. In addition, the Q fever observed in these species is present in at least one species in each district taken in the study. In total were collected 394 blood samples from which 111 sheep, 143 goats and 140 cattle. The 13.51% of sheep, 9.79% of goats and 16.43% of cows under control resulted positive. The serums were conserved in -30°C and ss serological test was used ELISA IDEXX which is carried out based on its relevant protocol using purified antigen of *C. burnetii*.

Key words: Q fever, sheep, goat, cattle, Elisa test

INTRODUCTION

Q fever as in animals and in humans is caused by a gram negative bacteria *Coxiella burnetii*. This bacteria is obligatory intracellular and is quite widespread in the world. The Q fever is a zoonotic disease and is observed in many geographical and climatic areas in the world (Woldehiwet, 2004). Q fever as zoonotic disease it was identified for the first time in Australia in 1935, after an outbreak of a fever between the employees in one slaughterhouse. The disease was named Q fever from English "Fever Query (Q)" due to unknown ethiopatogenesis from that time (McQuiston *et al*., 2002).

Many animals are reservoirs of this infection and according to the role that they play in the diffusion are ordered as follows (cattle, sheep and goat). These species are considered as primary reservoir of it. In addition to this role in the spread of infection play even cats and dogs (Pinsky *et al*., 1991; Buhariwalla *et al*., 1996).

A role in the spread of infection plays the mites as well other arthropods (Maurin and Raoult, 1999). There is data that Q fever in humans is spread even through contact with wild rabbits (Marrie *et al*., 1986). During birth period, microorganisms are eliminated through placenta and uterine liquid. Organism is quite resistant in the external environment, towards the temperature, drying as well as of different disinfectants. For this reason they survive long in external environment as well as in stables where even abortion infected animals with Q fever occurred. The infection of animals occurs in different ways as through direct contact with placental material. The transmission through aerosol of *C. burnetii* occurs during inhalation of infected materials and large outbreaks in humans are related with spread by wind from the place where are hold the infected animals (Hawker *et al*., 1998; Tissot-Dupont *et al*.,1999).

The infection in humans occurs through infected aerosol as well as through unprocessed milk and its by products. The infection in humans is usually asymptomatic or is manifested as light disease with spontaneous recovery. Nevertheless Q fever can lead in serious complication and cause the death in patient with acute disease especially in those with meningoencephalit or myocarditis and with more frequency in patients with endocarditis.

In animals, the infection is invisible but related with abortion and early birth as well as infertility (Aitken, 1989; Cekani *et al*., 2008).

MATERIALS AND METHODS

As material for current the study are used serums taken from different farms. The quantity and the district where was taken the samples was as follows: District of

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Berati 76 (24 sheep, 23 goats and 19 cattle) samples, Fier 85 (25 sheep, 25 goats and 30 cattle) samples, Gramsh 100 samples (20 sheep, 30 goats and 50 cow), Dibra 60 (15 sheep, 30 goats and 15 cattle), Pogradec 100 (25 sheep, 35 goats and 30 cattle). In total are collected 394 samples from which 111 sheep, 143 goats and 140 cattle. There was no any difference in blood taking which is made in random way. The unique principle for which reseachers have selected the above districts was been the continuous abortions in these districts. The blood taken is transported in laboratory in ice environment and the serum was separated immediately upon arrival in laboratory. The separation of serum is carried out with centrifugation with 1500 rpm for 10 min in centrifuge with cooling. The serums are conserved in -30°C. As serological test was used ELISA IDEXX which is carried out based on its relevant protocol using purified antigen of *C. burnetii*. The serums are diluted 1:400 and the evaluation of reaction is based on the values of optic density measured with ELISA reader. The results are expressed as percentage optic density based on the formula as follows:

$$\frac{S_{testues}-N_{ref}}{S_{poz.ref}-N_{ref}}\times 100$$

Ku ($S_{testues}$) are the serums that should be controlled, N_{ref} and $S_{poz.ref}$ (respectively negative and positive reference serum). The values of their OD (Optical Density) introduced in the above formula derive values in percentage which are evaluated as follows: if they are 40% or more are considered positive, suspicious the values from 30-40% whereas negative the values below 30%.

RESULTS AND DISCUSSION

Results of serological control are given in the Table 1. The data given in the Table 1 indicates for the presence of Q fever in the country. The infection that was observed many years ago is present in the three main category of animals: sheep, goats and cows. In addition, the Q fever observed in these species is present in at least one species in each district taken in the study.

The study of the year 2013, carried out in sheep, goats and cows, in the districts of Berat, Gramsh, Fier, Diber and Pogradec idicates in best way that Q fever, not only is present in these districts but what is peculiar is the fact that there is an increase, probably not very significant of this infection.

Based on the data of Table 1, obviously like in 1999, in these districts, even in 2013 is observed the presence of antibodies for Q fever. From data of this control is oberved that the higher percentage of infection in the first control is observed in sheep with a percentage of 25% (Diber distric). Whereas in 2013, the percentage of infection in sheep was the same but in different district (Berat). It is pointed out for these species the district of Gramsh where the percentage of infection in the year 1999 was 8% meanwhile in 2013 has reached 20% an increase large enough in relation with the district of Berat where the number of heads under control is almost equal (25 heads Gramsh in 1999 and 24 heads Berat in 2013). A reduction in the percentage of infection, during 2013 is observed in the district of Diber in relation with 1999 (with 1.47%). Nevertheless in total, the percentage of infection in sheep in 1999 has been 10.89 whereas in the year 2013 is increased with 2.62% (13.51%). Meanwhile, in the district of Fier, the percentage of infection in these species (sheep) remains unchanged, so it is not observed positivity where the number of heads is almost equal. Despite this inconvenience, researchers think that generally, in the control of 101 and 111 heads, respectively (1999 and 2013), it is observed an increase of this infection after a period of around 15 years.

Regarding goat species in total have also increased infection almost 2.04%, certainly there is a slight percentage increase of infection however it is founded an increase in these species. Characteristic of these species is the fact that while in 1999 researchers did not find any positive case in goats in the district of Fier, in 2013, the percentage of infection is increased around 8% which indicates a high percentage of it. In the opinion, this has occurred as a result of the movement of goats from an infected area in a free area, specifically from district of Berat where according to the data of veterinary service are purchased a significant number of heads.

Table 1: The results of infections in sheep, goats and cattle

	1999			2013		
Region	Total	Positive	Percentage	Total	Positive	Percentage
Sheep						
Berat	17	4	23.53	24	6	25.00
Gramsh	25	2	8.00	20	4	20.00
Fier	20	0	0.00	25	0	0.00
Diber	20	5	25.00	17	4	23.53
Pogradec	19	0	0.00	25	1	4.00
Total	101	11	10.89	111	15	13.51
Goats						
Berat	19	1	5.26	23	2	8.70
Gramsh	30	2	6.67	30	1	3.33
Fier	20	0	0.00	25	2	8.00
Diber	20	3	15.00	30	5	16.67
Pogradec	40	4	10.00	35	4	11.43
Total	129	10	7.75	143	14	9.79
Cows						
Berat	20	0	0.00	15	0	0.00
Gramsh	53	11	20.75	50	11	22.00
Fier	25	6	24.00	30	7	23.33
Diber	22	5	22.73	15	5	33.33
Pogradec	20	0	0.00	30	0	0.00
Total	140	22	15.71	140	23	16.43

Regarding category of cattle, it is noticed a presence of infection and nevertheless, in two districts and respectively in the district of Pogradec and Berat, researchers have not observed infection of Q fever, phenomenon observed even in 1999. Researchers can not say that cattle in these districts are not affected by this infection which is widespread in the country but the data obtained indicate his absence. This oblige us in the future to extent the research to prove with a larger number of heads of animals and a larger number of area of these districts, if really these districts are free from Q fever. Although, two districts are negative for the presence of antibodies in cattle, in total the percentage of infection is high. This is due to a high level of antibodies in the other districts where the level is over 20%. In addition, researchers can say based on the datas of relevant Table that according to the presence of infection, in the above species, first place is occupied by cattle with 16.43%, followed by sheep with 13.51% and than goats with 9.79%. This ranking was the same even in 1999. Differences in different species, regarding the percentage of the presence of antibodies is observed even in other countries as for example USA but goats in this country have the higher percentage with around 41.6% and then followed by sheep with 16.5% and cattle with 3.4% (Cekani *et al*., 2008). So, according to Khalili and Sakhaee (2009), goats in Iran have a higher percentage of infection in relation with other species with around 65.78% meanwhile that in cattle the above researchers have founded a percentage of 10.75%.

Researchers think that this difference or change the position of the rate of infection in the above mention species is probably dependent from the small number of districts taken on the current study or by the fact that in general in these district the cattle is growing outside the stable and is more exposed compared with cattle growing inside the stable in other districts as well as the small number of sheeps and goats which practically in these districts is several times higher that number of cattle. Also, the data that researchers have received are contradictory with the data of above mention researchers only regarding the ranking of the affection of these species, although, researchers can say that the percentage of presence of antibodies except the goats where is observed 65.78 and 41.6%, respectively (Iran and USA) in sheep for example is almost approximate to those observed in USA (16.5% SHBA, towards 13.51% in Albania).

However, based on data from the literature that the tendency of transmission of Q fever to humans is more related with the infection in goats (Maurin and Raoult, 1999), researchers think in successive years to extent the research for small ruminants. Researchers are also thinking that this disease agent, Q fever, in the country should be responsible even for frequent abortions in cattle and small ruminants.

Reserchers are also of opinion that under the global initiative ‘‘A health, an environment, a medicine” is necessary to undertake joint epidiemological studies to determine the role of different species in this infection and the possibility of transmission to humans, especially regarding the milk (Cekani and Berxholi, 2004).

CONCLUSION

The data of the study idicates that Q fever not only is present in these districts but what is peculiar is the fact that there is an increase, probably not very significant of this infection compare with the study carried during 1999.

ACKNOWLEDGEMENTS

This research work was carried out with the support of Veterinary Service of Berat, Diber, Fier, Gramsh and Pogradec. Researchers thank all the veterinarians and private farmers that were ready to support this research.

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