

SEROPREVALENCE OF Q FEVER AMONG SHEEP IN MOSUL CITY, IRAQ

(Soroprevalência de febre Q em ovinos da cidade de Mosul, Iraque)

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ABSTRACT - The current study aimed to determine the Q fever seroprevalence rate of local sheep in Mosul City in northern Iraq between October 2019 and January 2020. Three hundred and thirty sera were collected and analyzed by a commercial indirect enzyme-linked immune sorbent assays (ELISA) to detect *Coxiella burnetii* antibodies. A total of 68 animals (seroprevalence: 20.6%) gave positive results. The results showed that the eastern part of Mosul city's prevalence rate was higher than in other areas (28.2%). According to age and sex, the prevalence of adult sheep (21.8%) is higher in females (21.3%) than young sheep (19.4%) and males (19%). Also, we noticed that the infection rate of aborted ewes (26.4%) is higher than that of non-aborted ewes.

Key words: ELISA, *Coxiella burnetii*, prevalence.

RESUMO – O presente estudo objetivou a determinação da taxa de prevalência da febre Q em ovinos da cidade de Mosul no norte do Iraque, entre Outubro de 2019 e Janeiro de 2020. Trezentos e trinta amostras de soro foram coletadas e analisadas por kit comercial de ensaio indireto de imunoabsorção enzimática (ELISA) para detectar anticorpos de *Coxiella burnetii*. O total de 68 animais (soroprevalência: 20.6%) apresentou resultados positivos. A partir dos resultados fica entendido que a taxa de prevalência na região leste da cidade de Mosul foi maior que nas outras áreas (28.2%). De acordo com a idade e sexo, a prevalência de ovinos adultos (21.8%) foi maior em fêmeas (21.3%) que animais jovens (19.4%) e machos (19%). Também foi observado que a taxa de infecção em ovelhas que sofreram aborto (26.4%) foi maior que as que não passaram por esse processo.

Palavras-chave - ELISA, *Coxiella burnetii*, prevalência.

INTRODUCTION

Q fever is a zoonotic disease caused by the intracellular bacterium *C. burnetii*, which can cause abortion in livestock and acute and chronic diseases in humans (Hamidreza, 2012; OIE, 2018). The ruminants are the main reservoir of the disease (OIE, 2018). Q fever is a zoonosis with a worldwide distribution (Candela et al., 2017). In sheep, the infection is usually asymptomatic and manifests as spontaneous abortion in the third trimester and other reproductive failure (endometritis or infertility) that causes severe economic losses (Van Den Brom et al., 2015). In the Middle East around the world, the seroprevalence of Q fever in sheep has been recorded (Mohammed et al., 2014;

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Mobarez et al., 2017; Jalboush and Alzuheir, 2017; Obaidat M. and Kersh, 2017; Mustafa et al., 2019), Europe, Australia and United State (Amanda et al., 2012; Cooper et al., 2012; Georgiev et al., 2013).

In Iraq, after the war in 2003, the US military discovered Q fever for the first time (Anderson et al., 2005). During 2010, Q fever was detected in the city of Nasiriya, Iraq (Jalel et al., 2010), then distributed among the animals (sheep, goat and cattle) in Thi-Qar Province in 2010 (Jalel et al., 2010), and in the AL-Qassim city (Qassim, 2012). In Basra Provinces during 2015 (Mohanad and Rahman, 2016) and finally in cattle in Wasit province by (Gharban and Yousif, 2020). As far as we know, no research has been published on the prevalence of Q fever in sheep in Mosul city. The study aimed to determine the seropositivity rate of Q fever in local sheep in Mosul City in northern Iraq through a commercial indirect ELISA test.

Materials and methods:

Study Population

The animals used in this study were in different regions in Mosul city (western, central and eastern). The flocks grazed on outdoor pastures and included both sexes and different ages.

Study Sample

From October 2019 to January 2020, 330 sheep (male and female) between the ages of 1.5-5 were randomly selected from 15 farms to be studied. Collect blood samples from animals for ELISA testing. The blood samples collected from the animals were processed to extract the serum and stored at -20°C until further analysis. The serum samples were tested using the indirect ELISA kit (IDEXX CHEKIT Q fever antibody ELISA test kit from IDEXX Laboratories). The results were evaluated according to the manufacturer's recommendations.

Statistical analysis

Statistical analysis was performed by two – ways analysis of variance was performed using SPSS version 11.5 (2002) software for windows.

RESULTS

The study found that of the 330 sheep examined, 68 samples were positive for Q fever, with an overall prevalence of 20.6%, while the remaining 262 samples were

negative (79.4%). The results showed that the prevalence of disease in sheep varies according to the sample collection area, age, sex, and physiological status. (Tables 1, 2 and 3).

Table 1: Total results of sera according to different regions in Mosul city.

Regions (Numbers of examined sera)	No. of positive sera	%
Western (110)	18	16.4
Central (110)	19	17.3
Eastern (110)	31	28.2*

* Significantly at $p < 0.05$

Table 2: Seropositivity of local sheep according to age.

Age (Numbers of examined sera)	No. of positive sera	%
1.5-2.5 years (165)	32	19.4
2.5- 5 years (165)	36	21.8*

* Significantly at $p < 0.05$

Table 3: Seropositive of sheep according to sex and physiological status.

Parameter	No. of positive sample	%
Sex		
Male (110)	21	19
Female (220)	47	21.3*
Physiological status		
Aborted ewes (110)	29	26.4*
non-aborted ewes (110)	18	16.4

* Significantly at $p < 0.05$

DISCUSSION

The veterinary clinical diagnosis of Q fever is difficult, and handling *C. burnetii* is risky. It usually dependson serological methods (Kilic et al., 2005). ELISA is considered to be an important and valuable tool for detection of Q fever in animals (Horigan et al.,2011).

In this study, 68 sera were positive for *C. burnetii* with a prevalence rate of 20.6%. This rate is close to the rate recorded by Qassim (2012) in AL-Qassim City (19.4%) but higher than the rate recorded by Abed et al. (2010) in Thi-Qar Province (5.8%), and lower than that reported in Basra province (41.84%) by Mohanad and Rahman (2016). These variations belong to the differences in the environmental and geographical conditions between the Southern and Northern area of Iraq.

The results of this study revealed detection of *C. burnetii* antibody in sheep in a different region of Mosul city at first time, with the highest rate recorded in the Eastern area (28.2%) followed by central (17.3%) and finally the western area (16.4%). This may be due to the difference in the methods of sheltering animals, as sheep in eastern Mosul live indoors, which facilitates the transmission of disease between them, while sheep live in other parts of the city with an outdoors. In the current study, the prevalence increases with age, especially in sheep over two years old. This finding is consistent with the views of Ruiz-Fonset *et al.* (2010) and Keyvani Rad *et al.* (2014). In our study, the genders of sheep (male and female) were seropositive for *C. burnetii*, and this result has been recognized by many researchers (Qassim, 2012; Keyvani Rad *et al.*, 2014; Jalboush and Alzuheir, 2017). Rams infected during the active breeding season play a major role in the sexual transmission of *C. burnetii* to ewes, and because the organism has a high affinity for the placenta, fetal membranes and mammary glands, ewes are more susceptible to infection than rams (Menzies, 2011). According to our results, Q fever is associated with aborted ewes (26.4%). Abortion is the chief clinical signs of Q fever in sheep populations within the breeding period (Fraccalvleri *et al.*, 2006; Abed *et al.*, 2010) and belongs to the great affinity of organisms for fetal membranes, placenta and mammary glands (Palmer *et al.*, 1983).

CONCLUSION

This study shows that both older sex sheep and aborted ewes in Mosul city, Iraq are prone to Q fever.

Conflict of interest

The authors declare that they have no competing interests.

Ethical approval

The study has been approved by the Department of Internal and Preventive Medicine, College of Veterinary Medicine, University of Mosul, Mosul, Iraq.

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