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The first survey for antibody against Bluetongue virus in sheep flocks in Southeast of Iran

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ABSTRACT

Objective: Bluetongue virus is an arthropod-borne *Orbivirus* in the family Reoviridae which infects both domestic and wild ruminants. Bluetongue disease is a "List A" disease of the Office of International Epizootics. To the best of our knowledge, no report has been published on bluetongue disease of sheep flocks of Southeast of Iran. The objective of this study was to describe the seroprevalence rates of BTV in sheep flocks in southeast of Iran. **Methods:** The blood samples were collected randomly from herds of Southeast of Iran. A total of 188 sera samples (94 male, 94 female) collected between 2009 and 2010, were available. Antibodies to BTV in sera were detected by using a commercial competitive ELISA (Institute Pourquier, Montpellier, France) according to manufacturer's instructions. **Results:** The seroprevalence rates were 6.57 % for sheep herds. Within a herd, prevalence of BTV seropositive animals ranged from 0% to 42.85%. 33.3% sheep flocks were positive to BTV antibodies. Sex didn't affect the rate of seropositivity, but the rate of seropositivity was significantly changed in different age groups. **Conclusion:** This study describes the seroprevalence rates of Bluetongue virus (BTV) in sheep flocks in southeast of Iran for the first time.

1. Introduction

Bluetongue virus (BTV) is an arthropod-borne *Orbivirus* in the family Reoviridae which infects both domestic and wild ruminants[1]. Bluetongue disease is a "List A" disease of the Office of International Epizootics (OIE). List A diseases are those diseases which can spread rapidly and that have a considerable impact on the health of livestock [2]. The disease is not contagious and is transmitted biologically by certain species of Culicoides [3]. Infection occurs in a number of animals but significant disease occurs only in sheep. Cattle are the major reservoir host for sheep. Under natural conditions infection occurs in sheep and cattle, but rarely occurs in goats [4]. Mortality varies with the serotype but can significant and it is estimated that the incursion of the disease in Europe since 1998 has caused has death of over 1 million sheep [5]. Adults either lose their fleece from a break in the growth of the staple or develop a weakness (tender wool) that causes breaks in processing and markedly reduces the value of the fleece. Pregnant ewes commonly abort. There is a severe loss of condition and convalescence is prolonged, particularly in lambs. The loss from clinical disease and from reduced wool quality and suboptimal production following infection in sheep are significant [6]. In cattle the infections are usually inapparent and evidence of clinical disease is seldomly observed. However, indirect losses associated with loss of body weight and condition, drop in milk production and poor subsequent reproductive performance were thought to have greater economic effect than occasional overt disease[7]. Various techniques have been used to detect antibodies against BTV. These include agar gel immunodiffusion (AGID), hemagglutination-inhibition, complement fixation and ELISA, which are serogroupspecific and serum neutralization, which is serotypespecific. Although all these assays are available, only AGID and competitive-ELISA are recommended as prescribed tests for international trade in the OIE Manual of Standards for Diagnostic Tests and Vaccines [8]. Incursive disease has occurred in Portugal, Spain and Reece but until very recently bluetongue was not considered an endemic[9]. To the best of our knowledge, no report has been published on bluetongue disease of sheep flocks of

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southeast of Iran. The objective of this study was to describe the seroprevalence rates of Bluetongue virus (BTV) in sheep flocks in southeast of Iran.

2. Materials and Methods

The blood samples were collected randomly from sheep flocks of Southeast of Iran. A total of 188 sera samples (94 male, 94 female) collected between 2009 and 2010, were available. Blood was collected into sterile tubes by jugular vein puncture. Blood Samples were centrifuged, and sera were gathered and stored at −20℃. Antibodies to BTV in sera were detected by using a commercial competitive ELISA (Institute Pourquier, Montpellier, France) according to manufacturer's instructions. Paired T-test and one-way ANOVA (SPSS v12; SPSS Inc, Chicago IL, USA) were used to compare seroprevalence rates data between male and females and different age groups respectively.

3. Results

The seroprevalence rates were 6.57 % for sheep herds. Within a herd, prevalence of BTV seropositive animals ranged from 0% to 42.85%. 33.3% of sheep flocks were positive to BTV antibodies. Sex didn't affect the rate of seropositivity, but the rate of seropositivity was significantly changed in different age groups ($P<0.05$). The seroprevalnce rates decreased with increasing of age in sheep herds ($P<0.05$). The total seroprevalence rate, ranges of seroprevalence rates within the herds, seroprevalence rates in male and female animals and in different ages groups were presented in table 1.

4. Discussion

In present study the apparent seroprevalence rates were 6.57 % for sheep herds. A high seroprevalence (34.7%) of bluetongue virus seropositivity was reported in sheep flocks in West Azerbaijan, Iran. They presented that 172 of 184 flocks included BTV seropositive sheep (93.5%) [10]. BTV Seropositivity rates in sheep were detected as 29.5% in Southeastern Turkey[11]. BTV seropositive reactions were obtained in 184 (48.4%) out of 380 tested sera, and in 89.5% (34/38) of the sheep flocks in North West Frontier Province, Pakistan. In the 34 seropositive flocks, the prevalence ranged from 12.5 to 100% (median = 47)[12].

Bluetongue virus is currently recognized to infect domestic ruminants on the continents of the Africa, Asia, North America and Australia and several islands. As a general rule one can now consider that BTV infects live stock populations in all countries lying in the tropics and sub-tropics primarily between latitudes 40°N and 35°N S[13].

The geographical alignment of Iran suggests latitude of 32 o 00′ N and longitude of 53 o 00′ E. The geographical alignment of southeast of Iran suggests latitude of 30 o 00′ N and 57 o 00′ E. *Thus* the occurrence of BTV infection in southeast of Iran was expected.

The distribution and intensity of infection in regions of the continents is determined by the climate, geography and altitude, as they affect the occurrence and activity of the Culicuides vectors and by the presence of susceptible mammalian hosts [5] [13-14]. Climate is a major risk factor as Culicoides require warmth and moisture for breeding and calm, warm humid weather for feeding[5]. A cold winter or a dry summer can markedly reduce vector numbers and risk for diseases. Moisture may be in the form of rivers and streams or irrigation but rainfall is the predominant of influence and rainfall in the preceding months is a major determination of infection. Optimal temperature is also essential and in endemic areas temperature for survival of the adults and larvae requires temperatures sustained above a mean of 12.5℃ for the cooler months and temperatures in the range of 18 to 30℃ in the summer and autumn for optimum recruitment to adults and for optimal activity [15-18].

The climate of southeast of Iran varies in different regions. The north, northwest, and central areas experience a dry and moderate climate, whereas in the south and southeast, the weather is warm and relatively humid. The province of Kerman and the surrounding regions have a semi-moderate and dry climate, with a maximum and minimum temperature of 39.6℃, and −9℃ respectively. This means that the climate conditions of the southeast of Iran is not suitable for survival of the adults and larvae of Culicoides vectors. The low seroprevalence rates (6.57 %) in present study may be attributed to dry climate and high variations in temperatures of southeast of Iran.

In present study the seroprevalnce rates decreased with increasing of age in sheep herds. There are differences in age susceptibility to clinical disease which, inexplicably vary with different outbreaks. With Australian serotypes,

Table 1

The total seroprevalence rate, ranges of seroprevalence rates within the herds, seroprevalence rates in male and female animals and in different age groups of sheep.

seroprevalence rates (%)	Ranges of seroprevalence rates within a herd (%)	Seroprevalence rates (%) in males and females		seroprevalence rates (%) in different age groups		
		males	females	<2 years old	2-4 years old	>4 years old
6.57	0-42.85	7.89	5.26	0	9.75	16.66

disease occurs only in sheep 3 years of age or older [19]. Seroprevalence increases with age, probably a reflection of increased duration of exposure [6]. Sex did not affect the rate of seropositivity in sheep flocks in present study. Bulls have a greater risk for infection than females or castrated males [6].

This study describes the seroprevalence rates of Bluetongue virus (BTV) in sheep flocks in southeast of Iran for the first time.

Conflict of interest statement

We declare that we have no conflict of interest.

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