

North Africa: a regional overview of bluetongue virus, vectors, surveillance and unique features

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Summary

Bluetongue virus serotype 2 (BTV-2) appeared in North Africa in December 1999 and caused a total of 14 775 clinical cases and 1 286 deaths in sheep. This arthropod-borne viral disease was first reported by the Tunisian veterinary services in 1999 followed by the Algerian authorities in 2000 and has been described in adult sheep only. The overall morbidity and mortality rates were 9% and 3.5%, respectively. Following the initial incursion of BTV-2 in December 1999, Tunisia reported an epidemic in 2000 and a few outbreaks in 2002. Neither Morocco nor Libya has reported any clinical cases of bluetongue in recent years, despite surveillance programmes being carried out. In Tunisia, the control strategy was based on mass vaccination of sheep using a live-attenuated monovalent type 2 vaccine, while in Algeria, it was based on vector control. Vector surveillance has proven the presence of *Culicoides imicola* in Morocco but there are no data available for either Tunisia or Algeria.

Keywords

Algeria – Bluetongue – Epidemiology – Morocco – North Africa – Surveillance – Tunisia.

North Africa (Algeria, Libya, Morocco and Tunisia) with their livestock populations of approximately 60 million small ruminants and 5 million cattle, are threatened by numerous transboundary diseases. This is due in part to integrated global trade and cross-boundary movement of animals. In addition, climatic changes observed during recent years have affected the world distribution of several animal diseases including bluetongue (BT). First described in South Africa in 1870, BT has since been reported over a broad band of countries on all the continents between 40°N and 35°S. Changes in climatic conditions may have contributed to the newly emerging distribution patterns of the disease, extending its range in the Mediterranean region to countries that have not previously reported BT. The disease was diagnosed in the Greek Islands towards the end of 1998 (10). In 1999, cases of BT were reported in countries around the Mediterranean Basin, such as Bulgaria, Tunisia and Turkey (10). The following year, BT re-emerged in Tunisia and epidemics were reported in Algeria, Italy, Spain (Balearic islands), Greece and France (Corsica). In 2001, Italy confirmed the presence of bluetongue virus (BTV) serotypes 2 and 9, the latter also being reported in Bulgaria. New cases were also reported

in Greece and Corsica. In 2002, new clinical cases were reported in Tunisia (BTV-2) and Bulgaria (BTV-9) (11). In 2003, the disease re-emerged in Minorca and Corsica and Sardinia (BTV-4).

History of the incursion of bluetongue in North Africa and unique features of outbreaks

1956

In 1956, a limited incursion of BT was reported in the southern area of Larache and west of Arbua in Morocco (9). The rapid implementation of a vaccination programme using a polyvalent vaccine combined with unfavourable climatic conditions for the vectors halted the spread of the disease. Typical clinical signs were observed in some animals during this incursion. Only adult sheep were clinically affected with an incidence of 20% (9). No clinical cases have been reported in recent years in Morocco.

1999

In Tunisia, the autumn of 1999 was characterised by high temperatures and heavy rain. This weather

created favourable conditions for BTV vector activity and subsequently the occurrence, for the first time, of BT in the country. During this first incursion, severe clinical signs were observed in affected sheep: high temperature (41-42°C), nasal discharge, salivation, oedema and congestion of the head and the mucous membranes. Only adult sheep were affected; no cases were recorded in cattle or young lambs. Affected sheep flocks were located in the eastern part of Tunisia along the coast. The overall morbidity and mortality rates were 8.35% and 5.5%, respectively. Of the 837 reported clinical cases, 325 died. The serotype of the virus isolated in Tunisia was determined as BTV-2 by the Institute for Animal Health (IAH), Pirbright. During the winter of 2000, a serological survey, using competitive ELISA, was conducted one month after detection of the last clinical case on one farm, comprising 886 sheep, 812 lambs and 400 bovines. Seropositive BTV reactions were recorded in 63.4% of adult bovines, 40.6% of heifers, 27.09% of adult sheep and just 2.1% of young lambs. Overall, the average level of positivity of animals on the farm was 22.6% (7).

2000

Tunisia

In 2000, 72 outbreaks of BT were reported during the period extending from June to October. A total of 6 120 clinical cases were diagnosed in sheep, of which 1 318 died. Outbreaks were reported in 10 districts with most cases diagnosed in the eastern and central parts of the country. Circulation of BTV serotype 2 was confirmed by the IAH in Pirbright (6). Molecular studies comparing genomic segments 2 and 7 of the virus isolated in Tunisia to those of the isolate in Corsica showed no significant difference between them (segment 2: 99.4% homology; segment 7: 100% homology). Therefore, the two isolates were probably of the same origin; the transport and amplification in the vector had no effect on the virus genome sequence. No significant difference was observed when comparing segments of the virus isolated in 1999 and in 2000 in Tunisia (1). Further sequencing studies are needed to better characterise these isolates.

Algeria

For the first time in its history, Algeria reported 28 outbreaks of BT between July and September 2000 in the north-east of the country. The disease spread after the first cases to affect 24 localities in the district of Jijel. Of 21 175 susceptible sheep, 2 661 were clinically affected. The disease continued to spread and by the end of the epidemic, six districts in the eastern and central parts of the country were affected (Skikda: 1 277 cases; Souk Ahras: 430 cases;

Annaba: 500 cases; Guelma: 2 871 cases; Oum El Bouaghi: 5 cases; Tebessa: 35 cases; and Jijel: 18 cases) (8).

2002

In 2002, the Tunisian national veterinary authorities reported a very limited number of new outbreaks of BT. A total of 4 outbreaks with 21 clinical cases and 6 deaths were recorded in the central part of the country in non-vaccinated sheep flocks, indicating that BTV serotype 2 was probably still circulating. The Algerian national veterinary authorities did not report any new outbreaks in 2002. The virus was probably not circulating in the other countries in the region (Libya and Morocco). Figure 1 summarises the epidemiological situation in North African countries between 1999 and 2002.

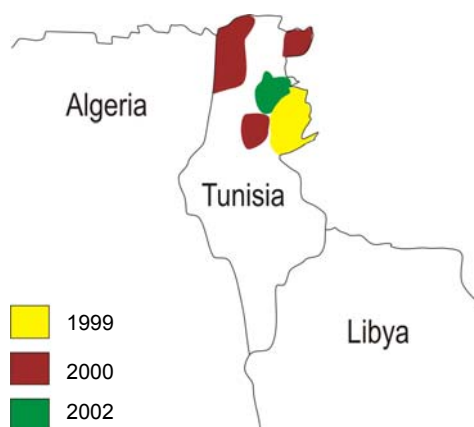


Figure 1
Distribution of recent bluetongue epidemics in North Africa, 1999-2002

Control measures and surveillance programmes

Control measures

Once BT had been confirmed in Tunisia, the national veterinary authorities implemented a series of control measures. On premises where outbreaks were recorded, flocks were isolated and dead animals buried. Sick animals, animal holdings and surrounding areas were sprayed with insecticide. Surveillance for the detection of new clinical cases in the nearby flocks was initiated and a monovalent type 2 vaccine was ordered from Onderstepoort in South Africa. In 2000, the only vector control measures used were the application of insecticides on the affected premises and spraying of these insecticides over the affected region. By the end of 2000, a campaign of mass vaccination of sheep was conducted with a total of 842 779 sheep vaccinated.

The subsequent annual vaccination campaigns involved 2 457 586 and 2 880 571 sheep in 2001 and 2002, respectively. A study conducted in the field on six flocks of different local breeds (3 controls and 3 vaccinated flocks of about 300 animals) to evaluate the innocuity and the efficacy of the vaccine, showed that side-effects were not detected and that animals did seroconvert after vaccination. The control strategy adopted by the Algerian national veterinary authorities during the first epizootic was based on vector control and included spraying insecticides over the affected regions. In addition, a surveillance programme aimed at the detection of clinical cases was conducted but at no time was vaccine used (8). In the absence of any clinical cases being either diagnosed or confirmed in Morocco, only serological monitoring was undertaken.

Vector surveillance

Since the incursion of BT into North Africa, the veterinary authorities of the region have implemented surveillance programmes to detect new clinical cases, circulation of BTV by seroconversion and the presence and the distribution of known vectors of the disease.

Tunisia

Following the epizootic of African horse sickness (AHS) in 1966, studies have been conducted to detect different species of *Culicoides* in Tunisia (4). A total of 17 species have been identified with *C. circumscriptus*, *C. coluzzii*, *C. longipennis* and *C. puncticollis* found most frequently. The distribution of *C. circumscriptus* was dependent on the degree of salinity of the collection site. In Tunisia, this halophytic species is the most frequently found under different climates. *C. puncticollis* was retrieved from most samples collected in the northern part of the country and semi-arid zones and it has also been found in the Saharan ecozone where it is commonly associated with *C. circumscriptus*. These two *Culicoides* species were adapted to heavily polluted sites. *C. coluzzii* is the most frequently found in the semi-arid, arid and Saharan ecozones. It is often associated with *C. circumscriptus* even in sites very rich in sodium chloride (3). Studies are being conducted to determine BT vector distribution and to try to detect *C. imicola*.

Morocco

Following the epizootic of vector-borne diseases (BT in 1956 and AHS in 1966), extensive field studies were conducted that identified 49 species of *Culicoides*. Further investigations were conducted following the two epizootics of AHS in 1989-1991

and in 1994-1995 (2). The presence of the following three *Culicoides* vector species was confirmed: *C. imicola*, *C. obsoletus* and *C. pulicaris*. The former is the most frequently trapped and was found in all sites covered by the investigation in altitudes varying between 4 m and 1 275 m. However, the abundance of this vector depends on geo-climatic parameters, thus Marrakech, Arbua and Larache, located in the north-west of the country, were the regions where *C. imicola* was found all year around. The two other species trapped during the investigation were *C. obsoletus* and *C. pulicaris* and have very similar spatial and seasonal distributions. Since 2000, the national veterinary authorities of Morocco have implemented an epidemiological surveillance programme. Entomological studies have been conducted for two years aimed at the detection of any new competent *Culicoides* vectors and to determine their spatial and temporal distributions with *C. imicola* identified in three of the five sites studied. Serological investigations in the susceptible population and in sentinel herds have been also conducted (5).

Conclusions

The distribution of BT worldwide is changing. The incursion of BTV serotype 2 into North Africa has been confirmed. The way that BTV entered and spread within the North African region remains unclear although it is likely that the virus will probably continue to circulate for a few years if favourable conditions are maintained. Surveillance programmes have to be implemented to detect circulation of this serotype, incursion of new serotypes and the distribution of competent vectors. These programmes will surely be more efficient with reinforced diagnostic capabilities of national laboratories and collaboration at regional and international levels.

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