Emergence Of Bluetongue In France 2000-2004

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Abstract

Bluetongue (BT) is a vector-borne disease transmitted by biting midges. Since 1999, several BT outbreaks of serotypes 2, 4 and 16 have been recorded in the Western Mediterranean region.
In response, France implemented entomological and serological surveillance, in addition to clinical surveillance, in Corsica island (infected area) and on the French Mediterranean coast (area at risk). In 2000, *Culicoides imicola*, the main vector of BT was discovered in Corsica. Entomological surveillance started in 2002 on 12 sites in Corsica and on 19 sites on the mainland. Settlement of *C. imicola* was documented in Corsica during 3 consecutive years. On the mainland, some erratic specimens were trapped in 2003 and by 2004 a settled population was discovered. This is the Northernmost population of proved BT vector found in Europe.
Serological surveillance was used to evaluate herd immunity and detect new serotypes. In Corsica, 91% of adult sheep were Elisa positive in 2002. To detect circulation of BT virus, slaughtered calves were systematically blood sampled and sentinel goats were sampled periodically to find any seroconversion. As a result, viral circulation of BT serotype 4 was detected as early as May 2003, while clinical signs were only declared in August 2003. On the mainland, no BT positives have been detected to date.
The 3-year surveillance has shown a) the gradual expansion of BT vectors to the North, and b) the silent spread of the virus before clinical signs are expressed. Ongoing adaptation of surveillance is then necessary to design and implement appropriate control measures.

Introduction

Bluetongue has emerged in the Western part of Mediterranea in 1999 (Baylis and Mellor 2001; Mellor and Wittmann 2002). It was first declared in Tunisia and the Eastern part of Algeria and then in Italian islands (Sicily and Sardinia), continental Italy, Balearic Spanish islands and the French island of Corsica (Source OIE: reports). This can be called a true emergence as BT has only been described in this region in 1957 (Morocco, Spain and Portugal). This old and limited in time epidemic was due to serotype 10 (Placidi 1957). Since 2000, Corsica faced three introductions of different virus strains: BTV2 in 2000, BTV4 in 2003 and BTV16 in 2004.

Material and Methods

Clinical surveillance: An outbreak is officially confirmed when clinical signs are reported and when infection is assessed by PCR in the national reference laboratory (AFSSA). *Entomological surveillance:* In 2002, an entomological surveillance network has been implemented. A classical New Jersey light trap slightly modified by Rieb (1982) is used. One-night catches per site are performed every three weeks. In Corsica, twelve traps are located all over Corsica island (Baldet 2004). On the mainland, traps are located on the Mediterranean coast approximately every 50 km. *Serological surveillance:* In 2001 and 2002, immune coverage in Corsica was assessed by serological surveys. Since 2004, samplings of both goat sentinels herds and calves in the slaughterhouses are used to evaluate viral circulation and potential introduction of new strains. On the mainland, 150 animals per departement (French secondary administrative level) are tested by competitive Elisa test (cELISA, VMRD©) to verify the absence of virus circulation. In addition, since 2005, in areas with a higher risk (near the Italian and Spanish borders and in the Var departement) sentinel herds are have been monthly sampled (10 animals in 5 herds per department).

Results

All the outbreaks due to a new serotype started in Autumn, in the South-West of the Corsica island (Figure 1). The sequence of the events was similar: isolation of the virus in Sardinia and later isolation in Corsica. Thus, serotype 2 was detected on 18 August 2000 in Sardinia, on 18 October 2000 in Corsica. And, for serotype 4, the disease was detected on 25 August 2003 in Sardinia, on 18 October 2003 in Corsica (Source: OIE). The situation was a little different for BTV 16 as serological traces of BTV 16 were first recorded in Sardinia in 2003 on sentinel herd (Anonymous 2004). Outbreaks in Corsica due to serotype 16 started on 18 August 2004. Zientara (2002) and Potgieter (2005) showed close phylogenetic relationship between BTV2, 4 and 16 strains from Corsica and Sardinia. There is then few doubt that source of the viruses were the circulation of these serotypes in Sardinia 12 kilometres far South from Corsica. There are evidence that, in 2003 (Gerbier, 2006) and probably in 2000, the viruses had spread silently few months before the apparition of clinical symptoms.

Whereas BTV2 and 4 outbreaks were declared mainly in the South West of the island, BTV16 outbreaks were recorded quite rapidly in the North. The number of outbreaks (Table 1), morbidity and mortality rates (data not shown) observed in infected flocks were higher for BTV2 than for BTV4. After 2 annual rounds of massive vaccination using South African BTV2 attenuated vaccine, no outbreak due to BTV2 or circulation of this serotype was observed. After one year of vaccination using South African BTV4 attenuated vaccine, outbreaks due to serotype 4 were observed in 2004 only in unvaccinated flocks (total: 13). Serological traces of this serotype are still found on sentinel herds in 2005. Vaccination against BTV16 has been stopped due to adverse effects in January 2005. Whereas only 17 flocks have been vaccinated (with only 10 showing BT evocating symptoms), no outbreak due to this serotype were recorded in 2005. Thus, spatial spread, pathogenicity and persistence capability were clearly different.

Year	Suspicions	BTV2		BTV4		BTV16	
		Outbreaks	Vaccinated flocks or vaccination coverage†	Outbreaks	Vaccinated flocks	Outbreaks	Vaccinated flocks
2000	78	49	0	0	0	0	0
2001	394	335	80%*	0	0	0	0
2002	73	0	91%**	0	0	0	0
2003	61	0	528	16	528	0	0
2004	74	0	613	13	613	25	17
2005	50	0	NA	0	NA	0	0

† Situation at the beginning of the year, before the start of the vector activity
* Edderai 2002
** Seropositivity rate estimated from a sample of 2176 sheep from 107 vaccinated flocks

Table 1 : Annual number of BT suspicions, outbreaks and vaccinated flocks according to the serotype in Corsica between 2000 and 2005

Culicoides imicola was trapped for the first time in Corsica in 2000 but the exact date of its introduction is unknown (Delecolle, 2002). Entomological surveillance of *Culicoides* in Corsica showed that the population was increasing. Usually, the highest densities are observed in Autumn but in 2003, as the monthly temperatures recorded in late spring were unusually high, we observed a higher peak of *C imicola* density in June instead of September.

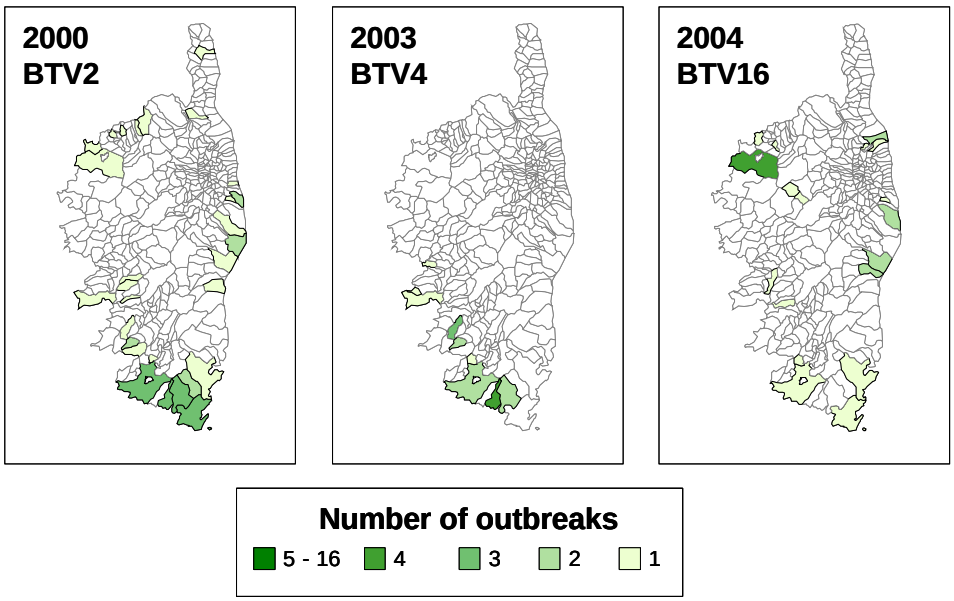

Figure 1 : Distribution of BT outbreaks in Corsica the first year after introduction of a sérotype

On the mainland, *C imicola* specimens have been trapped 3 times but after inquiries no other individuals were trapped. They were considered as erratic. In June 2004 and later in September and October, *C imicola* was caught in the Argens river valley in the Var departement. It was concluded that a population had now settled. This population was still active in Spring 2005 and was limited to a small area (20 km radius).

Conclusion

The experience gained from 5 years of surveillance of BT and its main vector in France showed the efficiency of active surveillance and entomological surveillance. From a disease control point of view, the massive vaccination of sheep using attenuated vaccine was successful. Clinical signs disappeared in 2005 and it seems that no more strain is circulating. The extension of the vector on the mainland is a matter of concern but no introduction of virus have been noticed yet.

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