Veterinary Immunology and Immunopathology 158 (2014) 116–119

Contents lists available at ScienceDirect

Veterinary Immunology and Immunopathology

journal homepage: www.elsevier.com/locate/vetimm

Research paper

Eradication of bluetongue disease in Germany by vaccination

Hans-Joachim Baetza*

Federal Ministry of Food, Agriculture and Consumer Protection, Rochusstrasse 1, 53123 Bonn, Germany

ARTICLE INFO

Keywords:
Bluetongue
Vaccination
Eradication

ABSTRACT

Bluetongue disease first broke out in Germany on 21 August 2006, almost simultaneously with the first outbreaks in Belgium and The Netherlands. More extensive tests showed that the serotype was serotype 8. Due to westerly winds the disease spread rapidly towards the East, with the result that in the year 2008 large parts of Germany were affected. The traditional methods of animal disease control were not of much help in view of the transmission of the disease by insects; the speed of the spread of the disease could only be slowed down by movement restrictions, but could not be influenced in a decisive manner. Authorised vaccines were not (yet) available. A large-scale field study based on three prototypes in bovine animals and sheep revealed that they were both effective and safe. Consequently, the Federal Ministry of Food, Agriculture and Consumer Protection issued an exceptional permission to administer these non-authorised vaccines. In May 2008, large-scale vaccination campaigns were launched (vaccination of all bovines, sheep and goats). As a consequence, the disease outbreak figures declined drastically. In 2009, the last blanket vaccinations were administered and from 2010 animal keepers were allowed to continue vaccinating their livestock on a voluntary basis. Intensive tests (serological, PCR) showed in the years 2010 and 2011 that BTV8 no longer circulated among the livestock population. Effective from 15.02.2012, Germany declared itself free from BTV8 in line with Article 8.3.3 of the OIE Animal Health Code.

1. Introduction

In Central and Northern Europe bluetongue disease was considered an animal disease which primarily occurs in warm climatic zones. When bluetongue virus serotype 8 was first detected in Germany in 2006, it very quickly became clear that it was not possible to obtain the eradication of the disease with the "traditional methods" of animal disease control. Considering that the vector responsible for the transmission in Germany was unknown and that vaccines were not available, eradication seemed far from possible at this stage. When entomological monitoring was introduced and the pharmaceutical industry stepped up its efforts to make vaccines available in a short space of time, eradicating the disease seemed realistic.

2. Materials and methods

2.1. Entomological monitoring

In August 2006, BTV 8 hit Germany widely unprepared. In particular it was not known which midges in central and northern Europe and especially in Germany were capable of transmitting the pathogen, since the biting midge *Culicoides imicola*, which is mostly responsible for outbreaks in Africa, is there not native. Hence, in 2007 and 2008, a large-scale entomological monitoring activity was implemented. Between May 2007 and April 2008, 89 traps (Fig. 1) were placed in those parts of the country which were mainly affected by the animal disease, the biting midges caught

* Tel.: +49 228 99529 3457.
E-mail address: hans-joachim.baetza@bmelv.bund.de

0165-2427/$ – see front matter © 2013 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.vetimm.2013.09.001

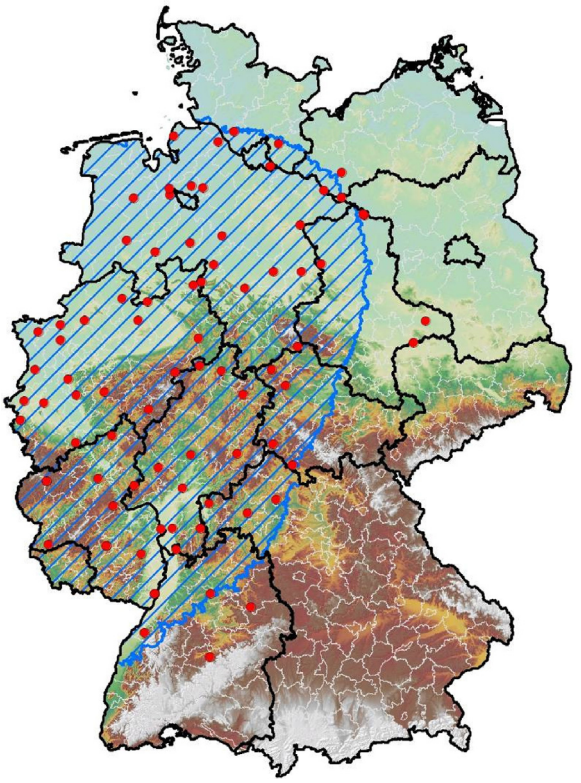

Fig. 1. Geographic positioning of the traps (red dots); the blue hatched area represents the spread of BT in early 2007.

were counted and differentiated first of all on the basis of their wing pattern into *Culicoides* (C.) *obsoletus* group, *C. pulicaris* group and other C. subspecies (Hoffmann et al., 2009; Mehlhorn et al., 2009a,b).

The result of this monitoring activity was that

- there is no vector free period (→ this was important for controlling the disease since susceptible animals to be moved also had to be tested before being moved during the cold season (the time which is supposed to be vector-free),
- most of the differentiated biting midges were classified under the *C. obsoletus* complex, followed by the *C. pulicaris* complex. Up to 50 biting midges were pooled from the individual C. complexes and were tested for BTV 8 via PCR at the national reference laboratory for bluetongue disease. In total, some 25,000 pools were tested, including 585 pools with a positive result. Out of these 585 pools it was possible to classify 562 pools under the *C. obsoletus* complex, 16 pools under the *C. pulicaris* complex and 7 pools under other C. complexes. 401 of the 585 positive pools came from biting midges which were caught in October (1 positive pool in June, 2 in July, 26 in August, 133 in September and still 22 pools of midges caught in November).

This monitoring made it possible to obtain an overview of the biting midges responsible for transmitting BTV 8 in Germany. Despite this knowledge it was absolutely impossible to contain the breeding areas and hence the propagation of the midges. Therefore the control strategy had to change its focus. "Classical methods" to eradicate a disease ("testing and destruction if positive") must fail. On the other hand the responsible authorities did not want to rely on a possible spontaneous disappearance of the virus. Animal health (and in this respect even animal welfare) and of course trade aspects were strong arguments against this option.

2.2. Vaccination

Initially there were no vaccines against BTV 8 available. Nevertheless, different livestock vaccine producers were working at full stretch on the development of a relevant vaccine (i.e. CZ Veterinara, Merial, Fort Dodge, Intervet). In 2008, many vaccines were not yet ready for authorisation, but they had been tested under laboratory conditions with the result that they seemed to be effective and safe. Since, however, it was only possible to eradicate the disease with a large-scale vaccination campaign, which had to include all susceptible animals, and given that such a vaccination campaign with non-authorised vaccines seemed to be problematic, not least because of possible claims for damages, a vaccination trial was conducted under the scientific guidance of the national reference laboratory for bluetongue disease at the Federal Research Institute for Animal Health–Friedrich Loeffler Institute (FLI) on the island of Riems in the federal state of Mecklenburg-Western Pomerania. 893 bovine animals from one farm and 1132 sheep from two farms were included in the trial. In each case, a third of the animals was vaccinated with one of the three available vaccines. The bovines received basic immunisation (two administrations at intervals of 21–28 days). Three weeks after basic immunisation the animals were bled and tested for antibodies against BTV 8: more than 95% of the bovines had developed BTV 8-specific antibodies. The response to the vaccinations was no more severe than that observed in other vaccinations. To provide evidence of whether the animals were also protected against a BTV 8 infection, six bovine animals and six naive sero-negative bovines as control animals from each vaccination group were infected with BTV 8, with the result that all vaccinated cattle were not only not protected, but also did not develop any viraemia and hence no BTV was transmitted to midges. The control animals showed typical clinical symptoms and a clear and long lasting viraemia (Wäckerlin et al., 2010; Eschbaumer et al., 2009).

The situation of the sheep groups was comparable. In this case, too, a third of the animals was vaccinated with one of the three vaccines at issue. As opposed to the bovines, the Merial vaccine and the vaccine of the CZV company were only administered once as basic immunisation, the vaccine of the company Fort Dodge was administered twice at intervals of 21–28 days. Three weeks after finalising the basic immunisation, the sheep were bled with the result that

- the seroconversion rate was up to 100%,
- a dual application (Fort Dodge) achieved a higher prevalence of antibodies,