

RISK FACTORS, INCIDENCE AND PREVALENCE OF BLUETONGUE IN ROMANIA AND WORLDWIDE IN THE LAST DECADE

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Abstract

Bluetongue affects domestic ruminants (sheep, goats, cattle) and wild (buffalo, deer, several species of African antelope and other species of the order Artiodactyla). In epidemiology of the disease, cattle have a particularly important role due to prolonged viremia, in the absence of clinical signs of disease, except infection with serotype 8 (BTV8) in Europe, according to the World Organization for Animal Health (OIE) data. The economic importance of the disease lies in economic losses consecutively reducing the productive capacity of the animals, mortality and fetal malformations, immunization costs for receptive animals, trade restrictions, reducing the selling price of animals of receptive species and products derived from them. According to the emergence and evolution of bluetongue outbreaks reported to OIE and recorded in WAHID (World Animal Health Information Database) from 1996 to September 2014 were registered worldwide more than 33,400 bluetongue outbreaks, over 28,300 outbreaks have been reported in Europe, more than 1,600 outbreaks in Africa, 3,500 outbreaks in Asia, six outbreaks in the Americas, including Central America and 4 outbreaks in Australia. Global warming is one of the possible reasons for which a change of the evolution of bluetongue in the Mediterranean region and is expected range of the vectors of the disease to spread north as global warming intensifies.

Key words: bluetongue, incidence, risk factors, World Organization for Animal Health.

INTRODUCTION

Bluetongue is known from the second half of the nineteenth century, with the intensification growth of merino sheep breed in South Africa. The first reports on the evolution of bluetongue dates from 1876 when it was described epidemics with high mortality. Subsequently, the disease has been reported in Cyprus in 1949, Turkey in 1949, Israel in 1951, USA in 1952, Portugal in 1958, Spain in 1958, Pakistan in 1960, Australia in 1978, and in 1998 bluetongue began spread in Europe, including territories increasingly numerous. Thus, in 1999 the disease was reported in Bulgaria, Greece and Turkey. The outbreaks from Greece were produced by serotypes 4, 9 and 16. Subsequently, cases of bluetongue were reported in Sardinia and the Balearic Islands. In 2001 clinical cases of bluetongue were identified in Corsica and in august and september, disease has been reported in

Sardinia and Calabira, suggesting that bluetongue virus, survived the winter season in France and Italy. Also in 2001, the disease was registered in Argentina, Brazil, Bulgaria, Croatia, France, Greece, Italy, Japan, Macedonia, Kosovo, Spain and Yugoslavia (OIE General Session, 2014). In late 2001, several mediterranean countries and neighboring area, were faced with the emergence of this disease. New serotypes reported on that occasion were 2, 4, 9 and 16, along the borders of countries in south-east Europe, from or added serotypes 6, 10 and 13 previously diagnosed. The emergence of new serotypes in Europe began in august-september 2006, when BTV 8 was diagnosed in the Netherlands, Germany and France, then in western and central European countries. In the summer of 2007 a new serotype was diagnosed in Europe, BTV 1. In those circumstances, in Europe there was at the same time areas that perform a single type of virus and the infected

areas with more than one type of virus. The existence of favorable biotopes vector multiplication, the relatively large number of animals of susceptible species, intra-Community trade conditions in which the animals move freely within the Community, have contributed since then unprecedented spread of the disease in Europe (Council Directive 425/90/EC).

MATERIALS AND METHODS

The main objective of this paper is the analysis of the occurrence and propagation of bluetongue, identifying risk factors, assessment of potential damage they produces evolution of the disease in the country, and assessing the response capacity of Romania. Another objective is to have a point of reference in risk management for the three stages: risk identification, evaluation and management.

Analyzing the documents produced in recent years by organizations involved in epidemiological surveillance, the World Organization for Animal Health, European Commission through DG SANCO, and the European Food Safety Authority, we tried to make an analysis of the incidence and prevalence of disease in the last decade.

RESULTS AND DISCUSSIONS

1. The incidence and prevalence of the disease. The top of disease in Europe, was the 2006-2009 period when there was a progressive increase from 2479 cases in 2006-2007 to 63,182 cases in 2007-2008, 39 737 cases in 2008-2009, followed by a decrease in the period 2009-2010, when there were 219 cases. Bluetongue has evolved in the past 5 years in 31 countries, over 50% of which are European countries such as Belgium, Cyprus, Switzerland, Denmark, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom, Turkey. In July of 2014, Bulgaria, and Greece, notified by codified system ADNS of EU and on the OIE WAHIS system, disease recurrence after about ten years of absence, and in August the disease recurs in the Republic of Macedonia. Thus, a risk analysis carried out by the central veterinary administration of Romania, it

considered that risk of developing this disease is very high in Romania, which was also true a month later.

Thus, the prevalence of disease in 2014 in Romania and the immediate vicinity of Romania (Albania, Bulgaria, Greece, Macedonia, Serbia, Hungary and Turkey) was, according to OMSA, the 3689 outbreaks, including 22 in Albania, Bulgaria 1090, Greece 271, 176 Macedonia, Romania 1028, 379 Serbia, Turkey 4, and Hungary with 22 outbreaks. In all cases, BTV4 serotype was incriminated (ADNS, 2014). The solution has been vaccination in restricted zones and was approved by Commission Decision 2008/655/EC on 24 July 2008. Later, it was approved the vaccination against other serotypes of the disease (Directive 2012/5/EU).

In Europe, at present, the disease is confined to several areas in the south as: Balearic Islands, Sardinia, Sicily, Corsica, in some areas of Italy, Spain, France, Portugal, Greece and Bulgaria.

According to the emergence and evolution of bluetongue outbreaks reported to OIE and recorded in WAHID (World Animal Health Information Database) from 1996 to September 2014 were registered worldwide more than 33.400 bluetongue outbreaks, over 28,300 outbreaks have been reported in Europe, more than 1,600 outbreaks in Africa, 3,500 outbreaks in Asia, six outbreaks in the Americas, including Central America and 4 outbreaks in Australia.

In the near future bluetongue will dominate the epidemiological situation of European countries, which requires a new approach, including the aspects of immunoprophylaxis susceptible animals, with live vaccines.

2. Risk analysis will be studied in three stages namely: risk identification, assessment and risk management.

a) Risk identification(determine the classes of risk factors, correlated with bluetongue). For all identified risk factors are used to determine the level of risk, expressed as the product of the probability of occurrence and magnitude of consequences. Through European Commission document "The assessment of the geographical risk of BSE carried out by the European Commission's Scientific Steering Committee", seven classes of severity are determined of the

consequences of a risk factor (extremely high = 7, very high = 6 = 5 increased moderately = 4, low = 3, very small and negligible = 2 = 1). In our analysis we have identified six risk factors with high and moderate impact, the other classes possibly making subject to further discussion (DG SANCO, 2012; EFSA, 2008).

Risk factors related of legal regulation. There are no unacceptable or intolerable risks on the regulation of surveillance, prevention and control of bluetongue and there exist, in this regard both Community legislation directly applicable in Romania (Regulation 1266/2007) and EU legislation transposed into national legislation (Directive 2000/75 implemented by Order 32/2006)(Council Directive 2000/75/EC; ANSVSA Order no. 32 of 16/02/2006; REGULATION (EC) Nr. 1266/2007).

Risk factors related to the etiology of bluetongue. Bluetongue pathogen occurs by having a plurality particular, the 26 serotypes identified so far (as of May 2014, according update by “Diagnostic Manual” of the World Organization for Animal Health, is added serotypes Toggenburg - BTV25 and serotype 26 in Kuwait - BTV26)(OIE General Session, 2014).

Risk factors regarding the epidemiology of bluetongue. Bluetongue virus produce an infectious diseases, non-contagious, vectorial transmitted, which affects domestic ruminants of economic interest (cattle, sheep, goats) and 80 species of wild ruminants. In terms of receptivity, there is differences of receptivity related to race, improved breeds are usually more receptive than indigenous, and differences related to age. These aspects varies inexplicably from one episode to another epidemic episode, but usually young animals are more susceptible. Exposure of animals of species susceptible to the action of sunlight for a long time, and any form of stress are factors important role in the onset of the disease.

Sick animals, in which the virus is found in blood, spleen and the lymph nodes, and passed through illness, are the main source of infection. Of particular importance in disease transmission, have wild ruminants which evolves bluetongue unapparent or with minimal clinical signs. Bluetongue is a non-

contagious disease, that is not directly transmitted from a sick animal to another, having one definite way of disease transmission, respectively by vectors. However, the disease can be transmitted from a sick animal to a healthy animal, through contaminated blood and semen. The high degree of dissemination of the disease in susceptible populations, is given by the degree of contamination with the *Culicoides*, and efficiency measures implemented to reduce these populations. Bluetongue evolves endemic in tropical areas, where hematophagous insects remain active throughout the year. In temperate climates, the disease is seasonal and evolve especially in late summer when *culicoides* density is highest. When in the contaminated area are ruminants, and is reported presence of bluetongue virus, and are presence insects involved in the transmission of the disease, the risk of disease is maximum. When in the area, are presence infected animals with bluetongue virus, but insects responsible for transmitting the virus, are not present, such as during cold seasons late autumn, winter and early spring, the risk of bluetongue is moderate. Strong relationship in terms of bluetongue virus transmission, between domestic and wild ruminants and insect population, makes the disease have a natural focal character, the persistence of cases in the area where it first appeared. Globally, bluetongue affect regions between 40-50 ° N and 35 ° S latitude, being able to expand due to global warming and the spread area of insect, up to 55 ° north latitude. Morbidity and mortality varies in very large limit and depends on certain factors. When the disease first appears in a flock of sheep, morbidity is between 50-75% and 20-50% mortality. In episodes of illness that have evolved in the Cyprus and Spain reported mortality rates of 70%, while in the US it is between 0-14%. In South Africa, have reported mortality rates ranging from 2-30%. Whatever the geographical area, the mortality rate increases when in the livestock penetrate a new strain of virus.

Risk factors correlated with the vectors - the Culicoides insects. The most important role in the transmission of bluetongue they have hematophagous insects from genus *Culicoides* (small insects between 1-3 mm, who

consuming the blood of mammals, birds, reptiles and other insects). Approximately 96% of the more than 1,400 species of Culicoides are hematophagous, of these, about 120 species of Culicoides are in Europe (especially in eastern basin of the Mediterranean countries, which confers natural focal of the disease). The Culicoides insects are active at temperatures between 13 and 35 ° C, and feed on the blood of animals only at night, being exposed to attack these insects, animals housed in open shelters, or in the night by pasture, printing a seasonal character of disease, in temperate climates. When Culicoides insect arrived in the body with the blood infected, the virus replicates and after 10-15 days locates in the salivary glands of the insect, being able to infect healthy animals. Each insect so infected, remain infected for life (REGULATION (EC) Nr. 1266/2007; ANSVSA Order no. 154 of 02/08/2007).

Risk factors correlated with the environmental conditions, including the meteorological risk. Wind speed, temperature and humidity, and light intensity, influences directly the activity of the Culicoides insects and their flight period. Experts have noted that most of Culicoides bites occurred between 10-10,000 lux brightness and wind speed of 1 m / sec. Culicoides species prefer generally calm weather (quiet) and weak wind (2m / sec). However, low light intensity and drizzle, does not suppress their activity. In the Mediterranean area, species Culicoides imicola was observed that could be carried by wind to distances of 100 km. It was observed that the largest number of Culicoides imicola live in areas where land is predominantly clay, as this land allows better humidity retention for a sufficient period of time, allowing Culicoides imicola larvae to perform their lifecycle quickly and successfully in 7-10 days. A hematophagous vector can travel up to 1.5 to 2 km / day in a zone, according to data from the literature, but if weather permits (prevailing winds in a certain direction and period), the vectors can be worn to much greater distances that can reach up to 200 km / day. Migration distances may vary, so, depending on environmental conditions, topography and the meteorological conditions from area. Therefore, it is important to know the direction

of movement of air masses (winds) to assess the risk of spreading the disease(DG SANCO, 2012).

Risk factors correlated with the intra-Community trade (live ruminants). Bluetongue can be introduced into a disease-free zone by Culicoides insects contaminated or by host animals (domestic or wild ruminants) infected. Bluetongue can be introduced into a disease-free zone or by Culicoides insects or contaminated by host animals (domestic or wild ruminants) infected. Intra-Community trade with animals from susceptible species developed in the period January 2013 to June 2014, was to introduce in Romania approximately 53,822 domestic and wild ruminants, of which 19,261 cattle, 32,512 sheep, 1,712 goats, 157 deer, bison 31 and 149 bison. In 2014, Romania received domestic and wild ruminants from three Member States where bluetongue has evolved during the year respectively Italy, Greece and Hungary, here is the origin of the disease in Romania and natural focal area where there are three limiting factors respectively: bluetongue virus, the existence of Culicoides insects and animals of susceptible species. In contrast, Romania has not developed import activities with third countries where bluetongue has evolved or evolves, namely: Albania, Bosnia-Herzegovina, Switzerland, Kosovo, Macedonia, Montenegro, Norway, Russia and Turkey (ADNS, 2014).

b) Risk assessment. Itinerary risk from bluetongue, in the opinion of the EFSA Scientific Committee on Animal Health and Welfare, in December 2007, in study "The origin and emergence of bluetongue", main pathways of introduction and dissemination of bluetongue virus in a country, region or free zone are:

- importation of infected ruminants;
- legal or illegal movement of infected ruminants;
- introduction of vectors infected with horses, exotic plants through the wind or planes;
- use of contaminated vaccines or unstable.

The spread of bluetongue virus in the immediate vicinity of the Romanian countries (Greece and Bulgaria) was a critically important point, because the danger they were exposed Romania was high, which required a

permanent state of alert, and training prevention and response systems, which must be active for a long time from now on.

Once entered in the territory of Romania, the disease became endemic shortly, causing significant economic losses breeders of cattle, sheep and goats, and of the economy in general.

Direct and indirect consequences of bluetongue evolution is reflected in the financial costs very important for Romania, the impact is complex and reflected in:

i) the economic, financial losses, which may be due to:

-costs of eradicating the disease, including: compensation for death or killed animals, expenses related to eradication activities (personnel, materials, equipment, etc.) DDD activities,

-economic losses due to restrictions on trade in animals from susceptible species and products and by-products derived from them, - loss from tourism and services sectors.

ii) in the social field, losses due to: -socio-ethical aspects (massive killing of animals not accepted by the population and generating positions against in civil society), -in rural areas, impact on revenue of small farmers,

-attitude of non-governmental organizations for the protection of animals (the methods of control provided by European legislation, particularly on killing methods chosen)(EFSA, 2008; Government Decision no.1189/2009).

c) Risk management coupled with bluetongue. Administration of risk factors correlated with the bluetongue, in the case of Romania, is performed in an initial phase of the structures that achieves the identification, characterization, evaluation, ranking and their estimation, namely Veterinary Administration (ANSVSA) and the Institute for Diagnosis and Animal Health (IDSA). This involves activities of laboratory surveillance, and management their results by analysis reports by the National Reference Laboratory for Arboviroze-bluetongue and African horse sickness, within the IDSA(Government Decision no.1189/2009).

CONCLUSIONS

According to the emergence and evolution of bluetongue outbreaks reported to OIE and recorded in WAHID (World Animal Health Information Database) from 1996 to September 2014 were registered worldwide more than 33.400 bluetongue outbreaks, over 28,300 outbreaks have been reported in Europe, more than 1,600 outbreaks in Africa, 3,500 outbreaks in Asia, six outbreaks in the Americas, including Central America and 4 outbreaks in Australia.

Control of susceptible species movements, compliance provisions of Regulation 1266/2007/EC, compliance the annual program monitoring indigenous livestock and those from intra-community trade, control identification, registration and movement of animals, are meant to minimize such events epidemiological due to BTV, although they cannot ensure the elimination of any risk. Respecting the rules of biosecurity and animal movement in the animal holdings, information and warning continues of decision makers and the general public, livestock farmers, hunters, hunting fund managers, public administration, involved in controlling diseases, can significantly reduce the risk of spreading the disease through control measures.

In the near future bluetongue will dominate the epidemiological situation of European countries, which requires a new approach, including the aspects of immunoprophylaxis susceptible animals, with live vaccines.

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