

## Serbia

### TRENDS AND SOURCES OF ZOONOSES AND ZOOTIC AGENTS IN FOODSTUFFS, ANIMALS AND FEEDINGSTUFFS

including information on foodborne outbreaks,  
antimicrobial resistance in zoonotic and indicator bacteria  
and some pathogenic microbiological agents

IN 2018

## PREFACE

This report is submitted to the European Commission in accordance with Article 9 of Council Directive 2003/99/EC\*. The information has also been forwarded to the European Food Safety Authority (EFSA).

The report contains information on trends and sources of zoonoses and zoonotic agents in Serbia during the year 2018.

The information covers the occurrence of these diseases and agents in animals, foodstuffs and in some cases also in feedingstuffs. In addition the report includes data on antimicrobial resistance in some zoonotic agents and indicator bacteria as well as information on epidemiological investigations of foodborne outbreaks.

Complementary data on susceptible animal populations in the country is also given. The information given covers both zoonoses that are important for the public health in the whole European Union as well as zoonoses, which are relevant on the basis of the national epidemiological situation.

The report describes the monitoring systems in place and the prevention and control strategies applied in the country. For some zoonoses this monitoring is based on legal requirements laid down by the European Union legislation, while for the other zoonoses national approaches are applied.

The report presents the results of the examinations carried out in the reporting year. A national evaluation of the epidemiological situation, with special reference to trends and sources of zoonotic infections, is given. Whenever possible, the relevance of findings in foodstuffs and animals to zoonoses cases in humans is evaluated.

The information covered by this report is used in the annual European Union Summary Reports on zoonoses and antimicrobial resistance that are published each year by EFSA.

The national report contains two parts: tables summarising data reported in the Data Collection Framework and the related text forms. The text forms were sent by email as pdf files and they are incorporated at the end of the report.

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\* Directive 2003/ 99/ EC of the European Parliament and of the Council of 12 December 2003 on the monitoring of zoonoses and zoonotic agents, amending Decision 90/ 424/ EEC and repealing Council Directive 92/ 117/ EEC, OJ L 325, 17.11.2003, p. 31

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## ANIMAL POPULATION TABLES

Table Susceptible animal population

Animal species	Category of animals	Population	
		holding	animal
Cattle (bovine animals)	Cattle (bovine animals)	118,453	878,000
Gallus gallus (fowl)	Gallus gallus (fowl)		16,232,000
Pigs	Pigs	154,265	2,782,000
Sheep and goats	Sheep and goats		1,908,000

**DISEASE STATUS TABLES**

**DISEASE STATUS TABLES**

**PREVALENCE TABLES**

**Table Brucella:BRUCELLA in animal**

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling Details	Method	Sampling unit	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Cattle (bovine animals) - Farm - Not Available - Not Available - Surveillance - Official sampling - Census	N_A	Not Available	animal	52384 0	2	Brucella abortus	2
	Sheep and goats - Farm - Not Available - Not Available - Surveillance - Official sampling - Census	N_A	Not Available	animal	11981 15	0	Brucella melitensis	0

**Table FLAVIVIRUS in animal**

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Vaccination status	Sampling Details	Method	Total units tested	Total units positive	Zoonoses	N of units positive
Serbia	Corvids, unspecified - wild - Natural habitat - Not Available - Not Available - Monitoring - Official sampling - Objective sampling	animal	Not Available	N_A	Real-Time PCR (qualitative or quantitative)	365	31	West Nile virus	31
	Other animals - unspecified - Natural habitat - Not Available - Not Available - Monitoring - Official sampling - Objective sampling	animal	Not Available	N_A	Real-Time PCR (qualitative or quantitative)	802	98	West Nile virus	98
	Solipeds, domestic - horses - Farm - Not Available - Not Available - Monitoring - Official sampling - Objective sampling	animal	Not Available	N_A	IgM-capture ELISA (MAC-ELISA)	2511	44	West Nile virus	44



Table Lyssavirus:LYSSAVIRUS in animal

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling Details	Method	Sampling unit	Total units tested	Total units positive	Zoonoses	N of units positive
Serbia	Bats - Veterinary clinics - Not Available - Not Available - Clinical investigations - Official sampling - Suspect sampling	N_A	Not Available	animal	1	0	Lyssavirus	0
	Cats - Veterinary clinics - Not Available - Not Available - Clinical investigations - Official sampling - Suspect sampling	N_A	Not Available	animal	17	0	Lyssavirus	0
	Cattle (bovine animals) - Farm - Not Available - Not Available - Clinical investigations - Official sampling - Suspect sampling	N_A	Not Available	animal	1	0	Lyssavirus	0
	Dogs - Veterinary clinics - Not Available - Not Available - Clinical investigations - Official sampling - Suspect sampling	N_A	Not Available	animal	26	0	Lyssavirus	0
	Foxes - wild - Natural habitat - Not Available - Not Available - Clinical investigations - Official sampling - Suspect sampling	N_A	Not Available	animal	57	1	Lyssavirus	1
	Foxes - wild - Natural habitat - Not Available - Not Available - Monitoring - active - Official sampling - Objective sampling	N_A	Not Available	animal	1132	0	Lyssavirus	0
	Marten - wild - Natural habitat - Not Available - Not Available - Monitoring - active - Official sampling - Objective sampling	N_A	Not Available	animal	23	0	Lyssavirus	0
	Other carnivores - wild - Natural habitat - Not Available - Not Available - Clinical investigations - Official sampling - Suspect sampling	N_A	Not Available	animal	13	0	Lyssavirus	0
	Other carnivores - wild - Natural habitat - Not Available - Not Available - Monitoring - active - Official sampling - Objective sampling	N_A	Not Available	animal	330	0	Lyssavirus	0
	Rats - Natural habitat - Not Available - Not Available - Clinical investigations - Official sampling - Suspect sampling	N_A	Not Available	animal	1	0	Lyssavirus	0
	Wolves - wild - Natural habitat - Not Available - Not Available - Monitoring - active - Official sampling - Objective sampling	N_A	Not Available	animal	3	0	Lyssavirus	0

**Table Mycobacterium:MYCOBACTERIUM in animal**

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling Details	Method	Sampling unit	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Cattle (bovine animals) - Farm - Not Available - Not Available - Surveillance - Official sampling - Census	N.A	Skin test	animal	91965 5	17	Mycobacterium bovis	17

## FOODBORNE OUTBREAKS TABLES

### Foodborne Outbreaks: summarized data

Causative agent	Food vehicle	Outbreak strenght			
		N outbreaks	N human cases	N hospitalized	N deaths
Campylobacter	Meat and meat products	1	2	0	0
Salmonella	Other or mixed red meat and products thereof	1	2	0	0
	Other, mixed or unspecified poultry meat and products thereof	2	17	2	0
Salmonella Enteritidis	Eggs and egg products	25	168	63	0
	Other, mixed or unspecified poultry meat and products thereof	3	27	6	0
	Fruit, berries and juices and other products thereof	1	6	1	0
	Mixed food	1	49	0	0
	Unknown	19	210	25	0
Salmonella group B	Mixed food	1	28	13	0
Salmonella Mbandaka	Eggs and egg products	1	8	0	0
Staphylococcus aureus	Pig meat and products thereof	1	14	0	0
	Other, mixed or unspecified poultry meat and products thereof	1	3	2	0
	Mixed food	4	28	1	0

## Strong Foodborne Outbreaks: detailed data

Causative agent	Other Causative Agent	FBO nat. code	Outbreak type	Food vehicle	More food vehicle info	Nature of evidence	Setting	Place of origin of problem	Origin of food vehicle	Contributory factors	Comment	N outbreaks	N human cases	N hosp.	N deaths
Campylobacter	Not Available	N_A	Household	Meat and meat products	N_A	Descriptive epidemiological evidence	Household	Not Available	Not Available	Unknown	N_A	1	2	0	0
Salmonella	Not Available	N_A	Household	Other or mixed red meat and products thereof	N_A	Descriptive epidemiological evidence	Household	Not Available	Not Available	Unknown	N_A	1	2	0	0
				Other, mixed or unspecified poultry meat and products thereof	N_A	Descriptive epidemiological evidence	Household	Not Available	Not Available	Unknown	N_A	2	17	2	0
Salmonella Enteritidis	Not Available	N_A	General	Eggs and egg products	Cake	Descriptive epidemiological evidence	Canteen or workplace catering	Not Available	Not Available	Inadequate heat treatment	N_A	1	11	1	0
					Undercooked /raw eggs	Descriptive epidemiological evidence	Restaurant or Cafe or Pub or Bar or Hotel or Catering service	Not Available	Not Available	Inadequate heat treatment	N_A	1	8	4	0
				Other, mixed or unspecified poultry meat and products thereof	N_A	Descriptive epidemiological evidence	Residential institution (nursing home or prison or boarding school)	Not Available	Not Available	Unknown	N_A	1	10	1	0
							School or kindergarten	Not Available	Not Available	Unknown	N_A	1	15	3	0
				Mixed food	N_A	Descriptive epidemiological evidence	School or kindergarten	Not Available	Not Available	Unknown	N_A	1	49	0	0
				Unknown	N_A	Descriptive epidemiological evidence	Canteen or workplace catering	Not Available	Not Available	Unknown	N_A	1	27	1	0

Causative agent	Other Causative Agent	FBO nat. code	Outbreak type	Food vehicle	More food vehicle info	Nature of evidence	Setting	Place of origin of problem	Origin of food vehicle	Contributory factors	Comment	N outbreaks	N human cases	N hosp.	N deaths										
Salmonella Enteritidis	Not Available	N_A	General	Unknown	N_A	Descriptive epidemiological evidence	Restaurant or Cafe or Pub or Bar or Hotel or Catering service	Not Available	Not Available	Unknown	N_A	1	8	3	0										
							School or kindergarten	Not Available	Not Available	Unknown	N_A	4	105	1	0										
			Household	Eggs and egg products	Homemade cake	Descriptive epidemiological evidence	Household	Not Available	Not Available	Inadequate heat treatment	N_A	N_A	N_A	N_A	14	101	23	0							
															Homemade icecream	Descriptive epidemiological evidence	Household	Not Available	Not Available	Unprocessed contaminated ingredient	N_A	1	6	6	0
															Homemade mayonnaise	Descriptive epidemiological evidence	Household	Not Available	Not Available	Unprocessed contaminated ingredient	N_A	2	27	20	0
															Undercooked /raw eggs	Descriptive epidemiological evidence	Household	Not Available	Not Available	Inadequate heat treatment	N_A	6	15	9	0
															Other, mixed or unspecified poultry meat and products thereof	N_A	Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans	Household	Not Available	Not Available	Infected food handler	N_A	1	2	2
			Fruit, berries and juices and other products thereof	Contaminated plums	Descriptive epidemiological evidence	Household	Not Available	Not Available	Cross-contamination	N_A	1	6	1	0											
Unknown	N_A	Descriptive epidemiological evidence	Household	Not Available	Not Available	Unknown	N_A	13	70	20	0														
Salmonella group B	Not Available	N_A	General	Mixed food	Sandwiches with ham or chicken, with mayonnaise and other ingredients	Descriptive epidemiological evidence	Take-away or fast-food outlet	Not Available	Not Available	Unknown	N_A	1	28	13	0										
Salmonella Mbandaka	Not Available	N_A	Household	Eggs and egg products	Homemade cake	Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans	Household	Not Available	Not Available	Inadequate heat treatment	N_A	1	8	0	0										

Causative agent	Other Causative Agent	FBO nat. code	Outbreak type	Food vehicle	More food vehicle info	Nature of evidence	Setting	Place of origin of problem	Origin of food vehicle	Contributory factors	Comment	N outbreaks	N human cases	N hosp.	N deaths	
Staphylococcus aureus	Not Available	N_A	General	Other, mixed or unspecified poultry meat and products thereof	Chicken salad	Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans	Take-away or fast-food outlet	Not Available	Not Available	Infected food handler	N_A	1	3	2	0	
					Mixed food	N_A	Descriptive epidemiological evidence	Canteen or workplace catering	Not Available	Not Available	Storage time/temperature abuse	N_A	2	14	0	0
					Sandwiches with different meat and other ingredients	Descriptive epidemiological evidence	Take-away or fast-food outlet	Not Available	Not Available	Infected food handler	N_A	1	9	0	0	
			Household	Pig meat and products thereof	Barbique	Descriptive epidemiological evidence	Household	Not Available	Not Available	Storage time/temperature abuse	N_A	1	14	0	0	
				Mixed food	N_A	Descriptive epidemiological evidence	Household	Not Available	Not Available	Storage time/temperature abuse	N_A	1	5	1	0	

## Weak Foodborne Outbreaks: detailed data

No data returned for this view. This might be because the applied filter excludes all data.

**ANTIMICROBIAL RESISTANCE TABLES FOR CAMPYLOBACTER**



**ANTIMICROBIAL RESISTANCE TABLES FOR SALMONELLA**

**ANTIMICROBIAL RESISTANCE TABLES FOR INDICATOR ESCHERICHIA COLI**

**OTHER ANTIMICROBIAL RESISTANCE TABLES**

**Specific monitoring of ESBL-/AmpC-/carbapenemase-producing bacteria and specific monitoring of carbapenemase-producing bacteria, in the absence of isolate detected**

No data returned for this view. This might be because the applied filter excludes all data.

**Specific monitoring of ESBL-/AmpC-/carbapenemase-producing bacteria and specific monitoring of carbapenemase-producing bacteria, in the absence of isolate detected**

## Latest Transmission set

<b>Table Name</b>	<b>Last submitted dataset transmission date</b>
Animal Population	26-Jul-2019
Food Borne Outbreaks	26-Jul-2019
Prevalence	26-Jul-2019

# Serbia, Text Forms 2018

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### 1. Institutions and Laboratories involved in zoonoses monitoring and reporting

Veterinary Directorate, Ministry of Agriculture, Forestry and Water management is responsible for reporting the data to EFSA. Collections of most zoonoses data reported in 2018 are going through Central data base of Veterinary Directorate. Some data are collect manually and that process goes though Veterinary Institutes who are involved in the process of laboratory testing.

Ten Veterinary Specialized Institutes and two Scientific Veterinary Institutes, on the basis of territorial jurisdiction (in epizootiological area for which they are established) cover the whole territory of the Republic of Serbia, continuously involved in prevention, early detection, monitoring and control of animal diseases and in collection of data on zoonozes. Some of the Institutes are National reference laboratories

for some diseases, depending on causative agents.

Veterinary Institutes:

Veterinary Specialized Institute "Subotica", Veterinary Specialized Institute "Sombor", Veterinary Specialized Institute "Šabac", Veterinary Specialized Institute "Zrenjanin", Veterinary Specialized Institute "Pančevo", Veterinary Specialized Institute "Jagodina", Veterinary Specialized Institute "Požarevac", Veterinary Specialized Institute "Zaječar", Veterinary Specialized Institute "Kraljevo", Veterinary Specialized Institute "Niš", Scientific Veterinary Institute "Novi Sad" and Scientific Institute of Veterinary Medicine of Serbia and Pasteur Institute in Novi Sad.

Data for food borne outbreaks are collecting by: Institute of Public Health of Serbia „Dr Milan Jovanovic Batut", District Institutes of Public Health, reference laboratories for zoonotic diseases (a number of different laboratories in institutes of public health, Institute of Virology, Vaccines and Sera "Torlak" Belgrade, Medical faculty in Belgrade, Clinical Center of Serbia, Pasteur Institute in Novi Sad, Institute for medical research Belgrade, Institute "INEP" Zemun), hospitals, primary health care institutions and other medical institutions in accordance with Law for protection of the population against communicable diseases.

FBOs are investigated at district level by epidemiology team of district public health Institutes. Laboratory tests are provided by either microbiological laboratories of district institutes or by reference laboratories for different agents. Institute of Public Health of Serbia aggregates all reported data, analyses and disseminates reports on weekly, monthly and annual basis to all relevant public health authorities/partners.

## 2. Animal population

### 1. Sources of information and the date(s) (months, years) the information relates to

Source of data on animal population is Statistical Office of the Republic of Serbia. Data are for 2018.

Source of data of animal holdings is Central data base of Veterinary Directorate, Ministry of Agriculture, Forestry and Water management.

### 2. Definitions used for different types of animals, herds, flocks and holdings as well as the production types covered

Number of herds for cattle, pigs and sheep and goats are the same as number of holdings. One herd is considered as one holding.



### 3. General evaluation: *Mycobacterium tuberculosis* complex (MTC) in animal - Cattle (bovine animals)

#### 1. History of the disease and/or infection in the country

Serbia is not recognized as country officially tuberculosis free according to Directive 64/432/EEC

### 4. General evaluation: *Brucella abortus* in animal - Cattle (bovine animals)

#### 1. History of the disease and/or infection in the country

Serbia is not recognized as country officially bovine brucellosis free according to Directive 64/432/EEC.

### 5. General evaluation: *Brucella melitensis* in animal - Sheep and goats

#### 1. History of the disease and/or infection in the country

Serbia is not recognized as country officially ovine/caprine brucellosis free.

### 6. General evaluation\*: *Salmonella* in humans

#### 1. History of the disease and/or infection in the country<sup>(a)</sup>

The most frequent zoonotic agent in humans.

#### 2. Evaluation of status, trends and relevance as a source for humans

Total number of reported cases was 1641 in 2018. Out of that number, 523 were reported in outbreaks, and 460 were *Salmonella enteritidis*. Annual notification rate for 2018 was 23.4. Decreasing trend of reported cases during last decade.

### 7. General evaluation\*: *Campylobacter* in humans

#### 1. History of the disease and/or infection in the country<sup>(a)</sup>

Reported from 20 out of 25 districts. More frequent in northern parts of the country.

#### 2. Evaluation of status, trends and relevance as a source for humans

Total number of reported cases was 567 in 2018. One outbreak (household). Annual notification rate for 2018 was 8.1. Increasing trend of reported cases during last decade.

### **8. General evaluation\*: Anthrax in humans**

#### **1. History of the disease and/or infection in the country<sup>(a)</sup>**

8 human cases in 10 years, no deaths reported

### **9. General evaluation\*: Leptospirosis in humans**

#### **1. History of the disease and/or infection in the country<sup>(a)</sup>**

16 cases, two deaths.

#### **2. Evaluation of status, trends and relevance as a source for humans**

Increasing trend of the notification rate over the last decade.

### **10. General evaluation\*: Trichinellosis in humans**

#### **1. History of the disease and/or infection in the country<sup>(a)</sup>**

11 human cases, no deaths. 6 cases linked to outbreaks from surrounding territories. No outbreaks in Serbia last year. 5 sporadic cases in which, despite epidemiological investigations, no additional cases were detected.

#### **2. Evaluation of status, trends and relevance as a source for humans**

Decreasing trend.

### **11. General evaluation\*: Echinococcosis in humans**

#### **1. History of the disease and/or infection in the country<sup>(a)</sup>**

64 cases in 2018, no deaths reported.

#### **2. Evaluation of status, trends and relevance as a source for humans**

Increasing trend of the notification rate.

### **12. General evaluation\*: Brucellosis in humans**

#### **1. History of the disease and/or infection in the country<sup>(a)</sup>**

4 human cases last year.

#### **2. Evaluation of status, trends and relevance as a source for humans**

Notification rate varies from year to year. Overall, increasing trend of the notification rate during last 10 years.

### **13. General evaluation\*: Toxoplasmosis in humans**

<b>1. History of the disease and/or infection in the country<sup>(a)</sup></b>
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112 reported cases in 2018.
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<b>14. General evaluation*: Q fever in humans</b>
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<b>1. History of the disease and/or infection in the country<sup>(a)</sup></b>
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8 human cases last year, no deaths reported.
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<b>2. Evaluation of status, trends and relevance as a source for humans</b>
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During the last decade most reports came from four subnational territories. In other regions rarely diagnosed. Significantly higher incidence rates recorded in 2012 and 2013;
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<b>15. General evaluation*: Tularemia in humans</b>
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<b>1. History of the disease and/or infection in the country<sup>(a)</sup></b>
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12 cases in 2018.
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<b>2. Evaluation of status, trends and relevance as a source for humans</b>
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Outbreaks in 2014 and 2015.
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**16. Description of Monitoring/Surveillance/Control programmes system:  
*Mycobacterium tuberculosis* complex (MTC) in animal - Cattle (bovine animals)**

**1. Monitoring/Surveillance/Control programmes system**

With the purpose of early detection of tuberculosis and determining the status of a farm a free from tuberculosis, diagnostic tests of all bovine animals older than 6 weeks are performed by application of intradermal tuberculin tests. Tuberculin skin test is performed by authorized veterinary organizations. Skin fold thickness on each spot of application is measured again 72 hours (4 hours) after application, and measured value is registered in the records. All slaughtered bovine animals and pigs are tested for presence of post-mortem lesions typical for tuberculosis. In case changes on internal organs (lungs, lymph nodes, bones, etc.) typical for tuberculosis are noticed during the inspection at a slaughterhouse, samples taken from slaughtered animals are to be delivered to authorized laboratory for tuberculosis for further tests. Slaughterhouse prepares separate report on every determined case of tuberculosis in bovine animals and pigs and notifies the veterinary inspector on the place of origin of infected animal. With the purpose of determining the greatest possible number of infected animals in the herd, epidemiological unit or area, apart from tuberculin tests, gamma-interferon test can also be used in the manner prescribed in the last edition of OIE Manual of Standards for Diagnostic Tests and Vaccines.

Bovine animals are subject to diagnostic tests once a year. Bovine animals are tested for tuberculosis whereas period since previous test must not be less than 6 and more than 12 months.

**Case definition**

According the Rulebook laying down establishing measures for early detection, diagnostics, prevention of spread, control and eradication of infective disease bovine tuberculosis, methods of their enforcement, including method for establishing status of holding free of bovine tuberculosis (Official Gazette RS, number 51/09) Confirmed case of bovine tuberculosis is confirmation of disease, if one of the following conditions is met:

- 1) diagnostic method of intra-dermal tuberculin application had established positive reaction;
- 2) laboratory testing of secretions, excretions or tissues establishes existence of bovine tuberculosis cause (*Mycobacterium bovis* or other micro-bacteria species belonging to M. Tuberculosis complex);
- 3) pathoanatomical examination establishes pathomorphological changes specific for tuberculosis, and laboratory testing establishes existence of bovine tuberculosis cause (*Mycobacterium bovis* or other micro-bacteria species belonging to M. Tuberculosis complex);
- 4) veterinary-hygiene examination on slaughtering establishes pathomorphological changes specific for tuberculosis, and laboratory testing establishes existence of bovine tuberculosis cause (*Mycobacterium bovis* or other micro-bacteria species belonging to M. Tuberculosis complex).

**2. Measures in place**

Cattle where tuberculosis was confirmed shall not be treated. Animals with confirmed tuberculosis are dispatched as soon as possible and within 30 days at the latest to a slaughterhouse by the competent veterinary inspector. In case the animals cannot be dispatched to slaughter, inspector may approve their killing in welfare manner.

**3. Notification system in place to the national competent authority**

Yes

## 17. Description of Monitoring/Surveillance/Control programmes system\*: *Brucella abortus* in animal - Cattle (bovine animals)

### 1. Monitoring/Surveillance/Control programmes system

Diagnostic tests of bovine animals, except fattening bulls, are performed in all animals older than 12 months. Competent scientific and specialist veterinary institutes perform diagnostic tests of properly labelled samples of blood serum of bovine animals by application of fast methods (fast serum agglutination, that is, Rose Bengal test or fluorescence polarization) and in case of positive test result, by application of confirmation serological method (indirect ELISA). In case of positive test results, sampling is repeated with the presence of epidemiologist and veterinary inspector and confirmation tests for presence of specific antibodies against *Brucella* by serological method (competitive ELISA or RVK) are performed at competent veterinary institute. Bovine animals with confirmed infection by brucellosis are immediately, or within 7 days at the latest, slaughtered in welfare manner, with the presence of veterinary inspector, and the carcasses are disposed in proper manner. Upon implementation of measures state above, repeated tests shall be performed in all seronegative bovine animals two times at an interval of 30 days, to determine the spread of the disease.

#### *Type of specimen taken*

The identification of the bovine *Brucella* by modified acid-fast or immune specific staining of organisms of *Brucella* morphology in abortion material, vaginal discharge or milk provides a credible evidence of brucellosis, especially in conjunction with immunological testing. The methods of polymerase chain reaction may be used as additional diagnostic tool for identifying the virus. When possible, *Brucella* spp. Shall be isolated by application of simple or selective media; by cultivating the discharge from uterus, aborted fetuses, secrete from udder or tissues such as lymphatic glands and reproductive male and female organs. After isolation, the species and biovar should be identified by phagelysis, oxidative metabolism tests, cultural, biochemical and serological criteria. Polymerase chain reaction may serve as an additional method and as biotype method based on genomic sequences. The techniques and media used, their standardization and the interpretation of results must conform to that specified in the OIE Manual of Standards for Diagnostic Tests and Vaccines for Terrestrial Animals.

### 2. Measures in place

#### *Measures in case of the positive findings or single cases*

In case brucellosis is suspected, the veterinary inspector shall immediately order taking of blood samples and diagnostic testing in order to confirm or rule out the presence of brucellosis in the herd. In case the contagious disease of bovine brucellosis is suspected the following measures shall be taken:

1. The herd shall be put under surveillance;
2. A ban shall be placed on introducing new animals into the herd or placing animals from the herd on the market, with the exception of situations where animals must be sent for emergency slaughter;
3. Separation and isolation within the herd, of animals suspected to have brucellosis;
4. A ban shall be placed on insemination and natural mating of animals suspected to have brucellosis;
5. A ban shall be placed on using the milk from cows suspected to have brucellosis; Measures provided above shall be applied until official confirmation of bovine brucellosis is ruled out in a herd. When bovine brucellosis has been officially confirmed in a herd, the veterinary inspector, in addition to the above measures, orders the following measures for prevention of spreading and control of disease on the infected holding:
  1. Separation and isolation of animals officially confirmed to have brucellosis and animals those were in contact with infected animals;
  2. Killing of infected animals and harmless disposal of carcasses under the supervision of the veterinary inspector within 7 days;
  3. Immediate diagnostic testing for brucellosis of all susceptible animals on the holding;
  4. Prohibition of use of milk from all diseased cows from the infected herd;
  5. Urgent harmless disposal and destruction of aborted fetuses, stillborn calves, and calves died of

Brucellosis after calving, as well as placentas, unless they are intended for diagnostic examination;  
 6. Disinfection and harmless disposal of hay, manure and upper layers of ground, as well as other objects that have come in contact with the infected animal, placentas or other infected material;  
 7. Packing or disinfection and disposal of manure from the infected objects at a site inaccessible to animals. Disinfection of liquid feces of infected animals and prohibition of using manure as a fertilizer for at least three weeks.

*Vaccination policy*

Bovine animals shall not be vaccinated against brucellosis.

**3. Notification system in place to the national competent authority**

Yes

**18. Description of Monitoring/Surveillance/Control programmes system: *Brucella melitensis* in animal - Sheep and goats**

**1. Monitoring/Surveillance/Control programmes system**

Diagnostic tests of sheep and goats are performed in all animals older than six months. Competent scientific and specialist veterinary institutes perform diagnostic tests of properly labelled samples of blood serum of sheep and goats by application of fast methods (fast serum agglutination, that is, Rose Bengal test or fluorescence polarization) and in case of positive test result, by application of confirmation serological method (indirect ELISA). Samples taken from rams are specially labelled. All stud rams are tested for infection by *B. ovis* (Epididymitis). In case of positive test results, sampling is repeated with the presence of epidemiologist and veterinary inspector and confirmation tests for presence of specific antibodies against *Brucella* by serological method (competitive ELISA or RVK) are performed at competent veterinary institute. Sheep and goats with confirmed infection by brucellosis are immediately, or within 7 days at the latest, slaughtered humanely, with the presence of veterinary inspector, and the carcasses are disposed in proper manner. Upon implementation of measures stated in the paragraph 7 of this section, repeated tests shall be performed in all seronegative sheep and goats two times at an interval of 30 days, to determine the spread of the disease.

Sheep and goats are subject to diagnostic tests one a year. Sheep and goats are tested for brucellosis, whereas period since previous test must not be less than 6 and more than 12 months.

**2. Measures in place**

When brucellosis in sheep and goat has been officially confirmed in a herd, the veterinary inspector orders the following measures for prevention of spreading and control of disease on the infected holding:

1. Separation and isolation of animals officially confirmed to have brucellosis and animals those were in contact with infected animals;
2. Killing of infected animals and harmless disposal of carcasses under the supervision of the veterinary inspector;
3. Slaughter or killing all seronegative animals in the positive herd.
4. Immediate diagnostic testing for brucellosis of all susceptible animals on the holding;
5. Disinfection and harmless disposal of hay, manure and upper layers of ground, as well as other objects that have come in contact with the infected animal, placentas or other infected material;
6. Packing or disinfection and disposal of manure from the infected objects at a site inaccessible to

animals.

**3. Notification system in place to the national competent authority**

Yes

**19. Description of Monitoring/Surveillance/Control programmes system:  
Lyssavirus (rabies) in animal - All animals**

**1. Monitoring/Surveillance/Control programmes system**

Lyssavirus (rabies) - general evaluation

History of the disease and/or infection in the country

The number of rabies cases in Serbia has been relatively high and was increasing at the beginning of 21st century. In period 2000 2009 approximately 160 to 200 cases per year was notified in the country, registered via passive surveillance. Mandatory notification and investigation of every rabies suspected animal, wild or domestic, is introduced in former SFRJ legislation and is presently implemented with no interruption. Serbia has started to adopt European standards in veterinary policies and legislation in 2005 when the Serbian Parliament adopted the Law on Veterinary Matters (Official Gazette of RS No. 91/2005). This law was further amended (Official Gazette of RS No 91/05, 30/2010, 93/2012). In accordance with the Veterinary Law, notification of animal disease including rabies is compulsory, also permanent identification and registration of dogs and issuing of Dog passport is mandatory. The Minister/Ministry of Agriculture for each year has adopted an annual Rulebook on establishing Program of Animal Health Protection Measures. In line with the Program of Measures of 2010, the oral rabies vaccination of foxes and other wild carnivores has been initiated for the first time in 2010. In every consecutive year, legal base for ORV was ensured in the Program of measures as well as resources for its implementation and monitoring of its effectiveness. At the same year, the Strategy and operational multi annual action plan for eradication, control and monitoring of rabies was developed and officially adopted. The Strategy is based on the Serbian veterinary legislation, which is harmonised with the EU Acquis and is in compliance with the recommendations of the OIE Terrestrial Animal Health Code, OIE Manual of Standards for Diagnostic Tests and Vaccines for Terrestrial Animals. Thus in 2010, Veterinary Directorate has started multiannual project of oral rabies vaccination of wild carnivore animals (e.g. foxes), as support of long-term program of eradication of rabies in Serbia, co-funded by the EU.

Fox population act as a reservoir for rabies and presents a permanent risk for transmission to humans, either directly or via domestic carnivores. Results from the oral rabies vaccination campaigns are very positive as they led to a dramatic and non-interrupted decrease of the disease incidence. During the recent years the number of the detected positive cases remained under five cases. In the calendar years 2013 we have 5 cases, in 2014 - 3, in 2015 - 3, in 2016 – 4, in 2017 – 1 and in the 2018 just 1 positive case have been detected in wild foxes for the whole territory of the country. Oral rabies vaccine Lysvulpen CZ and Fuchsoral DE are used in Serbia. The oral rabies vaccination campaign is to continue in 2019.

*Sampling strategy*

Passive surveillance of dead foxes and all susceptible species (suspect animals as well as road kills) in the whole territory of the country and active monitoring to control the effectiveness of oral vaccination in the vaccinated area.

In the dedicated period of the year in a definite number of shot wild animals/foxes and jackals: sampling period starts 21 days after the completion of each vaccination campaign and the minimum number of foxes is sampled is 4 animals/100 km<sup>2</sup> per year

Whole fox carcasses are submitted to the veterinary laboratory by hunters in the framework of Plan of

monitoring of ORV. Transversal tooth section is performed to detect presence of tetracycline, and ELISA test is carried out to detect antibodies from the samples.  
Whole carcasses of healthy shot foxes, suspect foxes or suspect animals of other species are submitted to the laboratory. Brain tissue sample is taken in the laboratory from all categories. Mandible and other sample are taken in the laboratory from foxes/jackals shot in the framework of monitoring of effectiveness of ORV.

The whole territory of Serbia excluding the urban settlements, main roads and water areas are designated for ORV, app. 73 000 km. Two vaccination campaigns per year (spring and autumn)

## 2. Measures in place

Rulebook on establishing the measures for early detection, diagnostics, spreading prevention, suppression, and eradication of the Rabies, and the manner of their implementation (Official Gazette RS No78/09)

Tracing human contacts, animal contacts. Obligatory vaccination of dogs and cats, and farm animals upon the decision of the veterinary authority.

All positive cases shall be reported to the human health service according to national legislation. Decision about immunization of a person in contact with a rabies positive animal is the competence of the human health authorities.

## 3. Notification system in place to the national competent authority

Yes

## 20. Description of Monitoring/Surveillance/Control programmes system: Lyssavirus (rabies) in animal - Dogs

### 1. Monitoring/Surveillance/Control programmes system<sup>(a)</sup>

In case of dogs and other domestic animals, only suspect animals are sampled. In cases of suspicion of rabies, epizootiological investigation and clinical examination of the animal shall be performed in order to establish whether the suspicion is justified. If it is established that the suspicion was justified, head or carcass of the animal shall be sent to an accredited laboratory for examination. When clinically healthy dogs or cats, vaccinated against rabies, injure people, these dogs or cats must be put immediately under control for ten days. During the control, three clinical examinations shall be carried out, on the first, fifth, and tenth day. The animal is considered infected with rabies if laboratory examination with the fluorescence method or the biological experiment on white mice confirms rabies. The biological experiment on white mice is carried out in the following cases:

- 1) If a human came into contact with the animal under suspicion of rabies infection, and the results obtained with fluorescence method are negative or suspicious,
- 2) When it is first confirmation of rabies in one animal species on a territory of a municipality,
- 3) In other justified cases

Passive surveillance sampling and investigations only in case of suspicion.



Types of specimens taken are whole carcass or head/ brain tissue and are submitted to the laboratory. Brain tissue sample is taken in the laboratory.

#### Case definition

According Rulebook on establishing the measures for early detection, diagnostics, spreading prevention, suppression, and eradication of the rabies infectious disease, and the manner of their implementation (Official Gazette of the Republic of Serbia no.78/09) case definition is define as:

- Case of rabies is a case when rabies is established and confirmed in a virusologic examination performed by a competent accredited laboratory.
- Suspected case of rabies is a case when the results of clinical examination and epizootiological investigation indicate that there is a danger of rabies, up to obtaining a confirmation from a competent accredited laboratory

#### Investigations of the human contacts with positive cases

All positive cases shall be reported to the human health service according to national legislation. Decision about immunization of a person in contact with a rabies positive animal is the competence of the human health authorities

#### Vaccination policy

Dogs and cats older than three months must be vaccinated once a year by inactivated vaccine against rabies, in accordance with manufacturer's instructions. Vaccination of dogs younger than three months may be performed provided there are justified reasons for such procedure, also in accordance with the manufacturer's instructions. Oral vaccination of foxes and other wild carnivores is performed twice a year, in spring and autumn, within the project of rabies eradication supported by European Union. Vaccines are distributed via planes or helicopters, or manually in some areas where aerial vaccination cannot be completed.

## **2. Measures in place**

*Rulebook on establishing the measures for early detection, diagnostics, spreading prevention, suppression, and eradication of the Rabies, and the manner of their implementation (Official Gazette RS No78/09)*

Tracing human contacts, animal contacts. Obligatory vaccination of dogs and cats, and farm animals upon the decision of the veterinary authority.

All positive cases shall be reported to the human health service according to national legislation. Decision about immunization of a person in contact with a rabies positive animal is the competence of the human health authorities.

## **3. Notification system in place to the national competent authority<sup>(c)</sup>**

Yes

## 21. Description of Monitoring/Surveillance/Control programmes system: West Nile Virus

### 1. Monitoring/Surveillance/Control programmes system

#### 1. Active surveillance:

- serological examination of selected horses (indicator of an individual animal selected by random selection for monitoring purposes from a specific area at a particular time during which the presence of IgM antibodies in the blood serum sample will be examined as evidence of an acute-recent infection of WNV);
- testing the presence of viruses in samples of mosquitos (especially the type of *Culex pipiens*, which in over 99% of cases proved to be the most common vector of WNV virus in our region) caught with special traps during the year with the highest vector activity;
- by examining the presence of viruses in specimens of killed or planned shoots of wild bird species or in swabs from live captive wildlife species during the year or during the year with the highest vector activity.

#### 2. Passive surveillance:

Serologic (serum vapor test) and virological examination of horses with signs of disorders of the central nervous system.

The distribution and selection of the sampling site shall be performed by the epizootic service of the veterinary institute for its epizootiological area, based on the risk assessment of exposure to the WNV virus, taking into account:

- 1) the existing results of serological and viral tests;
- 2) the presence of areas suitable for the development of mosquitoes (ponds, rivers, watercourses, canals and the like);
- 3) populated areas where human cases of disease are registered.

Based on the previous knowledge about the presence and circulation of the virus in the Republic of Serbia (human cases of diseases in 2013, 2014, 2015, 2016 and 2017 and the findings of the WNV in mosquitoes and wild birds), division of the area was carried out, in administrative districts, in relation to the risk of occurrence of a WNV infection (low risk and high risk area), also determinate the number of all type of samples which should be taken.

Serological tests were conducted using the ELISA test

Virusological tests were carried out using molecular methods (real-time RT-PCR or RT-PCR)

## 22. Food-borne Outbreaks

### 1. System in place for identification, epidemiological investigations and reporting of food-borne outbreaks

Reporting of foodborne outbreaks in Serbia is regulated by the Law on Protection of the Population from Communicable Diseases (OG RS No.125/04 No 15/2016) and the Rulebook on reporting of Communicable Diseases or other cases laid down by the Law on Protection of the Population from Communicable Diseases (OG RS No. 98/05, 44/2017).

According to the above-mentioned regulations each foodborne outbreak (FBO) is reported to the Center for Prevention and Control of Communicable Diseases of the Institute of Public Health of Serbia by Public Health Institute at district level, immediately when the outbreak occurs and is identified.

FBOs are investigated at district level by epidemiology teams of district public health institute. They also cooperate with and notify sanitary and veterinary inspection (if food of animal origin is suspected to be a source of an outbreak). This approach also enables environmental analysis (inspection of food facilities) and taking samples for laboratory investigation.

### 2. Description of the types of outbreaks covered by the reporting

54 food-borne outbreaks were caused by *Salmonella*, affecting 515 people. (49 *Salmonella* enteritidis, 1 *Salmonella* group B, 1 *Salmonella* mbandaka and 3 *Salmonella* spp.).

1 food-borne outbreak caused by *Campylobacter*, affecting 2 persons in one household.

6 food-borne outbreaks caused by *Staphylococcus aureus*, affecting 45 persons.

No deaths were reported in relation with food-borne outbreaks.

### 3. National evaluation of the reported outbreaks in the country

Most often food item suspected or confirmed as a source of food-borne outbreaks were eggs and food prepared with inadequately treated eggs (cakes, mayonnaise, ice-cream). Outbreaks caused by *staphylococcus aureus* were linked to consumption of mixed food, with red or poultry meat, and in most cases inadequate food storage practice was contributing factor. Majority of outbreaks were taking place in household settings. In only 3 out of 61 food-borne outbreaks causative agent was detected in both food and from ill persons. In all other outbreaks conclusions about food as a source of the infections was suggested by clinical and epidemiological investigations and by descriptive epidemiological evidence.

### 4. Descriptions of single outbreaks of special interest

There was no single food-borne outbreak of special interest last year. All outbreaks had common epidemiological and clinical characteristics.

### 5. Control measures or other actions taken to improve the situation

Education of population on safe practices regarding food preparation and storage, veterinary and phytosanitary measures related to food production, transport and trade, control of general hygiene and other conditions in food production, transport and trade, introduction and control of implementation of standards in food production and processing in all facilities where food is publicly served to the population (hotels, restaurants, cafes, schools and kindergartens, hospitals, residential facilities, canteens etc.). Early detection and treatment of persons infected by agents that could be transmitted by food, in particularly if they are involved in food production and processing.