

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 2019

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 2019.

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.

* 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 animal
Cattle (bovine animals)	Cattle (bovine animals)	898,000
Gallus gallus (fowl)	Gallus gallus (fowl)	15,780,000
Pigs	Pigs	2,903,000
Sheep and goats	Sheep and goats	1,833,000

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	52080 7	4	Brucella abortus	4
	Sheep and goats - Farm - Not Available - Not Available - Surveillance - Official sampling - Census	N_A	Not Available	animal	12951 54	6	Brucella melitensis	6

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)	585	15	West Nile virus	15
	Solipeds, domestic - horses - Farm - Not Available - Not Available - Monitoring - Official sampling - Objective sampling	animal	Not Available	N_A	IgM-capture ELISA (MAC-ELISA)	2477	12	West Nile virus	12

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	Cats - Veterinary clinics - Not Available - Not Available - Clinical investigations - Official sampling - Suspect sampling	N_A	Not Available	animal	19	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	32	0	Lyssavirus	0
	Foxes - wild - Natural habitat - Not Available - Not Available - Clinical investigations - Official sampling - Suspect sampling	N_A	Not Available	animal	22	0	Lyssavirus	0
	Foxes - wild - Natural habitat - Not Available - Not Available - Monitoring - active - Official sampling - Objective sampling	N_A	Not Available	animal	1107	0	Lyssavirus	0
	Marten - wild - Natural habitat - Not Available - Not Available - Monitoring - active - Official sampling - Objective sampling	N_A	Not Available	animal	30	0	Lyssavirus	0
	Other animals - wild - Natural habitat - Not Available - Not Available - Clinical investigations - Official sampling - Suspect sampling	N_A	Not Available	animal	2	0	Lyssavirus	0
	Other carnivores - wild - Natural habitat - Not Available - Not Available - Clinical investigations - Official sampling - Suspect sampling	N_A	Not Available	animal	21	0	Lyssavirus	0
	Other carnivores - wild - Natural habitat - Not Available - Not Available - Monitoring - active - Official sampling - Objective sampling	N_A	Not Available	animal	379	0	Lyssavirus	0
	Wild boars - Veterinary clinics - 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	1	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	911130	0	Mycobacterium	0

FOODBORNE OUTBREAKS TABLES

Foodborne Outbreaks: summarized data

when numbers referring to cases, hospitalized people and deaths are reported as unknown, they will be not included in the sum calculation

Causative agent	Food vehicle	Outbreak strenght		Strong				Weak			
		N outbreaks	N human cases	N hospitalized	N deaths	N outbreaks	N human cases	N hospitalized	N deaths		
Campylobacter	Broiler meat (Gallus gallus) and products thereof	1	2	0	0						
Escherichia coli	Other foods	1	4	1	0						
Francisella tularensis	Tap water, including well water	1	24	6	0						
Salmonella	Other foods	1	91	6	0						
Salmonella enterica subsp. enterica rough	Other foods					1	3	2	0		
	Meat and meat products	1	3	2	0						
Salmonella Enteritidis	Eggs and egg products	7	63	31	0						
	Other or mixed red meat and products thereof	1	19	0	0						
	Sweets and chocolate	2	18	0	0						
	Other foods	1	78	17	0						
	Mixed food	4	38	7	0						
	Buffet meals	1	71	5	0						
	Unknown					8	29	8	0		
Shigella flexneri	Dairy products (other than cheeses)	1	4	2	0						
	Eggs and egg products	1	6	2	0						
Staphylococcus aureus	Sweets and chocolate	1	7	3	0						
	Mixed food	1	21	0	0						
Trichinella	Pig meat and products thereof	2	27	8	0						

Strong Foodborne Outbreaks: detailed data

Causative agent	H	AG	VT	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	unk	Not Available	Not Available	Not Available	N_A	Household	Broiler meat (Gallus gallus) and products thereof	N_A	Descriptive epidemiological evidence	Household	Not Available	Not Available	Inadequate heat treatment	N_A	1	2	0	0
Escherichia coli	unk	Not Available	Not Available	Not Available	N_A	General	Other foods	N_A	Descriptive epidemiological evidence	Canteen or workplace catering	Not Available	Not Available	Cross-contamination	N_A	1	4	1	0
Francisella tularensis	unk	Not Available	Not Available	Not Available	N_A	General	Tap water, including well water	Local water supply system, no disinfection, contamination of water in reservoir	Descriptive epidemiological evidence	Others	Not Available	Not Available	Untreated drinking water	N_A	1	24	6	0
Salmonella	unk	Not Available	Not Available	Not Available	N_A	General	Other foods	N_A	Descriptive epidemiological evidence	Multiple places of exposure in one country	Not Available	Not Available	Cross-contamination	N_A	1	91	6	0
Salmonella enterica subsp. enterica rough	unk	Not Available	Not Available	Not Available	N_A	Household	Meat and meat products	N_A	Descriptive epidemiological evidence	Household	Not Available	Not Available	Inadequate heat treatment	N_A	1	3	2	0
Salmonella Enteritidis	unk	Not Available	Not Available	Not Available	N_A	General	Eggs and egg products	Homemade mayonaise	Analytical epidemiological evidence	Take-away or fast-food outlet	Not Available	Not Available	Inadequate heat treatment	N_A	1	40	25	0
							Other or mixed red meat and products thereof	N_A	Descriptive epidemiological evidence	Residential institution (nursing home or prison or boarding school)	Not Available	Not Available	Inadequate heat treatment	N_A	1	19	0	0
							Other foods	N_A	Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans	Restaurant or Cafe or Pub or Bar or Hotel or Catering service	Not Available	Not Available	Storage time/temperature abuse	N_A	1	78	17	0
							Mixed food	N_A	Descriptive epidemiological evidence	Canteen or workplace catering	Not Available	Not Available	Other contributory factor	N_A	1	6	3	0
											Restaurant or Cafe or Pub or Bar or Hotel or Catering service	Not Available	Not Available	Other contributory factor	N_A	1	14	2
										School or kindergarten	Not Available	Not Available	Other contributory factor	N_A	1	16	0	0

Causative agent	H	AG	VT	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.	deaths	
Salmonella Enteritidis	unk	Not Available	Not Available	Not Available	N_A	General	Buffet meals	N_A	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	71	5	0	
							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	Other contributory factor	N_A	2	7	4	0
									N_A	Descriptive epidemiological evidence	Household	Not Available	Not Available	Inadequate heat treatment	N_A	4	16	2	0
								Sweets and chocolate	Homemade cake	Descriptive epidemiological evidence	Household	Not Available	Not Available	Inadequate heat treatment	N_A	2	18	0	0
								Mixed food	N_A	Descriptive epidemiological evidence	Household	Not Available	Not Available	Other contributory factor	N_A	1	2	2	0
								Meat and meat products	N_A	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	3	3	0
Shigella flexneri	unk	Not Available	Not Available	Not Available	N_A	Household	Dairy products (other than cheeses)	N_A	Descriptive epidemiological evidence	Household	Not Available	Not Available	Storage time/temperature abuse	N_A	1	4	2	0	
							Eggs and egg products	N_A	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	6	2	0	
Staphylococcus aureus	unk	Not Available	Not Available	Not Available	N_A	General	Mixed food	N_A	Detection of causative agent in food vehicle or its component - Symptoms and onset of illness pathognomonic to causative agent	School or kindergarten	Not Available	Not Available	Storage time/temperature abuse	N_A	1	21	0	0	

Causative agent	H	AG	VT	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	unk	Not Available	Not Available	Not Available	N_A	Household	Sweets and chocolate	N_A	Descriptive epidemiological evidence	Household	Not Available	Not Available	Storage time/temperature abuse	N_A	1	7	3	0
Trichinella	unk	Not Available	Not Available	Not Available	N_A	Household	Pig 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	Other contributory factor	N_A	2	27	8	0

Weak Foodborne Outbreaks: detailed data

Causative agent	H	AG	VT	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 enterica subsp. enterica rough	unk	Not Available	Not Available	Not Available	N_A	General	Other foods	N_A	Descriptive epidemiological evidence	Others	Not Available	Not Available	Other contributory factor	N_A	1	3	2	0
Salmonella Enteritidis	unk	Not Available	Not Available	Not Available	N_A	Household	Unknown	N_A	Unknown	Household	Not Available	Not Available	Unknown	N_A	8	29	8	0

ANTIMICROBIAL RESISTANCE TABLES FOR CAMPYLOBACTER

ANTIMICROBIAL RESISTANCE TABLES FOR SALMONELLA

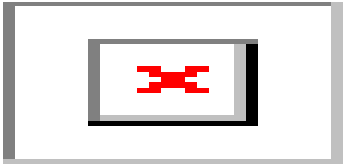
ANTIMICROBIAL RESISTANCE TABLES FOR INDICATOR ESCHERICHIA COLI

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

Table Name	Last submitted dataset transmission date
Animal Population	31-Aug-2020
Food Borne Outbreaks	31-Aug-2020
Prevalence	31-Aug-2020

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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 2019 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) covering the whole region of Republic of Serbia, continuously involved in preventing the occurrence, early detection, spread, monitoring and control of animal health situation also were involved in process of collecting the zoonoses data. Some of the Institute are National reference laboratory for some diseases, depending on causative agents.

Veterinary Institutes which are involved:

Veterinary Specialized Institutes "Subotica", Veterinary Specialized Institutes "Sombor", Veterinary Specialized Institutes "Šabac", Veterinary Specialized Institutes "Zrenjanin", Veterinary Specialized Institutes "Pančevo", Veterinary Specialized Institutes "Jagodina", Veterinary Specialized Institutes

“Požarevac”, Veterinary Specialized Institutes “Zaječar”, Veterinary Specialized Institutes “Kraljevo”, Veterinary Specialized Institutes “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 an 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, analyse and disseminate 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 2019.

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 consider 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^(a)

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 1275 in 2019. Out of that number, 416 were reported in outbreaks, and 279 were *Salmonella enteritidis*. Annual notification rate for 2019 was 18.3. 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^(a)

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 788 in 2019. One outbreak (household). Annual notification rate for 2019 was 11,3.
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^(a)**

No human cases in 2019 (8 human cases (only cutaneous form) in 10 years, no deaths reported)

9. General evaluation*: Leptospirosis in humans**1. History of the disease and/or infection in the country^(a)**

44 cases, no 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^(a)**

28 human cases, no deaths, in two outbreaks. Domestic pigs were found to be the source of the infection in both outbreaks.

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^(a)
30 cases in 2019, no deaths reported.
2. Evaluation of status, trends and relevance as a source for humans
Increasing trend of the notification rate over the last decade, though the number of cases in 2019 has decreased for 50% compared to the previous year

12. General evaluation*: Brucellosis in humans
1. History of the disease and/or infection in the country^(a)
2 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
1. History of the disease and/or infection in the country^(a)
72 reported cases in 2019.

14. General evaluation*: Q fever in humans
1. History of the disease and/or infection in the country^(a)
24 human cases in last year, no deaths reported.
2. Evaluation of status, trends and relevance as a source for humans
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;

15. General evaluation*: Tularemia in humans

1. History of the disease and/or infection in the country^(a)

28 cases in 2019.

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

There was a significant outbreak with 24 cases last year. Source of the infection was contaminated drinking water from a local water supply system.

**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 in 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 will be tested for presence of post-mortem lesions typical for tuberculosis. In case during the inspection at a slaughterhouse changes on internal organs (lungs, lymph nodes, bones, etc.) typical for tuberculosis are noticed, 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 one a year. Bovine animals are tested tuberculosis whereas period since previous test must not be less than 6 and more than 12 months.

Case definition

According the Rule book 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 the any rabies suspected animal, wild or domestic, is introduce 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, in 2018 just 1 positive case have been detected and in 2019 no case has 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 km² 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^(a)

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 plains 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^(c)

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);
- 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, 2017 and 2018 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 after the outbreak is detected.

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

28 food-borne outbreaks were caused by *Salmonella*, affecting 319 people. (25 Salmonella enteritidis).

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

2 food-borne outbreaks caused by *Staphylococcus aureus*, affecting 28 persons.

There were 2 outbreaks caused by *Trichinella*, with 27 cases in total.

In two food-borne outbreaks causative agent was *Shigella flexneri*, and 10 persons in total were infected.

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 9 out of 46 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.