ZOONOSES MONITORING

Republic of North Macedonia

TRENDS AND SOURCES OF ZOONOSES AND ZOONOTIC AGENTS IN FOODSTUFFS, ANIMALS AND FEEDINGSTUFFS

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

IN 2021

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 Republic of North Macedonia during the year 2021.

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

		Population			
Animal species	**Category of animals**	**holding**	**animal**	**slaughter animal (heads)**	**herd/flock**
All animals	All animals - zoo animals		801		
Alpacas	Alpacas - zoo animals		4		
Antelopes	Antelopes - zoo animal - oryx		1		
Barbary sheep	Barbary sheep - zoo animal		12		
Bears	Bears - zoo animal		6		
Bee-colonies	Bee-colonies	11,075			
Birds	Birds - zoo animal		370		
Bison	Bison - zoo animals		2		
Buffalos	Buffalos - zoo animal		1		
Camels	Camels - zoo animals		2		
Cats	Cats - pet animals		5,720		
Cattle (bovine animals)	Cattle (bovine animals)	14,889	144,788	6,547	
	Cattle (bovine animals) - adult cattle over 2 years		84,387	2,903	
	Cattle (bovine animals) - breeding bulls		6,314		
	Cattle (bovine animals) - calves (under or around 1 year)		37,804	630	
	Cattle (bovine animals) - dairy cows		78,073		
	Cattle (bovine animals) - young cattle (1-2 years)		22,597	3,014	
Crocodile	Crocodile - zoo animals		4		
Deer	Deer - zoo animals - fallow deer		19		
Dogs	Dogs - pet animals		100,648		
Eagle	Eagle - zoo animals		19		
Elephants	Elephants - zoo animals		2		
Emus	Emus - zoo animals		6		
Falcons	Falcons - zoo animals		2		
Ferrets	Ferrets - pet animals		2		
Fish	Fish - aquarium fish	3			
	Fish - farmed	137			
	Fish - farmed - carp	39			
	Fish - farmed - salmon	64			
Gallus gallus (fowl)	Gallus gallus (fowl)		25		
	Gallus gallus (fowl) - broilers		870,070	870,070	

		Population
Animal species	**Category of animals**	**Beehives**
All animals	All animals - zoo animals	
Alpacas	Alpacas - zoo animals	
Antelopes	Antelopes - zoo animal - oryx	
Barbary sheep	Barbary sheep - zoo animal	
Bears	Bears - zoo animal	
Bee-colonies	Bee-colonies	312,623
Birds	Birds - zoo animal	
Bison	Bison - zoo animals	
Buffalos	Buffalos - zoo animal	
Camels	Camels - zoo animals	
Cats	Cats - pet animals	
Cattle (bovine animals)	Cattle (bovine animals)	
	Cattle (bovine animals) - adult cattle over 2 years	
	Cattle (bovine animals) - breeding bulls	
	Cattle (bovine animals) - calves (under or around 1 year)	
	Cattle (bovine animals) - dairy cows	
	Cattle (bovine animals) - young cattle (1-2 years)	
Crocodile	Crocodile - zoo animals	
Deer	Deer - zoo animals - fallow deer	
Dogs	Dogs - pet animals	
Eagle	Eagle - zoo animals	
Elephants	Elephants - zoo animals	
Emus	Emus - zoo animals	
Falcons	Falcons - zoo animals	
Ferrets	Ferrets - pet animals	
Fish	Fish - aquarium fish	
	Fish - farmed	
	Fish - farmed - carp	
	Fish - farmed - salmon	
Gallus gallus (fowl)	Gallus gallus (fowl)	
	Gallus gallus (fowl) - broilers	

Animal species	Category of animals	Population			
		holding	animal	slaughter animal (heads)	herd/flock
Gallus gallus (fowl)	Gallus gallus (fowl) - laying hens		1,078,981		
	Gallus gallus (fowl) - laying hens - adult			747,553	
	Gallus gallus (fowl) - mixed flocks/holdings	59			153
Geese	Geese		13		
Giraffes	Giraffes - zoo animal		2		
Guinea fowl	Guinea fowl		6		
Guinea pigs	Guinea pigs		40		
Jaguar	Jaguar - zoo animals		1		
Kangaroos	Kangaroos - zoo animal		9		
Leopards	Leopards - zoo animals		1		
Leporidae	Rabbits		20		
	Rabbits - farmed	27		1,118	
Lion	Lion - zoo animals		6		
Llamas	Llamas - zoo animal		14		
Lynx	Lynx - zoo animal		4		
Marine mammals	Marine mammals - zoo animals		2		
Monkeys	Monkeys - zoo animal		99		
Ostriches	Ostriches - zoo animals		2		
Other carnivores	Other carnivores - zoo animals		4		
Owls	Owls - zoo animals		2		
Parrots	Parrots - zoo animals		158		
Peafowl	Peafowl - zoo animal		11		
Penguin	Penguin - zoo animals		9		
Pet animals, all	Pet animals, all		106,370		
Pheasants	Pheasants - zoo animals		28		
Pigeons	Pigeons		39		
Pigs	Pigs	5,166	144,164	212,978	
	Pigs - breeding animals - raised under controlled housing conditions - sows and boars		17,363		
	Pigs - fattening pigs - raised under controlled housing conditions		64,900		
	Pigs - mixed herds - raised under controlled housing conditions			2,736	
	Pigs - mixed herds - raised under controlled housing conditions - boars		813		
	Pigs - mixed herds - raised under controlled housing conditions - gilts		3,138		
	Pigs - mixed herds - raised under controlled housing conditions - piglets		58,763	210,242	
	Pigs - mixed herds - raised under controlled housing conditions - sows		16,550		
Ratites (ostrich, emu, nandu)	Ratites (ostrich, emu, nandu) - zoo animals		8		
Reptiles	Reptiles - zoo animal		39		

		Population
Animal species	**Category of animals**	**Beehives**
Gallus gallus (fowl)	Gallus gallus (fowl) - laying hens	
	Gallus gallus (fowl) - laying hens - adult	
	Gallus gallus (fowl) - mixed flocks/holdings	
Geese	Geese	
Giraffes	Giraffes - zoo animal	
Guinea fowl	Guinea fowl	
Guinea pigs	Guinea pigs	
Jaguar	Jaguar - zoo animals	
Kangaroos	Kangaroos - zoo animal	
Leopards	Leopards - zoo animals	
Leporidae	Rabbits	
	Rabbits - farmed	
Lion	Lion - zoo animals	
Llamas	Llamas - zoo animal	
Lynx	Lynx - zoo animal	
Marine mammals	Marine mammals - zoo animals	
Monkeys	Monkeys - zoo animal	
Ostriches	Ostriches - zoo animals	
Other carnivores	Other carnivores - zoo animals	
Owls	Owls - zoo animals	
Parrots	Parrots - zoo animals	
Peafowl	Peafowl - zoo animal	
Penguin	Penguin - zoo animals	
Pet animals, all	Pet animals, all	
Pheasants	Pheasants - zoo animals	
Pigeons	Pigeons	
Pigs	Pigs	
	Pigs - breeding animals - raised under controlled housing conditions - sows and boars	
	Pigs - fattening pigs - raised under controlled housing conditions	
	Pigs - mixed herds - raised under controlled housing conditions	
	Pigs - mixed herds - raised under controlled housing conditions - boars	
	Pigs - mixed herds - raised under controlled housing conditions - gilts	
	Pigs - mixed herds - raised under controlled housing conditions - piglets	
	Pigs - mixed herds - raised under controlled housing conditions - sows	
Ratites (ostrich, emu, nandu)	Ratites (ostrich, emu, nandu) - zoo animals	
Reptiles	Reptiles - zoo animal	

Animal species	Category of animals	Population			
		holding	animal	slaughter animal (heads)	herd/flock
Rodents	Rodents - zoo animal		40		
Sea lion	Sea lion - zoo animals		2		
Small ruminants	Goats	3,095	88,054	393	
	Goats - animals over 1 year		75,134	269	
	Goats - animals under 1 year		12,920	124	
	Sheep	3,407	674,460	177,074	
	Sheep - animals over 1 year		554,894	39,430	
	Sheep - animals under 1 year (lambs)		119,566	137,644	
	Sheep and goats	6,502	762,514	177,467	
Snakes	Snakes - zoo animal		9		
Solipeds, domestic	Solipeds, domestic	7,944	12,170		
	Solipeds, domestic - donkeys		2,555		
	Solipeds, domestic - horses		8,532		
	Solipeds, domestic - mule		677		
	Solipeds, domestic - ponies		16		
Swans	Swans - zoo animals		6		
Tiger	Tiger - zoo animals		3		
Turkeys	Turkeys		4		
Turtles	Turtles	17			
	Turtles - zoo animals		25		
Wild animals	Wild animals	151			
Wild ducks	Wild ducks - zoo animals		21		
Wolves	Wolves - zoo animal		10		

		Population
Animal species	**Category of animals**	**Beehives**
Rodents	Rodents - zoo animal	
Sea lion	Sea lion - zoo animals	
Small ruminants	Goats	
	Goats - animals over 1 year	
	Goats - animals under 1 year	
	Sheep	
	Sheep - animals over 1 year	
	Sheep - animals under 1 year (lambs)	
	Sheep and goats	
Snakes	Snakes - zoo animal	
Solipeds, domestic	Solipeds, domestic	
	Solipeds, domestic - donkeys	
	Solipeds, domestic - horses	
	Solipeds, domestic - mule	
	Solipeds, domestic - ponies	
Swans	Swans - zoo animals	
Tiger	Tiger - zoo animals	
Turkeys	Turkeys	
Turtles	Turtles	
	Turtles - zoo animals	
Wild animals	Wild animals	
Wild ducks	Wild ducks - zoo animals	
Wolves	Wolves - zoo animal	

DISEASE STATUS TABLES

Table Bovine brucellosis in countries and regions that do not receive Community co-financing for eradication programme

Region	Zoonotic agent	Number of herds with status officially free	Number of infected herds	Total number of herds
North Macedonia	Brucella	0	25	14,898
Вардарски (Vardarski)	Brucella	0	0	811
Источен (Istočen)	Brucella	0	0	1,589
Југозападен (Jugozapaden)	Brucella	0	3	1,620
Југоисточен (Jugoistočen)	Brucella	0	0	1,547
Пелагониски (Pelagoniski)	Brucella	0	16	2,587
Полошки (Pološki)	Brucella	0	5	2,705
Североисточен (Severoistočen)	Brucella	0	1	2,442
Скопски (Skopski)	Brucella	0	0	1,597

Table Ovine or Caprine brucellosis in countries and regions that do not receive Community co-financing for eradication programme

Region	Zoonotic agent	Number of herds with status officially free	Number of infected herds	Total number of herds
North Macedonia	Brucella	0	44	5,574
Вардарски (Vardarski)	Brucella	0	2	547
Источен (Istočen)	Brucella	0	1	952
Југозападен (Jugozapaden)	Brucella	0	4	759
Југоисточен (Jugoistočen)	Brucella	0	2	864
Пелагониски (Pelagoniski)	Brucella	0	9	596
Полошки (Pološki)	Brucella	0	22	538
Североисточен (Severoistočen)	Brucella	0	2	883
Скопски (Skopski)	Brucella	0	2	435

DISEASE STATUS TABLES

Table Bovine tuberculosis in countries and regions that do not receive Community co-financing for eradication programme

Region	Zoonotic agent	Number of herds with status officially free	Number of infected herds	Total number of herds
North Macedonia	Mycobacterium tuberculosis complex (MTC)	0	20	14,898
Вардарски (Vardarski)	Mycobacterium tuberculosis complex (MTC)	0	0	811
Источен (Istočen)	Mycobacterium tuberculosis complex (MTC)	0	1	1,589
Југозападен (Jugozapaden)	Mycobacterium tuberculosis complex (MTC)	0	0	1,620
Југоисточен (Jugoistočen)	Mycobacterium tuberculosis complex (MTC)	0	0	1,547
Пелагониски (Pelagoniski)	Mycobacterium tuberculosis complex (MTC)	0	4	2,587
Полошки (Pološki)	Mycobacterium tuberculosis complex (MTC)	0	11	2,705
Североисточен (Severoistočen)	Mycobacterium tuberculosis complex (MTC)	0	3	2,442
Скопски (Skopski)	Mycobacterium tuberculosis complex (MTC)	0	1	1,597

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 - Republic of North Macedonia - animal sample - blood - Control and eradication programmes - Official sampling - Census	N_A	Complement fixation test (CFT)	animal	2933	174	Brucella, unspecified sp.	174
	Cattle (bovine animals) - Farm - Republic of North Macedonia - animal sample - blood - Control and eradication programmes - Official sampling - Census	N_A	Indirect ELISA (I-ELISA)	animal	14	0	Brucella	0
	Cattle (bovine animals) - Farm - Republic of North Macedonia - animal sample - blood - Control and eradication programmes - Official sampling - Census	N_A	Direct agglutination (DA)	animal	118449	190	Brucella, unspecified sp.	190
	Cattle (bovine animals) - Farm - Republic of North Macedonia - animal sample - foetus/stillbirth - Clinical investigations - Official sampling - Suspect sampling	N_A	Detection method of microorganisms	animal	3	0	Brucella	0
	Sheep and goats - Farm - Republic of North Macedonia - animal sample - blood - Control and eradication programmes - Official sampling - Census	N_A	Complement fixation test (CFT)	animal	28935	679	Brucella, unspecified sp.	679
	Sheep and goats - Farm - Republic of North Macedonia - animal sample - blood - Control and eradication programmes - Official sampling - Census	N_A	Indirect ELISA (I-ELISA)	animal	374	48	Brucella, unspecified sp.	48
	Sheep and goats - Farm - Republic of North Macedonia - animal sample - blood - Control and eradication programmes - Official sampling - Census	N_A	Direct agglutination (DA)	animal	473555	679	Brucella, unspecified sp.	679
	Sheep and goats - Farm - Republic of North Macedonia - animal sample - blood - Survey - Official sampling - Selective sampling	N_A	Direct agglutination (DA)	animal	1886	1773	Brucella, unspecified sp.	1,773
	Sheep and goats - Farm - Republic of North Macedonia - animal sample - foetus/stillbirth - Clinical investigations - Official sampling - Suspect sampling	N_A	Detection method of microorganisms	animal	7	0	Brucella	0
	Sheep and goats - Farm - Republic of North Macedonia - animal sample - foetus/stillbirth - Clinical investigations - Official sampling - Suspect sampling	N_A	Real-Time PCR (qualitative or quantitative)	animal	1	0	Brucella	0
	Sheep and goats - Farm - Republic of North Macedonia - animal sample - organ/tissue - Monitoring - passive - Official sampling - Suspect sampling	N_A	Real-Time PCR (qualitative or quantitative)	animal	22	2	Brucella, unspecified sp.	2
	Sheep and goats - Slaughterhouse - Republic of North Macedonia - animal sample - organ/tissue - Control and eradication programmes - Official sampling - Selective sampling	N_A	Detection method of microorganisms	animal	50	1	Brucella, unspecified sp.	1

Table Campylobacter:CAMPYLOBACTER in food

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Sample weight	Sample weight unit	Sampling Details	Method	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Meat from bovine animals - fresh - frozen - Border Control Posts - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	10	0	Campylobacter	0
	Meat from broilers (Gallus gallus) - fresh - chilled - Border Control Posts - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	5	0	Campylobacter	0
	Meat from broilers (Gallus gallus) - fresh - chilled - Processing plant - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	5	4	Campylobacter, unspecified sp.	4
	Meat from broilers (Gallus gallus) - fresh - frozen - Border Control Posts - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	15	0	Campylobacter	0
	Meat from broilers (Gallus gallus) - fresh - frozen - Processing plant - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	5	0	Campylobacter	0
	Meat from broilers (Gallus gallus) - mechanically separated meat (MSM) - soft-type - frozen - Border Control Posts - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	15	0	Campylobacter	0
	Meat from pig - fresh - frozen - Border Control Posts - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	5	0	Campylobacter	0
	Meat, mixed meat - minced meat - intended to be eaten cooked - chilled - Processing plant - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	5	0	Campylobacter	0

Table Chlamydia/ Chlamydophila:CHLAMYDIA/ CHLAMYDOPHILA 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 - Republic of North Macedonia - animal sample - blood - Clinical investigations - Private sampling - Suspect sampling	N_A	Indirect ELISA (I-ELISA)	animal	6	3	Chlamydophila, unspecified sp.	3
	Cattle (bovine animals) - Farm - Republic of North Macedonia - animal sample - blood - Monitoring - passive - Official sampling - Suspect sampling	N_A	Indirect ELISA (I-ELISA)	animal	5	1	Chlamydophila, unspecified sp.	1
	Sheep and goats - Farm - Republic of North Macedonia - animal sample - blood - Clinical investigations - Private sampling - Suspect sampling	N_A	Indirect ELISA (I-ELISA)	animal	2	1	Chlamydophila, unspecified sp.	1
	Sheep and goats - Farm - Republic of North Macedonia - animal sample - blood - Monitoring - passive - Official sampling - Suspect sampling	N_A	Indirect ELISA (I-ELISA)	animal	14	1	Chlamydophila, unspecified sp.	1
	Sheep and goats - Farm - Republic of North Macedonia - animal sample - foetus/stillbirth - Monitoring - passive - Official sampling - Suspect sampling	N_A	Real-Time PCR (qualitative or quantitative)	animal	5	2	Chlamydophila, unspecified sp.	2
	Sheep and goats - Farm - Republic of North Macedonia - animal sample - organ/tissue - Monitoring - passive - Official sampling - Suspect sampling	N_A	Real-Time PCR (qualitative or quantitative)	animal	9	4	Chlamydophila, unspecified sp.	4

Table Clostridium:CLOSTRIDIUM 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 - Republic of North Macedonia - animal sample - organ/tissue - Monitoring - Official sampling - Selective sampling	N_A	Detection method of microorganisms	animal	1	1	Clostridium perfringens	1

Table Clostridium:CLOSTRIDIUM in food

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Sample weight	Sample weight unit	Sampling Details	Method	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Honey - Border Control Posts - Not Available - food sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	10	0	Clostridium	0
	Honey - Processing plant - Not Available - food sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	20	0	Clostridium	0
	Meat, mixed meat - meat products - ready-to-eat - Processing plant - Not Available - food sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	5	0	Clostridium	0

Table Clostridium:CLOSTRIDIUM in feed

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Sample weight	Sample weight unit	Sampling Details	Method	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Compound feedingstuffs for pigs - final product - Processing plant - Not Available - feed sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	3	0	Clostridium	0

Table COXIELLA in animal

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Sampling Details	Method	Total units tested	Total units positive	N of clinical affected herds	Zoonoses	N of units positive
Not Available	Cattle (bovine animals) - Farm - Republic of North Macedonia - animal sample - blood - Clinical investigations - Private sampling - Suspect sampling	animal	N_A	Indirect ELISA (I-ELISA)	14	2		Coxiella spp., unspecified	2
	Cattle (bovine animals) - Farm - Republic of North Macedonia - animal sample - blood - Monitoring - passive - Official sampling - Suspect sampling	animal	N_A	Indirect ELISA (I-ELISA)	2	0		Coxiella	0
	Sheep and goats - Farm - Republic of North Macedonia - animal sample - blood - Clinical investigations - Private sampling - Suspect sampling	animal	N_A	Indirect ELISA (I-ELISA)	64	0		Coxiella	0
	Sheep and goats - Farm - Republic of North Macedonia - animal sample - blood - Monitoring - passive - Official sampling - Suspect sampling	animal	N_A	Indirect ELISA (I-ELISA)	8	0		Coxiella	0
	Sheep and goats - Farm - Republic of North Macedonia - animal sample - foetus/stillbirth - Monitoring - passive - Official sampling - Suspect sampling	animal	N_A	Real-Time PCR (qualitative or quantitative)	5	0		Coxiella	0

Table Escherichia coli:ESCHERICHIA COLI in food

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Sample weight	Sample weight unit	Sampling Details	Method	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Cheeses made from cows' milk - hard - made from pasteurised milk - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	5	0	Escherichia coli	0
	Cheeses made from cows' milk - soft and semi-soft - made from pasteurised milk - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	10	0	Escherichia coli	0
	Cheeses made from sheep's milk - soft and semi-soft - made from pasteurised milk - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	20	0	Escherichia coli	0
	Cheeses, made from mixed milk from cows, sheep and/or goats - soft and semi-soft - made from pasteurised milk - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	5	0	Escherichia coli	0
	Meat from bovine animals - minced meat - intended to be eaten cooked - frozen - Processing plant - Not Available - food sample - meat - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	5	0	Escherichia coli	0
	Meat, mixed meat - minced meat - intended to be eaten cooked - chilled - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	5	0	Escherichia coli	0
	Meat, mixed meat - minced meat - intended to be eaten cooked - frozen - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	10	0	Escherichia coli	0

Table Leishmania:LEISHMANIA 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	Dogs - pet animals - Veterinary clinics - Republic of North Macedonia - animal sample - blood - Clinical investigations - Private sampling - Suspect sampling	N_A	Indirect Immunofluorescent Antibody test (IFAT)	animal	196	76	Leishmania	76
	Dogs - stray dogs - Natural habitat - Republic of North Macedonia - animal sample - blood - Monitoring - active - Official sampling - Selective sampling	N_A	Indirect Immunofluorescent Antibody test (IFAT)	animal	2069	69	Leishmania	69

Table Listeria:LISTERIA 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	Goats - Farm - Republic of North Macedonia - animal sample - foetus/stillbirth - Surveillance - Official sampling - Selective sampling	N_A	Detection method of microorganisms	animal	2	0	Listeria monocytogenes	0
	Sheep - Farm - Republic of North Macedonia - animal sample - organ/tissue - Surveillance - Official sampling - Selective sampling	N_A	Detection method of microorganisms	animal	1	1	Listeria monocytogenes	1

Table Listeria:LISTERIA in food

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Sample weight	Sample weight unit	Sampling Details	Total units tested	Total units positive	Method	Zoonoses	N of units tested	N of units positive
Not Available	Cheeses made from cows' milk - hard - made from pasteurised milk - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	5	0	detection	Listeria monocytogenes	5	0
	Cheeses made from cows' milk - hard - made from pasteurised milk - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	5	0	detection	Listeria monocytogenes	5	0
	Cheeses made from cows' milk - soft and semi-soft - made from pasteurised milk - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	5	0	detection	Listeria monocytogenes	5	0
	Cheeses made from cows' milk - soft and semi-soft - made from pasteurised milk - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	15	0	detection	Listeria monocytogenes	15	0
	Cheeses made from sheep's milk - soft and semi-soft - made from pasteurised milk - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	10	0	detection	Listeria monocytogenes	10	0
	Cheeses, made from mixed milk from cows, sheep and/or goats - soft and semi-soft - made from pasteurised milk - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	5	0	detection	Listeria monocytogenes	5	0
	Eggs - table eggs - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	26	0	detection	Listeria monocytogenes	26	0
	Fishery products, unspecified - raw - frozen - Border Control Posts - Not Available - food sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	10	0	detection	Listeria monocytogenes	10	0
	Fishery products, unspecified - ready-to-eat - Border Control Posts - Not Available - food sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	5	0	detection	Listeria monocytogenes	5	0
	Meat from pig - meat products - raw and intended to be eaten raw - chilled - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	10	0	detection	Listeria monocytogenes	10	0
	Meat from pig - meat products - raw and intended to be eaten raw - chilled - Primary production - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	45	3	detection	Listeria monocytogenes	45	3
	Meat, mixed meat - meat products - fermented sausages - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	5	0	detection	Listeria monocytogenes	5	0

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
Not Available	Badgers - Hunting - Republic of North Macedonia - animal sample - brain - Monitoring - passive - Official sampling - Suspect sampling	N_A	Real-Time PCR (qualitative or quantitative)	animal	1	0	Rabies virus	0
	Cats - Natural habitat - Republic of North Macedonia - animal sample - brain - Monitoring - passive - Official sampling - Suspect sampling	N_A	Real-Time PCR (qualitative or quantitative)	animal	6	0	Rabies virus	0
	Cats - Natural habitat - Republic of North Macedonia - animal sample - brain - Monitoring - passive - Official sampling - Suspect sampling	N_A	Immunofluorescence method	animal	1	0	Lyssavirus	0
	Dogs - Natural habitat - Republic of North Macedonia - animal sample - brain - Monitoring - passive - Official sampling - Suspect sampling	N_A	Real-Time PCR (qualitative or quantitative)	animal	3	0	Rabies virus	0
	Dogs - Natural habitat - Republic of North Macedonia - animal sample - brain - Monitoring - passive - Official sampling - Suspect sampling	N_A	Immunofluorescence method	animal	4	0	Lyssavirus	0
	Foxes - wild - Hunting - Republic of North Macedonia - animal sample - brain - Monitoring - active - Official sampling - Census	N_A	Immunofluorescence method	animal	122	0	Lyssavirus	0
	Foxes - wild - Hunting - Republic of North Macedonia - animal sample - brain - Monitoring - passive - Official sampling - Suspect sampling	N_A	Real-Time PCR (qualitative or quantitative)	animal	5	0	Rabies virus	0
	Foxes - wild - Hunting - Republic of North Macedonia - animal sample - brain - Monitoring - passive - Official sampling - Suspect sampling	N_A	Immunofluorescence method	animal	3	0	Lyssavirus	0
	Weasel - Hunting - Republic of North Macedonia - animal sample - brain - Monitoring - passive - Official sampling - Suspect sampling	N_A	Immunofluorescence method	animal	2	0	Lyssavirus	0
	Wolves - wild - Hunting - Republic of North Macedonia - animal sample - brain - Monitoring - active - Official sampling - Census	N_A	Immunofluorescence method	animal	41	0	Lyssavirus	0
	Wolves - wild - Hunting - Republic of North Macedonia - animal sample - brain - Monitoring - passive - Official sampling - Suspect sampling	N_A	Immunofluorescence method	animal	1	0	Lyssavirus	0

Table Salmonella:SALMONELLA in animal

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	N of flocks under control programme	Target verification	Sampling Details	Method	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Cattle (bovine animals) - Farm - Republic of North Macedonia - animal sample - organ/tissue - Surveillance - Official sampling - Selective sampling	animal		N_A	N_A	Detection method of microorganisms	1	0	Salmonella	0
	Sheep - Farm - Republic of North Macedonia - animal sample - organ/tissue - Surveillance - Official sampling - Selective sampling	animal		N_A	N_A	Detection method of microorganisms	4	0	Salmonella	0

Table Salmonella:SALMONELLA in food

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Sample weight	Sample weight unit	Sampling Details	Method	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Cheeses made from cows' milk - hard - made from pasteurised milk - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	ISO 6579-1:2017 Salmonella	5	0	Salmonella	0
	Cheeses made from cows' milk - soft and semi-soft - made from pasteurised milk - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	ISO 6579-1:2017 Salmonella	5	0	Salmonella	0
	Cheeses made from sheep's milk - soft and semi-soft - made from pasteurised milk - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	ISO 6579-1:2017 Salmonella	10	0	Salmonella	0
	Dairy products (excluding cheeses) - milk powder and whey powder - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	ISO 6579-1:2017 Salmonella	5	0	Salmonella	0
	Egg products - dried - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	ISO 6579-1:2017 Salmonella	5	0	Salmonella	0
	Eggs - table eggs - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	ISO 6579-1:2017 Salmonella	26	0	Salmonella	0
	Fish - raw - frozen - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	ISO 6579-1:2017 Salmonella	10	0	Salmonella	0
	Honey - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	ISO 6579-1:2017 Salmonella	5	0	Salmonella	0
	Meat from bovine animals - fresh - frozen - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	ISO 6579-1:2017 Salmonella	10	0	Salmonella	0
	Meat from broilers (Gallus gallus) - carcase - chilled - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	ISO 6579-1:2017 Salmonella	5	0	Salmonella	0
	Meat from broilers (Gallus gallus) - fresh - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	ISO 6579-1:2017 Salmonella	10	0	Salmonella	0
	Meat from broilers (Gallus gallus) - fresh - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	ISO 6579-1:2017 Salmonella	5	0	Salmonella	0
	Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - frozen - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	ISO 6579-1:2017 Salmonella	15	0	Salmonella	0
	Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - frozen - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	ISO 6579-1:2017 Salmonella	5	0	Salmonella	0
	Meat from broilers (Gallus gallus) - mechanically separated meat (MSM) - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	ISO 6579-1:2017 Salmonella	15	0	Salmonella	0
	Meat from pig - fresh - frozen - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	ISO 6579-1:2017 Salmonella	5	0	Salmonella	0
	Meat from pig - meat preparation - intended to be eaten cooked - chilled - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	ISO 6579-1:2017 Salmonella	5	0	Salmonella	0

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Sample weight	Sample weight unit	Sampling Details	Method	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Meat from pig - meat preparation - intended to be eaten cooked - chilled - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	ISO 6579-1:2017 Salmonella	10	0	Salmonella	0
	Other processed food products and prepared dishes - ices and similar frozen desserts - water-based ice creams - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	ISO 6579-1:2017 Salmonella	20	0	Salmonella	0

Table Salmonella:SALMONELLA in feed

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Sample weight	Sample weight unit	Sampling Details	Method	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Compound feedingstuffs for cattle - final product - Processing plant - Not Available - feed sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	50	Gram	N_A	Not Available	3	0	Salmonella	0
	Compound feedingstuffs for pigs - final product - Processing plant - Not Available - feed sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	50	Gram	N_A	Not Available	11	0	Salmonella	0
	Compound feedingstuffs for poultry, laying hens - final product - Processing plant - Not Available - feed sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	50	Gram	N_A	Not Available	4	0	Salmonella	0
	Feed material of marine animal origin - fish meal - Border Control Posts - Not Available - feed sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	5	0	Salmonella	0
	Pet food - final product - Border Control Posts - Not Available - feed sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	160	0	Salmonella	0
	Pet food - final product - Processing plant - Not Available - feed sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	10	0	Salmonella	0

Table Toxoplasma:TOXOPLASMA 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	Emus - zoo animals - Zoo - Republic of North Macedonia - animal sample - organ/tissue - Clinical investigations - Private sampling - Suspect sampling	N_A	PCR	animal	1	0	Toxoplasma gondii	0
	Lion - zoo animals - Zoo - Republic of North Macedonia - animal sample - organ/tissue - Clinical investigations - Private sampling - Suspect sampling	N_A	PCR	animal	2	0	Toxoplasma gondii	0
	Sheep and goats - Farm - Republic of North Macedonia - animal sample - organ/tissue - Monitoring - passive - Official sampling - Suspect sampling	N_A	PCR	animal	3	0	Toxoplasma gondii	0

Table Trichinella:TRICHINELLA 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	Wild boars - wild - Hunting - Republic of North Macedonia - animal sample - organ/tissue - Surveillance - Official sampling - Census	N_A	Magnetic stirrer method for pooled sample digestion	animal	1218	14	Trichinella, unspecified sp.	14

Table Yersinia:YERSINIA in food

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Sample weight	Sample weight unit	Sampling Details	Method	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Meat from bovine animals - fresh - frozen - Border Control Posts - Not Available - food sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	10	0	Yersinia	0
	Meat from broilers (Gallus gallus) - fresh - frozen - Border Control Posts - Not Available - food sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	15	0	Yersinia	0
	Meat from broilers (Gallus gallus) - meat products - raw but intended to be eaten cooked - chilled - Border Control Posts - Not Available - food sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	5	0	Yersinia	0
	Meat from broilers (Gallus gallus) - mechanically separated meat (MSM) - soft-type - frozen - Border Control Posts - Not Available - food sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	15	0	Yersinia	0
	Meat from pig - fresh - frozen - Border Control Posts - Not Available - food sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	5	0	Yersinia	0
	Meat, mixed meat - minced meat - intended to be eaten cooked - frozen - Processing plant - Not Available - food sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	5	0	Yersinia	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

		Outbreak strenght	Strong				Weak			
Causative agent	Food vehicle		N outbreaks	N human cases	N hospitalized	N deaths	N outbreaks	N human cases	N hospitalized	N deaths
Salmonella Enteritidis	Sauce and dressings - mayonnaise		1	90	12	0				
Staphylococcus aureus	Cooked cured (or seasoned) meat		1	12	0	0				
Unknown	Water						1	93	0	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
Salmonella Enteritidis	unk	Not Available	Not Available	Salmonella Sandiego	FBO1	General	Sauce and dressings - mayonnaise	N_A	Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans	School or kindergarten	School or kindergarten	Not Available	Infected food handler	N_A	1	90	12	0
Staphylococcus aureus	unk	Not Available	Not Available	Not Available	FBO3	Household	Cooked cured (or seasoned) meat	grilled chicken steak and burger	Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans	Domestic premises	Slaughterhouse	Not Available	Infected food handler	N_A	1	12	0	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
Unknown	unk	Not Available	Not Available	Not Available	FBO2	General	Water	suspected water supply network of 3 neighbouring villages after received information for irregular disinfection, but not proven	Unknown	Multiple places of exposure in one country	Water distribution system	Not Available	Untreated drinking water	N_A	1	93	0	0

ANTIMICROBIAL RESISTANCE TABLES FOR CAMPYLOBACTER

ANTIMICROBIAL RESISTANCE TABLES FOR SALMONELLA

ANTIMICROBIAL RESISTANCE TABLES FOR INDICATOR ESCHERICHIA COLI

Table Antimicrobial susceptibility testing of Escherichia coli, non-pathogenic, unspecified in Cattle (bovine animals) - calves (under 1 year)

Sampling Stage: Slaughterhouse

Sampling Type: animal sample - caecum

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Republic of North Macedonia

Sampling Details:

	AM substance	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
	ECOFF	8	16	0.25	0.5	16	0.064	2	2	0.125	8	64	8	0.5	2
	Lowest limit	1	2	0.25	0.5	8	0.015	1	0.5	0.03	4	8	2	0.25	0.25
	Highest limit	64	64	4	8	128	8	16	32	16	128	1024	64	8	32
	N of tested isolates														
MIC	N of resistant isolates														
<=0.015							10								
<=0.03										10					
<=0.25				10										9	6
<=0.5					10				4						
0.5														1	2
<=1	1							10							
1									5						2
<=2													3		
2	2								1						
<=4											8				
4	2												1		
<=8						10									
8	3	8											1		
16		2										2	4		
32	2										2	3	1		
64												2			
128												1			
512												1			

	AM substance	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
	ECOFF	**8**	**16**	**0.25**	**0.5**	**16**	**0.064**	**2**	**2**	**0.125**	**8**	**64**	**8**	**0.5**	**2**
	Lowest limit	**1**	**2**	**0.25**	**0.5**	**8**	**0.015**	**1**	**0.5**	**0.03**	**4**	**8**	**2**	**0.25**	**0.25**
	Highest limit	**64**	**64**	**4**	**8**	**128**	**8**	**16**	**32**	**16**	**128**	**1024**	**64**	**8**	**32**
	N of tested isolates														
MIC	**N of resistant isolates**														
>1024												1			

Table Antimicrobial susceptibility testing of Escherichia coli, non-pathogenic, unspecified in Pigs - fattening pigs

Sampling Stage: Slaughterhouse

Sampling Type: animal sample - caecum

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Republic of North Macedonia

Sampling Details:

	AM substance	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
	ECOFF	8	16	0.25	0.5	16	0.064	2	2	0.125	8	64	8	0.5	2
	Lowest limit	1	2	0.25	0.5	8	0.015	1	0.5	0.03	4	8	2	0.25	0.25
	Highest limit	64	64	4	8	128	8	16	32	16	128	1024	64	8	32
	N of tested isolates														
MIC	N of resistant isolates														
<=0.015							9								
<=0.03										13					
0.03							1								
0.064							2								
0.125							1								
<=0.25				13										13	9
<=0.5					13				4						
0.5															3
<=1		1						13							
1									8						1
<=2													7		
2		5													
<=4											12				
4		4	1						1				1		
<=8						13									
8			9										2		
16			3								1	1	1		
32												2			
64		1										5	2		
>64		2													
128												5			

OTHER ANTIMICROBIAL RESISTANCE TABLES

Table Antimicrobial susceptibility testing of Enterococcus, non-pathogenic - E. faecalis in Cattle (bovine animals) - calves (under 1 year)

Sampling Stage: Slaughterhouse

Sampling Type: animal sample - caecum

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: AMR MON

Analytical Method:

Country Of Origin:Republic of North Macedonia

Sampling Details:

MIC	AM substance	Ampicillin	Chloramphenicol	Ciprofloxacin	Daptomycin	Erythromycin	Gentamicin	Linezolid	Quinupristin/Dalfopristin	Teicoplanin	Tetracycline	Tigecycline	Vancomycin
	ECOFF	**4**	**32**	**4**	**4**	**4**	**64**	**4**	**0.5**	**2**	**4**	**0.25**	**4**
	Lowest limit	**0.5**	**4**	**0.125**	**0.25**	**1**	**8**	**0.5**	**0.5**	**0.5**	**1**	**0.03**	**1**
	Highest limit	**64**	**128**	**16**	**32**	**128**	**1024**	**64**	**64**	**64**	**128**	**4**	**128**
<=0.03												3	
0.064												2	
0.125												1	
<=0.25					1								
<=0.5	3							5	5	6			
0.5			2										
<=1						6					2		6
1	3		4	2				1	1				
2				3							1		
<=4		6											
4											3		
<=8							6						

Table Antimicrobial susceptibility testing of Enterococcus, non-pathogenic - E. faecalis in Pigs - fattening pigs

Sampling Stage: Slaughterhouse

Sampling Type: animal sample - caecum

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: AMR MON

Analytical Method:

Country Of Origin:Republic of North Macedonia

Sampling Details:

	AM substance	Ampicillin	Chloramphenicol	Ciprofloxacin	Daptomycin	Erythromycin	Gentamicin	Linezolid	Quinupristin/Dalfopristin	Teicoplanin	Tetracycline	Tigecycline	Vancomycin
	ECOFF	**4**	**32**	**4**	**4**	**4**	**64**	**4**	**0.5**	**2**	**4**	**0.25**	**4**
	Lowest limit	**0.5**	**4**	**0.125**	**0.25**	**1**	**8**	**0.5**	**0.5**	**0.5**	**1**	**0.03**	**1**
MIC	**Highest limit**	**64**	**128**	**16**	**32**	**128**	**1024**	**64**	**64**	**64**	**128**	**4**	**128**
<=0.03												2	
0.064												2	
<=0.125				1									
<=0.25					1								
<=0.5	1							4	3	4			
0.5				2									
<=1						4					1		4
1	3			1	1				1				
2					2						1		
<=4			4										
4											1		
<=8							4						
8											1		

Table Antimicrobial susceptibility testing of Enterococcus, non-pathogenic - E. faecium in Gallus gallus (fowl) - breeding flocks for broiler production line - before slaughter

Sampling Stage: Slaughterhouse

Sampling Type: animal sample - caecum

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: OTHER AMR MON

Analytical Method:

Country Of Origin:Republic of North Macedonia

Sampling Details:

	AM substance	Ampicillin	Chloramphenicol	Ciprofloxacin	Daptomycin	Erythromycin	Gentamicin	Linezolid	Quinupristin/Dalfopristin	Teicoplanin	Tetracycline	Tigecycline	Vancomycin
	ECOFF	**4**	**32**	**4**	**8**	**4**	**32**	**4**	**1**	**2**	**4**	**0.25**	**4**
	Lowest limit	**0.5**	**4**	**0.125**	**0.25**	**1**	**8**	**0.5**	**0.5**	**0.5**	**1**	**0.03**	**1**
MIC	**Highest limit**	**64**	**128**	**16**	**32**	**128**	**1024**	**64**	**64**	**64**	**128**	**4**	**128**
0.064												2	
<=0.5								2	2	2			
<=1						2							2
1		2		2									
2					2								
<=4			2										
<=8							2						
8											2		

Table Antimicrobial susceptibility testing of Enterococcus, non-pathogenic - E. faecium in Cattle (bovine animals) - calves (under 1 year)

Sampling Stage: Slaughterhouse

Sampling Type: animal sample - caecum

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: AMR MON

Analytical Method:

Country Of Origin:Republic of North Macedonia

Sampling Details:

	AM substance	Ampicillin	Chloramphenicol	Ciprofloxacin	Daptomycin	Erythromycin	Gentamicin	Linezolid	Quinupristin/Dalfopristin	Teicoplanin	Tetracycline	Tigecycline	Vancomycin
	ECOFF	**4**	**32**	**4**	**8**	**4**	**32**	**4**	**1**	**2**	**4**	**0.25**	**4**
	Lowest limit	**0.5**	**4**	**0.125**	**0.25**	**1**	**8**	**0.5**	**0.5**	**0.5**	**1**	**0.03**	**1**
MIC	**Highest limit**	**64**	**128**	**16**	**32**	**128**	**1024**	**64**	**64**	**64**	**128**	**4**	**128**
<=0.03												12	
0.064												5	
<=0.125				1									
<=0.25					5								
<=0.5	10							15	8	17			
0.5				6									
<=1						17					12		17
1	5			9	11				9				
2	1			1	1						2		
<=4			17										
4								2			1		
<=8							17						
8	1										2		

Table Antimicrobial susceptibility testing of Enterococcus, non-pathogenic - E. faecium in Pigs - fattening pigs

Sampling Stage: Slaughterhouse

Sampling Type: animal sample - caecum

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: AMR MON

Analytical Method:

Country Of Origin:Republic of North Macedonia

Sampling Details:

MIC	AM substance	Ampicillin	Chloramphenicol	Ciprofloxacin	Daptomycin	Erythromycin	Gentamicin	Linezolid	Quinupristin/Dalfopristin	Teicoplanin	Tetracycline	Tigecycline	Vancomycin
	ECOFF	**4**	**32**	**4**	**8**	**4**	**32**	**4**	**1**	**2**	**4**	**0.25**	**4**
	Lowest limit	**0.5**	**4**	**0.125**	**0.25**	**1**	**8**	**0.5**	**0.5**	**0.5**	**1**	**0.03**	**1**
	Highest limit	**64**	**128**	**16**	**32**	**128**	**1024**	**64**	**64**	**64**	**128**	**4**	**128**
<=0.03												8	
0.064												4	
<=0.25					1								
<=0.5	7							10	5	12			
0.5			3	1									
<=1						12					6		12
1	3		8	7				1	6				
2	1		1	2				1	1		3		
<=4		12											
4				1							2		
<=8							11						
8	1										1		
16							1						

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
Antimicrobial Resistance	20-Jul-2022
Animal Population	21-Jul-2022
Disease Status	21-Jul-2022
Food Borne Outbreaks	22-Sep-2022
Prevalence	21-Jul-2022

ZOONOSES MONITORING

NORTH MACEDONIA

TEXT FORMS FOR THE TRENDS AND SOURCES OF ZOONOSES AND ZOONOTIC AGENTS IN FOODSTUFFS, ANIMALS AND FEEDINGSTUFFS

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

IN 2021

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8.1. General description of sampling design and strategy[(a)] ..... **Error! Bookmark not defined.**

8.2. Stratification procedure per animal population and food category ..... **Error! Bookmark not defined.**

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8.6. Library preparation used ..... **Error! Bookmark not defined.**

8.7. Version of the predictive tool ..... **Error! Bookmark not defined.**

8.8. Results of investigation ..... **Error! Bookmark not defined.**

8.9. Additional information ..... **Error! Bookmark not defined.**

1. Institutions and Laboratories involved in zoonoses monitoring and reporting

Faculty of veterinary medicine-Skopje (FVMS) is a public institution dealing with university education, scientific and applied research and provision of scientific and technical expertise for the veterinary authorities and industry in the animal health and food safety domains.(**www.fvm.ukim.edu.mk**). FVMS is consisted of three institutes such as Veterinary Institute, Food Institute and Institute for veterinary biomedicine and reproduction.(https://fvm.ukim.edu.mk/en/fakultet/organizacija/organogram/).
Laboratories of FVMS operate under highest quality management standards, and have been accredited by the Institute for accreditation of R.N.Macedonia for the standard MKC EN ISO/IEC 17025 since 2008. Currently, 175 laboratory diagnostic methods are accredited and this number reflects the continuous broadening of the accreditation scope according to the national requirements and needs. (https://iarm.gov.mk/wp-content/uploads/2021/02/OB05-25_LT-006.pdf).
Food institute is dealing with testing of Food, feed and water born zoonotic pathogens such as: *Salmonella, Campylobacter, Escherichia coli, Listeria monocytogenes, Anisakis* and other bacterial, parasitic and viral zoonotic agents. Veterinary institute is testing zoonotic pathogens in animals such as: *Brucella, Mycobacterium*, *Salmonella, Campylobacter, Escherichia coli, Listeria, Trichinella, Echinococcus, Toxoplasma,* rabies, *Coxiella* (Q fever*),* Tularaemia and other bacterial parasitic and viral zoonotic agents. Vector born zoonotic pathogens such as *Leishmania* and West Nile Virus are tested in vectors and animals as well. Laboratory tests are performed as a part of a national surveillance and monitoring programs, as well as in cases of outbreaks, or on request of a customers. FVMS regularly report for the positive testing results of zoonotic agents to the Food and veterinary agency and submit monthly and annual reports for all performed testing and results.

Short description of the institutions and laboratories involved in data collection and reporting

2. Animal population

2.1. Sources of information and the date(s) (months, years) the information relates to [(a)]

Source of information is Informative system of Food and Veterinary Agency ISFVA. Identification and registration system since 2004, starts with bovine animal, and later for other animal species 2008 sheep and goats, 2012 bees, 2013 pigs, 2016 aquatic animals and pets, 2019 equine animals.

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

” Farm animal” shall mean a domestic animal of the bovine species including the species Bubalus bubalis and Bison bison, ovine, caprine, porcine and equidae species.

” Other animal” shall mean an animal which is not covered under the term farm animal of the species defined in indent (2) above, but which shall be identified and registered under this law depending on circumstances.

“Holding” shall mean any establishment, construction or, in the case of an open-air farm, any place in which animals covered by this law are held, kept or handled.

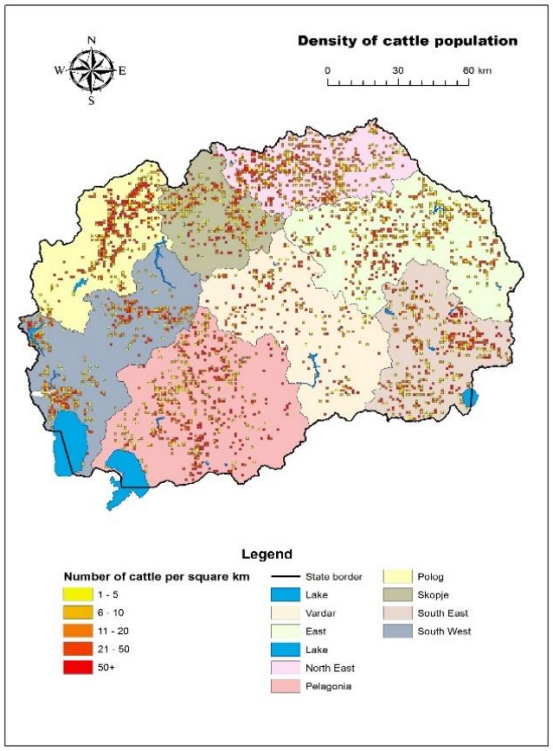
2.3. National changes of the numbers of susceptible population and trends

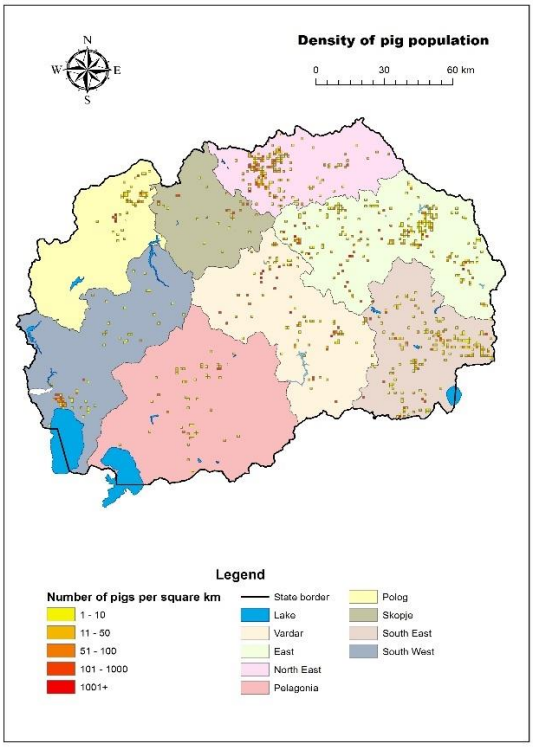
One of the more important activities carried out in previous period 2018 is census of bovine animals during the vaccination campaign of bovine animals against the Lumpy skin disease. The purpose of the census was to improve the quality of the data stored in Information System of the Food and Veterinary Agency where the movements were not reported in the database. After completion of the census, it was identified that there are more than 30,000 so-called animal ghosts (animals already dead, but not reported in the DB) that were removed from the electronic database and decreasing number of bovine populations.

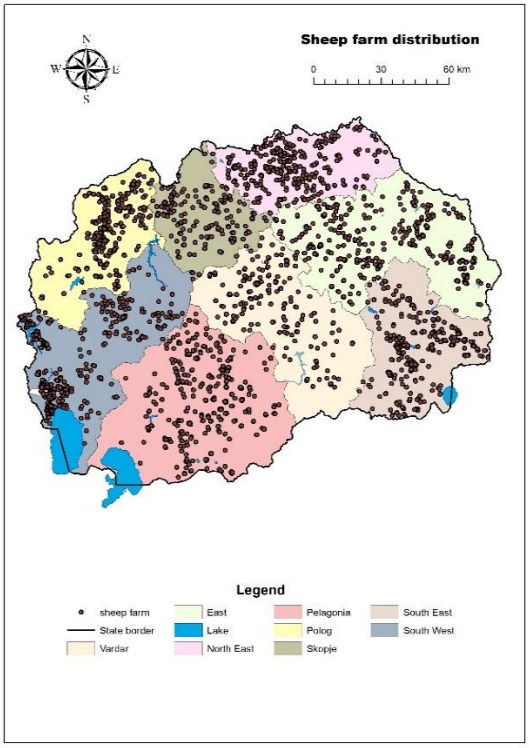
During the census, the Food and Veterinary Agency ordered the collection of data on the geographical coordinates of the registered holdings this is for the first time a spatial insight of the bovine holdings in the Republic of North Macedonia was received, which will improve the control of infectious diseases.

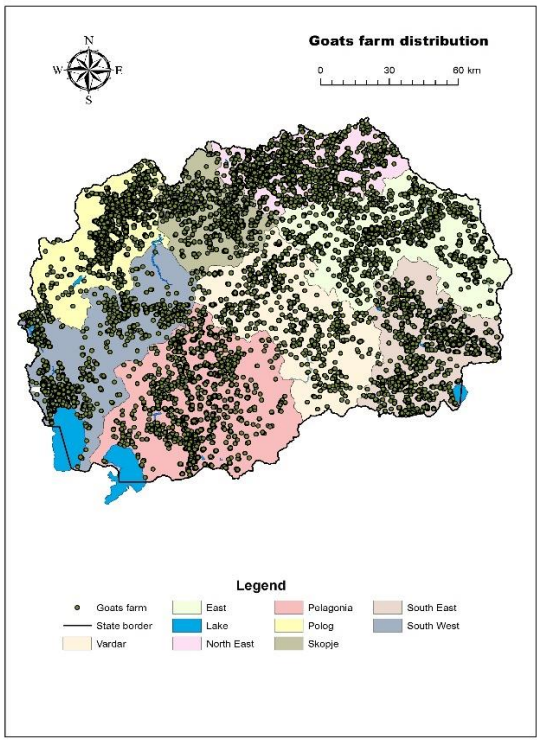
2.4. Geographical distribution and size distribution of the herds, flocks and holdings[(b)]

In map bellow are presented animal population density for 2021


Density of cattle population
N
W
E
S
0
30
60 km
Legend
Number of cattle per square km
1 - 5
6 - 10
11 - 20
21 - 50
50+
State border
Lake
Vardar
East
Lake
North East
Pelagonia
Polog
Skopje
South East
South West


Density of pig population
N
W
E
S
0
30
60 km
Legend
Number of pigs per square km
1 - 10
11 - 50
51 - 100
101 - 1000
1001+
State border
Lake
Vardar
East
North East
Pelagonia
Polog
Skopje
South East
South West


Sheep farm distribution
N
W
E
S
0
30
60 km
Legend
sheep farm
State border
Vardar
East
Lake
North East
Pelagonia
Polog
Skopje
South East
South West


Goats farm distribution
N
W
E
S
0
30
60 km
Legend
Goats farm
State border
Vardar
East
Lake
North East
Pelagonia
Polog
Skopje
South East
South West

2.5. Additional information

Cattle (bovine animals)	holdings	14889
Cattle (bovine animals)	animals	144788
Sheep and goats	animals	762514
Sheep and goats	holdings	6502

(a): National identification and registration system(s), source of reported statistics (Eurostat, others)
(b): Link to website with density maps if available, tables with number of herds and flocks according to geographical area

3. General evaluation*: Please add the zoonotic agent

3.1. History of the disease and/or infection in the country[(a)]

General evaluation Mycobacterium

Republic of North Macedonia is not officially free of bovine tuberculosis according to Directive 64/432/EEC.

Bovine Tuberculosis control and eradication programmes have been implemented in the country for decades. However, after the introduction of the system for I&R for different species, the current Programme for control and eradication of Bovine Tuberculosis in place since 2007. The Programme is harmonized with the Council Directive 64/432/EEC, having regard to this of all territory in the country has been systematically implemented active surveillance for Bovine Tuberculosis.

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

The Bovine Tuberculosis control and eradication program is based on a single skin test approach performed every year to all bovine animals older than 6 weeks of age. Skin test is performed by private veterinary practitioners and personnel of the Faculty of Veterinary Medicine, Skopje, re-tested suspected positive animals after 42 days with comparative tuberculin test (bovine/avian tuberculin). Confirmed positive animals are slaughtered.

3.3. Any recent specific action in the Member State or suggested for the European Union[(b)]

Write text here please

3.4. Additional information

Write text here please

* **For each zoonotic agent**

(a): Epidemiological evaluation (trends and sources) over time until recent/current situation for the different relevant matrixes (food, feed, animal). If relevant: the official "disease status" to be specified for the whole country and/or specific regions within the country

(b): If applicable

4. Description of Monitoring/Surveillance/Control programmes system*: Please add the matrix and zoonotic agent

4.1. Monitoring/Surveillance/Control programmes system[(a)]

General evaluation Brucella

1. Bovine brucellosis – B. abortus

Republic of North Macedonia is not officially free from bovine brucellosis
All regions are not officially free of bovine brucellosis according to Directive 64/432/EEC.

Bovine Brucellosis control and eradication programmes have been implemented in the country for decades. However, after the introduction of the system for I&R for different species, the current Programme for control and eradication of Bovine Brucellosis in place since 2007.

2. Brucellosis in small ruminants – B. melitensis

Republic of North Macedonia is not recognized as country officially free from sheep and goat brucellosis according to Directive 91/68/EEC.

Republic of North Macedonia has no regions officially free from sheep and goat brucellosis according to Directive 91/68/EEC.

In the last several years, the Food and Veterinary Agency implements programs for control of the disease.

The surveillance program for brucellosis in sheep and goats has been systematically implemented since 2008 when an individual identification of sheep and goats started. After several years of implementation of the program's provisions, in 2010 and 2014 after the conducted analysis of the results, certain corrections and revision were made to the program.

The application of the new strategy resulted with division of the territory of the country into certain number of individual regions i.e. epidemiological units where depending of the widespread of the disease in the country, the prevalence, different measures for control of Brucellosis in sheep and goats apply. After 2008 mass vaccination against brucellosis in sheep and goats was implemented and country was divided in to three regions.

In following years, vaccination of replacements animals and test and slaughter of adult animals have been implemented.

In 2016 new programme for control and eradication of brucellosis in small ruminants were implemented and two municipalities (these are municipalities where mass vaccination was carried out in 2008) as a pilot project have been introduced in the scheme for testing of the animals and applying test and slaughter policy. The aim of this program is public and animal health protection and providing pre-requisites for

placing on the market of sheep and goats and products thereof, and at same time achievement and maintenance of the status of the holdings of sheep and goats “officially free from Brucellosis in according to Directive 91/68/EEC.

At the beginning of 2019, the Program for amending the program for control and eradication of brucellosis in sheep and goats for the period 2016-2020 was published (Official Gazette of the Republic of Macedonia No. 5/19). A key element is the sampling of brucellosis in sheep’s and goats in municipalities that have been subject to mass vaccination against Brucellosis and where sampling is not carried out in past years.

The aim was to determine the prevalence of brucellosis in regions where no diagnostic test was performed but also to obtain official brucellosis-free status in eligible regions, and then gradually throughout the country over the coming years. With this approach, the Food and Veterinary Agency strengthens the measures for protection of human and animal health and provides basic preconditions for placing on the market and export of live sheep and goats and their products as well as conditions for introduction and maintenance of the status of sheep herds and goats as "officially free" of brucellosis (B. melitensis) in sheep and goats.

Taking into account that vaccination against Brucellosis in sheep and goats is implemented in the country, the Food and Veterinary Agency aims towards reduction of the prevalence to 1% on the level of holdings and 0,05% on individual level on the whole territory of the Republic of North Macedonia.
According to the epidemiologic situation, it is possible to stop or reduce the vaccination in order to establish the basis for requesting the status “officially free” from Brucellosis in the selected regions, and then gradually on the whole territory of the country.

Measures for control of Brucellosis in sheep and goats have been implemented on the basis of the situation with the disease and the prevalence in the country. Vaccination of the offspring on the age from 3-6 months and testing and slaughter of adult animals (samples are taken from animals older than 6 months of age) are carried out. The testing of the animals for Brucellosis is free of charge. In case when the testing results show findings of positive cases, measures for eradication of the disease are imposed by the official veterinarians. The implementation of these measures is obligatory. The infected animals are confiscated and slaughtered, and the compensation for the confiscated animals is paid to the owners from the budget of the Republic of North Macedonia in line with the market price for those animal species.

By applying this strategy
✓ Reduce the further spreading of the brucellosis in sheep and goats
✓ Decrease the absolute number of positive animals
✓ Decrease the number of positive humans. In the last 13 years, the number of humane cases shows a decreasing trend.
✓

Year	No. of infected people
2008	485

2009	287
2010	163
2011	96
2012	82
2013	36
2014	40
2015	24
2016	22
2017	21
2018	11
2019	15
2020	3
2021	2

A sheep/goat is defined as infected with brucellosis if positive in following diagnostic tests, Rose Bengal test as a screening, and Complement Fixation test as confirmation method, ELISA test as a complementary test and isolation of Brucella melitensis by culture after slaughter.

Notifications are made according Law of veterinary health and Book of rules for compulsory notification animal diseases.

3.Bovine Tuberculosis- Mycobacterium bovis

The control of tuberculosis is based on Council Directive 64/432/EEC, which is implemented and adapted in National legislation in Program for control and eradication of Bovine Tuberculosis is in place since 2007. Currently Food and Veterinary Agency updating existing program for control of Bovine Tuberculosis in accordance with new EU regulation 2020/689.

All bovine animals older than 6 weeks were tested once a year in the whole country. Animals with suspected of intradermal tuberculin test, are retested after 42 days with comparative tuberculin test.

Frequency of testing depends on:
- the results of tuberculin testing

Testing of cattle is done annually according to the national control and eradication programme.

Tuberculin skin testing: single (bovine tuberculin) or comparative (bovine/avian tuberculin).

Private Veterinary practitioners is responsible for application of single intradermal tuberculin test. Faculty of Veterinary Medicine Skopje-responsible for comparative intradermal test (re - tuberculinisation) with avian and bovine tuberculin after at least 6 weeks.

A 'bovine' is defined as infected with bovine tuberculosis if the animal is positive by skin testing or if *Mycobacterium bovis* is isolated by culture or confirmed by laboratory analysis (PCR).
A 'holding' is defined as infected if Mycobacterium bovis was isolated from an animal of the holding.
Bovine tuberculosis diagnostic tests and procedures

- BTB infection in cattle is usually diagnosed in the live animals on the basis of delayed hypersensitivity reactions with single tuberculin test (STT) and with the comparative tuberculin test (CTT)

Bovine tuberculosis is considered to be confirmed if:
a) Laboratory examination has confirmed agent from M. tuberculosis complex in tissue material from bovine animal,
b) Post mortem examination shows typical pathological changes, and agent from M. tuberculosis complex is confirmed by the laboratory examination
c) Post mortem veterinary control at slaughter line found typical pathological changes, and agent from M. tuberculosis complex is confirmed by the laboratory examination. Mycobacterium tuberculosis complex: Mycobacterium tuberculosis, Mycobacterium bovis, Mycobacterium caprine.

4.Rabies

The program for oral vaccination of foxes against rabies started in 2011 under the EU funded project “Capacity building of the veterinary service for implementation of EU Acquis EuropeAid/124586/C/SER/MK” (16 August 2010-15 December 2012). The program is comprised of two vaccination campaigns per year (spring and autumn) during the six consecutive years, taking into consideration the epidemiological situation in the neighboring countries. So far, fifteen vaccination campaigns have been implemented.

Rabies - Awareness Campaign

Various communication tools for general public & professionals on human and animal rabies: posters, leaflets, TV advertisements, radio and TV spots
Trainings for veterinary practitioners, official veterinarians and hunting inspectors, hunters and medical doctors (more than 1000 people trained)
Marking of the World Rabies Day – September 28 (press conference, and open public event “promotion of the vaccination against rabies of pets and stray animals”
National committee for Rabies control: parties involved in animal rabies control and human prevention to exchange information and to coordinate rabies activities

a) Quality controls on arrival of vaccines
b) Quality controls prior distribution
c) Quality controls during distribution

Before delivery, vaccine baits are stored and stored at -20˚C and tested for virus titer control from the Institute for State Control of Veterinary Biological Materials and Medicines, Brno, Czech Republic and the National Reference Laboratory in the Republic of North Macedonia. During the whole process, cold chain monitoring was carried out (transport-storage - delivery of vaccine baits to the plane). Three aircraft were used for the implementation of the campaigns, such as Cessna and Piper PA, and distribution was carried out by two sports airports in Skopje and Stip. During oral vaccination, aircraft flying in parallel lines at 500-600 m distance between them by tracking the flying line with a built-in GPS system. The baits were emptied using SURVIS, an automated system, with anticipated evacuation to reach a density of 20 baht / km2. Each dropped bait was registered using the GPS system, and the data were transferred to the Food and Veterinary Agency. In order to cover the entire territory of the Republic of North Macedonia, during both campaigns, 144 campaigns were conducted per campaign. Distribution of vaccine baits was carried out on the entire territory of the Republic of North Macedonia (on an area of 23.628 km2) to an altitude of 2,000 meters, with the exception of settlements and water surfaces. GPS system has data for dumping 495.142 vaccine baits. The average density of distributed baits was 21 baht / km² with a standard deviation (SD) of 7 baht / km.

In the period from 18.11.2021 to 02.01.2022, 2022, the last campaign of oral vaccination of foxes against rabies was carried out in the territory of Republic of North Macedoina.
No cases of rabies in domestic and wild animals were registered during 2021. The Food and Veterinary Agency during 2021 conducted the campaign "Stop Rabies" where on a mobile application that was available on the Google play store or through the free phone number 0800 00 210 could be reported dead animals. In the framework of campaign "Stop Rabies", a total of 325 found dead wild animals were reported on the territory of the Republic of Northern Macedonia. The Food and Veterinary Agency pays a fee for finding and reporting a carcass of a dead or shot animal in accordance with the Decision on the amount of fees for conducting activities of public interest in the field of animal health.

4.2. Measures in place[(b)]

Measures in case of the positive findings or single cases (brucellosis in sheep and goats)

National surveillance program by the Competent Authority on mandatory legal base.
In case of positive result, official veterinarian should order measures as follows:
1) The herd is placed under official surveillance.
2) The implementation of the epidemiological examination in order to identify the source, the time and the method of infection and the previous and the further spread of the infection
3) Isolation of all positive animals within the herd.
4) Prohibition of any movement into or out of the herd, unless authorized by the CA, for the purpose of slaughter without delay.
5) Isolation, until the further testing or sending to slaughter.

6) Milk from the infected cows may only be fed to animals on the same farm, after suitable heat treatment.
7) Milk from cows from the infected herd (without prejudice to national provisions concerning foodstuffs) cannot be delivered to a dairy, except to undergo suitable heat treatment
8) Carcasses, half-carcasses, quarters, pieces and offal from infected cattle intended for use as feed for animals are treated in such a way to avoid contamination.
9) All positive animals must be slaughtered as soon as possible, but not later than 30 days after the owner was officially notified about the disease and his obligation.
10) After the slaughter of all positive animals and prior to restocking, general cleaning and disinfection of all herd and equipment should be performed, under official supervision and in accordance with the instructions of the official veterinarian.

Measures in case of the positive findings or single cases (brucellosis in sheep and goats)

1. The holding shall be placed under official surveillance.
2. The implementation of the epidemiological examination in order to identify the source, the time and the method of infection and the previous and the further spread of the infection and
3. It is prohibited to introduce into or to take out from the holding all susceptible animals.
4. The sheep and goats in cases of which the Brucellosis is officially confirmed sed must be isolated, and the positive animals must be visibly identified.
5. The animals in case of which the Brucellosis in sheep and goats is officially confirmed, shall be slaughtered under official supervision as soon as possible, and not later than 30 days from the day when the owner of the animal or the responsible person has been informed about the presence of the disease and the obligation for slaughtering according to the program for eradication.
6. The milk obtained from the positive animals must be safely disposed or may be used for nutrition of the animals from the same holding following the appropriate heat treatment.

The milk obtained from the positive animals is not used for human consumption. The milk obtained from animals with negative result and the milk obtained from vaccinated animals, according to this program, may be used for human consumption in accordance with the provisions set out in the veterinary legislation.

7. Safe disposal of aborted fetuses, still born lambs and kids and placentas.
8. Daily collection of the manure and litter/bedding and burial thereof or disinfection.

The manure and the litter/bedding must not be taken out at least three weeks following their collection.

9. The hay, the litter/bedding and all the other objects which came into contact with the positive animals, fetuses or placenta must be buried after previous submersion in disinfectant.
10. The premises and the area in which the animals have been present, must be thoroughly cleaned and disinfected with a disinfectant which is registered for use in the Republic of Macedonia.

11. The objects which came into contact with the diseased animals must be thoroughly cleaned and disinfected. If this activity is not possible, they must be disposed.
12. In case of complete depopulation of the holding, the repopulation can take place four weeks following the disinfection.
13. Re-testing of the animals at least 15 and maximum 30 days following the removal of the diseased animals and the disinfection. In case if the animals give negative result, they shall be tested two more times with negative results in such a way that the first testing shall be one month following the last negative result and the second shall be three months later

4.3. Notification system in place to the national competent authority[(c)]

According Law of veterinary health and Book of rules for compulsory notification animal diseases

4.4. Results of investigations and national evaluation of the situation, the trends [(d)] and sources of infection[(e)]

Results of implementation of program of control of Bovine Tuberculosis

Year	Tested animals	Reported suspected animals	Reported suspected animal holding	Positive animals	% of positive animals
2017	174.967	192	78	61	0.03%
2018	155.624	171	64	58	0.04%
2019	151.919	93	30	38	0.025%
2020	147.915	105	25	60	0.04%
2021	137.654	100	20	45	0.03%

Results of implementation of program of control of Brucellosis in sheep and goats

Year	Tested flocks	Positive flocks	% of positive flocks	No. of tested animals	No. of positive animals	% of positive animals
2017	6.608	97	1,47%	412.978	448	0.11%
2018	5.873	112	1,64%	412.091	373	0.09%
2019	6.658	198	2,96%	531.831	1906	0,36%
2020	6.156	58	1,02%	510.335	992	0,19%
2021	5.546	44	0,81%	661.212	515	0,10%

Result of implementation of oral vaccination of Rabies

Year*	**Dates of ORV campaign** (from-to) spring/autumn				**Vaccine used** (name & producer)	**No. of baits/per campaign**	No. of baits/per km² (bait density)	**Vaccination area (in km²)**	No. of vaccine batches whose titre was checked before distribution	Financing (EU/ National/other)
2017	20.04	28.04	26.10	03.11	Lysvulpen SAD Bern, Bioveta Chech Republic	500.000	21	23.569 km²	All	EU contribution
2018	10.04	23.04	26.10	3.11	Lysvulpen SAD Bern, Bioveta Chech Republic	500.000	21	23.628 km²	All	EU contribution
2019	04.04	21.04	26.10	15.11	Lysvulpen SAD Bern, Bioveta Chech Republic	500.000	21	23.235 km²	All	EU contribution
2020	Not planned									
2021	X	X	20.12.	02.01.2022	Lysvulpen SAD Bern, Bioveta Chech Republic	500.000	21	23.095 km²	All	EU contribution

4.5. Additional information

Write text here please

*** For all combinations of zoonotic agents and matrix (Food, Feed and Animals) for 'Prevalence' and 'Disease Status': one text form reported per each combination of matrix/zoonoses or zoonotic agent**

(a): Sampling scheme (sampling strategy, frequency of the sampling, type of specimen taken, methods of sampling (description of sampling techniques) + testing scheme (case definition, diagnostic/analytical methods used, limit of detection of the method, diagnostic flow (parallel testing, serial testing) to assign and define cases. If programme approved by the EC, please provide link to the specific programme in the Commission`s website.

(b): The control program/strategies in place, including vaccination if relevant. If applicable a description of how eradication measures are/were implemented, measures in case of the positive findings or single cases; any specific action decided in the Member State or suggested for the European Union as a whole on the basis of the recent/current situation, if applicable. If programme approved by the EC, please provide link to the specific programme in the Commission`s website.

(c): Mandatory: Yes/No.

(d): Minimum five years.

(e): Relevance of the findings in animals to findings in foodstuffs and for human cases (as a source of infection).

5. Food-borne Outbreaks

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

There are several systems for detections of outbreaks (including food borne outbreaks - FBOs) in North Macedonia:
Case based surveillance is based on the universal system for reporting communicable diseases, where each medical doctor is obliged to report one of the 64 mandatory reported communicable diseases (including diseases or syndromes of food poisoning). National case definitions are fully aligned with ECDC/EU case definitions form 2012.
Laboratories are obliged to report on 56 microbiological agents (including microbiological agents causing for FBOs).

Cases detected by physicians are reported to centers for Public Health on local and regional level, while national communicable disease surveillance is responsibility of National Institute of Public Health, where the national case-based database is located.
FBO are detected by detecting clusters of reported cases on local/regional level.
In addition, there is syndromic surveillance in place (EWARN – Early Warning and Response System for communicable diseases) were 75% of general practitioners are participating. Reporting is based on weekly aggregated data. The main purpose is to detect clusters of communicable diseases including FBO. Starting from 2020, the system for real time detection of clusters of communicable diseases is integrated in to electronic health records system in the country. From 2018 as part of event-based surveillance Institute of Public Health is running weekly epidemiological teleconference with regional level epidemiologists, the purpose is timely information exchange and detection of potential clusters or linked cases from different regions.
Finally, there is system for 24/7 response, where rapid response teams (epidemiologists and laboratory experts) for Centres for Public Health can lunch

outbreak investigation upon call from medical doctors for clustering of cases with food poisoning symptoms.
All outbreaks are reported on outbreak reporting forms by Centres for public health to the Ministry of health and to the Institute of Public Health. FBO are reported to the Food and Veterinary Agency as well.

5.2. Description of the types of outbreaks covered by the reporting

Every type of outbreak (or cluster of cases) is mandatory to be reported

5.3. National evaluation of the reported outbreaks in the country[(a)]

In 2021 2 foodborne and one suspected waterborne outbreak was reported.
1 FBO – 90 reported cases, 12 hospitalized cases and no death cases reported. Detected Salmonella enteritidis in feces samples from 77 cases and 3 food handlers. Salmonella san diego detected in mayonnaise samples. Acinetobacter spp. and Enterobacter spp. detected in kitchen surfaces.

2 FBO(WBO) – 93 reported cases, no hospitalized or death cases reported. Outpatient cases treated for enterocolitis, but all cases refused to give specimens for testing. Only common item identified as water from the water supply network supplying the three villages where the reported cases were from. Water supply system not disinfected regularly, but collected specimens were negative since immediate disinfection before collected samples.

3 FBO – 12 reported cases, no reported hospitalized or death cases. Staphylococcus aureus detected in feces samples from 6 cases.

5.4. Descriptions of single outbreaks of special interest

Write text here please

5.5. Control measures or other actions taken to improve the situation

For the identified outbreak control measures were put in place according to the type of the outbreak, situation in the field and according to the law and regulations in the country

5.6. Any specific action decided in the Member State or suggested for the European Union as a whole on the basis of the recent/current situation

Write text here please

5.7. Additional information

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(a): Trends in numbers of outbreaks and numbers of human cases involved, relevance of the different causative agents, food categories and the agent/food category combinations, relevance of the different type of places of food production and preparation in outbreaks, evaluation of the severity of the human cases.

6. Institutions and laboratories involved in antimicrobial resistance monitoring and reporting

The authorization for performing the analysis foreseen with the Annual plan for monitoring of antimicrobial resistance is granted by the Director of the Food and Veterinary Agency on a basis of a signed contract awarded through a carried out tendering procedure.

The laboratory for microbiology of food and feed within the Food Institute – Faculty of veterinary medicine – Skopje, Ss Cyril and Methodius University, Skopje was the laboratory authorized for performing analysis foreseen with the Annual plan for monitoring of antimicrobial resistance for 2018.

Faculty of Veterinary Medicine - Skopje was accredited on June 25, 2008 by Accreditation Institute of the of Republic of North Macedonia for compliance with the requirements from the standard МКС EN ISO/IEC 17025:2006. (certificate no. LT-006).

The scope of accreditation of the Food Institute covers 139 methods, including microbiology, chemistry and residues and contaminants in food.

The laboratory for microbiology of food and feed is a modern equipped laboratory with trained staff, accredited according to ISO 17025. The laboratory services provided by this laboratory are in compliance with modern needs and requirements of food business operators in the validation of their procedures, as well as the competent inspection authorities performing controls on the safety of food imports and in the domestic market. The laboratory of microbiology of food and feed is a national testing laboratory in food pathogens (Salmonella spp., Listeria monocytogenes, Campylobacter spp., E. Coli O157:H7).

In this laboratory the following type of testing is performed:

- ✓ microbiological analysis of raw materials, food and feed,
- ✓ microbiological analysis of potable water and water used in food industry,
- ✓ microbiological analysis of swabs from surfaces and swabs from the carcasses of slaughtered animals,
- ✓ implementation of the activities of the National monitoring programme for testing Salmonella spp.,
- ✓ determination of antimicrobial resistance of isolates,
- ✓ screening tests for detection the presence of antimicrobial substances in foodstuffs.

All of the tests in the laboratory are performed according to ISO accredited methods or ISO methods or other internationally accepted standards, in constant communication with clients on the course and selection of analytical methods. Currently, the laboratory is working with 13 methods accredited according to ISO for testing food and feed and materials taken from the food processing objects and 5 methods for testing water accredited according to ISO.

Short description of the institutions and laboratories involved in data collection and reporting

7. General Antimicrobial Resistance Evaluation

7.1. Situation and epidemiological evolution (trends and sources) regarding AMR to critically important antimicrobials[(a)] (CIAs) over time until recent situation

In 2017 Republic of North Macedonia has adopted the Program for antimicrobial resistance for the period 2017 – 2021. The Program for Antimicrobial Resistance for the period 2017 - 2021 is performing monitor of antimicrobial resistance in order to ensure compliance with the requirements stipulated by the Law on Food Safety for obtaining comparative data on the occurrence of antimicrobial resistance among agents of zoonoses, if they pose a threat to public health or other triggers. The Program lays down the detailed rules for the harmonised monitoring and reporting of antimicrobial resistance (AMR) to be carried out in accordance with the Book of rules on the manner of performing official controls and procedures for monitoring zoonoses and zoonotic agents and a list of zoonoses and zoonotic agents that are regularly monitored (Official Gazette of the Republic of Macedonia No. 80/11). The Book of rules on the manner of performing official controls and procedures for monitoring zoonoses and zoonotic agents and a list of zoonoses and zoonotic agents that are regularly monitored (Official Gazette of the Republic of Macedonia No. 80/11) is fully harmonized with the Directive 2003/99/EC of the European Parliament and of the Council of 17 November 2003 on the monitoring of zoonoses and zoonotic agents, amending Council Decision 90/424/EEC and repealing Council Directive 92/117/EEC.

The Program for Antimicrobial Resistance for the period 2017 – 2021 is fully harmonized with the Commission Implementing Decision 2013/652/EU of 12 November 2013 on the monitoring and reporting of antimicrobial resistance in zoonotic and commensal bacteria.

With the Program for Antimicrobial Resistance for the period 2017 – 2021 are cover the following bacteria obtained from samples from certain food-producing animal populations and certain food:

(a) *Salmonella spp.;*
(b) *Campylobacter jejuni* and *Campylobacter coli* (*C. jejuni* and *C. coli*);
(c) Indicator commensal *Escherichia coli* (*E. coli*);
(d) Indicator commensal *Enterococcus faecalis* and *Enterococcus faecium* (*E. faecalis* and *E. faecium*).

The Program also lays down the specific requirements for the harmonised monitoring and reporting of the *E. coli* producing the following enzymes in certain food - producing animal populations and in certain food:

(a) Extended-Spectrum β-Lactamases (ESBL);
(b) AmpC β-Lactamases (AmpC);
(c) Carbapenemases.

Additionally, according to the Annual Order for the execution of veterinary measures and controls for the protection of public health from contaminants or residues transferred from animals or products of animal origin and the Annual plan for monitoring of antimicrobial resistance in 2021, the FVA added Methicillin - resistant *Staphylococcus aureus* in broilers, fattened pigs, dairy cows, cattle under one years of age and cattle under two years of age in breeding farms, during slaughter in slaughterhouses and fresh meat from cattle under one years of age, pigs and broilers.

Republic of North Macedonia in 2021 has collected representative isolates of the following bacteria:

(a) *Salmonella spp.;*
(b) *C. jejuni;*
(c) Indicator commensal *E. coli;*
(d) ESBL- or AmpC- or carbapenemase-producing *E. coli, and*
(e) Methicillin - resistant *Staphylococcus aureus.*

Due to a low bacterial prevalence, low number of epidemiological units and low number of productions in the country, we have decided to collect samples each year for laying hens, broilers, cattle under one years of age, fattening pigs and fresh meat from cattle under one years of age, pigs and broilers in slaughterhouses and retail for all bacterial species. Due to a low bacterial prevalence, additional we included isolates obtained from the National control plan for Salmonella spp. and isolates form the Book of rules on special requirements for microbiological criteria for food, that is harmonized with regulation 2073/2005 (points 2.1.3, 2.1.4 and 2.1.5 of Chapter 2 of Annex I to Regulation (EC) No. 2073/2005).

Sample size, sample frequency and sampling design are in accordance with the Commission Implementing Decision 2013/652/EU.

7.2. Public health relevance of the findings on food-borne AMR in animals and foodstuffs

According to number of slaughter animals and the category of approved slaughterhouses, at the beginning of the year we prepare an Annual plan for AMR in accordance with the Program for Antimicrobial Resistance for the period 2017 – 2021, that is public published. Based on that, every epidemiological unit and slaughterhouse have defined number of samples to be collected per month. Samples originates from retail are divided based on consumption of different type of meat that is covered by the program. FVA has implemented Guideline for the sampling strategy and sampling method for the program for antimicrobial resistance

7.3. Recent actions taken to control AMR in food producing animals and food

See point 7.2.

7.4. Any specific action decided in the Member State or suggestions to the European Union for actions to be taken against food-borne AMR threat

All the analytical methods used for detection and confirmation are accredited. We used methods according to ISO and EURL AR (DTU DK). The broth microdilution method and commercial prepared plates in accordance with the Decision 2013/652 were used to test the antimicrobial susceptibility of bacteria. Designated laboratory for performing identification of isolated and detection of antimicrobial resistance was the Faculty of veterinary medicine. The analytical method used for antimicrobial susceptibility determination for *Salmonella spp. Enterococcus spp., Campylobacter spp., E. coli* and
MRSA with broth micro dilution technique is in accordance with the ISO 20776-1:2008. For isolation of *Enterococcus spp.*, the designated laboratory uses accredited in-house method.

7.5. Additional information

Designated laboratory uses accredited method for performing identification of isolated and detection of antimicrobial resistance according to Instruction manual according MKC EN ISO 20776-1:2008, MKC EN ISO 20776-2:2009 (Susceptibility testing of infectious agents and evaluation of performance of antimicrobial susceptibility test devices — Part 1: Broth micro-dilution reference method for testing the in vitro activity of antimicrobial agents against rapidly

growing aerobic bacteria involved in infectious diseases) and Laboratory Protocol written by EURL-AR DTU Food National Food Institute version 1 for isolation of methicillin – resistant *Staphylococcus aureus* (*MRSA*) from food – producing animals and farm environment.

FVA through the designated laboratory tests the isolates of antimicrobial agents and interprets the results using the epidemiological limit values and the concentration range indicated in tables of the Program for antimicrobial resistance.

Salmonella spp.			
First panel			
Antimicrobial	EUCAST epidemiological cut-off values	Lowest concentration range	Highest concentration range
Ampicillin	8	1	64
Chloramphenicol	16	8	128
Ciprofloxacin	0.064	0.015	8
Gentamicin	2	0.5	32
Tetracycline	8	2	64
Tigecycline	1 **	0.25	8
Azithromycin	16 *	2	64
Colistin	2	1	16
Nalidixic acid	16	4	128
Sulfamethoxazole	256 *	8	1024
Ceftazidim	2	0.5	8
Trimethoprim	2	0.25	32
Cefotaxim	0.5	0.25	4
Meropenem	0.125	0.03	16

* By proposal by EFSA (Complementary interpretive thresholds missing from Decision 2013/652/EU to be used for reporting AMO in *Salmonella spp.* and indicator commensal *E. coli*)
** For serovar *S. Typhimurium, Typhi* and *Paratyphi* - 1mg/L, for *S. Enteritidis* - 2mg/L

Salmonella spp.			
Second panel			
Antimicrobial	EUCAST epidemiological cut-off values	Lowest concentration range	Highest concentration range
Ertapenem	0.064	0.015	2
Cefepime	0.12 *	0.064	32
Cefotaxim	0.5	0.25	64
Cefotaxime + Clavulanic acid	0.5 *	0.064	64
Cefoxitin	8	0.5	64
Imipenem	1	0.12	16
Meropenem	0.12	0.03	16
Ceftazidim	2	0.25	128
Ceftazidime + Clavulanic acid	2 *	0.12	128
Temocillin	32 *	0.5	64

* By proposal by EFSA (Complementary interpretive thresholds missing from Decision 2013/652/EU to be used for reporting AMO in *Salmonella spp.* and indicator commensal *E. coli*)

Indicator commensal *E. coli*			
First panel			
Antimicrobial	EUCAST epidemiological cut-off values	Lowest concentration range	Highest concentration range
Ampicillin	8	1	64
Chloramphenicol	16	8	128
Ciprofloxacin	0.064	0.015	8
Gentamicin	2	0.5	32
Tetracycline	8	2	64
Tigecycline	1	0.25	8
Azithromycin	16 *	2	64
Colistin	2	1	16
Nalidixic acid	16	4	128
Sulfamethoxazole	64	8	1024
Ceftazidim	0.5	0.5	8
Trimethoprim	2	0.25	32
Cefotaxim	0.25	0.25	4
Meropenem	0.125	0.03	16

* By proposal by EFSA (Complementary interpretive thresholds missing from Decision 2013/652/EU to be used for reporting AMO in *Salmonella spp.* and indicator commensal *E. coli*)

Indicator commensal *E. coli*			
Second panel			
Antimicrobial	EUCAST epidemiological cut-off values	Lowest concentration range	Highest concentration range
Ertapenem	0.064	0.015	2
Cefepime	0.12	0.064	32
Cefotaxim	0.25	0.25	64
Cefotaxime + Clavulanic acid	0.25 *	0.064	64
Cefoxitin	8	0.5	64
Imipenem	0.5	0.12	16
Meropenem	0.12	0.03	16
Ceftazidim	0.5	0.25	128
Ceftazidime + Clavulanic acid	0.5 *	0.12	128
Temocillin	32 *	0.5	64

* By proposal by EFSA (Complementary interpretive thresholds missing from Decision 2013/652/EU to be used for reporting AMO in *Salmonella spp.* and indicator commensal *E. coli*)

C. jejuni			
Antimicrobial	EUCAST epidemiological cut-off values	Lowest concentration range	Highest concentration range
Ciprofloxacin	0.5	0.12	16
Erythromycin	4	1	128
Gentamicin	2	0.12	16
Tetracycline	1	0.5	64
Nalidixic acid	16	1	64
Streptomycin	4	0.25	16
C. coli			
Antimicrobial	EUCAST epidemiological cut-off values	Lowest concentration range	Highest concentration range
Ciprofloxacin	0.5	0.12	16
Erythromycin	8	1	128
Gentamicin	2	0.12	16
Tetracycline	2	0.5	64
Nalidixic acid	16	1	64
Streptomycin	4	0.25	16

E. fecalis			
Antimicrobial	EUCAST epidemiological cut-off values	Lowest concentration range	Highest concentration range
Gentamicin	32	8	1024
Chloramphenicol	32	4	128
Ampicillin	4	0.5	64
Vancomycin	4	1	128
Teicoplanin	2	0.5	64
Erythromycin	4	1	128
Quinupristin/Dalfopristin	***	0.5	64
Tetracycline	4	1	128
Tigecycline	0.25	0.03	4
Linezolid	4	0.5	64
Daptomycin	4	0.25	32
Ciprofloxacin	4	0.12	16
E. faecium			
Antimicrobial	EUCAST epidemiological cut-off values	Lowest concentration range	Highest concentration range
Gentamicin	32	8	1024
Chloramphenicol	32	4	128
Ampicillin	4	0.5	64
Vancomycin	4	1	128

Teicoplanin	2	0.5	64
Erythromycin	4	1	128
Quinupristin/Dalfopristin	1	0.5	64
Tetracycline	4	1	128
Tigecycline	0.25	0.03	4
Linezolid	4	0.5	64
Daptomycin	4	0.25	32
Ciprofloxacin	4	0.12	16

Recommended set of antimicrobial substances, EUCAST epidemiological cut-off values (ECOFFs) and clinical cut-points and concentration ranges to be tested in all MRSA isolates

Antimicrobial	Concentration range (in mg/l)		
	Optimal	Recommended	Minimal
Cefoxitin	4-64	4-32	4-32
Chloramphenicol	1-128	4-64	4-32
Ciprofloxacin	0.06-256	0.25-16	0.5-8
Clindamycin	0.03-256	0.12-8	0.12-8
Erythromycin	0.06-512	0.5-64	0.5-32
Gentamicin	0.06-64	0.5-32	0.5-16
Linezolid	0.25-8	1-8	2-8
Mupirocin	0.06-512	0.25-256	0.25-8
Quinupristin/ Dalfopristin	0.06-4	0.25-4	0.25-4
Sulfamethoxazole/ Trimethoprim (ª)	0.03-4	0.12-4	0.25-4
Tetracycline	0.12-256	0.5-64	0.5-8
Tiamulin	0.25-64	0.5-8	1-8
Vancomycin	0.25-8	1-8	1-8

(a) Sulfamethoxazole and Trimethoprim may be tested separately. In such cases, the following sensitivity tests are used:
Sulfamethoxazole: ECOFF: >128, clinical breakpoint: >1024, optimal threshold: 4-2048, recommended threshold: 32-1024, minimum threshold: 128-1024.
Trimethoprim: ECOFF: >2, clinical breakpoint: >4, optimal threshold: 0.25-512, recommended threshold: 0.5-32, minimum threshold: 1-16.

Recommended panel of optional antimicrobial substances and concentration ranges to be tested in all MRSA isolates

Antimicrobial	Concentration range (in mg/l)		
	Optimal	Recommended	Minimal
Cefoxitin	0.25-8	0.5-8	2-8
Chloramphenicol	0.25-32	1-32	2-32
Ciprofloxacin	0.03-1	0.12-1	0.25-1
Clindamycin	0.06-16	0.12-8	0.12-4
Erythromycin	0.06-16	0.25-8	0.5-4
Florfenicol	8	0.5	64
Penicillin	0.125	0.006	16
Spectinomycin	128	16	256
Streptomycin	16	4	64

(a): The CIAs depends on the bacterial species considered and the harmonised set of substances tested within the framework of the harmonised monitoring:

- For *Campylobacter* spp., macrolides (erythromycin) and fluoroquinolones (ciprofloxacin);
- For *Salmonella* and *E. coli*, 3rd and 4th generation cephalosporins (cefotaxime) and fluoroquinolones (ciprofloxacin) and colistin (polymyxin);