

Republic of North Macedonia

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

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

IN 2019

PREFACE

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

The report contains information on trends and sources of zoonoses and zoonotic agents in Republic of North Macedonia during the year 2019.

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

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

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

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

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

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

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

List of Contents

ANIMAL POPULATION TABLES	3
DISEASE STATUS TABLES FOR BRUCELLA	9
Bovine brucellosis in countries and regions that do not receive Community co-financing for eradication programme	9
Ovine or Caprine brucellosis in countries and regions that do not receive Community co-financing for eradication programme	10
DISEASE STATUS TABLES FOR MYCOBACTERIUM	11
Bovine tuberculosis in countries and regions that do not receive Community co-financing for eradication programme	11
PREVALENCE TABLES	12
Bacillus:BACILLUS	12
food	12
Brucella:BRUCELLA	13
animal	13
Campylobacter:CAMPYLOBACTER	14
animal	14
food	15
Clostridium:CLOSTRIDIUM	16
animal	16
food	17
feed	18
COXIELLA	19
animal	19
Escherichia coli:ESCHERICHIA COLI	20
food	20
feed	21
Leishmania:LEISHMANIA	22
animal	22
Listeria:LISTERIA	23
animal	23
food	24
Lyssavirus:LYSSAVIRUS	25
animal	25
Salmonella:SALMONELLA	26
animal	26
food	27
feed	29
Trichinella:TRICHINELLA	30
animal	30
Yersinia:YERSINIA	31
food	31
FOODBORNE OUTBREAKS TABLES	32
AMR TABLES FOR CAMPYLOBACTER	35
Campylobacter coli	35
Pigs - fattening pigs - Slaughterhouse - Monitoring - Official sampling - AMR MON	35
N_A	35
AMR TABLES FOR SALMONELLA	36
Salmonella Enteritidis	36
Gallus gallus (fowl) - laying hens - Farm - Control and eradication programmes - Official sampling - AMR MON	36
N_A	36
Gallus gallus (fowl) - laying hens - Farm - Control and eradication programmes - Official sampling - AMR MON	37
N_A	37
Gallus gallus (fowl) - laying hens - Farm - Control and eradication programmes - Private sampling - AMR MON	38
N_A	38
Salmonella Typhimurium	39
Gallus gallus (fowl) - laying hens - Farm - Control and eradication programmes - Official sampling - AMR MON	39
N_A	39
Gallus gallus (fowl) - laying hens - Farm - Control and eradication programmes - Private sampling - AMR MON	40
N_A	40
Gallus gallus (fowl) - laying hens - Farm - Control and eradication programmes - Private sampling - AMR MON	41
N_A	41
AMR TABLES FOR ESCHERICHIA COLI	42
Escherichia coli, non-pathogenic, unspecified	42
Cattle (bovine animals) - calves (under 1 year) - Slaughterhouse - Monitoring - Official sampling - AMR MON pni2	42
N_A	42
Cattle (bovine animals) - calves (under 1 year) - Slaughterhouse - Monitoring - Official sampling - AMR MON	43
N_A	43
Pigs - fattening pigs - Slaughterhouse - Monitoring - Official sampling - AMR MON	45
N_A	45
Meat from bovine animals - fresh - Retail - Monitoring - Official sampling - ESBL MON pni2	47
N_A	47
Meat from bovine animals - fresh - Retail - Monitoring - Official sampling - ESBL MON	48
N_A	48
OTHER AMR TABLES	49
Enterococcus, non-pathogenic - E. faecalis	49
Cattle (bovine animals) - calves (under 1 year) - Slaughterhouse - Monitoring - Official sampling - AMR MON	49
N_A	49
Pigs - fattening pigs - Slaughterhouse - Monitoring - Official sampling - AMR MON	50
N_A	50
Enterococcus, non-pathogenic - E. faecium	51
Cattle (bovine animals) - calves (under 1 year) - Slaughterhouse - Monitoring - Official sampling - AMR MON	51
N_A	51
Pigs - fattening pigs - Slaughterhouse - Monitoring - Official sampling - AMR MON	52
N_A	52
ESBL	53
LATEST TRANSMISSIONS	55

ANIMAL POPULATION TABLES

Table Susceptible animal population

Animal species	Category of animals	Population			
		holding	animal	slaughter animal (heads)	herd/flock
Antelopes	Antelopes - zoo animal - oryx		1		
Bears	Bears - zoo animal		4		
Bee-colonies	Bee-colonies				
Bison	Bison - zoo animals		2		
Cats	Cats - pet animals		3,531		
Cattle (bovine animals)	Cattle (bovine animals)	17,202			
	Cattle (bovine animals) - adult cattle over 2 years		72,212	5,778	
	Cattle (bovine animals) - breeding bulls		31,664		
	Cattle (bovine animals) - calves (under or around 1 year)		42,367		
	Cattle (bovine animals) - dairy cows		152,313		
	Cattle (bovine animals) - young cattle (1-2 years)				3,398
Crocodile	Crocodile - zoo animals		2		
Deer	Deer - zoo animals - fallow deer		14		
Dogs	Dogs - pet animals		77,385		
Eagle	Eagle - zoo animals		19		
Elephants	Elephants - zoo animals		2		
Emus	Emus - zoo animals		4		
Ferrets	Ferrets - pet animals		1		
Fish	Fish - aquarium fish	9			
	Fish - farmed	19			
	Fish - farmed - carp	33			
	Fish - farmed - salmon	55			
Gallus gallus (fowl)	Gallus gallus (fowl)		25		
	Gallus gallus (fowl) - broilers		124,041	124,041	
	Gallus gallus (fowl) - laying hens		2,284,695		
	Gallus gallus (fowl) - laying hens - adult			697,629	
	Gallus gallus (fowl) - mixed flocks/holdings	96			140
Giraffes	Giraffes - zoo animal		3		
Goats	Goats - animals under 1 year			383	
	Goats - mixed herds			64	
Guinea fowl	Guinea fowl		3		

Animal species	Category of animals	Population
		Beehives
Antelopes	Antelopes - zoo animal - oryx	
Bears	Bears - zoo animal	
Bee-colonies	Bee-colonies	253,489
Bison	Bison - 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	
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	
	Gallus gallus (fowl) - laying hens	
	Gallus gallus (fowl) - laying hens - adult	
	Gallus gallus (fowl) - mixed flocks/holdings	
Giraffes	Giraffes - zoo animal	
Goats	Goats - animals under 1 year	
	Goats - mixed herds	
Guinea fowl	Guinea fowl	

Animal species	Category of animals	Population		
		holding	animal	slaughter animal (heads) herd/flock
Jaguar	Jaguar - zoo animals		1	
Kangaroos	Kangaroos - zoo animal		10	
Leopards	Leopards - zoo animals		3	
Lion	Lion - zoo animals		2	
Llamas	Llamas - zoo animal		11	
Lynx	Lynx - zoo animal		3	
Monkeys	Monkeys - zoo animal		71	
Ostriches	Ostriches - zoo animals		2	
Other carnivores	Other carnivores - zoo animals		4	
Owls	Owls - zoo animals		1	
Parrots	Parrots - zoo animals		8	
Peafowl	Peafowl - zoo animal		4	
Pheasants	Pheasants - zoo animals		15	
Pigs	Pigs	2,315	125,230	
	Pigs - mixed herds - raised under controlled housing conditions			201,546
	Pigs - mixed herds - raised under controlled housing conditions - boars		608	
	Pigs - mixed herds - raised under controlled housing conditions - gilts		2,828	
	Pigs - mixed herds - raised under controlled housing conditions - piglets		53,681	6,652
	Pigs - mixed herds - raised under controlled housing conditions - sows		14,555	
Rabbits	Rabbits - farmed	19		929
Sea lion	Sea lion - zoo animals		2	
Sheep	Sheep - animals over 1 year		589,127	
	Sheep - animals under 1 year (lambs)		122,328	204,042
	Sheep - mixed herds			2,012
Sheep and goats	Sheep and goats	6,703	711,455	
Snakes	Snakes - zoo animal		12	
Solipeds, domestic	Solipeds, domestic	7,813		
	Solipeds, domestic - donkeys		2,466	
	Solipeds, domestic - horses		8,256	
	Solipeds, domestic - mule		1,073	
Swans	Swans - zoo animals		2	
Tiger	Tiger - zoo animals		4	
Turkeys	Turkeys		5	
Turtles	Turtles	14		
	Turtles - zoo animals		20	
Wild animals	Wild animals	86		

Population

Animal species	Category of animals	Beehives
Jaguar	Jaguar - zoo animals	
Kangaroos	Kangaroos - zoo animal	
Leopards	Leopards - zoo animals	
Lion	Lion - zoo animals	
Llamas	Llamas - zoo animal	
Lynx	Lynx - zoo animal	
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	
Pheasants	Pheasants - zoo animals	
Pigs	Pigs	
	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	
Rabbits	Rabbits - farmed	
Sea lion	Sea lion - zoo animals	
Sheep	Sheep - animals over 1 year	
	Sheep - animals under 1 year (lambs)	
	Sheep - mixed herds	
Sheep and goats	Sheep and goats	
Snakes	Snakes - zoo animal	
Solipeds, domestic	Solipeds, domestic	
	Solipeds, domestic - donkeys	
	Solipeds, domestic - horses	
	Solipeds, domestic - mule	
Swans	Swans - zoo animals	
Tiger	Tiger - zoo animals	
Turkeys	Turkeys	
Turtles	Turtles	
	Turtles - zoo animals	
Wild animals	Wild animals	

Animal species	Category of animals	Population			
		holding	animal	slaughter animal (heads)	herd/flock
Wolves	Wolves - zoo animal		6		

Animal species	Category of animals	Population
		Beehives
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	Number of herds with status officially free	Number of infected herds	Total number of animals	Number of herds tested under surveillance	Number of animals tested under surveillance	Total number of herds
North Macedonia	0	30	151,950	15,620	129,889	17,201
Вардарски (Vardarski)	0	8	12,850	803	11,481	911
Источен (Istočen)	0	0	18,374	1,779	16,079	1,882
Југозападен (Jugozapaden)	0	1	9,496	1,631	7,302	1,793
Југоисточен (Jugoistočen)	0	1	17,240	1,618	13,676	1,847
Пелагониски (Pelagoniski)	0	14	39,381	3,146	36,037	3,250
Полошки (Pološki)	0	2	20,727	2,850	17,132	3,113
Североисточен (Severoistočen)	0	1	18,632	2,332	16,646	2,618
Скопски (Skopski)	0	3	15,250	1,461	11,536	1,787

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

Region	Number of herds with status officially free	Number of infected herds	Total number of animals	Number of herds tested under surveillance	Number of animals tested under surveillance	Total number of herds
North Macedonia	0	198	706,779	6,673	537,985	6,696
Вардарски (Vardarski)	0	15	96,350	756	82,337	731
Источен (Istočen)	0	14	106,894	1,316	94,220	1,295
Југозападен (Jugozapaden)	0	27	109,724	796	73,929	834
Југоисточен (Jugoistočen)	0	21	63,176	998	55,680	988
Пелагониски (Pelagoniski)	0	47	109,712	717	89,232	693
Полошки (Pološki)	0	45	113,616	559	70,751	598
Североисточен (Severoistočen)	0	12	54,931	1,084	43,667	1,086
Скопски (Skopski)	0	17	52,376	447	28,169	471

DISEASE STATUS TABLES

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

Region	Number of herds with status officially free	Number of infected herds	Total number of animals	Number of animals tested with tuberculin routine testing	Total number of herds
North Macedonia	0	25	151,950	144,047	17,201
Вардарски (Vardarski)	0	0	12,850	11,935	911
Источен (Istočen)	0	0	18,374	17,961	1,882
Југозападен (Jugozapaden)	0	0	9,496	8,415	1,793
Југоисточен (Jugoistočen)	0	0	17,240	15,858	1,847
Пелагониски (Pelagoniski)	0	7	39,381	39,649	3,250
Полошки (Pološki)	0	13	20,727	19,384	3,113
Североисточен (Severoistočen)	0	5	18,632	18,088	2,618
Скопски (Skopski)	0	0	15,250	12,757	1,787

PREVALENCE TABLES

Table Bacillus:BACILLUS 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	Seeds, dried - flour/meal or finely ground powder - Retail - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	142	0	Bacillus	0

Table Brucella:BRUCELLA in animal

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling Details	Method	Sampling unit	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Cattle (bovine animals) - Farm - Not Available - animal sample - blood - Control and eradication programmes - Official sampling - Census	N_A	Complement fixation test (CFT)	animal	3188	141	Brucella	141
	Cattle (bovine animals) - Farm - Not Available - animal sample - blood - Control and eradication programmes - Official sampling - Census	N_A	Indirect ELISA (I-ELISA)	animal	46	5	Brucella	5
	Cattle (bovine animals) - Farm - Not Available - animal sample - blood - Control and eradication programmes - Official sampling - Census	N_A	Direct agglutination (DA)	animal	130406	260	Brucella	260
	Sheep and goats - Farm - Not Available - animal sample - foetus/stillbirth - Control and eradication programmes - Official sampling - Census	N_A	Detection method of microorganisms	animal	10	10	Brucella	10
	Sheep and goats - Slaughterhouse - Not Available - animal sample - organ/tissue - Control and eradication programmes - Official sampling - Selective sampling	N_A	Detection method of microorganisms	animal	203	3	Brucella	3

Table Campylobacter:CAMPYLOBACTER in animal

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling Details	Method	Sampling unit	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Cattle (bovine animals) - Farm - Not Available - animal sample - foetus/stillbirth - Clinical investigations - Official sampling - Suspect sampling	N_A	Detection method of microorganisms	animal	1	0	Campylobacter	0
	Goats - Farm - Not Available - animal sample - foetus/stillbirth - Clinical investigations - Official sampling - Suspect sampling	N_A	Detection method of microorganisms	animal	1	0	Campylobacter	0
	Sheep - Farm - Not Available - animal sample - foetus/stillbirth - Clinical investigations - Official sampling - Suspect sampling	N_A	Detection method of microorganisms	animal	2	0	Campylobacter	0

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 - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	10	0	Campylobacter	0
	Meat from broilers (Gallus gallus) - fresh - frozen - Border Control Posts - Not Available - food sample - meat - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	95	25	Campylobacter, unspecified sp.	25
	Meat from broilers (Gallus gallus) - fresh - frozen - Retail - Not Available - food sample - meat - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	10	0	Campylobacter	0
	Meat from pig - fresh - chilled - Border Control Posts - Not Available - food sample - meat - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	10	0	Campylobacter	0
	Meat from pig - fresh - frozen - Border Control Posts - Not Available - food sample - meat - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	20	0	Campylobacter	0
	Meat from poultry, unspecified - fresh - frozen - Border Control Posts - 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	Campylobacter	0
	Meat from turkey - minced meat - Border Control Posts - 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	Campylobacter	0
	Meat, mixed meat - meat products - Border Control Posts - Not Available - food sample - meat - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	10	0	Campylobacter	0
	Meat, mixed meat - meat products - 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	30	0	Campylobacter	0

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 - Not Available - animal sample - organ/tissue - Clinical investigations - Official sampling - Suspect sampling	N_A	Detection method of microorganisms	animal	10	3	Clostridium	3
	Goats - Farm - Not Available - animal sample - organ/tissue - Clinical investigations - Official sampling - Suspect sampling	N_A	Detection method of microorganisms	animal	15	2	Clostridium	2
	Sheep - Farm - Not Available - animal sample - organ/tissue - Clinical investigations - Official sampling - Suspect sampling	N_A	Detection method of microorganisms	animal	25	2	Clostridium	2

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 - based on Regulation 2073 - 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 - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	10	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 - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N.A	Not Available	2	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 - Not Available - animal sample - blood - Monitoring - passive - Official sampling - Suspect sampling	animal	N_A	Indirect ELISA (I-ELISA)	11	0		Coxiella	0
	Cattle (bovine animals) - Farm - Not Available - animal sample - foetus/stillbirth - Monitoring - passive - Official sampling - Suspect sampling	animal	N_A	Real-Time PCR (qualitative or quantitative)	2	0		Coxiella	0
	Sheep and goats - Farm - Not Available - animal sample - blood - Monitoring - passive - Official sampling - Suspect sampling	animal	N_A	Indirect ELISA (I-ELISA)	15	7		Coxiella	7
	Sheep and goats - Farm - Not Available - animal sample - foetus/stillbirth - Monitoring - passive - Official sampling - Suspect sampling	animal	N_A	Real-Time PCR (qualitative or quantitative)	9	3		Coxiella	3

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	10	5	Escherichia coli	5
	Cheeses made from cows' milk - soft and semi-soft - made from pasteurised milk - Retail - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	15	10	Escherichia coli	10
	Honey - 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 broilers (Gallus gallus) - fresh - chilled - Retail - 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 from pig - fresh - chilled - 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 - 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	45	0	Escherichia coli	0
	Meat, mixed meat - minced meat - intended to be eaten cooked - frozen - Retail - Not Available - food sample - meat - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	10	0	Escherichia coli	0
	Meat, mixed meat - minced meat - Retail - Not Available - food sample - meat - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	15	10	Escherichia coli	10

Table Escherichia coli:ESCHERICHIA COLI 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	Pet food - final product - Border Control Posts - Not Available - feed 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 - Not Available - animal sample - blood - Clinical investigations - Private sampling - Suspect sampling	N_A	Indirect Immunofluorescent Antibody test (IFAT)	animal	228	81	Leishmania	81
	Dogs - stray dogs - Natural habitat - Not Available - animal sample - blood - Clinical investigations - Private sampling - Suspect sampling	N_A	Indirect Immunofluorescent Antibody test (IFAT)	animal	1375	70	Leishmania	70
	Dogs - stray dogs - Veterinary clinics - Not Available - animal sample - blood - Clinical investigations - Private sampling - Suspect sampling	N_A	Indirect Immunofluorescent Antibody test (IFAT)	animal	1375	70	Leishmania	70

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 - Not Available - animal sample - foetus/stillbirth - Clinical investigations - Official sampling - Suspect sampling	N_A	Immunofluorescence method	animal	2	0	Listeria	0
	Sheep - Farm - Not Available - animal sample - organ/tissue - Clinical investigations - Official sampling - Suspect sampling	N_A	Immunofluorescence method	animal	2	0	Listeria	0

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 d)	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 d)	25	Gram	N_A	25	0	detection	Listeria monocytogenes	25	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 d)	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 - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed d)	25	Gram	N_A	20	0	detection	Listeria monocytogenes	20	0
	Cheeses, made from mixed milk from cows, sheep and/or goats - soft and semi-soft - made from pasteurised milk - Retail - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed d)	25	Gram	N_A	35	0	detection	Listeria monocytogenes	35	0
	Crustaceans - shrimps - raw - frozen - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed d)	25	Gram	N_A	5	0	detection	Listeria monocytogenes	5	0
	Dairy products (excluding cheeses) - fermented dairy products - fermented milk - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed d)	25	Millilitre	N_A	20	0	detection	Listeria monocytogenes	20	0
	Dairy products (excluding cheeses) - fermented dairy products - fermented milk - Retail - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed d)	25	Millilitre	N_A	15	0	detection	Listeria monocytogenes	15	0
	Dairy products (excluding cheeses) - ice-cream - made from pasteurised milk - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed d)	25	Gram	N_A	10	0	detection	Listeria monocytogenes	10	0
	Eggs - table eggs - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed d)	25	Gram	N_A	15	0	detection	Listeria monocytogenes	15	0
	Eggs - table eggs - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed d)	25	Gram	N_A	85	0	detection	Listeria monocytogenes	85	0
	Eggs - table eggs - Retail - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed d)	25	Gram	N_A	21	0	detection	Listeria monocytogenes	21	0
	Fish - raw - frozen - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed d)	25	Gram	N_A	20	0	detection	Listeria monocytogenes	20	0
	Meat, mixed meat - meat products - fermented sausages - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed d)	25	Gram	N_A	4	4	detection	Listeria monocytogenes	4	4
	Meat, mixed meat - meat products - fermented sausages - Retail - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed d)	25	Gram	N_A	70	4	detection	Listeria monocytogenes	70	4

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	Dogs - Hunting - Not Available - animal sample - brain - Monitoring - passive - Official sampling - Census	N_A	Immunofluorescence method	animal	3	0	Lyssavirus	0
	Foxes - wild - Hunting - Not Available - animal sample - brain - Monitoring - Official sampling - Objective sampling	N_A	Immunofluorescence method	animal	130	0	Lyssavirus	0
	Wolves - wild - Hunting - Not Available - animal sample - brain - Monitoring - active - Official sampling - Census	N_A	Immunofluorescence method	animal	60	0	Lyssavirus	0
	Wolves - wild - Hunting - Not Available - animal sample - brain - Monitoring - Official sampling - Objective sampling	N_A	Immunofluorescence method	animal	60	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 - Not Available - animal sample - organ/tissue - Unspecified - Official sampling - Not specified	animal		N_A	N_A	Detection method of microorganisms	2	0	Salmonella	0
	Poultry, unspecified - Farm - Not Available - animal sample - Unspecified - Official sampling - Suspect sampling	herd/flock		N_A	N_A	ISO 6579-1:2017 Salmonella	314	7	Salmonella spp., unspecified	7

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/fee d)	25	Gram	N_A	Not Available	15	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/fee d)	25	Gram	N_A	Not Available	20	0	Salmonella	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/fee d)	25	Gram	N_A	Not Available	25	0	Salmonella	0
	Cheeses, made from mixed milk from cows, sheep and/or goats - soft and semi-soft - made from pasteurised milk - Retail - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/fee d)	25	Gram	N_A	Not Available	15	0	Salmonella	0
	Eggs - table eggs - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/fee d)	25	Gram	N_A	Not Available	15	0	Salmonella	0
	Eggs - table eggs - whole - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/fee d)	25	Gram	N_A	Not Available	100	0	Salmonella	0
	Eggs - table eggs - whole - Retail - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/fee d)	25	Gram	N_A	Not Available	21	0	Salmonella	0
	Fish - raw - frozen - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/fee d)	25	Gram	N_A	Not Available	30	0	Salmonella	0
	Honey - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/fee d)	25	Gram	N_A	Not Available	5	0	Salmonella	0
	Meat from bovine animals - fresh - chilled - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/fee d)	25	Gram	N_A	Not Available	95	0	Salmonella	0
	Meat from bovine animals - fresh - chilled - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/fee d)	25	Gram	N_A	Not Available	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/fee d)	25	Gram	N_A	Not Available	315	0	Salmonella	0
	Meat from bovine animals - fresh - frozen - Retail - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/fee d)	25	Gram	N_A	Not Available	15	0	Salmonella	0
	Meat from broilers (Gallus gallus) - carcass - chilled - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/fee d)	25	Gram	N_A	Not Available	5	0	Salmonella	0
	Meat from broilers (Gallus gallus) - fresh - frozen - Border Control Posts - Brazil - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/fee d)	25	Gram	N_A	Not Available	66	0	Salmonella	0
	Meat from broilers (Gallus gallus) - fresh - frozen - Processing plant - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/fee d)	25	Gram	N_A	Not Available	10	5	Salmonella spp., unspecified	5
	Meat from broilers (Gallus gallus) - fresh - frozen - Retail - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/fee d)	25	Gram	N_A	Not Available	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 broilers (Gallus gallus) - 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	Not Available	445	34	Salmonella spp., unspecified	34
	Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - chilled - Retail - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	16	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	Not Available	1191	137	Salmonella spp., unspecified	137
	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	Not Available	20	10	Salmonella spp., unspecified	10
	Meat from pig - fresh - 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	20	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	Not Available	30	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	Not Available	10	0	Salmonella	0
	Meat, mixed meat - 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	Not Available	10	0	Salmonella	0
	Meat, mixed meat - meat preparation - intended to be eaten raw - 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	105	4	Salmonella spp., unspecified	4

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 fish - final product - Border Control Posts - Not Available - feed sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	1	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	8	0	Salmonella	0
	Compound feedingstuffs for poultry (non specified) - final product - Processing plant - Not Available - feed sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	50	Gram	N_A	Not Available	9	0	Salmonella	0
	Pet food - final product - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	195	0	Salmonella	0
	Pet food - final product - Retail - Not Available - feed sample - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	25	0	Salmonella	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 - Not Available - animal sample - organ/tissue - Monitoring - active - Official sampling - Objective sampling	N_A	Magnetic stirrer method for pooled sample digestion	animal	933	10	Trichinella	10

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 - 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	Yersinia	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	Not Available	10	0	Yersinia	0
	Meat from broilers (Gallus gallus) - 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	Not Available	65	0	Yersinia	0
	Meat from broilers (Gallus gallus) - mechanically separated meat (MSM) - soft-type - frozen - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	25	0	Yersinia	0
	Meat from pig - fresh - chilled - Border Control Posts - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	10	0	Yersinia	0
	Meat from pig - fresh - 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	15	0	Yersinia	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	Not Available	20	0	Yersinia	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	10	0	Yersinia	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	Yersinia	0
	Meat, mixed meat - minced meat - intended to be eaten cooked - frozen - Retail - Not Available - food sample - Surveillance - based on Regulation 2073 - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	25	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

Causative agent	Food vehicle	Outbreak strenght		Strong				Weak			
		N outbreaks	N human cases	N hospitalized	N deaths	N outbreaks	N human cases	N hospitalized	N deaths		
Enterococcus	Mixed food	1	3	3	0						
Hepatovirus A	Tap water, including well water	2	34	15	0						
	Unknown					1	16	4	0		
Salmonella	Mixed food	1	22	5	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
Enterococcus	unk	Not Available	Not Available	Not Available	N_A	General	Mixed food	N_A	Detection of causative agent in food chain or its environment - Symptoms and onset of illness pathognomonic to causative agent; Descriptive epidemiological evidence	Restaurant or Cafe or Pub or Bar or Hotel or Catering service	Not Available	Republic of North Macedonia	Storage time/temperature abuse	N_A	1	3	3	0
Hepatitis A	unk	Not Available	Not Available	Not Available	N_A	General	Tap water, including well water	N_A	Detection of causative agent in food chain or its environment - Symptoms and onset of illness pathognomonic to causative agent; Descriptive epidemiological evidence	School or kindergarten	Water source	Republic of North Macedonia	Water treatment failure	N_A	1	29	10	0
						Household	Tap water, including well water	N_A	Detection of causative agent in food chain or its environment - Symptoms and onset of illness pathognomonic to causative agent; Descriptive epidemiological evidence	Household	Water source	Republic of North Macedonia	Water treatment failure	N_A	1	5	5	0
Salmonella	unk	Not Available	Not Available	Not Available	N_A	General	Mixed food	N_A	Detection of causative agent in food vehicle or its component - Symptoms and onset of illness pathognomonic to causative agent; Descriptive epidemiological evidence	Canteen or workplace catering	Canteen or workplace catering	Republic of North Macedonia	Inadequate heat treatment	N_A	1	22	5	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
Hepatovirus A	unk	Not Available	Not Available	Not Available	N_A	Household	Unknown	N_A	Descriptive epidemiological evidence	Household	Unknown	Republic of North Macedonia	Unknown	N_A	1	16	4	0

ANTIMICROBIAL RESISTANCE TABLES FOR CAMPYLOBACTER

Table Antimicrobial susceptibility testing of *Campylobacter coli* 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	Ciprofloxacin	Erythromycin	Gentamicin	Nalidixic acid	Streptomycin	Tetracycline
ECOFF	0.5	8	2	16	4	2
Lowest limit	0.12	1	0.12	1	0.25	0.5
Highest limit	16	128	16	64	16	64
N of tested isolates	3	3	3	3	3	3
N of resistant isolates	1	0	1	1	3	1
MIC						
<=0.12	2					
<=0.5						2
<=1		3				
1			1			
2			1	1		
4				1		
16	1				1	
>16			1		2	
64				1		
>64						1

ANTIMICROBIAL RESISTANCE TABLES FOR SALMONELLA

Table Antimicrobial susceptibility testing of Salmonella Enteritidis in Gallus gallus (fowl) - laying hens

Sampling Stage: Farm

Sampling Type: environmental sample - boot swabs and dust

Sampling Context: Control and eradication programmes

Sampler: Official sampling

Sampling Strategy: Census

Programme Code: 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	0.5	2	16	0.064	2	2	0.125	16	256	8	1	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	1	1	1	1	1	1	1	1	1	1	1	1	1	1
N of resistant isolates	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MIC														
<=0.03										1				
0.03						1								
<=0.25			1									1		
<=0.5				1					1					
0.5														1
<=1							1							
<=2												1		
2	1													
<=4										1				
<=8					1									
8											1			
64											1			

Table Antimicrobial susceptibility testing of Salmonella Enteritidis in Gallus gallus (fowl) - laying hens

Sampling Stage: Farm

Sampling Type: animal sample - faeces

Sampling Context: Control and eradication programmes
Programme Code: AMR MON

Sampler: Official sampling

Sampling Strategy: Census

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	0.5	2	16	0.064	2	2	0.125	16	256	8	1	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	2	2	2	2	2	2	2	2	2	2	2	2	2	2
N of resistant isolates	1	0	0	0	0	0	0	0	0	1	0	1	0	0
MIC														
<=0.015						2								
<=0.03									2					
<=0.25			2										2	1
<=0.5				2				1						
0.5														1
<=1	1						2							
1								1						
<=2												1		
<=8					2									
8		2								1				
32										1				
64											2			
>64	1												1	

Table Antimicrobial susceptibility testing of Salmonella Enteritidis in Gallus gallus (fowl) - laying hens

Sampling Stage: Farm

Sampling Type: animal sample - faeces

Sampling Context: Control and eradication programmes
Programme Code: AMR MON

Sampler: Private sampling

Sampling Strategy: Census

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	0.5	2	16	0.064	2	2	0.125	16	256	8	1	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	3	3	3	3	3	3	3	3	3	3	3	3	3	3
N of resistant isolates	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MIC														
<=0.015						2								
<=0.03									3					
0.064						1								
<=0.25			3										2	3
<=0.5				3				2						
0.5													1	
<=1	2						3							
1								1						
<=2												3		
2	1													
<=4										2				
<=8					3									
8		3								1				
64											1			
128											1			
256											1			

Table Antimicrobial susceptibility testing of Salmonella Typhimurium in Gallus gallus (fowl) - laying hens

Sampling Stage: Farm

Sampling Type: environmental sample - boot swabs and dust

Sampling Context: Control and eradication programmes

Sampler: Official sampling

Sampling Strategy: Census

Programme Code: 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	0.5	2	16	0.064	2	2	0.125	16	256	8	1	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	1	1	1	1	1	1	1	1	1	1	1	1	1	1
N of resistant isolates	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MIC														
<=0.03									1					
0.064						1								
<=0.25			1										1	
<=0.5				1				1						
0.5														1
<=1	1						1							
<=2												1		
<=4										1				
4		1												
<=8					1									
64											1			

Table Antimicrobial susceptibility testing of Salmonella Typhimurium in Gallus gallus (fowl) - laying hens

Sampling Stage: Farm

Sampling Type: environmental sample - boot swabs and dust

Sampling Context: Control and eradication programmes

Sampler: Private sampling

Sampling Strategy: Census

Programme Code: 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	0.5	2	16	0.064	2	2	0.125	16	256	8	1	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	1	1	1	1	1	1	1	1	1	1	1	1	1	1
N of resistant isolates	1	0	0	0	0	0	0	0	0	1	0	1	0	0
MIC														
<=0.015						1								
<=0.03									1					
<=0.25			1										1	1
<=0.5				1				1						
<=1							1							
4		1												
<=8					1									
32	1													
>64												1		
>128										1				
256											1			

Table Antimicrobial susceptibility testing of Salmonella Typhimurium in Gallus gallus (fowl) - laying hens

Sampling Stage: Farm

Sampling Type: animal sample - faeces

Sampling Context: Control and eradication programmes
Programme Code: AMR MON

Sampler: Private sampling

Sampling Strategy: Census

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	0.5	2	16	0.064	2	2	0.125	16	256	8	1	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	2	2	2	2	2	2	2	2	2	2	2	2	2	2
N of resistant isolates	1	0	0	0	0	0	0	0	0	0	1	1	0	0
MIC														
<=0.015						1								
<=0.03									2					
0.03						1								
<=0.25			2										1	1
<=0.5				2				2						
0.5													1	1
<=1	1						2							
<=2												1		
<=4										2				
4		2												
<=8					2									
32	1													
64												1		
256											1			
512											1			

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) - veal calves

Sampling Stage: Slaughterhouse

Sampling Type: animal sample - caecum

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: AMR MON pnl2

Analytical Method:

Country of Origin: Republic of North Macedonia

Sampling Details:

AM substance	Cefepime	Cefotaxim	Cefotaxime + Clavulanic acid	Cefoxitin	Ceftazidim	Ceftazidime + Clavulanic acid	Ertapenem	Imipenem	Meropenem	Temocillin
Cefotaxime synergy test	Not Available	Not Available	Positive/Pres ent	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
Ceftazidime synergy test	Not Available	Not Available	Not Available	Not Available	Not Available	Positive/Pres ent	Not Available	Not Available	Not Available	Not Available
ECOFF	0.125	0.25	0.25	8	0.5	0.5	0.06	0.5	0.125	32
Lowest limit	0.06	0.25	0.064	0.5	0.25	0.12	0.015	0.12	0.03	0.5
Highest limit	32	64	64	64	128	128	2	16	16	64
N of tested isolates	1	1	1	1	1	1	1	1	1	1
N of resistant isolates	1	1	0	0	1	0	0	0	0	0
MIC										
<=0.03									1	
0.03							1			
<=0.064			1							
<=0.12						1		1		
1					1					
2	1									1
4				1						
8		1								

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

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	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Collistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
ECOFF	8	16	0.25	0.5	16	0.064	2	2	0.125	16	64	8	1	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	18	18	18	18	18	18	18	18	18	18	18	18	18	18
N of resistant isolates	4	0	1	1	2	1	0	1	0	0	6	7	0	1
MIC														
<=0.015						16								
<=0.03									18					
0.03						1								
<=0.25			17										18	14
<=0.5				17				7						
0.5														3
<=1	4						17							
1				1				10						
<=2		1										9		
2	8						1							
<=4										15				
4	1	4										2		
>4			1											
<=8					16						1			
8	1	11								3				
>8						1								
16	1	2									4	2		
32					2						6	1		
>32								1						1
64											1			
>64	3											4		

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	16	64	8	1	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	18	18	18	18	18	18	18	18	18	18	18	18	18	18
N of resistant isolates	4	0	1	1	2	1	0	1	0	0	6	7	0	1
MIC														
128											1			
256											1			
512											1			
>1024											3			

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: AMR MON

Analytical Method:

Country of Origin: Republic of North Macedonia

Sampling Details:

AM substance	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Collistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
ECOFF	8	16	0.25	0.5	16	0.064	2	2	0.125	16	64	8	1	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	19	19	19	19	19	19	19	19	19	19	19	19	19	19
N of resistant isolates	7	0	0	0	3	4	0	0	0	1	5	12	0	2
MIC														
<=0.015						14								
<=0.03								19						
0.064						1								
0.12						1								
<=0.25			19										13	15
0.25						1								
<=0.5				19				7						
0.5						1							5	1
<=1	7						19							
1								10					1	1
<=2		1										6		
2	4							2						
<=4										15				
4		6										1		
<=8					14						2			
8	1	12				1				3				
16					2						6	2		
32	1										3	5		
>32														2
64					1						3	4		
>64	6											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	16	64	8	1	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	19	19	19	19	19	19	19	19	19	19	19	19	19	19
N of resistant isolates	7	0	0	0	3	4	0	0	0	1	5	12	0	2
MIC														
128					1						1			
>128					1					1				
>1024											4			

Table Antimicrobial susceptibility testing of Escherichia coli, non-pathogenic, unspecified in Meat from bovine animals - fresh - chilled

Sampling Stage: Retail

Sampling Type: food sample - meat

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: ESBL MON pnl2

Analytical Method:

Country of Origin: Republic of North Macedonia

Sampling Details:

AM substance	Cefepime	Cefotaxim	Cefotaxime + Clavulanic acid	Cefoxitin	Ceftazidim	Ceftazidime + Clavulanic acid	Ertapenem	Imipenem	Meropenem	Temocillin
Cefotaxime synergy test	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
Ceftazidime synergy test	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
ECOFF	0.125	0.25	0.25	8	0.5	0.5	0.06	0.5	0.125	32
Lowest limit	0.064	0.25	0.06	0.5	0.25	0.125	0.015	0.12	0.03	0.5
Highest limit	32	64	64	64	128	128	2	16	16	64
N of tested isolates	1	1	1	1	1	1	1	1	1	1
N of resistant isolates	0	0	0	0	0	0	1	0	1	0
<=0.064	1									
<=0.25		1			1					
0.25			1						1	
0.5						1	1	1		
2										1
4				1						

Table Antimicrobial susceptibility testing of Escherichia coli, non-pathogenic, unspecified in Meat from bovine animals - fresh - chilled

Sampling Stage: Retail

Sampling Type: food sample - meat

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: ESBL MON

Analytical Method:

Country of Origin: Republic of North Macedonia

Sampling Details:

AM substance	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Collistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
ECOFF	8	16	0.25	0.5	16	0.064	2	2	0.125	16	64	8	1	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	1	1	1	1	1	1	1	1	1	1	1	1	1	1
N of resistant isolates	1	0	0	0	0	0	0	0	1	0	0	0	0	0
MIC														
<=0.015						1								
<=0.25			1											
0.25									1					
<=0.5				1										
0.5													1	
<=1							1							
1								1						
<=2		1										1		
2														1
<=4										1				
<=8					1									
64											1			
>64	1													

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:

AM substance	Ampicillin	Chloramphenicol	Ciprofloxacin	Daptomycin	Erythromycin	Gentamicin	Linezolid	Quinupristin/Dalfopristin	Teicoplanin	Tetracycline	Tigecycline	Vancomycin
ECOFF	4	32	4	4	4	32	4	1	2	4	0.25	4
Lowest limit	0.5	4	0.12	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
MIC												
0.064											2	
0.12											3	
<=0.25				5								
<=0.5	4						4	4	5			
0.5			1									
<=1					5					3		5
1	1		3									
2			1				1	1		1		
<=4		5										
<=8						5						
32										1		

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	32	4	1	2	4	0.25	4
Lowest limit	0.5	4	0.12	0.25	1	8	0.5	0.5	0.5	1	0.03	1
Highest MIC limit	64	128	16	32	128	1024	64	64	64	128	4	128
0.064											1	
0.12											4	
<=0.25				3								
<=0.5	3						1	2	5			
0.5				1								
<=1					4					1		3
1	2		5	1			3	1				
2							1	1				2
<=4		4										
4										1		
<=8						5						
8								1		1		
32										1		
128		1								1		
>128					1							

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	4	4	32	4	1	2	4	0.25	4
Lowest limit	0.5	4	0.12	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
MIC												
<=0.03											1	
0.064											2	
0.25											1	
<=0.5	2						2	2	4			
<=1					2					4		4
1			1	1								
2	2		2	1			2	1				
<=4		3										
4			1	2				1				
<=8						4						
8		1			1							
16					1							

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

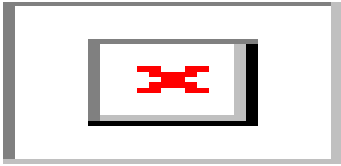
Sampling Details:

AM substance	Ampicillin	Chloramphenicol	Ciprofloxacin	Daptomycin	Erythromycin	Gentamicin	Linezolid	Quinupristin/Dalfopristin	Teicoplanin	Tetracycline	Tigecycline	Vancomycin
ECOFF	4	32	4	4	4	32	4	1	2	4	0.25	4
Lowest limit	0.5	4	0.12	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
MIC												
<=0.03											1	
0.064											3	
0.12											1	
<=0.25				1								
<=0.5	2						1	1	5			
<=1					3					4		5
1	2		3	1			2	1				
2	1		2		1		1	1				
<=4		4										
4				2			1	2				
<=8						4						
8				1								
16						1						
64		1										
128					1							
>128										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	11-Sep-2020
Animal Population	25-Jul-2020
Disease Status	03-Sep-2020
Food Borne Outbreaks	25-Jul-2020
Prevalence	25-Jul-2020

Ss. Cyril and Methodius University Faculty of Veterinary Medicine – Skopje

Faculty of Veterinary Medicine – Skopje has teaching, research and applicative activity in field of veterinary medicine and veterinary public health.

For educational and research activities, the Faculty of Veterinary Medicine-Skopje is organized in scientific and educational unit- Institutes. There are three teaching-scientific organization units in FVM-S. All Institutes of the Faculty are constituted by different departments, laboratories and clinics where the processes of education, research.

Within the Veterinary Institute the following departments are organized:

- Department of farm animals-Internal medicine
- Department of small animal internal medicine and horses
- Department of biology and pathology of fish, bees and wild animals
- Department of veterinary surgery
- Department for infectious diseases and epidemiology
- Department of avian diseases
- Department of parasitology and parasitic diseases
- Department of pathology and forensic medicine
- Department of pathophysiology
- Department of animal hygiene and environmental

Within the Institute of Food, the following departments are organized:

- Department of food safety and veterinary public health
- Department of nutrition of farm animals
- Department of Chemistry
- Department of Pharmacology and Toxicology
- Department of economics and management
- Department of Veterinary Legislation

Within the Institute of Reproduction and Biomedicine the following departments are organized:

- Department of Biochemistry and cell biology
- Department of functional morphology
- Department of animal science
- Department of reproduction

Within the Veterinary Institute the following Centres are organized:

- Zoonosis centre
- Centre for side effects and information for veterinary medical products
- Education center for food safety and veterinary public health
- Centre for artificial insemination
- Centre for animal welfare

Within the Institute for Veterinary following laboratories are included:

- Laboratory for Microbiology
- Laboratory for serology and molecular diagnostics
- Laboratory for parasitology and parasitic diseases
- Laboratory for TSE
- Laboratory for diagnosis fish, bees and hunting wild game diseases
- Laboratory for Pathology and patohystology
- Laboratory for Pathophysiology
- Laboratory for rabies
- Laboratory for Animal Hygiene and Environmental
- Cabinet for visual diagnostics
- Reception office

Within the Institute for Food following laboratories are included:

- Laboratory for microbiology of food and feed
- Laboratory for quality control of food and feed
- Laboratory for residues and contaminants
- Laboratory for raw milk quality
- Laboratory for Pharmacology and Toxicology

Within the Institute for Reproduction and Biomedicine following laboratories are included:

- Laboratory for production, cryoconservation and control of semen
- Laboratory for assisted reproduction
- Plastination laboratory
- Laboratory for histology and embryology
- Laboratory for Biochemistry and Cell Biology

The all Institutes of the Faculty are constituted by different departments, laboratories and clinics where the processes of education, research.

The capacities of the Veterinary Institute give opportunity for students to learn the fundamental principles of veterinary medicine by the educational process in the clinical departments. This Institute incorporates laboratories for diagnosis of infectious diseases affecting farm animals and humans, being included and regulated by the state policies. Another unit of the veterinary Institute is the University Veterinary Clinic which offers a wide range of diagnostic, surgical and therapeutically prospects.

The Food Institute includes departments focusing on food safety, food quality and veterinary public health issues. The laboratories are specialized in testing food safety and quality for human consumption, using different microbiological, chemical and nutritive analysis methods. They also offer an opportunity for animal food and water analysis.

The Institute for Reproduction and Biomedicine incorporates departments and laboratories which focus on issues regarding animal breeding, reproduction and animal welfare, but also those that study the fundamentals of veterinary medicine by pre-clinical subjects. The laboratory for Semen evaluation, Cryopreservation and Assisted Reproduction performs a wide range of scientific studies in the field of Andrology. Plastination laboratory produce anatomical models which are widely used for the education process. Department for Histology, Embryology as well the laboratories for Clinical Biochemistry are fully engaged in the work process of the University Veterinary Clinic of the Faculty of veterinary medicine in Skopje.

Within the application activities, on the Faculty of veterinary medicine in Skopje (FVMS), well equipped laboratories are functioning. They all fulfil different requirements to external customers. FVMS basic commitment is to increase the quality of service, production and testing, as well as customer satisfaction and national and international legal requirements of competent authorities. Therefore, a priority commitment of the management team of FVMS is the introduction of management systems and quality control.

The system for managing quality requirements according the International Standard MKC EN ISO 9001:2008 in the FVMS was introduced and certified on 02/05/2005 by the international certification body BSI (British Standard Institution – Cert. No. FS 74597), recertified on 26.03.2008, with the final validity till 01.03.2014.

FVMS (Institute for food and Veterinary institute) is accredited by the Institute for Accreditation of R. Macedonia (certificate.no. LT-006), which confirms that the requirements of the international standard „MKC EN ISO/IEC 17025:2006” in the field of testing food products, beverages, water and examination of animal diseases are fulfilled.

Implementation of international standards „MKC EN ISO/IEC 17025:2006” in the Institute for food and Veterinary institute in the FVMS for our customers means a guarantee for the reliability of results for all samples tested within the same. That is also the guarantee that tests will be conducted in accordance with the latest national and international standards and regulations. FVMS will also maintain a high level of reliability to customers for testing results, and high level of services depending on the customer requirements.

Accredited laboratories of FMVS are proposed to be “National Reference Laboratory” for control of food safety and monitoring of residues, zoonoses and antimicrobial resistance, as provided in Regulation EC/882/2004. In its vision and mission, FVMS unequivocally states that it will be competitive, internationally accredited laboratory that performs routine tests to monitor food safety, animal health and welfare in their varieties in North Macedonia.

Animal population
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 ISAHV – Identification and registration system since 2004, starts with bovine.
2. Definitions used for different types of animals, herds, flocks and holdings as well as the production types covered
<p>” 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.</p> <p>” 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.</p> <p>“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.</p>
3. National changes of the numbers of susceptible population and trends
<p>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.</p> <p>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.</p>
4. Geographical distribution and size distribution of the herds, flocks and holdings^(b)
5. Additional information
(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
General evaluation Mycobacterium
1. History of the disease and/or infection in the country^(a)
<p>Republic of North Macedonia is not officially free of bovine tuberculosis according to Directive 64/432/EEC.</p> <p>All regions are not officially free of bovine tuberculosis according to Directive 64/432/EEC</p> <p>In the last several years, the Food and Veterinary Agency implements programs for control and eradication of the disease.</p>
2. Evaluation of status, trends and relevance as a source for humans
<p>The control of bovine 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. All bovine animals older than 6 weeks were tested once a year in the whole country. Animals with suspected tuberculin skin test, are retested after 42 days with comparative tuberculin test.</p>
3. Any recent specific action in the Member State or suggested for the European Union^(b)
4. Additional information
<p>* For each zoonotic agent</p> <p>(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</p> <p>(b): If applicable</p>

General evaluation Brucella

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

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.

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 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.

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

1. Bovine brucellosis – B. abortus

Regular annual diagnostic tests for Bovine Brucellosis were performed on all cattle older than six months while retest of all positive herds continuously performed during the year.

Testing of cattle is done annually according to the national control program for control and eradication of bovine brucellosis.

Blood sampling and for isolation of *Brucella abortus* uterine discharges, aborted fetuses, udder secretions or selected tissues, such as lymph nodes.

Methods of sampling is Blood sampling.

An animal is defined as infected if *Brucella* spp. has been isolated by culture and identified. A herd is defined as infected if one of its animals is positive by bacteriological examination for Brucellosis.

2. Brucella in sheep and goats – *B. melitensis*

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. The measures applied under the new program are at the holding level.

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.

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 10 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

A sheep/goat is defined as infected with brucellosis if positive in two diagnostic tests, Rose Bengal test as a screening, and Complement Fixation test as confirmation method, ELISA 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.

The overall strategy is to be compliance with European legislation and to strengthen the surveillance and control program for brucellosis in sheep and goats.

The specific aims will be:

- 1) To assess the epidemiological situation in areas in which mass vaccination was previously performed and to apply nationwide a test and slaughter policy and

2) To evaluate if, according to epidemiological situation, it is possible to stop or reduce vaccination of replacements in order to pose the bases for claiming the Officially Brucellosis Free (OBF) status in selected regions and then progressively in all the country.
3. Any recent specific action in the Member State or suggested for the European Union^(b)
4. Additional information
<p>* For each zoonotic agent</p> <p>(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</p> <p>(b): If applicable</p>
Bovine Tuberculosis- Mycobacterium bovis
1. Monitoring/Surveillance/Control programmes system^(a)
<p>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.</p> <p>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.</p> <p>Frequency of testing depends on: - the results of tuberculin testing</p> <p>Testing of cattle is done annually according to the national control and eradication programme.</p> <p>Tuberculin skin testing: single (bovine tuberculin) or comparative (bovine/avian tuberculin).</p> <p>Private Veterinary organization 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.</p> <p>A 'bovine' is defined as infected with bovine tuberculosis if the animal is positive by skin testing or if <i>Mycobacterium bovis</i> is isolated by culture or confirmed by laboratory analysis (PCR).</p>

A 'holding' is defined as infected if *Mycobacterium bovis* was isolated from an animal of the holding.

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*.

2. Measures in place^(b)

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.

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

Year	Tested animals	Reported suspected animals	Reported suspected animal holding	Positive animals	% of positive animals
2013	167.128	269	184	269	0.002%
2014	180.902	112	71	109	0.061%
2015	187.601	144	52	33	0.04%
2016	188.519	147	81	45	0.04%
2017	174.967	192	78	61	0.03%
2018	155.624	171	64	58	0.04%
2019	151.919	93	30	38	0.025%

5. Additional information

*** 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, 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).

Rabies

1. Monitoring/Surveillance/Control programmes system^(a)

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, twelve vaccination campaigns have been implemented.

The contract is signed in July 2017, and it covers 4 campaigns for oral vaccination of foxes. During 2019, the following activities were implemented:

A spring campaign for oral vaccination of foxes was completed, whereby 500,000 vaccine bites were distributed in the entire territory of the Republic of North Macedonia,

An autumn campaign for oral vaccination of foxes was completed, whereby 500,000 vaccine bites were distributed in the entire territory of the Republic of North Macedonia.

Rabies – Diagnostic tests used

- Fluorescent Antibody Test (FAT, accredited 2013), *Protocol*: Laboratory SOP (references: OIE manual and EURL SOPs)
- Biomarker Detection (accredited 2013), *Protocol*: Laboratory SOP (references: OIE manual and EURL SOPs)
- Rabies Tissue Culture Infection Test (RTCIT), *Protocol*: Laboratory SOP (references: OIE manual and EURL SOPs)
 - *Cells*: Neuroblastoma cell line (N2a)
 - *Conjugate*: Fujirebio Diagnostics FITC Anti-Rabies Monoclonal Globulin
 - Vaccine titer
 - *Vaccine*: Fuchsoral SAD B19, IDT Biologika and Lysvulpen (Bioveta, Czech Republic),
 - *Cells*: BHK 21
 - *Protocol*: supplied by Manufacturer
- ELISA (accredited 2013)
 - *Test*: BioPro Rabies ELISA Ab *kit*
 - *Protocol*: supplied by Manufacturer
- Real Time (one step) RT-PCR
 - *Species amplified*: RABV, DUVV, EBLV-1, EBLV-2, ABLV
 - *Protocol*: Laboratory SOP (reference: EURL SOP)

Rabies – cases

Date of occurrence	Animal species	Village	Municipality	History
26.07.2011	Fox	Stari Grad	Veles	The fox enter the backyard of the village house during the day and bite a dog. The fox (and the dog) were shot.
03.08.2011	Fox	Martolci	Veles	The fox enter the backyard of the village house during the day and bite a dog. The fox (and the dog) were shot.
08.09.2011	Wolf	Istibanja	Vinica	The wolf enter the backyard of the village house during the day and bite a dog. The wolf (and the dog) were shot.
11.09.2011	Wolf (young)	Istibanja	Vinica	The young wolf came close to the village house in the evening (not entering the backyard). The dog start to bark. The owner came out, saw the young wolf and kill it with a hey fork.
17.11.2011	Fox	Selemli	Gevgelija	Regular monitoring for vaccination efficacy (shot during hunting)
30.11.2011	Fox	Dulica	Makedonska Kamenica	Found dead, together with one wolf, one dog and one sheep. The wolf and the dog were also investigated for rabies but were negative.
19.01.2012	Wolf	Banja	Chesinovo Oblesevo	Regular monitoring for vaccination efficacy (shot during hunting)
23.02.2012	Wolf	Glavovica	Kocani	Regular monitoring for vaccination efficacy (shot during hunting)
02.03.2012	Cat	Jargulica	Radovish	The cat bite and scratch the owners. The cat and two other animals (dog and cat in the same yard) were eutanised.

Rabies – cases



Date

- 26 July 2011
- 03 August 2011
- 08 September 2011
- 11 September 2011
- 17 November 2011
- 30 November 2011
- 19 January 2012
- 23 February 2012
- 02 March 2012

2.Measures in place^(b)

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”)

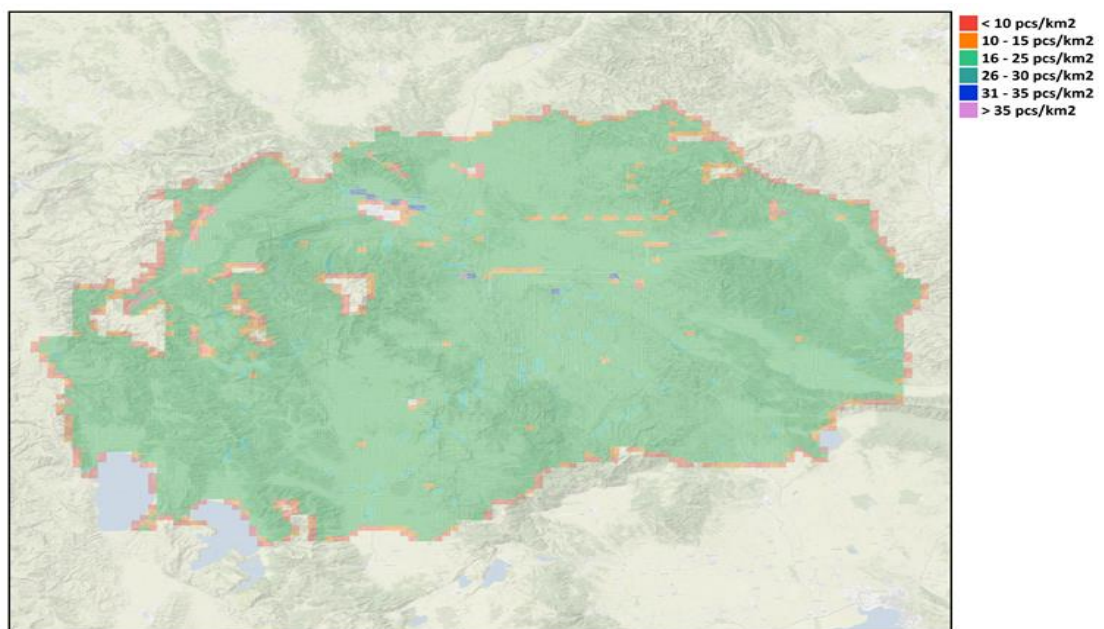
National committee for Rabies control: parties involved in animal rabies control and human prevention to exchange information and to coordinate rabies activities

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

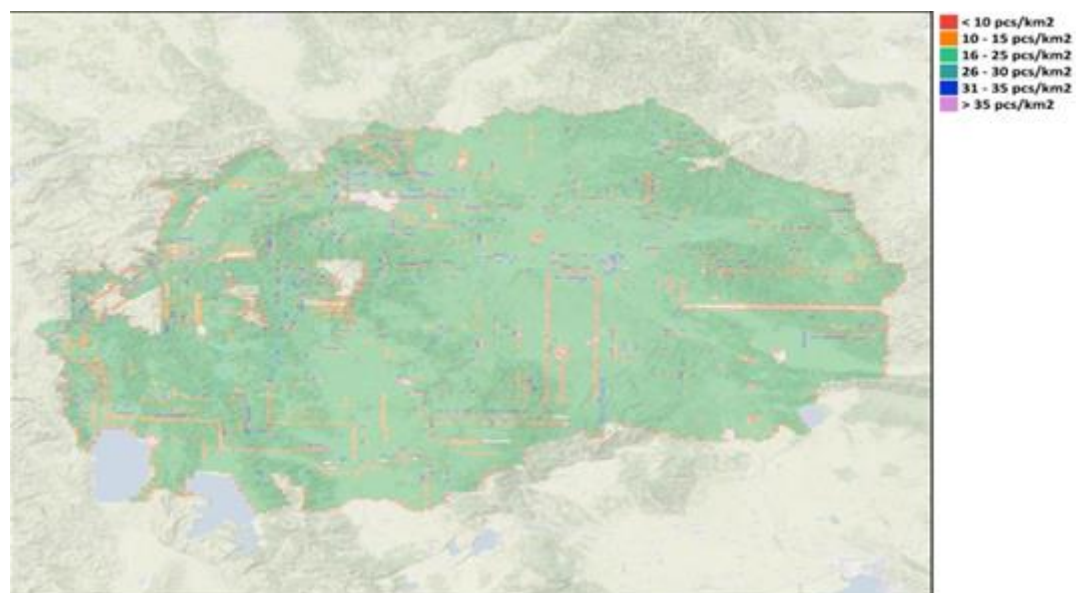
Before delivery, vaccine baits are stored and stored at -20°C and tested for virus titer control from the Institute for State Control of Veterinary Biological Materials and Medicines, Brno, Czech Republic and the National Reference Laboratory in the Republic of North Macedonia. During the whole process, 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 / km².

Preview of the geographical distribution of baits for oral vaccination against rabies in foxes's spring campaign in 2019.



On the graph below representation of geographical distribution of baits for oral vaccination against rabies in foxes Autumn campaign 2019



Monitoring the oral vaccination of foxes against rabies

The Agency monitors the control of the success of oral vaccination.

Agency in 2018 concluded for the period of 2018 to 2022 with 66 concessionaires on hunting grounds in the country for shooting a number of foxes (4 handcuffs 100km² per year in hunting, or 2 handcuffs 100km² for each campaign) and sampling for laboratory examination. Monitoring is carried out by determining the rate of consumption of bait by a vaccine through the detection of tetracycline in the teeth of fired foxes, and determining the rate of immunity achieved by detecting the presence of antibodies in the blood.

The results of the monitoring of the presence of tetracycline in the teeth and the detection of antibodies in the tested samples of the conducted campaigns of oral vaccination against rabies for the period from 2011 to 2019 are shown in Tables below.

Evaluation of the consumption of the vaccine by the detection of tetracycline in the examined fox samples

Year	No. Of tested animal	positive animals	negative animals	% of positive tetracycline
2011	141	86	55	60,99
2012	205	188	17	91,7
2013	479	403	76	84,13
2014	197	181	17	91,87
2015	221	206	15	93,21
2016	140	133	7	95

2017	216	101	115	46,75
2018	222	158	59	71,17
2019	109	100	9	82,71
Total	1930	1556	370	80.82

Detection of an immune response or antibody level in the examined fox samples

Year	No. Of tested animal	positive animals	negative animals	% of antibody respond
2011	45	4	41	8,9
2012	37	22	15	59,5
2013	59	21	38	35,6
2014	113	54	59	47,8
2015	39	20	19	51,3
2016	37	13	24	35,1
2017	81	33	48	40,7
2018	96	35	61	36,5
2019	62	21	41	33,8
Total	569	223	364	36

3. Notification system in place to the national competent authority^(c)

Yes, the obligation for mandatory reporting of rabies is prescribed in the Law on Veterinary Health, the Rulebook on the manner and procedure for reporting rabies in domestic and wild animals and measures to be taken for the eradication and eradication of rabies, and in accordance with the Annual Order for animal health.

4. Results of investigations and national evaluation of the situation, the trends ^(d) and sources of infection^(e)

YEAR	Dates of ORV campaign	Vaccine used	No. of baits/ per campaign	No. of baits	Vaccination area/ km ²
	spring/autumn				
2011	<u>19 May - 09 June</u>	Fuchsoral SAD B19, IDT Biologika Germany	484.000	22	21.407 km ²
	<u>11 - 31 October</u>		516.000	22	23.248 km ²
2012	<u>Missed-delay in tendering procedure</u>		528.000	22	23.248 km ²
	<u>19 October - 03 November</u>				
2013	<u>04 - 28 April</u>		501.119	22	22.186 km ²
	<u>28 September - 22 November</u>		510.400	22	23.248 km ²
2014	<u>22 April - 06 June</u>		500.00	21	23.218 km ²
	<u>25 September - 10 October</u>		500.000	21	23.569 km ²
2015	<u>Missed-delay in tendering procedure</u>		Lysvulpen SAD Bern, Bioveta Chech Republic		
	<u>05-18 November</u>	497.900		21	23.235 km ²
2016	<u>On 11 – 27 April 2016</u>	500.738		21	23.235 km ²
	<u>On 1-12 October 2016</u>	500.000		22	23.235 km ²
2017	<u>On 20 – 28 April 2017</u>	497.306		22	23.569 km ²
2018	<u>On 20 – 28 April 2018</u>	500.000		21	23.235 km ²
	<u>On 11 – 18 November 2018</u>	500.000		21	23.235 km ²
2019	<u>Spring</u>	500.000		20	23.235 km ²
	<u>Autumn</u>	500.000		20	23.235 km ²

5. Additional information

* 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, 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).

Brucella in small ruminates - Brucella melitensis

1. Monitoring/Surveillance/Control programmes system^(a)

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 provision laid down in Directive 91/68/EEC.

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

1. Testing and slaughtering of the ovine and caprine animals older than 6 months and
2. Combination of vaccination against brucellosis in ovine and caprine/testing and slaughtering

The type of specimen taken is Blood and method of sampling is Blood sampling.

A sheep is defined as infected with brucellosis if positive in two tests: Elisa, Rose Bengal test and Complement Fixation test and isolation of Brucella melitensis by culture after test slaughter.

Complement Fixation Test CFTRose Bengal Test RBTIndirect ELISACulture for isolation

2. Measures in place^(b)

According Program for control and eradication measures for control of Brucellosis in sheep and goats have been implemented on based on the risk assessment and the status of the disease and the prevalence in the country, the following measures have been implemented:

1. Vaccination of replacement animals at age of 3-6 months with Rev 1 vaccine through the conjunctival route. All the non-vaccinated animals, and all the animals older than 18 months which have been vaccinated up to their six months of age, are serologically tested
2. Testing and slaughter of adult animals (blood samples are collected from all animals in all flocks older than 6 months during the year).

Measures in case of the positive findings or single cases

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

3. Notification system in place to the national competent authority^(c)

Yes, according Law of veterinary health and Book of rules for compulsory notification animal diseases.

4. Results of investigations and national evaluation of the situation, the trends ^(d) and sources of infection^(e)

Reduce the further spreading of the brucellosis in sheep and goats

Decrease the absolute number of positive animals

Decrease the number of positive humans

Year	Tested flocks	Positive flocks	% of positive flocks	No. of tested animals	No. of positive animals	% of positive animals
2008	5.820	636	10,93%	626.748	16.052	2,56%
2009	6.522	712	10,92%	653.863	11.256	1,72%
2010	5.312	171	3,22%	422.752	2.865	0,68%
2011	4.545	80	1,76%	362.662	1.312	0,36%
2012	3.889	16	0,41%	296.561	112	0,04%
2013	7.453	42	0,56%	346.947	338	0,10%
2014	7.587	55	0,72%	362.828	347	0,10%

2015	7.375	71	0,96%	371.101	460	0,12%
2016	6.795	129	1,89%	419.061	673	0,16%
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%

5. Additional information

*** 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, 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).

Food-borne Outbreaks

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) where 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 launch 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.

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

Write text here please

3. National evaluation of the reported outbreaks in the country^(a)

In 2019, five foodborne outbreaks have been reported in the country, with 75 reported, of them 27 (36%) cases were hospitalized, no deaths were reported. Of the reported outbreaks, Hepatitis A virus was implicated in 3 food borne outbreaks, Salmonella and Enterobacter in one. One foodborne outbreak was reported where causative agent was not determined.

Salmonella was causative agent, in a related to food consumption in canteen - workplace catering in a factory, with 822 reported cases out of 300 exposed. Salmonella Enteritidis was causative agent, evidence is based on descriptive epidemiology and laboratory results. Of the three outbreaks where Hepatitis A was causative agent, in two contaminated water was source of the outbreak and in one outbreak source and vehicle were not determined. One small outbreak caused Enterobacter was reported among 3 guests in a restaurant meet and meet products were implicated (restaurant).

4. Descriptions of single outbreaks of special interest

Write text here please

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

For each 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

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

7. Additional information

Write text here please

(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.

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 (AMR) 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 at the Faculty of Veterinary medicine – Skopje, Ss Cyril and Methodius University, R.N. Macedonia was the laboratory authorized for performing analysis foreseen with the Annual plan for monitoring of antimicrobial resistance for 2019.

Faculty of Veterinary Medicine - Skopje was accredited on June 25, 2008 by Accreditation Institute of the Republic of North Macedonia for compliance with the requirements from the standard MKC 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.
- ✓ Molecular detection of different animal species in food and GMO testing

All of the tests in the laboratory are performed according to ISO accredited methods or other internationally accepted standards, in constant correlation with the latest EU regulative and in communication with clients on the course and selection of analytical methods. Currently, the laboratory is working with 27 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.

--

General Antimicrobial Resistance Evaluation
<p>1. Situation and epidemiological evolution (trends and sources) regarding AMR to critically important antimicrobials^(a) (CIAs) over time until recent situation</p> <p>In 2018 Republic of North Macedonia started with implementation of the Programme for monitoring of the antimicrobial resistance for the period of 2017 – 2021. In 2018 we have obtained the first results of the implementation of the programme with the first results of detected AMR in isolates from food producing animals.</p>
<p>2. Public health relevance of the findings on food-borne AMR in animals and foodstuffs</p> <p>All the finding and results about the antimicrobial resistance in 2019 in Republic of North Macedonia are public published on the official web site of the Food and Veterinary Agency of Republic of North Macedonia.</p>
<p>3. Recent actions taken to control AMR in food producing animals and food</p> <p>The Agency adopted amendments of the Law for veterinary – medicinal products.</p>
<p>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</p>
<p>5. Additional information</p>
<p>(a): The CIAs depends on the bacterial species considered and the harmonised set of substances tested within the framework of the harmonised monitoring:</p> <ul style="list-style-type: none"> • For <i>Campylobacter</i> spp., macrolides (erythromycin) and fluoroquinolones (ciprofloxacin); • For <i>Salmonella</i> and <i>E. coli</i>, 3rd and 4th generation cephalosporins (cefotaxime) and fluoroquinolones (ciprofloxacin) and colistin (polymyxin);

General Description of Antimicrobial Resistance Monitoring*

1. General description of sampling design and strategy^(a)

In 2017 Republic of North Macedonia has adopted the Plan for antimicrobial resistance for the period 2017 – 2021. The Program for Antimicrobial Resistance for the period 2017 - 2021 is performing the monitoring 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 Programme lays down the specific requirements for the harmonised monitoring and reporting of the *Salmonella spp.*, and *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.

Republic of North Macedonia in 2019 has collected representative isolates of the following bacteria in accordance with the technical requirements set out in the part A of the Annex of the Program:

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

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 and fresh meat thereof, pigs, bovines under one year of age, pig meat and bovine meat in slaughterhouses and retail. Additional we included all the isolated obtained from National control plan for *Salmonella spp.* and isolates from 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.

2. Stratification procedure per animal population and food category

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.

3. Randomisation procedure per animal population and food category

See point 2.

4. Analytical method used for detection and confirmation^(b)

All the analytical method used for detection and confirmation of the bacteria are accredited. The laboratory used methods according to ISO standards and guidance given from EURL-AR (DTU DK). The microdilution broth method and commercially prepared plates in accordance with the Decision 2013/652 were used to test the antimicrobial susceptibility of bacteria.

5. Laboratory methodology used for detection of antimicrobial resistance^(c)

Microdilution broth method (Dilution – sensititre)

6. Results of investigation

Bacterial	Population of animas	Number of taken samples	N (number of isolates)
<i>Salmonella spp.</i>	Broilers	0	0
	Fattening pigs	45	0
	Bovines under one year of age	24	0
<i>C. jejuni</i>	Broilers	1	0
Indicator commensal Escherichia coli (E. coli)	Broilers	1	1
	Fattening pigs	41	39
	Bovines under one year of age	46	42
ESBL- or AmpC- or carbapenemase-producing E. coli.	Broilers	6	0
	Fattening pigs	11	0
	Bovines under one year of age	25	25

Additional we included 10 isolates form the National monitoring plan for *Salmonella spp.* in laying hens (harmonized with the Regulation (EC) No 2160/2003 of the European Parliament and of the Council of 17 November 2003 on the control of salmonella and other specified food-borne zoonotic agents) and 5 isolates from point 2.1.5 of Chapter 2 of Annex I to Regulation (EC) No 2073/2005.

7. Additional information

* to be filled in per combination of bacterial species/matrix

- (a): Method of sampling (description of sampling technique: stage of sampling, type of sample, sampler), Frequency of sampling, Procedure of selection of isolates for susceptibility testing, Method used for collecting data.
- (b): Analytical method used for detection and confirmation: according to the legislation, the protocols developed by the EURL-AR should be used and reported here. In the case of the voluntary specific monitoring on Carbapenemase-producers, the selective media used (commercial plates, 'in house' media) should be also reported here. In general, any variation with regard to the EURL-AR protocols should be stated here, number of isolates isolated per sample, in particular for *Campylobacter spp.*.
- (c): Antimicrobials included, Cut-off values