ZOONOSES MONITORING

Croatia

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

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

IN 2021

PREFACE

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

The report contains information on trends and sources of zoonoses and zoonotic agents in Croatia during the year 2021.

The information covers the occurrence of these diseases and agents in animals, foodstuffs and in some cases also in feedingstuffs. In addition the report includes data on antimicrobial resistance in some zoonotic agents and indicator bacteria as well as information on epidemiological investigations of foodborne outbreaks.
Complementary data on susceptible animal populations in the country is also given. The information given covers both zoonoses that are important for the public health in the whole European Union as well as zoonoses, which are relevant on the basis of the national epidemiological situation.
The report describes the monitoring systems in place and the prevention and control strategies applied in the country. For some zoonoses this monitoring is based on legal requirements laid down by the European Union legislation, while for the other zoonoses national approaches are applied.

The report presents the results of the examinations carried out in the reporting year. A national evaluation of the epidemiological situation, with special reference to trends and sources of zoonotic infections, is given. Whenever possible, the relevance of findings in foodstuffs and animals to zoonoses cases in humans is evaluated.
The information covered by this report is used in the annual European Union Summary Reports on zoonoses and antimicrobial resistance that are published each year by EFSA.

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

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

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ANIMAL POPULATION TABLES

Table Susceptible animal population

Animal species	Category of animals	Population	
		holding	animal
Cattle (bovine animals)	Cattle (bovine animals)	18,250	426,549
Gallus gallus (fowl)	Gallus gallus (fowl)	77,707	4,073,123
Pigs	Pigs	72,198	1,258,398
Small ruminants	Goats	5,017	85,039
	Sheep	19,077	705,134
Solipeds, domestic	Solipeds, domestic	5,333	28,707
Turkeys	Turkeys	6,745	614,564

DISEASE STATUS TABLES

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

Region	Zoonotic agent	Number of infected herds	Total number of herds
CROATIA	Brucella	0	18,250

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

Region	Zoonotic agent	Number of infected herds	Total number of herds
CROATIA	Brucella	0	22,168

DISEASE STATUS TABLES

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

Region	Zoonotic agent	Number of infected herds	Total number of herds
CROATIA	Mycobacterium tuberculosis complex (MTC)	2	18,520

PREVALENCE TABLES

FOODBORNE OUTBREAKS TABLES

Foodborne Outbreaks: summarized data

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

		Outbreak strenght	Strong				Weak			
Causative agent	Food vehicle		N outbreaks	N human cases	N hospitalized	N deaths	N outbreaks	N human cases	N hospitalized	N deaths
Campylobacter jejuni	Broiler meat (Gallus gallus) and products thereof						1	2	0	0
	Unknown						1	2	0	0
Salmonella group B	Eggs and egg products						2	6	1	0
	Broiler meat (Gallus gallus) and products thereof						1	2	0	0
	Unknown						1	3	1	0
Staphylococcus spp., unspecified	Crustaceans, shellfish, molluscs and products thereof		1	5	0	0				
Unknown	Eggs and egg products						1	11	0	0
	Unknown						1	71	2	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
Staphylococcus spp., unspecified	unk	Not Available	Not Available	Enterococcus, non-pathogenic - Enterococcus spp., unspecified	CIPH7621	General	Crustaceans, shellfish, molluscs and products thereof	octopus	Detection of causative agent in food chain or its environment - Symptoms and onset of illness pathognomonic to causative agent	Restaurant or Cafe or Pub or Bar or Hotel or Catering service	Restaurant or Cafe or Pub or Bar or Hotel or Catering service	Not Available	Not Available	N_A	1	5	unk	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
Campylobacter jejuni	unk	Not Available	Not Available	Not Available	CIPH7302	Household	Broiler meat (Gallus gallus) and products thereof	boiled and roasted chicken breast	Descriptive epidemiological evidence	Domestic premises	Household	Not Available	Inadequate heat treatment	N_A	1	2	0	0
					CIPH7341	Household	Unknown	N_A	Descriptive epidemiological evidence	Domestic premises	Household	Not Available	Not Available	N_A	1	2	0	0
Salmonella group B	unk	Not Available	Not Available	Not Available	CIPH7161	Household	Broiler meat (Gallus gallus) and products thereof	roasted chicken breast and wings	Descriptive epidemiological evidence	Domestic premises	Not Available	Not Available	Not Available	N_A	1	2	0	0
					CIPH7162	Household	Eggs and egg products	soft boiled egg	Descriptive epidemiological evidence	Domestic premises	Household	Not Available	Inadequate heat treatment	N_A	1	3	0	0
					CIPH7541	Household	Eggs and egg products	N_A	Descriptive epidemiological evidence	Domestic premises	Household	Not Available	Not Available	N_A	1	3	1	0
					CIPH7762	Household	Unknown	N_A	Descriptive epidemiological evidence	Domestic premises	Household	Not Available	Not Available	N_A	1	3	1	0
Unknown	unk	Not Available	Not Available	Not Available	CIPH7521	General	Eggs and egg products	EGG SALAD	Descriptive epidemiological evidence	Residential institution (nursing home or prison or boarding school)	Restaurant or Cafe or Pub or Bar or Hotel or Catering service	Not Available	Not Available	N_A	1	11	0	0
					CIPH7801	General	Unknown	N_A	Descriptive epidemiological evidence	Restaurant or Cafe or Pub or Bar or Hotel or Catering service	Not Available	Not Available	Not Available	N_A	1	71	2	0

ANTIMICROBIAL RESISTANCE TABLES FOR CAMPYLOBACTER

Table Antimicrobial susceptibility testing of Campylobacter coli 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: Croatia

Sampling details:

	AM substance	Chloramphenicol	Ciprofloxacin	Ertapenem	Erythromycin	Gentamicin	Tetracycline
	ECOFF	16	0.5	0.5	8	2	2
	Lowest limit	2	0.125	0.125	1	0.125	0.5
	Highest limit	64	32	4	512	16	64
	N of tested isolates						
MIC	N of resistant isolates						
<=0.125			9	19		2	
0.25			3	9			
<=0.5							11
0.5			2	5		14	
<=1					28		
1				4		16	1
<=2		20					
2					1	5	1
4		11	2	1	1		
8			9				1
16		1	10				3
>16						1	
32			2		1		1
>32			1				
64		5			6		10
>64		1					10
128					1		

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: Croatia

Sampling details:

	AM substance	Chloramphenicol	Ciprofloxacin	Ertapenem	Erythromycin	Gentamicin	Tetracycline
	ECOFF	**16**	**0.5**	**0.5**	**8**	**2**	**2**
	Lowest limit	**2**	**0.125**	**0.125**	**1**	**0.125**	**0.5**
	Highest limit	**64**	**32**	**4**	**512**	**16**	**64**
	N of tested isolates						
MIC	**N of resistant isolates**						
<=0.125			30	63		4	
0.25				16			
<=0.5							14
0.5			1	5		34	
<=1					73		
1				1		44	3
<=2		67					
2					1	3	3
4		18	4		1		1
8			20				1
16			25		1		3
32			3				14
>32			2				
64					5		30
>64							16
128					2		
256					1		
>512					1		

Table Antimicrobial susceptibility testing of Campylobacter jejuni 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: Croatia

Sampling details:

	AM substance	Chloramphenicol	Ciprofloxacin	Ertapenem	Erythromycin	Gentamicin	Tetracycline
	ECOFF	16	0.5	0.5	4	2	1
	Lowest limit	2	0.125	0.125	1	0.125	0.5
	Highest limit	64	32	4	512	16	64
	N of tested isolates						
MIC	N of resistant isolates						
<=0.125			12	38		10	
0.25				4			
<=0.5							27
0.5			2	3		30	
<=1					45		
1				1		7	
<=2		42					
2				1			1
4		5	2				
8			18		1		1
16			12				4
32			1				6
64							4
>64							4
512					1		

ANTIMICROBIAL RESISTANCE TABLES FOR SALMONELLA

Table Antimicrobial susceptibility testing of Salmonella Bovismorbificans 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: Croatia

Sampling Details:

	AM substance	Amikacin	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
	ECOFF	**4**	**8**	**16**	**0.5**	**2**	**16**	**0.064**	**2**	**2**	**0.125**	**8**	**256**	**8**	**0.5**	**2**
	Lowest limit	**4**	**1**	**2**	**0.25**	**0.25**	**8**	**0.015**	**1**	**0.5**	**0.03**	**4**	**8**	**2**	**0.25**	**0.25**
	Highest limit	**128**	**32**	**64**	**4**	**8**	**64**	**8**	**16**	**16**	**16**	**64**	**512**	**32**	**8**	**16**
	N of tested isolates															
MIC	**N of resistant isolates**															
<=0.015								1								
<=0.03											1					
<=0.25					1	1									1	1
<=0.5										1						
<=1			1						1							
<=2				1										1		
<=4		1										1				
<=8							1									
16													1			

Table Antimicrobial susceptibility testing of Salmonella Derby 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: Croatia

Sampling Details:

	AM substance	Amikacin	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
	ECOFF	**4**	**8**	**16**	**0.5**	**2**	**16**	**0.064**	**2**	**2**	**0.125**	**8**	**256**	**8**	**0.5**	**2**
	Lowest limit	**4**	**1**	**2**	**0.25**	**0.25**	**8**	**0.015**	**1**	**0.5**	**0.03**	**4**	**8**	**2**	**0.25**	**0.25**
	Highest limit	**128**	**32**	**64**	**4**	**8**	**64**	**8**	**16**	**16**	**16**	**64**	**512**	**32**	**8**	**16**
	N of tested isolates															
MIC	**N of resistant isolates**															
<=0.015								2								
<=0.03											2					
<=0.25					1										2	1
<=0.5										2						
0.5					1	2										1
<=1			1						2							
<=2														2		
<=4		2										2				
4				2												
<=8							1									
16							1									
32													2			
>32			1													

Table Antimicrobial susceptibility testing of Salmonella Stanleyville 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: Croatia

Sampling Details:

	AM substance	Amikacin	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
	ECOFF	**4**	**8**	**16**	**0.5**	**2**	**16**	**0.064**	**2**	**2**	**0.125**	**8**	**256**	**8**	**0.5**	**2**
	Lowest limit	**4**	**1**	**2**	**0.25**	**0.25**	**8**	**0.015**	**1**	**0.5**	**0.03**	**4**	**8**	**2**	**0.25**	**0.25**
	Highest limit	**128**	**32**	**64**	**4**	**8**	**64**	**8**	**16**	**16**	**16**	**64**	**512**	**32**	**8**	**16**
	N of tested isolates															
MIC	**N of resistant isolates**															
<=0.015								2								
<=0.03											6					
0.03								4								
<=0.25					6	5									6	4
<=0.5										5						
0.5						1										2
<=1			4						6							
1										1						
<=2														6		
2			2													
<=4		6										5				
4				6												
<=8							6						4			
8												1				
16													2			

Table Antimicrobial susceptibility testing of Salmonella Typhimurium 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: Croatia

Sampling Details:

	AM substance	Amikacin	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
	ECOFF	**4**	**8**	**16**	**0.5**	**2**	**16**	**0.064**	**2**	**2**	**0.125**	**8**	**256**	**8**	**0.5**	**2**
	Lowest limit	**4**	**1**	**2**	**0.25**	**0.25**	**8**	**0.015**	**1**	**0.5**	**0.03**	**4**	**8**	**2**	**0.25**	**0.25**
	Highest limit	**128**	**32**	**64**	**4**	**8**	**64**	**8**	**16**	**16**	**16**	**64**	**512**	**32**	**8**	**16**
	N of tested isolates															
MIC	**N of resistant isolates**															
<=0.015								2								
<=0.03											5					
0.03								3								
<=0.25					5	3									4	3
<=0.5										4						
0.5						2									1	2
<=1			1						4							
<=2														4		
2			3						1							
<=4		5										4				
4				4										1		
<=8							4									
8				1								1				
16													4			
>16										1						
>32			1													
>64							1									
>512													1			

Table Antimicrobial susceptibility testing of Salmonella Typhimurium 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: Croatia

Sampling Details:

	AM substance	Amikacin	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
	ECOFF	**4**	**8**	**16**	**0.5**	**2**	**16**	**0.064**	**2**	**2**	**0.125**	**8**	**256**	**8**	**0.5**	**2**
	Lowest limit	**4**	**1**	**2**	**0.25**	**0.25**	**8**	**0.015**	**1**	**0.5**	**0.03**	**4**	**8**	**2**	**0.25**	**0.25**
	Highest limit	**128**	**32**	**64**	**4**	**8**	**64**	**8**	**16**	**16**	**16**	**64**	**512**	**32**	**8**	**16**
	N of tested isolates															
MIC	**N of resistant isolates**															
<=0.015								4								
<=0.03											12					
0.03								4								
0.064								3								
<=0.25					12	11									7	9
0.25								1								
<=0.5										10						
0.5						1									5	1
<=1			1						12							
<=2				1										4		
2			2													
<=4		12										8				
4				10												
<=8							7						1			
8												1				
16				1								2	1			
>16										2						2
32													1			
>32			9											8		
>64							5					1				
>512													9			

Table Antimicrobial susceptibility testing of Salmonella Typhimurium, monophasic 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: Croatia

Sampling Details:

	AM substance	Amikacin	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
	ECOFF	**4**	**8**	**16**	**0.5**	**2**	**16**	**0.064**	**2**	**2**	**0.125**	**8**	**256**	**8**	**0.5**	**2**
	Lowest limit	**4**	**1**	**2**	**0.25**	**0.25**	**8**	**0.015**	**1**	**0.5**	**0.03**	**4**	**8**	**2**	**0.25**	**0.25**
	Highest limit	**128**	**32**	**64**	**4**	**8**	**64**	**8**	**16**	**16**	**16**	**64**	**512**	**32**	**8**	**16**
	N of tested isolates															
MIC	**N of resistant isolates**															
<=0.015								1								
<=0.03											3					
0.03								2								
<=0.25					3	2									2	3
<=0.5										3						
0.5						1									1	
<=1									3							
<=2														1		
2			1													
<=4		3										2				
4				3												
8												1				
16							1									
32													1			
>32			2											2		
>64							2									
>512													2			

Table Antimicrobial susceptibility testing of Salmonella Typhimurium, monophasic 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: Croatia

Sampling Details:

	AM substance	Amikacin	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
	ECOFF	**4**	**8**	**16**	**0.5**	**2**	**16**	**0.064**	**2**	**2**	**0.125**	**8**	**256**	**8**	**0.5**	**2**
	Lowest limit	**4**	**1**	**2**	**0.25**	**0.25**	**8**	**0.015**	**1**	**0.5**	**0.03**	**4**	**8**	**2**	**0.25**	**0.25**
	Highest limit	**128**	**32**	**64**	**4**	**8**	**64**	**8**	**16**	**16**	**16**	**64**	**512**	**32**	**8**	**16**
	N of tested isolates															
MIC	**N of resistant isolates**															
<=0.015								2								
<=0.03											17					
0.03								9								
0.064								5								
<=0.25					17	13									9	12
0.25								1								
<=0.5										16						
0.5						4									8	1
<=1			2						17							
<=2														1		
2			1													
<=4		17										10				
4				14												
<=8							9						1			
8				3								6				
16							1					1	2			
>16										1						4
>32			14											16		
64							1									
>64							6									
>512													14			

Table Antimicrobial susceptibility testing of Salmonella Umbilo 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: Croatia

Sampling Details:

	AM substance	Amikacin	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
	ECOFF	**4**	**8**	**16**	**0.5**	**2**	**16**	**0.064**	**2**	**2**	**0.125**	**8**	**256**	**8**	**0.5**	**2**
	Lowest limit	**4**	**1**	**2**	**0.25**	**0.25**	**8**	**0.015**	**1**	**0.5**	**0.03**	**4**	**8**	**2**	**0.25**	**0.25**
	Highest limit	**128**	**32**	**64**	**4**	**8**	**64**	**8**	**16**	**16**	**16**	**64**	**512**	**32**	**8**	**16**
	N of tested isolates															
MIC	**N of resistant isolates**															
<=0.015								1								
<=0.03											1					
<=0.25					1	1									1	
<=0.5										1						
0.5																1
<=1			1						1							
<=2														1		
<=4		1										1				
4				1												
<=8							1									
16													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)

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: Croatia

Sampling Details:

AM substance	Amikacin	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
ECOFF	**8**	**8**	**16**	**0.25**	**0.5**	**16**	**0.064**	**2**	**2**	**0.125**	**8**	**64**	**8**	**0.5**	**2**
Lowest limit	**4**	**1**	**2**	**0.25**	**0.25**	**8**	**0.015**	**1**	**0.5**	**0.03**	**4**	**8**	**2**	**0.25**	**0.25**
Highest limit	**128**	**32**	**64**	**4**	**8**	**64**	**8**	**16**	**16**	**16**	**64**	**512**	**32**	**8**	**16**
N of tested isolates															
MIC / **N of resistant isolates**															
<=0.015							75								
<=0.03										84					
0.03							1								
0.064							5			1					
<=0.25				85	85									85	63
0.25							4								
<=0.5									77						
0.5															15
<=1		2						85							
1									8						
<=2			30										48		
2		45													
<=4	85										78				
4		23	54												
<=8						73						42			
8		1	1								3				
16						1						11			
>16															7
32						1						2	5		
>32		14											32		
64						5					1	2			

	AM substance	Amikacin	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
	ECOFF	**8**	**8**	**16**	**0.25**	**0.5**	**16**	**0.064**	**2**	**2**	**0.125**	**8**	**64**	**8**	**0.5**	**2**
	Lowest limit	**4**	**1**	**2**	**0.25**	**0.25**	**8**	**0.015**	**1**	**0.5**	**0.03**	**4**	**8**	**2**	**0.25**	**0.25**
	Highest limit	**128**	**32**	**64**	**4**	**8**	**64**	**8**	**16**	**16**	**16**	**64**	**512**	**32**	**8**	**16**
	N of tested isolates															
MIC	**N of resistant isolates**															
>64							5					3				
>512													28			

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

Sampling Stage: Slaughterhouse

Sampling Type: animal sample - caecum

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: ESBL MON pnl2

Analytical Method:

Country of Origin: Croatia

Sampling Details:

Ceftazidime synergy test	Cefotaxime synergy test	MIC	AM substance	Cefepime	Cefotaxim	Cefotaxime + Clavulanic acid	Cefoxitin	Ceftazidim	Ceftazidime + Clavulanic acid	Ertapenem	Imipenem	Meropenem	Temocillin
			ECOFF	0.125	0.25	0.25	8	0.5	0.5	0.06	0.5	0.125	16
			Lowest limit	0.064	0.25	0.064	0.5	0.25	0.125	0.015	0.125	0.03	0.5
			Highest limit	32	64	64	64	128	128	2	16	16	128
			N of tested isolates										
			N of resistant isolates										
Not Available	Not Available	<=0.015								70			
		<=0.03										85	
		0.03								14			
		0.064								1			
		<=0.125									85		
		0.25		3									
		0.5						4					
		1		2				23					
		2		11			14	14					
		4		22	1		52	14					38
		8		25	1		17	18					47
		16		11	9			11					
		32		2	23								
		>32		9									
		64			25			1					
		>64			26		2						
	Positive/Present	<=0.064				72							
		0.125				11							
	Negative/Absent	8				1							
		16				1							

		AM substance	Cefepime	Cefotaxim	Cefotaxime + Clavulanic acid	Cefoxitin	Ceftazidim	Ceftazidime + Clavulanic acid	Ertapenem	Imipenem	Meropenem	Temocillin
		ECOFF	**0.125**	**0.25**	**0.25**	**8**	**0.5**	**0.5**	**0.06**	**0.5**	**0.125**	**16**
		Lowest limit	**0.064**	**0.25**	**0.064**	**0.5**	**0.25**	**0.125**	**0.015**	**0.125**	**0.03**	**0.5**
		Highest limit	**32**	**64**	**64**	**64**	**128**	**128**	**2**	**16**	**16**	**128**
		N of tested isolates										
Ceftazidime synergy test	**Cefotaxime synergy test**	**MIC**	**N of resistant isolates**									
Positive/Present	Not Available	<=0.125						65				
		0.25						18				
Negative/Absent	Not Available	8						1				
		16						1				

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

Sampling Stage: Slaughterhouse

Sampling Type: animal sample - caecum

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: ESBL MON

Analytical Method:

Country of Origin: Croatia

Sampling Details:

	AM substance	Amikacin	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
	ECOFF	**8**	**8**	**16**	**0.25**	**0.5**	**16**	**0.064**	**2**	**2**	**0.125**	**8**	**64**	**8**	**0.5**	**2**
	Lowest limit	**4**	**1**	**2**	**0.25**	**0.25**	**8**	**0.015**	**1**	**0.5**	**0.03**	**4**	**8**	**2**	**0.25**	**0.25**
	Highest limit	**128**	**32**	**64**	**4**	**8**	**64**	**8**	**16**	**16**	**16**	**64**	**512**	**32**	**8**	**16**
	N of tested isolates															
MIC	**N of resistant isolates**															
<=0.015								16								
<=0.03											85					
0.125								11								
<=0.25															81	21
0.25								24								
<=0.5										44						
0.5						3		7							4	8
<=1									85							
1						28		1		25						1
<=2				23										19		
2						11		1								
<=4		85										30				
4				48	1	15										
>4					84											
<=8							35						16			
8				4		16		11		2		16				
>8						12		14								
16				1						2		12	3			
>16										12						55
32				5			1					1	1	6		
>32			85											60		
64				3			2									
>64				1			47					26				
>512													65			

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: Croatia

Sampling Details:

AM substance	Amikacin	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
ECOFF	**8**	**8**	**16**	**0.25**	**0.5**	**16**	**0.064**	**2**	**2**	**0.125**	**8**	**64**	**8**	**0.5**	**2**
Lowest limit	**4**	**1**	**2**	**0.25**	**0.25**	**8**	**0.015**	**1**	**0.5**	**0.03**	**4**	**8**	**2**	**0.25**	**0.25**
Highest limit	**128**	**32**	**64**	**4**	**8**	**64**	**8**	**16**	**16**	**16**	**64**	**512**	**32**	**8**	**16**
N of tested isolates															
N of resistant isolates															
MIC															
<=0.015							69								
<=0.03										85					
0.03							2								
0.064							3								
<=0.25				85	85									85	46
0.25							7								
<=0.5									74						
0.5															18
<=1		6						85							
1									10						
<=2			33										41		
2		34													
<=4	85										72				
4		21	50												
<=8						73						41			
8		1	1				1				4		1		
>8							3								
16						1					1	11			
>16									1						21
32											1	4	2		
>32		23											41		
64						4									
>64			1			7					7				
>512												29			

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: ESBL MON pnl2

Analytical Method:

Country of Origin: Croatia

Sampling Details:

Ceftazidime synergy test	Cefotaxime synergy test	MIC	Cefepime	Cefotaxim	Cefotaxime + Clavulanic acid	Cefoxitin	Ceftazidim	Ceftazidime + Clavulanic acid	Ertapenem	Imipenem	Meropenem	Temocillin
		AM substance										
		ECOFF	**0.125**	**0.25**	**0.25**	**8**	**0.5**	**0.5**	**0.06**	**0.5**	**0.125**	**16**
		Lowest limit	**0.064**	**0.25**	**0.064**	**0.5**	**0.25**	**0.125**	**0.015**	**0.125**	**0.03**	**0.5**
		Highest limit	**32**	**64**	**64**	**64**	**128**	**128**	**2**	**16**	**16**	**128**
		N of tested isolates										
		N of resistant isolates										
Not Available	Not Available	<=0.015							73			
		<=0.03									84	
		0.03							11			
		<=0.125								84		
		0.125	6								1	
		0.25	6							1		
		0.5	2				9					
		1	2	1			21		1			
		2	3	7		31	25					
		4	12	4		32	13					49
		8	28	4		12	11					35
		16	13	7		3	4					
		32	8	17		6	2					
		>32	5									
		64		26		1						
		>64		19								
		128										1
	Positive/Present	<=0.064			70							
		0.125			2							
	Negative/Absent	1			5							
		2			5							

		AM substance	Cefepime	Cefotaxim	Cefotaxime + Clavulanic acid	Cefoxitin	Ceftazidim	Ceftazidime + Clavulanic acid	Ertapenem	Imipenem	Meropenem	Temocillin
		ECOFF	**0.125**	**0.25**	**0.25**	**8**	**0.5**	**0.5**	**0.06**	**0.5**	**0.125**	**16**
		Lowest limit	**0.064**	**0.25**	**0.064**	**0.5**	**0.25**	**0.125**	**0.015**	**0.125**	**0.03**	**0.5**
		Highest limit	**32**	**64**	**64**	**64**	**128**	**128**	**2**	**16**	**16**	**128**
		N of tested isolates										
Ceftazidime synergy test	**Cefotaxime synergy test**	**MIC**	**N of resistant isolates**									
Not Available	Negative/Absent	4			2							
		8			1							
Positive/Present	Not Available	<=0.125						66				
		0.25						6				
Negative/Absent	Not Available	2						1				
		4						11				
		8						1				

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

Sampling Stage: Slaughterhouse

Sampling Type: animal sample - caecum

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: ESBL MON

Analytical Method:

Country of Origin: Croatia

Sampling Details:

AM substance	Amikacin	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
ECOFF	**8**	**8**	**16**	**0.25**	**0.5**	**16**	**0.064**	**2**	**2**	**0.125**	**8**	**64**	**8**	**0.5**	**2**
Lowest limit	**4**	**1**	**2**	**0.25**	**0.25**	**8**	**0.015**	**1**	**0.5**	**0.03**	**4**	**8**	**2**	**0.25**	**0.25**
Highest limit	**128**	**32**	**64**	**4**	**8**	**64**	**8**	**16**	**16**	**16**	**64**	**512**	**32**	**8**	**16**
N of tested isolates															
N of resistant isolates															
MIC															
<=0.015							40								
<=0.03										84					
0.03							2								
0.064							1								
0.125							8			1					
<=0.25														83	19
0.25							6								
<=0.5									76						
0.5					10		7							2	4
<=1								84							
1				1	20		2		2						
<=2			21										36		
2				7	26		1								
<=4	85										42				
4			57	4	12		2								1
>4				73											
<=8						60						11			
8			3		11		4	1			5				
>8					6		12								
16						1			1		5	3			
>16									6						61
32			2			5					1		2		
>32		85											47		
64						6					1	1			
>64			2			13					31				

	AM substance	Amikacin	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
	ECOFF	**8**	**8**	**16**	**0.25**	**0.5**	**16**	**0.064**	**2**	**2**	**0.125**	**8**	**64**	**8**	**0.5**	**2**
	Lowest limit	**4**	**1**	**2**	**0.25**	**0.25**	**8**	**0.015**	**1**	**0.5**	**0.03**	**4**	**8**	**2**	**0.25**	**0.25**
	Highest limit	**128**	**32**	**64**	**4**	**8**	**64**	**8**	**16**	**16**	**16**	**64**	**512**	**32**	**8**	**16**
	N of tested isolates															
MIC	**N of resistant isolates**															
>512													70			

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: Croatia

Sampling Details:

			AM substance	Cefepime	Cefotaxim	Cefotaxime + Clavulanic acid	Cefoxitin	Ceftazidim	Ceftazidime + Clavulanic acid	Ertapenem	Imipenem	Meropenem	Temocillin
			ECOFF	0.125	0.25	0.25	8	0.5	0.5	0.06	0.5	0.125	16
			Lowest limit	0.064	0.25	0.064	0.5	0.25	0.125	0.015	0.125	0.03	0.5
			Highest limit	32	64	64	64	128	128	2	16	16	128
			N of tested isolates										
Ceftazidime synergy test	Cefotaxime synergy test	MIC	N of resistant isolates										
Not Available	Not Available	<=0.015								4			
		<=0.03										4	
		<=0.125									4		
		0.125		1									
		1						2					
		2		1	1		1						
		4		1			2						2
		8		1				2					2
		16			1								
		32			1		1						
		>64			1								
	Positive/Present	<=0.064				3							
	Negative/Absent	1				1							
Positive/Present	Not Available	<=0.125							3				
Negative/Absent	Not Available	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: Croatia

Sampling Details:

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

Table Antimicrobial susceptibility testing of Escherichia coli, non-pathogenic, unspecified in Meat from pig - 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: Croatia

Sampling Details:

Ceftazidime synergy test	Cefotaxime synergy test	MIC	AM substance	Cefepime	Cefotaxim	Cefotaxime + Clavulanic acid	Cefoxitin	Ceftazidim	Ceftazidime + Clavulanic acid	Ertapenem	Imipenem	Meropenem	Temocillin
			ECOFF	0.125	0.25	0.25	8	0.5	0.5	0.06	0.5	0.125	16
			Lowest limit	0.064	0.25	0.064	0.5	0.25	0.125	0.015	0.125	0.03	0.5
			Highest limit	32	64	64	64	128	128	2	16	16	128
			N of tested isolates										
			N of resistant isolates										
Not Available	Not Available	<=0.015								3			
		<=0.03										3	
		<=0.125									3		
		1						1					
		2					3						
		4		2				1					3
		8		1				1					
		32			2								
		64			1								
	Positive/Present	<=0.064				3							
Positive/Present	Not Available	<=0.125							3				

Table Antimicrobial susceptibility testing of Escherichia coli, non-pathogenic, unspecified in Meat from pig - 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: Croatia

Sampling Details:

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

OTHER ANTIMICROBIAL RESISTANCE TABLES

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

Programme Code	Matrix Detailed	Zoonotic Agent Detailed	Sampling Strategy	Sampling Stage	Sampling Details	Sampling Context	Sampler	Sample Type	Sampling Unit Type	Sample Origin	Comment	Total Units Tested	Total Units Positive
CARBA MON	Cattle (bovine animals) - calves (under 1 year)	Escherichia coli, non-pathogenic, unspecified	Objective sampling	Slaughterhouse	N_A	Monitoring	Official sampling	animal sample - caecum	slaughter animal batch	Croatia	CARB/OXA, chromID CARBA SMART, Biomerieux	203	0
	Meat from bovine animals - fresh - chilled	Escherichia coli, non-pathogenic, unspecified	Objective sampling	Retail	N_A	Monitoring	Official sampling	food sample - meat	batch (food/feed)	Croatia	CARB/OXA, chromID CARBA SMART, Biomerieux	130	0
	Meat from pig - fresh - chilled	Escherichia coli, non-pathogenic, unspecified	Objective sampling	Retail	N_A	Monitoring	Official sampling	food sample - meat	batch (food/feed)	Croatia	CARB/OXA, chromID CARBA SMART, Biomerieux	139	0
	Pigs - fattening pigs	Escherichia coli, non-pathogenic, unspecified	Objective sampling	Slaughterhouse	N_A	Monitoring	Official sampling	animal sample - caecum	slaughter animal batch	Croatia	CARB/OXA, chromID CARBA SMART, Biomerieux	261	0

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	25-Jul-2022
Esbl	25-Jul-2022
Animal Population	25-Jul-2022
Disease Status	25-Jul-2022
Food Borne Outbreaks	25-Jul-2022

ZOONOSES MONITORING

CROATIA

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

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

IN 2021

Table of contents

1. Institutions and Laboratories involved in zoonoses monitoring and reporting

1.1. Ministry of Agriculture (MA)

Veterinary and Food Safety Directorate General (VFSDG)

In accordance with the current internal organisation of the Ministry of Agriculture, the competent authority in the veterinary and food safety field is the Veterinary and Food Safety Directorate General (VFSDG). The VFSDG is responsible for compliance with all requirements laid down in the legislation that governs veterinary and food safety. The VFSDG is a contact point with the European Commission. The VFSDG collects all the relevant statistical data from a number of different institutions, namely the Croatian Veterinary Institute and its branches, the Veterinary Faculty and the Croatian Agency for Agriculture and Food.

Stockbreeding and Food Quality Directorate

The Stockbreeding and Food Quality Directorate maintains the Central Register of Domestic Animals, which includes the Central Register of Bovine Animals, the Central Register of Pigs, the Central Register of Sheep and Goats and the Farms Register. The Stockbreeding and Food Quality Directorate closely cooperates with the Veterinary and Food Safety Directorate in the area of identification and registration of animals and farms.

1.2. State Inspectorate

The State Inspectorate is a state administration body within which 17 inspection services are established. The main strategic goal of the State Inspectorate is to strengthen activities in the field of environmental protection, nature, water resources, physical planning, consumer protection, health and safety of humans, animals, plants and combating all forms of illegal activities, work and employment, and increase the quality of services, tourists and life in the Republic of Croatia.

Sanitary inspection

In accordance with the Act on State Inspectorate (OG 115/2018) and with the Act on Official Controls Performed and Other Official Activities in Accordance with the Requirements of Food and Feed Law, Animal Health, Animal Welfare Rules, Plant Health and Plant Protection Products (OG 52/2021), Sanitary inspection is responsible for performing of official controls in the field of food safety.
Based on the article 14. of the cited Act on Official Controls, Sanitary inspection is responsible for performing official controls as follows: at production level for controls of food of non-animal origin, except primary production and of food intended for infants and young children, food for special medical purposes, and total diet replacement for weight control. Further, at import level Sanitary inspection is responsible for import control of food of non-animal origin. At retail level, Sanitary inspection carries out controls for all kind of FBO with the exception of establishments approved by the Ministry of Agriculture controlled by veterinary inspection.
In accordance with current internal organisation of State Inspectorate, Sector for Sanitary Inspection, at central level, is responsible for preparing monitoring plans performed by sanitary inspectors at county region and central level.
Preparation and reporting of data on monitoring plans carried out by the Sector for Sanitary Inspection, at central level.

Veterinary Inspection

In accordance with the Act on State Inspectorate (OG 115/2018) and with the Act on Official Controls Performed and Other Official Activities in Accordance with the Requirements of Food and Feed Law, Animal Health, Animal Welfare Rules, Plant Health and Plant Protection Products (OG 52/2021), Veterinary inspection is responsible for performing of official controls in the field of veterinary medicine and food and feed safety.

1.3. Ministry of Health

In accordance with the Croatian Food Law (OG 81/13, 14/14, 30/15, 115/18) the Ministry of Health is the competent authority in the food safety field, together with the Ministry of Agriculture.
Upon the national reorganization of the food and feed safety system, the competence of the Ministry of Health in the area of Directive 2003/99/EC on the monitoring of zoonoses and zoonotic agents, was transferred under the competence of the Sanitary Inspection of the State Inspectorate of Republic of Croatia.

1.4. Croatian Veterinary Institute

The Croatian Veterinary Institute is a leading research, diagnostic and analytical institute in the Republic of Croatia, consisting of:

- Croatian Veterinary Institute Zagreb
- Poultry Centre, Zagreb
- Veterinary Institute Križevci
- Veterinary Institute Rijeka
- Veterinary Institute Split
- Veterinary Institute Vinkovci

The Croatian Veterinary Institute is primarily engaged in the diagnostics of infectious and parasitic animal diseases, analysis of food of animal origin and animal feed, control of veterinary medicinal products and scientific research. The Croatian Veterinary Institute has approximately 240 employees, among whom there are more than 100 employees with university degree, including more than 40 PhDs. All the laboratories of the headquarters and the branches have been accredited by the Croatian Accreditation Agency, and the accreditation covers more than 130 methods.
Laboratory for Food Microbiology is NRL Salmonella, Campylobacter, Listeria, VTEC, CPS.
The Croatian Veterinary Institute is responsible for reporting prevalence data on zoonoses, zoonotic agents and antimicrobial resistance.

1.5. Croatian Institute of Public Health

The Croatian Institute of Public Health is the central public health institute of the Republic of Croatia. The Croatian Institute of Public Health is research, diagnostic and analytical institute that provides laboratory services for human health programs and for official controls within food and water safety area. The Croatian Institute of Public Health carries out activities of public health, epidemiology of infectious diseases, as well as chronic mass non-infectious diseases, disease prevention and microbiology. The Croatian Institute of Public Health also carries out epidemiological surveillance and proposes, organizes, and undertakes preventive and counter-epidemic measures.

The Croatian Institute of Public Health manages and maintains national public health registries, supervises data storage, and coordinates the work of other health registries. The Croatian Institute of Public Health also coordinates the network of 21 county public health institutes located in all Croatian counties. The Croatian Institute of Public Health is responsible for reporting data on food-borne outbreaks.

1.6. Croatian Agency for Agriculture and Food

The Croatian Agency for Agriculture and Food is a government-appointed agency within the portfolio of the Ministry of Agriculture. The Agency is the national contact point of the European Food Safety Authority (EFSA) and ensures the exchange of information between the EFSA and national stakeholders, especially in the area of Directive 2003/99/EC on the monitoring of zoonoses and zoonotic agents. It is authorized to establish and coordinate the National network of institutions in the field of food and feed safety, develop and apply methodologies for risk assessment in the field of food and feed safety, cooperate with the institutes, academic community, laboratories and other legal entities in Croatia involved in the food safety system.

The Agency provides scientific and technical support to the competent authorities and State Inspectorate in the areas of agriculture and food, including food and feed safety, food and feed quality, human nutrition, animal health and welfare, plant health, food and feed for particular nutritional uses and GM food and feed.

The Centre for Food Safety of the Agency coordinates submission of all national data on zoonoses, AMR, DS, AP, FBO and TXT to EFSA.

1.7. Other institutions and laboratories involved in zoonoses monitoring and reporting

Both competent authorities also closely collaborate with different institutions and laboratories in the area of Directive 2003/99/EC on the monitoring of zoonoses and zoonotic agents:

1. Teaching Institute of Public Health “dr. Andrija Štampar”, Zagreb
2. Teaching Institute of Public Health of Split Dalmatian County, Split
3. Institute of Public Health of Bjelovarsko-bilogorska County, Bjelovar
4. Institute of Public Health of Karlovac County, Karlovac
5. Institute of Public Health of Krapina Zagorje County, Zlatar
6. Institute of Public Health of Međimurje County, Čakovec
7. Institute of Public Health Zadar, Zadar
8. Institute of Public Health of Varaždin County, Varaždin
9. Institute of Public Health of Sisak-Moslavina County, Sisak
10. Institute of Public Health of Požega-Slavonia County, Požega
11. Teaching Institute of Public Health of Primorsko – Goranska County, Rijeka
12. Institute of Public Health of Dubrovnik – Neretva County, Dubrovnik
13. Institute of Public Health “St. Rok” of Virovitica – Podravska County, Virovitica
14. Institute of Public Health of Šibensko – Knin County, Šibenik
15. Institute of Public Health of Osijek – Baranja County, Osijek
16. Institute of Public Health of Vukovar-Srijem County, Vukovar
17. Institute of Public Health of Koprivnica – Križevci County, Koprivnica
18. Institute of Public Health of Istra County, Pula
19. Institute of Public Health of Lika – Senj County, Gospić
20. Institute of Public Health of Brod – Posavina County, Slavonski Brod
21. Institute of Public Health of Zagreb County, Zaprešić
22. Eurofins Croatiakontrola, Ltd, Zagreb
23. Sample Control, Ltd, Zagreb
24. Inspecto, Ltd, Osijek
25. Bioinstitut Ltd, Čakovec

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

2. Animal population

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

Data for animal population in Croatia are extracted from National database of all registered establishments in the country.

Poultry

Pursuant to the provisions of the Article 37 of the Veterinary Act (OG 82/13, 148/13, 115/18, 52/21) poultry farms and hatcheries must be registered in the Farms Register, which is an integral part of the Central Register of Domestic Animals, the responsibility for which lies with the MA. Detailed instructions on registration of poultry farms are prescribed in Ordinance on contents, form and manner of registration of farms (OG 96/15, 101/18, 44/19) according to which all farms with at least 250 birds and all farms from which poultry and eggs are placed on the market regardless of the number of animals have to be registered. Data on poultry production are taken from the Register of Farms.

Total number of adult breeding flocks comprising at least 250 birds in Croatia is 93

Total number of adult laying hen flocks comprising at least 200 birds and more is 386.

Total number of broilers comprising at least 500 birds and more is 3120.

Total number of fattening turkey flocks with at least 500 birds is 439.

Number of poultry in animal population tables are numbers on the day 31 December 2021. Total capacity of poultry production in Croatia during one year is approximately 40-45 000 000.

Sheep and goat

Number of sheep and goat establishments in the animal population table refers to establishments keeping sheep and goats, with mixed establishments counted twice.

Actual number of sheep and goat establishments in the country is 22 168 with 1926 mixed establishments.

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

All definitions are in line with the Article 4 of Regulation (EU) 2016/429 on transmissible animal diseases.

"Flock" means all poultry of the same health status kept on the same premises or in the same enclosure and constituting a single epidemiological unit; in the case of housed poultry; this includes all birds sharing the same airspace.

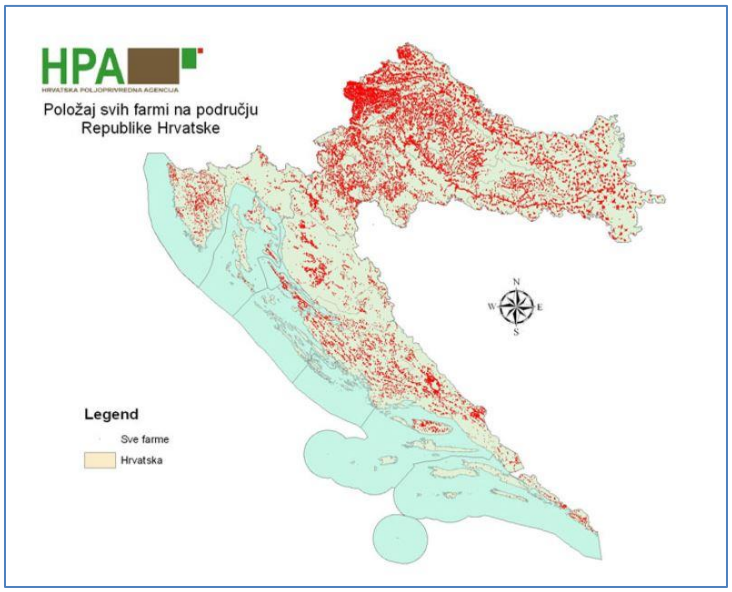
2.3. National changes of the numbers of susceptible population and trends

Write text here please

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

Geographical distribution of all establishments in Croatia is presented in Figure 1.

Figure 1



Most poultry production refers to a small-scale economies with extensive production. Only a few major manufacturers deal with Intensive poultry production. Companies are private, and small producers generally have subcontracting relationships with large companies. Majority of holdings with intensive poultry production are situated in northern part of Croatia (Varaždin, Međimurje, Bjelovar-bilogora, Zagrebačka county). No major changes occurred related to geographical and size distribution of poultry flocks in comparison to 2020.

2.5. 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

3. General evaluation*: Infection with *Mycobacterium tuberculosis* complex (*M. bovis, M. caprae, M. tuberculosis*)

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

Systematic control and eradication of Bovine tuberculosis in Croatia started in 1946. Due to comprehensive measures, herd disease incidence was from 1946 to 1953 rapidly reduced, from 28% to less than 1.4% in 1953. In the next 10 years herd disease incidence decreased to less than 1% of infected herds, and during the period of 1965 - 1990 it was constantly at the level between 0.5 - 1%. Eradication programme aligned with Directive 64/432/EEZ started in 2010.

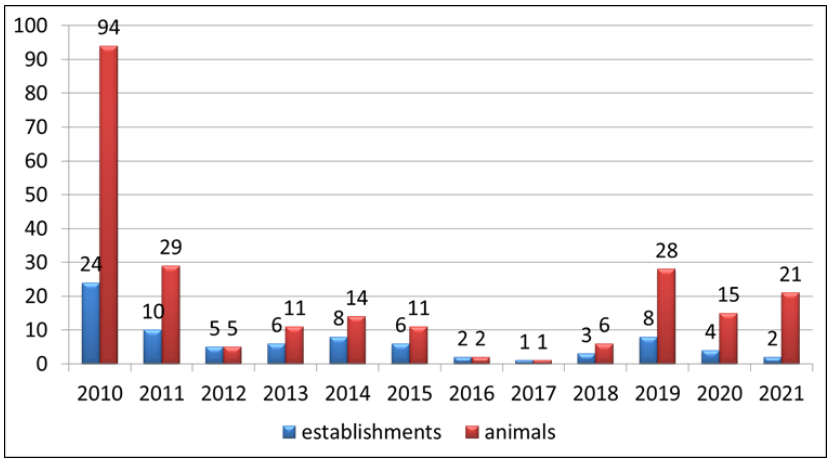
3.2. Evaluation of status, trends and relevance as a source for humans

Prevalence of bovine tuberculosis in Croatia during the time period 2010-2021:

- 2010 - 0,0587 % (24 establishments)
- 2011 - 0,024 % (10 establishments)
- 2012 - 0,0133 % (5 establishments)
- 2013 - 0,0168 % (6 establishments)
- 2014 - 0, 0233 % (8 establishments)
- 2015 - 0,0183 % (6 establishments)
- 2016 - 0,007 % (2 establishments)
- 2017 – 0,004 % (1 establishments)
- 2018 – 0,013 % (3 establishments)
- 2019 – 0,038 % (8 establishments)
- 2020 – 0,020 % (4 establishments)
- 2021 – 0,01 % (2 establishments)

Confirmed infection with *Mycobacterium tuberculosis* complex in bovine animals during the period 2010 -2021 is presented in Figure 2.

Figure 2. Confirmed infection with *Mycobacterium tuberculosis* complex in the time period 2010 - 2021.



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

New European Union legislation for animal health Regulation (EU) 2016/429 on transmissible animal diseases entered into force on 21 April 2016 and applies from 21 April 2021. Infection with *Mycobacterium tuberculosis* complex (*M. bovis, M. caprae, M. tuberculosis*) is a category B disease. For all category B diseases eradication is compulsory and it has to be implemented trough eradication programmes that are approved by European Commission.

3.4. Additional information

Write text here please

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

4. Description of Monitoring/Surveillance/Control programmes system*: Infection with *Mycobacterium tuberculosis* complex (*M. bovis, M. caprae, M. tuberculosis*)

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

From 2016 routine tuberculin skin testing of bovine animals in officially free herds is performed every 3 years. In 2021 routine testing was conducted in 5 counties: Virovitica – podravina county, Požega-slavonia county, Brod –posavina county, Osijek baranja county and Vukovar-srijem county. In addition to bovine animals, all goats older than 12 months intended for milk production and kept together with bovine animals in mixed herds were tested as well. Total number of 84 073 bovine animals in 2 493 establishments was tested from 1 January to 31 December 2021.

Suspect case
All animals positive on single intradermal tuberculin test are subjected to comparative intradermal tuberculin test in order to rule out false positive reaction or interference reaction. Animals not negative on comparative intradermal test are considered as animals suspected for infection with *Mycobacterium tuberculosis* complex *(M. bovis, M. caprae, M. tuberculosis*) (MTBC), and will be sent to immediate slaughter. Animals with suspected reaction on single intradermal tuberculin test are subjected to comparative intradermal tuberculin test. Animals not negative on the comparative test are considered as animals suspected on infection with MTBC and sent to immediate slaughter. Animals in herds where MTBC infection has been confirmed in the last two years or in establishments epidemiologically linked to infected establishments have to be slaughtered after positive or suspected reaction in single intradermal tuberculin test immediately, without comparative intradermal tuberculin test.

Confirmed case
Infection is confirmed by cultivation of the organism on primary isolation medium and identification by polymerase chain reaction (PCR). Direct PCR methods such as detection of the *M. tuberculosis* complex in fresh and fixed tissues can be used for rapid detection of infection. In all cases, infection has to be ruled out by cultivation of the organism on primary isolation medium and identification by polymerase chain reaction (PCR).

All positive reactors are slaughtered and sampled in the slaughterhouse for microbiological investigation (abnormal lymph nodes and parenchymatous organs such as lungs, liver, spleen, etc). In cases where pathological lesions are not present, samples from the retropharyngeal, bronchial, mediastinal, supramammary, mandibular and some mesenteric lymph nodes and liver are collected for examination and culture. Also, all healthy bovine animals that are slaughtered are examined for lesions of tuberculosis and any suspicious lesions are submitted to a bacteriological examination.

Tuberculin skin test is performed by authorised veterinary organisations, private veterinary organisation under contract with Ministry of Agriculture, and supervision of State Inspectorate. Samples at the slaughterhouse are taken by authorised veterinarian from accredited authorised veterinary organisation (control body) or by state veterinary inspector.

Wildlife monitoring was implemented during 2013th -2015th. During 2013 on wild boars and during 2014 and 2015 on roe deers - samples of selected lymph nodes from all shoot animals in certain hunting grounds were cultured. The goal of the surveillance was to detect the presence of MTBC in wild animals in selected higher risk counties. The presence of MTBC was not confirmed.

4.2. Measures in place[(b)]

In case of confirmation of MTBC in establishment keeping bovine animals, measures according to articles 24 to 31 of Commission Delegated Regulation (EU) 2020/689 are implemented.

Measures include the following:

- withdrawal of the disease-free status, with possibility of exemption of certain epidemiological units, provided that operators of such establishments fulfil conditions from Article 20 point 4 of Commission Delegated Regulation (EU) 2020/689
- conducting investigations and applying the measures laid down in Article 21 of Commission Delegated Regulation (EU) 2020/689 in all epidemiologically linked establishments
- epidemiological enquiry
- adaptation of surveillance to the identified risk factors, taking into consideration the conclusions of the epidemiological enquiry
- prohibition of movements of animals from targeted animal population out of the infected establishment, unless with authorisation for immediate slaughter in a designated slaughterhouse
- isolation of the suspected and confirmed cases in the establishment where technically possible
- restriction of the movements of animals from targeted animal population within the establishment
- restriction of introduction of animals from targeted animal population in the establishment
- restriction of movements of products of animals from targeted animal population from and to the infected establishment
- testing of all susceptible animals in the confirmed establishment
- testing in infected establishment within a maximum period (to be determined by the veterinary inspector) of those animals whose testing is considered necessary to complete the epidemiological enquiry and subsequent testing to restore the disease-free status
- additional testing if it is necessary to ensure swift detection of infected animals that may contribute to the spreading of the disease
- slaughter of all animals recognised as suspected cases within maximum period determined by competent authority
- milk from confirmed cases shall either be fed only to animals in the same establishment after it has been processed to ensure the inactivation of the disease agent, or it shall be disposed of
- manure, straw, feed or any other matter and substance which has come into contact with a confirmed case or with contaminated material shall be either collected and disposed of as soon as possible or, following an appropriate risk assessment, stored and processed to reduce to an acceptable level the risk of spreading of the disease
- tracing-back, processing or disposal of any products from infected establishments that may constitute a risk of spreading the disease or affect human health when it considers necessary.

Cleaning and disinfection is performed by designated authorised veterinary organisations with special approval from the Veterinary and Food Safety Directorate of Ministry of Agriculture to perform disinfection, insect and rodent control. Veterinary inspector restores disease-free status to the establishment when it considers that the cleaning and disinfection, or where relevant, the safe disposal, has been completed.

Before or upon lifting of the disease control measures, veterinary inspector can order proportionate risk mitigating measures to prevent reinfection taking into account relevant risk factors as indicated by the results of the epidemiological enquiry.

Additional measures can be implemented taking into consideration epidemiological investigation and extension of infection.

Additional measures include:

- whole herd depopulation at certain circumstances
- use of gamma-interferon assay to enable detection of the maximum number of infected animals on the establishment.

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

Infection with *Mycobacterium tuberculosis* complex (*M. bovis, M. caprae, M. tuberculosis*) is category B disease with compulsory notification in Croatia. The Ordinance on notification of animal diseases (OG 135/14) sets out the obligation to notify suspicion and confirmed case of bovine tuberculosis and lays down the procedures to be followed by the animal owner, the authorised veterinarian, the veterinary inspector and official laboratory. Veterinarian who suspects the disease or finds positive or inconclusive results of tuberculin test must notify the Veterinary and Food Safety Directorate and the veterinary inspector by telephone/telefax or by electronic means, without delay and not later than within 24 hours.

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

National situation regarding infection with MTBC in Croatia is very good since prevalence is very low and the disease is close to eradication.

4.5. Additional information

Write text here please

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

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

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

(c): Mandatory: Yes/No.

(d): Minimum five years.

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

5. General evaluation*: Infection with *Brucella abortus*, *B. melitensis* and *B. suis* in ovine and caprine animal populations

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

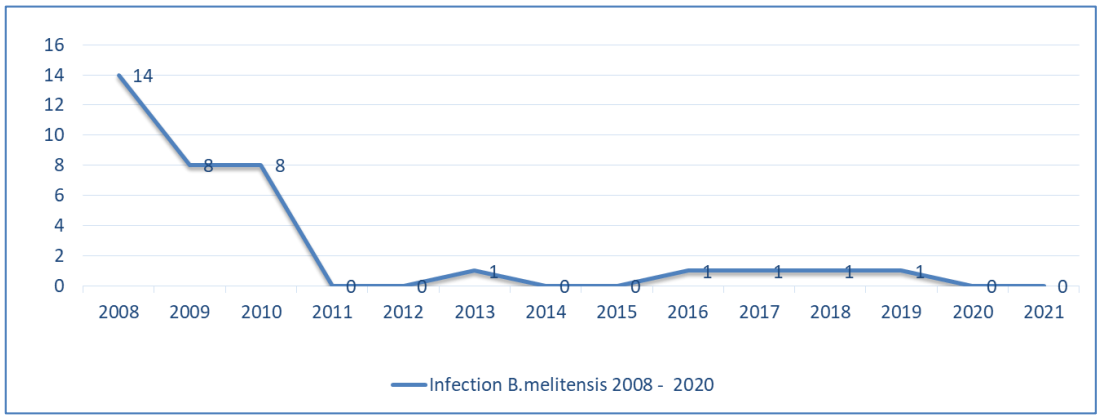
Infection with *Brucella abortus*, *B. melitensis* and *B. suis* in ovine and caprine population in Croatia has been controlled for many years. Designation of establishments keeping ovine and caprine animals as officially free from sheep and goat brucellosis, fully aligned with Directive 91/68/EEC started in 2012. In 2012 -2013, only dairy flocks were included in the programme. In 2014th whole ovine and caprine population was included in the programme.

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

During the last five years, 3 outbreaks of B. melitensis were confirmed. Outbreak from 2018 involved bovine animals infected with *B.melitensis*. B. suis was never confirmed in ruminant population in Croatia. In domestic and wild pigs *B. suis* biovar 2 was detected.

Number of outbreaks in the period 2008-2021 is presented in the Figure 3.

Figure 3 – *B. melitensis* confirmed infection 2008-2021



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

New European Union legislation for animal health Regulation (EU) 2016/429 on transmissible animal diseases entered into force on 21 April 2016 and applies from 21 April 2021. Infection with *Brucella abortus, B. melitensis* and *B. suis* in ovine and caprine population is a category B disease. For all category B diseases eradication is compulsory and it has to be implemented trough eradication programmes that are approved by European commission.

5.4. Additional information

* For each zoonotic agent

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

(b): If applicable

6. Description of Monitoring/Surveillance/Control programmes system*: Infection with *Brucella abortus*, *B. melitensis* and *B. suis* in ovine and caprine animal populations

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

Main components of the eradication programme in 2021 were:

- Serological testing (Rose Bengal Test - RBT) of small ruminants older than 6 months in the whole country in order to grant or maintain disease free status
- Laboratory investigation of each abortion (RBT on female animal, microbiological investigation of aborted material if it is available).
- Additional testing in areas at higher risk – in disease free establishments all animals older than 6 months were tested, not only representative number of animals, testing had to be performed before 31 March, premovement testing was mandatory for animals originating from establishments in at risk areas, including testing before and after pasture season

During 2021- 426 393 animals was tested in 18 133 establishments.

Samples positive on buffered Brucella antigen test are tested with CFT. If more than 5 % of ovine and caprine animals on the establishment have positive results on buffered Brucella antigen test, all ovine and caprine animals in the establishment are tested with CFT.
Animals positive on CFT are culled and sampled for bacteriology. Samples for bacteriology include: uterus, testicles, spleen, foetus, lymph nodes (sumpramammar, inguinal, portal, mandibular and mesenterial) and milk. *B. abortus, B. melitensis or B. suis* is identified by PCR.

6.2. Measures in place[(b)]

In all establishment where disease is suspected disease control measures from Articles 21, 22 and 23 or Delegated Regulation 2020/689 (DR 2020/689) have to be implemented.

In all establishments where disease is suspected or confirmed veterinary inspector suspends or withdraws disease free status of establishment.

In case of confirmation of *B. abortus, B. melitensis or B. suis* in ovine and caprine establishment, measures according to articles 24 – 31 of DR 2020/689 have to be implemented

Measures include the following:

- withdrawal of disease-free status of the infected establishment
- conducting investigations and application of measures laid down in Article 21 of DR 2020/689 in all epidemiologically linked establishments
- epidemiological enquiry conducted by a veterinary inspector
- adaptation of the surveillance to the identified risk factors, taking into account the conclusions of the epidemiological enquiry
- prohibition of movements of animals from targeted animal population out of the infected establishment, unless authorised for immediate slaughter in a designated slaughterhouse
- isolation of the suspected and confirmed cases in the establishment where technically possible
- restriction of movements of animals from targeted animal population within the establishment
- restriction of introduction of animals from targeted animal population in the establishment
- restriction of movement of products of animals from targeted animal population from and to the infected establishment
- testing of all susceptible animals in the confirmed establishment.
- extension of measures from Article 26 of DR 2020/689 to animals and products from additional animal populations to prevent the spread of the disease when necessary

- testing in infected establishment within a maximum period (to be determined by the veterinary inspector) of those animals whose testing is considered necessary to complete the epidemiological enquiry and subsequent testing to restore the disease-free status
- additional testing when necessary to ensure swift detection of infected animals that may contribute to the spreading of the disease
- killing and safe disposal of all suspect cases
- measures from Article 27 of DR 2020/689 can be extended to animals from additional animal populations when this is necessary to eradicate the disease in the infected establishment
- milk from confirmed cases shall either be fed only to animals in the same establishment after it has been processed to ensure the inactivation of the disease agent, or it shall be disposed of
- Manure, straw, feed or any other matter and substance which has come into contact with a confirmed case or with contaminated material shall be either collected and disposed of as soon as possible or, following an appropriate risk assessment, stored and processed to reduce to an acceptable level the risk of spreading of the disease
- In all infected establishments foetuses, still-born animals, animals which have died from the disease after birth and placentae have to be collected and safely disposed
- tracing-back, processing or the disposal of any products from infected establishments that may constitute a risk of spreading the disease or affect human health when it considers necessary
- derogations from Article 29 of DR 2020/689 are not implemented

Cleaning and disinfection is performed by designated authorised veterinary organisations with special approval from the Veterinary and Food Safety Directorate General (VFSDG) to perform disinfection, insect and rodent control. Veterinary inspector will not restore or grant again disease-free status to the establishment until it considers that the cleaning and disinfection, or where relevant, the safe disposal, has been completed.

Veterinary inspector will, based on a risk assessment, regard a pasture as contaminated and prohibit its use for kept animals of higher health status than that of the targeted animal population or, if epidemiologically relevant, additional animal populations, for a period of time sufficient to consider the risk of persistence of the disease agent to be negligible, and at least 60 days.

Before or upon lifting of the disease control measures, veterinary inspector will order proportionate risk mitigating measures to prevent reinfection taking into account relevant risk factors as indicated by the results of the epidemiological enquiry.

Additional measures will be implemented taking into consideration epidemiological investigation and extension of infection.

Additional measures may be ordered by VFSDG, and will include:
- whole herd depopulation at certain circumstances
- additional serological surveillance in a surrounding area

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

Notification of suspicion and confirmation infection with *B. abortus, B. melitensis* and *B. suis* in ovine and caprine is mandatory. The Ordinance on notification of animal diseases (OG 135/14) sets out the obligation to notify suspicion and confirmation of disease and lays down the procedures to be followed by the operator, the authorised veterinarian, the veterinary inspector and official laboratory. Veterinarian who suspects the disease must notify the VFSDG and the veterinary inspector by telephone/telefax or by electronic means, without delay and not later than within 24 hours.

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

Last outbreak involving *B. melitensis* was detected in mixed establishment keeping goats and bovine animals. Overall public health impact can be considered as very low, with attention in areas at risk.

6.5. 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, limit of detection of the method, diagnostic flow (parallel testing, serial testing) to assign and define cases. If programme approved by the EC, please provide link to the specific programme in the Commission`s website.

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

(c): Mandatory: Yes/No.

(d): Minimum five years.

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

7. General evaluation*: Infection with *Brucella abortus*, *B. melitensis* and *B. suis* in bovine animal population

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

Last case of bovine brucellosis in Croatia involving *B. abortus* was confirmed in 1965. Measures of active control and early detection of bovine brucellosis have been systematically implemented during the last 30 years. Mandatory reporting and laboratory investigation of each abortion in cattle and pre-movement testing of bovine animals older than 12 months were constantly the part of the control measures. Testing scheme has changed several times in the past, consisting of combination of bulk milk sampling and individual blood testing, especially in holdings with more than 10 dairy cows. Since 2011, the programme has been aligned with Directive 64/432/EEC and all animals intended for breeding older than 12 months have been screened annually with RBT.

Croatia has been recognised as a Member State free from infection with *Brucella abortus, B. melitensis and B. suis* in bovine animal population since April 2021 by Commission Implementing Decision (EU) 2021/596 of 8 April 2021 amending Annex II to Decision 2003/467/EC.

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

Disease in bovine animals is not relevant as a source for humans.

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

/

7.4. Additional information

/

* For each zoonotic agent

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

(b): If applicable

8. Description of Monitoring/Surveillance/Control programmes system*: Infection with *Brucella abortus*, *B. melitensis* and *B. suis* in bovine animal population

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

As a Member State free from infection with *Brucella abortus, B. melitensis* and *B. suis* in bovine animal population Croatia has an obligation to conduct surveillance. For the first 2 consecutive years following granting of the status, annual surveillance has to be based on a representative sample of all establishments keeping bovine animals that must allow at least for the detection, with a 95 % level of confidence, of infection with *Brucella abortus, B. melitensis* and *B. suis*, at a target prevalence rate of 0,2 % of the establishments keeping bovine animals or a target prevalence rate of 0,1 % of the bovine population.

In 2021 surveillance was conducted on all bovine animals older than 24 months. Total number of 151 981 bovine animals was tested in 15 533 establishments.

8.2. Measures in place[(b)]

In case of suspicion or confirmation of infection with *Brucella abortus, B. melitensis* and *B. suis* in bovine animal population measures according to articles 68 and 69 of Delegated Regulation (EU) 2020/687 have to be implemented.

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

Notification of suspicion or confirmation of infection with *Brucella abortus, B. melitensis* and *B. suis* in bovine animal population in mandatory. The Ordinance on notification of animal diseases (OG 135/14) sets out the obligation to notify suspicion and confirmation of disease and lays down the procedures to be followed by the operator, the authorised veterinarian, the veterinary inspector and official laboratory. Veterinarian who suspects the disease must notify the VFSDG and the veterinary inspector by telephone/telefax or by electronic means, without delay and not later than within 24 hours. As a Member State disease free, notification of confirmation of infection with *Brucella abortus, B. melitensis* and *B. suis* in bovine animal population to ADIS is mandatory within 24 hours.

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

8.5. Additional information

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

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

(b): The control program/strategies in place, including vaccination if relevant. If applicable a description of how eradication measures are/were implemented, measures in case of the positive findings or single cases; any specific action decided in the Member State or suggested for the European Union as a whole on the basis of the recent/current situation, if applicable. If programme approved by the EC, please provide link to the specific programme in the Commission`s website.
(c): Mandatory: Yes/No.
(d): Minimum five years.
(e): Relevance of the findings in animals to findings in foodstuffs and for human cases (as a source of infection).

9. General evaluation*: Salmonellosis

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

Salmonellosis in poultry has been systematically monitored in the Republic of Croatia since the seventies of the last century. Due to the implementation of strict measures under the National Programme for the Control and Eradication of Fowl Typhoid, *Salmonella*-specific serotypes *Salmonella* Gallinarum and *Salmonella* Pullorum have become economically insignificant and limited to individual rare cases in extensive production systems (the last case was recorded in 1993).

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

Thanks to the systematic and years-long implementation of disease monitoring and control measures prescribed by the annual national salmonellosis control programs (5 in total), the total number of isolated Salmonellas has significantly decreased.
Due to strict measures related to salmonella (EU legislation relevant serotypes) targets for primary production prescribed in current legislation are reached in all relevant poultry productions.
Strict and continuous implementation of SNPC resulted with decreasing of the number of human salmonella cases.

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

Write text here please

9.4. Additional information

Write text here please

* **For each zoonotic agent**
(a): Epidemiological evaluation (trends and sources) over time until recent/current situation for the different relevant matrixes (food, feed, animal). If relevant: the official “disease status” to be specified for the whole country and/or specific regions within the country
(b): If applicable

10. Description of Monitoring/Surveillance/Control programmes system*: Salmonellosis in Foodstuffs and Carcass swabs – under the remit of Veterinary and Food Safety Directorate, MoA, Veterinary Inspection

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

The National monitoring plan of food of animal origin of the Veterinary and Food Safety Directorate, MoA, in 2021 aimed to determine the microbiological status of certain categories of food of animal origin, i.e. the trends in the occurrence of certain microorganisms at all stages of production, processing and distribution, and verify that the objectives of the self-monitoring plans established by FBO in relation to the mandatory microbiological criteria laid down in Regulation (EC) No 2073/2005. Samples of food of animal origin, including carcass swabs of pigs, cattle, horses, sheep, goats, as well as broiler and turkey neck skins on the slaughter line, were sampled and tested respected within terms of number of the elementary units comprising one sample, according to Regulation (EC) No 2073/2005.

The Plan covered the following categories of food of animal origin:

- Meat, minced meat, meat preparations, mechanically separated meat and meat products
- Smoked meat products and smoked fishery products
- Milk and dairy products
- Fishery products
- Eggs
- RTE food
- Ice cream
- Carcass swabs of pigs, cattle, horses, sheep, goats
- Poultry neck skins

Veterinary inspectors were taken 1514 food samples, respectively in total 7570 elementary units sampled and tested on the presence of *Salmonella* spp., among which in 40 samples *Salmonella* was detected.
On the presence of *Salmonella* spp. a total of 8941 swabs were taken from carcasses of pigs (n=3278), cattle (n=3175), horses (n=49), sheep (n=2115), goats (n=324), as well the 806 samples (4030 elementary units) of poultry neck skins. From a total number of tested swabs and poultry neck skins, *Salmonella* was detected in 123 and 145 of them, respectively.

The following frequency of serovars was established by serotyping strains isolated from food samples, carcass swabs and poultry neck skins:

- *Salmonella* ser. Infantis (349)
- *Salmonella* ser. Typhimurium (monophasic) (39)
- *Salmonella* ser. Typhimurium (30)
- *Salmonella* ser. Hadar (22)
- *Salmonella* ser. Derby (18)
- *Salmonella* ser. Enteritidis (13)
- *Salmonella* ser. Goldcoast (11)
- *Salmonella* ser. Brandenburg (10)
- *Salmonella* ser. Agona (8)
- *Salmonella* ser. London (6)
- *Salmonella* ser. Fillmore (5)
- *Salmonella* ser. Bredeney (4)
- *Salmonella* ser. Tennessee (3)
- *Salmonella* ser. Rissen (2)
- *Salmonella* ser. Umbilo (2)
- *Salmonella* ser. Group K (2)

- *Salmonella* ser. Chichester (1)
- *Salmonella* ser. Senftenberg (1)
- *Salmonella* ser. Coeln (1)
- *Salmonella* ser. Group S (1)

10.2. Measures in place[(b)]

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

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

10.5. Additional information

Write text here please

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

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

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

(c): Mandatory: Yes/No.

(d): Minimum five years.

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

11. Description of Monitoring/Surveillance/Control programmes system*: Salmonellosis in Foodstuffs – under the remit of Sanitary Inspection

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

Monitoring/Surveillance plan on foodstuffs in 2021, included sampling and testing of *Salmonella spp*. in various foodstuffs, was prepared, in order to control compliance with food safety criteria according General Food Low (Regulation 178/2002) and microbiological criteria prescribed by Commission Regulation (EC) No 2073/2005 of 15 November 2005 on microbiological criteria for foodstuffs.
According annual monitoring plan, sampling was performed at retail level.
Except annual monitoring plan, sampling was performed in case of suspicion and/or investigations at import control or at distribution/retail level.
Were possible, sampling and testing were respected within terms of the number of units according Commission Regulation (EC) No 2073/2005 or in some type (category) food, one single sample were taken to verify compliance with the criteria, e.g. samples were taken at restaurant or café bar.
In the annual sampling plan for 2021. following foodstuff have been included for sampling and testing *Salmonella spp*:
- dried infant formula and follow-on formula
- dried infant formulae for special medical purposes intended for infants below six months of age
- minced meat and meat preparations made from beef and pork
- ice cream from catering
- pastries

- ready to eat meal (sandwiches, salads)
- herbs and spices
- juices and smoothies (unpasteurised juices from fruit and/or vegetables)

11.2. Measures in place[(b)]

In the case of positive result sanitary inspector were taken measures in line with Article 138 of Regulation (EU) 2017/625 of the European Parliament and of the Council of 15 March 2017 on official controls and other official activities performed to ensure the application of food and feed law, rules on animal health and welfare, plant health and plant protection products. In the case of positive result food of animal origin sanitary inspector notified results to Veterinary inspection by national RASFF system.

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

Yes

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

Sanitary inspectors in 2021. were taken 489 food samples, respectively in total 829 elementary units sampled and tested on the presence of Salmonella spp., among which in 3 food samples (minced meat made from beef (1), minced meat made from pork (1) and fresh poultry meat (1)) Salmonella spp. were detected .
The following serotypes were prevailing:
Salmonella ser. Infantis (1)
Salmonella ser. Typhimurium (1)
Salmonella group B (1)
According to the results, 0,62 % food samples were positive on Salmonella spp.

In 2020. sanitary inspectors were taken 355 food samples, respectively in total 912 elementary units sampled and tested on the presence of Salmonella spp., among which in 9 elementary units Salmonella spp. were detected.
The following serotypes were prevailing:
Salmonella ser. Tennessee (5)
Salmonella ser. Corvallis (2)
Salmonella ser. Infantis (1)
Salmonella ser. Agona (1)
In 2019. Sanitary inspection were taken 438 food samples, respectively in total 1083 elementary units sampled and tested on the presence of *Salmonella spp*., among which in 20 elementary units Salmonella spp. were detected. All samples were fresh minced meat and meat preparations made from poultry.

11.5. Additional information

Write text here please

12. General evaluation*: Campylobacteriosis

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

Due to the increase in the number of human cases of campylobacteriosis and the preparation of measures and recommendations necessary to prevent human illness, the Veterinary and Food Safety Directorate General carries out sine 2009 programs for the monitoring of *Campylobacter* spp. in primary production and slaughterhouses as well as their resistance to antimicrobial preparations in poultry.

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

In order to monitor campylobacteriosis in broiler flocks of *Gallus gallus* and to monitor the antimicrobial resistance of *Campylobacter* spp., sampling is carried out in line with Commission Implementing Decision (EU) 2020/1729. Monitoring of slaughterhouse process hygiene is done in line with point 2.1.9. of Regulation (EZ) 2073/2005 within the framework of National monitoring of food of animal origin. Samples are taken in the slaughterhouses.

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

Write text here please

12.4. Additional information

Write text here please

* **For each zoonotic agent**

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

(b): If applicable

13. Description of Monitoring/Surveillance/Control programmes system*: Campylobacteriosis

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

A total of 881 samples of broiler and turkey neck skins (832 and 49, respectively) were sampled at 33 slaughterhouses and tested by method EN ISO 10272-2:2017 while the species determination of isolated strains was performed by multiplex PCR.

13.2. Measures in place[(b)]

Write text here please

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

Yes.

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

Campylobacter counts in neck skin samples showed that a majority of counts belonged to the range less than 1,000 cfu/g (71%) while the contamination levels above 1000 cfu/g were found in 258 (29,3%) of tested samples with the highest established count of 1,2 x 10^6 *Campylobacter* cfu/g.
Among 428 samples positive on the presence of *Campylobacter* spp., the most prevalent species was *C. jejuni* (300 or 70,1%) followed by *C. coli* (128 or 29,9%).

13.5. Additional information

Write text here please

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

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

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

(c): Mandatory: Yes/No.

(d): Minimum five years.

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

14. Description of Monitoring/Surveillance/Control programmes system: *Listeria monocytogenes* in Foodstuffs - under the remit of Ministry of Health and Ministry of Agriculture

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

Ministry of Agriculture – Veterinary and Food Safety Directorate

The yearly National monitoring plan of food of animal origin included sampling and testing of *Listeria monocytogenes* in foods of animal origin in order to control compliance with microbiological criteria settled in the Commission Regulation (EC) No 2073/2005 of 15 November 2005
Following categories of food of animal origin were taken and tested:

- fermented meat products
- smoked fishery products
- raw milk intended for direct human consumption
- cheeses
- RTE food.

The samples of the food of animal origin were taken at the production, wholesale, storage or retail level, where microbiological criteria were respected with in terms of the number of five units comprising one sample. Methods used for testing were qualitative (absence or presence, using detection method) and/or quantitative (counts of colony forming units per gram (cfu/g) using enumeration method) depending of stage where the criterion applies.

In total, 304 of the food samples, respectively in total 1520 of elementary units, were taken and tested on the presence of *Listeria monocytogenes.*

14.2. Measures in place[(b)]

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

Yes.

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

Ministry of Agriculture – Veterinary and Food Safety Directorate

All of 304 food samples were collected at the production, wholesale, storage or retail level, among which 3 were found positive on the presence of *Listeria monocytogenes*. All samples tested by enumeration method complied with the criteria of levels not exceeding limit of 100 cfu/g, exactly results were below LOD (below 10 cfu/g).

15. Description of Monitoring/Surveillance/Control programmes system*: *Listeria monocytogenes* in Foodstuffs under the remit of Sanitary inspection

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

Monitoring/Surveillance plan on foodstuffs in 2021. included sampling and testing of Listeria monocytogenes in various foodstuffs, was prepared in order to control compliance with food safety criteria and microbiological criteria prescribed by Commission Regulation (EC) No 2073/2005 of 15 November 2005 on microbiological criteria for foodstuffs including all modifications and amendments were met.
According annual monitoring plan samples were taken at the wholesale at retail level.

Except annual monitoring plan, samples were also taken in case of suspicion and/or investigations at import control or at distribution/retail level.
Were possible, sampling and testing were respected within terms of the number of units according Commission Regulation (EC) No 2073/2005 or in some cases only one single sample were taken to verify compliance with the criteria, e.g. samples were taken at restaurant or caffe bar.
In the annual sampling plan for 2021. following foodstuff have been included for sampling and testing *Listeria monocytogenes*:

− ice cream produced at catering and industry production
− pastries
− ready to eat meal (sandwiches, salads)
− soft cheese
− smoked fishery products
− fermented meat products
- juices and smoothies (unpasteurised juices from fruit and/or vegetables)

15.2. Measures in place[(b)]

In the case of positive result sanitary inspector were taken measures in line with Article 138 of Regulation (EU) 2017/625 of the European Parliament and of the Council of 15 March 2017 on official controls and other official activities performed to ensure the application of food and feed law, rules on animal health and welfare, plant health and plant protection products. In the case of positive result food of animal origin sanitary inspector notified results to Veterinary inspection by national RASFF system.

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

Yes

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

Sanitary inspectors in 2021. were taken 464 food samples respectively in total 968 elementary units sampled and tested on Listeria monocytogenes.
Methods used for testing was qualitative investigations (absence or presence, using detection methods) and/or quantitative investigations (counts of colony forming units per gram (cfu/g) using enumeration methods).

In accordance with Regulation (EC) No 2073/2005 on microbiological criteria for foodstuffs 401 food samples, respectively 913 elementary units, analysed by enumeration method where at 1 food sample (soft cheese) counted number of colony Listeria monocytogenes 80 cfu/g (below 100 cfu/g) tested by enumeration method. Other samples tested by enumeration method were below LOD (mostly below 10 cfu/g).

Further 63 food samples / elementary units, analysed by detection method. All samples tested by detection method complied with the criteria of absence in 25 g.

In 2020. Sanitary inspectors were taken 374 food samples respectively in total 1332 elementary units sampled and tested on *Listeria monocytogenes*. In accordance with Regulation (EC) No 2073/2005 on microbiological criteria for foodstuffs 234 food samples, respectively 583 elementary units, analysed by enumeration method where 2 food samples (two samples smoked fishery product), respectively 4 elementary units, not comply with food safety criteria (exceeding limits 100 cfu/g) of Listeria monocytogenes. Further 94 food samples respectively 644 elementary units analysed with both enumeration and detection methods, and 46 food samples, respectively 106 elementary units, analysed by detection method where all food samples comply with food safety/microbiology criteria.

In 2019. Sanitary inspection were taken 436 food samples, respectively in total 1528 elementary units sampled and tested on Listeria monocytogenes, among which in 3 elementary units (smoked fishery product) counted number of colony Listeria monocytogenes below 100 cfu/g (40, 40, 50) tested by enumeration method.
All samples tested by enumeration method complied with the criteria of levels not exceeding limits100 cfu/g, mostly results, except above mentioned 3 elementary units, were below LOD (mostly below 10 cfu/g).
All samples tested by detection method complied with the criteria of absence in 25 g.

15.5. Additional information

Write text here please

16. General evaluation: VEROTOXIGENIC *E. COLI* (STEC) in Foodstuffs - under the remit of Ministry of Agriculture

16.1. History of the disease and/or infection in the country

The number of human cases is not very significant.

There were no outbreaks registered in Croatia due to VT *E.coli*.

17. Description of Monitoring/Surveillance/Control programmes system: VEROTOXIGENIC *E. COLI* (STEC) in Foodstuffs - under the remit of Ministry of Agriculture

17.1. Monitoring/Surveillance/Control programmes system

In 2016th the surveillance programme of ''top six'' VTEC took place in the frame of the yearly National monitoring plan of food of animal origin for the samples of raw bovine meat. Meat samples are taken at the production (cutting plant) and at the retail level (butchery shops).
Analytical method used - ISO/TS 13136:2012.

17.2. Measures in place

Since Regulation (EC) No 2073/2005 on microbiological criteria for fresh meat does not defines VTEC neither as a process hygiene criterion (Annex I, Chapter 2) nor as a Food Safety Criterion (Annex I, Chapter 1), by determining positive result there is no further action, except that the Competent Authority of the Member State on the results of the harmonized monitoring informs the EU Commission in such a way that the results of the examination are submitted to the EFSA data base

17.3. Notification system in place to the national competent authority

Verotoxigenic *E.coli* detection is notifiable in animals since the year 2000 according to the Infectious Animal Disease Control Act and the Ministry of Agriculture Regulation No 34 "List of Notifiable Diseases and Diseases subject to Registration".

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

The National monitoring plan of food of animal origin in 2021 included sampling and testing of VTEC for the samples of raw bovine meat. Meat samples are taken at the production level (cutting plant) and at the retail (butchery shops).
Among 145 tested samples only 9 (6,2%) of them were positive on the presence of *vtx*-1 and/or *vtx*-2 and *eae* genes. Further determination (i.e. serogroup, H-antigen) was not established.

18. Description of Monitoring/Surveillance/Control programmes system: Coagulase positive Staphylococcus (CPS)/*Staphylococcal enterotoxins* (SET) in Foodstuffs - under the remit of Ministry of Health and Ministry of Agriculture

18.1. Monitoring/Surveillance/Control programmes system

Ministry of Agriculture – Veterinary and Food Safety Directorate

The yearly National monitoring plan of food of animal origin included sampling and testing of *CPS/SET* in foods of animal origin in order to control compliance with microbiological criteria settled in the Regulation (EC) No 2073/2005

Following categories of food of animal origin were taken and tested:

- cheeses
- shelled and shucked products of cooked crustaceans and molluscan shellfish.

The samples of the food of animal origin were taken at the production, wholesale, storage or retail level, where microbiological criteria were respected with in terms of the number of five units comprising one sample. Methods used for testing were qualitative (absence or presence of SET in 25g) or quantitative (counts of colony forming units per gram (cfu/g) using enumeration method) depending of stage where the criterion applies.

In total, 80 food samples, respectively in total of 400 elementary units, were taken and analyzed with qualitative method (absence or presence of SET/25g; EN ISO 19020 method), or quantitative method (counts of colony forming units per gram (cfu/g); EN ISO 6888:1/-2 method) depending of stage where the criterion applies.

18.2. Measures in place

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

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

Ministry of Agriculture – Veterinary and Food Safety Directorate

Among overall number of tested food samples, 70 of them complied with the criteria regarding the contamination level of coagulase positive *Staphylococcus*, and 10 were found negative on the presence of SET.

19. Description of Monitoring/Surveillance/Control programmes system*: *Cronobacter* spp. in Foodstuffs under the remit of Sanitary inspection

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

Monitoring/Surveillance plan on foodstuffs in 2021., included sampling and testing of Cronobacter spp. in dried infant formulae and dried infant formulae for special medical purposes intended for infants below six months of age, was prepared in order to control compliance with food safety criteria and microbiological criteria prescribed by Commission Regulation (EC) No 2073/2005 of 15 November 2005 on microbiological criteria for foodstuffs including all modifications and amendments were met.

According annual monitoring plan samples were taken at distribution/retail level.

Sanitary inspectors were taken 5 sample dried infant formulae and 4 dried infant formulae for special medical purposes intended for infants below six months of age, respectively in total 9 elementary units sampled and tested on Cronobacter spp.
Methods used for testing was qualitative investigations (absence or presence, using detection methods).

19.2. Measures in place[(b)]

In the case of positive result sanitary inspector were taken measures in line with Article 138 of Regulation (EU) 2017/625 of the European Parliament and of the Council of 15 March 2017 on official controls and other official activities performed to ensure the application of food and feed law, rules on animal health and welfare, plant health and plant protection products.

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

Yes

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

All tested 9 elementary units in 2021. complied with the criteria of absence in 10 g.

In 2020. Sanitary inspection were taken and tested 10 elementary units, and all tested samples complied with the criteria of absence in 10 g.

In 2019. Sanitary inspection were taken 60 elementary units, and all tested samples complied with the criteria of absence in 10 g.

19.5. Additional information

Write text here please

20. Description of Monitoring/Surveillance/Control programmes system*: Noro virus in Foodstuffs under the remit of Sanitary inspection

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

Monitoring/Surveillance plan on foodstuffs in 2021., included sampling and testing of Noro virus in frozen fruits and fresh cooled prepacked lettuced.

According annual monitoring plan sanitary inspectors were taken 20 single samples of frozen unprocessed fruits and 5 single samples of fresh cooled prepacked lettuced at distribution/retail level.

Methods used for testing was ISO 15216-1:2017 Hepatitis A virus and norovirus.

20.2. 2. Measures in place[(b)]

In the case of positive result sanitary inspector were taken measures in line with Article 138 of Regulation (EU) 2017/625 of the European Parliament and of the Council of 15 March 2017 on official controls and other official activities performed to ensure the application of food and feed law, rules on animal health and welfare, plant health and plant protection products.

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

Yes

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

In all 25 tested samples Noro virus was not detected.

In 2020. Sanitary inspection sampled and tested at import control 5 samples of frozen raspberries. In all 5 tested samples Noro virus was not detected.

In 2019. Sanitary inspection were taken 11 elementary units of frozen raspberries, and Noro virus was not detected.

20.5. 5. Additional information

Write text here please

21. Food-borne Outbreaks

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

The reporting of foodborne outbreaks in Croatia is regulated by a number of laws and ordinances (Act on the Protection of the Population against Communicable Diseases (OG 79/2007; 113/2008; 44/2009; 130/2017, 114/2018 47/20, 134/20, 143/21), List of Communicable Diseases the control and prevention of which is of interest to Croatia (OG 60/14, 28/20), Ordinance on the method of reporting communicable diseases (OG 23/94). Pursuant to the above-mentioned regulations each foodborne outbreak is mandatorily notified to the Infectious Disease Epidemiology Division of the Croatian Institute of Public Health (CIPH) immediately when the outbreak occurs and is identified. Infectious Disease Epidemiology Division of the Croatian Institute of Public Health receives the paper report about an outbreak with all the necessary information after the completion of the outbreak investigation.

The outbreaks are investigated by the field epidemiology team that has a microbiological support from the county public health laboratories (21). They also notify and cooperate with the Ministry of Health' sanitary inspectors and this approach enables also environmental analysis (inspection of food facilities), taking samples for laboratory investigation. In some instances also veterinary inspection is notified and that enables taking also food samples of animal origin.

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

Reporting covers outbreaks of all infectious diseases listed in the List of communicable diseases the control and prevention of which is of interest to Croatia (OG 60/14, 28/20). The Croatian Institute of Public Health is also mandated to investigate outbreaks of unknown origin. Reporting covers the entire range of microbiological agents as well as outbreaks caused by toxins.

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

In 2021, 9 food-borne outbreaks affecting 102 individuals were reported. 4 individuals were hospitalized and no deaths reported. All 9 outbreaks are detected with weak evidence. In Croatia each outbreak is epidemiologically investigated and strong evidence outbreaks are based on the analytical epidemiological evidence or epidemiological investigation and detection of causative agent in food chain or its environment - detection of indistinguishable causative agent in humans. Out of 9 food-borne outbreaks, 4 outbreaks were caused by *Salmonella* (44% of all foodborne outbreaks). In foodborne outbreaks caused by *Salmonella*, all were caused by *Salmonella* group B. The largest number of people were affected in an outbreak of unknown causative agent reported as foodborne intoxication linked to the wedding ceremony organized in a restaurant.

COVID-19 pandemic certainly impacted surveillance and reporting of zoonoses and food-borne outbreaks. Pandemic shifted the activities and focus of resources from other infectious diseases toward itself already in quarter 1, 2020. Additionally, implemented control measures related to pandemic have probably influenced the risk of contracting the infectious diseases (closure of bars and restaurants, limited number of people on gatherings, restricted movement of people etc.). In 2019 much more food-borne outbreaks were reported (46), in 2021 the number of reported foodborne outbreaks decreased significantly. 2021 is the year with the smallest number of FBO reported so far.

21.4. Descriptions of single outbreaks of special interest

Write text here please

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

Write text here please

21.6. 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

21.7. 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.

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

Ministry of Agriculture
Veterinary and Food Safety Directorate General

Competent authority within the field of antimicrobial resistance in animals and food of animal origin is the Veterinary and Food Safety Directorate General.

The Veterinary and Food Safety Directorate General is responsible for development and implementation of AMR monitoring programs throughout the entire chain of production, distribution and retail, including primary production. Sampling is done by authorised veterinarians and samples are collected according to national monitoring programmes in relevant animal production.

State Inspectorate of the Republic of Croatia

Inspection control on the implementation of program is done by Veterinary Inspection of the State Inspectorate.

Croatian Veterinary Institute

Laboratory for general bacteriology and mycology

National Reference Laboratory for Antimicrobial Resistance is Laboratory for General Bacteriology and Mycology, Department of Bacteriology and Parasitology, Croatian Veterinary Institute in Zagreb.

Authorised veterinary organisations

Sampling is done by authorised veterinarians (primary production samples) and veterinary inspector (samples of fresh meat of broilers, pig meat and bovine meat gathered at retail).

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

23. General Antimicrobial Resistance Evaluation

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

Testing on AMR includes *Salmonella* spp., *Campylobacter* spp. isolates from foodstuffs and primary production (in 2021 samples from fattening pigs and bovines under one year of age were tested). Samples are collected in the frame of monitoring and surveillance programmes. Also, indicator bacteria (*Escherichia coli)*, presumptive ESBL/AmpC and carbapenemase producing *E.coli* isolates are tested in the frames of AMR monitoring according to the Commission Implementing Decision 2020/1729.

ESBL- or AmpC- or carbapenemase-producing *E. coli* from samples of fresh pig meat and bovine meat gathered at retail.

AMR testing of samples from primary production and from samples of fresh pig meat and bovine meat gathered at retail is done in National referent laboratory Croatian Veterinary Institute in Zagreb.

Results in 2021 are as follows:

Fattening Pigs:Caecum

Fresh meat

Bovines <1 year: Caecum

Fresh meat

If we compare AMR data from 2015, 2016, 2017 and 2019 we can see moderate resistance to ampicillin in indicator *E. coli* isolated from pigs (2015 - 32,9%, 2016 – 48,6%, 2017 – 30,2%, 2019 – 38,8%) and cattle under one year of age (2015 – 22,4%, 2016 – 22,1%, 2017 – 14,1%, 2019 – 13,1 %). Regarding resistance of indicator *E. coli* to tetracycline it is relatively high in pigs (2015 – 56,5, 2016 – 60,8%, 2017 – 48,8, 2019 – 47,1), while moderate in bovines (2015 – 34,1%, 2016 – 29,5%, 2017 – 14,1, 2017 – 13,1%). Low to moderate resistance was observed in *E. coli* isolates to ciprofloxacin isolated from pigs (2015 – 7,1%, 2016 – 21,6%, 2017 – 15,1%, 2019 – 16,5%) and calves (2015 – 9,4%, 2016 – 8,4%, 2017 – 8,2%, 2019 – 7,1%). From these data we can see increase of resistance for ampicillin and ciprofloxacin of indicator *E. coli* isolated from pigs, whereas decrease was observed for tetracycline. In *E. coli* isolated from bovine animals we can see decreasing trends for all three antimicrobials.
Resistance to cefotaxime in indicator *E. coli* isolated from fattening pigs and calves under one year was not observed. Also, from 2015. – 2019., none of the *E. coli* (indicator *E. coli* or *E. coli* strains from specific monitoring) strains were found to be resistant to colistin and meropenem.

Regarding resistance in *C. coli* isolated from fattening pigs, increase of resistance were observed for ciprofloxacin (2015 – 81,9%, 2016 – 2016 – 89,8%, 2017 – 89,9%) and streptomycin (2015 – 87,5%, 2016 – 94,9%, 2017 – 97,4%), whereas decrease were observed for erythromycin (2015 – 12,5%, 2016 – 5,1%, 2017 – 3,8%). Increase of resistance in *C. jejuni* isolates from cattle were also observed for ciprofloxacin and streptomycin.

Presumptive ESBL- and/or AmpC-producing isolates occurrence was generally ‘very low’ ranging from 2% to 3% in isolates from pigs and calves meat.

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

Write text here please

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

AMR monitoring in 2021 has been carried out in food producing animals (fattening pigs and bovines under one year of age) and in food (samples of fresh pig and bovine meat gathered at retail).
Sampling frequency, size and design includes rotation system according to the Commission Implementing Decision 2020/1729

National monitoring programs are implemented related to *Salmonella* spp., *Campylobacter* spp. and *E.coli.*

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

Write text here please

23.5. Additional information

Write text here please

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

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

24. General Description of Antimicrobial Resistance Monitoring*; Salmonella in Cattle (bovine animals) and fattening pigs

24.1. General description of sampling design and strategy[(a)]

Samples were taken from bovines and fattening pigs in slaughterhouse included caeca. Distribution of samples is organised according to monthly scheme depending on the production capacity of slaughterhouse.

Samples are taken by authorised veterinary organisations and are tested in NRL for AMR – Croatian Veterinary Institute in Zagreb.

AMR monitoring as well as testing of isolates is performed according to Commission Implementing Decision 2020/1729

Isolation of *Salmonella* sp. is made according to ISO 6579-1:2017 Microbiology of the food chain — Horizontal method for the detection, enumeration and serotyping of Salmonella — Part 1: Detection of *Salmonella* spp., while serotipisation was made according to ISO/TR 6579-3:2014 Microbiology of the food chain — Horizontal method for the detection, enumeration and serotyping of Salmonella — Part 3: Guidelines for serotyping of *Salmonella* spp. Agglutination was made by Statens Serum and bio Rad antisera.
Antimicrobial susceptibility testing was made by broth microdilution method and commercial TREK microplates were used (EUSEC3).

24.2. Stratification procedure per animal population and food category

As described under point 1.

24.3. Randomisation procedure per animal population and food category

Date of sampling is randomly determined using Random org application.

24.4. Analytical method used for detection and confirmation[(b)]

AMR testing is performed according to the Commission Implementing Decision 2020/1729 and protocols developed by the EURL-AR.
Serotyping of the strains and AMR testing are performed in the NRL for AMR.
Cut-off values used according to the Commission Implementing Decision 2020/1729.

24.5. Laboratory methodology used for detection of antimicrobial resistance[(C)]

Laboratory methodology is used according to the Commission Implementing Decision 2020/1729 (microdilution method)

Antimicrobials included	Cut-off values
Sulfamethoxazole	256
Trimethoprim	2
Ciprofloxacin	0,064
Tetracycline	8
Meropenem	0,125
Azithromycin	16
Nalidixic acid	8
Chloramphenicol	16
Tigecycline	0.5

Colistin	2
Cefotaxime	0,5
Ceftazidim	2
Ampicillin	8
Gentamicin	2
Amikacin	4

24.6. Library preparation used

Write text here please

24.7. Version of the predictive tool

Write text here please

24.8. Results of investigation

In 2021 in Laboratory for general bacteriology and mycology of Croatian Veterinary Institute, antimicrobial resistance (AMR) was determined in 15 *Salmonella* spp. isolated from bovine caecum and 32 *Salmonella* spp. isolated from fattening pig caecum.
The most prevalent serotypes isolated from cattle were S. Stanleywille (6), followed by S. Typhimurium (4), monophasic S. Typhimurium (3).
The most prevalent serotypes isolated from fattening pigs were monophasic S. Typhimurium (17) and S. Typhimurium (12).

24.9. Additional information

Write text here please

*** 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

25. General Description of Antimicrobial Resistance Monitoring*; *Campylobacter jejuni/coli* - Cattle (bovine animals) and fattening pigs

25.1. General description of sampling design and strategy[(a)]

The sampling plan was prepared by the Ministry of Agriculture, and with this plan all slaughterhouses in Croatia were included. Sampling was carried out by random selection of the day in the week.

Samples were taken from bovines and fattening pigs in slaughterhouse included caeca. Distribution of samples is organised according to monthly scheme depending on the production capacity of slaughterhouse.

Samples are taken by authorised veterinary organisations and are tested in NRL for AMR – Croatian Veterinary Institute in Zagreb.

AMR monitoring as well as testing of isolates is performed according to Commission Implementing Decision 2020/1729

25.2. Stratification procedure per animal population and food category

As described under point 1.

25.3. Randomisation procedure per animal population and food category

Date of sampling is randomly determined using Random org application

25.4. Analytical method used for detection and confirmation[(b)]

AMR testing is performed according to the Commission Implementing Decision 2020/1729 and protocols developed by the EURL-AR.
Isolation of *Campylobacter* sp. was made according to ISO 10272-1:2017 Microbiology of the food chain — Horizontal method for detection and enumeration of Campylobacter spp. — Part 1: Detection method. Identification of Campylobacter jejuni and Campylobacter coli was made by EURL-AR PCR protocol (https://www.eurl-ar.eu/CustomerData/Files/Folders/21-protocols/280_protocol-for-campylobacter-november-2013.pdf).

25.5. Laboratory methodology used for detection of antimicrobial resistance[(C)]

Laboratory methodology is used according to the Commission Implementing Decision 2020/1729 (microdilution method)
Antimicrobial susceptibility testing was made by broth microdilution method and commercial TREK microplates were used (EUCAMP2).

Antimicrobials included	Cut-off values	
	C. jejuni	*C. coli*
Chloramphenicol	16	16
Erythromycin	4	8
Ciprofloxacin	0.5	0.5
Tetracycline	1	2
Gentamicin	2	2
Ertapenem	0.5	0.5

25.6. Library preparation used

Write text here please

25.7. Version of the predictive tool

Write text here please

25.8. Results of investigation

In 2021, antimicrobial susceptibility testing was made on 85 isolates of *Campylobacter sp.* isolated from fattening pigs (all *C. coli*). And on 85 isolates of *Campylobacter sp.* isolated from bovines under one year of age (38 *C. coli*, 47 *C. jejuni*)

25.9. Additional information

Write text here please

*** 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

26. General Description of Antimicrobial Resistance Monitoring*; *E. coli* - Cattle (bovine animals) and fattening pigs

26.1. General description of sampling design and strategy[(a)]

The sampling plan was prepared by the Ministry of Agriculture, and with this plan all slaughterhouses in Croatia were included. Sampling was carried out by random selection of the day in the week.

Samples were taken from bovines and fattening pigs in slaughterhouse included caeca. Distribution of samples is organised according to monthly scheme depending on the production capacity of slaughterhouse.

Samples are taken by authorised veterinary organisations and are tested in NRL for AMR – Croatian Veterinary Institute in Zagreb.

AMR monitoring as well as testing of isolates is performed according to Commission Implementing Decision 2020/1729

26.2. Stratification procedure per animal population and food category

As described under point 1.

26.3. Randomisation procedure per animal population and food category

Date of sampling is randomly determined using Random org application

26.4. Analytical method used for detection and confirmation[(b)]

AMR testing is performed according to the Commission Implementing Decision 2020/1729 and protocols developed by the EURL-AR.

Isolation of *Escherichia coli* was made on TBX agar (Oxoid TBX medium).

26.5. Laboratory methodology used for detection of antimicrobial resistance [(C)]

Laboratory methodology is used according to the Commission Implementing Decision 2020/1729 (microdilution method)
Antimicrobial susceptibility testing was made by broth microdilution method and commercial TREK microplates were used (EUVSEC3).

Antimicrobials included	Cut-off values
Sulfamethoxazole	64
Trimethoprim	2
Ciprofloxacin	0,064
Tetracycline	8
Meropenem	0,125
Azithromycin	16
Nalidixic acid	8
Chloramphenicol	16
Tigecycline	0,5
Colistin	2
Cefotaxime	0,25
Ceftazidim	0,5
Ampicillin	8
Gentamicin	2
Amikacin	8

26.6. Library preparation used

Write text here please

26.7. Version of the predictive tool

Write text here please

26.8. Results of investigation

In 2021, antimicrobial susceptibility testing was made on 85 isolates of *E. coli* isolated from fattening pigs and on 85 *E. coli* isolates isolated from bovines under one year of age.

26.9. Additional information

Write text here please

*** 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

27. General Description of Antimicrobial Resistance Monitoring*; *E. coli* / ESBL; AmpC monitoring - Cattle (bovine animals) and fattening pigs

27.1. General description of sampling design and strategy[(a)]

The sampling plan was prepared by the Ministry of Agriculture, and with this plan all slaughterhouses in Croatia were included. Sampling of the caecum was carried out by random selection of the day in the week.
According annual monitoring plan, given by Ministry of Agriculture, veterinary inspectors took sampes of pig and bovine meat at retail level.

Samples were taken from bovines and fattening pigs in slaughterhouse included caeca. Distribution of samples is organised according to monthly scheme depending on the production capacity of slaughterhouse.

Samples are taken by authorised veterinary organisations and are tested in NRL for AMR – Croatian Veterinary Institute in Zagreb.

AMR monitoring as well as testing of isolates is performed according to Commission Implementing Decision 2020/1729

27.2. Stratification procedure per animal population and food category

As described under point 1.

27.3. Randomisation procedure per animal population and food category

Date of sampling is randomly determined using Random org application

27.4. Analytical method used for detection and confirmation[(b)]

AMR testing is performed according to the Commission Implementing Decision 2020/1729 and protocols developed by the EURL-AR.

Isolation is made according to EURL-AR protocols: Isolation of ESBL-, AmpC- and carbapenemase-producing *E. coli* from caecal samples (https://www.eurl-ar.eu/CustomerData/Files/Folders/21-protocols/530_esbl-ampc-cpeprotocol-version-caecal-v7-09-12-19.pdf)

Isolation of ESBL-, AmpC- and carbapenemase-producing *E. coli* from fresh meat (https://www.eurl-ar.eu/CustomerData/Files/Folders/21-protocols/529_esbl-ampc-cpeprotocol-version-meat-v7-09-12-19.pdf).

27.5. Laboratory methodology used for detection of antimicrobial resistance(C)

Laboratory methodology is used according to the Commission Implementing Decision 2020/1729 (microdilution method)
Antimicrobial susceptibility testing was made by broth microdilution method and commercial TREK microplates were used (EUVSEC3, EUVSEC2).

Antimicrobials included	Cut-off values
First panel	
Sulfamethoxazole	64
Trimethoprim	2
Ciprofloxacin	0,064
Tetracycline	8
Meropenem	0,125
Azithromycin	16
Nalidixic acid	8
Chloramphenicol	16
Tigecycline	0,5
Colistin	2
Cefotaxime	0,25
Ceftazidim	0,5
Ampicillin	8
Gentamicin	2
Amikacin	8
Second panel	
Cefoxitin	8
Ertapenem	0,06
Imipenem	0,5
Meropenem	0,125
Ceftazidim	0,5
Cefepim	0,125
Cefotaxime/clavulanic acid	0,25
Ceftazidim/clavulanic acid	0,5
Cefotaxime	0,25
Temocillin	32

27.6. Library preparation used

Write text here please

27.7. Version of the predictive tool

Write text here please

27.8. Results of investigation

Regarding specific monitoring of ESBL/AmpC/ producing *E. coli*, in 2021 261 samples of pig caecum (177 positive) and 203 samples of cattle caecum were tested (90 positive).

Also, in 2021, 139 saples of fresh pig meat (3 positive) and 130 saples of fresh cattle meat (4 positive) were tested.

27.9. Additional information

Write text here please

*** 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

28. General Description of Antimicrobial Resistance Monitoring*; carbapenemase producing *E. coli*, Cattle (bovine animals) and fattening pigs

28.1. General description of sampling design and strategy[(a)]

The sampling plan was prepared by the Ministry of Agriculture, and with this plan all slaughterhouses in Croatia were included. Sampling of the caecum was carried out by random selection of the day in the week.
According annual monitoring plan, given by Ministry of Agriculture, veterinary inspectors took sampes of pig and bovine meat at retail level.

Samples were taken from bovines and fattening pigs in slaughterhouse included caeca. Distribution of samples is organised according to monthly scheme depending on the production capacity of slaughterhouse.

Samples are taken by authorised veterinary organisations and are tested in NRL for AMR – Croatian Veterinary Institute in Zagreb.

AMR monitoring as well as testing of isolates is performed according to Commission Implementing Decision 2020/1729

28.2. Stratification procedure per animal population and food category

As described under point 1.

28.3. Randomisation procedure per animal population and food category

Date of sampling is randomly determined using Random org application

28.4. Analytical method used for detection and confirmation[(b)]

AMR testing is performed according to the Commission Implementing Decision 2020/1729 and protocols developed by the EURL-AR.
Isolation is made according to EURL-AR protocols: Isolation of ESBL-, AmpC- and carbapenemase-producing *E. coli* from caecal samples

(**https://www.eurl-ar.eu/CustomerData/Files/Folders/21-protocols/530_esbl-ampc-cpeprotocol-version-caecal-v7-09-12-19.pdf**)

Isolation of ESBL-, AmpC- and carbapenemase-producing *E. coli* from fresh meat (**https://www.eurl-ar.eu/CustomerData/Files/Folders/21-protocols/529_esbl-ampc-cpeprotocol-version-meat-v7-09-12-19.pdf**)

For isolation, commercial plates were used (chromID CARBA SMART Agar, Biomerieux).
In 2021. none of the carbapenemase producing *E. coli* from caecal samples and fresh meat samples was isolated.

28.5. Laboratory methodology used for detection of antimicrobial resistance(C)

Laboratory methodology is used according to the Commission Implementing Decision 2020/1729 (microdilution method)
Antimicrobial susceptibility testing was made by broth microdilution method and commercial TREK microplates were used (EUVSEC3, EUVSEC2).

Antimicrobials included	Cut-off values
First panel	
Sulfamethoxazole	64
Trimethoprim	2
Ciprofloxacin	0,064
Tetracycline	8
Meropenem	0,125
Azithromycin	16
Nalidixic acid	8
Chloramphenicol	16
Tigecycline	0,5
Colistin	2
Cefotaxime	0,25
Ceftazidim	0,5
Ampicillin	8
Gentamicin	2
Amikacin	8
Second panel	
Cefoxitin	8
Ertapenem	0,06
Imipenem	0,5
Meropenem	0,125
Ceftazidim	0,5
Cefepim	0,125
Cefotaxime/clavulanic acid	0,25
Ceftazidim/clavulanic acid	0,5
Cefotaxime	0,25
Temocillin	32

28.6. Library preparation used

Write text here please

28.7. Version of the predictive tool

Write text here please

28.8. Results of investigation

Regarding specific monitoring of carbapenemase producing *E. coli*, in 2021 261 samples of pig caecum, 203 samples of cattle caecum, 139 saples of fresh pig meat and 130 saples of fresh cattle meat were tested.
All tested isolates were negative for presence of carbapenemase producing *E. coli*

28.9. Additional information

Write text here please

*** 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