

Iceland

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

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

IN 2020

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 Iceland during the year 2020.

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

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

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

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

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

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

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

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ANIMAL POPULATION TABLES

Table Susceptible animal population

Animal species	Category of animals	Population			
		holding	animal	slaughter animal (heads)	herd/flock
Cattle (bovine animals)	Cattle (bovine animals) - calves (under 1 year) - dairy calves	634	11,426		634
	Cattle (bovine animals) - calves (under 1 year) - for slaughter	656	11,244		656
	Cattle (bovine animals) - dairy cows - adult	558	25,763		558
	Cattle (bovine animals) - dairy cows - young cattle (1-2 years)	528	6,133		528
	Cattle (bovine animals) - meat production animals - suckler cows	130	3,295		130
	Cattle (bovine animals) - unspecified			21,681	
	Cattle (bovine animals) - young cattle (1-2 years)	724	22,782		724
	Gallus gallus (fowl)	Gallus gallus (fowl) - broilers	26	771,249	5,401,052
Gallus gallus (fowl) - laying hens - adult		12	279,372		37
Gallus gallus (fowl) - laying hens - during rearing period		7	94,073		12
Gallus gallus (fowl) - parent breeding flocks for broiler production line - adult		4	63,400	26,267	19
Gallus gallus (fowl) - parent breeding flocks for broiler production line - during rearing period		6	52,717		14
Gallus gallus (fowl) - parent breeding flocks for egg production line - adult		2	8,720		3
Gallus gallus (fowl) - parent breeding flocks for egg production line - during rearing period		1	5,092		1
Pigs		Pigs - breeding animals - raised under controlled housing conditions - boars	10	42	10
	Pigs - breeding animals - raised under controlled housing conditions - sows	12	3,021	1,228	12
	Pigs - fattening pigs - raised under controlled housing conditions	13	29,409	78,678	13
	Pigs - fattening pigs - raised under controlled housing conditions - piglets	11	10,096		11
Small ruminants	Goats	119	1,621	580	119
	Sheep - animals over 1 year	2,104	315,552	50,960	2,104
	Sheep - animals under 1 year (lambs)	1,973	75,054	486,342	1,973
Solipeds, domestic	Solipeds, domestic - horses		70,500	9,306	
Turkeys	Turkeys - meat production flocks	5	15,305	48,838	9
	Turkeys - parent breeding flocks - adult	1	830		4
	Turkeys - parent breeding flocks - during rearing period	2	1,447		3

DISEASE STATUS TABLES

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

Region	Zoonotic agent	Number of herds with status officially free	Number of infected herds	Total number of herds
ISLAND	Brucella	752	0	752

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

Region	Zoonotic agent	Number of herds with status officially free	Number of infected herds	Total number of herds
ISLAND	Brucella	2,132	0	2,132

DISEASE STATUS TABLES

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

Region	Zoonotic agent	Number of herds with status officially free	Number of infected herds	Total number of herds
ISLAND	Mycobacterium bovis	752	0	752

PREVALENCE TABLES

Table Campylobacter:CAMPYLOBACTER in animal

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling Details	Method	Sampling unit	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Gallus gallus (fowl) - broilers - before slaughter - Farm - Iceland - animal sample - faeces - Control and eradication programmes - Industry sampling - Census	N_A	ISO 10272-2:2017 Campylobacter	herd/flock	671	4	Campylobacter, unspecified sp.	4
	Turkeys - meat production flocks - before slaughter - Farm - Iceland - animal sample - faeces - Control and eradication programmes - Industry sampling - Census	N_A	Not Available	herd/flock	32	1	Campylobacter, unspecified sp.	1

Table Campylobacter:CAMPYLOBACTER in food

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Sample weight	Sample weight unit	Sampling Details	Method	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Meat from broilers (Gallus gallus) - carcase - chilled - Slaughterhouse - Iceland - food sample - neck skin - Surveillance - based on Regulation 2073 - Industry sampling - Census	slaughter animal batch	10	Gram	N_A	ISO 10272-2:2017 Campylobacter	693	5	Campylobacter, unspecified sp.	5
	Meat from turkey - carcase - chilled - Slaughterhouse - Iceland - food sample - neck skin - Surveillance - based on Regulation 2073 - Industry sampling - Census	slaughter animal batch	10	Gram	N_A	ISO 10272-2:2017 Campylobacter	50	0	Campylobacter	0

Table COXIELLA in animal

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Sampling Details	Method	Total units tested	Total units positive	N of clinical affected herds	Zoonoses	N of units positive
Not Available	Cattle (bovine animals) - dairy cows - adult - Farm - Iceland - animal sample - milk - Monitoring - Official sampling - Objective sampling	herd/flock	N/A	Enzyme-linked immunosorbent assay (ELISA)	65	0	0	Coxiella burnetii	0

Table Escherichia coli:ESCHERICHIA COLI in feed

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Sample weight	Sample weight unit	Sampling Details	Method	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Pet food - final product - Border Control Posts - Canada - Not Available - Surveillance - Official sampling - Objective sampling	batch (food/feed)	20	Gram	N.A	Not Available	5	0	Escherichia coli	0

Table HISTAMINE in food

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Sample weight	Sample weight unit	Sampling Details	Total units tested	Total units positive	Method	Zoonoses	N of units tested	N of units positive
Not Available	Fish - Fishery products from fish species associated with a high amount of histidine - not enzyme matured - Border Control Posts - Thailand - Not Available - Surveillance - Official sampling - Objective sampling	batch (food/feed)	5	Gram	N.A	18	0	<=100	Histamine	0	0
								>100 TO <=200	Histamine	0	0
								>200	Histamine	0	0
	Fish - sauce produced by fermentation of fishery products - Border Control Posts - Thailand - Not Available - Surveillance - Official sampling - Objective sampling	batch (food/feed)	5	Gram	N.A	1	0	<=400	Histamine	0	1
								>400	Histamine	0	0

Table LISTERIA in food

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Sample weight	Sample weight unit	Sampling Details	Total units tested	Total units positive	Method	Zoonoses	N of units tested	N of units positive
Not Available	Roe - frozen - Border Control Posts - Peru - Not Available - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N.A	5	0	detection	Listeria monocytogenes	5	0

Table Salmonella:SALMONELLA in animal

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	N of flocks under control programme	Target verification	Sampling Details	Method	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Cattle (bovine animals) - dairy cows - adult - Farm - Iceland - animal sample - milk - Monitoring - Official sampling - Objective sampling	herd/flock		N_A	N_A	Enzyme-linked immunosorbent assay (ELISA)	65	0	Salmonella Dublin	0
	Gallus gallus (fowl) - broilers - before slaughter - Farm - Iceland - environmental sample - boot swabs - Control and eradication programmes - Official and industry sampling - Census	herd/flock	683	Y	N_A	Not Available	683	10	Salmonella Agona	8
									Salmonella Infantis	1
									Salmonella Typhimurium, monophasic	1
	Gallus gallus (fowl) - laying hens - adult - Farm - Iceland - environmental sample - boot swabs - Control and eradication programmes - Official and industry sampling - Census	herd/flock	52	Y	From some flocks, feces (animal samples) are taken	Not Available	52	0	Salmonella	0
	Gallus gallus (fowl) - laying hens - day-old chicks - Farm - Iceland - environmental sample - delivery box liner - Control and eradication programmes - Industry sampling - Census	herd/flock		N_A	N_A	Not Available	43	0	Salmonella	0
	Gallus gallus (fowl) - laying hens - during rearing period - Farm - Iceland - environmental sample - boot swabs - Control and eradication programmes - Industry sampling - Census	herd/flock		N_A	From some flocks, feces (animal samples) are taken	Not Available	26	0	Salmonella	0
	Gallus gallus (fowl) - parent breeding flocks for broiler production line - adult - Farm - Iceland - environmental sample - boot swabs - Control and eradication programmes - Official and industry sampling - Census	herd/flock	36	Y	From some flocks, boot swabs and dust samples are taken	Not Available	36	0	Salmonella	0
	Gallus gallus (fowl) - parent breeding flocks for broiler production line - day-old chicks - Farm - Iceland - animal sample - eggshells - Control and eradication programmes - Industry sampling - Census	herd/flock		N_A	N_A	Not Available	4	0	Salmonella	0
	Gallus gallus (fowl) - parent breeding flocks for broiler production line - during rearing period - Farm - Iceland - environmental sample - boot swabs - Control and eradication programmes - Industry sampling - Census	herd/flock		N_A	N_A	Not Available	11	0	Salmonella	0
	Gallus gallus (fowl) - parent breeding flocks for egg production line - adult - Farm - Iceland - environmental sample - boot swabs - Control and eradication programmes - Official and industry sampling - Census	herd/flock	5	Y	N_A	Not Available	5	0	Salmonella	0
	Gallus gallus (fowl) - parent breeding flocks for egg production line - day-old chicks - Farm - Iceland - environmental sample - boot swabs - Control and eradication programmes - Industry sampling - Census	herd/flock		N_A	N_A	Not Available	1	0	Salmonella	0
	Gallus gallus (fowl) - parent breeding flocks for egg production line - during rearing period - Farm - Iceland - environmental sample - boot swabs - Control and eradication programmes - Industry sampling - Census	herd/flock		N_A	N_A	Not Available	2	0	Salmonella	0
	Pigs - fattening pigs - raised under controlled housing conditions - Slaughterhouse - Iceland - animal sample - meat juice - Control and eradication programmes - Official sampling - Objective sampling	slaughter animal batch		N_A	N_A	Indirect ELISA (I-ELISA)	1078	127	Salmonella	127
	Turkeys - fattening flocks - before slaughter - Farm - Iceland - environmental sample - boot swabs - Control and eradication programmes - Official and industry sampling - Census	herd/flock	33	Y	N_A	Not Available	33	0	Salmonella	0
	Turkeys - parent breeding flocks - adult - Farm - Iceland - environmental sample - boot swabs and dust - Control and eradication programmes - Official and industry sampling - Census	herd/flock	4	Y	N_A	Not Available	4	0	Salmonella	0
	Turkeys - parent breeding flocks - day-old chicks - Farm - Iceland - environmental sample - boot swabs - Control and eradication programmes - Industry sampling - Census	herd/flock		N_A	N_A	Not Available	2	0	Salmonella	0
	Turkeys - parent breeding flocks - during rearing period - Farm - Iceland - environmental sample - boot swabs - Control and eradication programmes - Industry sampling - Census	herd/flock		N_A	N_A	Not Available	3	0	Salmonella	0

Table Salmonella:SALMONELLA in food

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Sample weight	Sample weight unit	Sampling Details	Method	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Dairy products (excluding cheeses) - milk powder and whey powder - Border Control Posts - United States - Not Available - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	10	0	Salmonella	0
	Meat from broilers (Gallus gallus) - carcass - Slaughterhouse - Iceland - food sample - neck skin - Control and eradication programmes - Industry sampling - Census	batch (food/feed)	25	Gram	N_A	Not Available	773	13	Salmonella Agona	7
									Salmonella Infantis	5
									Salmonella spp., unspecified	1
	Meat from pig - carcass - Slaughterhouse - Iceland - food sample - carcass swabs - Control and eradication programmes - Official sampling - Census	slaughter animal batch	300	Square centimetre	N_A	Not Available	1818	15	Salmonella Brandenburg	3
									Salmonella Kedougou	12
	Meat from poultry, unspecified - meat products - cooked, ready-to-eat - Border Control Posts - Thailand - Not Available - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	5	0	Salmonella	0
	Meat from turkey - carcass - Slaughterhouse - Iceland - food sample - neck skin - Control and eradication programmes - Industry sampling - Census	batch (food/feed)	25	Gram	N_A	Not Available	72	0	Salmonella	0
ISLAND	Meat from broilers (Gallus gallus) - fresh - chilled - Retail - Iceland - food sample - meat - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	137	0	Salmonella	0
	Meat from pig - fresh - chilled - Retail - Germany - food sample - meat - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	5	0	Salmonella	0
	Meat from pig - fresh - chilled - Retail - Iceland - food sample - meat - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	140	0	Salmonella	0
	Meat from pig - fresh - chilled - Retail - Unknown - food sample - meat - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N_A	Not Available	11	0	Salmonella	0

Table Salmonella:SALMONELLA in feed

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Sample weight	Sample weight unit	Sampling Details	Method	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	All feedingstuffs - Feed mill - Not Available - environmental sample - dust - Surveillance - Industry sampling - Selective sampling	batch (food/feed)	25	Gram	N.A	Not Available	267	2	Salmonella Idikan	1
									Salmonella Typhimurium	1
	Pet food - final product - Border Control Posts - Canada - Not Available - Surveillance - Official sampling - Objective sampling	batch (food/feed)	25	Gram	N.A	Not Available	5	0	Salmonella	0

Table Trichinella:TRICHINELLA in animal

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling Details	Method	Sampling unit	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Pigs - fattening pigs - raised under controlled housing conditions - Slaughterhouse - Iceland - animal sample - organ/tissue - Monitoring - Official sampling - Census	N.A	Not Available	animal	80535	0	Trichinella	0
	Solipeds, domestic - horses - Slaughterhouse - Iceland - animal sample - organ/tissue - Monitoring - Official sampling - Census	N.A	Not Available	animal	9309	0	Trichinella	0

FOODBORNE OUTBREAKS TABLES

Foodborne Outbreaks: summarized data

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

Causative agent	Food vehicle	Outbreak strength	Strong		
		N outbreaks	N human cases	N hospitalized	N deaths
Cryptosporidium	Mixed food	1	45	0	0

Strong Foodborne Outbreaks: detailed data

Causative agent	H	AG	VT	Other Causative Agent	FBO nat. code	Outbreak type	Food vehicle	More food vehicle info	Nature of evidence	Setting	Place of origin of problem	Origin of food vehicle	Contributory factors	Comment	N outbreaks	N human cases	N hosp.	N deaths
Cryptosporidium	unk	Not Available	Not Available	Not Available	N_A	General	Mixed food	N_A	Analytical epidemiological evidence	Canteen or workplace catering	Unknown	Unknown	Unknown	N_A	1	45	0	0

Weak Foodborne Outbreaks: detailed data

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

ANTIMICROBIAL RESISTANCE TABLES FOR CAMPYLOBACTER

Table Antimicrobial susceptibility testing of *Campylobacter jejuni* in *Gallus gallus* (fowl) - broilers - before slaughter

Sampling Stage: Farm

Sampling Type: animal sample - faeces

Sampling Context: Control and eradication programmes

Sampler: Industry sampling

Sampling Strategy: Census

Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Iceland

Sampling details:

AM substance	Ciprofloxacin	Erythromycin	Gentamicin	Nalidixic acid	Streptomycin	Tetracycline
ECOFF	0.5	4	2	16	4	1
Lowest limit	0.12	1	0.12	1	0.25	0.5
Highest limit	16	128	16	64	16	64
N of tested isolates	3	3	3	3	3	3
N of resistant isolates	0	0	0	0	0	0
MIC						
<=0.125	3		1			
0.25			2			
<=0.5						3
0.5					1	
<=1		3				
1					1	
2					1	
4				3		

Table Antimicrobial susceptibility testing of Campylobacter jejuni in Meat from broilers (Gallus gallus) - carcase - chilled

Sampling Stage: Slaughterhouse

Sampling Type: food sample - neck skin

Sampling Context: Surveillance - based on Regulation

Sampler: Industry sampling

Sampling Strategy: Census

2073

Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Iceland

Sampling details:

AM substance	Ciprofloxacin	Erythromycin	Gentamicin	Nalidixic acid	Streptomycin	Tetracycline
ECOFF	0.5	4	2	16	4	1
Lowest limit	0.12	1	0.12	1	0.25	0.5
Highest limit	16	128	16	64	16	64
N of tested isolates	4	4	4	4	4	4
MIC	N of resistant isolates	0	0	0	0	0
<=0.125	3					
0.25			4			
<=0.5						4
0.5	1					
<=1		4				
1					4	
2				3		
4				1		

ANTIMICROBIAL RESISTANCE TABLES FOR SALMONELLA

Table Antimicrobial susceptibility testing of Salmonella Agona in Gallus gallus (fowl) - broilers - before slaughter

Sampling Stage: Farm

Sampling Type: environmental sample - boot swabs

Sampling Context: Control and eradication programmes

Sampler: Industry sampling

Sampling Strategy: Census

Programme Code: AMR MON

Analytical Method:

Country of Origin: Iceland

Sampling Details:

AM substance	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
ECOFF	8	16	0.5	2	16	0.064	2	2	0.125	16	64	8	1	2
Lowest limit	1	2	0.25	0.5	8	0.015	1	0.5	0.03	4	8	2	0.25	0.25
Highest limit	64	64	4	8	128	8	16	32	16	128	1024	64	8	32
N of tested isolates	8	8	8	8	8	8	8	8	8	8	8	8	8	8
N of resistant isolates	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MIC														
<=0.03									8					
0.03						7								
0.064						1								
<=0.25			8										1	3
<=0.5				8				8						
0.5													7	5
<=1	7						8							
2	1													
<=4										6				
4												8		
<=8					8									
8		7								2				
16		1												
64											6			
128											2			

Table Antimicrobial susceptibility testing of Salmonella Agona in Meat from broilers (Gallus gallus) - carcase - chilled

Sampling Stage: Slaughterhouse

Sampling Type: food sample - neck skin

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

Sampler: Industry sampling

Sampling Strategy: Census

Analytical Method:

Country of Origin: Iceland

Sampling Details:

AM substance	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
ECOFF	8	16	0.5	2	16	0.064	2	2	0.125	16	64	8	1	2
Lowest limit	1	2	0.25	0.5	8	0.015	1	0.5	0.03	4	8	2	0.25	0.25
Highest limit	64	64	4	8	128	8	16	32	16	128	1024	64	8	32
N of tested isolates	5	5	5	5	5	5	5	5	5	5	5	5	5	5
N of resistant isolates	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MIC														
<=0.03									5					
0.03						5								
<=0.25			5										1	1
<=0.5				5				4						
0.5													4	4
<=1	5						5							
1								1						
<=2												1		
<=4										5				
4		1										4		
<=8					3									
8		4												
16					2									
32											3			
64											2			

Table Antimicrobial susceptibility testing of Salmonella Infantis in Gallus gallus (fowl) - broilers - before slaughter

Sampling Stage: Farm

Sampling Type: environmental sample - boot swabs

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

Sampler: Industry sampling

Sampling Strategy: Census

Analytical Method:

Country of Origin: Iceland

Sampling Details:

AM substance	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
ECOFF	8	16	0.5	2	16	0.064	2	2	0.125	16	64	8	1	2
Lowest limit	1	2	0.25	0.5	8	0.015	1	0.5	0.03	4	8	2	0.25	0.25
Highest limit	64	64	4	8	128	8	16	32	16	128	1024	64	8	32
N of tested isolates	1	1	1	1	1	1	1	1	1	1	1	1	1	1
N of resistant isolates	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MIC														
<=0.03									1					
0.03						1								
<=0.25			1										1	1
<=0.5				1				1						
<=1	1						1							
<=2												1		
<=8					1									
8		1								1				
32											1			

Table Antimicrobial susceptibility testing of Salmonella Infantis in Meat from broilers (Gallus gallus) - carcase - chilled

Sampling Stage: Slaughterhouse

Sampling Type: food sample - neck skin

Sampling Context: Control and eradication programmes
Programme Code: AMR MON pn12

Sampler: Industry sampling

Sampling Strategy: Census

Analytical Method:

Country of Origin: Iceland

Sampling Details:

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

Table Antimicrobial susceptibility testing of Salmonella Infantis in Meat from broilers (Gallus gallus) - carcase - chilled

Sampling Stage: Slaughterhouse

Sampling Type: food sample - neck skin

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

Sampler: Industry sampling

Sampling Strategy: Census

Analytical Method:

Country of Origin: Iceland

Sampling Details:

AM substance	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
ECOFF	8	16	0.5	2	16	0.064	2	2	0.125	16	64	8	1	2
Lowest limit	1	2	0.25	0.5	8	0.015	1	0.5	0.03	4	8	2	0.25	0.25
Highest limit	64	64	4	8	128	8	16	32	16	128	1024	64	8	32
N of tested isolates	5	5	5	5	5	5	5	5	5	5	5	5	5	5
N of resistant isolates	1	0	1	1	0	1	0	0	0	1	1	1	0	1
MIC														
<=0.03									5					
0.03						4								
0.12						1								
<=0.25			4										3	2
<=0.5				4				4						
0.5													2	2
<=1	3						5							
<=2		1										4		
2	1							1						
<=4										4				
4		1		1										
>4			1											
<=8					5									
8		3												
32											4			
>32														1
>64	1											1		
>128										1				
>1024											1			

Table Antimicrobial susceptibility testing of Salmonella Typhimurium, monophasic in Gallus gallus (fowl) - broilers - before slaughter

Sampling Stage: Farm

Sampling Type: environmental sample - boot swabs

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

Sampler: Industry sampling

Sampling Strategy: Census

Analytical Method:

Country of Origin: Iceland

Sampling Details:

AM substance	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
ECOFF	8	16	0.5	2	16	0.064	2	2	0.125	16	64	8	1	2
Lowest limit	1	2	0.25	0.5	8	0.015	1	0.5	0.03	4	8	2	0.25	0.25
Highest limit	64	64	4	8	128	8	16	32	16	128	1024	64	8	32
N of tested isolates	1	1	1	1	1	1	1	1	1	1	1	1	1	1
N of resistant isolates	1	0	0	0	0	0	0	0	0	0	1	1	0	0
MIC														
<=0.03									1					
0.064						1								
<=0.25			1											1
<=0.5				1				1						
0.5													1	
<=1							1							
<=8					1									
8		1								1				
>64	1											1		
>1024											1			

ANTIMICROBIAL RESISTANCE TABLES FOR INDICATOR ESCHERICHIA COLI

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: Iceland

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	32		
	Lowest limit	0.064	0.25	0.064	0.5	0.25	0.12	0.015	0.12	0.03	0.5		
	Highest limit	32	64	64	64	128	128	2	8	16	64		
	N of tested isolates	21	21	21	21	21	21	21	21	21	21		
Ceftazidime synergy test	Cefotaxime synergy test	MIC	N of resistant isolates	4	21	20	20	21	20	0	0	0	0
		<=0.015						7					
		<=0.03								21			
		0.03						13					
		<=0.064	5										
		0.064						1					
		0.12	12										
		0.25	3						21				
Not Available	Not Available	1	1										
		2		9									
		4		10	1	6						14	
		8		1		15						7	
		16		1	1								
		32			14								
		64			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	32		
		Lowest limit	0.064	0.25	0.064	0.5	0.25	0.12	0.015	0.12	0.03	0.5		
		Highest limit	32	64	64	64	128	128	2	8	16	64		
		N of tested isolates	21	21	21	21	21	21	21	21	21	21		
		N of resistant isolates	4	21	20	20	21	20	0	0	0	0		
Ceftazidime synergy test	Cefotaxime synergy test	MIC												
		Positive/Pre sent	<=0.064		1									
		Not Available	Negative/Ab sent	1		2								
				2		16								
4				2										
Positive/Pre sent	Not Available	MIC	<=0.125											
		2		3										
		4		16										
		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: Iceland

Sampling Details:

AM substance	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Collistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
ECOFF	8	16	0.25	0.5	16	0.064	2	2	0.125	16	64	8	1	2
Lowest limit	1	2	0.25	0.5	8	0.015	1	0.5	0.03	4	8	2	0.25	0.25
Highest limit	64	64	4	8	128	8	16	32	16	128	1024	64	8	32
N of tested isolates	21	21	21	21	21	21	21	21	21	21	21	21	21	21
N of resistant isolates	21	0	21	21	0	0	0	0	0	0	1	17	0	17
MIC														
<=0.015						16								
<=0.03									21					
0.03						4								
0.064						1								
<=0.25													8	2
<=0.5								17						
0.5													12	2
<=1							21							
1								2					1	
<=2												3		
2			11	1				2						
<=4										20				
4		6	10	9								1		
<=8					20						2			
8		15		11						1				
16					1						1			
32											10			16
>32														1
64											7	17		
>64	21													
1024											1			

Table Antimicrobial susceptibility testing of Escherichia coli, non-pathogenic, unspecified in Gallus gallus (fowl) - broilers

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: Iceland

Sampling Details:

AM substance	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Collistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
ECOFF	8	16	0.25	0.5	16	0.064	2	2	0.125	16	64	8	1	2
Lowest limit	1	2	0.25	0.5	8	0.015	1	0.5	0.03	4	8	2	0.25	0.25
Highest limit	64	64	4	8	128	8	16	32	16	128	1024	64	8	32
N of tested isolates	85	85	85	85	85	85	85	85	85	85	85	85	85	85
N of resistant isolates	6	0	0	0	0	6	0	1	0	6	4	3	0	9
MIC														
<=0.015						66								
<=0.03									84					
0.03						13								
0.064									1					
<=0.25			85										74	35
0.25						6								
<=0.5				85				58						
0.5													10	35
<=1	14						84							
1								20					1	6
<=2		13										60		
2	39						1	6						
<=4										76				
4	24	48										22		
<=8					84						21			
8	2	23								3				
16		1			1						53			
32								1			6			9
64	6									1	1	3		
128										5				
1024											4			

Table Antimicrobial susceptibility testing of Escherichia coli, non-pathogenic, unspecified in Gallus gallus (fowl) - broilers

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: Iceland

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	32
	Lowest limit	0.064	0.25	0.064	0.5	0.25	0.12	0.015	0.12	0.03	0.5
	Highest limit	32	64	64	64	128	128	2	8	16	64
	N of tested isolates	1	1	1	1	1	1	1	1	1	1
Ceftazidime synergy test	N of resistant isolates	0	1	1	1	1	1	0	0	0	0
	MIC										
	<=0.015							1			
	<=0.03									1	
	<=0.125								1		
Not Available	0.12	1									
	4		1								1
	8					1					
	32				1						
	Negative/Ab sent	4		1							
Negative/Ab sent	Not Available	4					1				

Table Antimicrobial susceptibility testing of Escherichia coli, non-pathogenic, unspecified in Gallus gallus (fowl) - broilers

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: Iceland

Sampling Details:

AM substance	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Collistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
ECOFF	8	16	0.25	0.5	16	0.064	2	2	0.125	16	64	8	1	2
Lowest limit	1	2	0.25	0.5	8	0.015	1	0.5	0.03	4	8	2	0.25	0.25
Highest limit	64	64	4	8	128	8	16	32	16	128	1024	64	8	32
N of tested isolates	1	1	1	1	1	1	1	1	1	1	1	1	1	1
N of resistant isolates	1	0	1	1	0	0	0	0	0	0	1	1	0	1
MIC														
<=0.015						1								
<=0.03									1					
<=0.25													1	
<=0.5								1						
<=1							1							
<=2		1												
<=4										1				
4			1											
<=8					1									
8				1										
32												1		
>32														1
>64	1													
>1024											1			

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: Iceland

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	32
		Lowest limit	0.064	0.25	0.064	0.5	0.25	0.12	0.015	0.12	0.03	0.5
		Highest limit	32	64	64	64	128	128	2	8	16	64
		N of tested isolates	1	1	1	1	1	1	1	1	1	1
Ceftazidime synergy test	Cefotaxime synergy test	MIC	N of resistant isolates									
			0	1	1	1	1	1	0	0	0	0
		<=0.015						1				
		<=0.03								1		
		0.12	1									
		0.25								1		
Not Available	Not Available	1		1								
		4					1					
		8										1
		16				1						
	Negative/Ab sent	1		1								
Negative/Ab sent	Not Available	2						1				

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: Iceland

Sampling Details:

AM substance	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Collistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
ECOFF	8	16	0.25	0.5	16	0.064	2	2	0.125	16	64	8	1	2
Lowest limit	1	2	0.25	0.5	8	0.015	1	0.5	0.03	4	8	2	0.25	0.25
Highest limit	64	64	4	8	128	8	16	32	16	128	1024	64	8	32
N of tested isolates	1	1	1	1	1	1	1	1	1	1	1	1	1	1
N of resistant isolates	1	0	1	1	0	0	0	0	0	0	0	0	0	0
MIC														
<=0.015						1								
<=0.03									1					
<=0.5								1						
0.5													1	
<=1							1							
1			1											1
<=2		1										1		
2				1										
<=4										1				
<=8					1									
32											1			
>64	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
ESBL MON	Meat from broilers (Gallus gallus) - fresh - chilled	Escherichia coli, non-pathogenic, unspecified	Objective sampling	Retail	N_A	Monitoring	Official sampling	food sample - meat	batch (food/feed)	Iceland	N_A	140	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	22-Jul-2021
Esbl	22-Jul-2021
Animal Population	23-Jul-2021
Disease Status	22-Jul-2021
Food Borne Outbreaks	22-Jul-2021
Prevalence	22-Jul-2021

Institutions and laboratories involved in antimicrobial resistance monitoring and reporting

The responsibilities for antimicrobial resistance monitoring (planning, sampling etc.) lies with The Icelandic Food and Veterinary Authority (MAST).

Samples are collected either by the regional MAST officers or by the local authorities depending on the type of sample.

Samples are processed at official laboratories.

Susceptibility testing is performed at The Institute for Experimental Pathology at Keldur (Keldur).

MAST reports all data to EFSA.

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

General Antimicrobial Resistance Evaluation

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

As systematic AMR monitoring is relatively recent in Iceland it is not timely to draw decisive conclusions on the trends and sources.

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

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

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

5. Additional information

(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);

General Description of Antimicrobial Resistance Monitoring*; *Salmonella* in meat from broilers - carcase - chilled

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

The *Salmonella* isolates originate from the national *Salmonella* control programme at the slaughterhouses, comprising neck skin samples. Sampling was conducted by the FBO.

2. Stratification procedure per animal population and food category

Census - Every slaughter batch was sampled.

3. Randomisation procedure per animal population and food category

Census - Every slaughter batch was sampled.

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

All samples were processed at official laboratories. Isolates from *Salmonella* positive samples were send to Landspítali- The National University Hospital of Iceland (LSH) for serotyping.

Salmonella was isolated with equivalent methods as the methods given in Commission Regulation (EC) No 2073/2005 of 15 November 2005 on microbiological criteria for foodstuffs. Serotyping of *Salmonella* isolates by slide agglutination according to the White-Kauffmann-Le Minor scheme.

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

Susceptibility testing of *Salmonella* were conducted by Keldur according to Decision 2013/652/EU (Annex A, table 1 and 4). Keldur applied epidemiological cut-offs as listed in the current EFSA manual for reporting AMR.

6. Results of investigation

773 samples tested for *Salmonella* and 13 found positive. Susceptibility testing performed on 10 isolates:

Year	Isolates tested	Isolates positive	Resistance pattern (no. isolates)	Serotypes (no. isolates)
2020	10	1	AMP, CTX, CAZ, FEP, FOX, CIP, NAL, SMX, TET, TMP	S. Infantis

7. Additional information

The *Salmonella* control programme is mandatory and detection of *Salmonella* spp. is notifiable to MAST.

Actions according to the *Salmonella* control programme.

* 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

General Description of Antimicrobial Resistance Monitoring*; *Salmonella* in *Gallus gallus* (fowl) – broilers and laying hens

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

The *Salmonella* isolates were found during sampling according to the national *Salmonella* control programme. Sampling was conducted by the FBOs and official sampling.

2. Stratification procedure per animal population and food category

Census - Every flock was sampled.

3. Randomisation procedure per animal population and food category

Census - Every flock was sampled.

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

All samples were processed at official laboratories. Isolates from *Salmonella* positive samples were sent to Landspítali- The National University Hospital of Iceland (LSH) for serotyping.

Salmonella was isolated with NMKL method 71 – 5th ed. Serotyping of *Salmonella* isolates by slide agglutination according to the White-Kauffmann-Le Minor scheme.

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

Susceptibility testing of *Salmonella* were conducted by Keldur according to Decision 2013/652/EU (Annex A, table 1 and 4). Keldur applied epidemiological cut-offs as listed in the current EFSA manual for reporting AMR.

6. Results of investigation

683 samples from broilers tested for *Salmonella* and 10 found positive.
Susceptibility testing performed on all 10 isolates (one per epidemiological unit):

Year	Isolates tested	Isolates positive	Resistance pattern (no. isolates)	Serotypes (no. isolates)
2020	10	1	AMP, SMX, TET	<i>S. Typhimurium</i> , <i>monophasic</i>

No *Salmonella* spp. found in laying hens.

7. Additional information

The *Salmonella* control programme is mandatory and detection of *Salmonella* spp. is notifiable to MAST.

Actions according to the *Salmonella* control programme.

*** 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

General Description of Antimicrobial Resistance Monitoring*; *Campylobacter* in *Gallus gallus* (fowl) – broilers

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

No caecal samples were taken for AMR testing of *Campylobacter jejuni*.

The *Campylobacter* isolates were found during sampling according to the national *Campylobacter* control programme at farm level by taking faecal samples and conducted by the FBO.

2. Stratification procedure per animal population and food category

Census

3. Randomisation procedure per animal population and food category

Census

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

All samples were tested at official laboratories.

Campylobacter is isolated with ISO 10272 , 2nd ed., method (detection, direct plating).

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

Susceptibility testing of *Campylobacter* were conducted by Keldur according to Decision 2013/652/EU (Annex A, table 2). Keldur applied epidemiological cut-offs as listed in the current EFSA manual for reporting AMR.

6. Results of investigation

671 samples tested for *Campylobacter* and 4 found positive.
Susceptibility testing performed on 3 isolates:

Year	Isolates tested	Isolates positive
2020	3	0

7. Additional information

The *Campylobacter* control programme is mandatory and detection is notifiable to MAST.

Actions according to the *Campylobacter* control programme.

*** 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

General Description of Antimicrobial Resistance Monitoring*; *Campylobacter* in meat from broilers - carcass - chilled

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

No caecal samples were taken for AMR testing of *Campylobacter jejuni*.

The *Campylobacter* isolates were found during sampling according to the national *Campylobacter* control programme at slaughter level by taking neck skin samples and conducted by the FBO.

2. Stratification procedure per animal population and food category

Census

3. Randomisation procedure per animal population and food category

Census

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

All samples were tested at official laboratories.

Campylobacter is isolated with ISO 10272 , 2nd ed., method (enumeration, colony count technique).

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

Susceptibility testing of *Campylobacter* were conducted by Keldur according to Decision 2013/652/EU (Annex A, table 2). Keldur applied epidemiological cut-offs as listed in the current EFSA manual for reporting AMR.

6. Results of investigation

693 samples tested for *Campylobacter* and 5 found positive.
Susceptibility testing performed on 4 isolates:

Year	Isolates tested	Isolates positive
2020	4	0

7. Additional information
The <i>Campylobacter</i> control programme is mandatory and detection is notifiable to MAST. Actions according to the <i>Campylobacter</i> control programme.
<p>* to be filled in per combination of bacterial species/matrix</p> <p>(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.</p> <p>(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 <i>Campylobacter</i> spp..</p> <p>(c): Antimicrobials included, Cut-off values</p>

General Description of Antimicrobial Resistance Monitoring*; <i>Escherichia coli</i> in Gallus gallus (fowl) – broilers (ESBL/AmpC producing <i>E. coli</i> and indicator <i>E. coli</i>)
1. General description of sampling design and strategy^(a)
Ceacal samples were collected at all broiler slaughterhouses throughout the year by regional MAST officers. The sampling design was in accordance with the technical requirements in Decision 2013/652/EU, following the EFSA monitoring specification.
2. Stratification procedure per animal population and food category
Sampling was stratified per slaughterhouse by allocating the number of samples proportionally to the annual throughput of the slaughterhouse.
3. Randomisation procedure per animal population and food category
Objective sampling - The sampling at each slaughterhouse was planned in order to randomise the days of sampling (Mondays to Thursdays only) as well of the flocks to be sampled. Caecal sample collected from at least ten animals per flock.
4. Analytical method used for detection and confirmation^(b)
Isolation of ESBL/AmpC producing <i>E. coli</i> and indicator <i>E. coli</i> from ceacal samples was conducted by Keldur, the current EURL-AR laboratory protocol was applied.
5. Laboratory methodology used for detection of antimicrobial resistance^(c)
Susceptibility testing was conducted by Keldur according to Decision 2013/652/EU (Annex A, table 1 and 4). Keldur applied epidemiological cut-offs as listed in the current EFSA manual for reporting AMR.
6. Results of investigation
ESBL/AmpC producing <i>E. coli</i>

Year	No. samples	No. positive	Genotype	Resistance pattern
2020	149	1	<i>bla</i> CMY-2	AMP, CTX, CAZ, FOX, SMX, TET, TMP
Indicator <i>E. coli</i>				
Year	No. samples	No. positive	Resistance pattern	
2020	85	18 (21,2%)	AMP (3) AMP, CIP, NAL, SMX, TET, TMP (1) AMP, SMX, TMP (1) AMP, SMX, TET, TMP (1) CIP, NAL (4) CIP, NAL, TMP (1) GEN, SMX (1) TET (1) TMP (5)	
7. Additional information				
<p>* to be filled in per combination of bacterial species/matrix</p> <p>(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.</p> <p>(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 <i>Campylobacter</i> spp.</p> <p>(c): Antimicrobials included, Cut-off values</p>				

General Description of Antimicrobial Resistance Monitoring*; *Escherichia coli* in pigs - fattening pigs (ESBL/AmpC producing *E. coli*)

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

Ceacal samples were collected at all pig slaughterhouses throughout the year by regional MAST officers. The sampling design was in accordance with the technical requirements in Decision 2013/652/EU, following the EFSA monitoring specification.

2. Stratification procedure per animal population and food category

Sampling was stratified per slaughterhouse by allocating the number of samples proportionally to the annual throughput of the slaughterhouse.

3. Randomisation procedure per animal population and food category

Objective sampling - The sampling at each slaughterhouse was planned in order to randomise the days of sampling (Mondays to Thursdays only) as well as selection of herds. Caecal sample collected from at least two animals per herd.

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

Isolation of ESBL/AmpC producing *E. coli* from ceacal samples was conducted by Keldur, the current EURL-AR laboratory protocol was applied.

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

Susceptibility testing of presumptive ESBL/AmpC producing *E. coli* was conducted by Keldur according to Decision 2013/652/EU (Annex A, table 1 and 4). Keldur applied epidemiological cut-offs as listed in the current EFSA manual for reporting AMR.

6. Results of investigation

150 samples tested, 21 positives:

Year	No. samples	No. positive	Genotype (no. isolates)	Resistance pattern (no. isolates)
2020	150	21 (14%)	Up-regulated chromosomal AmpC (20) <i>bla</i> CTX-M-15 og <i>bla</i> TEM-1 (1)	AMP, CTX, CAZ, FEP, FOX (1) AMP, CTX, CAZ, FEP, FOX, TET (1) AMP, CTX, CAZ, FEP, FOX, TET, TMP (1) AMP, CTX, CAZ, FEP, CIP, SMX, TET, TMP (1) AMP, CTX, CAZ, FOX (2) AMP, CTX, CAZ, FOX, TET, TMP (14) AMP, CTX, CAZ, FOX, TMP (1)

7. Additional information

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

(a): Method of sampling (description of sampling technique: stage of sampling, type of sample, sampler), Frequency of sampling, Procedure of selection of isolates for susceptibility testing, Method used for collecting data.

(b): Analytical method used for detection and confirmation: according to the legislation, the protocols developed by the EURL-AR should be used and reported here. In the case of the voluntary specific monitoring on Carbapenemase-producers, the

selective media used (commercial plates, 'in house' media) should be also reported here. In general, any variation with regard to the EURL-AR protocols should be stated here, number of isolates isolated per sample, in particular for *Campylobacter* spp..
(c): Antimicrobials included, Cut-off values

General Description of Antimicrobial Resistance Monitoring*; *Escherichia coli* in meat from broilers - fresh (ESBL/AmpC producing *E. coli*)

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

Samples of fresh meat were collected one or two times a month in Icelandic retail outlets throughout the year by the local authorities. Only packages of chilled meat were selected (minimum of 200g), and samples were kept cool until analysis. The sampling design was in accordance with the technical requirements in Decision 2013/652/EU, following the EFSA monitoring specification.

2. Stratification procedure per animal population and food category

The number of samples selected by each local authority was proportional to the population in that area, covering >80% of the national population. Samples collected from establishments were proportional to the company's market share. Sampling exclude all products with added saltwater or other types of marinade.

3. Randomisation procedure per animal population and food category

Objective sampling - Random selection of the packages of meat, without pre-selecting samples based on the country of origin of the meat producing animals.

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

Isolation of ESBL/AmpC producing *E. coli* from meat samples was conducted by Keldur, the current EURL-AR laboratory protocol was applied.

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

Susceptibility testing of presumptive ESBL/AmpC producing *E. coli* was conducted by Keldur according to Decision 2013/652/EU (Annex A, table 1 and 4). Keldur applied epidemiological cut-offs as listed in the current EFSA manual for reporting AMR.

6. Results of investigation

Year	Origin	No. samples	No. positive
	<i>Iceland</i>	156	0
2020	<i>EU/Unknown</i>	0	0
	Total	156	0

7. Additional information

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

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

General Description of Antimicrobial Resistance Monitoring*; *Escherichia coli* in meat from pigs – fresh (ESBL/AmpC producing *E. coli*)

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

Samples of fresh meat were collected one or two times a month in Icelandic retail outlets throughout the year by the local authorities. Only packages of chilled meat were selected (minimum of 200g), and samples were kept cool until analysis. The sampling design was in accordance with the technical requirements in Decision 2013/652/EU, following the EFSA monitoring specification.

2. Stratification procedure per animal population and food category

The number of samples selected by each local authority was proportional to the population in that area, covering >80% of the national population. Samples collected from establishments were proportional to the company's market share. Sampling exclude all products with added saltwater or other types of marinade.

3. Randomisation procedure per animal population and food category

Objective sampling - Random selection of the packages of meat, without pre-selecting samples based on the country of origin of the meat producing animals.

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

Isolation of ESBL/AmpC producing *E. coli* from meat samples was conducted by Keldur, the current EURL-AR laboratory protocol was applied.

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

(Susceptibility testing of presumptive ESBL/AmpC producing *E. coli* was conducted by Keldur according to Decision 2013/652/EU (Annex A, table 1 and 4). Keldur applied epidemiological cut-offs as listed in the current EFSA manual for reporting AMR.)

6. Results of investigation

Year	Origin	No. samples	No. positive	Genotype	Resistance pattern
2019	Iceland	140	1	Up-regulated chromosomal AmpC	AMP, CTX, CAZ, FOX
	EU	6	0		
	Unknown	7	0		
	Total	148	0		

7. Additional information

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

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