ZOONOSES MONITORING

Luxembourg

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 2017

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 Luxembourg during the year 2017.

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

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

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

---

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

List of Contents

ANIMAL POPULATION TABLES

Table Susceptible animal population

Animal species	Category of animals	Population	
		animal	herd/flock
Cattle (bovine animals)	Cattle (bovine animals)	202,435	1,274
Gallus gallus (fowl)	Gallus gallus (fowl) - broilers	19,444	
	Gallus gallus (fowl) - laying hens	101,940	
Goats	Goats	5,408	123
Pigs	Pigs	94,906	100
Sheep	Sheep	8,568	235

DISEASE STATUS TABLES

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

Region	Number of herds with status officially free	Number of infected herds	Total number of herds
LUXEMBOURG	1,274	0	1,274

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

Region	Number of herds with status officially free	Number of infected herds	Total number of herds
LUXEMBOURG	358	0	358

DISEASE STATUS TABLES

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

Region	Number of herds with status officially free	Number of infected herds	Total number of herds
LUXEMBOURG	1,274	0	1,274

PREVALENCE TABLES

Table Campylobacter:CAMPYLOBACTER in animal

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Method	Sampling unit	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Cattle (bovine animals) - Farm - Not Available - Not Available - Clinical investigations - Not applicable - Suspect sampling	Not Available	animal	128	59	Campylobacter coli	1
						Campylobacter hyointestinalis	10
						Campylobacter jejuni	47
						Campylobacter, unspecified sp.	1
	Gallus gallus (fowl) - broilers - Farm - Not Available - Not Available - Monitoring - Not applicable - Objective sampling	Not Available	animal	2	2	Campylobacter coli	1
						Campylobacter jejuni	1
	Pigs - fattening pigs - Slaughterhouse - Not Available - Not Available - Monitoring - Not applicable - Selective sampling	Not Available	animal	6	6	Campylobacter coli	4
						Campylobacter jejuni	1
						Campylobacter, unspecified sp.	1
	Sheep - Farm - Not Available - Not Available - Clinical investigations - Not applicable - Suspect sampling	Not Available	animal	4	3	Campylobacter jejuni	3

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	Method	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Meat from broilers (Gallus gallus) - fresh - chilled - Retail - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	10	Gram	Not Available	4	1	Campylobacter, unspecified sp.	1
	Meat from broilers (Gallus gallus) - fresh - with skin - Retail - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	10	Gram	Not Available	11	7	Campylobacter jejuni	4
								Campylobacter, unspecified sp.	3
	Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - Retail - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	10	Gram	Not Available	24	10	Campylobacter coli	4
								Campylobacter jejuni	4
								Campylobacter, unspecified sp.	2
	Meat from broilers (Gallus gallus) - meat products - Retail - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	10	Gram	Not Available	1	1	Campylobacter coli	1

Table Cysticercus:CYSTICERCUS in animal

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Method	Sampling unit	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Cattle (bovine animals) - Slaughterhouse - Not Available - Not Available - Surveillance - Official sampling - Census	Visual inspection	animal	26173	19	Cysticercus	19

Table Echinococcus:ECHINOCOCCUS in animal

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Method	Sampling unit	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Cattle (bovine animals) - Slaughterhouse - Not Available - Not Available - Surveillance - Official sampling - Census	Visual inspection	animal	26173	0	Echinococcus	0
	Foxes - Natural habitat - Not Available - Not Available - Monitoring - Official sampling - Selective sampling	Not Available	animal	139	35	Echinococcus multilocularis	35
	Pigs - Slaughterhouse - Not Available - Not Available - Surveillance - Official sampling - Census	Visual inspection	animal	157504	0	Echinococcus	0

Table Escherichia coli:ESCHERICHIA COLI in food

Area of sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Sample weight	Sample weight unit	Method	total units tested	total units positive	Zoonoses	ANTH	VTX	AG	N units positive
Not Available	Meat from bovine animals - fresh - Retail - Not Available - Not Available - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	Unspecified	26	0	Verocytotoxigenic E. coli (VTEC)	Not Available	Verotoxin production not applicable	Adhesion genes investigation not applicable	0
	Meat from bovine animals - meat preparation - intended to be eaten cooked - Retail - Not Available - Not Available - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	Unspecified	11	0	Verocytotoxigenic E. coli (VTEC)	Not Available	Verotoxin production not applicable	Adhesion genes investigation not applicable	0
	Meat from bovine animals - meat preparation - intended to be eaten raw - Retail - Not Available - Not Available - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	Unspecified	1	0	Verocytotoxigenic E. coli (VTEC)	Not Available	Verotoxin production not applicable	Adhesion genes investigation not applicable	0
	Meat from bovine animals - meat products - raw but intended to be eaten cooked - Retail - Not Available - Not Available - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	Unspecified	8	0	Verocytotoxigenic E. coli (VTEC)	Not Available	Verotoxin production not applicable	Adhesion genes investigation not applicable	0
	Meat from bovine animals - minced meat - intended to be eaten cooked - Retail - Not Available - Not Available - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	Unspecified	30	0	Verocytotoxigenic E. coli (VTEC)	Not Available	Verotoxin production not applicable	Adhesion genes investigation not applicable	0
	Meat from bovine animals - minced meat - intended to be eaten raw - Retail - Not Available - Not Available - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	Unspecified	113	0	Verocytotoxigenic E. coli (VTEC)	Not Available	Verotoxin production not applicable	Adhesion genes investigation not applicable	0
	Meat from bovine animals and pig - minced meat - intended to be eaten raw - Retail - Not Available - Not Available - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	Unspecified	1	0	Verocytotoxigenic E. coli (VTEC)	Not Available	Verotoxin production not applicable	Adhesion genes investigation not applicable	0

Table Listeria:LISTERIA in animal

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Method	Sampling unit	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Cattle (bovine animals) - Farm - Not Available - Not Available - Clinical investigations - Not applicable - Suspect sampling	Not Available	animal	139	1	Listeria monocytogenes	1
	Goats - Farm - Not Available - Not Available - Clinical investigations - Not applicable - Suspect sampling	Not Available	animal	9	1	Listeria monocytogenes	1

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	Sample weight	Sample weight unit	Total units tested	Total units positive	Method	Zoonoses	N of units tested	N of units positive
Not Available	Meat from bovine animals - minced meat - intended to be eaten raw - Processing plant - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	10	Gram	93	6	<= 100	Listeria monocytogenes	93	0
							>100	Listeria monocytogenes	93	0
	Meat from bovine animals - minced meat - intended to be eaten raw - Processing plant - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	93	6	detection	Listeria monocytogenes	93	6
	Meat from bovine animals - minced meat - intended to be eaten raw - Retail - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	10	Gram	47	2	<= 100	Listeria monocytogenes	47	0
							>100	Listeria monocytogenes	47	0
	Meat from bovine animals - minced meat - intended to be eaten raw - Retail - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	47	2	detection	Listeria monocytogenes	47	2
	Meat from bovine animals and pig - meat preparation - intended to be eaten raw - Retail - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	10	Gram	2	0	<= 100	Listeria monocytogenes	2	0
							>100	Listeria monocytogenes	2	0
	Meat from bovine animals and pig - meat preparation - intended to be eaten raw - Retail - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	2	0	detection	Listeria monocytogenes	2	0
	Meat from bovine animals and pig - meat products - Processing plant - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	10	Gram	210	8	<= 100	Listeria monocytogenes	210	0
							>100	Listeria monocytogenes	210	0
	Meat from bovine animals and pig - meat products - Processing plant - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	210	8	detection	Listeria monocytogenes	210	8
	Meat from bovine animals and pig - meat products - Retail - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	10	Gram	17	2	<= 100	Listeria monocytogenes	17	0
							>100	Listeria monocytogenes	17	0
	Meat from bovine animals and pig - meat products - Retail - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	17	2	detection	Listeria monocytogenes	17	2
	Meat from bovine animals and pig - minced meat - intended to be eaten raw - Processing plant - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	10	Gram	91	19	<= 100	Listeria monocytogenes	91	4
							>100	Listeria monocytogenes	91	0
	Meat from bovine animals and pig - minced meat - intended to be eaten raw - Processing plant - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	91	19	detection	Listeria monocytogenes	91	19
	Meat from pig - minced meat - intended to be eaten raw - Processing plant - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	10	Gram	4	1	<= 100	Listeria monocytogenes	4	0
							>100	Listeria monocytogenes	4	0
	Meat from pig - minced meat - intended to be eaten raw - Processing plant - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	4	1	detection	Listeria monocytogenes	4	1
	Meat from pig - minced meat - intended to be eaten raw - Retail - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	10	Gram	8	0	<= 100	Listeria monocytogenes	8	0
							>100	Listeria monocytogenes	8	0
	Meat from pig - minced meat - intended to be eaten raw - Retail - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	8	0	detection	Listeria monocytogenes	8	0
	Other processed food products and prepared dishes - sushi - Retail - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	10	Gram	30	0	<= 100	Listeria monocytogenes	30	0
							>100	Listeria monocytogenes	30	0
	Other processed food products and prepared dishes - sushi - Retail - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	30	0	detection	Listeria monocytogenes	30	0

Table Lyssavirus:LYSSAVIRUS in animal

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Method	Sampling unit	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Badgers - Natural habitat - Not Available - animal sample - brain - Monitoring - Official sampling - Selective sampling	Indirect Immunofluorescent Antibody test (IFAT)	animal	2	0	Lyssavirus	0
	Bats - Natural habitat - Not Available - animal sample - brain - Monitoring - Official sampling - Selective sampling	Indirect Immunofluorescent Antibody test (IFAT)	animal	14	0	Lyssavirus	0
	Cats - Veterinary clinics - Not Available - animal sample - brain - Clinical investigations - Official sampling - Suspect sampling	Indirect Immunofluorescent Antibody test (IFAT)	animal	1	0	Lyssavirus	0
	Cattle (bovine animals) - Farm - Not Available - animal sample - brain - Clinical investigations - Official sampling - Selective sampling	Indirect Immunofluorescent Antibody test (IFAT)	animal	1	0	Lyssavirus	0
	Foxes - wild - Natural habitat - Not Available - animal sample - brain - Monitoring - Official sampling - Selective sampling	Indirect Immunofluorescent Antibody test (IFAT)	animal	131	0	Lyssavirus	0
	Raccoons - Natural habitat - Not Available - animal sample - brain - Monitoring - Official sampling - Selective sampling	Indirect Immunofluorescent Antibody test (IFAT)	animal	4	0	Lyssavirus	0

Table Salmonella:SALMONELLA in animal

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Sampling unit	N of flocks under control programme	Target verification	Method	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Gallus gallus (fowl) - broilers - before slaughter - Farm - Luxembourg - environmental sample - boot swabs and dust - Control and eradication programmes - Official and industry sampling - Census	herd/flock		Y	Not Available	10	0	Salmonella	0
	Gallus gallus (fowl) - broilers - Farm - Not Available - Not Available - Monitoring - Official sampling - Objective sampling	animal		N_A	Not Available	78	3	Salmonella Livingstone	3
	Gallus gallus (fowl) - laying hens - adult - Farm - Luxembourg - environmental sample - boot swabs and dust - Control and eradication programmes - Official and industry sampling - Census	herd/flock		Y	Not Available	29	0	Salmonella	0
	Pigs - fattening pigs - Farm - Not Available - Not Available - Clinical investigations - Not applicable - Suspect sampling	animal		N_A	Not Available	15	3	Salmonella Typhimurium	1
								Salmonella Typhimurium, monophasic	2

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	Method	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Meat from bovine animals and pig - meat products - Processing plant - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	Not Available	28	1	Salmonella Typhimurium	1
	Meat from broilers (Gallus gallus) - fresh - with skin - Retail - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	Not Available	19	1	Salmonella Infantis	1
	Meat from other poultry species - meat preparation - intended to be eaten cooked - Processing plant - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	Not Available	7	1	Salmonella Infantis	1
	Meat from other poultry species - meat preparation - intended to be eaten cooked - Retail - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	Not Available	1	1	Salmonella Infantis	1
	Meat from pig - carcase - Slaughterhouse - Not Available - food sample - carcase swabs - Surveillance - based on Regulation 2073 - Official, based on Regulation 854/2004 - Objective sampling	single (food/feed)	400	Square centimetre	Not Available	330	0	Salmonella	0
	Meat from pig - fresh - chilled - Processing plant - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	Not Available	42	1	Salmonella Typhimurium, monophasic	1
	Meat from pig - fresh - chilled - Retail - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	Not Available	42	1	Salmonella Bredeney	1
	Meat from pig - meat preparation - intended to be eaten cooked - Processing plant - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	Not Available	28	1	Salmonella Colorado	1
	Meat, mixed meat - meat preparation - intended to be eaten cooked - chilled - Processing plant - Not Available - food sample - meat - Surveillance - Official sampling - Objective sampling	single (food/feed)	25	Gram	Not Available	23	1	Salmonella Typhimurium, monophasic	1

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	Method	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Compound feedingstuffs for cattle - final product - Farm - Not Available - feed sample - Surveillance - Official sampling - Selective sampling	batch (food/feed)	25	Gram	PCR	45	0	Salmonella	0
	Compound feedingstuffs for cattle - final product - Feed mill - Not Available - feed sample - Surveillance - Official sampling - Selective sampling	batch (food/feed)	25	Gram	PCR	1	0	Salmonella	0
	Compound feedingstuffs for cattle - final product - Retail - Not Available - feed sample - Surveillance - Official sampling - Selective sampling	batch (food/feed)	25	Gram	PCR	7	0	Salmonella	0
	Compound feedingstuffs for horses - final product - Farm - Not Available - feed sample - Surveillance - Official sampling - Selective sampling	batch (food/feed)	25	Gram	PCR	1	0	Salmonella	0
	Compound feedingstuffs for pigs - final product - Farm - Not Available - feed sample - Surveillance - Official sampling - Selective sampling	batch (food/feed)	25	Gram	PCR	33	0	Salmonella	0
	Compound feedingstuffs for poultry (non specified) - final product - Farm - Not Available - feed sample - Surveillance - Official sampling - Selective sampling	batch (food/feed)	25	Gram	PCR	4	0	Salmonella	0
	Compound feedingstuffs for poultry (non specified) - final product - Feed mill - Not Available - feed sample - Surveillance - Official sampling - Selective sampling	batch (food/feed)	25	Gram	PCR	3	0	Salmonella	0
	Compound feedingstuffs for poultry (non specified) - final product - Retail - Not Available - feed sample - Surveillance - Official sampling - Selective sampling	batch (food/feed)	25	Gram	PCR	2	0	Salmonella	0
	Feed material of cereal grain origin - barley derived - Farm - Not Available - feed sample - Surveillance - Official sampling - Selective sampling	batch (food/feed)	25	Gram	PCR	2	0	Salmonella	0
	Feed material of cereal grain origin - maize derived - Farm - Not Available - feed sample - Surveillance - Official sampling - Selective sampling	batch (food/feed)	25	Gram	PCR	1	0	Salmonella	0
	Feed material of cereal grain origin - other cereal grain derived - by-products of brewing and distilling - Farm - Not Available - feed sample - Surveillance - Official sampling - Selective sampling	batch (food/feed)	25	Gram	PCR	3	0	Salmonella	0
	Feed material of cereal grain origin - other cereal grain derived - by-products of brewing and distilling - Processing plant - Not Available - feed sample - Surveillance - Official sampling - Selective sampling	batch (food/feed)	25	Gram	PCR	1	0	Salmonella	0
	Feed material of oil seed or fruit origin - soya (bean) derived - Farm - Not Available - feed sample - Surveillance - Official sampling - Selective sampling	batch (food/feed)	25	Gram	PCR	1	0	Salmonella	0
	Feed material of oil seed or fruit origin - soya (bean) derived - Feed mill - Not Available - feed sample - Surveillance - Official sampling - Selective sampling	batch (food/feed)	25	Gram	PCR	1	0	Salmonella	0
	Feed material of oil seed or fruit origin - soya (bean) derived - Retail - Not Available - feed sample - Surveillance - Official sampling - Selective sampling	batch (food/feed)	25	Gram	PCR	4	0	Salmonella	0

Table Trichinella:TRICHINELLA in animal

Area of Sampling	Matrix - Sampling stage - Sampling origin - Sample type - Sampling context - Sampler - Sampling strategy	Method	Sampling unit	Total units tested	Total units positive	Zoonoses	N of units positive
Not Available	Foxes - wild - Natural habitat - Not Available - Not Available - Monitoring - Official sampling - Selective sampling	Not Available	animal	146	0	Trichinella	0
	Pigs - fattening pigs - not raised under controlled housing conditions - Slaughterhouse - Not Available - Not Available - Surveillance - Official sampling - Census	Not Available	animal	154398	0	Trichinella	0
	Solipeds, domestic - Slaughterhouse - Not Available - Not Available - Surveillance - Official sampling - Census	Not Available	animal	35	0	Trichinella	0
	Wild boars - wild - Natural habitat - Not Available - Not Available - Surveillance - Official sampling - Census	Not Available	animal	4348	0	Trichinella	0

FOODBORNE OUTBREAKS TABLES

Foodborne Outbreaks: summarized data

		Outbreak strenght	Strong		
Causative agent	**Food vehicle**	**N outbreaks**	**N human cases**	**N hospitalized**	**N deaths**
Salmonella Enteritidis	Eggs and egg products	1	4	0	0
Salmonella I 11:z41:e,n,z15	Cereal products including rice and seeds/pulses (nuts, almonds)	1	3	1	0

Strong Foodborne Outbreaks: detailed data

Causative agent	Other Causative Agent	FBO nat. code	Outbreak type	Food vehicle	More food vehicle info	Nature of evidence	Setting	Place of origin of problem	Origin of food vehicle	Contributory factors	Comment	N outbreaks	N human cases	N hosp.	N deaths
Salmonella Enteritidis	Not Available	N_A	Not Available	Eggs and egg products	N_A	Detection of causative agent in food chain or its environment - Detection of indistinguishable causative agent in humans	Not Available	Not Available	Poland	Not Available	Isolates of 4 human cases of Salmonella Enteritidis clustered by WGS with other European isolates in relation to Urgent Inquiry 367 related to Polish Eggs	1	4	0	0
Salmonella I 11:z41:e,n,z15	Not Available	N_A	Not Available	Cereal products including rice and seeds/pulses (nuts, almonds)	Sesame seed paste	Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans;Analytical epidemiological evidence	Not Available	Not Available	Greece	Not Available	N_A	1	3	1	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 coli in Cattle (bovine animals)

Sampling Stage: Farm

Sampling Type: animal sample - faeces

Sampling Context: Clinical investigations

Sampler: Not applicable

Sampling Strategy: Suspect sampling

Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

	AM substance	Ciprofloxacin	Erythromycin	Gentamicin	Nalidixic acid	Streptomycin	Tetracycline
	ECOFF	0.5	8	2	16	4	2
	Lowest limit	0.12	1	0.12	1	0.25	0.5
	Highest limit	16	128	16	64	16	64
	N of tested isolates	1	1	1	1	1	1
MIC	N of resistant isolates	0	0	0	0	0	0
0.25		1					
<=0.5							1
0.5				1			
2			1				
4						1	
8					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: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

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

Table Antimicrobial susceptibility testing of Campylobacter coli in Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked

Sampling Stage: Retail | Sampling Type: food sample | Sampling Context: Monitoring

Sampler: Official sampling | Sampling Strategy: Objective sampling | Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

	AM substance	Ciprofloxacin	Erythromycin	Gentamicin	Nalidixic acid	Streptomycin	Tetracycline
	ECOFF	**0.5**	**8**	**2**	**16**	**4**	**2**
	Lowest limit	**0.12**	**1**	**0.12**	**1**	**0.25**	**0.5**
	Highest limit	**16**	**128**	**16**	**64**	**16**	**64**
	N of tested isolates	**3**	**3**	**3**	**3**	**3**	**3**
MIC	**N of resistant isolates**	**2**	**1**	**1**	**2**	**1**	**2**
<=0.12		1					
0.5				2			
<=1			2				
1							1
2						2	
4		1			1		
8		1					
16				1			
>16						1	
64					1		
>64					1		2
128			1				

Table Antimicrobial susceptibility testing of Campylobacter hyointestinalis in Cattle (bovine animals)

Sampling Stage: Farm

Sampling Type: animal sample - faeces

Sampling Context: Clinical investigations

Sampler: Not applicable

Sampling Strategy: Suspect sampling

Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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	**10**	**10**	**10**	**10**	**10**	**10**
MIC	**N of resistant isolates**	**3**	**0**	**0**	**9**	**4**	**0**
<=0.12		5					
0.25		2		3			
<=0.5							10
0.5				7			
<=1			9				
1						4	
2						2	
4			1		1		
16		3					
>16						4	
64					1		
>64					8		

Table Antimicrobial susceptibility testing of Campylobacter jejuni in Sheep

Sampling Stage: Farm | Sampling Type: animal sample - faeces | Sampling Context: Clinical investigations

Sampler: Not applicable | Sampling Strategy: Suspect sampling | Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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**
MIC	**N of resistant isolates**	**2**	**0**	**0**	**2**	**0**	**1**
<=0.12		1		1			
<=0.5							2
0.5				2			
<=1			2				
1						1	
2			1			1	
4					1	1	
16		1					
>16		1					
>64					2		1

Table Antimicrobial susceptibility testing of Campylobacter jejuni in Cattle (bovine animals)

Sampling Stage: Farm

Sampling Type: animal sample - faeces

Sampling Context: Clinical investigations

Sampler: Not applicable

Sampling Strategy: Suspect sampling

Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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	**43**	**43**	**43**	**43**	**43**	**43**
MIC	**N of resistant isolates**	**27**	**2**	**1**	**26**	**1**	**13**
<=0.12		15		2			
<=0.25						1	
0.25		1		4			
<=0.5							29
0.5				32			
<=1			40				
1		1		3		13	1
2				1	2	26	
4			1		5	2	
8		11	1		9		
16		14			1		
>16		1		1		1	
32							4
64					1		2
>64					25		7
>128			1				

Table Antimicrobial susceptibility testing of Campylobacter jejuni in Pigs - fattening pigs

Sampling Stage: Slaughterhouse | Sampling Type: animal sample - caecum | Sampling Context: Monitoring

Sampler: Official sampling | Sampling Strategy: Objective sampling | Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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	**1**	**1**	**1**	**1**	**1**	**1**
MIC	**N of resistant isolates**	**0**	**0**	**0**	**0**	**0**	**0**
<=0.12		1					
0.25				1			
<=0.5							1
<=1			1				
1						1	
4					1		

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

Sampling Stage: Retail

Sampling Type: food sample

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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	**7**	**7**	**7**	**7**	**7**	**7**
MIC	**N of resistant isolates**	**3**	**0**	**0**	**3**	**0**	**2**
<=0.12		4		1			
<=0.25						1	
0.25				3			
<=0.5							5
0.5				1			
<=1			7		1		
1				2		1	
2						3	
4					3	2	
8		2					
>16		1					
64					1		
>64					2		2

Table Antimicrobial susceptibility testing of Campylobacter jejuni in Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked

Sampling Stage: Retail | Sampling Type: food sample | Sampling Context: Monitoring

Sampler: Official sampling | Sampling Strategy: Objective sampling | Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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	**5**	**5**	**5**	**5**	**5**	**5**
MIC	**N of resistant isolates**	**5**	**0**	**0**	**5**	**0**	**4**
0.25				2			
<=0.5							1
0.5				3			
<=1			5				
1						2	
2						3	
8		3					
16		2					1
>64					5		3

Table Antimicrobial susceptibility testing of Campylobacter, unspecified sp. in Cattle (bovine animals)

Sampling Stage: Farm

Sampling Type: animal sample - faeces

Sampling Context: Clinical investigations

Sampler: Not applicable

Sampling Strategy: Suspect sampling

Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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	**1**	**1**	**1**	**1**	**1**	**1**
MIC	**N of resistant isolates**	**0**	**0**	**0**	**0**	**0**	**0**
<=0.12		1					
<=0.5							1
0.5				1			
<=1			1				
4					1	1	

Table Antimicrobial susceptibility testing of Campylobacter, unspecified sp. in Meat from broilers (Gallus gallus) - fresh - chilled

Sampling Stage: Retail | Sampling Type: food sample | Sampling Context: Monitoring

Sampler: Official sampling | Sampling Strategy: Objective sampling | Programme Code: AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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	**1**	**1**	**1**	**1**	**1**	**1**
MIC	**N of resistant isolates**	**1**	**1**	**1**	**1**	**1**	**1**
4				1			
8		1					
16						1	
64			1				
>64					1		1

Table Antimicrobial susceptibility testing of Campylobacter, unspecified sp. in Goats

Sampling Stage: Farm

Sampling Type: animal sample - faeces

Sampling Context: Clinical investigations

Sampler: Not applicable

Sampling Strategy: Suspect sampling

Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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	**2**	**2**	**2**	**2**	**2**	**2**
MIC	**N of resistant isolates**	**0**	**0**	**0**	**0**	**0**	**0**
<=0.12		2		1			
0.25				1			
<=0.5							2
<=1			2				
1						1	
2						1	
16					2		

ANTIMICROBIAL RESISTANCE TABLES FOR SALMONELLA

Table Antimicrobial susceptibility testing of Salmonella Bredeney in Meat from pig - fresh

Sampling Stage: Retail

Sampling Type: food sample - meat

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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**
MIC	**N of resistant isolates**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
<=0.03										1					
0.03							1								
<=0.25				1										1	1
<=0.5					1				1						
<=2													1		
2		1						1							
<=4											1				
<=8						1									
16			1												
32												1			

Table Antimicrobial susceptibility testing of Salmonella Colorado in Meat from pig - meat products

Sampling Stage: Retail

Sampling Type: food sample - meat

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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**
MIC	**N of resistant isolates**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
<=0.03										1					
0.03							1								
<=0.25				1											1
<=0.5									1						
0.5														1	
<=1								1							
1					1										
<=2													1		
2		1													
<=4											1				
<=8						1									
8			1												
32												1			

Table Antimicrobial susceptibility testing of Salmonella Infantis in Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked

Sampling Stage: Retail

Sampling Type: food sample - meat

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
MIC	**N of resistant isolates**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**2**	**2**	**2**	**0**	**1**
<=0.03										2					
<=0.25				2											1
0.25							1								
<=0.5					2				2						
0.5							1							1	
<=1								2							
1														1	
2		2													
<=8						2									
8			2												
>32															1
>64													2		
128											1				
>128											1				
>1024												2			

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

Sampling Stage: Farm

Sampling Type: environmental sample - boot swabs

Sampling Context: Control and eradication programmes

Sampler: Official and industry sampling

Sampling Strategy: Objective sampling

Programme Code: AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
MIC	**N of resistant isolates**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
<=0.015							2								
<=0.03										2					
<=0.25				2										2	
<=0.5					2				2						
0.5															2
<=1		2						2							
<=2													2		
<=4											2				
<=8						2									
8			2												
32												1			
64												1			

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

Sampling Stage: Farm

Sampling Type: environmental sample - dust

Sampling Context: Control and eradication programmes

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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**
MIC	**N of resistant isolates**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
<=0.015							1								
<=0.03										1					
<=0.25				1										1	
<=0.5					1				1						
0.5															1
<=1		1						1							
<=2													1		
<=4											1				
<=8						1									
8			1												
64												1			

Table Antimicrobial susceptibility testing of Salmonella Typhimurium in Meat from bovine animals and pig - meat preparation - intended to be eaten raw

Sampling Stage: Retail

Sampling Type: food sample - meat

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: OTHER AMR MON pnl2

Analytical Method:

Country of Origin: Luxembourg

	AM substance	Cefepime	Cefotaxim	Cefotaxime + Clavulanic acid	Cefoxitin	Ceftazidim	Ceftazidime + Clavulanic acid	Ertapenem	Imipenem	Meropenem	Temocillin
	Cefotaxime synergy test	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**
	Ceftazidime synergy test	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**
	ECOFF	**0.125**	**0.5**	**0.25**	**8**	**2**	**2**	**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**	**16**	**16**	**64**
	N of tested isolates	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
MIC	**N of resistant isolates**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
<=0.015								1			
<=0.064		1		1							
0.064										1	
<=0.25			1								
0.25							1		1		
0.5						1					
2											1
4					1						

Table Antimicrobial susceptibility testing of Salmonella Typhimurium in Meat from bovine animals and pig - meat preparation - intended to be eaten raw

Sampling Stage: Retail

Sampling Type: food sample - meat

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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**
MIC	**N of resistant isolates**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
0.03							1								
0.064										1					
<=0.25				1											
<=0.5					1										
0.5														1	1
<=1								1							
1									1						
<=2													1		
<=4											1				
<=8						1									
16			1												
64												1			
>64		1													

Table Antimicrobial susceptibility testing of Salmonella Typhimurium in Pigs - fattening pigs

Sampling Stage: Farm

Sampling Type: environmental sample - boot swabs

Sampling Context: Clinical investigations

Sampler: Not applicable

Sampling Strategy: Suspect sampling

Programme Code: OTHER AMR MON pnl2

Analytical Method:

Country of Origin: Luxembourg

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

Table Antimicrobial susceptibility testing of Salmonella Typhimurium in Pigs - fattening pigs

Sampling Stage: Farm

Sampling Type: environmental sample - boot swabs

Sampling Context: Clinical investigations

Sampler: Not applicable

Sampling Strategy: Suspect sampling

Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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**
MIC	**N of resistant isolates**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**1**
<=0.03										1					
0.03							1								
<=0.25				1											
<=0.5					1				1						
0.5														1	
<=1								1							
<=4											1				
4			1												
<=8						1									
>32															1
>64		1											1		
>1024												1			

Table Antimicrobial susceptibility testing of Salmonella Typhimurium, monophasic in Meat from bovine animals and pig - meat products

Sampling Stage: Retail

Sampling Type: food sample - meat

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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**
MIC	**N of resistant isolates**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**1**	**0**	**1**
<=0.03										1					
0.03							1								
<=0.25				1											
<=0.5									1						
0.5														1	
1					1										
<=4											1				
4								1							
<=8						1									
8			1												
>32															1
>64		1											1		
>1024												1			

Table Antimicrobial susceptibility testing of Salmonella Typhimurium, monophasic in Pigs - fattening pigs

Sampling Stage: Farm

Sampling Type: animal sample - organ/tissue

Sampling Context: Clinical investigations

Sampler: Official sampling

Sampling Strategy: Suspect sampling

Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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**
MIC	**N of resistant isolates**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**
<=0.03										1					
0.03							1								
<=0.25				1											1
<=0.5					1				1						
0.5														1	
<=1		1						1							
<=2													1		
<=4											1				
4			1												
<=8						1									
>1024												1			

Table Antimicrobial susceptibility testing of Salmonella Typhimurium, monophasic in Dogs

Sampling Stage: Hospital or medical care facility

Sampling Type: animal sample - faeces

Sampling Context: Clinical investigations

Sampler: Not applicable

Sampling Strategy: Suspect sampling

Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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**
MIC	**N of resistant isolates**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**
<=0.03										1					
0.03							1								
<=0.25				1										1	1
<=0.5					1				1						
<=1								1							
<=4											1				
4			1												
<=8						1									
>64		1											1		
>1024												1			

Table Antimicrobial susceptibility testing of Salmonella Typhimurium, monophasic in Meat from pig - fresh

Sampling Stage: Retail

Sampling Type: food sample - meat

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: OTHER AMR MON

Analytical Method:

Country of Origin: Luxembourg

	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**
MIC	**N of resistant isolates**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**
<=0.03										1					
0.03							1								
<=0.25				1										1	1
<=0.5					1										
<=1								1							
1									1						
<=2													1		
<=4											1				
<=8						1									
8			1												
>64		1													
>1024												1			

ANTIMICROBIAL RESISTANCE TABLES FOR INDICATOR ESCHERICHIA COLI

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

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: Luxembourg

	AM substance	Cefepime	Cefotaxim	Cefotaxime + Clavulanic acid	Cefoxitin	Ceftazidim	Ceftazidime + Clavulanic acid	Ertapenem	Imipenem	Meropenem	Temocillin
	Cefotaxime synergy test	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**
	Ceftazidime synergy test	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**
	ECOFF	**0.125**	**0.25**	**0.25**	**8**	**0.5**	**2**	**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**	**16**	**16**	**64**
	N of tested isolates	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
MIC	**N of resistant isolates**	**1**	**1**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**0**
<=0.015								1			
<=0.03										1	
0.25		1							1		
0.5				1							
2			1			1	1				
8											1
16					1						

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

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: Luxembourg

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

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

Sampling Stage: Farm

Sampling Type: animal sample - faeces

Sampling Context: Monitoring

Sampler: Not applicable

Sampling Strategy: Selective sampling

Programme Code: OTHER ESBL MON pnl2

Analytical Method:

Country of Origin: Luxembourg

	AM substance	Cefepime	Cefotaxim	Cefotaxime + Clavulanic acid	Cefoxitin	Ceftazidim	Ceftazidime + Clavulanic acid	Ertapenem	Imipenem	Meropenem	Temocillin
	Cefotaxime synergy test	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**
	Ceftazidime synergy test	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**	**Not Available**
	ECOFF	**0.125**	**0.25**	**0.25**	**8**	**0.5**	**2**	**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**	**16**	**16**	**64**
	N of tested isolates	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**
MIC	**N of resistant isolates**	**11**	**11**	**1**	**2**	**11**	**1**	**2**	**0**	**0**	**0**
<=0.015								2			
<=0.03										10	
0.03								7			
<=0.064				9							
0.064								1		1	
<=0.12							5		8		
0.12				1							
0.25							4	1	2		
0.5							1		1		
1				1		2					
2											2
4		1			7		1				
8		2			2	4					6
16		5	2		1	4					3
32		2			1	1					
>32		1									
>64			9								

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

Sampling Stage: Farm

Sampling Type: animal sample - faeces

Sampling Context: Monitoring

Sampler: Not applicable

Sampling Strategy: Selective sampling

Programme Code: OTHER ESBL MON

Analytical Method:

Country of Origin: Luxembourg

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

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: Luxembourg

	AM substance	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
	ECOFF	**8**	**16**	**0.25**	**0.5**	**16**	**0.064**	**2**	**2**	**0.125**	**16**	**64**	**8**	**1**	**2**
	Lowest limit	**1**	**2**	**0.25**	**0.5**	**8**	**0.015**	**1**	**0.5**	**0.03**	**4**	**8**	**2**	**0.25**	**0.25**
	Highest limit	**64**	**64**	**4**	**8**	**128**	**8**	**16**	**32**	**16**	**128**	**1024**	**64**	**8**	**32**
	N of tested isolates	**44**	**44**	**44**	**44**	**44**	**44**	**44**	**44**	**44**	**44**	**44**	**44**	**44**	**44**
MIC	**N of resistant isolates**	**9**	**0**	**1**	**1**	**6**	**1**	**0**	**0**	**0**	**1**	**14**	**10**	**0**	**10**
<=0.015							37								
<=0.03										44					
0.03							6								
<=0.25				43										42	12
0.25							1								
<=0.5					43				34						
0.5														1	17
<=1		4						44							
1				1	1				10					1	3
<=2			7										31		
2		8													2
<=4											40				
4		20	14										2		
<=8						38						12			
8		3	20								2		1		
16			3								1	13			
32						2						4	2		
>32															10
64						2					1	1	2		
>64		9											6		
128						2									
1024												3			
>1024												11			

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: Luxembourg

	AM substance	Cefepime	Cefotaxim		Cefotaxime + Clavulanic acid	Cefoxitin		Ceftazidim		Ceftazidime + Clavulanic acid		Ertapenem	Imipenem	Meropenem	Temocillin
	Cefotaxime synergy test	Not Available	Not Available		Not Available	Not Available		Not Available		Not Available		Not Available	Not Available	Not Available	Not Available
	Ceftazidime synergy test	Not Available	Not Available		Not Available	Not Available		Not Available		Not Available		Not Available	Not Available	Not Available	Not Available
	ECOFF	0.125	0.25		0.25	8		0.5		2		0.06	0.5	0.125	32
	Lowest limit	0.064	0.25		0.064	0.5	0.25	0.5		0.12	0.5	0.015	0.12	0.03	0.5
	Highest limit	32	4	64	64	64	128	8	128	128	8	2	16	16	64
	N of tested isolates	34	34	34	34	34	34	34	34	34	34	34	34	34	34
MIC	N of resistant isolates	28	32	32	4	3	31	31	31	4	4	2	0	0	1
<=0.015												28			
<=0.03														32	
0.03												4			
<=0.064		3			26										
0.064														1	
<=0.12													19		
0.12		3			4									1	
<=0.25				2											
0.25										10		1	15		
<=0.5									3		20				
0.5		1			1							1			
1		1		4	3		6	3							
2		5				3	4	4			3				6
4		11	1			18	6	1			1				13
8		4		2		10	1	1							14
16		4		6		2	3								
32		2		6			1								
64				8		1	1								
>64				5											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: Luxembourg

	AM substance	Ampicillin		Azithromycin		Cefotaxim		Ceftazidim		Chloramphenicol		Ciprofloxacin		Colistin		Gentamicin		Meropenem		Nalidixic acid		Sulfamethoxazole		Tetracycline		Tigecycline		Trimethoprim	
	ECOFF	8		16		0.25		0.5		16		0.064		2		2		0.125		16		64		8		1		2	
	Lowest limit	1		2		0.25		0.5	6	8		0.015	0.5	1		0.5		0.03		4		8	1	2		0.25		0.25	
	Highest limit	64	128	64	4	64		8	128	128		8	16	16		32		16		128		1024	64	64		8		32	
	N of tested isolates	34	34	34	34	34		34	34	34		34	34	34		34		34		34		34	34	34		34		34	
MIC	N of resistant isolates	32	32	2	32	32		31	5	5		12	0	0		4		0		8		21	17	17		0		20	
<=0.015												17																	
<=0.03																		34											
0.03												5																	
<=0.25					2																					32		8	
0.25												4																	
<=0.5								3								27													
0.5												2														2		4	
<=1														33															
1					3			7					1			1												2	
<=2																								13					
2					2			10								2							1						
<=4																				24									
4		1		10	1			7								1								3					
>4					25																								
<=8										26												6							
8		1		19				2	1											2									
>8								5				6																	
16				3						2												6							
32																1						1							
>32																2												20	
64		1		2						1														4					
>64		30					1																	13					
128										2										1									
>128			1							2										7									
>1024																						21							

Table Antimicrobial susceptibility testing of Escherichia coli, non-pathogenic, unspecified in Meat from bovine animals - minced meat - intended to be eaten raw

Sampling Stage: Retail

Sampling Type: food sample - meat

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: OTHER ESBL MON pnl2

Analytical Method:

Country of Origin: Luxembourg

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

Table Antimicrobial susceptibility testing of Escherichia coli, non-pathogenic, unspecified in Meat from bovine animals - minced meat - intended to be eaten raw

Sampling Stage: Retail

Sampling Type: food sample - meat

Sampling Context: Monitoring

Sampler: Official sampling

Sampling Strategy: Objective sampling

Programme Code: OTHER ESBL MON

Analytical Method:

Country of Origin: Luxembourg

	AM substance	Ampicillin	Azithromycin	Cefotaxim	Ceftazidim	Chloramphenicol	Ciprofloxacin	Colistin	Gentamicin	Meropenem	Nalidixic acid	Sulfamethoxazole	Tetracycline	Tigecycline	Trimethoprim
	ECOFF	**8**	**16**	**0.25**	**0.5**	**16**	**0.064**	**2**	**2**	**0.125**	**16**	**64**	**8**	**1**	**2**
	Lowest limit	**1**	**2**	**0.25**	**0.5**	**8**	**0.015**	**1**	**0.5**	**0.03**	**4**	**8**	**2**	**0.25**	**0.25**
	Highest limit	**64**	**64**	**4**	**8**	**128**	**8**	**16**	**32**	**16**	**128**	**1024**	**64**	**8**	**32**
	N of tested isolates	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
MIC	**N of resistant isolates**	**1**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**
<=0.015							1								
<=0.03										1					
<=0.25														1	1
<=0.5									1						
<=1								1							
1					1										
<=4											1				
4			1												
>4				1											
<=8						1									
64													1		
>64		1													
>1024												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 pig - fresh	Escherichia coli, non-pathogenic, unspecified	Objective sampling	Retail	N_A	Monitoring	Official sampling	food sample - meat	single (food/feed)	Luxembourg	N_A	37	0
	Meat from pig - minced meat	Escherichia coli, non-pathogenic, unspecified	Objective sampling	Retail	N_A	Monitoring	Official sampling	food sample - meat	single (food/feed)	Luxembourg	N_A	3	0

European Food Safety Authority

Latest Transmission set

Table Name	Last submitted dataset transmission date
Antimicrobial Resistance	27-Nov-2018
Esbl	23-Jul-2018
Animal Population	23-Jul-2018
Disease Status	23-Jul-2018
Food Borne Outbreaks	23-Jul-2018
Prevalence	23-Jul-2018

Luxembourg, Text Forms 2017

Table of contents

1. Institutions and Laboratories involved in zoonoses monitoring and reporting

ASV: Veterinary Service Administration, Administration des services vétérinaires

LMVE : Laboratoire de Médecine Vétérinaire de l'État

LNS : Laboratoire national de Santé

SECUALIM : Food Safety Service, Ministry of Health

ASTA : Official feed control : Administration des services techniques de l'agriculture – Service de Contrôle des aliments pour animaux.

Official laboratory for *Salmonella* in feed : Laboratoire national de santé (LNS) – Division de la surveillance alimentaire

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

2. Animal population

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

SANITEL, Rural economy service (SER) and Administration of veterinary services (ASV) database of the Ministry of Agriculture

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

Number of animals = number of animals at a certain time point of the year.

Holding: any establishment, construction or, in the case of an open-air farm, any place in which animals are held, kept or handled.

Holding: any establishment, construction or, in the case of an open-air farm, any place in which animals are held, kept or handled.
The location of the holding is based on the address and the coordinates of the geographical entity.

An epidemiological entity is a unit of one building or a complex of buildings included grounds and territories where an animal species is or could be hold.

For Bovine :

Animals = individual bovines.

Herds = animals kept as one sanitary unit.

For Poultry:

Flocks = herds.

Holdings = all the flocks from one owner

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

Over the last years, there was an important decrease in total number of holdings of bovines. The total number of bovine animals remains unchanged what means that the mean total number of animals per holding is increasing. Since 2016 and by 2017 the situation appears to be stabilizing.

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

Given the size of Luxembourg, the bovine animal population density is relatively homogeneous throughout the country.
The number of porcine and poultry holdings in Luxembourg is rather limited.

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*: Bovine, ovine and caprine Brucellosis

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

Luxembourg is officially free from bovine, ovine and caprine brucellosis by decision 97/76/CE and confirmed by decision 2003/467/CE.

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

The situation remains favorable.

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

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

4. Description of Monitoring/Surveillance/Control programmes system*: Bovine Brucellosis

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

- Monitoring system
- Type of specimen taken - Animals at farm

Blood sampling. Diagnostic/analytical methods used: Rose Bengal plate test (RBT).
Bulk milk samples. Diagnostic/analytical methods used : ELISA

- Sampling strategy
The bulk tank milk all over the country are tested under surveillance program.
Suspicious animals due to abortions are tested.

- Frequency of the sampling
Once a year for the surveillance program or on suspicion

- Type of specimen taken
Surveillance: blood and tank milk, abortions: tissue samples

- Methods of sampling
Blood sampling by veterinarians
Tank milk samples taken for Milk Quality Assurance at the moment of the collection of the milk by the milk factory

- Diagnostic/analytical methods used
Screening: Rose Bengal plate test RBT (serum) - Indirect ELISA (milk).
Confirmation: Complement fixation test CFT (serum) - Bacteriological examination and culture of tissue samples

2. Measures in place[(b)]

Vaccination is prohibited.

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

Yes, the notification is mandatory.

- Case definition

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

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

No cases of brucellosis were recorded in 2017.

The situation remains favorable.

5. Additional information
Brucella suis - Monitoring system - Sampling strategy Serological screening (RBT) for Brucella is done for hunted wild boars. B. suis biovar 2 may be isolated. The infection seems to be endemic in wild boar in Luxembourg. (B. suis biovar 2, circulating among wild boars, shows only limited pathogenicity for humans, if pathogenic at all.)

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

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

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

(c): Mandatory: Yes/No.

(d): Minimum five years.

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

5. General evaluation*: Bovine Tuberculosis

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

Luxembourg has been granted the officially tuberculosis free status according to Council Directive 64/432/EEC

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

The situation remains favorable.

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

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*: Bovine Tuberculosis

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

- Monitoring system
- Sampling strategy

Systematic inspection post mortem at slaughter. In case of suspected TB lesions, tissue samples are send to the National Reference Laboratory for additional analysis to confirm the suspicion.
Isolation of M. bovis and typing is performed at the National Reference Laboratory (Sciensano in Belgium).

- Type of specimen taken

Organs and tissues : lesions, lymph nodes, lungs, blood

- Diagnostic/analytical methods used

Draw special attention and focus on the post-mortem examination of slaughtered animals.
Transmission for further analysis of any lesion that could be 'suspected' of tuberculosis to the National Reference Laboratory (Sciensano).
Culture of M. bovis, biochemical testing, PCR are performed on these 'suspicious' lesions ; Molecular typing by means of RFLP are realised on all isolates to support the epidemiological investigations and to eventually prove the link between different cases or outbreaks.

2. Measures in place[(b)]

Vaccination is prohibited.

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

Yes, the notification is mandatory.

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

The situation remains favorable.

5. Additional information

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

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

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

(c): Mandatory: Yes/No.

(d): Minimum five years.

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

7. General evaluation*: Trichinella

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

Trichinellosis is virtually absent in domestic livestock in Luxembourg.

No positive case were found in the systematic controls of all slaughtered pigs and horses (Regulation EC N° 2075/2005)
EU Directive requires that also wild boars hunted in the EU for commercial purpose are examined for Trichinella.
Each year, wild boars hunted in Luxembourg are tested. The routine examination of wild boars devoted to the market has proven to be a good measure to protect the consumer against sylvatic Trichinellosis. In addition, monitoring of infection through examination of sentinel animals, such as the fox, is done to assess the prevalence of trichinellosis and to follow trends in time.

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

The situation remains favorable.

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

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*: Trichinella

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

Monitoring system
- Frequency of the sampling
Systematic examinations for Trichinellosis of all slaughtered pigs.

- Type of specimen taken
Diaphragm muscle, min. 1 gram for fattening pigs, min. 2 grams for sows and boars.

- Case definition
An animal is considered positive in case of detection and identification of Trichinella larvae in the muscle sample.

- Diagnostic/analytical methods used
The analysis is done by artificial digestion: the magnetic stirrer method of pooled 100 gram sample as described in Commission Regulation (EC) No 2075/2005 modified by Regulation (UE) N°2015/1375, reference method, min. 1 gram per fattening pig, min. 2 grams per sow and boar, and min. 5 grams per horse and wild.

The control program/strategies in place
Commission Regulation (EC) No 2075/2005 modified by Regulation (UE) N°2015/1375 imposes systematic Trichinella examination of all slaughtered pigs, horses and wild boar and other wildlife animals by artificial digestion method of muscle before marketing.

2. Measures in place[(b)]

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

Yes, notification is mandatory.

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

No positive cases were found in 2017.

5. Additional information

Monitoring system - Sampling strategy (foxes)
Trichinella examinations of +/- 150 foxes/year
Frequency of the sampling : all foxes provided to the State Veterinary Laboratory for necropsy.
All examinations on these sentinel animals were negative.

Monitoring system - Sampling strategy (horses)
Systematic Trichinella examinations of all slaughtered horses.
All examinations were negative

Monitoring system - Sampling strategy (boars)
Systematic Trichinella examinations of all hunted boars.
All examinations were negative.

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

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

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

(c): Mandatory: Yes/No.

(d): Minimum five years.

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

9. Description of Monitoring/Surveillance/Control programmes system*: *Salmonella* in laying hens of Gallus gallus

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

- Monitoring system – Laying hens flocks

Sampling strategy
All laying hen flocks on farms with at least 1000 laying hens are under the *Salmonella* control program - Regulations (EC) Nos 2160/2003 and 517/2011. The owner samples flocks every 15 weeks during the laying phase and in the last 3 weeks of production before slaughtering.
When a flock has a second production cycle, the sampling continues every 15 weeks.

- Frequency of the sampling: Before slaughter at farm

Every flock is sampled in the last 3 weeks before slaughter at the farm.

- Type of specimen taken: Production period

The samples taken during production consist of 2 pairs of overshoes in accordance with Regulation (EU) N 517/2011.
Official samples consist of 2 pairs of overshoes and one dust sample, also in accordance with Regulation (EU) N 517/2011.

- Monitoring system - Type of specimen taken - Laying hens: Before slaughter at farm

2 pairs of socks/ boot swabs are taken in accordance with Regulation (EU) No. 517/2011.
Socks/ boot swabs are taken by the owner or competent authority, accordance with Regulation (EU) No. 517/2011

- Methods of sampling (description of sampling techniques): Production period

Socks/ boot swabs are taken by the owner or competent authority, accordance with Regulation (EU) No. 517/2011.

- Methods of sampling (description of sampling techniques): Before slaughter at farm

Samples are taken in accordance with Regulation (EU) N°. 517/2011.

- Case definition: Production period

A sample is considered positive if S. Enteritidis or S. Typhimurium is isolated. A flock is considered positive as soon as one sample is positive.

- Case definition: Before slaughter at farm

A sample is considered positive if S. Enteritidis or S. Typhimurium is isolated. A flock is considered positive as soon as one sample is positive.

- Diagnostic/analytical methods used: Production period

Bacteriological method: ISO 6579:2002 annex D in accordance with Regulation (EU) No. 517/2011. All isolates are serotyped by seroagglutination.

- Diagnostic/analytical methods used: Before slaughter at farm

Bacteriological method: ISO 6579:2002 annex D in accordance with Regulation (EU) No. 517/2011. All isolates are serotyped by seroagglutination

- Control program/mechanisms - Laying hens flocks

The control program/strategies in place:
The national control program for *Salmonella* in laying hens is based on Regulations (EC) Nos. 2160/2003, 1177/2006 and (EU) No. 517/2011 and N°853/2004 (EU).

- Measures in case of the positive findings or single cases - Laying hens flocks
In case of positive findings, following measures are implemented:
1) Pasteurization of eggs before human consumption.
2) Cleaning and disinfection of housing after removal of the positive flock.
3) Swab sampling of housing before entering a new flock.
If the result is positive for *Salmonella*, cleaning, disinfection and swabcontrol has to be repeated before restocking the house.

2. Measures in place[(b)]

- Other preventive measures than vaccination in place - Laying hens flocks
Minimal requirements for infrastructure, management, hygiene and bio-security issues are laid down in the framework of the authorization of holdings.

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

Yes, notification is mandatory for *S. thyphimuriu*m and *S. enteritidis*.
The vaccination against *Salmonella* is strongly recommended.

Zoonotic *Salmonella* is notifiable by the farmer and the laboratory. Notification is done by phone, fax or electronically to the Veterinary Inspection.

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

- *Salmonella* in laying hens of Gallus gallus - Results of the investigation

All samples were negative for Salmonella enteritidis and typhimurium.

- *Salmonella* in laying hens of Gallus gallus - National evaluation of the recent situation, the trends and sources of infection

The situation is favorable.

5. Additional information

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

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

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

(c): Mandatory: Yes/No.

(d): Minimum five years.

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

10. Description of Monitoring/Surveillance/Control programmes system*: *Salmonella* in in broiler flocks of Gallus gallus

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

- Monitoring system - Broiler flocks
- Sampling strategy
The official surveillance program for broilers in accordance with Regulations (EC) Nos 2160/2003 and 200/2012. It is compulsory to sample all flocks in the last three weeks before slaughter.
It is recommended to sample the boxes were the birds as one day-old chicks arrive in the farm.

- Frequency of the sampling: Day-old chicks

As the 1-day chicks are imported from a member state, parents must be tested free for *Salmonella* (TRACES certificate). Each 'batch' of day-old chicks that enters the farm should be sampled at the arrival on the farm.

- Frequency of the sampling: Before slaughter at farm

In the three weeks before slaughter, boot swab samples are taken in accordance with regulation (EC) No. 200/2012.

- Type of specimen taken: Before slaughter at farm

In the three weeks before slaughter, boot swab samples are taken in accordance with regulation (EC) No. 200/2012. As chickens are slaughtered in a member state they are tested on the farm. They are accompanied by a "TRACES certificate"
- Type of specimen taken - Broiler flocks: At slaughter (flock based approach)
At slaughter, caeca and neck skin samples are taken (in accordance with the EC program)

- Methods of sampling (description of sampling techniques): Before slaughter at farm

All flocks are sampled, by the owner, within 3 weeks before slaughter. The sampling is performed in accordance with Regulation (EU) n 200/2012.

- Methods of sampling (description of sampling techniques) : At slaughter (flock based approach)

The intact caeca of 5 broilers from the same flock are taken at the slaughterhouse with the aim to determine the load of *Salmonella* spp. entering the slaughterhouse (in accordance with the EC program).

- Case definition - Broiler flocks: Before slaughter at farm

A sample is considered positive if S. Enteritidis or S. Typhimurium is isolated. A flock is considered positive as soon as one sample is positive.

- Case definition: At slaughter (flock based approach)

A sample is considered positive if S. Enteritidis or S. Typhimurium is isolated.

- Diagnostic/analytical methods used: Before slaughter at farm

Bacteriological method: ISO 6579:2002 annex D in accordance with Regulation (EU) No. 200/2012.
All isolates are serotyped by seroagglutination

- Diagnostic/analytical methods used: At slaughter (flock based approach)

Bacteriological method: ISO 6579:2002 annex D in accordance with Regulation (EU) No. 200/2012.
All isolates are serotyped by sero agglutination

- Control program/mechanisms - The control program/strategies in place - Broiler flocks

The national control program for *Salmonella* in broiler flocks is based on Regulations (EC) Nos. 2160/2003, 1177/2006 and (EU) No 200/2012 and N° 853/2004 (EU).

2. Measures in place[(b)]

- Vaccination policy - Broiler flocks

There is no vaccination policy for broiler flocks.

- Other preventive measures than vaccination in place

Minimal requirements are laid down for holdings with broilers on infrastructure, management, hygiene and bio-security issues in the framework of the authorization of holdings

- Measures in case of the positive findings or single cases : Before slaughter at farm

Following measures are taken when a flock is positive for *Salmonella spp*:

1) logistic slaughter of the flock at the end of production;
2) heat treated;
3) mandatory cleaning and disinfection of the house;
4) hygienogram after disinfection and after the house has dried up;
4) swab control on the presence of *Salmonella* before restocking the house.

It is at all times prohibited to treat for *Salmonella* with antibiotics.

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

Zoonotic *Salmonella* is notifiable by the farmer and the laboratory .Notification is done by phone, fax or electronically to the Veterinary Inspection.

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

All samples were negative for *Salmonella enteritidis* and *typhimurium*.

National evaluation of the recent situation, the trends and sources of infection
The situation is favorable.

5. Additional information

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

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

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

(c): Mandatory: Yes/No.

(d): Minimum five years.

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

11. Description of Monitoring/Surveillance/Control programmes system*: *Salmonella* in other poultry - Meat production flocks

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

- Monitoring system
- Sampling strategy

In 2017, there was no production of ducks or turkeys or geese > 10000 T in Luxembourg

2. Measures in place[(b)]

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

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

5. Additional information

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

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

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

(c): Mandatory: Yes/No.

(d): Minimum five years.

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

12. Description of Monitoring/Surveillance/Control programmes system*: *Salmonella* in pigs - Fattening herds

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

- Monitoring system
- Sampling strategy

The official surveillance program for pigs in accordance with Regulations (EC) Nos 2160/2003 and 2073/2005 was carried out in 2017.

Frequency of the sampling : at slaughterhouse (herd based approach)
Preventive measures are based in the food safety management system by professionals.
At slaughterhouses: sampling distributed evenly throughout the year. Sampling of pork carcasses was done by means of swabs.
Methods of sampling (description of sampling techniques) : at slaughterhouse (herd based approach)
Sampling of pork carcasses is done by means of swabs in the context of autocontrols according to Regulation (EC)N° 2073/2005 It is carried out by the food business operator.

2. Measures in place[(b)]

The measures in case of exceeding the criteria are the improvement of hygiene at slaughter and an increase in the frequency of sampling.

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

The notification is done in accordance with art.19 of 178/2002.

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

- Results of the investigation

All the samples were negative.

5. Additional information

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

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

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

(c): Mandatory: Yes/No.

(d): Minimum five years.

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

13a Description of Monitoring/Surveillance/Control programmes system*: Thermophilic *Campylobacter* in general Gallus gallus

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

-Monitoring system
This monitoring plan was implemented in accordance with Directive 2003/99/EU and Decision 2013/652/EU

No slaughterhouse for broilers in Luxembourg but 2 facilities are slaughtering on the farm.
End of sampling after the first positive finding of a thermophilic *Campylobacter* per farm and per year.

- Type of specimen taken - At slaughter:

Caecal samples

- Case definition

A sample is positive if *Campylobacter spp*. is detected.

Diagnostic/analytical methods used - At slaughter
Bacteriological method: ISO 10272-1 (2017)
. All strains are isolates by MCCDA and CFA. After they are identified by Maldi-Tof Mass Spectrometry.

Alternative method
Biomérieux : BIO-12/30-05/10

2. Measures in place[(b)]

Measures in case of the positive findings or single cases
Samples are taken for monitoring purposes only. No measures are taken in case of positive findings.

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

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

No test results for 2017.

5. Additional information

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

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

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

(c): Mandatory: Yes/No.

(d): Minimum five years.

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

13b Description of Monitoring/Surveillance/Control programmes system*: Thermophilic *Campylobacter* in Gallus gallus meat

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

-Monitoring system
This monitoring plan was implemented in accordance with Directive 2003/99/EU and Decision 2013/652/EU

- Type of specimen taken – at butcher's or transformation plant:

Fresh meat

- Case definition

A sample is positive if *Campylobacter spp*. is detected.

Diagnostic/analytical methods used :
Alternative method
Biomérieux : BIO-12/30-05/10 or ISO 10272-1 (2017) for reference purposes
. All strains are isolates on CFA, identification by MALDI ToF. Then they are sent to LNS for genotyping purposes.

2. Measures in place[(b)]

Measures in case of the positive findings or single cases
Samples are taken for monitoring purposes only. No measures are taken in case of positive findings.

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

Direct access to test results

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

18/50 *Campylobacter* detected in 2017

5. Additional information

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

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

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

(c): Mandatory: Yes/No.

(d): Minimum five years.

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

13. General evaluation*: Echinococcus

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

At the slaughterhouse, carcasses are examined for Echinococcus (Cysts) lesions.
All foxes at the State Veterinary Laboratory are analysed (+/-150/year).

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

Echinococcosis is caused either by Echinococcus granulosus or Echinococcus multilocularis.

Echinococcus granulosus produces unilocular human hydatidosis. The adult stage is a small tapeworm (6 mm) that lives in the small intestine of domestic and wild canids. Sheep and cattle serve as intermediate hosts for the infection. Humans acquire infection by ingestion of typical taeniid eggs, which are excreted in the faeces of infected dogs: the oncospheres liberated from the eggs migrate via the bloodstream to the liver, lungs and other tissues to develop in hydatid cysts.
In 2017 no cysts were found by post-mortem inspection of the carcasses at the slaughterhouses.

Echinococcus multilocularis causes alveolar (multilocular) echinococcosis in humans. Foxes and dogs are the definitive hosts of this parasite and small rodents the intermediate hosts. In the liver of rodents the invasive larval stage has a multi-compartimented appearance containing many protoscolices. Ingestion of the eggs by humans can result in the development of invasive cysts in the liver. In Luxembourg, the percentage of infected foxes does not vary in the different regions of the country.

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

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

14. Description of Monitoring/Surveillance/Control program system*: Echinococcus granulosus or multilocularis

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

- Monitoring system - Sampling strategy

Post mortem, visual examination is performed at the slaughterhouses in the domestic intermediate hosts: cattle, sheep, horses and pigs.

Foxes: Search for Echinococcus multilocularis by intestinal scraping technique. Examinations done for +/- 150 foxes/year.

2. Measures in place[(b)]

Whole carcasses or parts of the carcasses are rejected in case Echinococcus granulosus cysts are found.

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

In case of carcasses showing lesions of Echinococcus (cysts), depending on the extent of the lesions, carcasses are partially or totally rejected and declared unfit for human consumption.

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

No case found by post-mortem inspection of the carcasses at the slaughterhouses in 2017.

25% of the foxes analyzed in 2017 at the State Veterinary State were positive for Echinococcus multilocularis (intestinal scraping technique). From 2012 to 2017 prevalence of Echinococcus multilocularis is stable in the fox population (25-40%).

5. Additional information

Consumption of wild raw berries is discouraged.

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

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

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

(c): Mandatory: Yes/No.

(d): Minimum five years.

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

15. General evaluation*: Lyssavirus (Rabies)

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

Luxembourg has the official status of rabies-free country since July 2001.

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

All foxes at the State Veterinary Laboratory are analyzed (+/-150/year).

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

Surveillance system and methods used.
Domestic and wild animals with nervous symptoms suspected of rabies have to be notified to the ASV.
Collection of dead-found bats is recommended for rabies surveillance.
Live suspect animals are quarantined if possible, if not, they are killed and their brain is examined by immunofluorescence (and further confirmation at the EURL if necessary).

Vaccination of dogs is compulsory according to the Luxembourg law on dogs (May 9, 2008) .

4. Additional information

It is highly recommended to report on the rabies virus type detected to be able to differentiate between the classical rabies type (genotype 1) and the European bat Lyssa virus types (unspecified or EBL 1 or EBL 2). Bat rabies is of public health concern. The public should be made aware of the danger of human exposure to bats, especially in case of abnormal behavior of bats. Rabies is transmitted to humans and other animals through saliva, usually by a bite. Any person exposed to bats should be previously vaccinated against rabies. Nobody should handle diseased or dead bats without protection such as gloves. Any person finding a bat behaving abnormally, in an unusual place, or under unusual circumstances, should not attempt to handle or to move the animal but should contact official authority. Education and recommendations should be given to travelers in order to reduce their risk of infection.

* **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

16. Description of Monitoring/Surveillance/Control programmes system*: Lyssavirus (rabies)

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

- Monitoring system
All foxes at the State Veterinary Laboratory are analyzed (±150/year).
All animals with nervous symptoms suspected of rabies are analyzed.

Sampling strategy
The brain of the foxes (+/-150) are examined by direct immunofluorescence test
The brain of animals with nervous symptoms suspected of rabies are examined by direct immunofluorescence test and virus cultivation in neuroblasts at the EURL in Malzéville

Type of specimen taken
Brain

Methods of sampling (description of sampling techniques)
Small animals: head / carcass.
Huge animals: brain (CNS).
Shipping and packaging conditions: brains are transported as soon as possible (refrigerated if possible) in a tightly sealed packet to the State Veterinary Laboratory.

Case definition
An animal is considered infected in case of a positive direct immunofluorescence test (antigen detection) confirmed by cell cultivation of the virus or detection by RT-PCR or (rarely performed) by mice inoculation test (clinical observation of rabies symptoms).

Diagnostic/analytical methods used
Direct immunofluorescence for the detection of viral antigen (in the State Veterinary Laboratory), virus isolation in neuroblastoma cell culture, detection by RT-PCR, mouse inoculation test (EURL).

Vaccination policy
Oral vaccination of foxes by baits started in 1989 and was stopped by the end of 2003.
All dog must be vaccinated against rabies.

2. Measures in place[(b)]

In case of positive findings, national legislation has to be applied.

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

Notification of all laboratory confirmed cases to the competent Authority is mandatory

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

No positive case in 2017 in domestic and wild animals.

The risk of transmission of bat rabies to human beings is regarded as very low. The bats are protected by

law in Luxembourg. It is thus recommended not to approach them. Capture, transport, sale, purchase or destruction of bats are prohibited. The wild animal rescue center collects dead bats and takes them to the State Veterinary Laboratory for rabies analysis.

5. Additional information

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

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

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

(c): Mandatory: Yes/No.

(d): Minimum five years.

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

17. General evaluation*: Cysticercose

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

History of the disease and/or infection in the country
Cattle: Taenia saginata: The situation has been stable for several years

Pigs :
The Luxembourg pig population is free of Cysticercus cellulosae.
Taenia solium (and Cysticercus cellulosae) is not autochthonous in Luxembourg.

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

National evaluation of the recent situation, the trends and sources of infection
Cysticercus bovis in muscular tissue of cattle is the larval stage of the tapeworm, Taenia saginata, a parasitic cestode of the human gut (taeniasis).
Cattle can become infected by ingestion of vegetation contaminated with T. saginata eggs shed in human faeces. Risk factors are access to rivers and flooding of pastures or wetland. Humans contaminate themselves by the ingestion of raw or undercooked beef containing the larval form (cysticerci). Usually pathogenicity for humans is low. The tapeworm eggs contaminate the environment directly or through surface waters. Human carriers should be treated promptly. Strict rules for the hygienic disposal or sanitation of human faeces with a method that inactivates T. saginata eggs should be developed. The spreading of human excrement on land should not be allowed.

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

Suggestions to the European Union for the actions to be taken
The introduction of serological analyzes for the detection of cysticerci antigens in the serum of animals (cattle) should be developed. This would allow the detection of more cases of infection than by live and infectious cysts by visual inspection of carcasses at slaughterhouse.

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

18. Description of Monitoring/Surveillance/Control programmes system*: Cysticercose

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

Cysticerci - general evaluation
Cattle: Taenia saginata
Post-mortem, macroscopic examination of carcasses of adult cattle as well as calves is routinely done in all slaughterhouses.

2. Measures in place[(b)]

Lightly contaminated carcasses by Taenia saginata are treated by freezing at -18C for 10 days before declared fit for human consumption.
Heavily contaminated carcasses by Taenia saginata are unfit for human consumption and are destroyed.

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

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

5. Additional information

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

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

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

(c): Mandatory: Yes/No.

(d): Minimum five years.

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

19. General evaluation*: SARCOCYSTOSIS

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

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

Sarcocystis bovihominis (bovine as intermediate host) and Sarcocystis suihominis (porcine intermediate host) occur sporadically. Domestic carnivores are hosts of the adult stage. Humans can be a definitive host for sarcosporidiosis by ingestion of infected meat or excreted oocysts and develop symptoms like diarrhoea, headache, eosinophilia, abortion, congenital disorder.
For human sarcosporidiosis there is no immunity development.
A majority of grazing animals are inappearent carriers of tissue cysts

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

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

20. Description of Monitoring/Surveillance/Control programmes system*: SARCOCYSTOSIS

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

At the slaughterhouses, a small number of carcasses showing myositis eosinophilica (green colouring spots of the carcass) are detected and notified to the ASV.

2. Measures in place[(b)]

In case of positive findings, carcasses are totally rejected and declared unfit for human consumption. Carcasses are entirely condemned when myositis eosinophilica lesions are apparent. Myositis eosinophilica is commonly associated with sarcosporidiosis but this has still to be proven.

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

Carcasses showing myositis eosinophilica (green colouring spots of the carcass) are notified to the ASV.

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

5. Additional information

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

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

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

(c): Mandatory: Yes/No.

(d): Minimum five years.

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

21. General evaluation*: TOXOPLASMA

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

The majority of grazing animals seem to be unapparent carriers of tissue cysts.

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

Humans are infected with Toxoplasma gondii through ingestion of undercooked infected meat or upon accidental ingestion of sporulated oocysts from the environment.
The cat is the final host, man and most warm-blooded animals are intermediate hosts. Most infections with T.gondii are asymptomatic, however mild (flu-like symptoms), moderate (lymphadenopathy, chronic fatigue) to severe disease (disseminated toxoplasmosis, encephalitis) may occur, the latter mainly in immunocompromized hosts. Moreover, when infection occurs in pregnant women, toxoplasmosis may cause abortion and congenital disorders. If a woman acquires primary infection during pregnancy, Toxoplasma can be transmitted through the placenta to the foetus and lead to congenital toxoplasmosis.
A percentage of young children (1 to 14-year-old age group) may get post-natal infections with T. gondii and develop symptomatic toxoplasmosis (e.g. ocular disease).
A number of cases of the disease in a 15 to 24-year-old age group may be referred to as acquired toxoplasmosis in immunocompetent patients, which may present a wide range of clinical signs, from lymphadenopathy to retinitis and uveitis.
Immunocompetent individuals may often develop clinical toxoplasmosis. The majority of adult persons have acquired a degree of immunity to re-infection but can remain carrier.

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

Screening for toxoplasmosis during pregnancy is common in Luxembourg.
Prevention of congenital toxoplasmosis by specific hygienic measures seems to have limited impact.

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

22. General evaluation*: LISTERIA

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

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

National evaluation of the recent situation, the trends and sources of infection
The prevalence of *Listeria monocytogenes* in food has not changed in comparaison to previous years.
Mostly people with cancer, immunodepression, ... get infected.

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

Recent actions taken to control the zoonoses.
General food hygiene rules are essential for the prevention of human listeriosis.
As some persons are at high risk (pregnant women), they are advised not to eat certain categories of food with proven elevated risk of *Listeria monocytogenes* contamination, such as unpasteurized milk and butter, soft cheeses and ice cream made from unpasteurized milk, any soft cheese crust, smoked fish, pat, cooked ham, salami, cooked meat in jelly, raw minced meat from beef, pork and poultry, steak tartar, raw fish and shellfish (oysters, mussels, shrimps), fish, meat and surimi salads, insufficiently rinsed raw vegetables, unpeeled fruit.

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

23. Description of Monitoring/Surveillance/Control programmes system*: LISTERIA in foodstuffs

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

- Monitoring system
- Frequency of the sampling

At retail
Samples are taken according to the national control program or in the framework of RASFF, complaints or suspicion. Samples are taken along the whole food chain.
Type of specimen taken
At retail
Different kind of products susceptible to *Listeria monocytogenes* are sampled and analysed: soft and semi-hard (soft) cheeses, ice-creams, RTE meals, meat preparations and meat products, ...
Definition of positive finding
At the production plant
A sample is considered to be positive after confirmation of *Listeria monocytogenes* (detection or enumeration).
At retail
A sample is considered to be positive after confirmation of *Listeria monocytogenes* (enumeration).

Diagnostic/analytical methods used

At the production plant
ISO 11290-2:2017 (Horizontal method for the detection and enumeration of *Listeria monocytogenes* -- Part 2: Enumeration method) and ISO 11290-1:2017 (Detection Method)

Alternative method Rapid'L.Mono
BRD:07/05-09/01 (Enumeration)
BRD: 07/04-09/98 (Detection)

At retail
ISO 11290-2:2017 (Horizontal method for the detection and enumeration of *Listeria monocytogenes* -- Part 2: Enumeration method) and ISO 11290-1:2017 (Detection Method)

Alternative method Rapid'L.Mono
BRD:07/05-09/01 (Enumeration)
BRD: 07/04-09/98 (Detection)

2. Measures in place[(b)]

Notification is mandatory.
For *Listeria monocytogenes*, the criterion of 100 cfu/g in ready-to-eat food put on the market may not be exceeded. Laboratories have to inform the ASV in case of a positive sample.

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

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

5. Additional information

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

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

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

(c): Mandatory: Yes/No.

(d): Minimum five years.

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

24. Description of Monitoring/Surveillance/Control programmes system*: Feed - Salmonella

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

Official feed control : random or selective selection of the feed business operators, selective choice of the feed batches that are sampled and analysed.

2. Measures in place[(b)]

National control plan for inspection and sampling of feed

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

Yes

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

Situation is good, very few feed samples are positive on *Salmonella* in Luxembourg, in some years not even any positive

5. Additional information

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

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

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

(c): Mandatory: Yes/No.

(d): Minimum five years.

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

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

LMVE (ASV): Laboratoire de Médecine Vétérinaire de l'État

LNS : Laboratoire national de Santé

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

26. General Description of Antimicrobial Resistance Monitoring*; *Salmonella* sp.

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

All strains of *Salmonella* isolated during the zoonosis monitoring program and EU monitoring are serotyped and the determination of antimicrobial resistance is done. This is also done for clinical investigations with finding of *Salmonella*.

Monitoring System
- Frequency of the sampling
Sampling throughout the year
- Type of specimen taken
Positive samples from other monitoring programs and clinical investigations.
- Methods of sampling (description of sampling techniques)
All samples found to be positive for *Salmonella* including clinical investigations
- Procedures for the selection of isolates for antimicrobial testing
All strains isolated during the zoonosis monitoring program and clinical investigations are serotyped and antimicrobial resistance is determined. AMR was performed on all serotypes identified.
- Methods used for collecting data
Minimum Inhibitory Concentrations (MIC) were determined by the dilution method using Sensititre, as described in the EU-legislation Official Journal of the European Union, Commission implementing decision 652/2013/EU on the monitoring and reporting of antimicrobial resistance in zoonotic and commensal bacteria. Interpretation was according to the EU-legislation.

2. Stratification procedure per animal population and food category

All isolates from official programs and from clinical investigations are analysed for AMR.

3. Randomisation procedure per animal population and food category

All isolates from official programs and from clinical investigations are analysed for AMR.

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

Bacteriological method: ISO 6579:2002 annex D in accordance with Regulation (EU) No. 200/2012. All

isolates are serotyped by seroagglutination.

Minimum Inhibitory Concentrations (MIC) were determined by the dilution method using Sensititre EUVSEC panel, as described in the EU Decision 2013/652/EU. The antimicrobials reported as well as the breakpoints for interpretation are listed in the table below.

First panel EUVSEC antimicrobial ECOFF (R> mg/l):
Ampicilline 8 Cefotaxime 0.5 Ceftazidime2 Meropenem 0.125 Nalidixic acid 16 Ciprofloxacin 0.064 Tetracycline 8 Colistine 2 Gentamicine 2 Trimethoprime 2 Sulfamethoxazole NA Chloramephnicol 16 Azithromycine NA Tigecycline 1.

Second panel EUVSEC 2 antimicrobial ECOFF* (R>mg/l):
Cefoxitin 8 Cefepime NA Cefotaxime+calvulanic acid NA Ceftazidime+Clavulanic acid NA Meropenem 0.125 Temocilline NA Imipenem 1 Ertapeneme 0.06 Cefotaxtime 0.5 Ceftazidime 2.

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

The cut-off values were used as described in the European Decision 2013/652/EU on the monitoring and reporting of antimicrobial resistance in zoonotic and commensal bacteria.
Minimum Inhibitory Concentrations (MIC) were determined by the use of broth microdilution, first panel Sensititre EUVSEC. The determination of the *Salmonella spp*. to third generation Cephalosporin's or Meropenem has been done with the second panel, EUVSEC2.

The antimicrobials of the first panel EUVSEC, tested and the breakpoints used are listed in the following table:
First panel EUVSEC antimicrobial ECOFF (R> mg/l):
Ampicillin 8, Cefotaxime 0.5 Ceftazidime 2, Meropenem 0,125 Nalidixic acid 16 Ciprofloxacin 0.064 Tetracycline 8 Colistin 2 Gentamicin 2 Trimethoprim 2 Sulfamthoxazole NA Chloramphnicol 16 Azithromycin NA Tigecycline 1.

The antimicrobials of the second panel EUVSEC 2, tested and the breakpoints used are listed in the following table:
Second Panel EUVSEC 2 antimicrobial ECOFF* (R>mg/l):
Cefoxitin 8 Cefepime NA Cefotaxime+Clavulanic acid NA Ceftazidime+Clavulanic acid NA Meropenem 0.125 Temocillin NA Imipenem 1 Ertapenem 0,06 Cefotaxtime 0,5 Ceftazidime 2.

6. Results of investigation

General prevalence of *Salmonella* is low.

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

27. General Description of Antimicrobial Resistance Monitoring*; Thermophilic *Campylobacter*

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

All strains of *Campylobacter* isolated during the zoonosis monitoring program, national monitoring and EFSA specific monitoring decision 652/2013 /EC or detected in the National reference laboratory, are identified by Maldi-tof mass spectrometry and the determination of antimicrobial resistance is done.

Monitoring system
- Frequency of the sampling
There are two establishment's slaughtering on the farm but no slaughterhouse for broilers in Luxembourg. Sampling ended after the first positive finding of a thermophilic *Campylobacter* per farm and per year.
- Type of specimen taken
Intact caeca from broilers are taken at slaughter within the framework of the monitoring plan decision 652/2013 /EC. Samples taken for clinical diagnostic from other species.

No sampling in 2017.

2. Stratification procedure per animal population and food category

No sampling in 2017.

3. Randomisation procedure per animal population and food category

No sampling in 2017.

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

Laboratory used for detection for resistance - Antimicrobials included in monitoring

Specification (coli/jejuni) with Maldi-Tof mass spectrometry.
Minimum Inhibitory Concentrations (MIC) were determined by using broth microdilution method (Sensititre EUCAMP2 panel). From 2014, a new European decision on the harmonization of the monitoring and reporting of antimicrobial resistance in zoonotic and commensal bacteria is adopted which specifies new interpretative threshold for resistance for C jejuni and C. coli. Therefore, the antimicrobials tested and the epidemiological cut-off values (ECOFF) used are listed in the table below following the official Journal of the European Union (L303/26 14.11.2013).

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

Antimicrobial Breakpoints R > (g / ml) C. jejuni C. coli
Tetracycline 1/2 Nalidixic acid 16/16 Ciprofloxacin 0.5 /0.5 Erythromycin 4/8 Gentamicin 2/2 Streptomycin 4/4.

6. Results of investigation

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

28. General Description of Antimicrobial Resistance Monitoring*; Commensal *E. coli* from animals

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

Caecal contents from pigs are taken at slaughter for analysis of Commensal *E. coli* within the framework of the monitoring plan decision 652/2013 /EC.

According to CID 2013/652/EU, bovines under one year of age where the production of meat of those bovines in the Member State is more than 10 000 tonnes slaughtered per year must be sampled. However, as less than 10 000 tonnes bovines under one year of age are slaughtered in Luxembourg, the AMR monitoring is not mandatory and was not performed.

2. Stratification procedure per animal population and food category

The caecal samples for the recovery of isolates for antimicrobial susceptibility testing originated from two slaughterhouses in which at least 60% of all fattened and slaughtered pigs in Luxembourg are processed (There are only 2 slaughterhouses for pigs in Luxembourg).

Samples were taken from 5 fattening pigs of every slaughter batch of the farmers and sampling ended with the first positive finding of a commensal *E. coli* per farm and per year.

3. Randomisation procedure per animal population and food category

In the case, that more than one animal has been sampled from the same epidemiological unit only the results of the first sampling of an epidemiological unit were used.

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

Laboratory methodology used for identification of the microbial isolates
All strains are isolated on Mac Conkey and Colombia Blood Agar. After isolation VITEK2 COMPACT identifies them.

Laboratory used for detection for resistance - Antimicrobials included in monitoring
Minimum Inhibitory Concentrations (MIC) were determined by the dilution method using Sensititre, as described in the EU-legislation Official Journal of the European Union, Commission implementing Decision 2013/652/EU on the monitoring and reporting of antimicrobial resistance in zoonotic and commensal bacteria. Interpretation was according to the EU-legislation.

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

Minimum Inhibitory Concentrations (MIC) were determined by the dilution method using Sensititre, as described in the EU-legislation Official Journal of the European Union, Commission implementing Decision 2013/652/EU on the monitoring and reporting of antimicrobial resistance in zoonotic and commensal bacteria. Interpretation was according to the EU-legislation.

Minimum Inhibitory Concentrations (MIC) were determined by the dilution method using Sensititre EUVSEC panel, as described in the EU-Decision 2013/652/EU. The antimicrobials reported as well as the breakpoints for interpretation are listed in the table below.

First panel EUVSEC antimicrobial ECOFF (R> mg/l):
Ampicillin 8 Cefotaxim 0.5 Ceftazidim 0.5 Meropenem 0.125 Nalidixic acid 16 Ciprofloxacine 0.064

Tetracycline 8 Colistin 2 Gentamicin 2 Trimethoprim 2 Sulfamethoxazol 64 Chloramphenicol 16 Azithromycin NA Tigecycline 1.

If characteristic resistance is notified, the second panel is done consequently.
Second panel EUVSE 2 antimicrobial ECOFF* (R>mg/l):
Cefoxitin 8 Cefepime 0.12, Cefotaxime+Clavulanic acid NA Ceftazidim+Clavulanic acid NA
Meropenem 0.125 Temocillin NA Imipenem 0.5 Ertapenem 0.06 Cefotaxtim 0.25 Ceftazidime 0.5.

6. Results of investigation

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

29. General Description of Antimicrobial Resistance Monitoring*; E. coli ESBL from animals

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

Samples for *E. coli* ESBL analysis are taken in the framework of the monitoring plan decision 652/2013 /EC, clinical investigations and laboratory findings. Antimicrobial resistance is determined for all strains.

According to CID 2013/652/EU, bovines under one year of age where the production of meat of those bovines in the Member State is more than 10 000 tonnes slaughtered per year must be sampled. However, as less than 10 000 tonnes bovines under one year of age are slaughtered in Luxembourg, the AMR monitoring is not mandatory and was not performed.

2. Stratification procedure per animal population and food category

The caecum samples for the recovery of *E. coli* ESBL isolates for antimicrobial susceptibility testing originated from two slaughterhouses in which at least 60% of all fattened and slaughtered pigs in Luxembourg are processed (There are only 2 slaughterhouses for pigs in Luxembourg).

Samples were taken from 5 fattening pigs of every slaughter batch and sampling ended with the first positive finding of *E. coli* ESBL per farm and per year.

Antimicrobial resistance was as well determined for all strains of *E. coli* originating from significant clinical investigations (faecal samples, milk, organs, samples from necropsies and others at the Veterinary State Laboratory).

3. Randomisation procedure per animal population and food category

In the case, that more than one animal has been sampled from the same epidemiological unit only the results of the first sampling of an epidemiological unit were used.

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

All strains are isolated on MCA. Then they are identified by VITEK2 COMPACT and confirmed by AMR EUVSEC and EUVSEC2.
Genotyping is used to confirm the ESBL (LNS).

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

6. Results of investigation

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

30. General Description of Antimicrobial Resistance Monitoring*; Commensal *E. coli* and *E. coli* ESBL from Food

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

The sampling plan is comprised from two different plans, one from the permanent routine sampling and the other from additional sampling, because the number of routine samples was too low. Approx. 150 samples should be collected at retail all over Luxembourg according to the revision and sampling plan given by the ASV.

2. Stratification procedure per animal population and food category

Routine samples: ASV created a risk based sampling plan to obtain the number of samples that had to be collected per food category. All samples were collected as objective samples.

3. Randomisation procedure per animal population and food category

The number of samples was allocated proportionally based on the population.

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

Tempo® for commensal *E. coli* and MCA for ESBL *E. coli.*

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

AMR EUVSEC and EUVSEC2.
Genotyping is used to confirm the ESBL (LNS)

6. Results of investigation

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

31. Food-borne Outbreaks

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

All human isolates of *Campylobacter, Salmonella, VTEC, Listeria monocytogenes, Yersinia enterocolitica* are sent to national reference lab for whole genome sequencing. All veterinary and food isolates are also genotyped (*VTEC* and *Salmonella* by WGS).

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

Outbreaks are ascertained by detecting national clusters of genetically similar isolates and comparing national isolates to those from outbreaks reported on EPIS. Outbreaks are investigated if size of cluster is large enough or if there is a link to international cases.

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

Few large national outbreaks are detected nationally, but usually several cases connected to international urgent inquiries (e.g. outbreak of S*almonella* with new serovar linked to sesame seeds initially imported in Greece)

4. Descriptions of single outbreaks of special interest

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

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

WGS typing data ought to be collected and analysed at European level to improve multinational outbreak detection and investigations.

7. Additional information

(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.