European Food Safety Authority

ZOONOSES MONITORING

SWITZERLAND

The Report referred to in Article 9 of Directive 2003/99/EC

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

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

IN 2011

INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Country: Switzerland

Reporting Year: 2011

Laboratory name	Description	Contribution
SFVO	Swiss Federal Veterinary Office	Swiss Zoonoses Report
SFOPH	Swiss Federal Office of public health	Foodborne outbreaks, Swiss Zoonoses Report
ZOBA	Centre for Zoonoses, Bacterial Animal Diseases Antimicrobial Resistance at Institute of Veterinary Bacteriology, Vetsuisse Faculty, University of Bern	National Reference Laboratory for Brucellosis, Salmonellosis, Campylobacteriosis, Listeriosis, Yersiniosis, Antimicrobial Resistance
ILS	Institute for Food Safety and Hygiene , Vetsuisse Faculty University of Zurich	National Reference Laboratory for STEC, enteropathogenic bacteria
IVB	Institute of Veterinary Bacteriology Vetsuisse Faculty University of Zurich	National Reference Laboratory for Coxiellosis, Tuberculosis
IPB	Institute of Parasitology, Vetsuisse Faculty and Faculty of Medicine University of Bern	National Reference Laboratory for Trichinellosis, Toxoplasmosis
SRC	Swiss Rabies Center at the Institute of Veterinary Virology, Vetsuisse Faculty University of Bern	National Reference Laboratory for Rabies
IPZ	Institute of Parasitology, Vetsuisse Faculty University of Zurich	National Reference Laboratory for Echinococcosis
ALP	Research Station Agroscope Liebefeld-Posieux	Official feed inspection service and Listeria Monitoring

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 Switzerland during the year 2011 .

The information covers the occurrence of these diseases and agents in humans, animals, foodstuffs and in some cases also in feedingstuffs. In addition the report includes data on antimicrobial resistance in some zoonotic agents and commensal 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 Community 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 Community 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 Community Summary Report on zoonoses that is published each year by EFSA.

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

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1. ANIMAL POPULATIONS

The relevance of the findings on zoonoses and zoonotic agents has to be related to the size and nature of the animal population in the country.

A. Information on susceptible animal population

Sources of information

Living animals and herds: Coordinated census of agriculture. Swiss federal office of agriculture and Swiss federal office of statistics.
Slaughtered animals: Official meat inspection statistics (FVO) and monthly agricultural statistics (Swiss Farmer’s Federation).

Dates the figures relate to and the content of the figures

Number of animals hold in farms in Switzerland in 2011 (data status May 2012). Number of animals slaughtered in the year 2011.

Definitions used for different types of animals, herds, flocks and holdings as well as the types covered by the information

The indicated number of holdings is identical to the number of farms holding respective species. Agriculture census counts the number of farms. Farms with more than one holding per species are rare in Switzerland.

National evaluation of the numbers of susceptible population and trends in these figures

The number of cattle holdings as well as the number of animals decreased by 2 and 1.1% respectively compared to the previous year. The number of pig, sheep and goat farms declined by 4.1%, 3.1% and 2.9%. Numbers of holdings with breeding hens have a large fluctuation due to a large number of very small flocks on farms which are counted in agricultural census. The number of holdings with laying hens was stable. The number of broiler holdings increased by 6.5%. 37 holdings with more than 100 breeding hens keep 90% of all breeding hens. Over 90% of poultry meat is produced by 4 major meat producing companies.

Geographical distribution and size distribution of the herds, flocks and holdings

Average size of the farms in 2011: 39 cattle, 180 pigs, 45 sheep, 14 goats, 196 laying hens, 5593 broilers.

Additional information

Day-old chicks and hatching eggs are imported on a large scale and reared in Switzerland. In 2011 about 862'530 day-old chicks (mainly from France, the Netherlands and Germany) and 24.9 million fertilized eggs of the broiler type (mainly from France, the Netherlands and Denmark) were imported.

Table Susceptible animal populations

* Only if different than current reporting year

		Number of herds or flocks		Number of slaughtered animals		Livestock numbers (live animals)		Number of holdings	
Animal species	Category of animals	Data	Year*	Data	Year*	Data	Year*	Data	Year*
Cattle (bovine animals)	- in total			655985		1583151		41018	
Gallus gallus (fowl)	breeding flocks, unspecified - in total					148867		1189	
	laying hens					3260496		16642	
	broilers			55605556		5996193		1072	
Goats	- in total			30715		81467		5889	
Pigs	- in total			2827506		1572590		8747	
Sheep	- in total			241934		416272		9266	
Solipeds, domestic	horses - in total			3115		55186		8837	
Turkeys	- in total [1)]					58443		268	

Comments:

[1)] The number of slaughtered turkeys is not available. 1'411 tons of turkey meat were produced in 2011.

2. INFORMATION ON SPECIFIC ZOONOSES AND ZOONOTIC AGENTS

Zoonoses are diseases or infections, which are naturally transmissible directly or indirectly between animals and humans. Foodstuffs serve often as vehicles of zoonotic infections. Zoonotic agents cover viruses, bacteria, fungi, parasites or other biological entities that are likely to cause zoonoses.

2.1 SALMONELLOSIS

2.1.1 General evaluation of the national situation

A. General evaluation

History of the disease and/or infection in the country

Salmonellosis in humans is a notifiable disease. The detection of Salmonella spp. must be reported by the laboratory within one week (ordinance of the FDHA on doctor and laboratory reports). In the 80s Salmonellosis was the most reported food borne disease in humans. After reaching a peak in 1992 with 113.4 reports per 100,000 inhabitants the incidence declined steadily resulting in a takeover of Campylobacteriosis as the most reported food borne disease in humans in 1995. Depart from 2004 the incidence was never over 30.0 reports per 100,000 inhabitants. S. Enteritidis has always been the most frequently isolated serovar followed by S. Typhimurium.

From 2002 until 2009 cheese production in cheese-making facilities was officially sampled and monitored for Salmonella in a national surveillance programme. As in the recent years no Salmonella were detected, the official testing on Salmonella in dairy products was stopped in 2009.
A study in broiler meat at retail in 2007 showed, that Swiss products from poultry had a low Salmonella prevalence (products originating from Switzerland had a prevalence of 0.4% compared to 15.3% within imported products). A baseline study on the prevalence and antimicrobial resistance of Salmonella spp. in broiler carcasses carried out in 2008 resulted in a prevalence of Salmonella in broiler carcasses of 2.6%.

Next to salmonellosis (see chapter salmonella in all animals) also the infection with Salmonella is notifiable. From 1995 until 2006 the infection of chicken with S. Enteritidis was notifiable and a control programme was in place for breeding flocks and laying hen flocks (TSV, Article 255-261). During this period the incidence of S. Enteritidis infection in breeding flocks and laying hen flocks has steadily declined from 38 to 3 infected flocks per year. This control programme was expanded 2007 to other serovars and species (TSV, Article 255-261) according to the regulation 2160/2003 of the European community. In 2009 the state control programme was extended to broiler flocks. Up to date detection of S. Enteritidis and S. Typhimurium in breeding flocks, laying hens, broilers and turkeys are covered in this control programme, in breeding flocks in addition S. Hadar, S. Virchow and S. Infantis. Since 2007, no more than 3 cases per year in poultry were reported.
Baseline studies were carried out in 2005 – 2008 resulting in the following prevalence estimates: in laying hens 1.3 % (2006), in broilers 0.3%(2007), in slaughter pigs 2.3% (2007) and in breeding pigs 12.9% (2008). The prevalence in slaughter pigs was on an equal level as in previous research studies. 60% of the detected serovars (9 of 15 serovars) were either S. Enteritidis or S. Typhimurium proving once again the clear presence of these two serovars in the pig population. As breeding pigs have not been addressed in recent research this prevalence cannot be compared with previous data. The presence of S. Enteritidis or S. Typhimurium was with 27% (8 of 30 serovars) significantly less dominant than in slaughter pigs.

National evaluation of the recent situation, the trends and sources of infection

1‘300 diagnostically confirmed cases of salmonellosis were reported in 2011 (1’179 cases in the previous year). This represents a notification rate of 16 per 100’000 inhabitants (15/100’000 in 2010). The number of salmonella cases has been on a declining trend for the last few years and stagnated in 2011. Similar to previous years, the most affected age group was young kids under 5 years (56/100’000). The most frequently reported serovars were S. Enteritidis (27%), followed by S. Typhimurium (20%) and the monophasic strain 4,12,:i:- (13%). There is an ongoing outbreak of S. Bardo since May 2011, which has affected 90 people until the end of 2011. S. Bardo is a very rare serovar and the source of infection still remains unknown.

In the framework of the control programme, 2 cases of salmonella infections in poultry were detected (1x S. Enteritidis in broilers and 1x S. Typhimurium in laying hens 2011).

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

By comparison with other countries, Switzerland has relatively few cases of salmonellosis.
Despite the steady decline in human cases, salmonellosis is still the second most common zoonosis in Switzerland. Since many years most cases in humans are caused by S. Enteritidis and S. Typhimurium. The longstanding control programme is showing its effect here. Salmonella are very rarely found in poultry. In broiler chickens, the first two years of control showed the presence of different Salmonella serotypes, with the first detection of one of the controlled serovars (S. Enteritidis) in 2010. It remains unclear to what extent pigs and cattle play a part as reservoirs for infection in humans. Stepping up and expanding the national control programme might be needed in order to further reduce human salmonellosis cases.

Recent actions taken to control the zoonoses

Baseline studies in laying hens (2006), broilers (2007), slaughter pigs (2007/2008) and breeding pigs (2008) were carried out to realise adequate control programmes. Control measures were implemented in breeding flocks according to Commission Regulation (EC) No. 1003/2005, in laying hen flocks according to Commission Regulation (EC) No. 1168/2006, in broilers according to Commission Regulation (EC) No. 646/2007 and in turkeys according to Commission Regulation (EC) No. 584/2008.

Additional information

1. In a Salmonella Kentucky study conducted in 2010 (Bonalli et al.) 106 human Salmonella Kentucky strains, isolated from patients between 2004 and 2009, were genotyped using PFGE. There was some evidence of a non-recognised outbreak of S. Kentucky in 2006. Travels to North Africa were a risk factor for S. Kentucky infection. [Bonalli, M., Stephan, R., Käppeli, U., Cernela, N., Adank, L., Hächler, H. Salmonella enterica serotype Kentucky associated with human infections in Switzerland: genotype and resistance trends 2004-2009, International Food Research (May 2011)]
2. The poultry industry takes responsibility for the monitoring of broilers and poultry meat production in a system of self-auditing. More information can be found in the relevant chapters.
3. Further information can be found on the FVO website www.bvet.admin.ch.

2.1.2 Salmonellosis in humans

Table Salmonella in humans - Species/serotype distribution

Species/serotype Distribution	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.	Unknown status
Salmonella	1300	16.39	0	0	0	0	0
S. Enteritidis	350	4.5					
S. Typhimurium	258	3.3					
S. Derby	13	0.16					
S. Napoli	18	0.22					
S. Stanley	21	0.26					
Salmonella spp., unspecified	265	3.3					
S. Hadar	14	0.17					
S. Infantis	21	0.26					
S. Newport	18	0.22					
S. 4,12:i:-	175	2.2					
S. Corvallis	7	0.09					
S. Bardo	90	1.1					
S. Bareilly	6	0.07					
S. Virchow	24	0.3					
S. Saintpaul	6	0.07					
S. Kentucky	14	0.17					

Table Salmonella in humans - Species/serotype distribution

Table Salmonella in humans - Age distribution

Age distribution	S. Enteritidis			S. Typhimurium			Salmonella spp.		
	All	M	F	All	M	F	All	M	F
<1 year	8	2	6	8	4	4	42	16	26
1 to 4 years	50	19	31	49	24	25	177	87	90
5 to 14 years	64	37	27	50	32	18	180	105	75
15 to 24 years	50	23	27	27	15	12	182	95	87
25 to 44 years	78	37	41	45	20	25	289	137	152
45 to 64 years	68	40	28	44	21	23	259	136	123
65 years and older	31	21	10	35	16	19	168	88	80
Age unknown	1	1	0				3	3	0
Total :	350	180	170	258	132	126	1300	667	633

Table Salmonella in humans - Seasonal distribution

Seasonal Distribution Months	S. Enteritidis Cases	S. Typhimurium Cases	Salmonella spp. Cases
January	12	19	77
February	11	15	49
March	18	16	66
April	14	13	74
May	35	18	122
June	19	22	109
July	33	23	113
August	82	37	209
September	38	27	143
October	44	25	143
November	27	27	106
December	17	16	89
Total :	350	258	1300

2.1.3 Salmonella in foodstuffs

A. Salmonella spp. in broiler meat and products thereof

Preventive measures in place

The Hygiene Ordinance lays down limits for Salmonella in various foods. If these limits are exceeded, the cantonal laboratories are required to report this to the FOPH. The foods affected are confiscated and destroyed. Depending on the situation, the products may be recalled, and a warning is issued to the population.

Results of the investigation

The industry takes responsibility for the monitoring for poultry meat in a system of self-auditing. Results of the Salmonella monitoring of the largest poultry producers and abattoirs are available covering more than 90% of the production. Samples are taken several times a year at random. Fresh poultry meat, poultry meat preparations and poultry meat products were tested at different stages such as slaughterhouse, cutting plant and processing plant (see poultry meat table). In 2011 2405 tests were done (including 60% single samples; excluding imported meat) of which 0,7% proved positive for Salmonella spp. (7x S. Typhimurium, 1x S. Enteritidis, 1x S. enterica subsp. enterica 4,12:i:- (monophasic strain) and 7x Salmonella spp. not identified).

B. Salmonella spp. in turkey meat and products thereof

Preventive measures in place

The Hygiene Ordinance lays down limits for Salmonella in various foods. If these limits are exceeded, the cantonal laboratories are required to report this to the FOPH. The foods affected are confiscated and destroyed. Depending on the situation, the products may be recalled, and a warning is issued to the population.

Results of the investigation

The industry takes responsibility for the monitoring for poultry meat in a system of self-auditing. Results of the Salmonella monitoring of the largest poultry producers and abattoirs are available covering more than 90% of the production. Samples are taken several times a year at random. In 2011 119 samples of fresh turkey meat, turkey meat preparations and turkey meat products (excluding imported meat) were tested at different stages such as slaughterhouse, cutting plant and processing plant (see poultry meat table). All samples were tested Salmonella negative.

C. Salmonella spp., unspecified in Food All foodstuffs - at border control - Monitoring

Monitoring system

Sampling strategy

The FVO runs a border inspection programme in which risked-based random samples are taken from commodities imported from third countries. As commodities from third countries can only be inspected at the airports and because this mode of importation is quite expensive not many samples can be tested.

Results of the investigation

In 2011 53 raw fish samples from Vietnam, Ghana, Uganda, Senegal and Morocco as well as 20 beef meat samples from Brazil, Chile and Argentina were tested Salmonella negative.

D. Salmonella spp. in food - Cheeses made from cows' milk - soft and semi-soft - at processing plant - Monitoring - official sampling - objective sampling

Preventive measures in place

It is the responsibility of the producers to implement a hygiene concept that guarantees the safety of their products. The Hygiene Ordinance lays down limits for Salmonella in various foods. If these limits are exceeded, the cantonal laboratories are required to report this to the FOPH. The foods affected are confiscated and destroyed. Depending on the situation, the products may be recalled, and a warning is issued to the population. All the larger cheese manufacturers have a hygiene management system in place that conforms to ISO 9000.

Table Salmonella in poultry meat and products thereof

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium
Meat from broilers (Gallus gallus) - fresh - at cutting plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	10g/25g	250	1		
Meat from broilers (Gallus gallus) - fresh - at cutting plant - imported - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	25g	238	96		
Meat from broilers (Gallus gallus) - fresh - at processing plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	25g/125g	234	1		
Meat from broilers (Gallus gallus) - fresh - at processing plant - imported - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	10g/25g	281	29		1
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	10g/25g	238	0		
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Batch	10g/25g	412	9	1	4
Meat from broilers (Gallus gallus) - meat preparation - at processing plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Batch	10g/25g	317	0		
Meat from broilers (Gallus gallus) - meat preparation - at processing plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	25g/125g	218	2		1
Meat from broilers (Gallus gallus) - meat preparation - at processing plant - imported - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	25g	207	3		

Table Salmonella in poultry meat and products thereof

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium
Meat from broilers (Gallus gallus) - meat products - cooked, ready-to-eat - at processing plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	125g	1	0		
Meat from broilers (Gallus gallus) - mechanically separated meat (MSM) - at cutting plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Batch	10g/25g	34	0		
Meat from broilers (Gallus gallus) - mechanically separated meat (MSM) - at cutting plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	25g	260	2		2
Meat from broilers (Gallus gallus) - minced meat - at cutting plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Batch	10g/25g	195	0		
Meat from broilers (Gallus gallus) - minced meat - at processing plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	25g/125g	245	1		
Meat from turkey - fresh - at cutting plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	25g	46	0		
Meat from turkey - fresh - at cutting plant - imported - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	25g	114	0		
Meat from turkey - fresh - at processing plant - imported - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	10g/25g	147	4		
Meat from turkey - fresh - at slaughterhouse - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	25g	13	0		
Meat from turkey - fresh - at slaughterhouse - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Batch	10g	25	0		

Table Salmonella in poultry meat and products thereof

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium
Meat from turkey - meat preparation - at processing plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Batch	25g	1	0		
Meat from turkey - meat preparation - at processing plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	25g	10	0		
Meat from turkey - mechanically separated meat (MSM) - at cutting plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Batch	10g	24	0		

	Salmonella spp., unspecified
Meat from broilers (Gallus gallus) - fresh - at cutting plant - Surveillance (HACCP and own checks)	1
Meat from broilers (Gallus gallus) - fresh - at cutting plant - imported - Surveillance (HACCP and own checks)	96
Meat from broilers (Gallus gallus) - fresh - at processing plant - Surveillance (HACCP and own checks)	1
Meat from broilers (Gallus gallus) - fresh - at processing plant - imported - Surveillance (HACCP and own checks)	28

Table Salmonella in poultry meat and products thereof

	Salmonella spp., unspecified
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Surveillance (HACCP and own checks)	
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Surveillance (HACCP and own checks)	4
Meat from broilers (Gallus gallus) - meat preparation - at processing plant - Surveillance (HACCP and own checks)	
Meat from broilers (Gallus gallus) - meat preparation - at processing plant - Surveillance (HACCP and own checks)	1
Meat from broilers (Gallus gallus) - meat preparation - at processing plant - imported - Surveillance (HACCP and own checks)	3
Meat from broilers (Gallus gallus) - meat products - cooked, ready-to-eat - at processing plant - Surveillance (HACCP and own checks)	
Meat from broilers (Gallus gallus) - mechanically separated meat (MSM) - at cutting plant - Surveillance (HACCP and own checks)	
Meat from broilers (Gallus gallus) - mechanically separated meat (MSM) - at cutting plant - Surveillance (HACCP and own checks)	
Meat from broilers (Gallus gallus) - minced meat - at cutting plant - Surveillance (HACCP and own checks)	

Table Salmonella in poultry meat and products thereof

	Salmonella spp., unspecified
Meat from broilers (Gallus gallus) - minced meat - at processing plant - Surveillance (HACCP and own checks)	1
Meat from turkey - fresh - at cutting plant - Surveillance (HACCP and own checks)	
Meat from turkey - fresh - at cutting plant - imported - Surveillance (HACCP and own checks)	
Meat from turkey - fresh - at processing plant - imported - Surveillance (HACCP and own checks)	4
Meat from turkey - fresh - at slaughterhouse - Surveillance (HACCP and own checks)	
Meat from turkey - fresh - at slaughterhouse - Surveillance (HACCP and own checks)	
Meat from turkey - meat preparation - at processing plant - Surveillance (HACCP and own checks)	
Meat from turkey - meat preparation - at processing plant - Surveillance (HACCP and own checks)	
Meat from turkey - mechanically separated meat (MSM) - at cutting plant - Surveillance (HACCP and own checks)	

Table Salmonella in other food

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Fish - at border control - Monitoring (food imported from third countries) [1)]	FVO	Selective sampling	Official sampling	food sample		Single	25g	53	0			
Meat from bovine animals - at border control - Monitoring (food imported from third countries) [2)]	FVO	Selective sampling	Official sampling	food sample		Single	25g	20	0			

Comments:

[1)] fish from Vietnam, Uganda, Senegal and Morocco

[2)] beef meat from Brazil, Chile and Argentina

Footnote:

The FVO runs a border inspection programme in which risked-based random samples are taken from commodities imported from third countries. As commodities from third countries can only be inspected at the airports and because this mode of importation is quite expensive not many samples can be tested.

2.1.4 Salmonella in animals

A. Salmonella spp. in Gallus Gallus - breeding flocks

Vaccination policy

Breeding flocks (separate elite, grand parent and parent flocks when necessary)

Vaccination is prohibited.

Control program/mechanisms

The control program/strategies in place

Breeding flocks (separate elite, grand parent and parent flocks when necessary)

Control measures according to the Swiss ordinance of epizootics (TSV, Article 255-261) and Commission Regulation (EC) No. 1003/2005. Since 1 January 2007, the control programme covers breeding holdings with more than 250 places. The samples of poultry breeding flocks that were obtained from one-day chicks, in the rearing or the production phase, contained materials such as shell residues, meconium, empty chick eggs, dead chicks, basket lining or environmental samples (cumulative samples of faeces, drag swabs, boot swabs, dust). They are taken six times under official supervision: three times during the rearing phase (at ages 1–3 days, 4–5 weeks, 15 –20 weeks, and two weeks before being moved to the laying house) as well as three times during the laying phase (beginning, middle and end). Salmonella serotypes S. Enteritidis, S. Typhimurium, S. Hadar, S. Infantis and S. Virchow are subject to state control measures.

Measures in case of the positive findings or single cases

Breeding flocks (separate elite, grand parent and parent flocks when necessary)

If Salmonella serotypes subject to control measures are detected in the environment, there is a suspicion of Salmonella infection. In the event of a suspected infection, the official veterinarian samples further test material as soon as possible (20 killed animals or fallen stock per flock) and submits the meat and organs to bacteriological testing for Salmonella. If testing reveals Salmonella serotypes whose control is of significance to public health, a Salmonella infection covered in the control programme does exist.
In the event of a definitive positive finding, a simple first-degree quarantine is imposed on the flock (Article 69 TSV): To prevent the disease from spreading, animal movements are prohibited. All direct contacts between birds that are subject to the quarantine and birds from other flocks is forbidden. The quarantined flocks must not be changed either by moving animals to other flocks or by introducing animals from other flocks. In breeding flocks the animals are killed and the eggs are no longer allowed to be used for fertilisation purposes. The quarantine conditions are lifted when all animals have been killed and the premises cleaned, disinfected and the freedom from Salmonella of the premises checked by official sampling after disinfection by means of bacteriological testing.

Notification system in place

The Swiss ordinance of epizootics covers Salmonella infection in poultry (TSV, Article 255-261) as notifiable animal disease.

Results of the investigation

In the control programme none of the tested breeding flocks were positive for salmonella. There was one suspect case in breeding flocks for S. Enteritidis which was not confirmed.

National evaluation of the recent situation, the trends and sources of infection

Since many years tested breeding flocks were always negative for Salmonella. The target of the control programme could be reached.

Additional information

Further information can be found on the FVO website www.bvet.admin.ch.

B. Salmonella spp. in Gallus Gallus - broiler flocks

Monitoring system

Sampling strategy

Broiler flocks

Flocks with at least 5’000 broiler places are being monitored since January 1st 2009.

Vaccination policy

Broiler flocks

Vaccination is prohibited.

Control program/mechanisms

The control program/strategies in place

Broiler flocks

Control measures in broiler flocks according to the Swiss ordinance of epizootics (TSV, Article 255-261) and Commission Regulation (EC) No. 646/2007 were implemented and are in force since 01.01.2009. The national control programme covers broiler flocks on farms with at least 5000 places. In broiler flocks, the samples are taken from drag swabs or boot swabs shortly before slaughter. The flocks are tested three weeks at the earliest before slaughter. An official sample is taken from a flock on 10 % of farms; in all other flocks testing is commissioned by the animal owner. Salmonella serotypes S. Enteritidis and S. Typhimurium are subject to state control measures.

Measures in case of the positive findings or single cases

Broiler flocks: Before slaughter at farm

If Salmonella serotypes subject to control measures are detected in the environment, there is a suspicion of Salmonella infection. In the event of a suspected infection, the official veterinarian samples further test material as soon as possible (20 killed animals or fallen stock per flock) and submits the meat and organs to bacteriological testing for Salmonella. If testing reveals Salmonella serotypes whose control is of significance to public health, a Salmonella infection covered in the control programme does exist.
In the event of a definitive positive finding, a simple first-degree quarantine is imposed on the flock (Article 69 TSV): To prevent the disease from spreading, animal movements are prohibited. All direct contacts between birds that are subject to the quarantine and birds from other flocks is forbidden. The quarantined flocks must not be changed either by moving animals to other flocks or by introducing animals from other flocks. The infected flocks must be slaughtered or culled. In broiler and laying flocks the fresh meat and eggs either have to be disposed of or subjected to treatment in order to destroy the Salmonella before being marketed as food. The quarantine conditions are lifted when all animals have been killed and the premises cleaned, disinfected and the freedom from Salmonella of the premises checked by official sampling after disinfection by means of bacteriological testing.

Notification system in place

Notifiable disease in animals according to Swiss ordinance of epizootics (TSV, Art. 5).

Results of the investigation

In the framework of the national control programme, 5 flocks were tested positive for Salmonella (1x S. Enteritidis, 1x S. Jerusalem, 1x S. Yoruba, 1x S. Bredeney, 1x S. Indiana). Thus, there was one positive broiler flock covered by the target of the control programme.

National evaluation of the recent situation, the trends and sources of infection

The target of the control programme could be reached. The baseline study conducted in broiler flocks in 2007 showed, that Salmonella prevalence in broilers in Switzerland is low (0.3%). Switzerland wants to maintain the current situation by applying the afore-mentioned control measures.

Additional information

Further information can be found on the FVO website www.bvet.admin.ch.

C. Salmonella spp. in Gallus Gallus - flocks of laying hens

Vaccination policy

Laying hens flocks

Vaccination is prohibited.

Control program/mechanisms

The control program/strategies in place

Laying hens flocks

Control measures according to the Swiss ordinance of epizootics (TSV, Article 255-261) and Commission Regulation (EC) No. 1168/2006. The control programme covers all flocks of laying hens on farms with at least 1000 places. Samples from laying hens may contain eggs, blood or environmental samples and are taken during the rearing and production phase: twice under official supervision (aged 15 –20 weeks (the latest two weeks before being moved to the laying house) as well as nine weeks at the earliest before slaughter). S. Enteritidis and S. Typhimurium are subject to state control measures.

Measures in case of the positive findings or single cases

Laying hens flocks

If Salmonella serotypes subject to control measures are detected in the environment, there is a suspicion of Salmonella infection. In the event of a suspected infection, the official veterinarian samples further test material as soon as possible (20 killed animals or fallen stock per flock) and submits the meat and organs to bacteriological testing for Salmonella. If testing reveals Salmonella serotypes whose control is of significance to public health, a Salmonella infection covered in the control programme does exist.
In the event of a definitive positive finding, a simple first-degree quarantine is imposed on the flock (Article 69 TSV): To prevent the disease from spreading, animal movements are prohibited. All direct contacts between birds that are subject to the quarantine and birds from other flocks is forbidden. The quarantined flocks must not be changed either by moving animals to other flocks or by introducing animals from other flocks. The infected flocks must be slaughtered or culled. In broiler and laying flocks the fresh meat and eggs either have to be disposed of or subjected to treatment in order to destroy the Salmonella before being marketed as food. The quarantine conditions are lifted when all animals have been killed and the premises cleaned, disinfected and the freedom from Salmonella of the premises checked by official sampling after disinfection by means of bacteriological testing.

Notification system in place

The Swiss ordinance of epizootics covers Salmonella infection in poultry (TSV, Article 255-261) as notifiable animal disease.

Results of the investigation

In the framework of the national control programme, 2 laying hen flocks were tested positive for Salmonella (1x S. Typhimurium, 1x S. Tennessee) in 2011. Thus, there was one flock positive for a serovar covered by the target. In addition, there was one suspect case in laying hens for S. Enteritidis which was not confirmed.

National evaluation of the recent situation, the trends and sources of infection

The target of the control programme could be reached. The prevalence of Salmonella spp. in flocks of laying hens in Switzerland in the recent years is low. This was approved by the baseline study on the prevalence of Salmonella in laying flocks of Gallus Gallus in 2006 where Salmonella prevalence was 1,3%.

Apart from the flocks tested in the framework of the control programme, one laying hen flock, which had less than 1000 places, was tested S. Enteritidis positive in 2011. Since many years not more than 3 cases of Salmonella infection in laying hens per year are reported.

Additional information

Further information can be found on the FVO website www.bvet.admin.ch.

D. Salmonella spp. in turkey - breeding flocks and meat production flocks

Control program/mechanisms

The control program/strategies in place

Breeding flocks (separate elite, grand parent and parent flocks when necessary)

Control measures according to the Swiss ordinance of epizootics (TSV, Article 255-261) and Commission Regulation (EC) No. 584/2008. The control programme covers all flocks of turkeys on farms with at least 500 places. Samples from turkeys contain environmental samples and are taken 3 to 6 weeks before slaughter. S. Enteritidis and S. Typhimurium are subject to state control measures.

Measures in case of the positive findings or single cases

If Salmonella serotypes subject to control measures are detected in the environment, there is a suspicion of Salmonella infection. In the event of a suspected infection, the official veterinarian samples further test material as soon as possible (20 killed animals or fallen stock per flock) and submits the meat and organs to bacteriological testing for Salmonella. If testing reveals Salmonella serotypes whose control is of significance to public health, a Salmonella infection covered in the control programme does exist.
In the event of a definitive positive finding, a simple first-degree quarantine is imposed on the flock (Article 69 TSV): To prevent the disease from spreading, animal movements are prohibited. All direct contacts between birds that are subject to the quarantine and birds from other flocks are forbidden. The quarantined flocks must not be changed either by moving animals to other flocks or by introducing animals from other flocks. The infected flocks must be slaughtered or culled. Flocks positive for S. Enteritidis or S. Typhimurium have to be culled or, if slaughtered, the fresh meat must be subjected to treatment in order to destroy the Salmonella before being marketed as food. The quarantine conditions are lifted when all animals have been killed and the premises cleaned, disinfected and the freedom from Salmonella of the premises checked by official sampling after disinfection by means of bacteriological testing.

Notification system in place

The Swiss ordinance of epizootics covers Salmonella infection in poultry (TSV, Article 255-261) as notifiable animal disease.

Results of the investigation

In the framework of the national control programme, one flock of turkeys was tested positive for Salmonella (1x S. Indiana) in 2011. Thus, there was no positive flock for a serovar covered by the target.

National evaluation of the recent situation, the trends and sources of infection

The target of the control programme could be reached. Prevalence data in turkeys in the framework of a baseline study do not exist. As there are not many turkey flocks and Salmonella has not appeared to be a specific problem in turkeys in Switzerland, the baseline study on the prevalence of Salmonella in turkey flocks was not conducted.

Additional information

Further information can be found on the FVO website www.bvet.admin.ch.

E. Salmonella in Animals All animals

Control program/mechanisms

The control program/strategies in place

Animal keepers, livestock inspectors, AI technicians, animal health advisory services, meat inspectors, abattoir personnel, police and customs officers are under an obligation to report any suspected case of salmonellosis in animals to a veterinarian. If Salmonella are confirmed in a suspected case by a diagnostic laboratory, this must be reported to the cantonal veterinarian who is responsible for the livestock.

Measures in case of the positive findings or single cases

If biungulates are affected, the sick animals must be isolated and the whole herd and the environment must be tested. Only healthy animals from this herd (even if they might be excreting Salmonellae) may be slaughtered, but then only with a special official permit and subject to appropriate precautions at the abattoir. If salmonellosis is detected in cows, goats or dairy sheep, the cantonal veterinarian must inform the cantonal health and food safety authorities. Milk from animals that are excreting Salmonella must not be used for human consumption and may only be used as animal feed after pasteurisation or boiling. If the disease occurs in animals other than biungulates, appropriate action must likewise be taken to prevent any risk to humans.

Notification system in place

Salmonellosis in animals is a notifiable diseases and classified as animal diseases to be controlled (Swiss ordinance of epizootics (TSV), Article 222-227).

Results of the investigation

In the past 10 years (2002-2011) 713 salmonellosis cases were recorded to the FVO by cantonal veterinarians ranging between 55 and 83 cases per year since 2007. Almost half of them (45%) occurred in livestock (mainly cows), one quarter in reptiles and 18% in dogs/cats.
In 2011, 55 cases of Salmonellosis were reported to the FVO by cantonal veterinarians (18 in cattle, 22 in reptiles, 8 in dogs and cats, 3 in sheep, 1 in domestic birds, 1 in horses, 1 in poultry and 1 in other zoo animals).
In veterinary diagnostic laboratories 5223 tests for salmonellosis were carried out in the context of clinical investigations, mainly in cattle (35%), dogs (23%), cats (16%), birds (7%), horses (5%) and pigs (4%) (see table). Only antigen testing was included.

National evaluation of the recent situation, the trends and sources of infection

Salmonellosis cases in animals are frequently reported.

Table Salmonella in breeding flocks of Gallus gallus

	No of flocks under control programme	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Target Verification	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis
Gallus gallus (fowl) - breeding flocks for broiler production line - adult - at farm - Control and eradication programmes	51	cantons	Census	Official sampling	animal sample		no	Flock	35	0	
Gallus gallus (fowl) - breeding flocks for broiler production line - adult - at farm - Control and eradication programmes	51	cantons	Suspect sampling	Official sampling	animal sample		no	Flock	1	0	
Gallus gallus (fowl) - breeding flocks for broiler production line - adult - at farm - Control and eradication programmes	51	cantons	Census	Official and industry sampling	animal sample		yes	Flock	46	0	
Gallus gallus (fowl) - breeding flocks for broiler production line - adult - at farm - Control and eradication programmes	51	cantons	Census	HACCP and owns check	animal sample		no	Flock	37	0	
Gallus gallus (fowl) - breeding flocks for broiler production line - day-old chicks - at farm - Control and eradication programmes	51	cantons	Census	Official sampling	animal sample		no	Flock	33	0	
Gallus gallus (fowl) - breeding flocks for broiler production line - during rearing period - at farm - Control and eradication programmes	51	cantons	Census	Official sampling	animal sample		no	Flock	41	0	
Gallus gallus (fowl) - breeding flocks for egg production line - adult - at farm - Control and eradication programmes	111	cantons	Census	Official and industry sampling	animal sample		yes	Flock	36	0	
Gallus gallus (fowl) - breeding flocks for egg production line - adult - at farm - Control and eradication programmes	111	cantons	Census	Official sampling	animal sample		no	Flock	8	0	
Gallus gallus (fowl) - breeding flocks for egg production line - adult - at farm - Control and eradication programmes	111	cantons	Census	HACCP and owns check	animal sample		no	Flock	33	0	

Table Salmonella in breeding flocks of Gallus gallus

	No of flocks under control programme	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Target Verification	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis
Gallus gallus (fowl) - breeding flocks for egg production line - day-old chicks - at farm - Control and eradication programmes	111	cantons	Census	Official sampling	animal sample		no	Flock	11	0	
Gallus gallus (fowl) - breeding flocks for egg production line - during rearing period - at farm - Control and eradication programmes	111	cantons	Census	Official sampling	animal sample		no	Flock	11	0	

	S. Hadar	S. Infantis	S. Typhimurium	S. Virchow	S. 1,4,[5],12:i:-	Salmonella spp., unspecified
Gallus gallus (fowl) - breeding flocks for broiler production line - adult - at farm - Control and eradication programmes						
Gallus gallus (fowl) - breeding flocks for broiler production line - adult - at farm - Control and eradication programmes						
Gallus gallus (fowl) - breeding flocks for broiler production line - adult - at farm - Control and eradication programmes						
Gallus gallus (fowl) - breeding flocks for broiler production line - adult - at farm - Control and eradication programmes						
Gallus gallus (fowl) - breeding flocks for broiler production line - day-old chicks - at farm - Control and eradication programmes						

Table Salmonella in breeding flocks of Gallus gallus

	S. Hadar	S. Infantis	S. Typhimurium	S. Virchow	S. 1,4,[5],12:i:-	Salmonella spp., unspecified
Gallus gallus (fowl) - breeding flocks for broiler production line - during rearing period - at farm - Control and eradication programmes						
Gallus gallus (fowl) - breeding flocks for egg production line - adult - at farm - Control and eradication programmes						
Gallus gallus (fowl) - breeding flocks for egg production line - adult - at farm - Control and eradication programmes						
Gallus gallus (fowl) - breeding flocks for egg production line - adult - at farm - Control and eradication programmes						
Gallus gallus (fowl) - breeding flocks for egg production line - day-old chicks - at farm - Control and eradication programmes						
Gallus gallus (fowl) - breeding flocks for egg production line - during rearing period - at farm - Control and eradication programmes						

Table Salmonella in other animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	S. 1,4,[5],12:i:-
Alpacas - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	11	0			
Birds - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	346	28			
Buffalos - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	1	0			
Camels - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	5	0			
Cats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	830	6			
Cattle (bovine animals) - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	1828	156			
Deer - farmed - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	3	0			
Dogs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	1212	15			
Fur animals - farmed - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	11	0			
Goats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	70	0			
Other animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	322	76			
Pigs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	226	4			
Rabbits - farmed - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	31	0			
Sheep - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	70	8			
Solipeds, domestic - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	252	2			
Wild animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	5	0			

Table Salmonella in other animals

	Salmonella spp., unspecified
Alpacas - Clinical investigations	0
Birds - Clinical investigations	28
Buffalos - Clinical investigations	0
Camels - Clinical investigations	0
Cats - Clinical investigations	6
Cattle (bovine animals) - Clinical investigations	156
Deer - farmed - Clinical investigations	0
Dogs - Clinical investigations	15
Fur animals - farmed - Clinical investigations	0
Goats - Clinical investigations	0
Other animals - Clinical investigations	76
Pigs - Clinical investigations	4
Rabbits - farmed - Clinical investigations	0
Sheep - Clinical investigations	8
Solipeds, domestic - Clinical investigations	2
Wild animals - Clinical investigations	0

Footnote:

All data categorised as “clinical investigations” are summaries of data from the ILD (Informationssystem Labordiagnostik = information system of laboratory data). ILD is run by the FVO and all labs, which are approved for the diagnosis of certain diseases have to report their results in this system. Only tests on antigen detection are selected for the zoonoses reporting in the context of "clinical investigations".

Table Salmonella in other animals

Table Salmonella in other poultry

	No of flocks under control programme	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Target Verification	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes	906	cantons	Census	Official and industry sampling	animal sample		yes	Flock	841	2	1
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes	909	cantons	Census	Official and industry sampling	animal sample		yes	Flock	415	5	1
Turkeys - fattening flocks - before slaughter - at farm - Control and eradication programmes	64	cantons	Census	Official and industry sampling	animal sample		yes	Flock	42	1	
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes	909	cantons	Census	HACCP and owns check	animal sample		no	Flock	363	4	
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes	909	cantons	Census	Official sampling	animal sample		no	Flock	52	1	1
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes	906	cantons	Census	HACCP and owns check	animal sample		no	Flock	729	2	1
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes	906	cantons	Census	Official sampling	animal sample		no	Flock	481	0	
Gallus gallus (fowl) - laying hens - during rearing period - at farm - Control and eradication programmes	906	cantons	Census	Official sampling	animal sample		no	Flock	267	0	
Turkeys - fattening flocks - at farm - Control and eradication programmes	64	cantons	Census	HACCP and owns check	animal sample		no	Flock	39	1	
Turkeys - fattening flocks - at farm - Control and eradication programmes	64	cantons	Census	Official sampling	animal sample		no	Flock	3	0	

Table Salmonella in other poultry

	S. Typhimurium	S. 1,4,[5],12:i:-	Salmonella spp., unspecified	S. Bredeney	S. Indiana	S. Jerusalem	S. Tennessee	S. Yoruba
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes							1	
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes				1	1	1		1
Turkeys - fattening flocks - before slaughter - at farm - Control and eradication programmes					1			
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes				1	1	1		1
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes								
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes							1	
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes								
Gallus gallus (fowl) - laying hens - during rearing period - at farm - Control and eradication programmes								
Turkeys - fattening flocks - at farm - Control and eradication programmes					1			
Turkeys - fattening flocks - at farm - Control and eradication programmes								

2.1.5 Salmonella in feedingstuffs

Table Salmonella in compound feedingstuffs

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium
Compound feedingstuffs for cattle - final product - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample		Single	25g	140	0		
Compound feedingstuffs for pigs - final product - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample		Single	25g	59	0		
Compound feedingstuffs for poultry (non specified) - final product - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample		Single	25g	1	0		
Compound feedingstuffs for poultry - laying hens - final product - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample		Single	25g	42	0		
Compound feedingstuffs for poultry - broilers - final product - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample		Single	25g	31	0		
Compound feedingstuffs for fish	ALP	Unspecified	Official sampling	feed sample		Single	25g	15	0		
Compound feedingstuffs for horses	ALP	Unspecified	Official sampling	feed sample		Single	25g	3	0		
Compound feedingstuffs for rabbits	ALP	Unspecified	Official sampling	feed sample		Single	25g	2	0		

	Salmonella spp., unspecified
Compound feedingstuffs for cattle - final product - at feed mill - Surveillance	

Table Salmonella in compound feedingstuffs

	Salmonella spp., unspecified
Compound feedingstuffs for pigs - final product - at feed mill - Surveillance	
Compound feedingstuffs for poultry (non specified) - final product - at feed mill - Surveillance	
Compound feedingstuffs for poultry - laying hens - final product - at feed mill - Surveillance	
Compound feedingstuffs for poultry - broilers - final product - at feed mill - Surveillance	
Compound feedingstuffs for fish	
Compound feedingstuffs for horses	
Compound feedingstuffs for rabbits	

Footnote:

ALP = Institute Agroscope Liebefeld Posieux, official feed inspection service

Table Salmonella in feed material of animal origin

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Feed material of marine animal origin - fish meal - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample		Single	25g	7	0			

Footnote:

ALP = Institute Agroscope Liebefeld Posieux, official feed inspection service

Table Salmonella in other feed matter

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium
Feed material of cereal grain origin - barley derived - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample		Single	25g	4	0		
Feed material of cereal grain origin - wheat derived - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample		Single	25g	1	0		
Feed material of cereal grain origin - maize derived - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample		Single	25g	13	0		
Feed material of oil seed or fruit origin - rape seed derived - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample		Single	25g	3	0		
Feed material of oil seed or fruit origin - soya (bean) derived - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample		Single	25g	35	0		
Feed material of oil seed or fruit origin - linseed derived - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample		Single	25g	3	0		
Feed material of oil seed or fruit origin - sunflower seed derived - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample		Single	25g	1	0		
Other feed material - other seeds and fruits - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample		Single	25g	2	0		
Other feed material - yeast	ALP	Unspecified	Official sampling	feed sample		Single	25g	2	0		

Table Salmonella in other feed matter

	Salmonella spp., unspecified
Feed material of cereal grain origin - barley derived - at feed mill - Surveillance	
Feed material of cereal grain origin - wheat derived - at feed mill - Surveillance	
Feed material of cereal grain origin - maize derived - at feed mill - Surveillance	
Feed material of oil seed or fruit origin - rape seed derived - at feed mill - Surveillance	
Feed material of oil seed or fruit origin - soya (bean) derived - at feed mill - Surveillance	
Feed material of oil seed or fruit origin - linseed derived - at feed mill - Surveillance	
Feed material of oil seed or fruit origin - sunflower seed derived - at feed mill - Surveillance	
Other feed material - other seeds and fruits - at feed mill - Surveillance	
Other feed material - yeast	

Footnote:

ALP = Institute Agroscope Liebefeld Posieux, official feed inspection service

2.1.6 Antimicrobial resistance in Salmonella isolates

A. Antimicrobial resistance in Salmonella in cattle

Sampling strategy used in monitoring

Frequency of the sampling

Samples were collected from clinical or subclinical material.

Type of specimen taken

Clinical samples

Procedures for the selection of isolates for antimicrobial testing

All Salmonella isolates were submitted to susceptibility testing.

Methods used for collecting data

All samples were analysed in the same laboratory (Centre for Zoonoses, Bacterial Animal Diseases and Antibiotic Resistance, University of Bern, Switzerland).

Laboratory methodology used for identification of the microbial isolates

Samples were cultured and identified using standard microbiological procedures.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

ampicillin, cefotaxime, ceftazidime, chloramphenicol, ciprofloxacin, colistin, florfenicol, gentamicin, kanamycin, nalidixic acid, sulfamethoxazole, streptomycin, trimethoprim, tetracycline

Cut-off values used in testing

Wherever possible the epidemiological cut-off values according to EUCAST were used.

Preventive measures in place

No specific preventive measures for antimicrobial resistance in Salmonella. General preventive measures include education of veterinarians and farmers, disease eradication programmes, incentives for good farming practice and limitation of use of antimicrobials to veterinary prescription.

Results of the investigation

29 Salmonella spp. isolates from cattle were available for susceptibility testing. 24 S. Typhimurium (5 of them S. 4,12:i.-), 3 S. Ohio and 2 S. Infantis were available.   High prevalences of resistance to ampicillin, streptomycin, sulfamethoxazol, tetracycline and trimethoprim were found in S. Typhimurium isolates from cattle (22 - 39%).

National evaluation of the recent situation, the trends and sources of infection

Resistance was most frequently observed against antimicrobials that have been used in food animals for many years. No resistances against third-generation cephalosporins were found.

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

Salmonella prevalence in healthy animals in Switzerland is very low, therefore Salmonella isolates from clinical material are used for Monitoring.

Additional information

Further information can be found in the annual report on the sale of antibiotics for veterinary use and antibiotic resistance monitoring of livestock in Switzerland (Arch-Vet 2011) on the FVO website www.bvet.admin.ch

B. Antimicrobial resistance in Salmonella in pigs

Sampling strategy used in monitoring

Frequency of the sampling

Samples were collected from clinical or subclinical material.

Type of specimen taken

Clinical samples

Procedures for the selection of isolates for antimicrobial testing

All Salmonella isolates were submitted to susceptibility testing.

Methods used for collecting data

All samples were analysed in the same laboratory (Centre for Zoonoses, Bacterial Animal Diseases and Antibiotic Resistance, University of Bern, Switzerland).

Laboratory methodology used for identification of the microbial isolates

Samples were cultured and identified using standard microbiological procedures.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

ampicillin, cefotaxime, ceftazidime, chloramphenicol, ciprofloxacin, colistin, florfenicol, gentamicin, kanamycin, nalidixic acid, sulfamethoxazole, streptomycin, trimethoprim, tetracycline

Cut-off values used in testing

Wherever possible the epidemiological cut-off values according to EUCAST were used.

Preventive measures in place

No specific preventive measures for antimicrobial resistance in Salmonella. General preventive measures include education of veterinarians and farmers, disease eradication programmes, incentives for good farming practice and limitation of use of antimicrobials to veterinary prescription.

Results of the investigation

2 Salmonella Typhimurium isolates from pigs were available for susceptibility testing. No resistance against the tested antimicrobials was found.

Additional information

Further information can be found in the annual report on the sale of antibiotics for veterinary use and antibiotic resistance monitoring of livestock in Switzerland (Arch-Vet 2011) on the FVO website www.bvet.admin.ch

C. Antimicrobial resistance of Salmonella spp. in Animals Birds - unspecified - Clinical investigations

Sampling strategy used in monitoring

Frequency of the sampling

Samples were collected from clinical or subclinical material.

Type of specimen taken

Clinical samples

Procedures for the selection of isolates for antimicrobial testing

All Salmonella isolates were submitted to susceptibility testing.

Methods used for collecting data

All samples were analysed in the same laboratory (Centre for Zoonoses, Bacterial Animal Diseases and Antibiotic Resistance, University of Bern, Switzerland).

Laboratory methodology used for identification of the microbial isolates

Samples were cultured and identified using standard microbiological procedures.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

ampicillin, cefotaxime, ceftazidime, chloramphenicol, ciprofloxacin, colistin, florfenicol, gentamicin, kanamycin, nalidixic acid, sulfamethoxazole, streptomycin, trimethoprim, tetracycline

Cut-off values used in testing

Wherever possible the epidemiological cut-off values according to EUCAST were used.

Preventive measures in place

No specific preventive measures for antimicrobial resistance in Salmonella. General preventive measures include education of veterinarians and farmers, disease eradication programmes, incentives for good farming practice and limitation of use of antimicrobials to veterinary prescription.

Results of the investigation

21 Salmonella spp. isolates from birds were available for susceptibility testing. 5 S. Typhimurium , 8 S. Enteritidis, 2. S. Indiana, 1 S. Tenessee, 1 S. Gallinarum, 1 S. Jerusalem, 1 S. Virchow, 1 S. Wien and 1 S. Yoruba. Moderate to high prevalences of resistance to ampicillin, streptomycin, sulfamethoxazol, tetracycline and trimethoprim were found in Salmonella spp. isolates from birds (14 - 24%). One isolate (S. Indiana) was resistant against third-generation cephalosporins and therefore is suspected to be an ESBL producer.

National evaluation of the recent situation, the trends and sources of infection

Resistance was most frequently observed against antimicrobials that have been used in food animals for many years. Resistance against newer antimicrobials more critical for human health (fluoroquinolones, cephalosporines) was rare.

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

Salmonella prevalence in healthy animals in Switzerland is very low, therefore Salmonella isolates from clinical material are used for Monitoring.

Additional information

Further information can be found in the annual report on the sale of antibiotics for veterinary use and antibiotic resistance monitoring of livestock in Switzerland (Arch-Vet 2011) on the FVO website www.

bvet.admin.ch

Table Antimicrobial susceptibility testing of S. Durban in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Durban	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0										1													
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0															1								
Amphenicols - Chloramphenicol	16	1	0														1									
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0										1													
Fluoroquinolones - Ciprofloxacin	0.06	1	0						1																	
Penicillins - Ampicillin	8	1	0													1										
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0										1													
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																			1				

Table Antimicrobial susceptibility testing of S. Durban in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Durban	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Enteritidis in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Enteritidis	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	3	0									1	2													
Aminoglycosides - Kanamycin	8	3	0													3										
Aminoglycosides - Streptomycin	16	3	0												1	1	1									
Amphenicols - Chloramphenicol	16	3	0													2	1									
Amphenicols - Florfenicol	16	3	0													2	1									
Cephalosporins - Cefotaxime	0.5	3	0							1		2														
Fluoroquinolones - Ciprofloxacin	0.06	3	0						3																	
Penicillins - Ampicillin	8	3	0												3											
Quinolones - Nalidixic acid	16	3	0													3										
Tetracyclines - Tetracycline	8	3	0												3											
Trimethoprim	2	3	0										3													
Cephalosporins - Ceftazidim	2	3	0									3														
Polymyxins - Colistin	2	3	0												3											
Sulfonamides - Sulfamethoxazol	256	3	0																	3						

Table Antimicrobial susceptibility testing of S. Enteritidis in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Enteritidis	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Lome in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Lome	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0									1														
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0													1										
Amphenicols - Chloramphenicol	16	1	0													1										
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0							1																
Fluoroquinolones - Ciprofloxacin	0.06	1	0			1																				
Penicillins - Ampicillin	8	1	0											1												
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0											1												
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																	1						

Table Antimicrobial susceptibility testing of S. Lome in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Lome	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Jerusalem in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Jerusalem	Birds - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0									1														
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0														1									
Amphenicols - Chloramphenicol	16	1	0													1										
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0							1																
Fluoroquinolones - Ciprofloxacin	0.06	1	0				1																			
Penicillins - Ampicillin	8	1	0											1												
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																		128 → 1					

Table Antimicrobial susceptibility testing of S. Jerusalem in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Jerusalem	Birds - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Bredeney in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Bredeney	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	1																1							
Aminoglycosides - Kanamycin	8	1	1																1							
Aminoglycosides - Streptomycin	16	1	1																		1					
Amphenicols - Chloramphenicol	16	1	1																	1						
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	1													1										
Fluoroquinolones - Ciprofloxacin	0.06	1	1											1												
Penicillins - Ampicillin	8	1	1																1							
Quinolones - Nalidixic acid	16	1	0															1								
Tetracyclines - Tetracycline	8	1	1																1							
Trimethoprim	2	1	1																1							
Cephalosporins - Ceftazidim	2	1	1															1								
Polymyxins - Colistin	2	1	1													1										
Sulfonamides - Sulfamethoxazol	256	1	1																						1	

Table Antimicrobial susceptibility testing of S. Bredeney in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

S. Bredeney	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. enterica subsp. arizonae in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. enterica subsp. arizonae	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0									1														
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0													1										
Amphenicols - Chloramphenicol	16	1	0													1										
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0							1																
Fluoroquinolones - Ciprofloxacin	0.06	1	0				1																			
Penicillins - Ampicillin	8	1	0											1												
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																	1						

Table Antimicrobial susceptibility testing of S. enterica subsp. arizonae in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. enterica subsp. arizonae	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. enterica subsp. diarizonae in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. enterica subsp. diarizonae	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	4	0									3		1												
Aminoglycosides - Kanamycin	8	4	0													4										
Aminoglycosides - Streptomycin	16	4	1														1	2	1							
Amphenicols - Chloramphenicol	16	4	0												2	1	1									
Amphenicols - Florfenicol	16	4	0												2	1	1									
Cephalosporins - Cefotaxime	0.5	4	0							3	1															
Fluoroquinolones - Ciprofloxacin	0.06	4	0			2	1		1																	
Penicillins - Ampicillin	8	4	0										1	2		1										
Quinolones - Nalidixic acid	16	4	0													4										
Tetracyclines - Tetracycline	8	4	2											1	1					2						
Trimethoprim	2	4	0										4													
Cephalosporins - Ceftazidim	2	4	0									4														
Polymyxins - Colistin	2	4	0												4											
Sulfonamides - Sulfamethoxazol	256	4	0														1		1		2					

Table Antimicrobial susceptibility testing of S. enterica subsp. diarizonae in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

S. enterica subsp. diarizonae	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. enterica subsp. salamae in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. enterica subsp. salamae	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0									1														
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0													1										
Amphenicols - Chloramphenicol	16	1	0														1									
Amphenicols - Florfenicol	16	1	0														1									
Cephalosporins - Cefotaxime	0.5	1	0								1															
Fluoroquinolones - Ciprofloxacin	0.06	1	0						1																	
Penicillins - Ampicillin	8	1	0												1											
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0										1													
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																	1						

Table Antimicrobial susceptibility testing of S. enterica subsp. salamae in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. enterica subsp. salamae	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Wien in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Wien	Birds - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0											1												
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0															1								
Amphenicols - Chloramphenicol	16	1	0														1									
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0							1																
Fluoroquinolones - Ciprofloxacin	0.06	1	0						1																	
Penicillins - Ampicillin	8	1	0											1												
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																1							

Table Antimicrobial susceptibility testing of S. Wien in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Wien	Birds - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Montevideo in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Montevideo	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0										1													
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0														1									
Amphenicols - Chloramphenicol	16	1	0														1									
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0							1																
Fluoroquinolones - Ciprofloxacin	0.06	1	0				1																			
Penicillins - Ampicillin	8	1	0											1												
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																		1					

Table Antimicrobial susceptibility testing of S. Montevideo in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

S. Montevideo	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Typhimurium in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Typhimurium	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0									1														
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0														1									
Amphenicols - Chloramphenicol	16	1	0														1									
Amphenicols - Florfenicol	16	1	0														1									
Cephalosporins - Cefotaxime	0.5	1	0							1																
Fluoroquinolones - Ciprofloxacin	0.06	1	0						1																	
Penicillins - Ampicillin	8	1	0												1											
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0													1										
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																1							

Table Antimicrobial susceptibility testing of S. Typhimurium in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Typhimurium	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Typhimurium in Solipeds, domestic - horses - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Typhimurium	Solipeds, domestic - horses - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0									1														
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0															1								
Amphenicols - Chloramphenicol	16	1	0														1									
Amphenicols - Florfenicol	16	1	0														1									
Cephalosporins - Cefotaxime	0.5	1	0								1															
Fluoroquinolones - Ciprofloxacin	0.06	1	0						1																	
Penicillins - Ampicillin	8	1	0											1												
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																	1						

Table Antimicrobial susceptibility testing of S. Typhimurium in Solipeds, domestic - horses - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

S. Typhimurium	Solipeds, domestic - horses - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Typhimurium, monophasic in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Typhimurium, monophasic	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0									1														
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	1																		1					
Amphenicols - Chloramphenicol	16	1	0														1									
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0							1																
Fluoroquinolones - Ciprofloxacin	0.06	1	0						1																	
Penicillins - Ampicillin	8	1	1																1							
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	1																	1						
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	1																						1	

Table Antimicrobial susceptibility testing of S. Typhimurium, monophasic in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

S. Typhimurium, monophasic	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Gallinarum in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Gallinarum	Birds - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0									1														
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	1																1							
Amphenicols - Chloramphenicol	16	1	0													1										
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0							1																
Fluoroquinolones - Ciprofloxacin	0.06	1	0						1																	
Penicillins - Ampicillin	8	1	0											1												
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	1													1										
Sulfonamides - Sulfamethoxazol	256	1	0																			1				

Table Antimicrobial susceptibility testing of S. Gallinarum in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Gallinarum	Birds - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. enterica subsp. diarizonae in Sheep - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. enterica subsp. diarizonae	Sheep - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	4	0									4														
Aminoglycosides - Kanamycin	8	4	0													4										
Aminoglycosides - Streptomycin	16	4	0														2	2								
Amphenicols - Chloramphenicol	16	4	0													3	1									
Amphenicols - Florfenicol	16	4	0												3	1										
Cephalosporins - Cefotaxime	0.5	4	0							3	1															
Fluoroquinolones - Ciprofloxacin	0.06	4	0				4																			
Penicillins - Ampicillin	8	4	0										1	3												
Quinolones - Nalidixic acid	16	4	0													4										
Tetracyclines - Tetracycline	8	4	0											2	2											
Trimethoprim	2	4	0										4													
Cephalosporins - Ceftazidim	2	4	0									4														
Polymyxins - Colistin	2	4	0												4											
Sulfonamides - Sulfamethoxazol	256	4	0																4							

Table Antimicrobial susceptibility testing of S. enterica subsp. diarizonae in Sheep - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. enterica subsp. diarizonae	Sheep - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Tennessee in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Tennessee	Birds - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0											1												
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0															1								
Amphenicols - Chloramphenicol	16	1	0														1									
Amphenicols - Florfenicol	16	1	0														1									
Cephalosporins - Cefotaxime	0.5	1	0								1															
Fluoroquinolones - Ciprofloxacin	0.06	1	0				1																			
Penicillins - Ampicillin	8	1	0											1												
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0													1										
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																		1					

Table Antimicrobial susceptibility testing of S. Tennessee in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Tennessee	Birds - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Yoruba in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Yoruba	Birds - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0									1														
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0														1									
Amphenicols - Chloramphenicol	16	1	0														1									
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0								1															
Fluoroquinolones - Ciprofloxacin	0.06	1	0						1																	
Penicillins - Ampicillin	8	1	0											1												
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																		1					

Table Antimicrobial susceptibility testing of S. Yoruba in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Yoruba	Birds - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Ohio in Cattle (bovine animals) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - organ/tissue - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Ohio	Cattle (bovine animals) - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	3	0									3														
Aminoglycosides - Kanamycin	8	3	0													3										
Aminoglycosides - Streptomycin	16	3	0														3									
Amphenicols - Chloramphenicol	16	3	0														3									
Amphenicols - Florfenicol	16	3	0													3										
Cephalosporins - Cefotaxime	0.5	3	0								3															
Fluoroquinolones - Ciprofloxacin	0.06	3	0						3																	
Penicillins - Ampicillin	8	3	0											1	2											
Quinolones - Nalidixic acid	16	3	0													3										
Tetracyclines - Tetracycline	8	3	0												3											
Trimethoprim	2	3	0										3													
Cephalosporins - Ceftazidim	2	3	0									1	2													
Polymyxins - Colistin	2	3	0												3											
Sulfonamides - Sulfamethoxazol	256	3	0																	2	1					

Table Antimicrobial susceptibility testing of S. Ohio in Cattle (bovine animals) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - organ/tissue - quantitative data [Dilution method]

S. Ohio	Cattle (bovine animals) - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Typhimurium in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Typhimurium	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	2	0									1	1													
Aminoglycosides - Kanamycin	8	2	0													2										
Aminoglycosides - Streptomycin	16	2	0														1	1								
Amphenicols - Chloramphenicol	16	2	0														2									
Amphenicols - Florfenicol	16	2	0													1	1									
Cephalosporins - Cefotaxime	0.5	2	0							1	1															
Fluoroquinolones - Ciprofloxacin	0.06	2	0						2																	
Penicillins - Ampicillin	8	2	0											1		1										
Quinolones - Nalidixic acid	16	2	0													2										
Tetracyclines - Tetracycline	8	2	0												2											
Trimethoprim	2	2	0										2													
Cephalosporins - Ceftazidim	2	2	0									1		1												
Polymyxins - Colistin	2	2	0												2											
Sulfonamides - Sulfamethoxazol	256	2	0																	1	1					

Table Antimicrobial susceptibility testing of S. Typhimurium in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

S. Typhimurium	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Typhimurium in Dogs - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Typhimurium	Dogs - pet animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0										1													
Aminoglycosides - Kanamycin	8	1	1																		1					
Aminoglycosides - Streptomycin	16	1	1																1							
Amphenicols - Chloramphenicol	16	1	1																	1						
Amphenicols - Florfenicol	16	1	0															1								
Cephalosporins - Cefotaxime	0.5	1	0							1																
Fluoroquinolones - Ciprofloxacin	0.06	1	1												1											
Penicillins - Ampicillin	8	1	0											1												
Quinolones - Nalidixic acid	16	1	0															1								
Tetracyclines - Tetracycline	8	1	1																	1						
Trimethoprim	2	1	1																1							
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	1																						1	

Table Antimicrobial susceptibility testing of S. Typhimurium in Dogs - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Typhimurium	Dogs - pet animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Typhimurium, monophasic in Cattle (bovine animals) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Typhimurium, monophasic	Cattle (bovine animals) - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	5	0									1	4													
Aminoglycosides - Kanamycin	8	5	0													5										
Aminoglycosides - Streptomycin	16	5	1														1	3			1					
Amphenicols - Chloramphenicol	16	5	0														5									
Amphenicols - Florfenicol	16	5	0													3	2									
Cephalosporins - Cefotaxime	0.5	5	0							1	4															
Fluoroquinolones - Ciprofloxacin	0.06	5	0						5																	
Penicillins - Ampicillin	8	5	1											2	2				1							
Quinolones - Nalidixic acid	16	5	0													5										
Tetracyclines - Tetracycline	8	5	4												1					4						
Trimethoprim	2	5	0										5													
Cephalosporins - Ceftazidim	2	5	0									3	2													
Polymyxins - Colistin	2	5	0												5											
Sulfonamides - Sulfamethoxazol	256	5	1																1	3					1	

Table Antimicrobial susceptibility testing of S. Typhimurium, monophasic in Cattle (bovine animals) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

S. Typhimurium, monophasic	Cattle (bovine animals) - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Enteritidis in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Enteritidis	Birds - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0										1													
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0													1										
Amphenicols - Chloramphenicol	16	1	0													1										
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0							1																
Fluoroquinolones - Ciprofloxacin	0.06	1	0						1																	
Penicillins - Ampicillin	8	1	0											1												
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																1							

Table Antimicrobial susceptibility testing of S. Enteritidis in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

S. Enteritidis	Birds - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Enteritidis in Cats - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Enteritidis	Cats - pet animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0									1														
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0														1									
Amphenicols - Chloramphenicol	16	1	0														1									
Amphenicols - Florfenicol	16	1	0														1									
Cephalosporins - Cefotaxime	0.5	1	0								1															
Fluoroquinolones - Ciprofloxacin	0.06	1	0						1																	
Penicillins - Ampicillin	8	1	0												1											
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																1							

Table Antimicrobial susceptibility testing of S. Enteritidis in Cats - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

S. Enteritidis	Cats - pet animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Indiana in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Indiana	Birds - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	2	0									1	1													
Aminoglycosides - Kanamycin	8	2	0													2										
Aminoglycosides - Streptomycin	16	2	2																		2					
Amphenicols - Chloramphenicol	16	2	0													1	1									
Amphenicols - Florfenicol	16	2	0													1	1									
Cephalosporins - Cefotaxime	0.5	2	1							1						1										
Fluoroquinolones - Ciprofloxacin	0.06	2	0				1		1																	
Penicillins - Ampicillin	8	2	2																2							
Quinolones - Nalidixic acid	16	2	0													2										
Tetracyclines - Tetracycline	8	2	2																	2						
Trimethoprim	2	2	2																2							
Cephalosporins - Ceftazidim	2	2	1									1						1								
Polymyxins - Colistin	2	2	0												2											
Sulfonamides - Sulfamethoxazol	256	2	2																						2	

Table Antimicrobial susceptibility testing of S. Indiana in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Indiana	Birds - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Braenderup in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Braenderup	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0									1														
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0														1									
Amphenicols - Chloramphenicol	16	1	0														1									
Amphenicols - Florfenicol	16	1	0														1									
Cephalosporins - Cefotaxime	0.5	1	0									1														
Fluoroquinolones - Ciprofloxacin	0.06	1	0						1																	
Penicillins - Ampicillin	8	1	0												1											
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0										1													
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																	1						

Table Antimicrobial susceptibility testing of S. Braenderup in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

S. Braenderup	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. enterica subsp. diarizonae in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. enterica subsp. diarizonae	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	5	0									3	2													
Aminoglycosides - Kanamycin	8	5	0													5										
Aminoglycosides - Streptomycin	16	5	1														1	3		1						
Amphenicols - Chloramphenicol	16	5	0													4	1									
Amphenicols - Florfenicol	16	5	0													4	1									
Cephalosporins - Cefotaxime	0.5	5	1							4						1										
Fluoroquinolones - Ciprofloxacin	0.06	5	0				4		1																	
Penicillins - Ampicillin	8	3	1											2					1							
Quinolones - Nalidixic acid	16	5	0													3	2									
Tetracyclines - Tetracycline	8	5	1											1	3					1						
Trimethoprim	2	5	0										4		1											
Cephalosporins - Ceftazidim	2	5	1									4						1								
Polymyxins - Colistin	2	5	0												5											
Sulfonamides - Sulfamethoxazol	256	5	0																		5					

Table Antimicrobial susceptibility testing of S. enterica subsp. diarizonae in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. enterica subsp. diarizonae	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of Salmonella spp., unspecified in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

Salmonella spp., unspecified	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0											1												
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	1																	1						
Amphenicols - Chloramphenicol	16	1	0														1									
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0								1															
Fluoroquinolones - Ciprofloxacin	0.06	1	0				1																			
Penicillins - Ampicillin	8	1	0											1												
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0													1										
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0										1													
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	1																						1	

Table Antimicrobial susceptibility testing of Salmonella spp., unspecified in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Salmonella spp., unspecified	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. enterica subsp. houtenae in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. enterica subsp. houtenae	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	2	0									1	1													
Aminoglycosides - Kanamycin	8	2	0													2										
Aminoglycosides - Streptomycin	16	2	2																2							
Amphenicols - Chloramphenicol	16	2	0													1	1									
Amphenicols - Florfenicol	16	2	0													2										
Cephalosporins - Cefotaxime	0.5	2	0								2															
Fluoroquinolones - Ciprofloxacin	0.06	2	0						2																	
Penicillins - Ampicillin	8	2	0											2												
Quinolones - Nalidixic acid	16	2	0													2										
Tetracyclines - Tetracycline	8	2	0												2											
Trimethoprim	2	2	0										2													
Cephalosporins - Ceftazidim	2	2	0									2														
Polymyxins - Colistin	2	2	0												2											
Sulfonamides - Sulfamethoxazol	256	2	0																1		1					

Table Antimicrobial susceptibility testing of S. enterica subsp. houtenae in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. enterica subsp. houtenae	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Virchow in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Virchow	Birds - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0										1													
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0														1									
Amphenicols - Chloramphenicol	16	1	0													1										
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0							1																
Fluoroquinolones - Ciprofloxacin	0.06	1	0						1																	
Penicillins - Ampicillin	8	1	0											1												
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																1							

Table Antimicrobial susceptibility testing of S. Virchow in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Virchow	Birds - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Infantis in Cattle (bovine animals) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Infantis	Cattle (bovine animals) - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	2	0									1	1													
Aminoglycosides - Kanamycin	8	2	0													2										
Aminoglycosides - Streptomycin	16	2	0														1	1								
Amphenicols - Chloramphenicol	16	2	0														2									
Amphenicols - Florfenicol	16	2	0													1	1									
Cephalosporins - Cefotaxime	0.5	2	0								2															
Fluoroquinolones - Ciprofloxacin	0.06	2	0						2																	
Penicillins - Ampicillin	8	2	0											1	1											
Quinolones - Nalidixic acid	16	2	0													2										
Tetracyclines - Tetracycline	8	2	0												1		1									
Trimethoprim	2	2	0										2													
Cephalosporins - Ceftazidim	2	2	0										2													
Polymyxins - Colistin	2	2	0												2											
Sulfonamides - Sulfamethoxazol	256	2	0																	2						

Table Antimicrobial susceptibility testing of S. Infantis in Cattle (bovine animals) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

S. Infantis	Cattle (bovine animals) - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Typhimurium in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Typhimurium	Birds - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0									1														
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0														1									
Amphenicols - Chloramphenicol	16	1	0														1									
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0							1																
Fluoroquinolones - Ciprofloxacin	0.06	1	0							1																
Penicillins - Ampicillin	8	1	0												1											
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																		1					

Table Antimicrobial susceptibility testing of S. Typhimurium in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

S. Typhimurium	Birds - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Typhimurium in Cattle (bovine animals) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Typhimurium	Cattle (bovine animals) - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	15	0									8	7													
Aminoglycosides - Kanamycin	8	15	1													14					1					
Aminoglycosides - Streptomycin	16	15	3														9	3		1	2					
Amphenicols - Chloramphenicol	16	15	3													5	7			3						
Amphenicols - Florfenicol	16	15	2													8	5		2							
Cephalosporins - Cefotaxime	0.5	15	0							7	8															
Fluoroquinolones - Ciprofloxacin	0.06	15	1				2		12				1													
Penicillins - Ampicillin	8	15	4											9	2				4							
Quinolones - Nalidixic acid	16	15	0													14		1								
Tetracyclines - Tetracycline	8	15	4												11				1	3						
Trimethoprim	2	15	4										11				1		3							
Cephalosporins - Ceftazidim	2	15	0									14	1													
Polymyxins - Colistin	2	15	0												15											
Sulfonamides - Sulfamethoxazol	256	15	5														3		2	5					5	

Table Antimicrobial susceptibility testing of S. Typhimurium in Cattle (bovine animals) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

S. Typhimurium	Cattle (bovine animals) - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Paratyphi B var. Java in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Paratyphi B var. Java	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0										1													
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0															1								
Amphenicols - Chloramphenicol	16	1	0														1									
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0								1															
Fluoroquinolones - Ciprofloxacin	0.06	1	0				1																			
Penicillins - Ampicillin	8	1	0												1											
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																	1						

Table Antimicrobial susceptibility testing of S. Paratyphi B var. Java in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

S. Paratyphi B var. Java	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Enteritidis in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Enteritidis: Birds - unspecified - Clinical investigations

Isolates out of a monitoring program (yes/no):

Number of isolates available in the laboratory: unknown

Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	2	0									1		1												
Aminoglycosides - Kanamycin	8	2	0													2										
Aminoglycosides - Streptomycin	16	2	0													2										
Amphenicols - Chloramphenicol	16	2	0														2									
Amphenicols - Florfenicol	16	2	0													2										
Cephalosporins - Cefotaxime	0.5	2	0							1	1															
Fluoroquinolones - Ciprofloxacin	0.06	2	0						2																	
Penicillins - Ampicillin	8	2	0											1	1											
Quinolones - Nalidixic acid	16	2	0													2										
Tetracyclines - Tetracycline	8	2	0												2											
Trimethoprim	2	2	0										2													
Cephalosporins - Ceftazidim	2	2	0									2														
Polymyxins - Colistin	2	2	0												2											
Sulfonamides - Sulfamethoxazol	256	2	0																1	1						

Table Antimicrobial susceptibility testing of S. Enteritidis in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

S. Enteritidis	Birds - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Enteritidis in Cats - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Enteritidis	Cats - pet animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0									1														
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0												1											
Amphenicols - Chloramphenicol	16	1	0													1										
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0								1															
Fluoroquinolones - Ciprofloxacin	0.06	1	0						1																	
Penicillins - Ampicillin	8	1	0												1											
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	1													1										
Sulfonamides - Sulfamethoxazol	256	1	0																	1						

Table Antimicrobial susceptibility testing of S. Enteritidis in Cats - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Enteritidis	Cats - pet animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Aqua in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Aqua	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0										1													
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0														1									
Amphenicols - Chloramphenicol	16	1	0													1										
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0								1															
Fluoroquinolones - Ciprofloxacin	0.06	1	0				1																			
Penicillins - Ampicillin	8	1	0											1												
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																		1					

Table Antimicrobial susceptibility testing of S. Aqua in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Aqua	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Blijdorp in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Blijdorp	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0										1													
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	1																1							
Amphenicols - Chloramphenicol	16	1	0													1										
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0								1															
Fluoroquinolones - Ciprofloxacin	0.06	1	0						1																	
Penicillins - Ampicillin	8	1	0											1												
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																	1						

Table Antimicrobial susceptibility testing of S. Blijdorp in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

S. Blijdorp	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Thompson in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Thompson	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0											1												
Aminoglycosides - Kanamycin	8	1	0														1									
Aminoglycosides - Streptomycin	16	1	0															1								
Amphenicols - Chloramphenicol	16	1	0														1									
Amphenicols - Florfenicol	16	1	0														1									
Cephalosporins - Cefotaxime	0.5	1	1													1										
Fluoroquinolones - Ciprofloxacin	0.06	1	0				1																			
Penicillins - Ampicillin	8	1	1																1							
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	1																	1						
Trimethoprim	2	1	1																1							
Cephalosporins - Ceftazidim	2	1	1															1								
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	1																						1	

Table Antimicrobial susceptibility testing of S. Thompson in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

S. Thompson	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. enterica subsp. diarizonae in Sheep - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. enterica subsp. diarizonae	Sheep - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0									1														
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0															1								
Amphenicols - Chloramphenicol	16	1	0													1										
Amphenicols - Florfenicol	16	1	0												1											
Cephalosporins - Cefotaxime	0.5	1	0							1																
Fluoroquinolones - Ciprofloxacin	0.06	1	0				1																			
Penicillins - Ampicillin	8	1	0										1													
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																1							

Table Antimicrobial susceptibility testing of S. enterica subsp. diarizonae in Sheep - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

S. enterica subsp. diarizonae	Sheep - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Veneziana in Dogs - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Veneziana	Dogs - pet animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0									1														
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0														1									
Amphenicols - Chloramphenicol	16	1	0														1									
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0								1															
Fluoroquinolones - Ciprofloxacin	0.06	1	0						1																	
Penicillins - Ampicillin	8	1	0												1											
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	1																	1						
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0										1													
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																		1					

Table Antimicrobial susceptibility testing of S. Veneziana in Dogs - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

S. Veneziana	Dogs - pet animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Gaminara in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Gaminara	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0									1														
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0														1									
Amphenicols - Chloramphenicol	16	1	0													1										
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0							1																
Fluoroquinolones - Ciprofloxacin	0.06	1	0						1																	
Penicillins - Ampicillin	8	1	0											1												
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																	1						

Table Antimicrobial susceptibility testing of S. Gaminara in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

S. Gaminara	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Typhimurium in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Typhimurium	Birds - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	4	0									4														
Aminoglycosides - Kanamycin	8	4	0													4										
Aminoglycosides - Streptomycin	16	4	2														2		2							
Amphenicols - Chloramphenicol	16	4	0													1	3									
Amphenicols - Florfenicol	16	4	0												2	2										
Cephalosporins - Cefotaxime	0.5	4	0							4																
Fluoroquinolones - Ciprofloxacin	0.06	4	0				2		2																	
Penicillins - Ampicillin	8	4	1											1	2				1							
Quinolones - Nalidixic acid	16	4	0													4										
Tetracyclines - Tetracycline	8	4	1											1	2				1							
Trimethoprim	2	4	1										3					1								
Cephalosporins - Ceftazidim	2	4	0									4														
Polymyxins - Colistin	2	4	0												4											
Sulfonamides - Sulfamethoxazol	256	4	1														1				2				1	

Table Antimicrobial susceptibility testing of S. Typhimurium in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Typhimurium	Birds - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Typhimurium in Cattle (bovine animals) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Typhimurium	Cattle (bovine animals) - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	4	0									3	1													
Aminoglycosides - Kanamycin	8	4	0													4										
Aminoglycosides - Streptomycin	16	4	1														3			1						
Amphenicols - Chloramphenicol	16	4	1														3			1						
Amphenicols - Florfenicol	16	4	1													1	2		1							
Cephalosporins - Cefotaxime	0.5	4	0							1	3															
Fluoroquinolones - Ciprofloxacin	0.06	4	0						4																	
Penicillins - Ampicillin	8	4	1											3					1							
Quinolones - Nalidixic acid	16	4	0													4										
Tetracyclines - Tetracycline	8	4	1												2	1				1						
Trimethoprim	2	4	1										3						1							
Cephalosporins - Ceftazidim	2	4	0									2	2													
Polymyxins - Colistin	2	4	0												4											
Sulfonamides - Sulfamethoxazol	256	4	1																	3					1	

Table Antimicrobial susceptibility testing of S. Typhimurium in Cattle (bovine animals) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Typhimurium	Cattle (bovine animals) - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Typhimurium in Pigs - unspecified - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Typhimurium	Pigs - unspecified - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	2	0									2														
Aminoglycosides - Kanamycin	8	2	0													2										
Aminoglycosides - Streptomycin	16	2	0														2									
Amphenicols - Chloramphenicol	16	2	0														2									
Amphenicols - Florfenicol	16	2	0														2									
Cephalosporins - Cefotaxime	0.5	2	0							2																
Fluoroquinolones - Ciprofloxacin	0.06	2	0						2																	
Penicillins - Ampicillin	8	2	0											2												
Quinolones - Nalidixic acid	16	2	0													2										
Tetracyclines - Tetracycline	8	2	0												1	1										
Trimethoprim	2	2	0										2													
Cephalosporins - Ceftazidim	2	2	0									2														
Polymyxins - Colistin	2	2	0												2											
Sulfonamides - Sulfamethoxazol	256	2	0																	2						

Table Antimicrobial susceptibility testing of S. Typhimurium in Pigs - unspecified - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Typhimurium	Pigs - unspecified - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Enteritidis in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Enteritidis	Birds - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	5	0									4	1													
Aminoglycosides - Kanamycin	8	5	0													5										
Aminoglycosides - Streptomycin	16	5	0													3	1	1								
Amphenicols - Chloramphenicol	16	5	0													2	3									
Amphenicols - Florfenicol	16	5	0													4	1									
Cephalosporins - Cefotaxime	0.5	5	0							1	2	2														
Fluoroquinolones - Ciprofloxacin	0.06	5	0				1		4																	
Penicillins - Ampicillin	8	5	0											1	4											
Quinolones - Nalidixic acid	16	5	0													4	1									
Tetracyclines - Tetracycline	8	5	1												3	1			1							
Trimethoprim	2	5	0										5													
Cephalosporins - Ceftazidim	2	5	0									4	1													
Polymyxins - Colistin	2	5	0												5											
Sulfonamides - Sulfamethoxazol	256	5	0																1	3	1					

Table Antimicrobial susceptibility testing of S. Enteritidis in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Enteritidis	Birds - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Enteritidis in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Enteritidis	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	2	0									2														
Aminoglycosides - Kanamycin	8	2	0													2										
Aminoglycosides - Streptomycin	16	2	0													2										
Amphenicols - Chloramphenicol	16	2	0														2									
Amphenicols - Florfenicol	16	2	0														2									
Cephalosporins - Cefotaxime	0.5	2	0							2																
Fluoroquinolones - Ciprofloxacin	0.06	2	0						2																	
Penicillins - Ampicillin	8	2	0												2											
Quinolones - Nalidixic acid	16	2	0													2										
Tetracyclines - Tetracycline	8	2	0												2											
Trimethoprim	2	2	0										2													
Cephalosporins - Ceftazidim	2	2	0									2														
Polymyxins - Colistin	2	2	0												2											
Sulfonamides - Sulfamethoxazol	256	2	0															1	1							

Table Antimicrobial susceptibility testing of S. Enteritidis in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

S. Enteritidis	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Muenchen in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Muenchen	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	3	0									2	1													
Aminoglycosides - Kanamycin	8	3	0													2	1									
Aminoglycosides - Streptomycin	16	3	0														2	1								
Amphenicols - Chloramphenicol	16	3	0													3										
Amphenicols - Florfenicol	16	3	0													2	1									
Cephalosporins - Cefotaxime	0.5	3	0							1	1		1													
Fluoroquinolones - Ciprofloxacin	0.06	3	0				3																			
Penicillins - Ampicillin	8	3	1											2					1							
Quinolones - Nalidixic acid	16	3	0													3										
Tetracyclines - Tetracycline	8	3	0												2	1										
Trimethoprim	2	3	0										3													
Cephalosporins - Ceftazidim	2	3	0									2			1											
Polymyxins - Colistin	2	3	0												3											
Sulfonamides - Sulfamethoxazol	256	3	0																1		2					

Table Antimicrobial susceptibility testing of S. Muenchen in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Muenchen	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Beaudesert in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Beaudesert	Other animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0										1													
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0														1									
Amphenicols - Chloramphenicol	16	1	0													1										
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0							1																
Fluoroquinolones - Ciprofloxacin	0.06	1	0				1																			
Penicillins - Ampicillin	8	1	0											1												
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0												1											
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																	1						

Table Antimicrobial susceptibility testing of S. Beaudesert in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

S. Beaudesert	Other animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of S. Newport in Dogs - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Newport	Dogs - pet animals - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	unknown																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	1	0										1													
Aminoglycosides - Kanamycin	8	1	0													1										
Aminoglycosides - Streptomycin	16	1	0															1								
Amphenicols - Chloramphenicol	16	1	0													1										
Amphenicols - Florfenicol	16	1	0													1										
Cephalosporins - Cefotaxime	0.5	1	0							1																
Fluoroquinolones - Ciprofloxacin	0.06	1	0						1																	
Penicillins - Ampicillin	8	1	0											1												
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	8	1	0											1												
Trimethoprim	2	1	0										1													
Cephalosporins - Ceftazidim	2	1	0									1														
Polymyxins - Colistin	2	1	0												1											
Sulfonamides - Sulfamethoxazol	256	1	0																	1						

Table Antimicrobial susceptibility testing of S. Newport in Dogs - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

S. Newport	Dogs - pet animals - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	unknown	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Cut-off values for antibiotic resistance testing of Salmonella in Animals

Test Method Used

Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin	NON-EFSA		
	Streptomycin	NON-EFSA		
Amphenicols	Chloramphenicol	NON-EFSA		
Cephalosporins	Cefotaxime	NON-EFSA		
Fluoroquinolones	Ciprofloxacin	NON-EFSA		
Penicillins	Ampicillin	NON-EFSA		
Quinolones	Nalidixic acid	NON-EFSA		
Sulfonamides	Sulfonamides	NON-EFSA		
Tetracyclines	Tetracycline	NON-EFSA		
Trimethoprim	Trimethoprim	NON-EFSA		

Table Cut-off values for antibiotic resistance testing of Salmonella in Feed

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin	NON-EFSA		
	Streptomycin	NON-EFSA		
Amphenicols	Chloramphenicol	NON-EFSA		
Cephalosporins	Cefotaxime	NON-EFSA		
Fluoroquinolones	Ciprofloxacin	NON-EFSA		
Penicillins	Ampicillin	NON-EFSA		
Quinolones	Nalidixic acid	NON-EFSA		
Sulfonamides	Sulfonamides	NON-EFSA		
Tetracyclines	Tetracycline	NON-EFSA		
Trimethoprim	Trimethoprim	NON-EFSA		

Table Cut-off values for antibiotic resistance testing of Salmonella in Food

Test Method Used

Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin	NON-EFSA		
	Streptomycin	NON-EFSA		
Amphenicols	Chloramphenicol	NON-EFSA		
Cephalosporins	Cefotaxime	NON-EFSA		
Fluoroquinolones	Ciprofloxacin	NON-EFSA		
Penicillins	Ampicillin	NON-EFSA		
Quinolones	Nalidixic acid	NON-EFSA		
Sulfonamides	Sulfonamides	NON-EFSA		
Tetracyclines	Tetracycline	NON-EFSA		
Trimethoprim	Trimethoprim	NON-EFSA		

2.2 CAMPYLOBACTERIOSIS

2.2.1 General evaluation of the national situation

A. Thermophilic Campylobacter general evaluation

History of the disease and/or infection in the country

Campylobacteriosis in humans is a notifiable disease. Laboratories have to report cases within one week of Campylobacter spp. being detected (ordinance of the FDHA on medical doctor and laboratory reporting). In the 80s campylobacteriosis was the second most reported food borne disease in humans. Increasing every year it overtook salmonellosis in 1995. Since then campylobacteriosis is the main food-associated infection in Switzerland. After reaching a peak in 2000 with 105,1 reports per 100,000 inhabitants the incidence declined steadily until 2005, but always remained over 70 reports per 100,000 inhabitants. From 2005 until 2009 campylobacteriosis cases rose again to up to 100,1 reports per 100,000 inhabitants. C. jejuni has always been the most isolated serovar in humans.

In a study conducted in 2007, the prevalence of Campylobacter in poultry meat was 43.7%. A cross-sectional study in broiler meat at retail was conducted from April 2009 to April 2010 showed a slightly decrease to 38.4%. In both studies it could be shown that frozen products and products without skin have a smaller risk to be contaminated with Campylobacter than fresh products and products with skin. Campylobacteriosis is an animal disease to be monitored (TSV, Article 5), i.e. the suspicion of occurrence of such a disease must be reported to the cantonal veterinarian. In general, campylobacteriosis cases reported to the FVO by cantonal veterinarians in animals are low because infected animals usually don't get ill. In the last 10 years (2002-2011) 93 campylobacteriosis cases were reported, 90% of which occurred in pets (dogs and cats) and 10% in livestock (cattle and sheep).

As poultry represents an important reservoir of Campylobacter, the occurrence of Campylobacter spp. in broiler chicken farms has been studied since 2002 as part of the monitoring programme on antimicrobial resistance. In 2008 the baseline study on the prevalence and antimicrobial resistance of Campylobacter spp. in broiler flocks and on the prevalence of Campylobacter spp. and Salmonella spp. in broiler carcasses was carried out. This baseline study showed a prevalence of 46.8% positive broiler flocks in the period May 2008 to April 2009 (60% from May 2008 to December 2008) and a prevalence of Campylobacter in broiler carcasses of 70.6% (cumulated qualitative and quantitative approach). The Campylobacter prevalence in broiler herds for the entire 2009 (from January to December) came to 44%.

A survey conducted in 2006 in calves revealed a Campylobacter prevalence of 40.4%. In the framework of the antimicrobial resistance monitoring 2010 a marked decrease could be observed: The prevalence in calves was 15% with 25 C. jejuni and 12 C. coli isolated from 245 samples.

National evaluation of the recent situation, the trends and sources of infection

Compared to 2010 with 6610 cases of campylobacteriosis, the number of campylobacteriosis cases increased in 2011 to 7964, which corresponds with an incidence rate of 101 per 100'000 inhabitants (2010: 84/100'000). This is the highest rate of new infections since the introduction of compulsory registration. Similar to previous years the most affected age groups were babies under one year of age (131/100'000) and young adults aged 15 to 24 years (147/100'000). Most notifications were registered in August and December. In concordance with other years, most cases were caused by C. jejuni (63% of all cases, whereat in 26% of cases no distinction was made between C. jejuni and C. coli).

In animals, 10 cases (8 in dogs, 1 in cats and 1 in cattle) of campylobacteriosis were reported to the FVO by cantonal veterinarians in 2011. The notification rate was similar to previous years. Furthermore, in veterinary diagnostic laboratories 2612 tests for campylobacteriosis were carried out in the context of clinical investigations, mainly in dogs and cats.

Campylobacter is one of the main bacteria in the antimicrobial resistance monitoring programme. A random sample of broilers and pigs was investigated at slaughter using cloacal and faecal swabs. The samples are taken evenly distributed throughout the year, in order to exclude seasonal effects.
2011, 445 broiler herds were tested, of which 166 (37.3%) were Campylobacter positive (156x C. jejuni and 10x C. coli). Compared to 2010 (with 33% positive herds) the prevalence increased, but did not reach the level of 2009 with 44%.
The Campylobacter prevalence in pigs remained stable also in 2011. 189 from 287 sampled pigs (66%) were found to be Campylobacter positive 66%. Only C. coli strains were isolated.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

Campylobacteriosis occurs most commonly in young adults (20-29 years). Like in the years before, in 2011 the incidences were highest in infants under one year of age and in young adults aged 15-24 years. Typically, infections above average occur in summer (July/August) and to a lesser extend at the beginning of the year (December/January). It is assumed that the high rate of disease in young adults is attributable to increased travel and less regard for kitchen hygiene at this age. Therefore, travelling abroad as well as consumption of poultry meat and poultry liver are expected to be the most likely risk factors in humans for campylobacteriosis in Switzerland, whereas cattle and pets seem to be less important.

Recent actions taken to control the zoonoses

In 2009 Switzerland formed a so called Campylobacter-platform with stakeholders of the poultry industry, researchers and national and cantonal authorities, all of them concerned by increasingly high incidence of human campylobacteriosis, high prevalence in broiler flocks and absence of efficient control measures. The aim of the Campylobacter-platform is to contribute to a substantial decrease of campylobacteriosis in humans. Information exchange, coordination and evaluation of control measures, identification of gaps of knowledge and initialization of applied research projects are the main tasks of the Campylobacter-platform. The focus is on the three topics risk factors for human infection, Campylobacter safe broiler production and disease awareness along the food chain.

Additional information

1. The industry takes responsibility for the monitoring of broilers and poultry meat production in a system of self-auditing. More information can be found in the relevant chapters.
2. Further information can be found on the FVO website www.bvet.admin.ch.

2.2.2 Campylobacteriosis in humans

Table Campylobacter in humans - Species/serotype distribution

Species/serotype Distribution	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.	Unknown status
Campylobacter	7964	100.8	0	0	0	0	0
C. coli	302	3.8					
C. jejuni	5052	63.9					
C. upsaliensis	1	0.1					
C. fetus	19	0.2					
Campylobacter spp., unspecified	2584	32.7					
C. lari	6	0.1					

Table Campylobacter in humans - Age distribution

Age distribution	C. coli			C. jejuni			Campylobacter spp., unspecified		
	All	M	F	All	M	F	All	M	F
<1 year	3	2	1	65	38	25	103	63	38
1 to 4 years	9	2	7	217	119	96	363	190	171
5 to 14 years	15	8	7	362	203	157	575	335	237
15 to 24 years	49	26	23	907	416	488	1386	648	733
25 to 44 years	98	54	44	1487	775	712	2363	1252	1108
45 to 64 years	69	27	42	1180	702	473	1866	1071	786
65 years and older	58	29	29	810	443	365	1269	679	587
Age unknown	1	1	0	24	14	9	39	23	15
Total :	302	149	153	5052	2710	2325	7964	4261	3675

Table Campylobacter in humans - Seasonal distribution

Seasonal Distribution / Months	C. coli	C. jejuni	C. upsaliensis	Campylobacter spp., unspecified
	Cases	Cases	Cases	Cases
January	16	285		529
February	14	169		335
March	13	199		392
April	9	201		356
May	29	325		640
June	17	463		863
July	40	628	1	940
August	54	718		1048
September	32	478		682
October	29	479		672
November	21	398		567
December	28	709		940
Total :	302	5052	1	7964

2.2.3 Campylobacter in foodstuffs

A. Thermophilic Campylobacter in Broiler meat and products thereof

Results of the investigation

Additional information

1. The industry takes responsibility for the monitoring of poultry meat production in a system of self-auditing following the HACCP principles. Results of the Campylobacter monitoring of the largest poultry producers and abattoirs are available covering more than 92% of the production. Samples are taken several times a year at random. Fresh poultry meat, poultry meat preparations and poultry meat products were tested at different stages such as slaughterhouse, cutting plant and processing plant (see Campylobacter poultry meat table). 380 of 1286 (29.5%) broiler meat samples tested positive. No imported meat samples were included.
2. Further information can be found on the FVO website www.bvet.admin.ch.

B. Thermophilic Campylobacter spp., unspecified in Food Meat from turkey

Results of the investigation

1. The industry takes responsibility for the monitoring of poultry meat production in a system of self-auditing following the HACCP principles. Results of the Campylobacter monitoring of the largest poultry producers and abattoirs are available covering more than 92% of the production. Samples are taken several times a year at random. Fresh poultry meat, poultry meat preparations and poultry meat products were tested at different stages such as slaughterhouse, cutting plant and processing plant (see Campylobacter poultry meat table). In total 14 of 67 (21%) meat samples from fattening turkeys tested positive. No imported meat samples were included.
2. Further information can be found on the FVO website www.bvet.admin.ch.

Table Campylobacter in poultry meat

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Sample weight	Units tested	Total units positive for Campylobacter	C. coli	C. jejuni
Meat from broilers (Gallus gallus) - fresh - at cutting plant - Surveillance (HACCP and own checks)	poultry industry	Unspecified	Industry sampling	food sample		Single	10g/25g	146	94	9	57
Meat from broilers (Gallus gallus) - fresh - at cutting plant - imported - Surveillance (HACCP and own checks)	poultry industry	Unspecified	Industry sampling	food sample		Single	10g	166	125		
Meat from broilers (Gallus gallus) - fresh - at processing plant - Surveillance (HACCP and own checks)	poultry industry	Unspecified	Industry sampling	food sample		Single	10g/25g	239	84		
Meat from broilers (Gallus gallus) - fresh - at processing plant - imported - Surveillance (HACCP and own checks)	poultry industry	Unspecified	Industry sampling	food sample		Single	10g/25g	151	64	3	4
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Surveillance (HACCP and own checks)	poultry industry	Unspecified	Industry sampling	food sample		Batch	10g	141	80		
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Surveillance (HACCP and own checks)	poultry industry	Unspecified	Industry sampling	food sample		Single	10g/25g	89	48	8	30
Meat from broilers (Gallus gallus) - meat preparation - at processing plant - Surveillance (HACCP and own checks)	poultry industry	Unspecified	Industry sampling	food sample		Single	10g/25g	224	68	1	6
Meat from broilers (Gallus gallus) - meat products - cooked, ready-to-eat - at processing plant - Surveillance (HACCP and own checks)	poultry industry	Unspecified	Industry sampling	food sample		Single	25g	1	0		
Meat from broilers (Gallus gallus) - meat products - cooked, ready-to-eat - at processing plant - Surveillance (HACCP and own checks)	poultry industry	Unspecified	Industry sampling	food sample		Batch	25g	398	0		

Table Campylobacter in poultry meat

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Sample weight	Units tested	Total units positive for Campylobacter	C. coli	C. jejuni
Meat from broilers (Gallus gallus) - minced meat - at processing plant - Surveillance (HACCP and own checks)	poultry industry	Unspecified	Industry sampling	food sample		Single	10g	48	6		
Meat from turkey - fresh - at cutting plant - Surveillance (HACCP and own checks)	poultry industry	Unspecified	Industry sampling	food sample		Single	10g	41	9	1	7
Meat from turkey - fresh - at cutting plant - imported - Surveillance (HACCP and own checks)	poultry industry	Unspecified	Industry sampling	food sample		Single	10g	111	53		
Meat from turkey - fresh - at processing plant - imported - Surveillance (HACCP and own checks)	poultry industry	Unspecified	Industry sampling	food sample		Single	10g/25g	136	19		
Meat from turkey - fresh - at slaughterhouse - Surveillance (HACCP and own checks)	poultry industry	Unspecified	Industry sampling	food sample		Single	10g	13	5	2	3
Meat from turkey - meat preparation - at processing plant - Surveillance (HACCP and own checks)	poultry industry	Unspecified	Industry sampling	food sample		Single	10g	13	0		

	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Meat from broilers (Gallus gallus) - fresh - at cutting plant - Surveillance (HACCP and own checks)			28
Meat from broilers (Gallus gallus) - fresh - at cutting plant - imported - Surveillance (HACCP and own checks)			125

Table Campylobacter in poultry meat

	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Meat from broilers (Gallus gallus) - fresh - at processing plant - Surveillance (HACCP and own checks)			84
Meat from broilers (Gallus gallus) - fresh - at processing plant - imported - Surveillance (HACCP and own checks)			57
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Surveillance (HACCP and own checks)			80
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Surveillance (HACCP and own checks)			10
Meat from broilers (Gallus gallus) - meat preparation - at processing plant - Surveillance (HACCP and own checks)			61
Meat from broilers (Gallus gallus) - meat products - cooked, ready-to-eat - at processing plant - Surveillance (HACCP and own checks)			0
Meat from broilers (Gallus gallus) - meat products - cooked, ready-to-eat - at processing plant - Surveillance (HACCP and own checks)			0
Meat from broilers (Gallus gallus) - minced meat - at processing plant - Surveillance (HACCP and own checks)			6
Meat from turkey - fresh - at cutting plant - Surveillance (HACCP and own checks)			1

Table Campylobacter in poultry meat

	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Meat from turkey - fresh - at cutting plant - imported - Surveillance (HACCP and own checks)			53
Meat from turkey - fresh - at processing plant - imported - Surveillance (HACCP and own checks)			19
Meat from turkey - fresh - at slaughterhouse - Surveillance (HACCP and own checks)			0
Meat from turkey - meat preparation - at processing plant - Surveillance (HACCP and own checks)			0

2.2.4 Campylobacter in animals

A. Thermophilic Campylobacter in Gallus gallus

Monitoring system

Sampling strategy

A random sample of 445 broiler herds is investigated at slaughter using cloacal swabs (5 swabs pooled per herd). The samples are taken evenly distributed throughout the year, in order to exclude seasonal effects.
The broiler slaughter plants included in the surveillance programme account for 92% of the total production of broilers in Switzerland. The number of samples for each plant has been determined in proportion to the number of animals slaughtered per year. Each sample represents one herd. The samples were taken in the framework of the antimicrobial resistance monitoring and the number of samples taken should provide at least 170 isolates for the susceptibility testing.

Frequency of the sampling

At slaughter

Sampling distributed evenly throughout the year

Type of specimen taken

At slaughter

cloacal swabs

Methods of sampling (description of sampling techniques)

At slaughter

In total 5 cloacal swabs (one each from 5 different broilers) per slaughter batch were taken. The samples were taken using a swab in standard transportation medium (Transport swabs, Oxoid TS0001A, Amies W/O CH). Immediately after collection the samples were sent to the laboratory for analysis.

Case definition

At slaughter

Herds tested positive for C. jejuni or C. coli.

Diagnostic/analytical methods used

At slaughter

Bacteriological method: At the laboratory, cloacal swabs were pooled and direct culture was carried out on a selective medium suitable for Campylobacter (m CCDA). Identification of Campylobacter was carried out according to ISO 10272-1: 2006 (interpretation of gram staining, oxidase-katalase-tests and hippurat- and indoxylacetate-hydrolysis).

Vaccination policy

No vaccination available.

Other preventive measures than vaccination in place

The poultry industry encourages farmers to lower the Campylobacter burden by offering incentives for negative herds at slaughter. No immunoprophylactic methods are allowed.

Measures in case of the positive findings or single cases

No measures are taken.

Notification system in place

Campylobacteriosis (but not an infection with Campylobacter) in animals is notifiable (TSV, Art.5).

Results of the investigation

In 2011, 37.3% of the 445 sampled broiler flocks were positive for Campylobacter, 156 isolates of C. jejuni and 10 C. coli were identified.

National evaluation of the recent situation, the trends and sources of infection

The prevalence of Campylobacter in broiler flocks slightly increased from 33% in 2010 to 37.3% in 2011.

Additional information

Further information can be found on the OVF website www.bvet.admin.ch.

B. Campylobacter spp., unspecified in Animals Pigs - fattening pigs - unspecified - at slaughterhouse - Surveillance - official controls - objective sampling

Monitoring system

Sampling strategy

A random sample of 287 pigs is investigated at slaughter using faecal swabs in 2011. The samples are taken evenly distributed throughout the year, in order to exclude seasonal effects.
The pig slaughter plants included in the surveillance programme account for >85% of the total production of pigs in Switzerland. The number of samples for each plant has been determined in proportion to the number of animals slaughtered per year. The samples were taken in the framework of the antimicrobial resistance monitoring and the number of samples taken should provide at least 170 isolates for the susceptibility testing.

Frequency of the sampling

6 samples per week.

Type of specimen taken

Faeces

Methods of sampling (description of sampling techniques)

The samples were taken rectally using a swab in standard transportation medium (Transport swabs, Oxoid TS0001A, Amies W/O CH). Immediately after collection the samples were sent to the laboratory for analysis.

Case definition

Samples tested positive for C. jejuni or C. coli.

Diagnostic/analytical methods used

At the laboratory, samples were cultured within 72h after sampling with direct cultivation on selective culture media (m CCDA). Identification of Campylobacter was carried out according to ISO 10272-1: 2006.

Vaccination policy

No vaccination available.

Other preventive measures than vaccination in place

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Measures in case of the positive findings or single cases

No measures are taken.

Notification system in place

Campylobacteriosis (but not an infection with Campylobacter) in animals is notifiable (TSV, Art.5).

Results of the investigation

In 287 sampled pigs the prevalence of Campylobacter was 66%, 189 C. coli strains were isolated.

National evaluation of the recent situation, the trends and sources of infection

C. coli is prevalent in most swine holdings. As Campylobacter doesn’t survive on the surface of swine carcass due to drying process, this finding is not very meaningful for public health.

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

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Additional information

Further information can be found on the FVO website www.bvet.admin.ch.

Table Campylobacter in animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Units tested	Total units positive for Campylobacter	C. coli	C. jejuni	C. lari
Pigs - fattening pigs - at slaughterhouse - Monitoring 1)	FVO	Objective sampling	Official sampling	animal sample > rectum-anal swab		Animal	287	189	189		
Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring 2)	FVO	Objective sampling	Official sampling	animal sample > cloacal swab		Animal	445	166	10	156	
Alpacas - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	1	1			
Birds - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	65	1			
Camels - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	2	0			
Cats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	818	2			
Cattle (bovine animals) - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	156	8			
Dogs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	1279	21			
Fur animals - farmed - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	11	0			
Goats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	12	0			
Other animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	108	4			
Pigs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	9	2			
Rabbits - farmed - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	27	0			
Sheep - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	13	0			
Solipeds, domestic - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	111	0			

Table Campylobacter in animals

	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Pigs - fattening pigs - at slaughterhouse - Monitoring [1]		
Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring [2]		
Alpacas - Clinical investigations		1
Birds - Clinical investigations		1
Camels - Clinical investigations		0
Cats - Clinical investigations		2
Cattle (bovine animals) - Clinical investigations		8
Dogs - Clinical investigations		21
Fur animals - farmed - Clinical investigations		0
Goats - Clinical investigations		0
Other animals - Clinical investigations		4
Pigs - Clinical investigations		2
Rabbits - farmed - Clinical investigations		0
Sheep - Clinical investigations		0
Solipeds, domestic - Clinical investigations		0

Comments:

[1] Data originate from the antimicrobial resistance monitoring.

Table Campylobacter in animals

Comments:

[2)] Data originate from the antimicrobial resistance monitoring.

Footnote:

All data categorised as “clinical investigations” are summaries of data from the ILD (Informationssystem Labordiagnostik = information system of laboratory data). ILD is run by the FVO and all labs, which are approved for the diagnosis of certain diseases have to report their results in this system. Only tests on antigen detection are selected for the zoonoses reporting in the context of "clinical investigations".

2.2.5 Antimicrobial resistance in Campylobacter isolates

A. Antimicrobial resistance in Campylobacter jejuni and coli in pigs

Sampling strategy used in monitoring

Frequency of the sampling

Sampling in the framework of a monitoring programme on antimicrobial resistance in food-producing animals. In total 287 faecal samples were evenly collected throughout the year. The pig slaughter plants included in the surveillance programme account for > 85% of the total production of pigs in Switzerland. The number of samples for each plant has been determined in proportion to the number of animals slaughtered per year. The number of samples taken should provide at least 170 isolates for the susceptibility testing.

Type of specimen taken

Faecal samples.

Methods of sampling (description of sampling techniques)

At slaughter: The samples were taken rectally using a swab in standard transportation medium (Transport Swabs, Oxoid TS0001A, AMIES W/O CH). Immediately after collection, the samples were sent to the laboratory for analysis.

Procedures for the selection of isolates for antimicrobial testing

From each sample and campylobacter subtype one isolate was submitted to susceptibility testing.

Methods used for collecting data

All samples were analyzed in the same laboratory (Centre for Zoonoses, Bacterial Animal Diseases and Antibiotic Resistance, University of Bern, Switzerland).

Laboratory methodology used for identification of the microbial isolates

Samples were cultured for Campylobacter spp. within 72 h after sampling using standard microbiological procedures with direct cultivation on selective culture media. Identification of Campylobacter was carried out according to ISO 10272-1: 2006.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

chloramphenicol, ciprofloxacin, erythromycin, gentamicin, nalidixic acid, streptomycin, tetracycline

Cut-off values used in testing

Resistance was defined following the epidemiological cut-off values published by the Europaean Committee on Antimicrobial Susceptiblitiy Testing (EUCAST).

Preventive measures in place

No specific preventive measures for antimicrobial resistance in campylobacter. General preventive measures include education of veterinarians and farmers, disease eradication programmes, incentives for good farming practice and limitation of use of antimicrobials to veterinary prescription.

Measures in case of the positive findings or single cases

None

Notification system in place

None

Results of the investigation

185 C. coli isolates from fattening pigs were subjected to susceptibility testing.
The highest proportions of resistant isolates were found against streptomycin (73%). High levels of resistance were also found against ciprofloxacin (40.5%), nalidixic acid (41.1%) and tetracycline (29.7%). 14.6 % of the C. coli isolates were fully sensitive to all tested antimicrobials, 2.2 % showed resistance against more than four antimicrobials.

National evaluation of the recent situation, the trends and sources of infection

Prevalence of resistance is very high for streptomycin and high for tetracycline and ciprofloxacin. The prevalence of resistance for ciprofloxacin slightly increased over the last years. The occurrence of resistances to erythromycin and gentamicin are low to very low and stayed stable for C. coli in pigs.

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

Consumption of pork amounted to 24.9 kg per person in the year 2011. This corresponds to 39.8% of the total meat consumption. Even though the relevance of campylobacter is substantially reduced during the meat processing, pork can not be neglected as a source of resistant campylobacter for humans.
The large percentage of isolates resistant to fluoroquinolones, macrolides is of concern, because these antimicrobials are used to treat human campylobacter infections.

Additional information

Further information can be found in the annual report on the sale of antibiotics for veterinary use and antibiotic resistance monitoring of livestock in Switzerland (Arch-Vet 2011) on the FVO website www.bvet.admin.ch

B. Antimicrobial resistance in Campylobacter jejuni and coli in poultry

Sampling strategy used in monitoring

Frequency of the sampling

Sampling in the framework of a monitoring programme on antimicrobial resistance in food-producing animals. In total cloacal swabs (5 from each batch) from 445 slaughter batches were collected evenly throughout the year. The broiler slaughter plants included in the surveillance programme account for > 92% of the total production of broilers in Switzerland. The number of samples for each plant has been determined in proportion to the number of broilers slaughtered per year. Each sample represents one herd. The number of samples taken should provide at least 170 isolates for the susceptibility testing.

Type of specimen taken

Cloacal swabs

Methods of sampling (description of sampling techniques)

In total 5 cloacal swabs (from 5 different broilers) per slaughter batch were collected using a swab in standard transportation medium (Transport Swabs, Oxoid TS0001A, AMIES W/O CH). Immediately after collection, the samples were sent to the laboratory for pooling and analysis.

Procedures for the selection of isolates for antimicrobial testing

From each sampled slaughter batch and campylobacter subtype, one isolate was submitted to susceptibility testing.

Methods used for collecting data

All samples were analysed in the same laboratory (Centre for Zoonoses, Bacterial Animal Diseases and Antibiotic Resistance, University of Bern, Switzerland).

Laboratory methodology used for identification of the microbial isolates

Samples were cultured for Campylobacter spp. within 72 h after sampling using standard microbiological procedures with direct cultivation on selective culture media. Identification of Campylobacter was carried out according to ISO 10272-1: 2006.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

chloramphenicol, ciprofloxacin, erythromycin, gentamicin, nalidixic acid, streptomycin, tetracycline

Cut-off values used in testing

Resistance was defined following the epidemiological cut-off values published by the Europaean Committee on Antimicrobial Susceptiblitiy Testing (EUCAST).

Preventive measures in place

No specific preventive measures for antimicrobial resistance in campylobacter. General preventive measures include education of veterinarians and farmers, disease eradication programmes, incentives for good farming practice and limitation of use of antimicrobials to veterinary prescription.

Measures in case of the positive findings or single cases

None

Notification system in place

None

Results of the investigation

150 C. jejuni and 10 C. coli isolates from broilers were subjected to susceptibility testing.

The highest proportions of resistant isolates for both species were found against ciprofloxacin, nalidixic acid and tetracycline. For C. coli additionally high levels of resistance against streptomycin could be detected.
47.3 % of the C. jejuni isolates and 50 % of the C. coli isolates were fully sensitive to all tested antimicrobials.

National evaluation of the recent situation, the trends and sources of infection

Resistance in campylobacter from poultry has been monitored in Switzerland since 2002. Prevalence of resistance is constantly low for gentamicin and erythromycin in C. jejuni. The prevalence of resistance to ciprofloxacin significantly increased from about 15% in 2006 to over 40% in C. jejuni. The Number of C. coli isolates is too small to be able to make conclusions on trends.

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

Consumption of poultry meat was 11.4 kg per person in 2010 which corresponds to 18.3% of total meat consumption. About 50% of the poultry meat consumed in Switzerland is imported. Campylobacter survives well in poultry meat, therefore broilers are an important source of human infection with Campylobacter jejuni. It is thus important for public health to maintain a favorable resistance situation in campylobacter in broilers. The increase of resistances against ciprofloxacin gives cause for certain concern because quinolones are on the WHO list of critically important antimicrobials and are a preferred empiric treatment for gastrointestinal diseases.

Additional information

Further information can be found in the annual report on the sale of antibiotics for veterinary use and antibiotic resistance monitoring of livestock in Switzerland (Arch-Vet 2011) on the FVO website www.bvet.admin.ch

Table Antimicrobial susceptibility testing of C. jejuni in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

C. jejuni	Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	150																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	1	150	2								81	59	8					2								
Aminoglycosides - Streptomycin	2	150	14											132	4	2		12								
Amphenicols - Chloramphenicol	16	150	1												42	81	19	7	1							
Fluoroquinolones - Ciprofloxacin	1	150	61							18	48	21	2			61										
Quinolones - Nalidixic acid	16	150	63												25	44	18		1	62						
Tetracyclines - Tetracycline	2	150	31									53	42	20	4	2		29								
Macrolides - Erythromycin	4	150	8										53	31	41	17	3	2	3							

C. jejuni	Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	150	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.12	16
Aminoglycosides - Streptomycin	1	16
Amphenicols - Chloramphenicol	2	32
Fluoroquinolones - Ciprofloxacin	0.06	4
Quinolones - Nalidixic acid	2	64

Table Antimicrobial susceptibility testing of C. jejuni in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

C. jejuni	Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	150	
Antimicrobials:	lowest	highest
Tetracyclines - Tetracycline	0.25	16
Macrolides - Erythromycin	0.5	32

Table Antimicrobial susceptibility testing of C. coli in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

C. coli	Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	10																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	10	1									7	2			1										
Aminoglycosides - Streptomycin	4	10	4											5	1			4								
Amphenicols - Chloramphenicol	16	10	0													4	5	1								
Fluoroquinolones - Ciprofloxacin	1	10	2								5	3				2										
Quinolones - Nalidixic acid	32	10	2													4	3	1		2						
Tetracyclines - Tetracycline	2	10	3									1	4	1	1			3								
Macrolides - Erythromycin	16	10	0										3	2	1	3	1									

C. coli	Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	10	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.12	16
Aminoglycosides - Streptomycin	1	16
Amphenicols - Chloramphenicol	2	32
Fluoroquinolones - Ciprofloxacin	0.06	4
Quinolones - Nalidixic acid	2	64

Table Antimicrobial susceptibility testing of C. coli in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

C. coli	Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	10	
Antimicrobials:	lowest	highest
Tetracyclines - Tetracycline	0.25	16
Macrolides - Erythromycin	0.5	32

Table Antimicrobial susceptibility testing of C. coli in Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

C. coli	Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	185																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	185	2								24	103	53	3				2								
Aminoglycosides - Streptomycin	4	185	136											42	5	2	3	133								
Amphenicols - Chloramphenicol	16	185	2												20	96	62	5	2							
Fluoroquinolones - Ciprofloxacin	1	185	76							35	51	21	2		1	75										
Quinolones - Nalidixic acid	32	185	77												4	46	51	4	3	77						
Tetracyclines - Tetracycline	2	185	56									32	48	38	11	3	3	50								
Macrolides - Erythromycin	16	185	14										25	26	66	48	6		14							

C. coli	Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	185	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.12	16
Aminoglycosides - Streptomycin	1	16
Amphenicols - Chloramphenicol	2	32
Fluoroquinolones - Ciprofloxacin	0.06	4
Quinolones - Nalidixic acid	2	64

Table Antimicrobial susceptibility testing of C. coli in Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

C. coli	Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	185	
Antimicrobials:	lowest	highest
Tetracyclines - Tetracycline	0.25	16
Macrolides - Erythromycin	0.5	32

Table Cut-off values used for antimicrobial susceptibility testing of C. coli in Animals

Test Method Used

Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin		2	
	Streptomycin		4	
Fluoroquinolones	Ciprofloxacin		1	
Macrolides	Erythromycin		16	
Tetracyclines	Tetracycline		2	

Table Cut-off values used for antimicrobial susceptibility testing of C. coli in Feed

Test Method Used

Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin		2	
	Streptomycin		4	
Fluoroquinolones	Ciprofloxacin		1	
Macrolides	Erythromycin		16	
Tetracyclines	Tetracycline		2	

Table Cut-off values used for antimicrobial susceptibility testing of C. coli in Food

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin		2	
	Streptomycin		4	
Fluoroquinolones	Ciprofloxacin		1	
Macrolides	Erythromycin		16	
Tetracyclines	Tetracycline		2	

Table Cut-off values used for antimicrobial susceptibility testing of C. jejuni in Animals

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin		1	
	Streptomycin		2	
Fluoroquinolones	Ciprofloxacin		1	
Macrolides	Erythromycin		4	
Tetracyclines	Tetracycline		2	

Table Cut-off values used for antimicrobial susceptibility testing of C. jejuni in Feed

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin		1	
	Streptomycin		2	
Fluoroquinolones	Ciprofloxacin		1	
Macrolides	Erythromycin		4	
Tetracyclines	Tetracycline		2	

Table Cut-off values used for antimicrobial susceptibility testing of C. jejuni in Food

Test Method Used

Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin		1	
	Streptomycin		2	
Fluoroquinolones	Ciprofloxacin		1	
Macrolides	Erythromycin		4	
Tetracyclines	Tetracycline		2	

2.3 LISTERIOSIS

2.3.1 General evaluation of the national situation

A. Listeriosis general evaluation

History of the disease and/or infection in the country

Listeriosis in humans is a notifiable disease. The laboratory must report it within one week of detecting Listeria monocytogenes (ordinance of the FDHA on doctor and laboratory reports) to the Federal Office of Public Health.
The biggest epidemic outbreak in Switzerland was in the 1980s due to contaminated cheese of a particular variety. The first cases of this outbreak were diagnosed in 1983. However, the epidemic pattern and the cause of the infection was a long time not identified because the disease was not notifiable to that time. No more than in 1986 the contaminated cheese was identified as a source of infection. To that time 122 people diseased and 33 died.
In the 1990s human listeriosis cases fluctuated between 19 (in 1990) and 45 (in 1998) cases per year. Since 2000, cases per year are still unstable and compared to the 1990s noticeably higher with cases between 28 (in 2002) and 76 (in 2006). In the years 2005 and 2006 there was a remarkable increase in listeriosis cases with more than 70 cases in these years.
In 2005, the elevated number of cases was partly due to an outbreak with a particular cheese contaminated with Listeria monocytogenes (serotyp 1/2a). The increased number of cases in 2006 could not be linked to a particular outbreak. After 2005 and 2006 the number of cases decreased 2007 to the level of 2004 with roughly 60 cases. In 2008, it declined further to 45 reported cases. The incidence decreased thus from 1.0 in 2006 to 0.8 in 2007 and 0.6 in 2008 per 100’000 inhabitants. The people mainly affected are children less than one year old and people aged over 60.

The surveillance of Listeria monocytogenes that had been conducted within the framework of the national testing programme in the dairy industry by official food control was not continued in 2011. From 2002 onwards several hundred samples of semi-hard and soft-cheese from either raw or pasteurized cow’s, sheep’s and goat’s milk were tested every year for Listeria. Only a few samples were positive each year.

A Listeria Monitoring Programme (LMP) that was set up by the research institute of Agroscope Liebefeld-Posieux (ALP) in 2007 focuses on the identification of contaminants in the dairy industry. Products were tested for Listeria at ALP as part of quality assurance programmes. By taking part in the LMP, customers provide important evidence to ensure compliance with legal requirements (CH law and EU hygiene regulations). Furthermore, ALP provides a Listeria Advisory Team. The team can be called in for planning and consultation in partial or total decontamination of facilities enabling businesses to return to the market. The team further provides a checkup of companies safety concepts for any weaknesses or deficits. An evaluation of the years 1996 until 2008 showed that consultations by the ALP Listeria Advisory Team had a sustainable impact: in 85% of cases, the measures taken proved successful over the subsequent years of operation.

Listeriosis in animals is notifiable (TSV, Article 5), i.e. the suspicion or occurrence of such a disease must be reported to the cantonal veterinarian. From 1991 until 1995 never more than 3 cases of listeriosis were reported. Most cases occurred in the time period 1999 until 2004, with reported cases ranging between 27 to 34 per year. Since 2005, no more than 21 cases per year were reported. In the past 10 years (2001 until 2010) 218 listeriosis cases were reported to the FVO by cantonal veterinarians. 94% of these cases affected ruminants (cattle, sheep and goats).

National evaluation of the recent situation, the trends and sources of infection

In comparison to the previous year, the number of reported cases in humans decreased from 67 to 47 in 2011. Consequently, the notification rate decreased from 0.85 (2010) to 0.59 (2011) per 100’000 inhabitants. Persons over 65 years of age remain the most affected age group. The two most frequently identified serovars were 1/2a and 4b, which is in concordance with the previous year. One outbreak of listeriosis (6 cases) was reported from April to July 2011 in the German-speaking part of Switzerland, which was also caused by serovar 1/2a. The most probable source of infection was imported boiled ham.

In order to calculate corresponding prevalences ALP started a new programme, in 2011 in which raw milk cheese pastes were analysed for the presence of various pathogens. 300 samples of various types of raw milk based hard cheeses as well as 98 samples of raw milk based semi-soft cheeses were tested for the presence of L. monocytogenes. All samples were negative for L. monocytogenes.
In the framework of the Listeria Monitoring Programme (LMP) 4’314 samples were tested for the presence of listeria in 2011. L. monocytogenes were detected in 24 samples (0.6%), 21 of which were samples from the surroundings, 2 from semi-soft cheese and 1 from hard cheese. In all three types of products the bacteria were found on the surface. Other species of listeria were found in 86 samples (2%). With regard to listeria in the dairy industry, the situation has remained on a constantly low level for many years.

2011, 15 cases of listeriosis were reported to the FVO by the cantonal veterinarians. All 15 cases affected ruminants (8 in cattle, 3 in sheep and 4 in goats).
In veterinary diagnostic laboratories 82 tests for listeriosis were carried out in the context of clinical investigations in 2011, 2/3 of them in ruminants and 1/3 in horses, pigs and other animals.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

Listeria are repeatedly leading to disease in humans. Even if the number of cases is relatively small, the high mortality, especially in older people, makes it very significant.
Milk products and cheeses are a potential source of infection. Monitoring the occurrence of Listeria at different stages in the food chain is extremely important to prevent infections with contaminated food. With regard to listeria in the dairy industry, the situation has remained on a constantly low level for many years.

In animals, the reported listeriosis cases have remained stable at a low level over the last years.

Additional information

1. In a border control inspection program risk-based random samples are taken. In 2011, these included 24 fish samples from Vietnam and Morocco, all of which were Listeria spp. negative.
2. Further information can be found on the FVO website www.bvet.admin.ch.

2.3.2 Listeriosis in humans

Table Listeria in humans - Species/serotype distribution

Species/serotype Distribution	Cases	Cases Inc.
Listeria	47	.7
Listeria spp., unspecified	4	0.1
L. monocytogenes - L. monocytogenes serovar 1/2b	3	0.1
L. monocytogenes - L. monocytogenes serovar 1/2a	29	0.4
L. monocytogenes - L. monocytogenes serovar 4b	11	0.1

Table Listeria in humans - Age distribution

Age distribution	L. monocytogenes			Listeria spp., unspecified		
	All	M	F	All	M	F
<1 year	1	1	0			
25 to 44 years	5	0	5			
45 to 64 years	10	5	5			
65 years and older	31	18	13			
Total :	47	24	23	0	0	0

2.3.3 Listeria in foodstuffs

A. L. monocytogenes in food - Cheeses made from cows' milk - at processing plant - Monitoring (The same monitoring was done in processing plants producing goats semi-soft cheese.)

Preventive measures in place

The implementation of a hygiene concept in order to control the safety of the products is in the responsibility of the producers. All larger cheese producers run a certified quality management fulfilling ISO 9000. The federal research station Agroscope Liebefeld Posieux (ALP) is running a Listeria monitoring program for early detection of Listeria in production facilities.

Measures in case of the positive findings

The concerned food has to be confiscated and destroyed. Depending on the situation the product is recalled and a public warning is submitted.

Results of the investigation

In the framework of the Listeria Monitoring Programme (LMP) 4’314 samples were tested for the presence of listeria in 2011. L. monocytogenes were detected in 24 samples (0.6%), 21 of which were samples from the surroundings, 2 from semi-hard cheese and 1 from hard cheese. In all three types of products the bacteria were found on the surface. Other species of listeria were found in 86 samples (2%). With regard to listeria in the dairy industry, the situation has remained on a constantly low level for many years.

Table Listeria monocytogenes in milk and dairy products

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Sample weight	Units tested	Total units positive for L. monocytogenes	Units tested with detection method	Listeria monocytogenes presence in x g
Cheeses made from cows' milk - hard - made from raw or low heat-treated milk - Monitoring	ALP	Unspecified	Official sampling	food sample		Single	25g	300	0	300	0
Cheeses made from cows' milk - soft and semi-soft - made from raw or low heat-treated milk - Monitoring	ALP	Unspecified	Official sampling	food sample		Single	25g	98	0	98	0

	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Cheeses made from cows' milk - hard - made from raw or low heat-treated milk - Monitoring			
Cheeses made from cows' milk - soft and semi-soft - made from raw or low heat-treated milk - Monitoring			

Footnote:

ALP = Agroscope Liebefeld Posieux

Table Listeria monocytogenes in other foods

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Sample weight	Units tested	Total units positive for L. monocytogenes	Units tested with detection method	Listeria monocytogenes presence in x g
Fish - at border control - Monitoring ((food imported from third countries)) [1)]	FVO	Selective sampling	Official sampling	food sample		Single	25g	24	0	24	0

	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Fish - at border control - Monitoring ((food imported from third countries)) [1)]			

Comments:

[1)] samples originated from Vietnam and Morocco

Footnote:

The FVO runs a border inspection programme in which risked-based random samples are taken from commodities imported from third countries. As commodities from third countries can only be inspected at the airports and because this mode of importation is quite expensive not many samples can be tested.

2.3.4 Listeria in animals

Table Listeria in animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Units tested	Total units positive for Listeria	L. monocytogenes	Listeria spp., unspecified
Cattle (bovine animals) - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	14	6		6
Dogs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	1	0		0
Goats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	17	7		7
Other animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	12	1		1
Pigs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	11	0		0
Sheep - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	18	5		5
Solipeds, domestic - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	8	0		0

Footnote:

All data categorised as “clinical investigations” are summaries of data from the ILD (Informationssystem Labordiagnostik = information system of laboratory data). ILD is run by the FVO and all labs, which are approved for the diagnosis of certain diseases have to report their results in this system. Only tests on antigen detection are selected for the zoonoses reporting in the context of "clinical investigations".

2.4 E. COLI INFECTIONS

2.4.1 General evaluation of the national situation

A. Verotoxigenic Escherichia coli infections general evaluation

History of the disease and/or infection in the country

Laboratories report the detection of EHEC and physicians report EHEC diseases within one week to the cantonal health authorities and to the Federal Office of Public Health (FOPH). Since the first reporting in 1999 confirmed human VTEC cases are fluctuating between 28 and 67 cases per year. The incidence of VTEC infections was never above 0,9 reports per 100,000 inhabitants. Babies and infants aged up to 4 years old are the most frequently affected and disease often develops to the severe form of haemolytic-uraemic syndrome (HUS). From 114 cases occurring from 1997 to 2004 81,5% involved pre-school children suggesting that VTEC is primarily a paediatric problem.
In a study conducted 2010 (Käppeli et al., 2011) 97 human non-O157 VTEC isolates - collected from patients from 2000 to 2009 - were further characterized. In total, 40 different serotypes were found, of which serotypes O26:H11/H-; O103:H2; O121:H19; O145:H28/H- dominated. O26:H11/H- was the one which was most frequently associated with HUS. The high genetic diversity indicates that the non-O157 STEC infections in Switzerland are often sporadic and not major outbreaks.
Furthermore, it is known that VTEC infections also occur frequently after trips abroad to warmer climes. From 1999 to 2006 in 249 cases of EHEC diseases it was found that 62.7% of the patients had been abroad in the week before the onset of the disease. The most common regions mentioned were Southern Europe (incl. Turkey), North Africa, Central America and India.

Figures from food producing animals show that ruminants, especially small ruminants, are an important reservoir for STEC infections in Switzerland. A survey at slaughter in 2000 showed that 14% of faecal samples from cattle, 30% from sheep and 22% from pigs were STEC-positive. In bovine species, it was also found that younger animals excrete more STEC than older animals. Caution is therefore needed when interpreting average figures on the occurrence of STEC for the whole cattle population. In swine the virulence factors of the majority of the found strains seem to be of low virulence.
A study in the 1990s showed that 2.4% of minced meat samples and 21.6% of uncooked, deep-frozen hamburgers were positive for STEC.
Raw milk cheese was tested for STEC from 2006 to 2008 as part of the “national monitoring program for dairy products” (Zweifel et al. 2010). In 1422 samples of raw milk cheese from all over Switzerland, STEC strains could be isolated from 29 of these cheeses in cultures involving 24 semi-hard cheeses and 5 soft cheeses. Thirteen of the 24 strains typeable with O antisera belonged to the serogroups O2, O22 and O91. Nine strains harbored hlyA (enterohemorrhagic E. coli hemolysin), whereas none of the strains tested positive for eae (intimin). The data from the national monitoring program for dairy products confirm a low prevalence of STEC-strains in semi-hard and soft cheese from raw milk. All isolated strains belonged to non-O157 serotypes. These findings confirm that raw milk cheese may constitute a possible source of infection for STEC.

National evaluation of the recent situation, the trends and sources of infection

71 diagnostically established cases of EHEC were registered in 2011. The notification rate was 0.9 new infections per 100’000 inhabitants (previous year: 0.4). This increase of EHEC cases can be partially contributed to the EHEC outbreak in Germany and in the resulting increased disease awareness. Most cases were reported in May (14 cases) and June (13 cases), which coincides with the EHEC outbreak in

Germany. 5 of 71 cases were caused by the O104:H4 strain, the outbreak strain in Germany. Since all 5 affected individuals had stayed in Germany prior to the onset of the disease, it is most likely that they got infected there. In 8 cases serogroup O157 was confirmed and in 9 cases it could be excluded. The other strains remained completely unknown. The most affected age group were young children under 5 years of age. 12 of 17 reported cases with haemolytic uremic syndrome (HUS) were reported from this age group.

2011, two studies relating to Shiga-toxin producing E. coli (STEC) in foodstuffs were conducted by the national reference laboratory within the reporting period. It was shown in a recently published study by Stephan et al. 2008 that 5% of semi-hard raw milk cheeses in Switzerland contain STEC. In a follow-up study (Peng et al. 2012) the die-off behavior of Shiga-toxin producing E. coli was studied during the ripening process of semi-hard raw milk cheeses. It was demonstrated that STEC could be detected after 16 weeks of ripening irrespective of the selected burning temperature (40°C und 46°C) and the initial contamination level (low level and high level).
The other study was concerned with the occurrence of STEC in foods of plant origin (Althaus et al. 2012). Only one out of 233 samples (ready-to-eat lettuce (142), freshly cut fruits (64) and sprouts (27)) was found to be contaminated with a low pathogenic STEC.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

The situation with regard to STEC cases in humans is stable. Thorough cooking of critical foods prevents infection with STEC originally present in the raw products. The findings of the study looking at the behavior of STEC during the ripening process of semi-hard raw milk cheeses underline the importance of good hygiene in the context of milk production and show that STEC are a relevant hazard in this type of dairy product.
As most of the laboratories do not routinely test for VTEC, it is very likely that the impact of VTEC is underestimated. In view of the low infectious dose of STEC (<100 microorganisms) an infection via contaminated food or water is easily possible.

Recent actions taken to control the zoonoses

2011, two studies relating to Shiga-toxin producing E. coli (STEC) in foodstuffs were conducted by the national reference laboratory to generate new information (results see above).

Additional information

1. Althaus, D., Hofer, E., Corti, S., Julmi, A., Stephan R. (2012). Bacteriological survey of ready-to-eat lettuce, fresh-cut fruits and sprouts collected from the Swiss market. Journal of Food Protection, in press.
2. Federal Office of Public Health (2008). Enterohämorrhagische Escherichia coli (EHEC), epidemiologische Daten in der Schweiz von 1996 bis 2006. Bulletin of the FOPH; No. 14: 240-246.
3. Peng, S. Hoffmann, W. Bockelmann, W. Hummerjohann, J., Stephan, R. Hammer, P. (2012). Behavoiur of Shiga toxin-producing and generic E. coli during ripening of semi-hard raw milk cheese. International Journal of Food Microbiology, submitted
4. Stephan et al., Schweiz. Arch. Tierheilkd. 142, 110-114 (2000), Zweifel et al., Int. J. Food Microbiol. 92, 45-53 (2004), Kaufmann et al., J. Food. Prot. 69/2, 260-266 (2006).
5. Stephan et al. (2008). Prevalence and characteristics of Shiga toxin-producing Escherichia coli in Swiss Raw Milk Cheeses Collected at Producer Level. Journal of Dairy Science. 91, 2561-2565.
6. Zweifel C. et al. (2010). Characteristics of Shiga Toxin-Producing Escherichia coli Isolated from Swiss Raw Milk Cheese within a 3-Year Monitoring Program. Journal of Food Protection, Vol. 73, No. 1, 88-91.
7. Käppeli, U., Hächler, H., Giezendanner, N., Beutin, L., Stephan. R. (2011). Shiga toxin-producing Escherichia coli non-O157 strains associated with human infections in Switzerland: 2000-2009. Emerging Infectious Diseases 17, 180-185.
8. Further information can be found on the FVO website www.bvet.admin.ch.

2.4.2 E. coli infections in humans

Table Escherichia coli, pathogenic in humans - Species/serotype distribution

Species/serotype Distribution	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.
Escherichia coli, pathogenic	71	.9	0	0	0	0
HUS	17	0.2				
E.coli infect. (except HUS)	54	0.7				

Footnote:

HUS: All 17 cases were clinically and laboratory confirmed. In 13 cases the serogroup was unknown (inc: 0.2). 2 cases were caused by O157 (inc:<0.1) and 2 by other VTEC (inc:<0.1).

E. coli infection (except HUS): 54 cases were clinically and laboratory confirmed. In addition, there were 5 cases which were only laboratory confirmed and thus not included in the total of the definitiv cases. The serogroup was unknown in 46 cases (inc: 0.6). 6 cases were caused by O157 (inc:<0.1) and 7 by other VTEC (inc:<0.1).

Table Escherichia coli, pathogenic in humans - Age distribution

Age distribution	Verotoxigenic E. coli (VTEC)			Verotoxigenic E. coli (VTEC) - VTEC O157:H7			Verotoxigenic E. coli (VTEC) - VTEC non-O157		
	All	M	F	All	M	F	All	F	M
<1 year	7	4	3	0	0	0	1	0	1
1 to 4 years	18	9	9	2	0	2	4	3	1
5 to 14 years	9	6	3	2	0	2	2	2	0
15 to 24 years	6	3	3	1	0	1	0	0	0
25 to 44 years	15	7	8	2	0	2	0	0	0
45 to 64 years	11	5	6	0	0	0	1	1	0
65 years and older	10	5	5	1	1	0	1	0	1
Total :	76	39	37	8	1	7	9	6	3

2.5 TUBERCULOSIS, MYCOBACTERIAL DISEASES

2.5.1 General evaluation of the national situation

A. Tuberculosis general evaluation

History of the disease and/or infection in the country

Among the reported tuberculosis cases each year, the proportion of tuberculosis cases attributable to Mycobacterium bovis (bovine tuberculosis) has been constantly lower than 2% since many years. Bovine tuberculosis cases are reported each year on a low scale (between 4 and 8 cases per year in the years 2005 to 2010).

Switzerland is officially acknowledged as free from bovine tuberculosis since 1959. Between 1960 and 1980, the entire bovine population was tested every other year in an active surveillance programme. Since 1980, monitoring has been conducted only in the form of passive surveillance at the slaughterhouse. The official meat inspection is investigating each carcass, its organs and lymphatic tissue on the prevalence of abnormal alterations. Carcasses showing clinical signs of tuberculosis have to be destroyed. Since then, isolated cases of bovine tuberculosis have been found (most recently in 1998), which were partly due to reactivation of Mycobacterium bovis infections in humans with subsequent infection of bovine animals. Freedom from disease has been proven in 1997 conducting a survey in a randomized sample of about 10% of farms (4874 farms). 111‘394 cattle (whole holdings older than 6 months) were tuberculin tested. In 72 farms tests had to be repeated. All farms were negative.
No cases of TB were found in captive wild animals that were tested in 1998 (Wyss et al. 2000).

In the last two decades, no more than two cases per year in animals were reported to the FVO by cantonal veterinarians. In the last 10 years a total of 9 cases were registered, of which none occurred in cattle, affecting parrots (2), cats (2) and one each of monkeys, chicken, dogs, horses and lamas.

National evaluation of the recent situation, the trends and sources of infection

In 2011 the Federal Office of Public Health received reports from 578 cases of tuberculosis, 487 of which could be diagnostically confirmed. 370 of them were caused by M. tuberculosis, 13 by M. bovis, 10 by M. africanum and 4 by M. caprae. 90 strains could not be identified. With 13 reported cases, the number of M. bovis associated tuberculosis reports increased compared to the previous year. This increase was mainly observed in over 64 year old Swiss citizens (n=8). The other 5 cases were reported in under 65 year old persons with migration background.

In animals, 2 cases of tuberculosis in lamas (1) and cats (1) were reported in 2011. Furthermore, 60 tests were carried out in veterinary diagnostic laboratories (1/3 each in farm animals (mainly pigs), pets and other species).
Within the framework of a dissertation from August 2009 to February 2012 (Schöning 2012), 165 wild boars and 269 red deer were tested for tuberculosis. Bacteria from the MTBC complex were detected in 6 wild boars (3.6%) and none of the red deer. None of the samples tested positive for M. bovis or M. caprae.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

There is no risk of an TB infection by contact to infected bovines within Switzerland or through food containing Mycobacteria (like raw meat or milk) from Swiss products.

Recent actions taken to control the zoonoses

Because M. caprae infection in red deer is endemic in Austria (Tyrolia and Vorarlberg) since the 90ties, the summer grazing of Swiss cattle in these regions poses a certain risk. Other risk factors are wild animals living close to the Austrian or German border and the international trade with animals.
Within the framework of a dissertation from August 2009 to February 2012 (Schöning 2012, unpublished at the Vetsuisse Faculty in Bern and Zurich), 582 cattle of the Canton St. Gallen, which spent the Alpine pasturing season 2009 on Alpine pastures in Austria, were tested in 2010 using the tuberculin skin test. 23 cows reacted with an unclear result, but were negative after retesting with either or both of the following methods: the tuberculin skin test as well as the Interferon-gamma test.
In addition, wild animal populations of areas bordering Austria, Italy and France were tested for tuberculosis (results see above). The results of the dissertation give no indication of the occurrence of the disease in either the pastured cattle in Austria nor the wild game population of Switzerland.

Additional information

1. Wyss D., Giacometti M., Nicolet J., Burnens A., Pfyffer GE., Audige L., (2000). Farm and slaughter survey of bovine tuberculosis in captive deer in Switzerland. Vet. Rec. 147,713 -717.
2. Schöning 2012, dissertation, unpublished
3. Further information can be found on the FVO website www.bvet.admin.ch.

2.5.2 Tuberculosis, mycobacterial diseases in humans

A. Tuberculosis due to Mycobacterium bovis in humans

Reporting system in place for the human cases

Tuberculosis in humans is a notifiable disease. Medical doctors have to report within one week the detection of mycobacteria (of the Mycobacterium tuberculosis complex) in culture or the start of a treatment with more than 3 different antituberculosis agents. Laboratories have to report the detection of mycobacteria of the Mycobacterium tuberculosis complex as well (ordinance of the FDHA on medical doctor and laboratory reporting).

Table Mycobacterium in humans - Species/serotype distribution

Species/serotype Distribution	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.
Mycobacterium	487	6.2	0	0	0	0
M. bovis	13	0.2				
M. tuberculosis	370	4.7				
M. africanum	10	0.1				
M. caprae	4	0.1				
Mycobacterium spp., unspecified	90	1.1				

Table Mycobacterium in humans - Age distribution

Age distribution	M. bovis			Mycobacterium spp., unspecified		
	All	M	F	All	M	F
<1 year	0	0	0	1	1	0
1 to 4 years	0	0	0	8	5	3
5 to 14 years	0	0	0	7	3	4
15 to 24 years	0	0	0	73	45	28
25 to 44 years	3	2	1	205	122	83
45 to 64 years	2	0	2	108	68	40
65 years and older	8	3	5	72	41	31
Total :	13	5	8	474	285	189

2.5.3 Mycobacterium in animals

A. Mycobacterium bovis in bovine animals

Status as officially free of bovine tuberculosis during the reporting year

The entire country free

Switzerland is officially acknowledged as free from bovine tuberculosis. Requirements of section 3.2.3.10 of the OIE International Animal Health Code are fulfilled since 1959. Free status is recognised by EU (Bilateral Agreement on Agriculture, Veterinary Annex). Freedom from disease has been proven in 1997 conducting a survey in a randomized sample of 4874 farms. 111‘394 cattle (whole holdings older than 6 months) were tuberculin tested. In 72 farms tests had to be repeated. All farms were negative.

Monitoring system

Case definition

Tuberculosis is defined as the detection of Mycobacterium bovis or Mycobacterium tuberculosis (TSV, Articles 158 – 159).

Vaccination policy

Vaccination is prohibited.

Notification system in place

Bovine tuberculosis is notifiable since 1950. Bovine tuberculosis is regulated as zoonoses to be eradicated (Swiss ordinance of epizootics, TSV Art. 158 - Art. 165). Notification of suspicious cases is mandatory. Actions to be taken in suspicious farms are ban of all animal traffic and investigation of the whole herd. In confirmed cases (herds) all diseased or suspicious cattle has to be slaughtered and the milk of them is disposed. The barn has to be disinfected.

National evaluation of the recent situation, the trends and sources of infection

Up to date there are no observations that would challenge the freedom of Swiss cattle from tuberculosis. Especially the results of the monitoring of cattle which were on Alpine pastures in Austria and of red deer and wild pigs in the Alpine region close to the Swiss border in 2010 will be important for a more accurate evaluation.

Table Tuberculosis in other animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Units tested	Total units positive for Mycobacterium	M. bovis	M. tuberculosis	Mycobacterium spp., unspecified
Alpacas - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	1	0			0
Birds - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	2	0			0
Camels - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	1	0			0
Cats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	4	0			0
Cattle (bovine animals) - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	3	0			0
Dogs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	2	0			0
Other animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	20	6			6
Pigs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	16	3			3
Wild animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	3	0			0

Footnote:

All data categorised as “clinical investigations” are summaries of data from the ILD (Informationssystem Labordiagnostik = information system of laboratory data). ILD is run by the FVO and all labs, which are approved for the diagnosis of certain diseases have to report their results in this system. Only tests on antigen detection are selected for the zoonoses reporting in the context of "clinical investigations".

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

If present, the row "Total -1" refers to analogous data of the previous year.

Region	Total number of existing bovine		Officially free herds		Infected herds		Routine tuberculin testing		Number of tuberculin tests carried out before the introduction into the herds (Annex A(I)(2)(c) third indent (1) of Directive 64/432/EEC)	Number of animals with suspicious lesions of tuberculosis examined and submitted to histopathological and bacteriological	Number of animals detected positive in bacteriological examination
	Herds	Animals	Number of herds	%	Number of herds	%	Interval between routine tuberculin tests	Number of animals tested			
Schweiz/Suisse/Svizzera	41018	1583151	41018	100	0	0	no routine test	0	0	2	0
Total : [1]	41018	1583151	41018	100	0	0	N.A.	0	0	2	0

Comments:

[1] N.A.

Footnote:

Freedom from disease has been proven in 1997 conducting a survey in a randomized sample of 4874 farms. 111'394 cattle were tuberculin tested. All farms were negative.

2.6 BRUCELLOSIS

2.6.1 General evaluation of the national situation

A. Brucellosis general evaluation

History of the disease and/or infection in the country

Brucellosis in humans is a notifiable disease. Laboratories must report the detection of Brucella within one week (ordinance of the FOHA on doctor and laboratory reports). The number of detections of Brucella spp. in humans have been rare for many years. The literature shows that in contrast to Biovar 1 and Biovar 3, B. suis Biovar 2 is very rarely notified in humans (probably as Biovar 2 is known to be less virulent to humans than Biovar 1 and 3).
Brucellosis in animals falls into the category of a “disease to be eradicated“ (TSV, Article 3). Government measures are applied to control brucellosis in sheep and goats (Brucella melitensis, TSV, Articles 190-195), in cattle (Brucella abortus, TSV, Articles 150-157) and in pigs (Brucella suis as well as Brucella abortus and Brucella melitensis, TSV, Articles 207 – 211). These animal species must be tested for brucellosis in cases where the causes of abortion are being investigated (TSV, Article 129). Bovine brucellosis is notifiable since 1956, in sheep and goats since 1966.
Switzerland is officially recognised as free of brucellosis in cattle, sheep and goats. The last case of bovine Brucella abortus infection was reported in 1996, the last case of Brucella melitensis infection in small ruminants in 1985. Freedom from bovine brucellosis has been proven the last time in 1997 conducting a survey in a randomized sample of 4’874 farms. 139‘655 cows (in general older than 24 months) were tested using a serological test. There were no positive findings in these samples. Since 1998 the freedom of the sheep and goat population from disease is documented annually in National Surveys with serological testing (TSV, Article 130). The farms to be tested are randomly selected. EU regulation 91/68/EEC that defines populations of sheep and goat as one epidemiological unit is the basis of the survey.
Brucella suis in pigs is very rare: after a reported case in a wild boar in 2001, three cases occurred in 2009 in pigs (Brucella suis Biovar 2), the first cases since many years in domestic pigs. The primary outbreak was in a farm where the pigs were reared outdoor and contact to wild boars was very likely. Two secondary farms had contact to the first one via animal traffic.
Vaccination is prohibited since 1961. Requirements of section 3.2.1.5 of the OIE International Animal Health Code are fulfilled since 1963. Free status is recognised by EU (Bilateral Agreement on Agriculture, Veterinary Annex).

National evaluation of the recent situation, the trends and sources of infection

In 2011 8 brucellosis cases were reported, all of which were caused by Brucella melitensis. Among these cases, 4 affected members of the same family that had consummated imported raw milk cheese from abroad.
Human infections with Brucella through the consumption of Swiss raw milk or dairy products from non-heat-treated milk (for example sheep or goat’s cheese) is considered to be of no relevance in Switzerland, because the Swiss animal population is free of this pathogen. Cases of brucellosis in humans are anticipated to be attributable either to stays abroad or to the consumption of foreign products.
In the yearly National Survey in 2011 a total of 681 sheep farms (10‘998 blood samples) and 526 goat farms (5’030 blood samples) were tested negative for Brucella melitensis. Furthermore, no cases of brucellosis in sheep and goats were reported by the cantonal veterinarians. In addition, a total of 1’281

animals were tested in the context of clinical investigations or abortions in 2011 in diagnostic laboratories. It is known that B. suis Biovar 2 is prevalent in wild boars (Leuenberger et al., 2007). In a recent study conducted between 2008 and 2010 Wu (2011) found that 28.8% (95% CI 23.0%-34.0%) of the tested wild boars were Brucella suis Biovar 2 positive and 35.8% (95% CI 30.0%-42.0%) had antibodies against B. suis. These findings were significantly higher than in previous studies indicating a spread of B. suis Biovar 2 in Swiss wild boars. In addition, Wu (2011) found that mainly outdoor pigs which are outside the whole day, close to the forest (<50m) and with low fences (<60cm) had the highest risk of contact with wild boars. A questionnaire revealed that 31% of the gamekeeper and 25% of outdoor pig holders observed at least 1 interaction between wild boars and pigs in the past 20 years. 5% of holdings reported hybrides. As wild boars live mainly in the Jura and holdings which keep pigs outdoors are located mainly in the middle part of Switzerland, contacts are most likely to occur at the border of these two regions.

Although the cases in 2009 are unlikely to have come from wild boar contacts (comparison of the isolates found in pigs in 2009 with those found in wild boars using the MLVA (Multi locus variable number of tandem repeats) typing method showed no relation amongst these (Abril 2011)), the occurrence of B. suis in wild pigs should be investigated also in the future.

Recent actions taken to control the zoonoses

National surveys on a yearly basis are carried out to document freedom from brucellosis in sheep and goat.
A research study was conducted in 2008 -2010 to obtain recent B.suis prevalence data in wild boars and to evaluate risk factors for the infection of pigs which are reared outdoor (results see above).

Additional information

1. Leuenberger R, Boujon P, Thür B, Miserez R, Garin-Bastuji B, Rüfenacht J, Stärk KD (2007) Prevalence of classical swine fever, Aujeszky's disease and brucellosis in a population of wild boar in Switzerland, Vet Rec; 160(11):362-8.
2. Hinić V., Brodard I., Thomann A., Cvetnić Z., Makaya P.V., Frey J., Abril C. (2008) Novel identification and differentiation of Brucella melitensis, B. abortus, B. suis, B. ovis, B. canis, and B. neotomae suitable for both conventional and real-time PCR systems; J Microbiol Methods Oct 75(2):375-8
3. Hinić V, Brodard I, Thomann A, Holub M, Miserez R, Abril C. (2009) IS711-based real-time PCR assay as a tool for detection of Brucella spp. in wild boars and comparison with bacterial isolation and serology; BMC Veterinary Research. Jul 14;5:22
4. Hinić V., Brodard I., Petridou E., Filiousis G., Contos V., Frey J., Abril C. (2009); Brucellosis in a dog caused by Brucella melitensis Rev 1,Vet Microbiol, Sept 26
5. Abril C, Thomann A, Brodard I, Wu N, Ryser-Degiorgis MP, Frey J, Overesch G. (2011) A novel isolation method of Brucella species and molecular tracking of Brucella suis biovar 2 in domestic and wild animals, Vet Microbiol. 2011 Mar 5
6. Wu, N Abril, C., Hinic, V., Brodard, I., Thür, B., Fattebert, J., Hüssy, D., Ryser-Degiorgis, M.P. 82011). Free-ranging wild boar may represent a threat to disease freedom in domestic pigs in Switzerland. J Wildl Dis, in revision
7. Wu, N., Abril, C., Thomann, A., Grosclaude, E., Doherr, M.G., Boujon, P., Ryser-Degiorgis, M.P. (2011). Contacts between wild boar and outdoor pigs in Switzerland: risk factors and assessment of pathogen spill -over. Vet Rec, in revision
8. Further information can be found on the FVO website www.bvet.admin.ch.

2.6.2 Brucellosis in humans

Table Brucella in humans - Species/serotype distribution

Species/serotype Distribution	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.
Brucella	8	.1	0	0	0	0
B. melitensis	8	0.1				

Table Brucella in humans - Age distribution

Age distribution	B. abortus			B. melitensis			Brucella spp., unspecified		
	All	M	F	All	M	F	All	M	F
<1 year				0	0	0			
1 to 4 years				1	0	1			
5 to 14 years				0	0	0			
15 to 24 years				2	2	0			
25 to 44 years				3	2	1			
45 to 64 years				2	1	1			
65 years and older				0	0	0			
Total :	0	0	0	8	5	3	0	0	0

2.6.3 Brucella in animals

A. Brucella abortus in bovine animals

Status as officially free of bovine brucellosis during the reporting year

The entire country free

Switzerland is officially acknowledged as free from bovine brucellosis since 1959. Bovine brucellosis is notifiable since 1956. Requirements of section 3.2.1.5 of the OIE International Animal Health Code are fulfilled since 1963. Free status is recognised by EU (Bilateral Agreement on Agriculture, Veterinary Annex).
Freedom from disease has been proven in 1997 conducting a survey in a randomized sample of 4874 farms. 139‘655 cows (in general older than 24 months) were tested using serological test were tested. Tests were perfotmed in blood samples from 31042 animals and in 18952 pooled bulk milk samples. There were no positive findings in these samples.

Vaccination policy

Vaccination is prohibited since 1961.

Measures in case of the positive findings or single cases

Actions to be taken in suspicious farms are ban of all animal traffic and investigation of the whole herd as well as the placenta of calving cows.
In confirmed cases (herds) the whole herd has to be killed immediately. All placentas, abortion material and the milk of diseased and suspicious animals have to be disposed. The barn has to be disinfected. Official meat inspection is investigating each carcass, its organs and lymphatic tissue on the prevalence of abnormal alterations. Carcasses showing clinical signs of brucellosis have to be destroyed and farms of origin are investigated.

Notification system in place

Notification of suspicious cases and outbreaks is mandatory since 1956. Brucellosis in bovine animals is regulated as zoonoses to be eradicated (TSV, Art. 150 - Art. 157).

National evaluation of the recent situation, the trends and sources of infection

There are no observations that would challenge the freedom of Swiss cattle population from brucellosis.

B. Brucella melitensis in goats

Status as officially free of caprine brucellosis during the reporting year

The entire country free

Switzerland is officially acknowledged as free from ovine and caprine brucellosis.
Freedom from disease has been proved every year since 1998 conducting a survey in a randomized sample of farms. Free status is recognized by EU (Bilateral Agreement on Agriculture, Veterinary Annex).

Additional information

EU regulation 91/68/EEC that defines populations of sheep and goat as one epidemiological unit is the basis of the survey. Scientific basis is published by Hadorn et al. 2002: Risk-based design of repeated surveys for the documentation of freedom from non-highly contagious diseases. Preventive Veterinary Medicine (2002) 56: 179.192.

Vaccination policy

Vaccination is prohibited since 1961.

Measures in case of the positive findings or single cases

Actions to be taken in suspicious farms are ban of all animal traffic and the investigation of the whole herd. In confirmed cases (herds) the whole herd has to be killed immediately. All placentas, abortion material and the milk of diseased and suspicious animals have to be disposed. The barn has to be disinfected. Official meat inspection is investigating each carcass, its organs and lymphatic tissue on the prevalence of abnormal alterations. Carcasses showing clinical signs of brucellosis have to be destroyed and farms of origin are investigated.

Notification system in place

Notification of suspicious cases and outbreaks is mandatory since 1966. Brucellosis in sheep and goats is regulated as zoonoses to be eradicated (TSV, Art. 190 - Art. 195).

Results of the investigation

In 2011 a randomized sample of 681 farms with sheep and 526 farms with goats were included in the survey. 10’998 samples from sheep and 5’030 samples from goats were tested using serological test. There were no positive findings in these samples.

National evaluation of the recent situation, the trends and sources of infection

There are no observations that would challenge the freedom of Swiss sheep and goat population from brucellosis.

C. Brucella melitensis in sheep

Status as officially free of ovine brucellosis during the reporting year

The entire country free

Switzerland is officially free of ovine brucellosis during reporting year. The entire country is free.

Table Brucellosis in other animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Units tested	Total units positive for Brucella	B. abortus	B. melitensis	B. suis
Alpacas - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	3	0			
Cattle (bovine animals) - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	1206	0			
Goats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	16	0			
Other animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	3	0			
Pigs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	13	0			
Sheep - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	34	0			
Solipeds, domestic - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	6	0			

	Brucella spp., unspecified
Alpacas - Clinical investigations	
Cattle (bovine animals) - Clinical investigations	
Goats - Clinical investigations	
Other animals - Clinical investigations	
Pigs - Clinical investigations	
Sheep - Clinical investigations	
Solipeds, domestic - Clinical investigations	

Table Brucellosis in other animals

Footnote:

All data categorised as “clinical investigations” are summaries of data from the ILD (Informationssystem Labordiagnostik = information system of laboratory data). ILD is run by the FVO and all labs, which are approved for the diagnosis of certain diseases have to report their results in this system. Only tests on antigen detection are selected for the zoonoses reporting in the context of "clinical investigations".

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

If present, the row "Total -1" refers to analogous data of the previous year.

Region	Total number of existing		Officially free herds		Infected herds		Surveillance			Investigations of suspect cases				
	Herds	Animals	Number of herds	%	Number of herds	%	Number of herds tested	Number of animals tested	Number of infected herds	Number of animals tested with serological blood tests	Number of animals positive serologically	Number of animals examined microbio logically	Number of animals positive microbio logically	Number of suspended herds
Schweiz/Suisse/Svizzera [1)]	15155	497739	15155	100	0	0	1207	16028	0	0	0	0	0	0
Total : [2)]	15155	497739	15155	100	0	0	1207	16028	0	0	0	0	0	0

Comments:

1) In 2011 a randomized sample of 681 farms with sheep and 526 farms with goats were included in the survey. 10’998 samples from sheep and 5’030 samples from goats were tested using serological tests. There were no positive findings in these samples.

2) N.A.

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

If present, the row "Total -1" refers to analogous data of the previous year.

Region	Total number of existing bovine		Officially free herds		Infected herds		Surveillance						Investigations of suspect cases								
							Serological tests			Examination of bulk milk			Information about			Epidemiological investigation					
																		Number of positive animals			
	Herds	Animals	Number of herds	%	Number of herds	%	Number of bovine herds tested	Number of animals tested	Number of infected herds	Number of bovine herds tested	Number of animals or pools tested	Number of infected herds	Number of notified abortions whatever cause	Number of isolations of Brucella infection	Number of abortions due to Brucella abortus	Number of animals tested with serological blood tests	Number of suspended herds	Sero logically	BST	Number of animals examined microbio logically	Number of animals positive microbio logically
Schweiz/Suisse/Svizzera	41018	1583151	41018	100	0	0	0	0	0	0	0	0	1405	0	0	2713	0	10	0	1	0
Total : [1]	41018	1583151	41018	100	0	0	0	0	0	0	0	0	1405	0	0	2713	0	10	0	1	0

Comments:

[1] N.A.

Footnote:

Freedom from disease has been proven in 1997 conducting a survey in a randomized sample of 4874 farms. 139'655 cows were tested using serological test were tested. Tests were perfotmed in blood samples from 31042 animals and in 18952 pooled bulk milk samples. There were no positive findings in these samples.

2.7 YERSINIOSIS

2.7.1 General evaluation of the national situation

A. Yersinia enterocolitica general evaluation

History of the disease and/or infection in the country

Yersiniosis in humans is not notifiable. Thus, no data on the occurrence of human yersiniosis are available.

In animals, yersiniosis is notifiable (TSV, Article 5 and Article 291) and cantonal veterinarians may issue an order for a suspected case to be investigated.
In most cases, yersiniosis is caused by Yersinia enterocolitica and, in rare cases, also by Yersinia pseudotuberculosis. In the past ten years (2002-2011) never more than 3 cases per year were reported, in the last 5 years even never more than 1. 4 (28%) of the 14 yersiniosis cases reported during this time period affected monkeys, 7 (50%) were unknown species and one case each occurred in sheep, rabbits and alpacas.

In 2001 faecal samples of 88 farms with fattening pigs were analysed for yersinia. 56 of the 88 (64%) were Yersinia positive. In 133 of the 352 faecal samples Y. enterocolitica was isolated. 37% of the 133 isolates were Biotype 1A, 10% Biotype 4/O:3, 4% Biotype 3/O:3; 13,5% Biotype 2/O:9 and 29% Biotype 2/neither O:3 nor O:9. In this study the use of medical feed at beginning of housing was a potential risk factor.

In 2002 865 Swiss pig meat samples (Schnitzel, minced meat, chopped meat) were collected in 283 different markets. 15,5% were Y. enterocolitica positive, of which almost 90% were Biotype 1A. Overall in 0,7% of the 865 samples potentially humanpathogenic Y. enterocolitica were isolated.
From 2003 until 2005 a yersinia monitoring on the surface of slaughter pig carcasses at the four largest slaughter houses was conducted. Each year 80 slaughter pigs were sampled (from each pig samples from 4 different regions of the carcass were pooled). Low rates of Yersinia contamination on the carcass surfaces were found (between 1% und 6%).

In 2006, tonsils of 212 slaughter pigs representing 16 farms were sampled in one single slaughter house. Using real-time PCR 88% of the 212 tonsils were positive. Using the culture method prevalence rates were much lower (34%). 69 isolates (96%) were found to be Biotype 4/O:3, 6 isolates were Biotype 2/O:5;27 and 1 Biotype 2/O:9.

Between October 2007 and March 2008 153 wild boars shot in the region of Geneva were sampled. 65% of the wild boars had antibodies in the tonsil fluids. Using PCR 44% of the tonsils were positive for Yersinia spp., 35% for Y. enterocolitica and 20% for Y. pseudotuberculosis. However, in culture detection rates were much lower: 9% for Y. enterocolitica and 3% for Y. pseudotuberculosis.

National evaluation of the recent situation, the trends and sources of infection

No cases in animals were reported to the FVO by the cantonal veterinarians in 2011. The number of reported cases in the recent years has been constantly at a very low level.
In veterinary diagnostic laboratories 2339 tests for yersiniosis were carried out in the context of clinical investigations in 2011, mainly in dogs and cats (79%), cattle (6%), horses (5), birds (3%) and “other species” (5%). Except for 13 dogs and 1 pig all laboratory results were negative (see table Yersinia in

animals).

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

The risk of infection for humans is estimated to be minimal in Switzerland.

Recent actions taken to control the zoonoses

Switzerland carries out a Yersinia prevalence study in tonsils in slaughter pigs from March 2012 to February 2013 according to the technical specifications for harmonized national surveys on Yersinia enterocolitica in slaughter pigs (EFSA Journal 2009; 7(11):1374).

Additional information

Further information can be found on the FVO website www.bvet.admin.ch.

2.7.2 Yersinia in animals

Table Yersinia in animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Units tested	Total units positive for Yersinia	Y. enterocolitica	Y. pseudotuberculosis	Yersinia spp., unspecified
Alpacas - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	1	0			0
Birds - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	62	0			0
Camels - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	2	0			0
Cats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	752	0			0
Cattle (bovine animals) - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	136	0			0
Dogs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	1090	13			13
Fur animals - farmed - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	11	0			0
Goats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	11	0			0
Other animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	114	0			0
Pigs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	11	1			1
Rabbits - farmed - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	27	0			0
Sheep - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	11	0			0
Solipeds, domestic - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal	111	0			0

Table Yersinia in animals

	Y. enterocolitica - O:3	Y. enterocolitica - O:9	Y. enterocolitica - unspecified	Y. enterocolitica - O:5	Y. enterocolitica - O:5,27	Y. enterocolitica - biotype 1A
Alpacas - Clinical investigations						
Birds - Clinical investigations						
Camels - Clinical investigations						
Cats - Clinical investigations						
Cattle (bovine animals) - Clinical investigations						
Dogs - Clinical investigations						
Fur animals - farmed - Clinical investigations						
Goats - Clinical investigations						
Other animals - Clinical investigations						
Pigs - Clinical investigations						
Rabbits - farmed - Clinical investigations						
Sheep - Clinical investigations						
Solipeds, domestic - Clinical investigations						

Footnote:

All data categorised as “clinical investigations” are summaries of data from the ILD (Informationssystem Labordiagnostik = information system of laboratory data). ILD is run by the FVO and all labs, which are approved for the diagnosis of certain diseases have to report their results in this system. Only tests on antigen detection are selected for the zoonoses reporting in the context of "clinical investigations".

2.8 TRICHINELLOSIS

2.8.1 General evaluation of the national situation

A. Trichinellosis general evaluation

History of the disease and/or infection in the country

Trichinellosis in humans is a notifiable disease in Switzerland since 1st January 2009. Medical doctors have to report the disease and laboratories the detection of Trichinella spp. (ordinance of the FDHA on doctor and laboratory reporting).

Trichinella infections and suspicion of Trichinella infections in animals are notifiable since 1966. Trichinella infections in animals fall in the category of animal diseases to be monitored (TSV, Article 5).

The testing on trichinellosis of all slaughter pigs is mandatory since 1st January 2007. At that time Switzerland's regulations got aequivalent to Commission Regulation (EC) No. 2075/2005. Exceptions from this obligation are only made for slaughterhouses with a small capacity who do not export to the EU. Meat of pigs which have not been tested for trichinellosis is since then labeled with a special stamp, so it can be guaranteed that such meat is not exported to the EU.

Trichinella infections in pigs have not been detected in Switzerland for many decades. From 2001 to 2004, between 400'000 and 490'000 pigs (15 to 19% of all slaughtered pigs) were tested every year without any positive findings. Since 2005 the number of pigs tested of the pigs slaughtered in abattoirs increased steadily, all with negative results: 34% in 2005, 44% in 2006, about 90% in 2007, 2008 and 2009.
In the last 10 years reported cases in animals to the FVO by the cantonal veterinarians ranged between 0 and 3 cases per year and always concerned carnivorous wild animals, never domestic animals. The 14 cases reported to the FVO by cantonal veterinarians in 2002-2011 concerned lynx (11), foxes (2) and wolves (1). The nematodes involved were of a single species, namely Trichinella britovi.

A study of the University of Berne conducted from 1999 until 2007 found that 15 (27.3%) of 55 assessed lynxes harbored Trichinella britovi larvae. Furthermore, in 2006/2007 21 (1.6%) of 1298 assessed foxes proved positive for Trichinella britovi larvae (Frey et al., Veterinary Parasitology, 2009).
In another study of the University of Berne, 1458 wild boars were tested for Trichinella spp. in 2008. Although all 1458 wild boars have been tested negative for Trichinella by artificial digestion, 3 wild boars had antibodies against Trichinella (seroprevalence 0.2%) illustrating that wild boars can have contact with this nematode (Frey et al., 2009, Schweiz. Archiv für Tierheilkunde).

National evaluation of the recent situation, the trends and sources of infection

In 2011, the Federal Office of Public Health received no report of human trichinellosis.

2011 2660000 million slaughter pigs (94% of all slaughtered pigs) were tested for Trichinella with a negative result. Due to the extensive testing of the last years with only negative results, Swiss slaughter pigs are projected to be free of Trichinella. A study in 2009 confirms this declaration. 20'000 slaughter pigs were tested with an improved digestion method and all animals were free of antibodies against Trichinella spp. (Schuppers et al., 2009, Zoonoses and Public Health). In addition, 2622 horses (84% of all slaughtered horses) were tested for trichinellosis by digestion of meat samples, which all tested negative.

However, the disease is sporadically detected in the wild animal population (excluding wild boars). 2011, one case of Trichinella infection in a lynx was reported to the FVO by the cantonal veterinarians. Furthermore, 1918 wild animals, mainly wild boars, were tested negative for Trichinella.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

Trichinellosis in humans is very rare in Switzerland and is often associated with infections abroad. Although, the risk of transmission from wild animals to domestic pigs is minimal, the surveillance of trichinellosis in wild animals is of vital importance. As all infections in wildlife in the past were T. britovi, Switzerland is considered free of Trichinella spiralis. The estimated risk of Trichinella transmission from wildlife to the slaughter pig population is negligible.

Additional information

1. Jakob et al., Schweiz. Arch. Tierheilk. 136: 298-308,1994
2. Frey et al., Veterinary Parasitology, 2009
3. Frey et al., Schweiz. Archiv für Tierheilkunde, 2009
4. Schuppers et al., Zoonoses and Public Health, 2009
5. Further information can be found on the FVO website www.bvet.admin.ch.

2.8.2 Trichinellosis in humans

Table Trichinella in humans - Species/serotype distribution

Species/serotype Distribution	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.
Trichinella	0	0	0	0	0	0
Trichinella spp., unspecified	0	0	0	0	0	0

2.8.3 Trichinella in animals

A. Trichinella in horses

Monitoring system

Sampling strategy

The investigation of horses is mandatory (Swiss ordinance of slaughter and meat control, VSFK, Art. 31).

Frequency of the sampling

All slaughtered horses are tested during or immediately after the slaughter process.

Type of specimen taken

Piece of tongue

Case definition

Detection of Trichinella spp. larvae.

Diagnostic/analytical methods used

Artificial digestion method according to Commission Regulation (EC) No. 2075/2005.

Results of the investigation including the origin of the positive animals

In 2011 2622 horses (84% of all slaughtered horses) were tested for Trichinella with negative results.

Notification system in place

Trichinellosis in animals is notifiable (TSV, Article 5).

National evaluation of the recent situation, the trends and sources of infection

There are no observations that would challenge the freedom of Swiss horses from trichinellosis.

B. Trichinella in pigs

Monitoring system

Sampling strategy

General

The investigation of slaughtered pigs and wild boars is mandatory (Swiss ordinance of slaughter and meat control, VSFK, Art. 31). All pigs slaughtered in slaughterhouses that are approved to export in the EU are sampled for Trichinella examination. Exception of this test obligation is made for small slaughterhouses of the national market which do not export to the EU.

Frequency of the sampling

General

Census sampling with the exception of pigs slaughtered in small slaughterhouses and only produced for the local market, is done during or immediately after the slaughter process.

Type of specimen taken

General

Piece of pillar of the diaphragm.

Methods of sampling (description of sampling techniques)

General

Piece of pillar of the diaphragm taken at slaughter.

Case definition

General

Detection of Trichinella spp. larvae.

Diagnostic/analytical methods used

General

Artificial digestion method according to Commission Regulation (EC) No. 2075/2005.

Measures in case of the positive findings or single cases

A positive tested batch at a slaughter house would be traced back and contaminated carcasses would be disposed of.

Notification system in place

Trichinellosis in animals falls in the category of animal diseases to be monitored (TSV, Article 5).

Results of the investigation including description of the positive cases and the verification of the Trichinella species

In 2011, 2.66 Mio slaughter pigs (94% of the total slaughter population) were tested and no Trichinella larvae were found.
In addition, 1918 wild boars were tested with negative results.

National evaluation of the recent situation, the trends and sources of infection

Although the risk of the parasite cycle crossing from the wild animal population into the conventional domestic pig population can be regarded as negligible, the risk has to be categorised differently or higher with regard to the special situation of grazing pigs.

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

As all results were negative since many years, it is highly unlikely that Trichinella infections acquired in Switzerland do occur.

Additional information

Table Trichinella in animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Units tested	Total units positive for Trichinella	T. spiralis	Trichinella spp., unspecified	T. britovi
Solipeds, domestic - horses - at slaughterhouse - Surveillance [1)]	FVO	Census	Not applicable	animal sample		Animal	2622	0			
Pigs - at slaughterhouse - Surveillance [2)]	FVO	Census	Official sampling	animal sample		Animal	2660000	0			
Wild boars - wild [3)]	FVO	Unspecified	Not applicable	animal sample		Animal	1918	0			

Comments:

[1)] Data originate from the FLEKO = Fleischkontrollstatistik (meat inspection statistics)

[2)] Data originate from the FLEKO = Fleischkontrollstatistik (meat inspection statistics)

[3)] Data originate from the ILD = Informationssystem Labordiagnostik (information system of laboratory data) as well as from the FLEKO = Fleischkontrollstatistik (meat inspection statistics). Up to date there is no further differentiation in the ILD among wild animals possible. However, it is known that only very few other wild animals other than wild boars are tested for Trichinella. In 2011, one lynx was found positive for Trichinella britovi.

2.9 ECHINOCOCCOSIS

2.9.1 General evaluation of the national situation

A. Echinococcus spp. general evaluation

History of the disease and/or infection in the country

Echinococcus granulosus, the causative agent of Zystic Echinococcosis has nearly been extincted in Switzerland, sporadically imported cases are diagnosed in humans or animals (dogs or cattle or sheep, probably infected from imported infected dogs).

Alveolar echinococcosis (AE) is caused by the “dangerous” fox tapeworm Echinococcus multilocularis. An infection results in disease with severe consequences for the person concerned. Human cases of Echinococcosis were notifiable to FOPH until 1998. Although it is no longer notifiable, data are available. Exact figures on the incidence of AE in humans are collected in Switzerland since 1956 at the Institute of Parasitology of the University of Zurich being the National Reference Centre for echinococcosis. Data originates from cohorts of the large treatment centres as well as analysis of seropositive patients originating from the 3 centres for serodiagnosis of the disease. In comparison to earlier years (1990 until 2000), the frequency of AE increased from the beginning of 2001 until the end of 2008 by the 2.5-fold. From 2006-2010 the average incidence was 0.25 cases in 100’000 per year adding up to approximately 20 (each year 10 – 29 cases) newly diagnosed cases annually. Average age at time of diagnosis in all studies ranged from 52 to 55 years without any significant difference. The age specific incidence yields a significant increase with every 20 years of life except for persons aged > 80 years. The proportion of female cases increased significantly to 55% in the years 1984-2010 compared to earlier years (46%). 55% of all AE cases in Switzerland from 1984-2010 have been diagnosed in patients living in urban areas, although the incidence in rural areas is still significantly higher (0.26 per 100’000 per year from 1984-2010, and 0.12 in urban areas, respectively; $p< 0.001$). Incidences increased mainly in 6 major agglomeration areas (defined based on criteria such as population size, number of places of employment and proportion of the workforce working in core cities, core areas of an agglomeration, edificial interconnection or bordering of cities): around Constanz, Zurich, Bern, Basel, Lausanne and Geneva.

In animals, echinococcosis is notifiable (TSV, Article 5 and Article 291). Since 1996 reported cases per year rank between 0 and 9 cases. In the past ten years (2001 to 2010) 44 echinococcosis cases were reported to the FVO by cantonal veterinarians. 52% occurred in dogs, 20% in foxes, 12% in monkeys and the remaining 16% in pigs, wild animals and other species.
In the years 2007 and 2008, the Institute of Parasitology of the University of Zurich tested mice and feacal fox samples in the region of Zurich. About 17% of the mice (100 mice from 634 in 2007 resp. 66 from 393 in 2008) were positive for E. multilocularis. In the fox faecal samples the number of positive samples declined from 26% in 2007 to 19% in 2008 (361/1376 in 2007 resp. 202/1044 in 2008). However fox faecal samples from regions without deworming bait containing praziquantel remained at the level of the previous year (63/254 (25%) samples were positive).
In a dog survey in 2009 in Switzerland the prevalence of E. multilocularis (determined by egg isolation and species specific PCR) was found to be 0% (0.0/0.0-2.5) in 118 randomly collected pet dogs, but 2.4% (0.5 -6.9%) in 124 farm dogs with free access to the surrounding fields. In this study eggs were also isolated from hair samples of all dogs. No taeniid-eggs were found on the surface of pet dogs, but in 2 cases (1.6%) taeniid-eggs were isolated from farm dogs. Species identification in these two cases was not achieved by PCR.

National evaluation of the recent situation, the trends and sources of infection

Generally speaking, an infection of humans with Echinococcus multilocularis, the causative agent in AE, is rare – albeit the increased risk of infection since 2001. Following the steep increase in 2001, the incidence of human AE-cases currently appears to stabilize on this higher level. In contrast to existing perceptions, the majority of cases in Switzerland are diagnosed in urban areas. Also, most areas with increasing incidences can be allocated to areas of core cities and the corresponding agglomeration. Age appears to be an important factor in the development of clinically relevant AE.
The increased risk is thought to be caused by the encroachment of foxes to the urban areas as a consequence of an increased fox population by a factor of 2.6 after having eradicated fox rabies from 1984 to 2000 (mean numbers of foxes shot or found dead: 19’500 from 1977-1987 and 51’500 from 1997-2007). It is estimated that the prevalence of Echinococcus multicularis in foxes lies between 30% and 70%.

Up to date, no more than 10 cases per year are reported in animals. In 2011, 10 cases were reported to the FVO by the cantonal veterinarians, affecting 8 foxes and 2 dogs. A total of 52 cases of echinococcosis were registered in the last 10 years, most of which occurred in dogs (46%), foxes (33%) and apes (10%). In 2011, 71 tests for echinococcosis were carried out in veterinary diagnostic laboratories in the context of clinical investigations mainly in dogs (45%) and wild animals (40%), which also contribute most to the positive findings, see table “Echinococcosis in animals”.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

In fresh foodstuffs, outdoor cultivation for example can lead to the occurrence of fox tapeworm eggs, but there are no figures on the degree of contamination of individual foods. Moreover, people can also become infected through contact with soil, shoes and also dogs that are contaminated with fox tapeworm.

Recent actions taken to control the zoonoses

The FVO is funding a project entitled ‘Control of alveolar echinococcosis & management of foxes in urban areas’. New methods in the management of urban foxes are to be tried out along with active communication to encourage dealing with foxes in a way that is appropriate to wild animals.

The Institute of Parasitology of the University of Zurich currently runs a study to control the disease in foxes in the urban area of Zurich. Fox baits are distributed once a month by hand on extended parts of the surrounding of the city. The baits contain the anthelminthic praziquantel for the deworming of the foxes. The method has been proved to be effective, thus areas with bait distribution showed a significant decrease of the E. multilocularis egg contamination. The practicability of the method in a larger scale is under investigation.
Owners from dogs which regularly are hunting mice are encouraged to deworm their dogs regularly (see also www.ESCCAP.ch).

Additional information

1. Information on fox tapeworm: www.paras.uzh.ch/infos and www.ESCCAP.ch.
2. Torgerson, P.R., Schweiger, A., Deplazes, et al., 2008, Alveolar echinococcosis: From a deadly disease to a well-controlled infection. Relative survival and economic analysis in Switzerland over the last

35 years. J. of Hepatol. 49: 72-77
3. Schweiger A, Ammann RW, Candinas D, Clavien P-A, Eckert J, Gottstein B, et al. Human alveolar echinococcosis after fox population increase, Switzerland. Emerg Infect Dis. 2007 Jun. Available from http://www.cdc.gov/EID/content/13/6/878.htm
4. Guidelines for deworming of dogs and cats are published for Switzerland under www.ESCCAP.ch by the Expertgroup ESCCAP_CH.
5. Further information can be found on the FVO website www.bvet.admin.ch

2.9.2 Echinococcus in animals

Table Echinococcus in animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Region	Units tested	Total units positive for Echinococcus	E. granulosus	E. multilocularis	Echinococcus spp., unspecified
Cats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal		5	0			0
Dogs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal		32	4			4
Other animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal		5	3			3
Pigs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample		Animal		1	1			1
Wild animals - Clinical investigations [1)]	FVO	Unspecified	Not applicable	animal sample		Animal		28	13			13

Comments:

[1)] Up to date there is no further differentiation in the ILD among wild animals possible. However, wild animals tested here are mainly foxes.

Table Echinococcus in animals

Footnote:

All data categorised as “clinical investigations” are summaries of data from the ILD (Informationssystem Labordiagnostik = information system of laboratory data). ILD is run by the FVO and all labs, which are approved for the diagnosis of certain diseases have to report their results in this system. Only tests on antigen detection are selected for the zoonoses reporting in the context of "clinical investigations".

2.10 TOXOPLASMOSIS

2.10.1 General evaluation of the national situation

A. Toxoplasmosis general evaluation

History of the disease and/or infection in the country

Toxoplasmosis in humans is not notifiable. Thus, no data on the frequency of human toxoplasmosis are available. It is known, that some sporadic human cases do occur.

In animals, toxoplasmosis is notifiable (TSV, Article 5 and Article 291). Veterinarians and diagnostic laboratories must report any suspected cases of toxoplasmosis to the cantonal veterinarian, who may issue an order for the suspected cases to be investigated. In the past ten years (2002-2011) a total of 19 cases were reported to the FVO by cantonal veterinarians. Never more than 4 cases per year were recorded. 40% of these cases occurred in livestock (mainly goats and sheep), 22% in cats and the remaining 38% in other species.

In 2000, Toxoplasma-DNA in meat-producing animals was present in meat samples in 1% of the assessed cows, 0% of young cattle, 2% of young bulls, 1% of calves, 0% of pigs and 4% of sheep samples. Toxoplasma antibodies could be detected in 32% of cows and young cattle, 21% in young bulls, 4% in calves and 53% in sheep; in the breeding pigs 27% and in the fattening pigs 1% (Wyss et al., 2000).
In 2009, again meat from various animal categories was sampled at the slaughterhouse. Using real-time PCR technique it could be shown that DNA of T. gondii was prevalent in 4.7% of bovine samples, 2.2% of porcine samples, 2.0% of sheep samples and 0.7% of wild boar samples (Berger-Schoch et al., 2011).
Toxoplasma antibodies could be detected in 13% in calves (6/47), 37% in cattle (48/129), 62% in bulls (62/100) and 53% in cows (69/130). In the fattening pigs it was 14% (7/50), in the free-range pigs 13% (13/100), in the sows 36% (43/120) and in the wild boars 6.7% (10/150). Seroprevalence in the lambs was 33% (33/100) and in the ewes 81% (121/150). The seroprevalence rose significantly with the increasing age of the animals tested, while the housing conditions (conventional fattening pigs versus free-range pigs) appeared to have no influence on the results of serological testing (Berger-Schoch et al., in press).
In comparison of the two studies (which is justifiable as the same standardised P-30 ELISA was used and various other studies from abroad have shown that both substrates (serum and meat juice) are directly comparable) the T. gondii seroprevalence in all species rose over the past 10 years. With the switch from the conventional PCR to the real-time system, PCR has become more sensitive, so that the increase in the T. gondii prevalence in meat samples apparent in most species (except sheep) needs to be taken with caution. In addition, the difference in prevalence was only significant in calves.
As another source of human infection, faeces of 252 cats was investigated in the same study. Oocytes of T. gondii were found in 0.4% of the samples (Berger-Schoch et al. 2011).
Genotyping of the isolates of the survey from 2009 indicated that all 3 genotypes occur in Switzerland (Berger-Schoch et al., 2011).

National evaluation of the recent situation, the trends and sources of infection

Humans become infected by the oral route, either through the uptake of infectious oocysts from the environment or by means of tissue cysts from raw or insufficiently cooked meat.
The seroprevalence figures in the new study, which were very high in some cases, show that infections with Toxoplasma gondii in meat-producing animals are widespread in Switzerland and infection with T. gondii was more frequently than was the case 10 years ago. The increasing age of the animals was

identified as a risk factor for Toxoplasma infection.

The low rate of infection in wild boars can most likely be explained by the fact that wild pigs normally live extensively in areas with low cat density.
The oocyst excretion rate of 0.4 % found in cats may appear low. But when one considers that a sick cat may excrete large quantities of oocysts for up to 20 days, and these can survive for a year under favourable conditions (i.e. not too cold, hot or dry), the environmental contamination with T. gondii must not be underestimated.

In 2011, the reported cases in animals by cantonal veterinarians to the FVO were in the range of the past 10 years. A total of 4 cases were reported: one case in cats, 2 in apes and 1 in another zoo animal.

In veterinary diagnostic laboratories 521 tests for toxoplasmosis were carried out in the context of clinical investigations in 2011, mainly in cats (94%).

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

In non-immune sheep and goats (first-time infection) Toxoplasma gondii is regarded as a major cause of abortion and loss of lambs.
There is a risk of exposure in Switzerland both from the consumption of meat and from cats as contaminators of the environment. The risk appears to have increased rather than decreased in the past ten years.

Recent actions taken to control the zoonoses

A national survey on Toxoplasma gondii was conducted in 2009 in order to update the data obtained 10 years ago (results are described in the text above and in the publications mentioned below).
Pregnant women are informed about the recommendations from the FOPH to disclaim on raw or insufficient cooked meat and that caution is generally called for when faced with cat faeces (and potentially contaminated surroundings).

Additional information

1. Berger-Schoch A.E., Bernet D. et al., in press, Toxoplasma gondii in Switzerland: A serosurvey based on meat juice analysis of slaughter pigs, wild boar, sheep and cattle. Zoonoses and Public Health
2. Berger-Schoch A.E., Herrmann D.C. et al., (2011)Molecular prevalence and genotypes of Toxoplasma gondii in feline faeces (oocysts) and meat from sheep, cattle and pigs in Switzerland. Veterinary Parasitology, 177 : 290–297.
3. Wyss R., Sager H. et al. (2000) The occurrence of Toxoplasma gondii and Neospora caninum as regards meat hygiene. Schweiz. Arch. Tierheilkd. 142(3): 95-108.
4. Further information can be found on the FVO website www.bvet.admin.ch.

2.10.2 Toxoplasma in animals

Table Toxoplasma in animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Analytical Method	Sampling unit	Units tested	Total units positive for Toxoplasma	T. gondii	Toxoplasma spp., unspecified
Cats - Clinical investigations	FVO	Suspect sampling	Not applicable	animal sample			Animal	484	2		2
Alpacas - Clinical investigations	FVO	Suspect sampling	Not applicable	animal sample			Animal	1	0		0
Birds - Clinical investigations	FVO	Suspect sampling	Not applicable	animal sample			Animal	2	0		0
Cattle (bovine animals) - Clinical investigations	FVO	Suspect sampling	Not applicable	animal sample			Animal	1	0		0
Dogs - Clinical investigations	FVO	Suspect sampling	Not applicable	animal sample			Animal	4	0		0
Goats - Clinical investigations	FVO	Suspect sampling	Not applicable	animal sample			Animal	5	0		0
Other animals - Clinical investigations	FVO	Suspect sampling	Not applicable	animal sample			Animal	10	3		3
Pigs - Clinical investigations	FVO	Suspect sampling	Not applicable	animal sample			Animal	2	0		0
Sheep - Clinical investigations	FVO	Suspect sampling	Not applicable	animal sample			Animal	4	0		0
Wild animals - Clinical investigations	FVO	Suspect sampling	Not applicable	animal sample			Animal	4	0		0

Footnote:

All data categorised as “clinical investigations” are summaries of data from the ILD (Informationssystem Labordiagnostik = information system of laboratory data). ILD is run by the FVO and all labs, which are approved for the diagnosis of certain diseases have to report their results in this system. Only tests on antigen detection are selected for the zoonoses reporting in the context of "clinical investigations". Methods used for Toxoplasma diagnostics: histopathology, immunhistochemistry, PCR as well as the detection of oocyst in case of final hosts.

2.11 RABIES

2.11.1 General evaluation of the national situation

A. Rabies general evaluation

History of the disease and/or infection in the country

Rabies in humans is a notifiable disease. It has to be reported within one day of rabies being clinically suspected by a medical doctor or the Lyssavirus being detected in culture by a laboratory (ordinance of the FDHA on doctor and laboratory reporting).
In the period from 1967 until 1999, an estimated number of some 25 000 postexposure treatments in humans were done due to the increased risk of rabies infections. Rabies caused in 1977 three human deaths.
Rabies in animals falls into the category of an animal disease to be eradicated (TSV, Article 3). According to Articles 142-149 of the animal health ordinance, government action is taken to control the disease. Anyone who sees a wild animal or stray pet that behaves in a way that appears suspiciously like rabies is required to report this to the police, hunting authorities or a veterinarian. Animal keepers must also report pets that behave in a way that is suspiciously like rabies to a veterinarian. (Re-)Import conditions for cats, dogs and ferrets were implemented in 2003 and adapted in 2004 according to the EU regulation 998/2003/EC.
The European fox rabies epizootic starting in 1939 at the eastern border of Poland reached Switzerland on March 3, 1967. In the period from 1967 until 1999 a total of 17’108 rabies cases, of which 73% in foxes and 14% in domestic animals were diagnosed. To eliminate rabies, in 1978 the first field trial world-wide for the oral immunization of foxes against rabies was conducted in Switzerland. Overall, between 1978 and 1998 a total of 2.8 million baits containing a modified live virus were distributed. The 1990s were characterized by a recrudescence of rabies in spite of regular oral immunization of foxes. The last case of fox rabies occurred in 1996. Bat rabies has been diagnosed in 3 cases in the past fifteen years (1992, 1993, 2002). Therefore, bat rabies remains a source, albeit little, of infection for animals and humans. According to the definitions of the OIE and WHO (no cases for at least two years) the territory of Switzerland is considered to be free of rabies since 1999. A suspected case of rabies in a dog (urban rabies) was confirmed in 2003, but since the dog was a foundling picked up close to the French border with a viral sequence closely related to North African strains from dogs, it does not indicate a focus of rabies infection in Switzerland but an illegal import.

National evaluation of the recent situation, the trends and sources of infection

In 2011 609 sera from humans were tested for neutralizing antibodies at the national reference laboratory for rabies. In 371 cases (61%) antibody titers were controlled after pre-expositional immunization and in 220 of cases (36%) the blood was checked after post exposure prophylaxis (PEP). In 18 cases no reason for the investigation was given.
109 animals were tested for rabies at the national reference laboratory (Swiss Rabies Center) in 2011, none of which were positive. The samples most frequently originated from dogs and cats (39%), bats (25%) and foxes (20%). Additionally, 2483 sera of dogs and cats were tested in the context of travelling procedures in order to detect the level of neutralising antibodies.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

Switzerland and most of the neighboring countries were free from European fox rabies in 2011. The import conditions implemented in 2003 reduce the risk of imported rabies cases in domestic animals to a very low level. However, illegal imports as well as bat rabies remain a certain risk to Switzerland.

Recent actions taken to control the zoonoses

Vaccination of dogs is recommended (and common), but not mandatory. (Re-)Import conditions for cats, dogs and ferrets are implemented according to the EU regulation 998/2003/EC. Animals with suspect symptoms originating from countries with urban rabies are tested for rabies.
Switzerland prepared itself to react quickly with an oral immunization campaign for foxes in Switzerland close to the Italian border in 2010 if rabies should spread further from Italy to the Swiss border (two foxes were diagnosed positive in October 2008 in northeastern Italy, spread further in 2009 and 2010 to the north of Italy close to the Swiss border (68 cases occurred in 2009 and 149 up to April in 2010). Due to an extensive immunization campaign reaching from the Slovenian to the Swiss border further spread of the outbreak was prevented. The last rabies case was reported in February 2011 in the region Veneto in north Italy.

Additional information

1. Diagnostic/analytical methods used
All test concerning rabies are carried out in the reference laboratory, the Swiss Rabies Center =>http://www.ivv.unibe.ch/Swiss_Rabies_Center/swiss_rabies_center.html). It is authorized by the EU for rabies testing, see http://ec.europa.eu/food/animal/liveanimals/pets/approval_en.htm.
For rabies virus detection immunfluorescence (FAT) and virus isolation using murine neuroblastoma cell culture (RTCIT) is used and the rabies antibody detection is carried out using the rapid fluorescent focus inhibition test (RFFIT) as described in the OIE manual, see http://www.oie.int/eng/normes/mmanual/a_00044.htm.
2. Swiss Rabies Center: http://www.cx.unibe.ch/ivv/Swiss_Rabies_Center/swiss_rabies_center.html
3. Further information can be found on the FVO website www.bvet.admin.ch.

2.11.2 Rabies in humans

Table Lyssavirus (rabies) in humans - Species/serotype distribution

Species/serotype Distribution	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.
Lyssavirus (rabies)	0	0	0	0	0	0
Lyssavirus (unspecified virus)	0	0	0	0	0	0

2.11.3 Lyssavirus (rabies) in animals

A. Rabies in dogs

Monitoring system

Case definition

An animal is rabies diseased if the analytical method (see additional information below) gives a positive result.

Vaccination policy

Vaccination of the Swiss dog population is recommended (and common), but not mandatory.

Other preventive measures than vaccination in place

(Re-)Import conditions for cats, dogs and ferrets according to the EU regulation 998/2003/EC.

Notification system in place

Rabies in animals falls into the category of an animal disease to be eradicated (TSV, Article 3). According to Articles 142-149 of the animal health ordinance, government action is taken to control the disease. Animal keepers must report pets that behave in a way that is suspiciously like rabies to a veterinarian.

Additional information

1. Diagnostic/analytical methods used
For rabies virus detection immunfluorescence (FAT) and virus isolation using murine neuroblastoma cell culture (RTCIT) is used and the rabies antibody detection is carried out using the rapid fluorescent focus inhibition test (RFFIT) as described in the OIE manual, see http://www.oie.int/eng/normes/mmanual/a_00044.htm.
2. Swiss Rabies Center: http://www.cx.unibe.ch/ivv/Swiss_Rabies_Center/swiss_rabies_center.html

Table Rabies in animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Region	Units tested	Total units positive for Lyssavirus (rabies)	Rabies virus (RABV)	EBLV-1
Cattle (bovine animals)	Swiss Rabies Center	Unspecified	Not applicable	animal sample		Animal	Schweiz/Suisse/Svizzera	2	0		
Sheep	Swiss Rabies Center	Unspecified	Not applicable	animal sample		Animal	Schweiz/Suisse/Svizzera	1	0		
Goats	Swiss Rabies Center	Unspecified	Not applicable	animal sample		Animal	Schweiz/Suisse/Svizzera	1	0		
Solipeds, domestic	Swiss Rabies Center	Unspecified	Not applicable	animal sample		Animal	Schweiz/Suisse/Svizzera	3	0		
Badgers - wild	Swiss Rabies Center	Unspecified	Not applicable	animal sample		Animal	Schweiz/Suisse/Svizzera	1	0		
Bats - wild	Swiss Rabies Center	Unspecified	Not applicable	animal sample		Animal	Schweiz/Suisse/Svizzera	28	0		
Cats	Swiss Rabies Center	Unspecified	Not applicable	animal sample		Animal	Schweiz/Suisse/Svizzera	9	0		
Deer - wild - fallow deer	Swiss Rabies Center	Unspecified	Not applicable	animal sample		Animal	Schweiz/Suisse/Svizzera	1	0		
Dogs	Swiss Rabies Center	Unspecified	Not applicable	animal sample		Animal	Schweiz/Suisse/Svizzera	33	0		
Foxes - wild	Swiss Rabies Center	Unspecified	Not applicable	animal sample		Animal	Schweiz/Suisse/Svizzera	22	0		
Marten - wild	Swiss Rabies Center	Unspecified	Not applicable	animal sample		Animal	Schweiz/Suisse/Svizzera	2	0		
Raccoon dogs - wild	Swiss Rabies Center	Unspecified	Not applicable	animal sample		Animal	Schweiz/Suisse/Svizzera	1	0		
Rats	Swiss Rabies Center	Unspecified	Not applicable	animal sample		Animal	Schweiz/Suisse/Svizzera	1	0		

	EBLV-2	Lyssavirus (unspecified virus)
Cattle (bovine animals)		

Table Rabies in animals

	EBLV-2	Lyssavirus (unspecified virus)
Sheep		
Goats		
Solipeds, domestic		
Badgers - wild		
Bats - wild		
Cats		
Deer - wild - fallow deer		
Dogs		
Foxes - wild		
Marten - wild		
Raccoon dogs - wild		
Rats		

2.12 STAPHYLOCOCCUS INFECTION

2.12.1 General evaluation of the national situation

2.12.2 Staphylococcus in animals

Table Staphylococcus in Animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Sampling unit	Sample weight	Units tested	Total units positive for Staphylococcus	S. aureus, meticillin resistant (MRSA)	S. aureus, meticillin resistant (MRSA) - spa-type t011
Cattle (bovine animals) - dairy cows - adult (Bulktankmilk samples) [1)		Objective sampling	Official sampling	animal sample > milk		Herd		200		3	3
Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - active		Objective sampling	Official sampling	animal sample > nasal swab		Animal		392	22	22	1

	S. aureus, meticillin resistant (MRSA) - spa-type t108	S. aureus, meticillin resistant (MRSA) - spa-type t034	S. aureus, meticillin resistant (MRSA) - MRSA, unspecified
Cattle (bovine animals) - dairy cows - adult (Bulktankmilk samples) [1)			
Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - active		19	2

Comments:

[1) Bulktankmilk samples

Table Staphylococcus in Animals

Footnote:

1 MRSA Isolates from pigs belonged to spa-type t208, 1 to spa-type t2279

2.12.3 Antimicrobial resistance in Staphylococcus isolates

A. Antimicrobial resistance of S. aureus in Animals Pigs - fattening pigs - at slaughterhouse - Monitoring - active

Sampling strategy used in monitoring

Frequency of the sampling

A random sample of 392 fattening pigs were investigated at slaughter using nasal swabs. The slaughter plants included in the monitoring program accounted for over 85% of the total production of pigs in Switzerland. The number of samples for each plant has been determined in proportion to the number of animals slaughtered per year. The samples were taken by the competent authority in the framework of the antimicrobial resistance monitoring. The samples were taken evenly distributed over the year, in order to exclude seasonal effects.

Type of specimen taken

Nasal swabs

Methods of sampling (description of sampling techniques)

Samples were taken using transport swabs (Oxoid Ltd, Basingstoke, England) from the nares of the pigs subsequent to stunning by officials of the Swiss abattoir authorities. They were transported to the laboratory immediately after samplin without cooling.

Procedures for the selection of isolates for antimicrobial testing

From each positive sample one MRSA isolate was submitted to susceptibility testing.

Methods used for collecting data

All samples were analyzed in the same laboratory (Centre for Zoonoses, Bacterial Animal Diseases and Antibiotic Resistance, University of Bern, Switzerland).

Laboratory methodology used for identification of the microbial isolates

Swabs were transferred into tubes containing 10 ml Mueller Hinton Broth supplemented with 6.5% NaCl and incubated aerobically at 37°C for 24 h under agitation. One ml from this pre-enrichment was inoculated into 9 ml tryptone soy broth containing 3.5 mg/L cefoxitin and 75 mg/L aztreonam, and further incubated aerobically at 37°C for 24 h. A loopful was then spread onto MRSA selective agar plates (BBL ™ CHROMagar ™ MRSA; Becton Dickinson, Franklin Lakes, NJ), which were incubated at 37°C for 24 h. Pink to mauve-colored colonies were regarded as suspicious and five presumptive colonies were cultivated onto tryptone soy agar plates containing 5% sheep blood (TSA-SB) (Oxoid Ltd, Basingstoke, England) at 37°C for 24 h. S. aureus was identified using Vitek 2 with Gram-Positive (GP) cards (BioMérieux, Mary l'Etoile, France) following manufacturer's recommendations.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

chloramphenicol, ciprofloxacin, clindamycin, erythromycin, fusidic acid, genatmicin, kanamycin, linezolid, mupirocin, oxacillin, penicillin, quinuprisitin/dalfoprisitn, rifampin, tetracyclin, trimethoprim, tiamulin, streptomycin, sulfamethoxazol, vancomycin

Cut-off values used in testing

Resistance was defined following the epidemiological cut-off values published by the Europaean Committee on Antimicrobial Susceptiblitiy Testing (EUCAST).

Preventive measures in place

None

Control program/mechanisms

The control program/strategies in place

None

Measures in case of the positive findings or single cases

None

Notification system in place

None

Results of the investigation

MRSA prevalence in fattening pigs was 5.6% (95%CI 3.6 - 8.4). 19 isolates belonged to the genotye ST398-t034-V, 1 to the genotype ST398-t011-V, 1 to the genotype ST49-t208-V and 1 to the genotype ST1-t2279-IVc. 15 isolates belonging to the most commonly detected genotype ST398-t034-V shared an identical resistance profile. They showed resistance to ß-lactams , tetracycline, macrolides, lincosamides, trimethoprim, pleuromutilins, streptomycin and quinupristin/dalfopristin. Three additional isolates were resistant to all these antimicrobials exept streptomycin whereas one isolate had additional resistance to all testet aminoglycosides.

National evaluation of the recent situation, the trends and sources of infection

In 2009, the prevalence of MRSA in Swiss slaughter pigs was 2.2% (95%CI 1.0-4.2) with 8 of 405 pig nasal samples being positive. It increased significantly to 5.9% in 2010 with 23 of 392 nasal swabs containing MRSA. Compared to the situation in other european countries, the MRSA prevalence in Swiss livestock is still low.

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

The increased MRSA prevalence in fattening pigs is giving cause for a certain concern. The monitoring of the situation will be continued. People in close contact with animals have been shown to have a higher risk of carrying MRSA. In a study carried out in 2009 no MRSA were found on food of animal origin in Switzerland.

Additional information

Further information can be found in the annual report on the sale of antibiotics for veterinary use and antibiotic resistance monitoring of livestock in Switzerland (Arch-Vet 2011) on the FVO website www.bvet.admin.ch

B. Antimicrobial resistance of S. aureus in Animals Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active (Bulk tank milk samples)

Sampling strategy used in monitoring

Frequency of the sampling

In the milk-testing scheme in Switzerland, BTM samples are routinely collected twice a month from all dairy farms and subsequently subjected to quality testing in a single laboratory. In November 2011, 200 BTM samples were randomly collected at this Laboratory. All samples were taken in the first two weeks of November 2011 in order to exclude the possibility that one farm could be sampled twice.

Type of specimen taken

Bulk Tank milk (BTM)

Methods of sampling (description of sampling techniques)

The BTM samples are automatically collected on each farm by milk-collection tankers along the milk collecting routes. A large number of farms are also sampled manually at milk collection locations, at dairies and at milk collecting or centrifugation plants. Specially-trained professionals take the samples in accordance with the international standards of the International Dairy Federation (IDF) and the Swiss law. BTM samples are refrigerated at 1 – 5ºC and sent to a single laboratory for the milk inspection analyses, where a smaller sample is randomly taken and immediately sent to the ZOBA.

Procedures for the selection of isolates for antimicrobial testing

From each positive sample one methillin-sensible Staph. aureus (MSSA) and one methicillin-resistant Staph. aureus (MRSA) was submitted to susceptibility testing.

Methods used for collecting data

All samples were analyzed in the same laboratory (Centre for Zoonoses, Bacterial Animal Diseases and Antibiotic Resistance, University of Bern, Switzerland).

Laboratory methodology used for identification of the microbial isolates

MSSA: Method with preenrichment following direct plating on selective agar. Confirmation of S.aureus phenotypically.
MRSA: Method with preenrichment following enrichemt and plating on selective agar. Confirmation of S.aureus phenotypically and detection of mecA gene by PCR.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

chloramphenicol, ciprofloxacin, clindamycin, erythromycin, fusidic acid, genatmicin, kanamycin, linezolid, mupirocin, oxacillin, penicillin, quinuprisitin/dalfoprisitn, rifampin, tetracyclin, trimethoprim, tiamulin, streptomycin, sulfamethoxazol, vancomycin

Cut-off values used in testing

Resistance was defined following the epidemiological cut-off values published by the Europaean Committee on Antimicrobial Susceptiblitiy Testing (EUCAST).

Preventive measures in place

None

Control program/mechanisms

The control program/strategies in place

None

Measures in case of the positive findings or single cases

None

Notification system in place

None

Results of the investigation

31 MSSA (15.5%, 95%CI 10.8-21.3%) and 3 MRSA (1.5%, 95%CI 0.5-4.3%) were isolated. 58% of all MSSA isolates were fully susceptible to all tested antimicrobials, none were resistant to more than 4 antimicrobials. Resistance against penicillin (22.6%) was most often found.
One MRSA Isolate showed resistance to 10 of the 19 tested antimicrobials. The 2 other MRSA isolates were both resistant against oxacillin, penicillin, gentamicin, kanamycin, tetracycline and trimethoprim. All three MRSA isolates belonged to spa type t-011.

National evaluation of the recent situation, the trends and sources of infection

It was the first time that BTM samples were used in the Swiss antibiotic resistance monitoring. The sampling of BTM turned out to be easy and cost effective. However to get more accurate results and to be able to find trends of resistance or newly emerging resistances with a certain confidence, there should be tested far more BTM samples.

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

In the last years a steady increase in the use of cephalosporins has been noticed in Switzerland especially for the treatment of mastitis during lactation. This use could have an influence on resistance in indicator and zoonotic bacteria in the environment of dairy farms – a setting that is not well covered by the existing monitoring of antimicrobial resistance in Switzerland. The routine monitoring of bacteria obtained from bulk tank milk (BTM) could be a convenient tool for detecting trends in antimicrobial resistance on dairy farms.

Additional information

Further information can be found in the annual report on the sale of antibiotics for veterinary use and antibiotic resistance monitoring of livestock in Switzerland (Arch-Vet 2011) on the FVO website www.bvet.admin.ch

Table Antimicrobial susceptibility testing of Staphylococcus in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk sample)

Staphylococcus	S. aureus		S. aureus, meticillin resistant (MRSA) - spa-type t011	
Isolates out of a monitoring program (yes/no)	yes		yes	
Number of isolates available in the laboratory	31		3	
Antimicrobials:	N	n	N	n
Aminoglycosides - Gentamicin	31	0	3	2
Aminoglycosides - Kanamycin	31	0	3	2
Aminoglycosides - Streptomycin	31	2	3	1
Amphenicols - Chloramphenicol	31	1	3	0
Fluoroquinolones - Ciprofloxacin	31	0	3	0
Tetracyclines - Tetracycline	31	2	3	2
Trimethoprim	31	1	3	3
Antimycobacterial drugs - Rifampicin	31	1	3	0
Fully sensitive	31	18	3	0
Fusidanes - Fusidic acid	31	1	3	1
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	31	0	3	0
Lincosamides - Clindamycin	31	1	3	1
Macrolides - Erythromycin	31	0	3	1
Oxazolidines - Linezolid	31	0	3	0
Penicillins - Oxacillin	31	0	3	3
Penicillins - Penicillin	31	7	3	3
Pleuromutilins - Tiamulin	31	1	3	1
Resistant to 1 antimicrobial	31	9	3	0

Table Antimicrobial susceptibility testing of Staphylococcus in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk sample)

Staphylococcus	S. aureus		S. aureus, meticillin resistant (MRSA) - spa-type t011	
Isolates out of a monitoring program (yes/no)	yes		yes	
Number of isolates available in the laboratory	31		3	
Antimicrobials:	N	n	N	n
Resistant to 2 antimicrobials	31	2	3	0
Resistant to 3 antimicrobials	31	1	3	0
Resistant to 4 antimicrobials	31	1	3	0
Resistant to >4 antimicrobials	31	0	3	3
Streptogramins - Quinupristin/Dalfopristin	31	1	3	1
Sulfonamides - Sulfamethoxazol	31	2	3	1

Table Antimicrobial susceptibility testing of Staphylococcus in Pigs - fattening pigs - at slaughterhouse - Monitoring - active - Objective sampling - Official sampling - animal sample - nasal swab

Staphylococcus	S. aureus, meticillin resistant (MRSA)	
Isolates out of a monitoring program (yes/no)	yes	
Number of isolates available in the laboratory	22	
Antimicrobials:	N	n
Aminoglycosides - Gentamicin	22	2
Aminoglycosides - Kanamycin	22	2
Aminoglycosides - Streptomycin	22	18
Amphenicols - Chloramphenicol	22	0
Fluoroquinolones - Ciprofloxacin	22	1
Tetracyclines - Tetracycline	22	22
Trimethoprim	22	20
Antimycobacterial drugs - Rifampicin	22	0
Fully sensitive	22	0
Fusidanes - Fusidic acid	22	0
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	22	0
Lincosamides - Clindamycin	22	19
Macrolides - Erythromycin	22	20
Oxazolidines - Linezolid	22	0
Penicillins - Oxacillin	22	22
Penicillins - Penicillin	22	22
Pleuromutilins - Tiamulin	22	20
Resistant to 1 antimicrobial	22	0

Table Antimicrobial susceptibility testing of Staphylococcus in Pigs - fattening pigs - at slaughterhouse - Monitoring - active - Objective sampling - Official sampling - animal sample - nasal swab

Staphylococcus	S. aureus, meticillin resistant (MRSA)	
Isolates out of a monitoring program (yes/no)	yes	
Number of isolates available in the laboratory	22	
Antimicrobials:	N	n
Resistant to 2 antimicrobials	22	0
Resistant to 3 antimicrobials	22	0
Resistant to 4 antimicrobials	22	0
Resistant to >4 antimicrobials	22	22
Streptogramins - Quinupristin/Dalfopristin	22	19
Sulfonamides - Sulfamethoxazol	22	1

Table Antimicrobial susceptibility testing of S. aureus in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk sample) - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. aureus	Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active (Bulk tank milk sample)																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	31																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides - Gentamicin	2	31	0								31													1	16
Aminoglycosides - Kanamycin	8	31	0										30	1										4	64
Aminoglycosides - Streptomycin	16	31	2										14	13	2	1	1							4	32
Amphenicols - Chloramphenicol	16	31	1										7	21	2	1								4	64
Fluoroquinolones - Ciprofloxacin	1	31	0						23	8														0.25	8
Tetracyclines - Tetracycline	1	31	2							29						2								0.5	16
Trimethoprim	2	31	1									30	1											2	32
Antimycobacterial drugs - Rifampicin	0.032	31	1		30		1																	0.015	0.25
Fusidanes - Fusidic acid	0.5	31	1							30			1											0.5	4
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	2	31	0								31													1	16
Lincosamides - Clindamycin	0.25	31	0					29	2															0.125	4
Macrolides - Erythromycin	1	31	0						17	14														0.25	8
Oxazolidines - Linezolid	4	31	0								7	14	10											1	8
Penicillins - Oxacillin	2	31	0						25	5	1													0.25	8
Penicillins - Penicillin	0.125	31	7					24			2	1	4											0.125	2
Pleuromutilins - Tiamulin	2	31	2							23	5	1		2										0.5	4
Streptogramins - Quinupristin/Dalfopristin	1	31	1							30		1												0.5	4
Sulfonamides - Sulfamethoxazol	128	31	2														29				2			64	512

Table Antimicrobial susceptibility testing of S. aureus in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk sample) - quantitative data [Dilution method]

Table Antimicrobial susceptibility testing of S. aureus, meticillin resistant (MRSA) in Pigs - fattening pigs - at slaughterhouse - Monitoring - active - Objective sampling - Official sampling - animal sample - nasal swab - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. aureus, meticillin resistant (MRSA)	Pigs - fattening pigs - at slaughterhouse - Monitoring - active																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	22																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides - Gentamicin	2	22	2								19	1			1	1								1	16
Aminoglycosides - Kanamycin	8	22	2										19	1				2						4	64
Aminoglycosides - Streptomycin	16	22	18										2	2		1	17							4	32
Amphenicols - Chloramphenicol	16	22	0										1	21										4	64
Fluoroquinolones - Ciprofloxacin	1	22	1						8	13					1									0.25	1
Tetracyclines - Tetracycline	1	22	22													22								0.25	16
Trimethoprim	2	22	20									2					20							2	32
Antimycobacterial drugs - Rifampicin	0.032	22	0		22																			0.015	0.25
Fusidanes - Fusidic acid	0.5	22	0							22														0.5	4
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	2	22	0								22													1	16
Lincosamides - Clindamycin	0.25	22	19					2	1					19										0.125	4
Macrolides - Erythromycin	1	22	20						1	1					20									0.25	8
Oxazolidines - Linezolid	4	22	0								1	15	6											1	8
Penicillins - Oxacillin	2	22	22												22									0.25	8
Penicillins - Penicillin	0.125	22	22										22											0.125	2
Pleuromutilins - Tiamulin	2	22	20							2				20										0.5	4
Streptogramins - Quinupristin/Dalfopristin	1	22	19							1	2	4	11	4										0.5	4
Sulfonamides - Sulfamethoxazol	128	22	1														21				1			64	512

Table Antimicrobial susceptibility testing of S. aureus, meticillin resistant (MRSA) in Pigs - fattening pigs - at slaughterhouse - Monitoring - active - Objective sampling - Official sampling - animal sample - nasal swab - quantitative data [Dilution method]

Table Antimicrobial susceptibility testing of S. aureus, meticillin resistant (MRSA) - spa-type t011 in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk sample) - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

spa-type t011	Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active (Bulk tank milk sample)																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	3																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides - Gentamicin	2	3	2								1				1	1								1	16
Aminoglycosides - Kanamycin	8	3	2										1					2						4	64
Aminoglycosides - Streptomycin	16	3	1										1	1			1							4	32
Amphenicols - Chloramphenicol	16	3	0										1	2										4	64
Fluoroquinolones - Ciprofloxacin	1	3	0							3														0.25	8
Tetracyclines - Tetracycline	1	3	2							1						2								0.5	16
Trimethoprim	2	3	3													1	2							2	32
Antimycobacterial drugs - Rifampicin	0.032	3	0		3																			0.015	0.25
Fusidanes - Fusidic acid	0.5	3	1							2			1											0.5	4
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	2	3	0								3													1	16
Lincosamides - Clindamycin	0.25	3	1					2						1										0.125	4
Macrolides - Erythromycin	1	3	1							2					1									0.25	8
Oxazolidines - Linezolid	4	3	0								1	2												1	8
Penicillins - Oxacillin	2	3	3												3									0.25	8
Penicillins - Penicillin	0.125	3	3										1	2										0.125	2
Pleuromutilins - Tiamulin	2	3	1							2				1										0.5	4
Streptogramins - Quinupristin/Dalfopristin	1	3	1							2			1											0.5	4

Table Antimicrobial susceptibility testing of S. aureus, meticillin resistant (MRSA) - spa-type t011 in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk sample) - quantitative data [Dilution method]

spa-type t011	Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active (Bulk tank milk sample)																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	3																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Sulfonamides - Sulfamethoxazol	128	3	1														1	1			1			64	512

Table Cut-off values for antibiotic resistance testing of Staphylococcus in Animals

Test Method Used	Standard methods used for testing
Broth dilution	EUCAST

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin		2	
	Kanamycin		8	
	Streptomycin		16	
Amphenicols	Chloramphenicol		16	
Fluoroquinolones	Ciprofloxacin		1	
Penicillins	Oxacillin		2	
	Penicillin		0.125	
Sulfonamides	Sulfamethoxazol		128	
Tetracyclines	Tetracycline		1	
Trimethoprim	Trimethoprim		2	
Lincosamides	Clindamycin		0.25	
Macrolides	Erythromycin		1	
Fusidanes	Fusidic acid		0.5	

Table Cut-off values for antibiotic resistance testing of Staphylococcus in Animals

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Oxazolidines	Linezolid		4	
Streptogramins	Quinupristin/Dalfopristin		1	
Antimycobacterial drugs	Rifampicin		0.032	
Pleuromutilins	Tiamulin		2	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin		2	

2.13 Q-FEVER

2.13.1 General evaluation of the national situation

A. Coxiella burnetii (Q-fever) general evaluation

History of the disease and/or infection in the country

Because Q fever (pathogen: Coxiella burnetii) in humans is not a notifiable disease since 1999, there are no current data on the frequency of this disease in humans. Mandatory reporting was stopped as only few cases were reported: from 1992 until 1998 it were between 10 and 18 cases per year. 1989 until 1991 reported case numbers were higher, ranging between 32 and 52 cases per year. A big outbreak occurred back in 1983 when 12 flocks of sheep apparently shedding C. burnetii were descending from alpine pastures. About 415 people which lived close to the village roads the sheep passed through were infected.

Screening of C. burnetii using PCR in various foodstuff (bovine, ovine, caprine milk and egg shells) in the years 2005-2006 showed that C. burnetii could only be detected in bovine milk (17 of 359 (4.7%) samples or 8 from 27 (29.6%) farms). 504 egg shells, 81 samples from 13 sheep farms and 39 samples of 39 goat farms tested negative.

Coxiellosis in animals is notifiable. In March 2009 it was re-categorised from a diseases to be controlled into a disease to be monitored (TSV, Article 5). Coxiella burnetii plays a certain role as a causative pathogen for abortions in biungulate animals. Abortions in cattle after three months of pregnancy have to be reported to a veterinarian (TSV, Articles 217-221). In sheep, goats and pigs every abortion must be reported. If more than one animal in a holding of ruminants aborts within the space of four months, or if an abortion occurs in a dealer’s stable or during alpine pasturing, then cattle, sheep and goats amongst other also undergo laboratory investigation for Coxiella burnetii (TSV, Article 129). If clinically suspected cases are confirmed by laboratory diagnostic tests, the cantonal veterinary office is notified.
Especially at the beginning of the 1990s numbers per year were high with about 100 reported cases a year. Until the mid 1990s numbers declined to roughly 70 cases per year and decreased further to about 40 cases per year in the period 1996 until 2005. In 2006 reported coxiellosis cases rose again to the level of around 70 cases per year and stayed at this higher level up to 2011. In the past ten years 583 coxiellosis cases were reported to the FVO by cantonal veterinarians, 82% of which occurred in cattle, 11% in goats and 6% in sheep.

The total number of C. burnetii-related abortions reported every year is low; in cattle 30–60 cases are recorded every year, while in sheep and goats only isolated cases are reported. This situation is also reflected in data on seroprevalence of the pathogen, which has been found in studies from the Swiss reference laboratory to be about 30% in cattle and about 1–3% in sheep and goats.

National evaluation of the recent situation, the trends and sources of infection

In 2011, 78 cases of coxiellosis in ruminants (72 in cattle, 5 in goats and 1 in sheep) were reported to the FVO by cantonal veterinarians, which is within the range of the past 6 years, however with a very slight tendency to increase in the last 3 years.
In veterinary diagnostic laboratories 2865 tests for Coxiella spp. were carried out in the context of clinical

investigations. Samples were derived from cattle (90%), sheep (5%) and goats (4%), most due to abortions (70%).

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

The role of Coxiella burnetii as abortion cause among ruminants is mainly of significance for cattle. Infected cattle are less dangerous for humans than infected sheep. The risk of a high epidemic appearance seems to be small for Switzerland.

Recent actions taken to control the zoonoses

Efforts to strengthen disease awareness as well as to improve knowledge how to avoid infection are ongoing.

Additional information

1. Metzler AE et al., 1983: Distribution of Coxiella burnetii: a seroepidemiological study of domestic animals and veterinarians [in German]. Schweizer Archiv für Tierheilkunde, 125, 507-517.
2. Fretz, R., Schaeren, W., Tanner, M., Baumgartner, A., 2007. Screening of various foodstuffs for occurrence of Coxiella burnetii in Switzerland. Int J Food Microbiol 116, 414-418.
3. Further information can be found on the FVO website www.bvet.admin.ch.

2.13.2 Coxiella (Q-fever) in animals

Table Coxiella burnetii (Q fever) in animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample Origin	Analytical Method	Sampling unit	Units tested	Total units positive for Coxiella (Q-fever)	C. burnetii	No of clinically affected herds
Alpacas - Clinical investigations	FVO	Suspect sampling	Not applicable	animal sample			Animal	4	1	1	
Cattle (bovine animals) - Clinical investigations	FVO	Suspect sampling	Not applicable	animal sample			Animal	2579	58	58	
Goats - Clinical investigations	FVO	Suspect sampling	Not applicable	animal sample			Animal	116	7	7	
Other animals - Clinical investigations	FVO	Suspect sampling	Not applicable	animal sample			Animal	6	0		
Pigs - Clinical investigations	FVO	Suspect sampling	Not applicable	animal sample			Animal	3	0		
Sheep - Clinical investigations	FVO	Suspect sampling	Not applicable	animal sample			Animal	150	0		
Solipeds, domestic - Clinical investigations	FVO	Suspect sampling	Not applicable	animal sample			Animal	6	0		

Footnote:

All data categorised as “clinical investigations” are summaries of data from the ILD (Informationssystem Labordiagnostik = information system of laboratory data). ILD is run by the FVO and all labs, which are approved for the diagnosis of certain diseases have to report their results in this system. Only tests on antigen detection are selected for the zoonoses reporting in the context of "clinical investigations". For Coxiella burnetii diagnostics direct detection of the bacteria and PCR were used.

2.14 TULARAEMIA

2.14.1 General evaluation of the national situation

2.14.2 Francisella in animals

A. Francisella in Animals

Notification system in place

Tularaemia is notifiable in animals and in humans.
In humans the number of reported cases per year are still very low, although since 2007 numbers seemed to have slightly increased to a level of more than 10 cases per year (before 2007 cases were always below 10).
In animals, in the past ten years no more than 3 cases were reported. In total 11 cases occurred, 9 in hares and two in monkeys.

Results of the investigation

In 2011, 15 cases in humans were registered (compared to 13 in the year 2010).
In animals, 3 cases in hares were reported to the FVO by the cantonal veterinarians.
In diagnostic laboratories 11 animals were tested (6 hares, 1 cat and 4 other animals).

National evaluation of the recent situation, the trends and sources of infection

No active surveillance is performed in animals. Monitoring is based on voluntary testing of wild animals found dead or hunted as well as animals showing clinical signs typical for tularaemia.

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

Tularaemia affects mainly wild animals, especially hares and also zoo animals. Contact to wild animals (carrier of F. tularensis and possible reservoir) seems to be an important source of infections to humans. Other sources of infection can be bites of ticks or insects as well as the inhalation of dust/aerosol. Those at risk are mainly gamekeepers, hunters, people who work in agriculture or forestry, veterinary practitioners for wild animals and laboratory staff.
The slight increase in reported cases since 2007 might be the result of improved disease awareness as well as changed diagnostic methods (use of PCR for confirmation).

Additional information

1. Further information can be found on the FVO website www.bvet.admin.ch.

2.15 CYSTICERCOSIS, TAENIOSIS

2.15.1 General evaluation of the national situation

2.15.2 Cysticerci in animals

A. Cysticerci in Animals

Monitoring system

Sampling strategy

Cattle, small ruminants and swine are inspected at slaughter for lesions of Cysticerci.
According to the ordinance of the Federal Department of Economic Affairs (FDEA) of 23 November 2005 on hygiene in the slaughter process (VhyS; SR 817.190.1), all cattle older than 6 months must be checked with incisions into the jaw muscles and heart.

Measures in case of the positive findings or single cases

Carcasses with mild lesions are frozen, carcasses with massive lesions condemned.

Results of the investigation

Studies in six Swiss abattoirs in 2002 until 2005 have shown that the frequency of cestode larvae has remained constant in these years. It revealed, that In the slaughter of large livestock a total average of 0.58% of animals were found to be infested with cestode larvae (data from some abattoirs are missing for individual years). In all cases, the animals most heavily infested were clearly cows.
The FLEKO (= meat inspection statistics) contains data on carcasses which needed to be condemned due to cyticerci. In the time period 2006 until 2011 in total 151 carcasses with massive lesions (which means about 30 each year) were condemned. 77% of these carcasses were cattle, 17% sheep, 5% pigs and 1% goats.

National evaluation of the recent situation, the trends and sources of infection

Cysticercosis in humans is not notifiable. Thus there are no data available.
Numbers of carcasses which needed to be condemned due to massive lesions of cyticerci are constant since many years.
In a case-control study with data from May 2005 until April 2006 the role of possible risk factors for bovine cysticercosis was investigated at livestock level. Statistically significant risk factors are considered to be pastures bordering a railway line, the location of the pasture close to a recreational area with parking spaces and leisure activities, and also farmyard visitors and raw feed that has been bought in. This study showed that the risk is thus primarily dependent on external factors. But in heavily infested cases, other aspects may also play a role, such as not being connected up to the sewage system or the presence of a tapeworm carrier on the farm.

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

The illness in humans is mostly of a mild character and can be treated.
The sensitivity of the used methods at slaughter is estimated to be around 10–30 %, meaning that only a

fraction of infested slaughter cattle are identified during meat inspection using the specified methodology.

Additional information

1. Flütsch, F. et al: Case-control study to identify risk factors for bovine cysticercosis on farms in Switzerland; Parasitology. 2008 Apr;135(5):641-6. Epub 2008 Mar 27.
2. Further information can be found on the FVO website www.bvet.admin.ch.

3. INFORMATION ON SPECIFIC INDICATORS OF ANTIMICROBIAL RESISTANCE

3.1 ESCHERICHIA COLI, NON-PATHOGENIC

3.1.1 General evaluation of the national situation

3.1.2 Antimicrobial resistance in Escherichia coli, non-pathogenic

A. Antimicrobial resistance of E.coli in animal

Sampling strategy used in monitoring

Frequency of the sampling

E. coli were analysed for antimicrobial resistance in 206 samples from fattening pigs, 200 samples from cattle and 214 samples from broiler herds. The samples were evenly collected throughout the year in a stratified and randomized sample scheme in the framework of a permanent national monitoring programme on antimicrobial resistance in Swiss food-producing animals. The slaughter plants included in the surveillance programme account for >92% of the total broiler, > 85 % of the total pig and > 80% of the total cattle production in Switzerland. The number of samples for each plant has been determined in proportion to the number of animals slaughtered per year.
178 of these samples from broilers, 175 of these samples from fattening pigs and 174 of these samples from cattle were addintianlly screened for ESBL/AmpC produceres by selective methodes.

Additionally 200 bulk tank milk (BTM) samples were randomly collected at the Laboratory, where milk samples from all dairy farms of Switzerland are routinely subjected to quality testing twice a month. The sampling took place during 2 weeks in November 2011 in order to exclude the possibility that one farm could be sampled twice.

Type of specimen taken

Faecal samples from pigs and cattle, cloacal samples from broilers. BTM samples from dairy cows.

Methods of sampling (description of sampling techniques)

Faecal samples from calves and pigs and 5 cloacal samples from different broilers per slaughter batch were taken at the slaughter line using a swab in standard transportation medium (Transport Swabs, Oxoid TS0001A, AMIES W/O CH). Immediately after collection, the samples were brought to the laboratory for analysis. Cloacal swabs from one slaughter batch were pooled at the laboratory.

The BTM samples are automatically collected on each farm by milk-collection tankers along the milk collecting routes. A large number of farms are also sampled manually at milk collection locations, at dairies and at milk collecting or centrifugation plants. Specially-trained professionals take the samples in accordance with the international standards of the International Dairy Federation (IDF) and the Swiss law. BTM samples are refrigerated at 1 – 5ºC and sent to a single laboratory for the milk inspection analyses, where a smaller sample is randomly taken and immediately sent to the ZOBA.

Procedures for the selection of isolates for antimicrobial testing

From each sample positive for E. coli or ESBL/AMpC producer one isolate was submitted to susceptibility testing.

Methods used for collecting data

All samples were analysed in the same laboratory (Centre for Zoonoses, Bacterial Animal Diseases and Antibiotic Resistance, University of Bern, Switzerland).

Laboratory methodology used for identification of the microbial isolates

Samples were cultured for E. coli within 72 h after sampling using standard microbiological procedures.

For detection of ESBL/AmpC producers the feacal/pooled cloacal swabs were transferred into 5ml of MacConkey broth (Oxoid) containing ceftazidime (4mg/L) and incubated at 37° for 24h unter agitation. Then, 1 full loop was plated onto selective chromogenic medium for the sreening of third generation cephalosporin-resistant Enterobacteriaceae (chromID ESBL, bioMérieux) and reincubated over night. From each selective plate, a single colony from those showing a unique color an morphology as described in the manufacturers product documentation was further indentified to species level wit Vitek2 system on AST-GN38 cards.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

For E.coli/ unselective method:
ampicillin, cefotaxime, ceftazidime, chloramphenicol, ciprofloxacin, colistin, florfenicol, gentamicin, kanamycin, nalidixic acid, sulfamethoxazole, streptomycin, trimethoprim, tetracycline

For ESBL/AmpC producing E.coli/selective method:
ampicillin, cefazolin, cefepime, cefotaxime, cefotaxime / clavulic acid, cefoxitin, cefpodoxime, ceftazidime, ceftazidime / clavulanic acid, ceftriaxon, cephalotin, ciprofloxacin, gentamicin, imipinem, meropenem, piperacillin / tazobactam

Cut-off values used in testing

E.coli: Wherever possible the epidemiological cut-off values according to EUCAST were used.
ESBL/AmpC producer: CLSI M100-S21

Preventive measures in place

No specific measures for antimicrobial resistance in E. coli. General preventive measures include education of veterinarians and farmers and limitation of use of antimicrobials to veterinary prescription.

Measures in case of the positive findings or single cases

None

Notification system in place

None

Results of the investigation

176 isolates from broiler herds, 175 isolates from pigs, 164 isolates from cattle and 18 isolates from BTM were subjected to susceptibility testing. Resistance is common in E. coli from all three animal species. The highest levels of resistance were found for tetracycline, sulfomethoxazole, streptomycin, ampicillin and trimethoprim. In broilers levels of resistance were also high for ciprofloxacin and nalidixic acid (35% for both). In BTM high levels of resistance were found for ampicillin and streptomycin (28%) and moderate levels for kanamycin, sulfamehtoxazol, tetracycline and trimethoprim (11 - 17%).

With the unselective culture methode four ESBL producing E. coli from broilers and one from pigs could be found, whereas with selective methods 32.6% of the broiler herds, 13.1% of the pigs and 12.6% of the cattle turned out to carry E.coli with resistance to third generation cephalosporins. According to susceptiblity testing most of these isolates were suspicious for the production of beta-Lactamases of the CTX-M-type (57). There was also a group of isolates that seemed to be pAmC-producers (15) and an other that seemed to be ESBL producers of the TEM- or SHV-type (14).

National evaluation of the recent situation, the trends and sources of infection

The results for E. coli from broilers and pigs were similar to those of previous years. In cattle resistance in E. coli is increasing for ampicillin, sulfomethoxazol, streptomycin and tetracycline. Resistance levels in E. coli from BTM in general are lower than in E. coli from slaughtered animals. Resistance in E.coli was most frequently observed against antimicrobials that have been used in food animals for many years, such as trimethoprim/sulfonamide, tetracycline and streptomycin.
With unselective methods prevalence of E. coli with resistance to third generation cephalosporins was low to very low. With selective methods a higher prevalence could be detected.

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

The relatively high prevalence of resistance to ciprofloxacin and nalidixic acid in E. coli from broilers is a potential public health concern.
The occurence of ESBL/AmpC producing E. coli in Switzerland found with selective methods is lower than in certain other european countries. To assess the public health relevance of the E. coli isolates with a resistance to third generation cephalosporins, these isolates have to be characterized in more detail by molecular methods and compared to clinical and subclinical isolates from humans.

Additional information

Further information can be found in the annual report on the sale of antibiotics for veterinary use and antibiotic resistance monitoring of livestock in Switzerland (Arch-Vet 2011) on the FVO website www.bvet.admin.ch

Table Antimicrobial susceptibility testing of E. coli in Cattle (bovine animals)

Escherichia coli, non-pathogenic	E.coli, non-pathogenic, unspecified	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	18	
Antimicrobials:	N	n
Aminoglycosides - Gentamicin	18	0
Aminoglycosides - Kanamycin	18	2
Aminoglycosides - Streptomycin	18	5
Amphenicols - Chloramphenicol	18	1
Amphenicols - Florfenicol	18	0
Fluoroquinolones - Ciprofloxacin	18	0
Penicillins - Ampicillin	18	5
Quinolones - Nalidixic acid	18	0
Tetracyclines - Tetracycline	18	2
Trimethoprim	18	2
Fully sensitive	18	12
Resistant to 1 antimicrobial	18	2
Resistant to 2 antimicrobials	18	1
Resistant to 3 antimicrobials	18	0
Resistant to 4 antimicrobials	18	0
Resistant to >4 antimicrobials	18	3
Cephalosporins - Cefotaxime	18	0
Cephalosporins - Ceftazidim	18	0
Polymyxins - Colistin	18	0

Table Antimicrobial susceptibility testing of E. coli in Cattle (bovine animals)

Escherichia coli, non-pathogenic	E.coli, non-pathogenic, unspecified	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	18	
Antimicrobials:	N	n
Sulfonamides - Sulfamethoxazol	18	3

Footnote:

Bulk tank milk samples

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk samples) - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

E.coli, non-pathogenic, unspecified	Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active (Bulk tank milk samples)																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	18																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides - Gentamicin	2	18	0						2	14	2													0.25	32
Aminoglycosides - Kanamycin	8	18	2										16						2					4	128
Aminoglycosides - Streptomycin	16	18	5									1	5	7			1		4					2	128
Amphenicols - Chloramphenicol	16	18	1									3	3	9	2			1						2	64
Amphenicols - Florfenicol	16	18	0									3	7	7	1									2	64
Cephalosporins - Cefotaxime	0.25	18	0				17	1																0.06	4
Fluoroquinolones - Ciprofloxacin	0.64	18	0	2	16																			0.008	8
Penicillins - Ampicillin	8	18	5									6	6	1	1		4							0.5	32
Quinolones - Nalidixic acid	16	18	0										18											4	64
Tetracyclines - Tetracycline	8	18	2								4	7	5					2						1	64
Trimethoprim	2	18	2							14	1	1					2							0.5	32
Cephalosporins - Ceftazidim	0.5	18	0						16	2														0.25	16
Polymyxins - Colistin	2	18	0									18												2	4
Sulfonamides - Sulfamethoxazol	64	18	3											4	7	4						3		8	1024

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

E.coli, non-pathogenic, unspecified	Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	164																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	164	6									26	113	18	1			3	3							
Aminoglycosides - Kanamycin	8	164	16													146	2				16					
Aminoglycosides - Streptomycin	16	164	52													50	55	7	12	18	22					
Amphenicols - Chloramphenicol	16	164	19												1	39	96	9	4	15						
Amphenicols - Florfenicol	16	164	3												1	56	89	15		3						
Cephalosporins - Cefotaxime	0.25	164	0							149	12	3														
Fluoroquinolones - Ciprofloxacin	0.06	164	7			15	122		19	1	2	3					2									
Penicillins - Ampicillin	8	164	29											5	38	88	4		29							
Quinolones - Nalidixic acid	16	164	6													156	2			6						
Tetracyclines - Tetracycline	8	164	60											9	70	24	1	3	1	56						
Trimethoprim	2	164	18										127	17	2				18							
Cephalosporins - Ceftazidim	0.5	164	1									158	5	1												
Polymyxins - Colistin	2	164	0												164											
Sulfonamides - Sulfamethoxazol	64	164	58														38	25	33	10	3		2		53	

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

E.coli, non-pathogenic, unspecified	Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	164	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

E.coli, non-pathogenic, unspecified	Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	176																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	176	4									13	113	45	1	1			3							
Aminoglycosides - Kanamycin	8	176	5													167	4	2			3					
Aminoglycosides - Streptomycin	16	176	31													49	81	15	2	14	15					
Amphenicols - Chloramphenicol	16	176	3												4	54	104	11		3						
Amphenicols - Florfenicol	16	176	1												11	69	91	4		1						
Cephalosporins - Cefotaxime	0.25	176	4							154	17	1				4										
Fluoroquinolones - Ciprofloxacin	0.06	176	66			7	85		13	5	15	37	6	2		2	4									
Penicillins - Ampicillin	8	176	49										2	10	51	61	3		49							
Quinolones - Nalidixic acid	16	176	68													106		2	6	62						
Tetracyclines - Tetracycline	8	176	46											19	76	31	4	1	3	42						
Trimethoprim	2	176	28										113	27	8				28							
Cephalosporins - Ceftazidim	0.5	176	4									167	5				4									
Polymyxins - Colistin	2	176	0												176											
Sulfonamides - Sulfamethoxazol	64	176	63														24	28	41	20	4	2	1		56	

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

E.coli, non-pathogenic, unspecified	Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	176	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

E.coli, non-pathogenic, unspecified	Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	175																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	2	175	2									29	123	20	1		1	1								
Aminoglycosides - Kanamycin	8	175	6													163	6				6					
Aminoglycosides - Streptomycin	16	175	90												2	26	48	9	12	23	55					
Amphenicols - Chloramphenicol	16	175	18												5	44	98	10	7	11						
Amphenicols - Florfenicol	16	175	0												4	63	98	10								
Cephalosporins - Cefotaxime	0.25	175	2							160	13		1			1										
Fluoroquinolones - Ciprofloxacin	0.06	175	13			21	123		17	1	4	4		1			4									
Penicillins - Ampicillin	8	175	43										1	6	52	69	4		43							
Quinolones - Nalidixic acid	16	175	12													160	2	1	2	10						
Tetracyclines - Tetracycline	8	175	55											24	68	22	6	2	1	52						
Trimethoprim	2	175	63										94	18		1	1		61							
Cephalosporins - Ceftazidim	0.5	175	3									171	1	2			1									
Polymyxins - Colistin	2	175	2												173	2										
Sulfonamides - Sulfamethoxazol	64	175	89														31	25	20	10	6	1	2		80	

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

E.coli, non-pathogenic, unspecified	Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	175	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	64
Cephalosporins - Cefotaxime	0.06	4
Fluoroquinolones - Ciprofloxacin	0.008	8
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Cephalosporins - Ceftazidim	0.25	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Cut-off values used for antimicrobial susceptibility testing of Escherichia coli, non-pathogenic in Animals

Test Method Used	Standard methods used for testing
Broth dilution	NCCLS/CLSI

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin	EFSA	2	
	Kanamycin		8	
	Streptomycin	EFSA	16	
Amphenicols	Chloramphenicol	EFSA	16	
	Florfenicol		16	
Cephalosporins	Cefotaxime	EFSA	0.25	
	Ceftazidim		0.5	
Fluoroquinolones	Ciprofloxacin	NON-EFSA	0.64	
Penicillins	Ampicillin	EFSA	8	
Quinolones	Nalidixic acid	EFSA	16	
Sulfonamides	Sulfonamides	EFSA	256	
	Sulfamethoxazol		64	
Tetracyclines	Tetracycline	EFSA	8	

Table Cut-off values used for antimicrobial susceptibility testing of Escherichia coli, non-pathogenic in Animals

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Trimethoprim	Trimethoprim	EFSA	2	
Polymyxins	Colistin		2	

Table Cut-off values used for antimicrobial susceptibility testing of Escherichia coli, non-pathogenic in Feed

Test Method Used

Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin	NON-EFSA		
	Streptomycin	NON-EFSA		
Amphenicols	Chloramphenicol	NON-EFSA		
Cephalosporins	Cefotaxime	NON-EFSA		
Fluoroquinolones	Ciprofloxacin	NON-EFSA		
Penicillins	Ampicillin	NON-EFSA		
Quinolones	Nalidixic acid	NON-EFSA		
Sulfonamides	Sulfonamides	NON-EFSA		
Tetracyclines	Tetracycline	NON-EFSA		
Trimethoprim	Trimethoprim	NON-EFSA		

Table Cut-off values used for antimicrobial susceptibility testing of Escherichia coli, non-pathogenic in Food

Test Method Used

Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin	NON-EFSA		
	Streptomycin	NON-EFSA		
Amphenicols	Chloramphenicol	NON-EFSA		
Cephalosporins	Cefotaxime	NON-EFSA		
Fluoroquinolones	Ciprofloxacin	NON-EFSA		
Penicillins	Ampicillin	NON-EFSA		
Quinolones	Nalidixic acid	NON-EFSA		
Sulfonamides	Sulfonamides	NON-EFSA		
Tetracyclines	Tetracycline	NON-EFSA		
Trimethoprim	Trimethoprim	NON-EFSA		

3.2 ENTEROCOCCUS, NON-PATHOGENIC

3.2.1 General evaluation of the national situation

3.2.2 Antimicrobial resistance in Enterococcus, non-pathogenic isolates

A. Antimicrobial resistance of Enterococcus spp., unspecified in animal

Sampling strategy used in monitoring

Frequency of the sampling

Enterococci were analysed for antimicrobial resistance in 390 samples from fattening pigs, 200 samples from cattle and 216 samples from broilers. The samples were evenly collected throughout the year in a stratified and randomized sample scheme in the framework of a permanent national monitoring programme on antimicrobial resistance in Swiss food-producing animals. The slaughter plants included in the surveillance programme account for >92% of the total broiler, > 85% of the total pig and > 80% of the total cattle production in Switzerland. The number of samples for each plant has been determined in proportion to the number of animals slaughtered per year.
Additionally 200 bulk tank milk (BTM) samples were randomly collected at the Laboratory, where milk samples from all dairy farms of Switzerland are routinely subjected to quality testing twice a month. The sampling took place during 2 weeks in November 2011 in order to exclude the possibility that one farm could be sampled twice.

Type of specimen taken

Faecal samples from pigs and cattle, cloacal samples from broilers.
BTM samples from dairy cows.

Methods of sampling (description of sampling techniques)

Faecal samples from calves and pigs and 5 cloacal samples from different broilers per slaughter batch were taken at the slaughter line using a swab in standard transportation medium (Transport Swabs, Oxoid TS0001A, AMIES W/O CH). Immediately after collection, the samples were brought to the laboratory for analysis. Cloacal swabs from one slaughter batch were pooled at the laboratory.
The BTM samples are automatically collected on each farm by milk-collection tankers along the milk collecting routes. A large number of farms are also sampled manually at milk collection locations, at dairies and at milk collecting or centrifugation plants. Specially-trained professionals take the samples in accordance with the international standards of the International Dairy Federation (IDF) and the Swiss law. BTM samples are refrigerated at 1 – 5ºC and sent to a single laboratory for the milk inspection analyses, where a smaller sample is randomly taken and immediately sent to the ZOBA.

Procedures for the selection of isolates for antimicrobial testing

From each sample and Enterococcus subtype one isolate was submitted to susceptibility testing.

Methods used for collecting data

All samples were analysed in the same laboratory (Centre for Zoonoses, Bacterial Animal Diseases and Antibiotic Resistance, University of Bern, Switzerland).

Laboratory methodology used for identification of the microbial isolates

Samples were cultured for Enterococcus spp. within 72 h after sampling using standard microbiological procedures.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

ampicillin, amoxicillin/clavulanic acid (2:1), bacitracin, chloramphenicol, ciprofloxacin, erythromycin, florfenicol, gentamicin, linezolid, neomycin, nitrofurantoin, salinomycin, streptomycin, quinupristin/dalfopristin, tetracyclin, vancomycin

Cut-off values used in testing

Wherever possible the epidemiological cut-off values according to EUCAST were used.

Preventive measures in place

No specific measures for antimicrobial resistance in Enterococcus spp. General preventive measures include education of veterinarians and farmers and limitation of use of antimicrobials to veterinary prescription.

Results of the investigation

117 Enterococcus faecalis and 13 Enterococcus faecium isolates from broilers, 64 Enterococcus faecalis and 25 Enterococcus faecium from pigs, 37 Enterococcus faecalis and 7 Enterococcus faecium isolates from cattle as well as 19 Enterococcus faecalis from BTM were subjected to susceptibility testing. Resistance were commonly found in Enterococci from all three animal species and from BTM. Very high to extremely high levels of resistance to bacitracin and neomycin were observed in E. faecalis and E. feacium from all three animal species. Very high to extremely high levels of resistance were also found to tetracycline in E. faecalis and to quinupristin/dalfopristin in E. faecium. High levels of resistance were found to erythromycin in E. faecalis and E. faecium from broilers, pigs, cattle and BTM. None of the isolates was resistant against vancomycin.

National evaluation of the recent situation, the trends and sources of infection

The results for slaughtered animals are similar to those in previous years.
It was the first time that BTM samples were used in the Swiss antibiotic resistance monitoring. The sampling of BTM turned out to be easy and cost effective. However to get more accurate results and to be able to find trends of resistance or newly emerging resistances with a certain confidence, there should be tested far more BTM samples.

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

Non-pathogenic Enterococci from food animals may serve as a reservoir for resistance genes which could potentially be transmitted to human pathogens.

Additional information

Further information can be found in the annual report on the sale of antibiotics for veterinary use and antibiotic resistance monitoring of livestock in Switzerland (Arch-Vet 2011) on the FVO website www.bvet.admin.ch

Table Antimicrobial susceptibility testing of E. faecium in Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

E. faecium	Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	25																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	512	25	0																		21	3	1			
Aminoglycosides - Neomycin	16	25	13														4	8	6	6	1					
Aminoglycosides - Streptomycin	128	25	2																		23				2	
Amphenicols - Chloramphenicol	32	25	0													2	21	2								
Amphenicols - Florfenicol	8	25	0												7	16	2									
Fluoroquinolones - Ciprofloxacin	4	25	0										8	5	7	5										
Penicillins - Ampicillin	4	25	0												21	4										
Tetracyclines - Tetracycline	4	25	9											15		1			9							
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	32	25	22																3	4	8	10				
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	25	0											17	6	2										
Ionophores - Salinomycin	8	25	0											7	17	1										
Macrolides - Erythromycin	4	25	5										4	3	8	5	2	3								
Nitroimidazoles and Nitrofurans - Nitrofurantoin	256	25	0																3	15	7					
Oxazolidines - Linezolid	4	25	0											1	10	14										
Penicillins - Amoxicillin / Clavulanic acid	4	25	0												24	1										
Streptogramins - Quinupristin/Dalfopristin	1	25	20										1	4	1	11	6	2								

Table Antimicrobial susceptibility testing of E. faecium in Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

E. faecium	Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	25	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	128	2048
Aminoglycosides - Neomycin	8	128
Aminoglycosides - Streptomycin	128	2048
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	32
Fluoroquinolones - Ciprofloxacin	0.5	32
Penicillins - Ampicillin	2	128
Tetracyclines - Tetracycline	1	32
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	8	256
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	1	32
Ionophores - Salinomycin	1	32
Macrolides - Erythromycin	0.5	16
Nitroimidazoles and Nitrofurans - Nitrofurantoin	32	256
Oxazolidines - Linezolid	0.5	32
Penicillins - Amoxicillin / Clavulanic acid	2	64
Streptogramins - Quinupristin/Dalfopristin	0.5	32

Table Antimicrobial susceptibility testing of E. faecium in Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

Table Antimicrobial susceptibility testing of E. faecalis in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

E. faecalis	Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	117																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	512	117	0																		109	8				
Aminoglycosides - Neomycin	16	117	116															1	11	47	58					
Aminoglycosides - Streptomycin	512	117	15																		94	7	1		1	14
Amphenicols - Chloramphenicol	32	117	2													20	83	9	3	2						
Amphenicols - Florfenicol	8	117	0												59	55	3									
Fluoroquinolones - Ciprofloxacin	4	117	0										42	67	8											
Penicillins - Ampicillin	4	117	0												114	3										
Tetracyclines - Tetracycline	4	117	74											39	2	2	1	1	72							
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	32	117	92															3	22	37	24	31				
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	117	0											67	44	6										
Ionophores - Salinomycin	8	117	0											102	12	3										
Macrolides - Erythromycin	4	117	46										18	31	19	3	7	39								
Nitroimidazoles and Nitrofurans - Nitrofurantoin	32	117	7																110	6	1					
Oxazolidines - Linezolid	4	117	0											33	81	3										
Penicillins - Amoxicillin / Clavulanic acid	4	117	0												114	3										
Streptogramins - Quinupristin/Dalfopristin	16	117	4											1		1	65	46	4							

Table Antimicrobial susceptibility testing of E. faecalis in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

E. faecalis	Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	117	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	128	2048
Aminoglycosides - Neomycin	8	128
Aminoglycosides - Streptomycin	128	2048
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	32
Fluoroquinolones - Ciprofloxacin	0.5	32
Penicillins - Ampicillin	2	128
Tetracyclines - Tetracycline	1	32
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	8	256
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	1	32
Ionophores - Salinomycin	1	32
Macrolides - Erythromycin	0.5	16
Nitroimidazoles and Nitrofurans - Nitrofurantoin	32	256
Oxazolidines - Linezolid	0.5	32
Penicillins - Amoxicillin / Clavulanic acid	2	64
Streptogramins - Quinupristin/Dalfopristin	0.5	32

Table Antimicrobial susceptibility testing of E. faecalis in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

Table Antimicrobial susceptibility testing of E. faecium in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

E. faecium	Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	13																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	512	13	0																		13					
Aminoglycosides - Neomycin	16	13	8														1	4	5	1	2					
Aminoglycosides - Streptomycin	128	13	2																		11					2
Amphenicols - Chloramphenicol	32	13	0													3	8	1	1							
Amphenicols - Florfenicol	8	13	0												5	8										
Fluoroquinolones - Ciprofloxacin	4	13	1										2	4	4	2	1									
Penicillins - Ampicillin	4	13	1												10	2	1									
Tetracyclines - Tetracycline	4	13	6											7					6							
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	32	13	10															1	2	3	1	6				
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	13	0											11	2											
Ionophores - Salinomycin	8	13	0											2		2	9									
Macrolides - Erythromycin	4	13	3										4	5	1			3								
Nitroimidazoles and Nitrofurans - Nitrofurantoin	256	13	0																6	5	2					
Oxazolidines - Linezolid	4	13	0											1	11	1										
Penicillins - Amoxicillin / Clavulanic acid	4	13	0												12	1										
Streptogramins - Quinupristin/Dalfopristin	1	13	11											2	4	5	1	1								

Table Antimicrobial susceptibility testing of E. faecium in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

E. faecium	Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	13	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	128	2048
Aminoglycosides - Neomycin	8	128
Aminoglycosides - Streptomycin	128	2048
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	32
Fluoroquinolones - Ciprofloxacin	0.5	32
Penicillins - Ampicillin	2	128
Tetracyclines - Tetracycline	1	32
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	8	256
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	1	32
Ionophores - Salinomycin	1	32
Macrolides - Erythromycin	0.5	16
Nitroimidazoles and Nitrofurans - Nitrofurantoin	32	256
Oxazolidines - Linezolid	0.5	32
Penicillins - Amoxicillin / Clavulanic acid	2	64
Streptogramins - Quinupristin/Dalfopristin	0.5	32

Table Antimicrobial susceptibility testing of E. faecium in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

Table Antimicrobial susceptibility testing of E. faecalis in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

E. faecalis	Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	37																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	512	37	3																		32	1	1		1	2
Aminoglycosides - Neomycin	16	37	35														1	1	3	9	23					
Aminoglycosides - Streptomycin	512	37	17																		18	1	1		1	16
Amphenicols - Chloramphenicol	32	37	10													3	21	1	2	10						
Amphenicols - Florfenicol	8	37	0												24	12	1									
Fluoroquinolones - Ciprofloxacin	4	37	0										8	25	4											
Penicillins - Ampicillin	4	37	0												37											
Tetracyclines - Tetracycline	4	37	26											11			1		25							
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	32	37	26														2	1	8	10	6	10				
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	37	0											17	19	1										
Ionophores - Salinomycin	8	37	0											33	3		1									
Macrolides - Erythromycin	4	37	13										12	7	2	3		13								
Nitroimidazoles and Nitrofurans - Nitrofurantoin	32	37	5																32	4	1					
Oxazolidines - Linezolid	4	37	0											6	28	3										
Penicillins - Amoxicillin / Clavulanic acid	4	37	0												36	1										
Streptogramins - Quinupristin/Dalfopristin	16	37	1											1	3	9	7	16	1							

Table Antimicrobial susceptibility testing of E. faecalis in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

E. faecalis	Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	37	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	128	2048
Aminoglycosides - Neomycin	8	128
Aminoglycosides - Streptomycin	128	2048
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	32
Fluoroquinolones - Ciprofloxacin	0.5	32
Penicillins - Ampicillin	2	128
Tetracyclines - Tetracycline	1	32
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	8	256
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	1	32
Ionophores - Salinomycin	1	32
Macrolides - Erythromycin	0.5	16
Nitroimidazoles and Nitrofurans - Nitrofurantoin	32	256
Oxazolidines - Linezolid	0.5	32
Penicillins - Amoxicillin / Clavulanic acid	2	64

Table Antimicrobial susceptibility testing of E. faecalis in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

E. faecalis	Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	37	
Antimicrobials:	lowest	highest
Streptogramins - Quinupristin/Dalfopristin	0.5	32

Table Antimicrobial susceptibility testing of E. faecalis in Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

E. faecalis	Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	64																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	512	64	3																		57	4				3
Aminoglycosides - Neomycin	16	64	63														1		7	20	36					
Aminoglycosides - Streptomycin	512	64	26																		36	1	1		3	23
Amphenicols - Chloramphenicol	32	64	4													8	43	6	3	4						
Amphenicols - Florfenicol	8	64	0												28	34	2									
Fluoroquinolones - Ciprofloxacin	4	64	0										10	48	5	1										
Penicillins - Ampicillin	4	64	0												60	4										
Tetracyclines - Tetracycline	4	64	36											28				3	33							
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	32	64	46														1		17	26	9	11				
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	64	0											26	31	7										
Ionophores - Salinomycin	8	64	0											55	9											
Macrolides - Erythromycin	4	64	21										8	11	13	11		21								
Nitroimidazoles and Nitrofurans - Nitrofurantoin	32	64	7																57	7						
Oxazolidines - Linezolid	4	64	0											7	52	5										
Penicillins - Amoxicillin / Clavulanic acid	4	64	0												61	3										
Streptogramins - Quinupristin/Dalfopristin	16	64	4												2	5	14	39	4							

Table Antimicrobial susceptibility testing of E. faecalis in Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

E. faecalis	Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	64	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	128	2048
Aminoglycosides - Neomycin	8	128
Aminoglycosides - Streptomycin	128	2048
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	32
Fluoroquinolones - Ciprofloxacin	0.5	32
Penicillins - Ampicillin	2	128
Tetracyclines - Tetracycline	1	32
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	8	256
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	1	32
Ionophores - Salinomycin	1	32
Macrolides - Erythromycin	0.5	16
Nitroimidazoles and Nitrofurans - Nitrofurantoin	32	256
Oxazolidines - Linezolid	0.5	32
Penicillins - Amoxicillin / Clavulanic acid	2	64
Streptogramins - Quinupristin/Dalfopristin	0.5	32

Table Antimicrobial susceptibility testing of E. faecalis in Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

Table Antimicrobial susceptibility testing of E. faecium in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

E. faecium	Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	7																									
Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	512	7	0																		7					
Aminoglycosides - Neomycin	16	7	3														2	2		1	2					
Aminoglycosides - Streptomycin	128	7	1																		6					1
Amphenicols - Chloramphenicol	32	7	0													1	6									
Amphenicols - Florfenicol	8	7	0												2	5										
Fluoroquinolones - Ciprofloxacin	4	7	0										1	3	1	2										
Penicillins - Ampicillin	4	7	1												6						1					
Tetracyclines - Tetracycline	4	7	3											4					3							
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	32	7	7																	1	2	4				
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	7	0											6	1											
Ionophores - Salinomycin	8	7	0											1	5	1										
Macrolides - Erythromycin	4	7	2										1		2	2	1	1								
Nitroimidazoles and Nitrofurans - Nitrofurantoin	256	7	0																1	3	3					
Oxazolidines - Linezolid	4	7	0											1	3	3										
Penicillins - Amoxicillin / Clavulanic acid	4	7	1												6					1						
Streptogramins - Quinupristin/Dalfopristin	1	7	4										1	2	1	1	2									

Table Antimicrobial susceptibility testing of E. faecium in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

E. faecium	Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	7	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	128	2048
Aminoglycosides - Neomycin	8	128
Aminoglycosides - Streptomycin	128	2048
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	32
Fluoroquinolones - Ciprofloxacin	0.5	32
Penicillins - Ampicillin	2	128
Tetracyclines - Tetracycline	1	32
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	8	256
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	1	32
Ionophores - Salinomycin	1	32
Macrolides - Erythromycin	0.5	16
Nitroimidazoles and Nitrofurans - Nitrofurantoin	32	256
Oxazolidines - Linezolid	0.5	32
Penicillins - Amoxicillin / Clavulanic acid	2	64

Table Antimicrobial susceptibility testing of E. faecium in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

E. faecium	Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	7	
Antimicrobials:	lowest	highest
Streptogramins - Quinupristin/Dalfopristin	0.5	32

Table Antimicrobial susceptibility testing of E. faecalis in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk samples) - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

E. faecalis — Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active (Bulk tank milk samples)

Isolates out of a monitoring program (yes/no):

Number of isolates available in the laboratory: 19

Antimicrobials:	Cut-off value	N	n	<=0.002	<=0.004	0.008	0.015	0.016	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>4096	1024	2048
Aminoglycosides - Gentamicin	512	19	3																		16					3
Aminoglycosides - Neomycin	16	19	19																1	6	12					
Aminoglycosides - Streptomycin	512	19	8																		11					8
Amphenicols - Chloramphenicol	32	19	1													7	11			1						
Amphenicols - Florfenicol	8	19	0												17	2										
Fluoroquinolones - Ciprofloxacin	4	19	0										6	13												
Penicillins - Ampicillin	4	19	0												19											
Tetracyclines - Tetracycline	4	19	15											4					15							
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	32	19	8															3	8	6		2				
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	19	0											10	7	2										
Ionophores - Salinomycin	8	19	0											19												
Macrolides - Erythromycin	4	19	5										5	3	4	2		5								
Nitroimidazoles and Nitrofurans - Nitrofurantoin	32	19	0																19							
Oxazolidines - Linezolid	4	19	0											8	11											
Penicillins - Amoxicillin / Clavulanic acid	4	19	0												19											
Streptogramins - Quinupristin/Dalfopristin	16	19	0												3	3	9	4								

Table Antimicrobial susceptibility testing of E. faecalis in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk samples) - quantitative data [Dilution method]

E. faecalis	Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active (Bulk tank milk samples)	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	19	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	128	2048
Aminoglycosides - Neomycin	8	128
Aminoglycosides - Streptomycin	128	2048
Amphenicols - Chloramphenicol	2	64
Amphenicols - Florfenicol	2	32
Fluoroquinolones - Ciprofloxacin	0.5	32
Penicillins - Ampicillin	2	128
Tetracyclines - Tetracycline	1	32
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	8	256
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	1	32
Ionophores - Salinomycin	1	32
Macrolides - Erythromycin	0.5	16
Nitroimidazoles and Nitrofurans - Nitrofurantoin	32	256
Oxazolidines - Linezolid	0.5	32
Penicillins - Amoxicillin / Clavulanic acid	2	64
Streptogramins - Quinupristin/Dalfopristin	0.5	32

Table Antimicrobial susceptibility testing of E. faecalis in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk samples) - quantitative data [Dilution method]

Table Cut-off values for antibiotic resistance of E. faecalis in Animals

Test Method Used

Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin	NON-EFSA		
	Streptomycin	NON-EFSA		
Amphenicols	Chloramphenicol	NON-EFSA		
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin	NON-EFSA		
Macrolides	Erythromycin	NON-EFSA		
Oxazolidines	Linezolid	NON-EFSA		
Penicillins	Ampicillin	NON-EFSA		
Streptogramins	Quinupristin/Dalfopristin	NON-EFSA		
Tetracyclines	Tetracycline	NON-EFSA		

Table Cut-off values for antibiotic resistance of E. faecalis in Feed

Test Method Used

Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin	NON-EFSA		
	Streptomycin	NON-EFSA		
Amphenicols	Chloramphenicol	NON-EFSA		
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin	NON-EFSA		
Macrolides	Erythromycin	NON-EFSA		
Oxazolidines	Linezolid	NON-EFSA		
Penicillins	Ampicillin	NON-EFSA		
Streptogramins	Quinupristin/Dalfopristin	NON-EFSA		
Tetracyclines	Tetracycline	NON-EFSA		

Table Cut-off values for antibiotic resistance of E. faecalis in Food

Test Method Used

Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin	NON-EFSA		
	Streptomycin	NON-EFSA		
Amphenicols	Chloramphenicol	NON-EFSA		
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin	NON-EFSA		
Macrolides	Erythromycin	NON-EFSA		
Oxazolidines	Linezolid	NON-EFSA		
Penicillins	Ampicillin	NON-EFSA		
Streptogramins	Quinupristin/Dalfopristin	NON-EFSA		
Tetracyclines	Tetracycline	NON-EFSA		

Table Cut-off values for antibiotic resistance of E. faecium in Animals

Test Method Used	Standard methods used for testing

		Standard	Concentration (microg/ml) Resistant >	Zone diameter (mm) Resistant <=
Aminoglycosides	Gentamicin	NON-EFSA		
	Streptomycin	NON-EFSA		
Amphenicols	Chloramphenicol	NON-EFSA		
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin	NON-EFSA		
Macrolides	Erythromycin	NON-EFSA		
Oxazolidines	Linezolid	NON-EFSA		
Penicillins	Ampicillin	NON-EFSA		
Streptogramins	Quinupristin/Dalfopristin	NON-EFSA		
Tetracyclines	Tetracycline	NON-EFSA		

Table Cut-off values for antibiotic resistance of E. faecium in Feed

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin	NON-EFSA		
	Streptomycin	NON-EFSA		
Amphenicols	Chloramphenicol	NON-EFSA		
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin	NON-EFSA		
Macrolides	Erythromycin	NON-EFSA		
Oxazolidines	Linezolid	NON-EFSA		
Penicillins	Ampicillin	NON-EFSA		
Streptogramins	Quinupristin/Dalfopristin	NON-EFSA		
Tetracyclines	Tetracycline	NON-EFSA		

Table Cut-off values for antibiotic resistance of E. faecium in Food

Test Method Used

Standard methods used for testing

		Standard	Concentration (microg/ml) Resistant >	Zone diameter (mm) Resistant <=
Aminoglycosides	Gentamicin	NON-EFSA		
	Streptomycin	NON-EFSA		
Amphenicols	Chloramphenicol	NON-EFSA		
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin	NON-EFSA		
Macrolides	Erythromycin	NON-EFSA		
Oxazolidines	Linezolid	NON-EFSA		
Penicillins	Ampicillin	NON-EFSA		
Streptogramins	Quinupristin/Dalfopristin	NON-EFSA		
Tetracyclines	Tetracycline	NON-EFSA		

4. INFORMATION ON SPECIFIC MICROBIOLOGICAL AGENTS

4.1 ENTEROBACTER SAKAZAKII

4.1.1 General evaluation of the national situation

4.2 HISTAMINE

4.2.1 General evaluation of the national situation

4.3 STAPHYLOCOCCAL ENTEROTOXINS

4.3.1 General evaluation of the national situation

5. FOODBORNE

Foodborne outbreaks are incidences of two or more human cases of the same disease or infection where the cases are linked or are probably linked to the same food source. Situation, in which the observed human cases exceed the expected number of cases and where a same food source is suspected, is also indicative of a foodborne outbreak.

A. Foodborne outbreaks

System in place for identification, epidemological investigations and reporting of foodborne outbreaks

The Swiss Federal Office of Public Health (FOPH) coordinates the national surveillance of communicable diseases. Notifications of physicians and laboratories are made to cantonal (regional) health authorities and to the FOPH under the provisions of the public health legislation, namely the Ordinance on Disease Notification of 13th January 1999.
Under this scheme, data provided for each notification depend on its supplier: (i) laboratories report diagnostic confirmations (subtype, method, material) while for selected diseases (ii) physicians additionally cover the subsidiaries of clinical diagnosis, exposition, development and measures. Besides the case-oriented reporting, physicians also have to report observations of unexpected clusters of any communicable disease. At the FOPH, the combined notifications of laboratories and physicians are analyzed and published in the weekly Bulletin.

The surveillance of food-borne infectious agents follows the mandatory system. The laboratories are required to report identifications of Salmonella causing gastroenteritis, Salmonella Typhi, Salmonella Paratyphi, Campylobacter spp., Shigella spp., verotoxin-positive Escherichia coli, Listeria monocytogenes, Clostridium botulinum and hepatitis A virus. A complementary notification by physicians is required for typhoid/paratyphoid fever, diseases associated with verotoxin-positive Escherichia coli, botulism and hepatitis A. Following a modification of the Ordinance on Disease Notification, laboratories are additionally required to report identifications of Trichinella spp. since 1st January 2009.

Basically, the responsibility for outbreak investigations lies with the cantonal authorities. Relevant data of outbreaks are reported in a standardized format to the FOPH as soon as the investigations are accomplished. On request, the FOPH offers the cantons its expertise in epidemiology, infectious diseases, food microbiology, risk assessment and risk management. However, under the federal law on the Control of Transmissible Diseases of Man and the federal law on Food-Stuffs and Utility Articles, the central government, and in particular the FOPH, have the duty to supervise the enforcement of the concerned legislation. In cases of outbreaks which are not limited to the territory of one canton, the federal authorities have the competence to coordinate, and if necessary, to direct control actions and information activities of the cantons. In such a situation, the FOPH can conduct its own epidemiological investigations in cooperation with its national reference laboratories. In the field of food-borne diseases, the FOPH is supported by the National Centre for Enteropathogenic Bacteria and Listeria (NENT). This reference laboratory disposes of the facilities, techniques and agents required not only to confirm results from other laboratories but also for epidemiological typing (serotyping and molecular typing) of various bacterial pathogens.

Description of the types of outbreaks covered by the reporting:

The outbreaks were categorised according to the "Manual for reporting of food-borne outbreaks in accordance with Directive 2003/99/EC from the year 2011".

National evaluation of the reported outbreaks in the country:

Trends in numbers of outbreaks and numbers of human cases involved

The number of outbreaks is too low to calculate precise trends. However, it can be clearly stated that the number of outbreaks decreased continuously since the mid 1980 ies. One reason for that is certainly the successful eradication of S. Enteritidis in layer flocks where the prevalence became very low. The implementation of HACCP-systems in food businesses may also have had an influence.

Relevance of the different type of places of food production and preparation in outbreaks

Restaurants and similar places for collective catering were the most frequent settings of outbreaks.

Evaluation of the severity and clinical picture of the human cases

The available clinical data are not very good since this aspect is not in the main focus of the competent authorities. Surprisingly, there were also short hospitalizations in cases of intoxications with histamines and SET. Probably, persons with symptoms more often directly go to emergency stations of hospitals.

Control measures or other actions taken to improve the situation

In Switzerland, the number of outbreaks is already quite low. Therefore, it will be difficult to get a further decrease.

Table Foodborne Outbreaks: summarised data

	Weak evidence or no vehicle outbreaks					
	Number of outbreaks	Human cases	Hospitalized	Deaths	Strong evidence Number of Outbreaks	Total number of outbreaks
Salmonella - S. Typhimurium	0	unknown	unknown	unknown	0	0
Salmonella - S. Enteritidis	0	unknown	unknown	unknown	0	0
Salmonella - Other serovars	1	90	19	0	0	1
Campylobacter	0	unknown	unknown	unknown	0	0
Listeria - Listeria monocytogenes	0	unknown	unknown	unknown	1	1
Listeria - Other Listeria	0	unknown	unknown	unknown	0	0
Yersinia	0	unknown	unknown	unknown	0	0
Escherichia coli, pathogenic - Verotoxigenic E. coli (VTEC)	0	unknown	unknown	unknown	0	0
Bacillus - B. cereus	0	unknown	unknown	unknown	0	0
Bacillus - Other Bacillus	0	unknown	unknown	unknown	0	0
Staphylococcal enterotoxins	0	unknown	unknown	unknown	0	0
Clostridium - Cl. botulinum	0	unknown	unknown	unknown	0	0
Clostridium - Cl. perfringens	0	unknown	unknown	unknown	0	0

	Weak evidence or no vehicle outbreaks					
	Number of outbreaks	Human cases	Hospitalized	Deaths	Strong evidence Number of Outbreaks	Total number of outbreaks
Clostridium - Other Clostridia	0	unknown	unknown	unknown	0	0
Other Bacterial agents - Brucella	0	unknown	unknown	unknown	0	0
Other Bacterial agents - Shigella	1	5	0	0	0	1
Other Bacterial agents - Other Bacterial agents	0	unknown	unknown	unknown	0	0
Parasites - Trichinella	0	unknown	unknown	unknown	0	0
Parasites - Giardia	0	unknown	unknown	unknown	0	0
Parasites - Cryptosporidium	0	unknown	unknown	unknown	0	0
Parasites - Anisakis	0	unknown	unknown	unknown	0	0
Parasites - Other Parasites	0	unknown	unknown	unknown	0	0
Viruses - Norovirus	1	10	0	0	0	1
Viruses - Hepatitis viruses	0	unknown	unknown	unknown	0	0
Viruses - Other Viruses	0	unknown	unknown	unknown	0	0
Other agents - Histamine	0	unknown	unknown	unknown	1	1
Other agents - Marine biotoxins	0	unknown	unknown	unknown	0	0
Other agents - Other Agents	0	unknown	unknown	unknown	0	0

	Weak evidence or no vehicle outbreaks					
	Number of outbreaks	Human cases	Hospitalized	Deaths	Strong evidence Number of Outbreaks	Total number of outbreaks
Unknown agent	2	25	0	0	0	2

Table Foodborne Outbreaks: detailed data for Listeria

Please use CTRL for multiple selection fields

L. monocytogenes - L. monocytogenes serovar 1/2a

	Value
FBO Code	
Number of outbreaks	1
Number of human cases	9
Number of hospitalisations	unknown
Number of deaths	0
Food vehicle	Pig meat and products thereof
More food vehicle information	
Nature of evidence	Detection of causative agent in food chain or its environment - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Household / domestic kitchen
Place of origin of problem	Processing plant
Origin of food vehicle	Intra EU trade
Contributory factors	Cross-contamination
Mixed Outbreaks (Other Agent)	
Additional information	hygienic deficiencies in slicing and packaging factory in Italy

Table Foodborne Outbreaks: detailed data for Other agents

Please use CTRL for multiple selection fields

Histamine

	Value
FBO Code	
Number of outbreaks	1
Number of human cases	3
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Fish and fish products
More food vehicle information	tuna fish tatar
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Unknown
Contributory factors	Storage time/temperature abuse
Mixed Outbreaks (Other Agent)	
Additional information	