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 2012

INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Country: Switzerland

Reporting Year: 2012

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 2012 .

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 held in farms in Switzerland in 2012 (data status May 2013). Number of animals slaughtered in the year 2012.

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% respectively compared to the previous year. The number of pig farms, sheep farms and goat farms declined by 6.5%, 2.6% and 0.3%, respectively. 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. 41 holdings with more than 100 breeding hens keep 91% of all breeding hens. The number of holdings with laying hens and broilers was stable. 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 2012: 39 cattle, 188 pigs, 46 sheep, 14 goats, 208 laying hens, 5853 broilers.

Additional information

Day-old chicks and hatching eggs are imported on a large scale and reared in Switzerland. In 2012 about 232'574 day-old chicks (from France, the Netherlands and Germany) and 28.6 million fertilized eggs of the broiler type (mainly from France, the Netherlands and Germany) 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			649468		1568886		40207	
Gallus gallus (fowl)	breeding flocks, unspecified - in total					150865		1216	
	laying hens					3450552		16624	
	broilers			58097619		6291487		1075	
Goats	- in total			32431		83451		5874	
Pigs	- in total			2763096		1538096		8175	
Sheep	- in total			227655		410762		9025	
Solipeds, domestic	horses - in total			3409		55930		8710	
Turkeys	- in total					51638		298	

Footnote:

(1): Number of slaughtered turkeys is not available. 1378 tons of turkey meat was produced.

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 notifiable (ordinance of the FDHA on doctor and laboratory reports). In the 80s Salmonellosis in humans was the most reported food borne disease. After reaching a peak in 1992 with 113 reports per 100,000 inhabitants the incidence declined steadily and in 1995 Campylobacteriosis took over to be the most reported food borne disease. Since 2003 the incidence of Salmonellosis was never over 30.0 reports per 100,000 inhabitants. S. Enteritidis was 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 since 2004 no Salmonella were detected, the official testing on Salmonella in dairy products was stopped in 2009.
In 2007 a study in broiler meat at retail showed that Salmonella prevalence was low in Swiss products (0.4% compared to 15.3% within imported products). In 2008 a baseline study of Salmonella spp. in broiler carcasses resulted in a Salmonella prevalence of 2.6%.

From 1995 until 2006 the infection of chicken with S. Enteritidis was notifiable and a control programme for S. Enteritidis 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 and laying hen flocks steadily declined from 38 to 3 infected flocks per year. Since 2007 Salmonella infection in poultry and pigs is notifiable according to the regulation 2160/2003 of the European community. The control programme covers the detection of S. Enteritidis and S. Typhimurium in breeding flocks with over 250 places, laying hen flocks with over 1000 places, broiler flocks with over 5000 places and turkey flocks with over 500 places. For breeding flocks S. Hadar, S. Virchow and S. Infantis are included additionally. Since 2007, no more than 5 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 % (3 of 235 flocks; 2006), in broilers 0.3% (1 of 299 flocks; 2007), in slaughter pigs 2.3% (14 of 615; 2007) and in breeding pigs 13.0% (29 of 223; 2008). In laying hens and broilers all isolates were either S. Enteritidis or S. Typhimurium. In slaughter pigs 60% and in breeding pigs 27% of the detected serovars were S. Enteritidis or S. Typhimurium - proving once again the presence of these two serovars in the pig population.

Furthermore, Salmonellosis is notifiable in all animals and regularly reported. In the past 10 years (2003-2012) 670 salmonellosis cases were recorded by cantonal veterinarians ranging between 49 and 73 cases per year since 2007. 45% occurred in livestock (mainly cows), 25% in reptiles and 20% in dogs/cats.

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

1’241 cases in humans were reported in 2012, which represents a notification rate of 15.5 cases per 100’000 inhabitants (2011: 16/100’000). The Salmonella cases have stagnated at this level since 2009. As in previous years the most affected age group were young kids under 5 years (54/100’000). Also 2012 the typical seasonal increase of notifications in the summer and autumn months occurred and the most

frequently reported serovars were S. Enteritidis (30%), S. Typhimurium (16%) and the monophasic strain 4,12,:i:- (15%).
In 2012, 1 case of salmonella infection (1x S. Enteritidis in breeding flocks for egg production line > 250 places) was detected in the framework of the control programme in poultry flocks. In laying hen flocks > 1000 places 6 suspect cases for S. Enteritidis or S. Typhimurium were not confirmed in animal samples. Furthermore, two very small laying hen flocks (25 and 79 animals respectively) were tested positive for S. Enteritidis.
In broiler chickens, the first three years of control showed the presence of different Salmonella serotypes, with the first detection of one of the controlled serovars (S. Enteritidis) in 2010. 2012 the following serovars which are not covered in the control programme were discovered in environmental samples: in 5 broiler flocks > 5000 places (2x S. Rissen, 1x S. Infantis, 1x S. Indiana, 1x S. Welikade), in 1 turkey flock > 500 places (1x S. Indiana) and in 2 laying hen flocks with > 1000 places (1x S. Tennessee, 1x S. enterica subsp. diarizonae).
The prevalence in slaughter pigs in 2007 was equal as in previous research studies. As breeding pigs have not been addressed before the prevalence obtained 2008 cannot be compared with previous data.

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

The longstanding S. Enteritidis control programme showed its effect in the decline of human cases. However, salmonellosis is still the second most zoonosis in Switzerland with stagnation in numbers of cases since 2009. 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

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.
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 larger cheese manufacturers have a hygiene management system in place that conforms to ISO 9000.

Additional information

1. In a S. Kentucky study conducted in 2010 (Bonalli et al.) 106 human S. 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 industry takes responsibility for the monitoring of poultry meat production in a system of self-auditing following the HACCP principles. Results of the Salmonella 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. No imported meat samples were included in the data analysis. In total 3269 tests were done in 2012 (including 60% single samples and 40% batch-related). 21 (0.6%) of the 3269 samples proved positive for Salmonella spp. (8x S. Typhimurium, 5x S. Mbandaka, 2x Indiana, 1x S. Welikade, 1x S. Choleraesuis, 1x S. 4,1,[5],12:i:-, 1x Salmonella spp., 2x S. enterica subsp. arizonae). 8 of the 21 (40%) positive samples were batch samples.

3. The FVO runs a border inspection programme in which risked-based random samples are taken from commodities 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. In 2012, 14 fish samples from Vietnam and 29 fresh beef meat samples from South America and the United States were tested negative for Salmonella.
4. 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	1241	16.1	0	0	0	0	1241
S. Enteritidis	374	4.7					374
S. Typhimurium	197	2.5					197
S. Newport	22	0.3					22
S. Species	29	0.4					29
S. Brandenburg	10	0.3					10
S. Infantis	31	0.4					31
S. Rissen	8	0.1					8
S. 4,12:i:-	183	2.3					183
S. Agona	13	0.2					13
S. Stanley	28	0.4					28
S. Virchow	8	0.1					8
S. 4,12:b:-	9	0.1					9
S. Thompson	10	0.3					10
S. Napoli	22	0.3					22
S. Kentucky	12	0.2					12
S. Paratyphi B	12	0.2					12
S. Bovismorbificans	9	0.1					9

Table Salmonella in humans - Species/serotype distribution

Species/serotype Distribution	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.	Unknown status
Salmonella	1241	16.1	0	0	0	0	1241
S. Bredeney	8	0.1					8
S. Braenderup	10	0.1					10
S. Montevideo	8	0.1					8
Salmonella spp.	219	2.7					219
S. Oranienburg	8	0.1					8
S. Kottbus	11	0.1					11

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	6	4	2	6	2	4	31	13	18
1 to 4 years	50	20	30	36	23	13	88	49	39
5 to 14 years	67	38	29	37	22	15	84	44	40
15 to 24 years	61	24	37	20	14	6	99	53	46
25 to 44 years	77	37	40	29	15	14	147	75	72
45 to 64 years	69	36	33	37	24	13	130	80	50
65 years and older	44	23	21	32	9	23	91	45	46
Total :	374	182	192	197	109	88	670	359	311

Table Salmonella in humans - Seasonal distribution

Seasonal Distribution Months	S. Enteritidis Cases	S. Typhimurium Cases	Salmonella spp. Cases
January	20	11	53
February	10	14	44
March	12	10	43
April	15	9	52
May	27	20	48
June	22	13	38
July	41	18	66
August	74	34	113
September	53	18	55
October	56	27	71
November	37	13	42
December	7	10	45
Total :	374	197	670

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

In the framework of the self auditing system of the poultry meat industry 3110 samples of broiler meat were tested for Salmonella. 19 of 3110 (0.6%) were Salmonella spp. positive
(8x S. Typhimurium, 5x S. Mbandaka, 2x Indiana, 1x S. Welikade, 1x S. Choleraesuis, 1x S. 4,1,[5],12:i:-, 1x Salmonella spp., 2x S. enterica subsp. arizonae). 10 of the 19 samples were fresh broiler meat at different production stages, 7 were mechanically separated broiler meat and 2 minced broiler meat.

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

In the framework of the self auditing system of the poultry meat industry 156 samples of turkey meat were tested for Salmonella. 2 of 156 (1.3%) were Salmonella spp. positive (2x Indiana). Both positive samples were mechanically separated turkey meat.

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 2012 14 raw fish samples from Vietnam as well as 29 beef meat samples from South America and the United States were tested with negative results.

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

Monitoring system

Sampling strategy

2007 a Listeria Monitoring Programme (LMP) was set up by ALP. Products are tested for Listeria as part of quality assurance programmes. As part of an ongoing additional study within the LMP prevalence of various pathogenic organisms is evaluated. Salmonella in 2012 was one of them.

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.

Results of the investigation

115 samples of raw milk and the edible part of 329 samples of hard cheese, 209 samples of semi-hard cheese and 46 samples of semi-soft cheese were found negative for Salmonella.

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	Domestic	Single	25g	285	1		
Meat from broilers (Gallus gallus) - fresh - at processing plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample	Domestic	Single	25g	231	3		2
Meat from broilers (Gallus gallus) - fresh - at processing plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample	Domestic	Batch	25g	28	0		
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample	Domestic	Batch	10g/25g	307	6		2
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample	Domestic	Single	25g	261	0		
Meat from broilers (Gallus gallus) - meat preparation - at processing plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample	Domestic	Single	10g/25g	379	0		
Meat from broilers (Gallus gallus) - meat preparation - at processing plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample	Domestic	Batch	25g	290	0		
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	Domestic	Batch	25g	520	0		
Meat from broilers (Gallus gallus) - mechanically separated meat (MSM) - at cutting plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample	Domestic	Batch	10g	28	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 broilers (Gallus gallus) - mechanically separated meat (MSM) - at cutting plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample	Domestic	Single	25g	255	7		3
Meat from broilers (Gallus gallus) - minced meat - at cutting plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample	Domestic	Single	10g/25g	10	0		
Meat from broilers (Gallus gallus) - minced meat - at processing plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample	Domestic	Single	25g	516	2		1
Meat from turkey - fresh - at cutting plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample	Domestic	Single	25g	61	0		
Meat from turkey - fresh - at slaughterhouse - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample	Domestic	Single	25g	9	0		
Meat from turkey - fresh - at slaughterhouse - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample	Domestic	Batch	10g	25	0		
Meat from turkey - meat preparation - at processing plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample	Domestic	Single	25g	45	0		
Meat from turkey - mechanically separated meat (MSM) - at cutting plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample	Domestic	Batch	10g	19	2		

Table Salmonella in poultry meat and products thereof

	S. 1,4,[5],12:i:-	Salmonella spp., unspecified	S. Choleraesuis	S. Indiana	S. Mbandaka	S. Welikade	S. enterica subsp. arizonae
Meat from broilers (Gallus gallus) - fresh - at cutting plant - Surveillance ((HACCP and own checks))		1					
Meat from broilers (Gallus gallus) - fresh - at processing plant - Surveillance (HACCP and own checks)							1
Meat from broilers (Gallus gallus) - fresh - at processing plant - Surveillance (HACCP and own checks)							
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Surveillance (HACCP and own checks)	1				3		
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Surveillance (HACCP and own checks)							
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)							
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)							

Table Salmonella in poultry meat and products thereof

	S. 1,4,[5],12:i:-	Salmonella spp., unspecified	S. Choleraesuis	S. Indiana	S. Mbandaka	S. Welikade	S. enterica subsp. arizonae
Meat from broilers (Gallus gallus) - mechanically separated meat (MSM) - at cutting plant - Surveillance (HACCP and own checks)			1		2	1	
Meat from broilers (Gallus gallus) - minced meat - at cutting plant - Surveillance (HACCP and own checks)							
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 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 - mechanically separated meat (MSM) - at cutting plant - Surveillance (HACCP and own checks)				2			

Table Salmonella 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 Salmonella	S. Enteritidis	S. Typhimurium
Milk, cows' - raw milk for manufacture - intended for manufacture of raw or low heat-treated products - at processing plant - Surveillance	ALP	Unspecified	Official and industry sampling	food sample	Domestic	Single	25g	115	0		
Cheeses made from cows' milk - soft and semi-soft - made from pasteurised milk - at processing plant - Monitoring	ALP	Unspecified	Official and industry sampling	food sample	Domestic	Single	25g	41	0		
Cheeses made from cows' milk - soft and semi-soft - made from raw or low heat-treated milk - at processing plant - Monitoring [1)]	ALP	Unspecified	Official and industry sampling	food sample	Domestic	Single	25g	91	0		

	S. 1,4,[5],12:i:-	Salmonella spp., unspecified
Milk, cows' - raw milk for manufacture - intended for manufacture of raw or low heat-treated products - at processing plant - Surveillance		
Cheeses made from cows' milk - soft and semi-soft - made from pasteurised milk - at processing plant - Monitoring		
Cheeses made from cows' milk - soft and semi-soft - made from raw or low heat-treated milk - at processing plant - Monitoring [1)]		

Comments:

[1)] All 91 were samples from semi-hard cheeses.

Table Salmonella in milk and dairy products

Footnote:

ALP = Agroscope Liebefeld Posieux Research Institute, 3003 Bern

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
Fish - at border control - Monitoring [1)]	FVO	Selective sampling	Official sampling	food sample	Imported from outside EU	Single	25g	14	0		

	S. 1,4,[5],12:i:-	Salmonella spp., unspecified
Fish - at border control - Monitoring [1)]		

Comments:

[1)] samples originated from Vietnam

Footnote:

The FVO runs a border inspection programme in which risked-based random samples are taken from commodities 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.

Table Salmonella in red 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 bovine animals - fresh - chilled - at border control - Monitoring [1)]	FVO	Selective sampling	Official sampling	food sample > meat	Imported from outside EU	Single	25g	29	0		

	S. 1,4,[5],12:i:-	Salmonella spp., unspecified
Meat from bovine animals - fresh - chilled - at border control - Monitoring [1)]		

Comments:

[1)] samples originated from South America and the United States.

Footnote:

The FVO runs a border inspection programme in which risked-based random samples are taken from commodities 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 are taken according to the Swiss ordinance of epizootics (TSV, Article 255-261) and Commission Regulation (EC) No. 1003/2005. Since 2007, the control programme covers breeding holdings with more than 250 places. 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 20 killed animals or fallen stock per flock and submits the meat and organs to bacteriological testing for Salmonella. If S. Enteritidis, S. Typhimurium, S. Hadar, S. Infantis and/or S. Virchow are detected in the animal samples, a case of Salmonella infection is reported. In this case animal movements from this holding are prohibited (Article 69 TSV) in order to prevent spread of disease. 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 were cleaned, disinfected and freedom from Salmonella of the premises by means of bacteriological testing was proved.

Notification system in place

Salmonella infection in poultry (TSV, Art. 4 (disease to be controlled) and Article 255-261) is notifiable.

Results of the investigation

In the control programme one breeding flock for egg production line was positive for S. Enteritidis. No other suspect cases in breeding flocks occurred.

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

2012 the first breeding flock since many years was tested Salmonella positive. It is assumed, that this was a rare event and that the Salmonella situation in breeding flocks in Switzerland is very good.

Additional information

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

B. Salmonella spp. in Gallus Gallus - broiler flocks

Vaccination policy

Broiler flocks

Vaccination is prohibited.

Control program/mechanisms

The control program/strategies in place

Broiler flocks

Control measures in broiler flocks are taken according to the Swiss ordinance of epizootics (TSV, Article 255-261) and Commission Regulation (EC) No. 646/2007 since 01.01.2009. The national control programme covers broiler flocks on farms with at least 5000 places. 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: Day-old chicks

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 20 killed animals or fallen stock per flock and submits the meat and organs to bacteriological testing for Salmonella. If S. Enteritidis and/or S. Typhimurium are detected in the animal samples, a case of Salmonella infection is reported. In this case animal movements from this holding are prohibited (TSV, Article 69) in order to prevent spread of disease. 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. Fresh meat has 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 culled or slaughtered and the premises were cleaned, disinfected and freedom from Salmonella of the premises by means of bacteriological testing was proved.

Notification system in place

Salmonella infection in broilers (TSV, Art. 4 (disease to be controlled) and Article 255-261) is notifiable.

Results of the investigation

In 2012 there was no broiler flock positive for a serovar covered by the target. 5 broiler flocks were tested positive for other Salmonella serovars (2x S. Rissen, 1x S. Infantis, 1x S. Indiana, 1x S. Welikade).

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

The baseline study conducted in broiler flocks in 2007 showed, that the 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 are taken according to the Swiss ordinance of epizootics (TSV, Article 255-261) and Commission Regulation (EC) No. 1168/2006. The control programme covers all laying hen flocks on farms with at least 1000 places. 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 20 killed animals or fallen stock per flock and submits the meat and organs to bacteriological testing for Salmonella. If S. Enteritidis and/or S. Typhimurium are detected in the animal samples, a case of Salmonella infection is reported. In this case animal movements from this holding are prohibited (Article 69 TSV) in order to prevent spread of disease. 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. 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 culled or slaughtered and the premises were cleaned, disinfected and freedom from Salmonella of the premises by means of bacteriological testing was proved.

Notification system in place

Salmonella infection in laying hens (TSV, Art. 4 (disease to be controlled) and Article 255-261) is notifiable.

Results of the investigation

In 2012 2 laying hen flocks were tested positive for Salmonella (1x S. Tennessee, 1x S. enterica spp. diarizonae). There was no flock positive for a serovar covered by the target.
However, there were 6 laying hen flocks suspicious for S. Enteritidis which were not confirmed. In addition to the results of the control programme, two small laying hen flocks (with 25 and 78 animals respectively) were tested positive for S. Enteritidis.

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

The prevalence of Salmonella spp. in flocks of laying hens in Switzerland is low. No more than 4 cases of Salmonella infection in laying hens per year are reported which is in concordance with the 1,3% prevalence estimate from the baseline study in 2006. 2012 slightly more Salmonella detection in the environment of holdings was registered than the years before.

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 are taken 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. 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 20 killed animals or fallen stock per flock and submits the meat and organs to bacteriological testing for Salmonella. If S. Enteritidis and/or S. Typhimurium are detected in the animal samples, a case of Salmonella infection is reported. In this case animal movements from this holding are prohibited (TSV, Article 69) in order to prevent spread of disease. 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. Fresh meat has 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 culled or slaughtered and the premises were cleaned, disinfected and freedom from Salmonella of the premises by means of bacteriological testing was proved.

Notification system in place

Salmonella infection in turkeys (TSV, Art. 4 (disease to be controlled) and Article 255-261) is notifiable.

Results of the investigation

In 2012 one flock of turkeys was tested positive for Salmonella (1x S. Indiana). 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

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. The results of the control programme in the recent years showed that the target of the control programme can be reached.

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

There is a passive surveillance in place: animal keepers, livestock inspectors, AI technicians, animal health advisory services, meat inspectors, abattoir personnel, police and customs officers have to report any suspected case of salmonellosis in animals to a veterinarian. If Salmonella are confirmed by a diagnostic laboratory, this must be reported to the cantonal veterinarian. Cases in cows, goats or dairy sheep must be reported to the cantonal health and food safety authorities.

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 notifiable (TSV, Art. 4: diseases to be controlled) and Article 222-227).

Results of the investigation

48 salmonellosis cases were reported by cantonal veterinarians in 2012 (14 in cattle, 16 in reptiles, 12 in pets, 2 in sheep, 1 in domestic birds, 1 in horses and 2 in wild animals).
In veterinary diagnostic laboratories 5183 antigen tests for salmonellosis were carried out in the context of clinical investigations, mainly in cattle (38.5%), dogs (23.5%), cats (16%), horses (5%), pigs (4.5%) and birds (4%) (see table).

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

Reported salmonellosis cases in animals in 2012 are within the range of the recent years.

Additional information

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

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	47	cantons	Census	Industry sampling	environmental sample > boot swabs	Domestic	no	Flock	3	0	
Gallus gallus (fowl) - breeding flocks for broiler production line - adult - at farm - Control and eradication programmes	47	cantons	Census	Official and industry sampling	environmental sample > boot swabs	Domestic	yes	Flock	14	0	
Gallus gallus (fowl) - breeding flocks for broiler production line - adult - at farm - Control and eradication programmes	47	cantons	Census	Official sampling	environmental sample > boot swabs	Domestic	no	Flock	11	0	
Gallus gallus (fowl) - breeding flocks for broiler production line - day-old chicks - at farm - Control and eradication programmes	47	cantons	Census	Official sampling	environmental sample > boot swabs	Domestic	no	Flock	9	0	
Gallus gallus (fowl) - breeding flocks for broiler production line - during rearing period - at farm - Control and eradication programmes	47	cantons	Census	Official sampling	environmental sample > boot swabs	Domestic	no	Flock	19	0	
Gallus gallus (fowl) - breeding flocks for egg production line - adult - at farm - Control and eradication programmes	53	cantons	Census	Official and industry sampling	environmental sample > boot swabs	Domestic	yes	Flock	33	1	1
Gallus gallus (fowl) - breeding flocks for egg production line - adult - at farm - Control and eradication programmes	53	cantons	Census	Industry sampling	environmental sample > boot swabs	Domestic	no	Flock	24	0	
Gallus gallus (fowl) - breeding flocks for egg production line - adult - at farm - Control and eradication programmes	53	cantons	Suspect sampling	Official sampling	animal sample > organ/tissue	Domestic	no	Flock	1	1	1
Gallus gallus (fowl) - breeding flocks for egg production line - adult - at farm - Control and eradication programmes	53	cantons	Census	Official sampling	environmental sample > boot swabs	Domestic	no	Flock	11	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	53	cantons	Census	Official sampling	environmental sample > boot swabs	Domestic	no	Flock	6	0	
Gallus gallus (fowl) - breeding flocks for egg production line - during rearing period - at farm - Control and eradication programmes	53	cantons	Census	Official sampling	environmental sample > boot swabs	Domestic	no	Flock	9	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 - day-old chicks - at farm - Control and eradication programmes						
Gallus gallus (fowl) - breeding flocks for broiler production line - during rearing period - 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 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 - 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	Domestic	Animal	6	0			
Birds - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	220	15			
Buffalos - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	1	0			
Camels - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	3	0			
Cats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	827	13			
Cattle (bovine animals) - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	1998	176			
Deer - farmed - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	9	4			
Dogs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	1219	16			
Fur animals - farmed - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	7	0			
Goats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	58	0			
Other animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	222	40			
Pigs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	242	1			
Rabbits - farmed - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	38	2			
Sheep - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	50	5			
Solipeds, domestic - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	264	2			
Wild animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	19	0			

Table Salmonella in other animals

	Salmonella spp., unspecified
Alpacas - Clinical investigations	0
Birds - Clinical investigations	15
Buffalos - Clinical investigations	0
Camels - Clinical investigations	0
Cats - Clinical investigations	13
Cattle (bovine animals) - Clinical investigations	176
Deer - farmed - Clinical investigations	4
Dogs - Clinical investigations	16
Fur animals - farmed - Clinical investigations	0
Goats - Clinical investigations	0
Other animals - Clinical investigations	40
Pigs - Clinical investigations	1
Rabbits - farmed - Clinical investigations	2
Sheep - Clinical investigations	5
Solipeds, domestic - Clinical investigations	2
Wild animals - Clinical investigations	0

Footnote:

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

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 - during rearing period - Control and eradication programmes [1)]	882	cantons	Census	Official sampling	environmental sample > boot swabs	Domestic	no	Flock	238	0	
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes [2)]	882	cantons	Census	Official and industry sampling	environmental sample > boot swabs	Domestic	no	Flock	756	7	5
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes	1009	cantons	Census	Official sampling	environmental sample	Domestic	no	Flock	130	1	
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes	1009	cantons	Census	Industry sampling	environmental sample > boot swabs	Domestic	no	Flock	374	4	
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes	1009	cantons	Census	Official and industry sampling	environmental sample > boot swabs	Domestic	yes	Flock	504	5	
Turkeys - fattening flocks - before slaughter - at farm - Control and eradication programmes	41	cantons	Census	Official and industry sampling	environmental sample > boot swabs	Domestic	yes	Flock	27	1	
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes [3)]	882	cantons	Suspect sampling	Official sampling	animal sample > organ/tissue	Domestic	no	Flock	5	0	
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes [4)]	882	cantons	Census	Official and industry sampling	animal sample	Domestic	yes	Flock	756	0	
Gallus gallus (fowl) - laying hens - during rearing period - Control and eradication programmes [5)]	882	cantons	Suspect sampling	Official sampling	animal sample > organ/tissue	Domestic	no	Flock	1	0	

Table Salmonella in other poultry

	S. Typhimurium	S. 1,4,[5],12:i:-	Salmonella spp., unspecified	S. Indiana	S. Infantis	S. Rissen	S. Tennessee	S. Welikade	S. enterica subsp. diarizonae	Salmonella spp.
Gallus gallus (fowl) - laying hens - during rearing period - Control and eradication programmes [1)]										
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes [2)]							1		1	
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes					1					
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes				1		2		1		
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes				1	1	2		1		
Turkeys - fattening flocks - before slaughter - at farm - Control and eradication programmes				1						
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes [3)]										
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes [4)]										
Gallus gallus (fowl) - laying hens - during rearing period - Control and eradication programmes [5)]										

Comments:

[1)] One flock was initially positive for S. Enteritidis in the environmental sample, but could not be confirmed in the animal testing (see also data under "suspect sampling" in this table).

[2)] 5 flocks were initially positive for S. Enteritidis in the environmental samples, but could not be confirmed in the animal testing (see also data under "suspect sampling" in this table).

Table Salmonella in other poultry

Comments:

[3] The 5 positive environmetal samples could not be confirmed as cases.

[4] Most samples were environmental samples.

[5] The 1 positive environmetal sample could not be confirmed as case.

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	Unknown	Single	25g	10	0		
Compound feedingstuffs for pigs - final product - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample	Unknown	Single	25g	6	0		
Compound feedingstuffs for poultry (non specified) - final product - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample	Unknown	Single	25g	1	0		
Compound feedingstuffs for cattle - final product - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample	Domestic	Single	25g	131	1		
Compound feedingstuffs for horses - final product - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample	Unknown	Single	25g	3	0		
Compound feedingstuffs for pigs - final product - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample	Domestic	Single	25g	83	0		
Compound feedingstuffs for poultry (non specified) - final product - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample	Domestic	Single	25g	58	0		
Compound feedingstuffs for rabbits - final product - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample	Unknown	Single	25g	1	0		

Table Salmonella in compound feedingstuffs

	S. 1,4,[5],12:i:-	Salmonella spp., unspecified	S. Mbandaka
Compound feedingstuffs for cattle - final product - at feed mill - Surveillance			
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 cattle - final product - at feed mill - Surveillance			1
Compound feedingstuffs for horses - final product - at feed mill - Surveillance			
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 rabbits - final product - at feed mill - Surveillance			

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
Feed material of marine animal origin - fish meal - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample	Unknown	Single	25g	4	0		
Feed material of land animal origin - dairy products - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample	Domestic	Single	25g	3	0		

	S. 1,4,[5],12:i:-	Salmonella spp., unspecified
Feed material of marine animal origin - fish meal - at feed mill - Surveillance		
Feed material of land animal origin - dairy products - at feed mill - Surveillance		

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	Unknown	Single	25g	2	0		
Feed material of cereal grain origin - wheat derived - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample	Domestic	Single	25g	3	0		
Feed material of cereal grain origin - other cereal grain derived - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample	Unknown	Single	25g	3	0		
Feed material of cereal grain origin - maize derived - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample	Unknown	Single	25g	6	0		
Feed material of oil seed or fruit origin - rape seed derived - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample	Unknown	Single	25g	2	0		
Feed material of oil seed or fruit origin - soya (bean) derived - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample	Unknown	Single	25g	22	1		
Feed material of oil seed or fruit origin - linseed derived - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample	Domestic	Single	25g	1	0		
Other feed material - forages and roughages - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample	Domestic	Single	25g	2	0		
Other feed material - miscellaneous - at feed mill - Surveillance [1)]	ALP	Unspecified	Official sampling	feed sample	Unknown	Single	25g	1	0		
Other feed material - miscellaneous - at feed mill - Surveillance [2)]	ALP	Unspecified	Official sampling	feed sample	Domestic	Single	25g	1	0		
Other feed material - other plants - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample	Unknown	Single	25g	1	0		
Other feed material - other plants - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample	Domestic	Single	25g	1	0		

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
Other feed material - yeast - at feed mill - Surveillance	ALP	Unspecified	Official sampling	feed sample	Unknown	Single	25g	1	0		

	S. 1,4,[5],12:i:-	Salmonella spp., unspecified	S. Mbandaka
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 - other cereal grain 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			1
Feed material of oil seed or fruit origin - linseed derived - at feed mill - Surveillance			
Other feed material - forages and roughages - at feed mill - Surveillance			
Other feed material - miscellaneous - at feed mill - Surveillance [1)]			

Table Salmonella in other feed matter

	S. 1,4,[5],12:i:-	Salmonella spp., unspecified	S. Mbandaka
Other feed material - miscellaneous - at feed mill - Surveillance [2)]			
Other feed material - other plants - at feed mill - Surveillance			
Other feed material - other plants - at feed mill - Surveillance			
Other feed material - yeast - at feed mill - Surveillance			

Comments:

[1)] 1x Lysinsulfat

[2)] 1x Pic.Mix

Footnote:

ALP = Institute Agroscope Liebefeld Posieux, official feed inspection service. Unknown means feed was imported, but origin EU or third country is not known.

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

Methods of sampling (description of sampling techniques)

Not applicable

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

A micro-dilution method (Sensititre®-System, MCS-Diagnostics) was used for susceptibility testing, including the following antimicrobials: ampicillin, cefotaxime, ceftazidime, chloramphenicol, ciprofloxacin, colistin, florfenicol, gentamicin, kanamycin, nalidixic acid, sulfamethoxazole, streptomycin, trimethoprim, tetracycline

Cut-off values used in testing

Whenever 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.

Control program/mechanisms

The control program/strategies in place

None

Recent actions taken to control the zoonoses

None

Suggestions to the European Union for the actions to be taken

None

Measures in case of the positive findings or single cases

None

Notification system in place

None

Results of the investigation

24 Salmonella spp. isolates from cattle were available for susceptibility testing. 21 S. Typhimurium (3 of them S. 4,12:i.-), 3 S. Enteritidis were available. Moderate to high levels of resistance to ampicillin, streptomycin and sulfamethoxazol were found in S. Typhimurium isolates from cattle (14 - 24%).

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 2012) 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

Methods of sampling (description of sampling techniques)

Not applicable

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

A micro-dilution method (Sensititre®-System, MCS-Diagnostics) was used for susceptibility testing, including the following antimicrobials: ampicillin, cefotaxime, ceftazidime, chloramphenicol, ciprofloxacin, colistin, florfenicol, gentamicin, kanamycin, nalidixic acid, sulfamethoxazole, streptomycin, trimethoprim, tetracycline

Cut-off values used in testing

Whenever 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.

Control program/mechanisms

The control program/strategies in place

None

Recent actions taken to control the zoonoses

None

Suggestions to the European Union for the actions to be taken

None

Measures in case of the positive findings or single cases

None

Notification system in place

None

Results of the investigation

1 Salmonella Typhimurium isolate from pigs was available for susceptibility testing. No resistance against the tested antimicrobials was found.

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

-

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

-

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 itional information www.bvet.admin.ch

C. Antimicrobial resistance in Salmonella in poultry

Sampling strategy used in monitoring

Frequency of the sampling

Samples were collected from clinical material or were taken in the framework of the control programme for Salmonella in poultry (TSV, Art.4 and Art. 255-256).

Type of specimen taken

Clinical samples / samples taken in the framework of the control programme for Salmonella

Methods of sampling (description of sampling techniques)

Not applicable

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

A micro-dilution method (Sensititre®-System, MCS-Diagnostics) was used for susceptibility testing, including the following antimicrobials: ampicillin, cefotaxime, ceftazidime, chloramphenicol, ciprofloxacin, colistin, florfenicol, gentamicin, kanamycin, nalidixic acid, sulfamethoxazole, streptomycin, trimethoprim, tetracycline

Cut-off values used in testing

Whenever 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.

Control program/mechanisms

The control program/strategies in place

None

Recent actions taken to control the zoonoses

None

Suggestions to the European Union for the actions to be taken

None

Measures in case of the positive findings or single cases

None

Notification system in place

None

Results of the investigation

17 Salmonella spp. isolates from birds were available for susceptibility testing. 9 S. Typhimurium, 4 S. Enteritidis, 1. S. Indiana, 2 S. Wien and 1 S. Braenderup. Moderate to high levels of resistance to ampicillin, ciprofloxacin, nalidixic acid, streptomycin, sulfamethoxazol and tetracycline were found in Salmonella spp. isolates from birds (18 - 41%). One isolate (S. Indiana) was resistant against five different antimicrobials. All four S. Enteritidis were susceptible against all tested antimicrobials.

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 fluoroquinolones was found at higher levels compared to previous years.

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 and from control programme in poultry are used for AMR-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 2012) on the FVO website www.bvet.admin.ch

Table Antimicrobial susceptibility testing of S. Wien in Poultry, 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. Wien	Poultry, unspecified - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	2																									
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													1	1									
Amphenicols - Florfenicol	16	2	0													2										
Cephalosporins - Cefotaxime	0.5	2	0							1	1															
Fluoroquinolones - Ciprofloxacin	0.06	2	0				1		1																	
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									1	1													
Polymyxins - Colistin	2	2	1												1	1										
Sulfonamides - Sulfamethoxazol	256	2	1																	1					1	

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

S. Wien	Poultry, unspecified - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	2	
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 Gallus gallus (fowl) - broilers - 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	Gallus gallus (fowl) - broilers - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory													4													
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													3		1								
Amphenicols - Chloramphenicol	16	4	0													1	3									
Amphenicols - Florfenicol	16	4	0													4										
Cephalosporins - Cefotaxime	0.5	4	0								3	1														
Fluoroquinolones - Ciprofloxacin	0.06	4	0						4																	
Penicillins - Ampicillin	8	4	0												4											
Quinolones - Nalidixic acid	16	4	0													4										
Tetracyclines - Tetracycline	8	4	0											1	3											
Trimethoprim	2	4	0										4													
Cephalosporins - Ceftazidim	2	4	0									4														
Polymyxins - Colistin	2	4	0												4											
Sulfonamides - Sulfamethoxazol	256	4	0															2	2							

Table Antimicrobial susceptibility testing of S. Enteritidis in Gallus gallus (fowl) - broilers - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Enteritidis	Gallus gallus (fowl) - broilers - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	4	
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 - fattening pigs - unspecified - weaners to growers - 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 - fattening pigs - unspecified - weaners to growers - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory													1													
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 Pigs - fattening pigs - unspecified - weaners to growers - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Typhimurium	Pigs - fattening pigs - unspecified - weaners to growers - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	1	
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 Gallus gallus (fowl) - broilers - 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. Braenderup	Gallus gallus (fowl) - broilers - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory													1													
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 Gallus gallus (fowl) - broilers - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Braenderup	Gallus gallus (fowl) - broilers - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	1	
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	6																									
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	6	0									1	5													
Aminoglycosides - Kanamycin	8	6	0													6										
Aminoglycosides - Streptomycin	16	6	2														2	2		1	1					
Amphenicols - Chloramphenicol	16	6	0														5	1								
Amphenicols - Florfenicol	16	6	0													6										
Cephalosporins - Cefotaxime	0.5	6	0							2	4															
Fluoroquinolones - Ciprofloxacin	0.06	6	4			1	1					4														
Penicillins - Ampicillin	8	6	3											1	2				3							
Quinolones - Nalidixic acid	16	6	4													2				4						
Tetracyclines - Tetracycline	8	6	1												5					1						
Trimethoprim	2	6	0										6													
Cephalosporins - Ceftazidim	2	6	0									6														
Polymyxins - Colistin	2	6	0												6											
Sulfonamides - Sulfamethoxazol	256	6	5														1								5	

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	6	
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 Gallus gallus (fowl) - broilers - 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, monophasic	Gallus gallus (fowl) - broilers - unspecified - Clinical investigations																								
Isolates out of a monitoring program (yes/no)																									
Number of isolates available in the laboratory													1												
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. Typhimurium, monophasic in Gallus gallus (fowl) - broilers - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Typhimurium, monophasic	Gallus gallus (fowl) - broilers - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	1	
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 Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - 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	Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory													3													
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													2	1									
Aminoglycosides - Streptomycin	16	3	0													3										
Amphenicols - Chloramphenicol	16	3	0													1	2									
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												3											
Quinolones - Nalidixic acid	16	3	0													3										
Tetracyclines - Tetracycline	8	3	0											1	2											
Trimethoprim	2	3	0										3													
Cephalosporins - Ceftazidim	2	3	0									3														
Polymyxins - Colistin	2	3	1												2	1										
Sulfonamides - Sulfamethoxazol	256	3	0																3							

Table Antimicrobial susceptibility testing of S. Enteritidis in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Enteritidis	Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	3	
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

Switzerland - 2012 Report on trends and sources of zoonoses

Table Antimicrobial susceptibility testing of S. Typhimurium in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - 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) - meat production animals - young cattle (1-2 years) - unspecified - Clinical investigations																								
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	2	19	0										17	2											
Aminoglycosides - Kanamycin	8	19	2													17		1	1						
Aminoglycosides - Streptomycin	16	19	2														10	7		2					
Amphenicols - Chloramphenicol	16	19	1												1	4	13			1					
Amphenicols - Florfenicol	16	19	1												2	16			1						
Cephalosporins - Cefotaxime	0.5	19	1							11	7					1									
Fluoroquinolones - Ciprofloxacin	0.06	19	0				3		16																
Penicillins - Ampicillin	8	19	2											9	8				2						
Quinolones - Nalidixic acid	16	19	0													19									
Tetracyclines - Tetracycline	8	19	1												18				1						
Trimethoprim	2	19	1										18						1						
Cephalosporins - Ceftazidim	2	19	0									16	2		1										
Polymyxins - Colistin	2	19	0												19										
Sulfonamides - Sulfamethoxazol	256	19	3														1		8	6	1				3	

Table Antimicrobial susceptibility testing of S. Typhimurium in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Typhimurium	Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	19	
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 Gallus gallus (fowl) - broilers - 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	Gallus gallus (fowl) - broilers - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory													1													
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	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. Indiana in Gallus gallus (fowl) - broilers - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Indiana	Gallus gallus (fowl) - broilers - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	1	
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 Gallus gallus (fowl) - broilers - 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	Gallus gallus (fowl) - broilers - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	3																									
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														1	1								
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											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																2							

Table Antimicrobial susceptibility testing of S. Typhimurium in Gallus gallus (fowl) - broilers - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Typhimurium	Gallus gallus (fowl) - broilers - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	3	
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) - meat production animals - young cattle (1-2 years) - 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, monophasic	Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - unspecified - Clinical investigations																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	2																									
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	1														1				1					
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				1		1																	
Penicillins - Ampicillin	8	2	1											1					1							
Quinolones - Nalidixic acid	16	2	0													1	1									
Tetracyclines - Tetracycline	8	2	1												1					1						
Trimethoprim	2	2	0										2													
Cephalosporins - Ceftazidim	2	2	0									2														
Polymyxins - Colistin	2	2	0												2											
Sulfonamides - Sulfamethoxazol	256	2	1																	1					1	

Table Antimicrobial susceptibility testing of S. Typhimurium, monophasic in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

S. Typhimurium, monophasic	Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - unspecified - Clinical investigations	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	2	
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) - meat production animals - young cattle (1-2 years) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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		2	
	Streptomycin		32	
Amphenicols	Chloramphenicol		16	
Cephalosporins	Cefotaxime		0.5	
Fluoroquinolones	Ciprofloxacin		0.06	
Penicillins	Ampicillin		4	
Quinolones	Nalidixic acid		16	
Sulfonamides	Sulfonamides		256	
Tetracyclines	Tetracycline		8	
Trimethoprim	Trimethoprim		2	

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		2	
	Streptomycin		32	
Amphenicols	Chloramphenicol		16	
Cephalosporins	Cefotaxime		0.5	
Fluoroquinolones	Ciprofloxacin		0.06	
Penicillins	Ampicillin		4	
Quinolones	Nalidixic acid		16	
Sulfonamides	Sulfonamides		256	
Tetracyclines	Tetracycline		8	
Trimethoprim	Trimethoprim		2	

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		2	
	Streptomycin		32	
Amphenicols	Chloramphenicol		16	
Cephalosporins	Cefotaxime		0.5	
Fluoroquinolones	Ciprofloxacin		0.06	
Penicillins	Ampicillin		4	
Quinolones	Nalidixic acid		16	
Sulfonamides	Sulfonamides		256	
Tetracyclines	Tetracycline		8	
Trimethoprim	Trimethoprim		2	

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 notifiable (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 has been the main food-associated notified infection in Switzerland. After reaching a peak in 2000 with 97 reports per 100,000 inhabitants the incidence declined steadily until 2005, but always remained over 65 reports per 100,000 inhabitants. From 2005 until 2009 campylobacteriosis cases rose again up to 100 reports per 100,000 inhabitants. C. jejuni has always been the most isolated species in humans.

In 2007 the prevalence of Campylobacter in poultry meat was estimated to be 43.7%, the one in broiler meat at retail in 2009/2010 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. In the EU-wide baseline study in 2008 70.6% (cumulated qualitative and quantitative approach) of the broiler carcasses were Campylobacter positive.

Campylobacteriosis in animals is notifiable (TSV, Article 5: disease to be monitored). Few campylobacteriosis cases are reported by cantonal veterinarians because infected animals usually don’t get ill. In the last 10 years (2003-2012) 111 campylobacteriosis cases were reported, 88% of which occurred in pets (dogs and cats) and 12% 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. Until 2007 samples were only taken during 2 months in spring. The percentage of positive flocks was with roughly 40% in 2002 and 2007 higher than in the years in between with approximately 25%. The EU-wide baseline study in 2008 revealed that there are remarkable differences in the percentages of positive flocks during the year. Thus, from 2009 onwards samples were taken evenly distributed throughout the year. Prevalence obtained was 44% (2009; in caecum samples), 30% (2010; cloacal swabs) and 37% (2011; cloacal swabs).

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.
The Campylobacter prevalence in pigs remained stable from 2009 until 2011 (65.8% - 67.5%).

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

The number of notified campylobacteriosis cases in 2012 increased slightly to 8’432 (105 per 100’000 inhabitants compared to 101/100’000 in 2011). This is the highest rate of new infections since the introduction of mandatory notification. Similar to previous years the most affected age group were young adults aged 15 to 24 years (161/100’000). The winter peak was extremely high with 874 registered cases in January 2012 compared to previous years. The typical summer peak was highest in July 2012 with 982 cases. In accordance with other years, most cases were caused by C. jejuni (68% of all cases, in 22% of cases no distinction was made between C. jejuni and C. coli).

In animals, 18 cases (12 in dogs, 2 in cats and 4 in cattle) of campylobacteriosis were reported by cantonal veterinarians in 2012. The notification rate was similar to previous years. In veterinary diagnostic laboratories 2737 tests for campylobacteriosis were carried out in the context of clinical investigations, mainly in dogs and cats.

Campylobacter is part in the antimicrobial resistance monitoring programme. 2012, a random sample of broilers, pigs and young cattle (1-2 years) was investigated at slaughter using cloacal and rectum-anal swabs, respectively.
In 2012, 546 broiler herds were tested, of which 190 (33.7%) were Campylobacter positive (175x C. jejuni and 15x C. coli). Compared to 2011 with 37.3% positive herds the prevalence slightly decreased. 145 of the 305 pigs (47.5%) and 48 of the 373 cattle tested (12.8%) in 2012 were Campylobacter positive.

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

Campylobacteriosis occurs most commonly in young adults (15-29 years). Like in the years before, in 2012 the incidence was highest 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, pigs and pets seem to be less important. As Campylobacter prevalence in food animals has remained the same or has slightly decreased throughout the last years, the reasons for the increasing trend in human campylobacterioses are not completely understood at present.

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. Niederer L, Kuhnert P, Egger R, Büttner S, Hächler H, Korczak, BM., 2012: Genotypes and antibiotic resistances of Campylobacter jejuni and Campylobacter coli isolates from domestic and travel-associated human cases. Appl Environ Microbiol.;Jan;78(1):288-91
2. 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. No imported meat samples were included in the data analysis. In total 1000 tests were done in 2012 (including 80% single samples and 20% batch-related). 367 (37%) of the 1000 samples proved positive for Campylobacter spp. (C. jejuni (130), C. coli (19) and unspecified (218)) (see also Campylobacter poultry meat table).
3. 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	8432	105.49	0	0	0	0	0
C. coli	394	4.9					
C. jejuni	5757	72.1					
C. upsaliensis	3	0.04					
C. gracilis	1	0.01					
Campylobacter spp., unspecified	2257	28.2					
C. fetus	17	0.2					
C. rectus	1	0.01					
C. lari	2	0.03					

Footnote:

Campylobacter spp.,unspecied were 416x C. species and 1841x "C. jejuni or C. coli".

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	6	4	2	51	26	25	33	15	18
1 to 4 years	17	14	3	257	146	108	113	56	55
5 to 14 years	20	11	8	415	246	164	145	90	54
15 to 24 years	60	34	26	1087	536	546	378	174	201
25 to 44 years	122	57	65	1692	887	794	670	351	311
45 to 64 years	103	54	48	1328	746	571	544	314	219
65 years and older	65	32	33	905	484	417	387	213	164
Age unknown	1	0	1	22	10	6	11	6	4
Total :	394	206	186	5757	3081	2631	2281	1219	1026

Table Campylobacter in humans - Seasonal distribution

Seasonal Distribution / Months	C. coli	C. jejuni	C. upsaliensis	Campylobacter spp., unspecified
	Cases	Cases	Cases	Cases
January	38	621	0	215
February	14	288	1	112
March	19	325	0	119
April	18	278	0	115
May	32	431	0	211
June	48	611	0	202
July	48	677	0	257
August	43	662	2	270
September	39	445	0	179
October	27	519	0	200
November	38	499	0	196
December	30	401	0	202
Total :	394	5757	3	2278

2.2.3 Campylobacter in foodstuffs

A. Thermophilic Campylobacter in Broiler meat and products thereof

Results of the investigation

In the framework of the self auditing system of the poultry meat industry 925 samples of broiler meat were tested for Campylobacter. 351 of 925 (38%) were Campylobacter spp. positive.

Additional information

1. Wirz SE, Overesch G, Kuhnert P, Korczak BM, 2010: Genotype and antibiotic resistance analysis of Campylobacter isolates from ceaca and the carcasses of slaughtered broiler flocks. Appl Environ Microbiol. 2010 Oct;76(19):6377-86.
2. Kittl S, Korczak BM, Niederer L, Baumgartner A, Buettner S, Overesch G, Kuhnert P., 2013: Comparison of genotypes and antibiotic resistances of Campylobacter jejuni and Campylobacter coli on chicken retail meat and at slaughter. Appl Environ Microbiol.
3. 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

In the framework of the self auditing system of the poultry meat industry 75 samples of turkey meat were tested for Campylobacter. 16 of 75 (21%) were Campylobacter spp. positive.

Additional information

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)	FVO	Unspecified	Industry sampling	food sample		Single	10g/25g	193	134	7	77
Meat from broilers (Gallus gallus) - fresh - at processing plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	10g/25g	236	72	0	0
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	10g/25g	117	71	6	39
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Batch	10g	133	36	0	0
Meat from broilers (Gallus gallus) - meat preparation - at processing plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	10g/25g	172	38	3	4
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		Batch	25g	52	0	0	0
Meat from broilers (Gallus gallus) - minced meat - at processing plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	10g	22	0	0	0
Meat from turkey - fresh - at cutting plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	10g	56	9	1	6
Meat from turkey - fresh - at slaughterhouse - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	10g	9	5	2	3

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 turkey - meat preparation - at processing plant - Surveillance (HACCP and own checks)	FVO	Unspecified	Industry sampling	food sample		Single	10g	10	2	0	1

	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Meat from broilers (Gallus gallus) - fresh - at cutting plant - Surveillance (HACCP and own checks)			50
Meat from broilers (Gallus gallus) - fresh - at processing plant - Surveillance (HACCP and own checks)			72
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Surveillance (HACCP and own checks)			26
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Surveillance (HACCP and own checks)			36
Meat from broilers (Gallus gallus) - meat preparation - at processing plant - Surveillance (HACCP and own checks)			31
Meat from broilers (Gallus gallus) - meat products - cooked, ready-to-eat - at processing plant - Surveillance (HACCP and own checks)			0

Table Campylobacter in poultry meat

	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Meat from broilers (Gallus gallus) - minced meat - at processing plant - Surveillance (HACCP and own checks)			0
Meat from turkey - fresh - at cutting plant - Surveillance (HACCP and own checks)			2
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)			1

2.2.4 Campylobacter in animals

A. Thermophilic Campylobacter in Gallus gallus

Monitoring system

Sampling strategy

A random sample of 546 broiler herds is investigated at slaughter using cloacal swabs (5 swabs pooled per herd). The samples were taken in the framework of the antimicrobial resistance monitoring and the number of samples should provide at least 170 isolates for the susceptibility testing. As the prevalence in the first half of the year was lower than expected, the sampling had to be increased in the last 4 months of the year, in order to get 170 isolates. The broiler slaughter plants included in the surveillance programme account for > 90% 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.

Frequency of the sampling

At slaughter

From January to August approximately 9 samples per week and from September to December approximately 16 samples per week.

Type of specimen taken

At slaughter

Cloacal swabs

Methods of sampling (description of sampling techniques)

At slaughter

In total 5 cloacal swabs (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 positive tested for C. jejuni or C. coli.

Diagnostic/analytical methods used

At slaughter

At the laboratory, cloacal swabs were pooled and direct culture was carried out on a selective medium suitable for Campylobacter (mCCDA, Oxoid, Pratteln, Switzerland). Speciation of suspect colonies was carried out using Matrix-assisted laser desorption/ ionization time-of-flight mass spectrometry (MALDI TOF MS) (Bruker Daltonics).

Vaccination policy

No vaccination available.

Other preventive measures than vaccination in place

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

Measures in case of the positive findings or single cases

No measures are taken.

Notification system in place

Mandatory notification for the detection of Campylobacter spp.

Results of the investigation

In 2012, 33.7% of the 546 sampled broiler flocks were positive for Campylobacter, 175 isolates of C. jejuni and 15 C. coli were identified.

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

Compared to 2011 (with 37.3% positive herds) the prevalence slightly decreased in 2012, and was at the same level as 2010 (33%).

Additional information

1. Kittl S, Kuhnert P, Hächler H, Korczak BM., 2011: Comparison of genotypes and antibiotic resistance of Campylobacter jejuni isolated from humans and slaughtered chickens in Switzerland. J Appl Microbiol. 2011 Feb;110(2):513-520.

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

B. Thermophilic Campylobacter spp., unspecified in Animals Cattle (bovine animals) - young cattle (1-2 years) - at slaughterhouse - Surveillance

Monitoring system

Sampling strategy

A random sample of 373 young cattle (1-2 years) is investigated at slaughter using rectum-anal swabs. The samples are taken evenly distributed throughout the year, in order to exclude seasonal effects. The cattle slaughter plants included in the surveillance programme account for >80% of the total production of young cattle 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

approx. 7 samples per week

Type of specimen taken

rectum-anal swabs

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 positive tested for C. jejuni or C. coli.

Diagnostic/analytical methods used

At the laboratory direct culture was carried out on a selective medium suitable for Campylobacter (mCCDA, Oxoid, Pratteln, Switzerland). Speciation of suspect colonies was carried out using Matrix-assisted laser desorption/ ionization time-of-flight mass spectrometry (MALDI TOF MS) (Bruker Daltonics).

Vaccination policy

No vaccination available.

Measures in case of the positive findings or single cases

No measures are taken.

Notification system in place

Mandatory notification for the detection of Campylobacter spp. .

Results of the investigation

48 of the 373 cattle tested in 2012 were Campylobacter positive (12.8%). 38 isolates were identified as C. jejuni and 10 isolates were identified as C. coli.

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

Campylobacter prevalence in young cattle is low in Switzerland and is about the same as in calves. In addition Campylobacter doesn’t survive on the surface of bovine carcasses due to drying process during slaughter, therefore bovine meat is not a relevant source of human campylobacteriosis.

Additional information

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

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

Monitoring system

Sampling strategy

A random sample of 305 pigs is investigated at slaughter using rectum-anal swabs. 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

approx. 6 samples per week

Type of specimen taken

rectum-anal swabs

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 direct culture was carried out on a selective medium suitable for Campylobacter (mCCDA, Oxoid, Pratteln, Switzerland). Speciation of suspect colonies was carried out using Matrix-assisted laser desorption/ ionization time-of-flight mass spectrometry (MALDI TOF MS) (Bruker Daltonics).

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

Mandatory notification for the detection of Campylobacter spp. .

Results of the investigation

145 of 305 (47.5%) sampled pigs were found Campylobacter positive. 144 were identified as C. coli strains and one isolate was identified as C. jejuni.

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, there occurrence in pigs has not a great impact on 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

1. Egger R, Korczak BM, Niederer L, Overesch G, Kuhnert P.. 2011: Genotypes and antibiotic resistance of Campylobacter coli in fattening pigs.Vet Microbiol. 2011 Aug 19.

2. 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	Domestic	Animal	305	145	144	1	
Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring [2)]	FVO	Objective sampling	Official sampling	animal sample > cloacal swab	Domestic	Flock	546	190	15	175	
Alpacas - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	2	0			
Birds - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	48	0			
Camels - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	2	0			
Cats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	842	5			
Cattle (bovine animals) - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	221	7			
Cattle (bovine animals) - young cattle (1-2 years) - at slaughterhouse - Monitoring [3)]	FVO	Objective sampling	Official sampling	animal sample > rectum-anal swab	Domestic	Animal	373	48	10	38	
Dogs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	1303	20			
Fur animals - farmed - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	7	0			
Goats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	22	1			
Other animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	90	2			
Pigs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	2	0			
Rabbits - farmed - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	28	0			
Sheep - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	13	0			

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
Solipeds, domestic - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	154	1			
Wild animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	3	0			

	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Pigs - fattening pigs - at slaughterhouse - Monitoring [1)]		0
Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring [2)]		0
Alpacas - Clinical investigations		0
Birds - Clinical investigations		0
Camels - Clinical investigations		0
Cats - Clinical investigations		5
Cattle (bovine animals) - Clinical investigations		7
Cattle (bovine animals) - young cattle (1-2 years) - at slaughterhouse - Monitoring [3)]		0
Dogs - Clinical investigations		20
Fur animals - farmed - Clinical investigations		0
Goats - Clinical investigations		1
Other animals - Clinical investigations		2

Table Campylobacter in animals

	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Pigs - Clinical investigations		0
Rabbits - farmed - Clinical investigations		0
Sheep - Clinical investigations		0
Solipeds, domestic - Clinical investigations		1
Wild animals - Clinical investigations		0

Comments:

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

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

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

Footnote:

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

2.2.5 Antimicrobial resistance in Campylobacter isolates

A. Antimicrobial resistance in Campylobacter jejuni and coli in cattle

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 373 fecal samples of cattle aged between 1 and 2 years were evenly collected throughout the year. The cattle slaughter plants included in the surveillance programme account for > 80% of the total production of cattle in Switzerland. The number of samples for each plant has been determined in proportion to the number of cattle slaughtered per year.

Type of specimen taken

Rectum anal swaps

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.

Procedures for the selection of isolates for antimicrobial testing

From each sampled animal 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. Specification of suspect colonies was carried out using Matrix-assisted laser desorption/ionization time of flight mass spectrometry (MALD TOF MS) (Burker Daltonics).

Laboratory used for detection for resistance

Antimicrobials included in monitoring

A micro-dilution method (Sensititre®-System, MCS-Diagnostics) was used for susceptibility testing, including the following antimicrobials: 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

None

Control program/mechanisms

The control program/strategies in place

None

Recent actions taken to control the zoonoses

None

Suggestions to the European Union for the actions to be taken

None

Measures in case of the positive findings or single cases

None

Notification system in place

None

Results of the investigation

38 C. jejuni and 10 C. coli isolates from cattles (1-2years old) 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. 47.4% of the C. jejuni isolates and 30 % 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 rates in campylobacter from cattle are comparable to the ones from broilers. Compared to 2006 prevalence of resistance in C. jejuni increased for ciprofloxacin (14.3% vs. 36.8%) and decreased for streptomycin (35.7% vs. 5.3%). But the number of isolates is too small to detect significant chances.

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

Consumption of beef amounted to 11 kg per person in the year 2012. This corresponds to 21.3 % of the total meat consumption. Prevalence of campylobacter in Swiss cattle is low and as it is substantially reduced during the meat processing, the risk of beef as a source of resistant campylobacter for humans is negligible.

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 2012) on the FVO website www.bvet.admin.ch

B. 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 305 fecal samples of fattening pigs 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

Rectum anal swaps.

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. Specification of suspect colonies was carried out using Matrix-assisted laser desorption/ionization time of flight mass spectrometry (MALD TOF MS) (Burker Daltonics).

Laboratory used for detection for resistance

Antimicrobials included in monitoring

A micro-dilution method (Sensititre®-System, MCS-Diagnostics) was used for susceptibility testing including the following antimicrobials: 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.

Control program/mechanisms

The control program/strategies in place

None

Recent actions taken to control the zoonoses

None

Suggestions to the European Union for the actions to be taken

None

Measures in case of the positive findings or single cases

None

Notification system in place

None

Results of the investigation

144 C. coli isolates and 1 C. jejuni isolate from fattening pigs were subjected to susceptibility testing. The highest proportions of resistant C. coli isolates were found against streptomycin (70.8%). High levels of resistance were also found against ciprofloxacin (41%), nalidixic acid (41.7%) and tetracycline (31.9%). 14.6 % of the C. coli isolates were fully sensitive to all tested antimicrobials, 2 % showed resistance against more than four antimicrobials.

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

Prevalence of resistance against streptomycin decreased significantly in the past 6 years but is still very high. Resistance levels for tetracycline and ciprofloxacin are high. The prevalence of resistance for ciprofloxacin slightly increased from 2006 to 2011 and stayed stable in 2012. The prevalence of resistance 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 23.54 kg per person in the year 2012. This corresponds to 45.5% of the total meat consumption. As the prevalence of campylobacter is substantially reduced during the meat processing, relevance of pork as transmitter of resistant campylobacter to humans is estimated to be small. Nevertheless the large percentage of isolates resistant to fluoroquinolones and 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 2012) on the FVO website www.bvet.admin.ch

C. 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 546 slaughter batches of broilers 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. Specification of suspect colonies was carried out using Matrix-assisted laser desorption/ionization time of flight mass spectrometry (MALD TOF MS) (Burker Daltonics). A micro-dilution method (Sensititre®-System, MCS-Diagnostics) was used for susceptibility testing

Laboratory used for detection for resistance

Antimicrobials included in monitoring

A micro-dilution method (Sensititre®-System, MCS-Diagnostics) was used for susceptibility testing, including the following antimicrobials: 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

None

Control program/mechanisms

The control program/strategies in place

None

Recent actions taken to control the zoonoses

None

Suggestions to the European Union for the actions to be taken

None

Measures in case of the positive findings or single cases

None

Notification system in place

None

Results of the investigation

171 C. jejuni and 14 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. 57.3 % of the C. jejuni isolates and 28.6 % 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 in C. jejuni significantly increased from about 15% in 2006 to over 40% in 2011 and now slightly decreased to 33%. The Number of C. coli isolates is too small to be able to make reliable 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 11.3 kg per person in 2012 which corresponds to 21.8% 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 2012) on the FVO website www.bvet.admin.ch

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	14																								
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	14	0								2	8	4												
Aminoglycosides - Streptomycin	2	14	7											6	1			7							
Amphenicols - Chloramphenicol	16	14	0												3	4	5	2							
Fluoroquinolones - Ciprofloxacin	0.5	14	7								5	2				7									
Quinolones - Nalidixic acid	16	14	7													3	4			7					
Tetracyclines - Tetracycline	2	14	7									2	3	2			2	5							
Macrolides - Erythromycin	8	14	2										4	2	2	4			2						

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	14	
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	14	
Antimicrobials:	lowest	highest
Tetracyclines - Tetracycline	0.25	16
Macrolides - Erythromycin	0.5	32

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	171																								
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	171	0								134	31	6												
Aminoglycosides - Streptomycin	2	171	1											169	1			1							
Amphenicols - Chloramphenicol	16	171	0												107	57	6	1							
Fluoroquinolones - Ciprofloxacin	0.5	171	57							51	60	2	1		1	56									
Quinolones - Nalidixic acid	16	171	57												31	77	6		1	56					
Tetracyclines - Tetracycline	1	171	40									89	29	13	2	1		37							
Macrolides - Erythromycin	4	171	0										122	26	23										

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	171	
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	171	
Antimicrobials:	lowest	highest
Tetracyclines - Tetracycline	0.25	16
Macrolides - Erythromycin	0.5	32

Table Antimicrobial susceptibility testing of C. jejuni in Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

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

C. jejuni	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	1																									
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 - Streptomycin	2	1	0											1												
Amphenicols - Chloramphenicol	16	1	0												1											
Fluoroquinolones - Ciprofloxacin	0.5	1	0							1																
Quinolones - Nalidixic acid	16	1	0													1										
Tetracyclines - Tetracycline	1	1	0										1													
Macrolides - Erythromycin	4	1	0										1													

C. jejuni	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	1	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.12	16
Aminoglycosides - Streptomycin	1	16
Amphenicols - Chloramphenicol	2	32

Table Antimicrobial susceptibility testing of C. jejuni in Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

C. jejuni	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	1	
Antimicrobials:	lowest	highest
Fluoroquinolones - Ciprofloxacin	0.06	4
Quinolones - Nalidixic acid	2	64
Tetracyclines - Tetracycline	0.25	16
Macrolides - Erythromycin	0.5	32

Table Antimicrobial susceptibility testing of C. coli in Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

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

C. coli	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	144																									
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	144	1								64	51	27	1				1								
Aminoglycosides - Streptomycin	2	144	102											37	5		7	95								
Amphenicols - Chloramphenicol	16	144	0												44	72	25	3								
Fluoroquinolones - Ciprofloxacin	0.5	144	59							55	29	1			2	57										
Quinolones - Nalidixic acid	16	144	60												8	51	22	3	4	56						
Tetracyclines - Tetracycline	2	144	46									49	22	21	6	4	3	39								
Macrolides - Erythromycin	8	144	14										59	27	36	8		1	13							

C. coli	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	144	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.12	16
Aminoglycosides - Streptomycin	1	16
Amphenicols - Chloramphenicol	2	32

Table Antimicrobial susceptibility testing of C. coli in Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

C. coli	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	144	
Antimicrobials:	lowest	highest
Fluoroquinolones - Ciprofloxacin	0.06	4
Quinolones - Nalidixic acid	2	64
Tetracyclines - Tetracycline	0.25	16
Macrolides - Erythromycin	0.5	32

Table Antimicrobial susceptibility testing of C. coli in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

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

C. coli	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	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	0								4	5	1													
Aminoglycosides - Streptomycin	2	10	5											5				5								
Amphenicols - Chloramphenicol	16	10	0												2	5	3									
Fluoroquinolones - Ciprofloxacin	0.5	10	3							1	6					3										
Quinolones - Nalidixic acid	16	10	3												2	1	4			3						
Tetracyclines - Tetracycline	2	10	1									1	3	4	1	1										
Macrolides - Erythromycin	8	10	0										3	1	5		1									

C. coli	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	10	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.12	16
Aminoglycosides - Streptomycin	1	16

Table Antimicrobial susceptibility testing of C. coli in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

C. coli	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	10	
Antimicrobials:	lowest	highest
Amphenicols - Chloramphenicol	2	32
Fluoroquinolones - Ciprofloxacin	0.06	4
Quinolones - Nalidixic acid	2	64
Tetracyclines - Tetracycline	0.25	16
Macrolides - Erythromycin	0.5	32

Table Antimicrobial susceptibility testing of C. jejuni in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

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

C. jejuni	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	38																									
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	38	0								26	9	3													
Aminoglycosides - Streptomycin	2	38	2											35	1			2								
Amphenicols - Chloramphenicol	16	38	0												22	16										
Fluoroquinolones - Ciprofloxacin	0.5	38	14							6	16	2				14										
Quinolones - Nalidixic acid	16	38	15												6	14	3			15						
Tetracyclines - Tetracycline	1	38	17									16	5				1	16								
Macrolides - Erythromycin	4	38	1										27	4	6				1							

C. jejuni	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	38	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.12	16
Aminoglycosides - Streptomycin	1	16

Table Antimicrobial susceptibility testing of C. jejuni in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

C. jejuni	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	38	
Antimicrobials:	lowest	highest
Amphenicols - Chloramphenicol	2	32
Fluoroquinolones - Ciprofloxacin	0.06	4
Quinolones - Nalidixic acid	2	64
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	

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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	

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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	

Switzerland - 2012 Report on trends and sources of zoonoses

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 notifiable (ordinance of the FDHA on doctor and laboratory reports). People mainly affected are adults aged over 60. In the 1990s human listeriosis cases fluctuated between 19 and 45 cases per year, from 2000 onwards between 28 and 76 cases per year. Especially in 2005 and 2006 there was an increase in listeriosis cases with more than 70 cases. 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 higher number of cases in 2006 could not be linked to a particular outbreak. The biggest epidemic outbreak in Switzerland with 122 cases occurred in the 1980s due to contaminated cheese.

In the aftermath of the epidemic outbreak in the late 1980s the Swiss government decreed the creation of appropriate means to prevent a repetition of such a case. Agroscope Liebefeld-Posieux Research Institute ALP was given the order to create a Listeria Monitoring Programme (LMP) in cooperation with the Swiss dairy industry. From 1990 on milk and milk products have been tested for Listeria spp. as part of quality assurance programmes. Since 2007 Listeria monocytogenes was present in less than in 1% of the samples in all years. Usually samples from the environment were tested positive. If rarely cheese samples were positive, L. monocytogenes was only found on the cheese surface.
An ALP Listeria Advisory Team can be called in for planning and consultation in decontamination of facilities and providing checkups of company safety concepts. An evaluation in 2008 showed that in 85% of cases the measures advised proved successful over the subsequent years of operation.

In addition, from 2002 until 2011 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 spp. within the framework of the national testing programme in the dairy industry by official food control. As only a few samples were positive each year the programme was stopped 2011.

Listeriosis in animals is notifiable (TSV, Article 5: disease to be monitored). From 1991 until 1995 not more than 3 cases of listeriosis per year were reported. Most cases occurred between 1999 and 2004, ranging between 27 and 34 per year. Since 2005, no more than 21 cases per year were reported. In the past 10 years (2003 until 2012) 180 listeriosis cases were reported by cantonal veterinarians, 94% of them affected ruminants (cattle, sheep and goats).

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

The number of reported cases in humans slightly decreased to 39 in 2012 with a notification rate of 0.5 per 100'000 inhabitants (2011: 0.59). Persons over 65 years of age remain the most affected age group. Like in previous years the two most frequently identified serovars were 1/2a (44%) and 4b (36%).

In the framework of the Listeria Monitoring Programme (LMP) 3'086 samples were tested for the presence of Listeria spp. in 2012. L. monocytogenes were detected in 9 samples (0.3%), 5 of which were samples from the environment, 2 from the surface of semi-hard cheese, 1 from smear-water and 1 from brine. Other species of Listeria spp. were found in 46 samples (1.5%).
As part of an ongoing additional study within the LMP prevalence of various pathogenic organisms is evaluated. 115 samples of raw milk were found negative for L. monocytogenes and Salmonella spp. . In

raw milk cheese, the edible part of 329 samples of hard cheese, 209 samples of semi -hard cheese and 46 samples of semi-soft cheese were negative for L. monocytogenes (quantitatively and qualitatively) and Salmonella spp. (qualitatively). One sample was found positive for staphylococcal enterotoxins (qualitatively).

2012, 9 cases of listeriosis in ruminants were registered in animals (3 in cattle, 6 in sheep). In veterinary diagnostic laboratories 45 tests for listeriosis were carried out in the context of clinical investigations, 50% in ruminants, 18% in horses, 18% in dogs and cats and 14% in other animals.

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

L. monocytogenes 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.
Monitoring the occurrence of Listeria spp. at different stages in the food chain is extremely important to prevent infections with contaminated food. Milk products and cheeses are a potential source of infection. With regard to Listeria spp. 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.

Recent actions taken to control the zoonoses

The research institute of Agroscope Liebefeld-Posieux (ALP) started in 2011 with the analysis of raw milk cheese pastes for the presence of various pathogens (results see above).

Additional information

1. In a border control inspection program risk-based random samples are taken. In 2012 these included 14 raw fish samples from Vietnam of which two were positive for Listeria monocytogens.
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	39	.5
Listeria spp., unspecified	3	0.04
L. monocytogenes - L. monocytogenes serovar 1/2c	2	0.03
L. monocytogenes - L. monocytogenes serovar 1/2b	3	0.04
L. monocytogenes - L. monocytogenes serovar 1/2a	17	0.21
L. monocytogenes - L. monocytogenes serovar 4b	14	0.18

Table Listeria in humans - Age distribution

Age distribution	L. monocytogenes			Listeria spp., unspecified		
	All	M	F	All	M	F
<1 year	1	1	0			
1 to 4 years	0	0	0			
5 to 14 years	1	0	1			
15 to 24 years	0	0	0			
25 to 44 years	4	0	4			
45 to 64 years	12	8	4			
65 years and older	21	7	14			
Total :	39	16	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) 3’086 samples were tested for the presence of Listeria spp. in 2012. L. monocytogenes were detected in 9 samples (0.3%), 5 of which were samples from the environment, 2 from the surface of semi-hard cheese, 1 from smear-water and 1 from brine. Other species of Listeria spp. were found in 46 samples (1.5%).

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
Milk, cows' - raw milk for manufacture - intended for manufacture of raw or low heat-treated products - at processing plant - Surveillance	ALP	Unspecified	Official and industry sampling	food sample	Domestic	Single	25g	115	0	115	0
Cheeses made from cows' milk - hard - made from raw or low heat-treated milk - at processing plant - Monitoring	ALP	Unspecified	Official and industry sampling	food sample	Domestic	Single	25g	329	0	329	0
Cheeses made from cows' milk - soft and semi-soft - made from pasteurised milk - at processing plant - Monitoring [1)]	ALP	Unspecified	Official and industry sampling	food sample	Domestic	Single	25g	138	0	138	0
Cheeses made from cows' milk - soft and semi-soft - made from raw or low heat-treated milk - at processing plant - Monitoring [2)]	ALP	Unspecified	Official and industry sampling	food sample	Domestic	Single	25g	217	0	217	0

	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Milk, cows' - raw milk for manufacture - intended for manufacture of raw or low heat-treated products - at processing plant - Surveillance	115	0	0
Cheeses made from cows' milk - hard - made from raw or low heat-treated milk - at processing plant - Monitoring	329	0	0
Cheeses made from cows' milk - soft and semi-soft - made from pasteurised milk - at processing plant - Monitoring [1)]	138	0	0

Table Listeria monocytogenes in milk and dairy products

	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Cheeses made from cows' milk - soft and semi-soft - made from raw or low heat-treated milk - at processing plant - Monitoring [2)]	217	0	0

Comments:

[1)] 92 of the 138 were samples from semi-hard cheeses.

[2)] 209 of the 217 were samples from semi-hard cheeses.

Footnote:

ALP = Agroscope Liebefeld Posieux Research Institute, 3003 Bern

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 [1)]	FVO	Selective sampling	Official sampling	food sample	Imported from outside EU	Single	25g	14	2		

	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Fish - at border control - Monitoring [1)]	14	1	1

Comments:

[1)] samples originated from Vietnam

Footnote:

The FVO runs a border inspection programme in which risked-based random samples are taken from commodities 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
Buffalos - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	1	0		0
Cats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	2	0		0
Cattle (bovine animals) - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	10	2		2
Dogs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	6	0		0
Goats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	3	3		3
Other animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	5	1		1
Sheep - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	8	6		6
Solipeds, domestic - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	8	0		0
Wild animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	2	0		0

Footnote:

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

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

Detection of VTEC in humans is notifiable since 1999. Confirmed human VTEC cases fluctuated between 31 and 72 cases per year. The notification rate of VTEC infections was never above 1.1 reports per 100,000 inhabitants in the total population. Children under 5 years were the age group mostly affected. In the last 10 years, the notification rate ranged between 3 and 9 reports per 100’000 inhabitants in this age group without a clear time trend.

97 human non-O157 VTEC isolates collected from patients from 2000 to 2009 were further characterized: 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 of strains indicates that non-O157 STEC infections in Switzerland are often sporadic and not linked to bigger outbreaks (Käppeli et al., 2011).
In the time period 1999 to 2006, 62.7% of the 249 patients had been abroad in the week before onset of disease. The most common regions mentioned were Southern Europe, North Africa, Central America and India. Thus, travelling abroad to warmer climes can be a risk factor for VTEC infections.

Ruminants, especially small ruminants, are an important reservoir for VTEC in Switzerland. 14% of fecal samples from cattle, 30% from sheep and 22% from pigs were VTEC-positive in 2000. Younger bovines were found to excrete more frequently VTEC than older bovines. Caution is therefore needed when interpreting average figures on the occurrence of VTEC for the whole cattle population. In swine, characterization data of the strains showed that they are harbouring mainly stx2e and therefore belong to low pathogenic VTEC group.

In the 1990s 2.4% of minced meat samples and 21.6% of uncooked, deep-frozen hamburgers were positive for VTEC.
In 29 of 1422 samples (2%) of raw milk cheese - collected in the national monitoring program for dairy products from 2006 to 2008 - VTEC strains were isolated (24 semi-hard and 5 soft cheeses). All isolated strains belonged to non-O157 serotypes (13 of 24 strains typeable with O antisera belonged to the serogroups O2, O22 and O91; 9 strains harbored hlyA (enterohemorrhagic E. coli hemolysin); none of the strains tested positive for eae (intimin)) (Stephan et al. 2008, Zweifel et al. 2010). A study looking at the die-off behavior of Shiga-toxin producing E. coli during the ripening process of semi-hard raw milk cheeses revealed that VTEC 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) (Peng et al. 2013).
In a study concerned with the occurrence of VTEC in foods of plant origin, one of 233 samples (ready-to-eat lettuce (142), freshly cut fruits (64) and sprouts (27)) was found to be contaminated with a low pathogenic VTEC (Althaus et al. 2012).

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

2012, 63 laboratory confirmed cases of human VTEC infections were registered (3x O157, 1x O145, 13x non-O157, 46 x unknown). The notification rate was 0.8 per 100’000 inhabitants (2011: 1.0), which is in

the normal range of yearly differences. Children under 5 years of age were the most frequently affected (3.5 per 100’000 inhabitants). All of the 9 cases of haemolytic-uraemic syndrome (HUS) were registered in children under 15 years.

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

Reported VTEC cases in humans are stable. 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 VTEC (<100 microorganisms) an infection via contaminated food or water is easily possible. Thorough cooking of critical foods prevents infection with VTEC originally present in raw products. Data from the national monitoring program for dairy products 2006-2008 confirm that raw milk cheese may constitute a possible source of VTEC infections. 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 VTEC are a relevant hazard in this type of dairy product.

Recent actions taken to control the zoonoses

Two studies relating to Shiga-toxin producing E. coli (STEC) in foodstuffs were conducted by the national reference laboratory to generate new information (Althaus et al. 2012 and Peng et al. 2013).

Additional information

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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. The FVO runs a border inspection programme in which risked-based random samples are taken from commodities 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 are tested. In 2012, 29 bovine meat samples from South America and the United States were tested negative for E.coli.
9. 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	0	0	0	0	0	0
HUS	9	0.11				
- lab. confirmed cases	9	0.11				
- caused by O157 (VT+)	2	0.03				
- caused by other VTEC	4	0.05				
E.coli infect. (except HUS)	54	0.68				
- laboratory confirmed	54	0.68				
- caused by 0157 (VT+)	1	0.01				
- caused by other VTEC	10	0.13				

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	3	1	2				1	1	0
1 to 4 years	11	5	6				3	0	3
5 to 14 years	10	6	4	2	1	1	7	4	3
15 to 24 years	3	1	2	1	0	1	0	0	0
25 to 44 years	14	4	10				1	0	1
45 to 64 years	10	4	6				1	0	1
65 years and older	12	5	7				0	0	0
Total :	63	26	37	3	1	2	13	5	8

Footnote:

VTEC all: including cases that are clinical and lab. confirmed as well as cases that are only lab. confirmed

2.4.3 Escherichia coli, pathogenic in foodstuffs

Table VT E. coli in food

	Source of information	Sampling strategy	Sampler	Sample type	Sample origin	Analytical Method	Sampling unit	Sample weight	Units tested	Total units positive for Verotoxigenic E. coli (VTEC)	Verotoxigenic E. coli (VTEC) - VTEC O157
Meat from bovine animals - fresh - chilled - at border control - Monitoring [1)]	FVO	Selective sampling	Official sampling	food sample	Imported from outside EU	Microbiological tests	Single	25g	29	0	

	Verotoxigenic E. coli (VTEC) - VTEC non-O157	Verotoxigenic E. coli (VTEC) - VTEC, unspecified
Meat from bovine animals - fresh - chilled - at border control - Monitoring [1)]		

Comments:

[1)] samples originated from South America and the United States.

Footnote:

The FVO runs a border inspection programme in which risked-based random samples are taken from commodities 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.

2.5 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

Tuberculosis in humans is notifiable (ordinance of the FDHA on medical doctor and laboratory reporting). Human tuberculosis cases due to M. bovis are reported on a low scale (not more than 15 cases per year since 2005), which corresponds to less than 2% of all reported tuberculosis cases.
In animals, tuberculosis is notifiable (TSV, Article 3: disease to be eradicated and 158 – 159). Vaccination is prohibited. 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). Between 1960 and 1980, the entire bovine population was tested every other year in an active surveillance programme. Since 1980, passive surveillance at the slaughterhouse is performed. 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. In 1997 a survey in a randomized sample of about 10% of farms (4874 farms) was conducted to prove freedom from disease. 111‘394 cattle were tuberculin tested. On 72 farms, tests had to be repeated. All farms were negative.
In animals cases are reported extremely rarely (no more than two cases per year since 1991). In the last 10 years a total of 8 cases were registered, affecting parrots (2), cats (2) and one each of chicken, dogs, horses and lama. The last case in cattle was reported 1998.
In 1998, lymph nodes from slaughtered captive deer from 124 sampled holdings (from a total of 485 farmed deer holdings) showed no lesions typical of bovine tuberculosis and were tested negative in culture for Mycobacterium bovis and Mycobacterium tuberculosis (Wyss et al. 2000).

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

In 2012, 398 diagnostically confirmed human cases of tuberculosis and 65 non-laboratory confirmed cases were reported. 308 of the laboratory confirmed cases were caused by M. tuberculosis, 5 by M. bovis, 4 by M. africanum and 2 by M. caprae. 79 strains were M. tuberculosis-complex positive, but could not be identified further. All 5 M. bovis cases were older than 60 years and 4 were Swiss citizens. In one case the origin of the person was unknown.
In animals no cases of tuberculosis were reported in 2012. In veterinary diagnostic laboratories 25 tests were carried out, mainly in cattle and pigs.
In 2010, 23 of 582 cattle of the Canton St. Gallen, which had spent the Alpine pasturing season 2009 on Alpine pastures in Austria, reacted with an unclear result in the tuberculin skin test, but were negative after retesting with the tuberculin skin test and/or the Interferon-gamma test. In addition, in 6 of 165 wild boars (3.6) bacteria from the MTBC complex were detected, but none of these tested positive for M. bovis or M. caprae. 269 wild red deer were tested negative for tuberculosis (Schöning 2012, dissertation, unpublished).

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

As Swiss livestock is recognized free of bovine tuberculosis, the risk of an TB infection by contact to infected bovines within Switzerland or through food containing mycobacteria (like milk) from Swiss products is negligible. Although no cases were reported since 1998 and the results of the dissertation 2012 gave no indication of the occurrence of the disease in pastured cattle in Austria or wild boars or red

deer in Switzerland, it cannot be excluded that isolated TB cases do exist. As detecting suspect cases during meat inspection in slaughterhouses is a challenge in a country with a very low prevalence, disease awareness in meat inspectors should be strengthened.
Risk factors for the incursion of the disease are international trade with animals, summer grazing of Swiss cattle in risk areas (i.e. in Tyrolia and Vorarlberg, Austria, where M. caprae infection is endemic in red deer since the 90ties), wild animals living close to the Austrian or German border.

Recent actions taken to control the zoonoses

Wild animal population of areas bordering Austria, Italy and France were tested for tuberculosis (results see above).

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 at the Vetsuisse Faculty in Bern and Zurich
3. Further information can be found on the FVO website www.bvet.admin.ch.

2.5.2 Tuberculosis, mycobacterial diseases in humans

Table Mycobacterium in humans - Species/serotype distribution

Species/serotype Distribution	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.
Mycobacterium	463	5.87	0	0	0	0
M. bovis	5	0.06				
M. tuberculosis	308	3.85				
M. africanum	4	0.05				
Mycobacterium spp., unspecified	144	1.88				
M. caprae	2	0.03				
Reactivation of previous cases	47	0.59				

Footnote:

In the group of unspecified Mycobacterium spp. are 79 cases of M. tub. complex (cases inc. 0.99) and 65 (cases inc. 0.86) non laboratory confirmed cases where thus the Mycobacterium species is unknown.

Table Mycobacterium in humans - Age distribution

Age distribution	M. bovis		
	All	M	F
45 to 64 years	1	1	0
65 years and older	4	2	2
Total :	5	3	2

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 since 1959. Freedom from disease has been proven in 1997 conducting a survey in a randomized sample of 4874 farms. 111‘394 cattle were tuberculin tested. In 72 farms tests had to be repeated. All farms were negative.

Notification system in place

Bovine tuberculosis is notifiable since 1950 (TSV, Art. 3: disease to be eradicated and Art. 158 - Art. 165). Notification of suspicious cases are 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.

Results of the investigation

No cases were reported in cattle since 1998.

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. Cattle which were on Alpine pastures in Austria 2009 as well as red deer and wild boar in the Alpine region in 2010 were all tested negative. In countries with very low prevalence, disease awareness at slaughterhouses need to be strengthened regularly in order not to miss isolated cases.

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
Birds - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	1	0			
Cats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	2	1			
Cattle (bovine animals) - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	9	0			
Dogs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	1	0			
Goats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	1	0			
Pigs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	9	1			
Reptiles - Clinical investigations [1)]	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	1	0			
Solipeds, domestic - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	1	0			

	M. avium complex - M. avium subsp. avium
Birds - Clinical investigations	
Cats - Clinical investigations	1
Cattle (bovine animals) - Clinical investigations	
Dogs - Clinical investigations	
Goats - Clinical investigations	
Pigs - Clinical investigations	1

Table Tuberculosis in other animals

	M. avium complex - M. avium subsp. avium
Reptiles - Clinical investigations [1)]	
Solipeds, domestic - Clinical investigations	

Comments:

[1)] green iguana

Footnote:

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

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	40207	1568886	40207	100	0	0	no routine test	0	0	1	0
Total : [1)]	40207	1568886	40207	100	0	0	N.A.	0	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. 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 notifiable (ordinance of the FOHA on doctor and laboratory reports). The number of detections of Brucella spp. in humans has been rare for many years.
Brucellosis in animals is notifiable (TSV, Article 3: disease to be eradicated; bovine brucellosis since 1956, in sheep and goats since 1966). 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). Vaccination is prohibited since 1961. Switzerland is officially recognized by EU (Bilateral Agreement on Agriculture, Veterinary Annex) as free of brucellosis in cattle, sheep and goats. Requirements of section 3.2.1.5 of the OIE International Animal Health Code are fulfilled since 1963. Brucella abortus in bovines was last reported in 1996, Brucella melitensis in small ruminants in 1985. Freedom from bovine brucellosis has been proven the last time in 1997 when a random sample of 139‘655 cows (in general older than 24 months) in 4’874 farms was tested negative using a serological test. Since 1998 the freedom of the sheep and goat population from brucellosis is documented annually with serological testing of randomly selected farms according to EU regulation 91/68/EEC .
Brucella suis in pigs is very rare. However, it is known that B. suis Biovar 2 is prevalent in wild boars (Leuenberger et al., 2007). Outdoor pigs which are outside the whole day, close to the forest (<50m) and with low fences (<60cm) have the highest risk of contact with wild boars. From 252 wild boars tested from 2008 until 2010 28.8% (95% CI 23.0%-34.0%) were B. suis Biovar 2 positive by culture and PCR and 35.8% (95% CI 30.0%-42.0%) had antibodies against B. suis (Wu et al. 2011). These findings were significantly higher than in previous studies indicating a spread of B. suis Biovar 2 in Swiss 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 hybrids (Wu et al. 2012).
After a reported case in wild boars in 2001, in 2009 the first outbreak since many years with B. suis Biovar 2 occurred in domestic pigs. The primary case was in a farm with Mangalitza pigs, which were reared outdoor and therefore contact to wild boars was very likely. Two secondary farms had contact to the first one via animal traffic. The outbreak isolates constituted a unique cluster by MLVA (Multi locus variable number of tandem repeats) and was distinct from that of isolates obtained from wild boars, suggesting that direct transmission of the pathogen from wild boars to domestic pigs was not responsible for this outbreak. (Abril 2011)).

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

2012 3 brucellosis cases in humans were reported (in the previous year 8), all of which were caused by Brucella melitensis.
In the yearly national survey a total of 542 sheep farms (8’401 blood samples) and 716 goat farms (6’003 blood samples) were tested negative for Brucella melitensis in 2012. Furthermore, no cases of brucellosis in sheep and goat were reported by the cantonal veterinarians. A total of 1365 animals were tested in the context of clinical investigations or abortions in 2012 in diagnostic laboratories.
Human infections with Brucella spp. 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 negligible risk because its prevalence is probably close to zero in the Swiss animal population as no new cases in dairy livestock were found since many years. Cases of brucellosis in humans are anticipated to be attributable either to stays abroad or to the consumption of foreign products.
The occurrence of B. suis in wild boars and holdings which keep pigs outdoors should be investigated also in the future. Contacts between wild boars and pigs kept outdoor are most likely to occur at the border of the Jura and the middle part of Switzerland.

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

B. suis Biovar 2 is very rarely notified in humans, probably as it is known to be less virulent to humans than Biovar 1 and 3.

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. (2011): Free-ranging wild boar may represent a threat to disease freedom in domestic pigs in Switzerland. J Wildl Dis.
7. Wu, N., Abril, C., Thomann, A., Grosclaude, E., Doherr, M.G., Boujon, P., Ryser-Degiorgis, M.P. (2012): Risk factors for contacts between wild boar and outdoor pigs in Switzerland and investigations on potential Brucella suis spill-over. BMC Vet Res
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	3	.04	0	0	0	0
B. melitensis	3	0.04				

Table Brucella in humans - Age distribution

Age distribution	B. abortus			B. melitensis			Brucella spp., unspecified		
	All	M	F	All	M	F	All	M	F
25 to 44 years				1	0	1			
45 to 64 years				2	2	0			
Total :	0	0	0	3	2	1	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. 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) all diseased cattle have to be killed. All placentas, abortion material and the milk of diseased and suspicious cows 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.

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 proven 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). 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 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 2012 a randomized sample of 542 farms with sheep and 716 farms with goats were investigated. 8401 samples from sheep and 6003 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

see Brucella melitensis in goats

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	Domestic	Animal	1	0			
Cattle (bovine animals) - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	1262	0			
Deer - wild - fallow deer - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	1	0			
Dogs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	1	0			
Goats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	28	0			
Monkeys - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	2	0			
Other animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	1	0			
Pigs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	8	0			
Sea lion - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	1	0			
Sheep - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	55	0			
Solipeds, domestic - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	5	0			

	Brucella spp., unspecified
Alpacas - Clinical investigations	
Cattle (bovine animals) - Clinical investigations	
Deer - wild - fallow deer - Clinical investigations	

Table Brucellosis in other animals

	Brucella spp., unspecified
Dogs - Clinical investigations	
Goats - Clinical investigations	
Monkeys - Clinical investigations	
Other animals - Clinical investigations	
Pigs - Clinical investigations	
Sea lion - Clinical investigations	
Sheep - Clinical investigations	
Solipeds, domestic - Clinical investigations	

Footnote:

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

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	14899	494213	14899	100	0	0	1258	14404	0	233	1	5	0	0
Total : [1)]	14899	494213	14899	100	0	0	1258	14404	0	233	1	5	0	0

Comments:

[1)] N.A.

Footnote:

In 2012 a randomised sample of 542 sheep farms and 717 goat farms were tested. 8401 sheep blood samples and 6003 goat samples were tested negative using serological tests.

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					
	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	Number of positive animals		Number of animals examined microbio logically	Number of animals positive microbio logically
																		Sero logically	BST		
Schweiz/Suisse/Svizzera	40207	1568886	40207	100	0	0	0	0	0	0	0	0	1792	0	0	3047	0	33	0	6	0
Total : [1)]	40207	1568886	40207	100	0	0	0	0	0	0	0	0	1792	0	0	3047	0	33	0	6	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 tests. Tests were performed in blood samples from 31042 animals and in 18952 bulk milkk 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

Since 1999 Yersiniosis in humans is no longer notifiable. From 1988 until 1998 the number of reported cases dropped from about 170 to 50 cases per year. Since 2005 the national reference laboratory NENT detects about 20 to 30 isolates of Yersinia spp. from human samples per year, mainly Y. enterocolitica. In the recent years about 50% belong to Y. enterocolitica biovar 1A. Among the other half mainly Biovar 4:O3 and Biovar 3:O9 are detected.
Analysis of 128 human Y. enterocolitica isolates from 2001 to 2010 showed that 60% belonged to the pathogenic biotypes 2, 3 or 4 (mainly 4/O:3 and 2/O:9) and 40% to the apathogenic biotype 1A. 5% (6 of 128) of the people had an anamnesis with travelling before they got ill (Fredriksson-Ahomaa, 2012).

In animals, yersiniosis is notifiable (TSV, Article 5: disease to be monitored and Article 291).
Never more than 3 cases per year were reported, adding up 14 yersiniosis cases in the past ten years (2003-2012): 4 in monkeys and 1 each in sheep, hares, rabbits and alpacas. 6 cases affected “other species”.

2001 64% (56 of 8) of fattening pig farms were Yersinia positive in faecal samples. Y. enterocolitica was isolated in 38% (133 of 352) of the faecal samples with following Biotypes: Biotype 1A (37%), Biotype 2/neither O:3 nor O:9 (29%), Biotype 2/O:9 (13,5%), Biotype 4/O:3 (10%) and Biotype 3/O:3 (4%). In this study the use of medical feed at beginning of housing was a potential risk factor.

2002 15,5% of 865 Swiss pig meat samples (Schnitzel, minced meat, chopped meat) collected in 283 different markets were Y. enterocolitica positive (mainly Biotype 1A).Only in 0,7% of the 865 samples potentially humanpathogenic Y. enterocolitica were isolated. From 2003 until 2005 carcass surfaces of 80 slaughter pigs each year were sampled at the four largest slaughter houses. From each pig samples from 4 different regions of the carcass were pooled. Between 1% and 6% of Yersinia contamination on the carcass surfaces were found.
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. In culture 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.
In 2007/2008 65% of 153 wild boars shot in the region of Geneva 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. In culture detection rates again were much lower: 9% for Y. enterocolitica and 3% for Y. pseudotuberculosis.

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

2012 there were 22 detections of Y. enterocolitica in human samples (32% biotype A, 41% 3:O9, 27% 4:O3) in the national reference laboratory NENT. This is comparable to the numbers in recent years.
57% (229 of 410) of the tonsils of slaughter pigs were positive for Yersinia enterocolitica in 2012/2013. Except for one sample all isolates belonged to the potentially humanpathogenic Biovars 3 and 4. This prevalence is even higher than the 34% estimate from 2006 (1).
The number of reported cases in animals in the recent years is constant at a very low level. 2012 one

case in rabbits was reported. In veterinary diagnostic laboratories 2341 tests for yersiniosis were carried out in the context of clinical investigations in 2012, mainly in dogs and cats (79%), horses (6%) and cattle (5%).

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

It can be assumed that more than half of all slaughter pigs carry potentially humanpathogenic Yersinia enterocolitica in their tonsils. How often pig meat is contaminated and how often these agents cause disease in humans is not really known. The number of tests carried out in the human reference laboratory are constant at a very low level in the recent years in Switzerland.

Recent actions taken to control the zoonoses

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

Additional information

1. Fredriksson-Ahomaa, M. et al., 2007: Prevalence of pathogenic Yersinia enterocolitica in pigs slaughtered at a Swiss abattoir. Int J Food Microbiol, 119, 207-212.
2. Fredriksson-Ahomaa, M. et al., 2012: Yersinia enterocolitica strains associated with human infections in Switzerland, 2001-2010: Eur J Clin Microbiol Infect Dis (2012) 31:1543–1550.
3. Fredriksson-Ahomaa, M. et al., 2009: Prevalence of pathogenic Yersinia enterocolitica and Yersinia pseudotuberculosis in wild boars in Switzerland. Int J Food Microbiol, 135, 199-202.
4. Fredriksson-Ahomaa, M. et al., 2011: Different enteropathogenic yersinia strains found in wild boars and domestic pigs. Foodborne Pathog Dis 8,733-7.
5. Further information can be found on the FVO website www.bvet.admin.ch.

2.7.2 Yersinia in animals

A. Yersinia enterocolitica in pigs

Monitoring system

Sampling strategy

Animals at farm

Sampling strategy was defined according to the technical specifications for harmonized national surveys on Yersinia enterocolitica in slaughter pigs (EFSA Journal 2009; 7(11):1374): One sample is collected from each slaughter batch and the two tonsils of one pig were regarded as one sample. At seven pig slaughterhouses – covering about 80% of slaughtered pigs - meat inspectors removed both tonsils in 420 randomly selected slaughter pigs evenly distributed over the year (35 samples per month). The sample size per slaughterhouse was proportional to its share in pigs slaughtered. Per sampling day 5 slaughter pigs from different slaughter batches were selected.

Frequency of the sampling

Animals at farm

420 samples were taken evenly distributed during a 1 year period, which corresponded to 35 samples per month.

Type of specimen taken

Animals at farm

From each slaughter pig both (intact) tonsils were removed for analysis.

Methods of sampling (description of sampling techniques)

Animals at farm

On the slaughter line, tonsil samples were collected from plucks with intact tonsils. Using disposable plastic gloves, the tonsils were removed using sterile scissors. In case the slaughter procedure left the tonsils in the head region of the carcass, intact tonsils were taken from the carcass. Disposable gloves were changed between each sample. The scissors were cleaned and sterilized with ethanol between operations.
Samples were transported in cold boxes at temperatures between 1ºC to 8ºC and reached the laboratory within 24 hours of sampling (send with night express).

Case definition

Animals at farm

One sample was positive, if Yersinia spp. were detected in the culture method according to ISO 10273:2003.

Diagnostic/analytical methods used

Animals at farm

Samples were kept refrigerated below 5ºC at the laboratory until examination, which commenced within 24 hours after receipt. The surface of each sample was disinfected with 80% Ethanol. Then, 10g of both tonsils were solved in 90 ml PSB-solution. The culture method according to ISO 10273:2003 was used for the detection of Yersinia enterocolitica. All Y. enterocolitica were further bio- and serotyped.

Vaccination policy

No vaccine against Yersinia is approved in Switzerland.

Measures in case of the positive findings or single cases

None.

Notification system in place

Yersiniosis in animals is notifiable (TSV, Article 5: disease to be monitored and Article 291).

Results of the investigation

In 229 of 410 pigs (56%; 95% CI 51-61%) Y. enterocolitica was detected. 74% belonged to Biovar 4/O:3 and 16% to Biovar 3/O:5,27. Other rare Biovars were Biovar 3/O:5, Biovar 3/O:9, Biovar 4/O:5 and Biovar 4/O:5,27. Biovar 1A was detected only in one sample.

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

Detection rates differed considerably between the different methods described in the ISO 10273:2003.

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

It can be assumed that more than half of all slaughter pigs carry potentially humanpathogenic Yersinia enterocolitica in their tonsils. How often pig meat is contaminated and how often these agents cause disease in humans is not really known.

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
Pigs - fattening pigs - at slaughterhouse - Monitoring [1)]	FVO	Objective sampling	Official sampling	animal sample > tonsil	Domestic	Slaughter batch	410	229	229		0
Alpacas - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	2	0			0
Birds - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	47	0			0
Camels - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	2	0			0
Cats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	743	0			0
Cattle (bovine animals) - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	118	0			0
Dogs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	1122	6			6
Fur animals - farmed - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	7	0			0
Goats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	16	0			0
Other animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	90	0			0
Pigs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	2	0			0
Rabbits - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	28	0			0
Sheep - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	9	0			0
Solipeds, domestic - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	151	0			0
Wild animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	4	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	Y. enterocolitica - biotype 3	Y. enterocolitica - biotype 3/O:5,27	Y. enterocolitica - biotype 4	Y. enterocolitica - biotype 4/O:3
Pigs - fattening pigs - at slaughterhouse - Monitoring [1)]		6		4	1	1	3	39	7	171
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 - Clinical investigations										
Sheep - Clinical investigations										
Solipeds, domestic - Clinical investigations										
Wild animals - Clinical investigations										

Comments:

[1)] In 3 samples two different biovars and/or serotypes were found. Therefore samples add up to 232 single results instead of the 229. The 6 serotypes O:9 and the 4 serotypes O:5 all belonged to biovar 3. The 1 serotypes O:5,27 belonged to biovar 4.

Table Yersinia in animals

Footnote:

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

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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 notifiable since 1st January 2009 (ordinance of the FDHA on doctor and laboratory reporting), in animals since 1966 (TSV, Article 5: disease to be monitored).
The testing on trichinellosis of all slaughter pigs is mandatory since 1st January 2007 according to Commission Regulation (EC) No. 2075/2005. Exceptions are made for slaughterhouses with a small capacity who do not export to the EU. Meat of pigs which have not been tested for trichinellosis from these small slaughterhouses are labeled with a special stamp and cannot be exported. Trichinella infections in pigs were not detected for many decades. From 2001 to 2004, between 400’000 and 490’000 pigs (15 to 19% of all slaughtered pigs) were tested per year without any positive findings. Since 2005 the number of slaughtered pigs tested increased steadily, all with negative results: 34% in 2005, 44% in 2006 and about 90% since 2007. In addition, in 2009 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 the last 10 years reported cases in animals were less than 3 cases per year and always concerned carnivorous wild animals. The 16 cases reported by cantonal veterinarians from 2003 to 2012 concerned lynx (13), foxes (2) and wolves (1). The nematodes involved were all Trichinella britovi.
A study conducted from 1999 until 2007 found that 15 of 55 (27.3%) assessed lynxes harbored Trichinella britovi larvae. In 2006/2007 21 of 1298 (1.6%) assessed foxes proved positive for Trichinella britovi larvae (Frey et al., Veterinary Parasitology, 2009). In 2008 all 1458 wild boars tested negative for Trichinella by artificial digestion, but 3 had antibodies against Trichinella (seroprevalence 0.2%). This illustrates that wild boars may come in contact with this nematode (Frey et al., 2009, Schweiz. Archiv für Tierheilkunde).

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

Since 2009 the Federal Office of Public Health received very few reports of human trichinellosis, never exceeding 4 per year. In 2012, there was one case in a 22 year old hunter/ butcher from the French part of Switzerland. It is believed that he got infected by eating raw sausage pastry containing wild boar meat. It is unclear, where exactly the wild boar was hunted.
2012 2.56 million slaughter pigs (93% 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. In addition, 2905 horses (85% of all slaughtered horses) were tested negative for trichinellosis by digestion of meat samples.
The disease is sporadically detected in the wild animal population (so far excluding wild boars). 2012, two cases of Trichinella infections in lynx were reported to the FVO by the cantonal veterinarians. 3439 wild animals, mainly wild boars, were tested negative for Trichinella. However, it cannot be ruled out that the wild boar and suspected source of infection of the one human case 2012 was a swiss wild boar. As the human case from 2012 was tested positive by serology only, the exact Trichinella species could not be investigated.

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 often associated with infections abroad. As

infections in wild animal populations can occur and infections in wild boars in Switzerland cannot be completely excluded, meat especially from wild boars should not be consumed raw. Although the risk of transmission from wild animals to domestic pigs is negligible, the surveillance of trichinellosis in wild animals is vital. As all infections in wildlife in the past were T. britovi, Switzerland is considered free of Trichinella spiralis.

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	1	.01	0	0	0	0
Trichinella spp., unspecified	1	0.01				

Table Trichinella in humans - Age distribution

Age distribution	Trichinella spp., unspecified		
	All	M	F
15 to 24 years	1	1	0
Total :	1	1	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

Methods of sampling (description of sampling techniques)

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 2012, 2905 horses (85% 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.

Additional information

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

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 disposed.

Notification system in place

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

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

In 2012, 2.56 Mio slaughter pigs (93% of the total slaughter population) were tested and no Trichinella larvae were found. In addition, 3439 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 in domestic pigs, it is highly unlikely that Trichinella infections acquired from domestic pig meat originating from Switzerland do occur.

Additional information

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

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
Solipeds, domestic - horses - at slaughterhouse - Surveillance [1)]	FVO	Census	Official sampling	animal sample	Domestic	Animal	2905	0		
Wild boars - wild - Surveillance [2)]	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	3439	0		
Pigs - at slaughterhouse - Surveillance [3)]	FVO	Census	Official sampling	animal sample	Domestic	Animal	2561131	0		

Comments:

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

[2)] Data originate from the FLEKO (Fleischkontrollstatistik = meat inspection statistics) and from the ILD (= information system of laboratory data).Up to date there is no further differentiation possible among wild animals. However, it is known that only a few other wild animals other than wild boars are tested for trichinella. In 2012, two lynx were found positive for Trichinella britovi.

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

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 Cystic 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 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. However, exact figures on the incidence of AE in humans are collected since 1956 at the Institute of Parasitology of the University of Zurich. Data originate from cohorts of the large treatment centres as well as analysis of seropositive patients originating from the 3 centres for serodiagnosis of the disease. The frequency of AE increased between 2001 - 2005 by the 2.5-fold compared to the time period 1990-2000. From 2006-2010 the average incidence was 0.25 cases per 100’000 inhabitants per year, adding up to approximately 20 newly diagnosed cases annually. Average age at time of diagnosis ranged from 52 to 55 years without any significant difference. The age specific incidence yields a significant increase with every 20 years of life until the age of 80 years. The proportion of female cases increased to 55% in the years 1984-2010 compared to earlier years (46%). 55% of all AE cases 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 compared to 0.12 in urban areas in 1984-2010). Incidence increased mainly in 6 major agglomeration areas: around Constanz, Zurich, Bern, Basel, Lausanne and Geneva.

In animals, echinococcosis is notifiable (TSV, Article 5: disease to be monitored). Since 1996 reported cases rank between 0 and 10 cases per year. In the past ten years (2003 to 2012) 54 echinococcosis cases were reported: 46% in dogs, 35% in foxes, 6% in monkeys and the remaining 13% in pigs, wild animals and other species.
In 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 in general from 26% in 2007 to 19% in 2008 (361/1376 in 2007 resp. 202/1044 in 2008). However in regions without deworming baits containing praziquantel fox faecal samples remained at the same level (63/254 (25%)).
In a dog survey in 2009 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. Eggs were also isolated from hair samples of dogs: no taeniid-eggs were found on the surface of pet dogs, whereas 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

An infection of humans with Echinococcus multilocularis is rare – albeit the increased risk of infection since 2001. The incidence of human AE-cases currently appears to stabilize on this higher level. The increased risk is thought to be caused by a general increase of the fox population from 1984 to 2000 due

to the successful immunization campaigns against rabies in foxes, and by the encroachment of foxes to the urban areas. The prevalence of Echinococcus multicularis in foxes is estimated to lie between 30% and 70%. The Institute of Parasitology of the University of Zurich found in a research project 2012 53% (105 of 200) of hunted foxes from the Eastern Switzerland positive for E. multilocularis.

Up to date, no more than 10 cases per year were reported in animals. A total of 54 cases of echinococcosis were registered in the last 10 years, most of which occurred in dogs (46%) and foxes (35%). 2012 5 cases were registered, affecting 2 foxes, 2 dogs and 1 cow. The later was detected during meat inspection, so that no laboratory data are available for this case. It was the first reported case in a cow since 1991.

In 2012, 94 tests for echinococcosis were carried out in veterinary diagnostic laboratories in the context of clinical investigations mainly in dogs (68%) and wild animals (24%, mainly foxes), which also contribute most to the positive findings.

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 eggs.

Recent actions taken to control the zoonoses

The FVO funded the project ‘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 evaluated the control of the disease in the urban periphery of Zurich. The monthly distribution of anthelmintic baits (Praziquantel) for foxes proved to be effective, thus areas with bait distribution showed a significant decrease of the E. multilocularis egg contamination. Nevertheless, the efficiency of the treatment varied strongly between different field experiments.
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. Hegglin, D., & Deplazes, P., 2013, Control of Echinococcus multilocularis: Strategies, feasibility and cost-benefit analyses. Int. J. Par., 43: 327–337
5. Expertgroup ESCCP_CH: www.ESCCAP.ch.
6. Guidelines for deworming of dogs and cats are published for Switzerland in www.ESCCAP.ch
7. 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
Beavers - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	Schweiz/Suisse/Svizzera	5	5		
Cats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	Schweiz/Suisse/Svizzera	2	0		
Dogs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	Schweiz/Suisse/Svizzera	64	16		
Foxes - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	Schweiz/Suisse/Svizzera	19	4		
Pigs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	Schweiz/Suisse/Svizzera	4	1		

	Echinococcus spp., unspecified
Beavers - Clinical investigations	5
Cats - Clinical investigations	0
Dogs - Clinical investigations	16
Foxes - Clinical investigations	4
Pigs - Clinical investigations	1

Footnote:

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

Table Echinococcus in animals

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. Some sporadic human cases have however been reported.
In animals, toxoplasmosis is notifiable (TSV, Article 5: disease to be monitored and Article 291). Veterinarians and diagnostic laboratories must report any suspected case of toxoplasmosis to the cantonal veterinarian, who may issue an order for the suspected case to be investigated. In the past ten years (2003-2012) a total of 20 cases were reported by cantonal veterinarians. Never more than 4 cases per year were recorded. 40% of these cases occurred in livestock (mainly goats and sheep), 15% in cats and the remaining 45% 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 ovine 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 it could be shown that DNA of T. gondii was detectable in 4.7% of bovine, 2.2% of porcine, 2.0% of ovine and 0.7% of wild boar samples. Toxoplasma antibodies were detected in 13% of calves (6/47), 37% of cattle (48/129), 62% of fattening bulls (62/100), 53% of cows (69/130), 14% of fattening pigs (7/50), 13% of free-ranging pigs (13/100), 36% of sows (43/120), 6.7% in wild boars (10/150), 33% of lambs (33/100) and 81% of ewes (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., 2011).
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 DNA-prevalence in meat samples apparent in most species (except sheep) requires cautious interpretation. The difference in prevalence was only significant in calves.
In order to address another source of human infection, faecal samples of 252 cats were investigated in the same study. Oocysts of T. gondii were found in 0.4% of the specimen. 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. In addition, a study in free-ranging alpine ibex revealed very low numbers of Toxoplasma gondii antibody positive ibex, so that it seems unlikely that alpine ibex are a reservoir for this abortive agent (Marreros, N. et al. 2011).

The oocyst excretion rate of 0.4 % found in cats may appear low. But when one considers that an infected cat may excrete large quantities of oocysts for up to 20 days, and these can survive for a year or more under favourable conditions (i.e. not too cold, hot or dry) the environmental contamination with T. gondii must not be underestimated.
In 2012, 3 cases (one in goats, one in sheep and one in a kangaroo) were reported by cantonal veterinarians, which was in the range of the past 10 years.
In veterinary diagnostic laboratories 289 tests for toxoplasmosis were carried out in the context of clinical investigations in 2012, mainly in cats (87%).

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., (2011), Toxoplasma gondii in Switzerland: A serosurvey based on meat juice analysis of slaughter pigs, wild boar, sheep and cattle. Zoonoses and Public Health,58(7):472-8.
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. Marreros, N. et al. (2011), Epizootiologic investigations of selected abortive agents in free-ranging Alpine ibex (Capra ibex ibex) in Switzerland, J Wildl Dis. 2011 Jul;47(3):530-43.
4. Spycher A, Geigy C, Howard J, Posthaus H, Gendron K, Gottstein B, Debache K, Herrmann DC, Schares G, Frey CF(2011). Isolation and genotyping of Toxoplasma gondii causing fatal systemic toxoplasmosis in an immunocompetent 10-year-old cat. J Vet Diagn Invest. 23: 104-108
5. Frey CF, Berger-Schoch AE, Hermann DC, Schares G, Müller N, Bernet D, Doherr MG, Gottstein B (2012): Vorkommen und Genotypen von Toxoplasma gondii in der Muskulatur von Schaf, Rind und Schwein sowie im Katzenkot in der Schweiz. Schweiz. Arch. Tierheilk. 154: 251-255.
6. 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.
7. 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	Unspecified	Not applicable	animal sample	Domestic		Animal	252	1		1
Dogs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic		Animal	8	0		0
Goats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic		Animal	8	0		0
Other animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic		Animal	4	0		0
Rabbits - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic		Animal	1	1		1
Sheep - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic		Animal	13	1		1
Wild animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic		Animal	3	1		1

Footnote:

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

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 (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. 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 37 years (1992, 1993, 2002) and 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 2012, an imported case of rabies was detected in Switzerland. An American citizen was transferred of a hospital in Dubai to a hospital in Zurich, where he died. The history showed that he was bitten by a bat in California 3 months before the first symptoms started. In total, 675 sera from humans were tested for neutralizing antibodies at the national reference laboratory for rabies in 2012. In 423 cases (63%) antibody titers were controlled after pre-expositional immunization, in 231 of cases (34%) the blood was checked after post exposure prophylaxis (PEP), 2 were clinical suspect cases and in 19 cases no reason for the investigation was given.

77 animals were tested for rabies at the national reference laboratory (Swiss Rabies Center) in 2012, none of which were positive. The samples most frequently originated from dogs and cats (50%), bats (20%) and foxes (13%). Additionally, 1120 sera of dogs and cats were tested in the context of travelling procedures in order to detect the level of neutralising antibodies. Compared to the recent years the number of cat and dog sera tested declined significantly. It is assumed that the decrease is associated with the fact that the blood test for travelling to England, Ireland and Scandinavia is no longer mandatory for domestic rabies free countries like Switzerland.

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

Switzerland and its neighboring countries were free from European fox rabies in 2012. The import conditions implemented in 2003 reduce the risk of imported rabies cases in domestic animals to a very low level. However, illegal imports (like the imported rabies case in 2003) as well as bat rabies (like the ones in 1992,1993 and 2002) 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 Lyssavirus (rabies) in animals

A. Rabies in dogs

Monitoring system

Case definition

An animal is rabies diseased if the analytical method (see 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
Bats - wild - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	Schweiz/Suisse/Svizzera	15	0		
Cats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	Schweiz/Suisse/Svizzera	7	0		
Cattle (bovine animals) - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	Schweiz/Suisse/Svizzera	7	0		
Dogs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	Schweiz/Suisse/Svizzera	31	0		
Ferrets - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	Schweiz/Suisse/Svizzera	1	0		
Foxes - wild - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	Schweiz/Suisse/Svizzera	10	0		
Marten - wild - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	Schweiz/Suisse/Svizzera	1	0		
Raccoon dogs - wild - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	Schweiz/Suisse/Svizzera	1	0		
Solipeds, domestic - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	Schweiz/Suisse/Svizzera	2	0		
Squirrels - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic	Animal	Schweiz/Suisse/Svizzera	2	0		

	EBLV-2	Lyssavirus (unspecified virus)
Bats - wild - Clinical investigations		
Cats - Clinical investigations		
Cattle (bovine animals) - Clinical investigations		
Dogs - Clinical investigations		

Table Rabies in animals

	EBLV-2	Lyssavirus (unspecified virus)
Ferrets - Clinical investigations		
Foxes - wild - Clinical investigations		
Marten - wild - Clinical investigations		
Raccoon dogs - wild - Clinical investigations		
Solipeds, domestic - Clinical investigations		
Squirrels - Clinical investigations		

Footnote:

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

2.12 STAPHYLOCOCCUS INFECTION

2.12.1 General evaluation of the national situation

2.12.2 Antimicrobial resistance in Staphylococcus isolates

A. Antimicrobial resistance of S. aureus, meticillin resistant (MRSA) in Animals Pigs

Sampling strategy used in monitoring

Frequency of the sampling

A random sample of 397 fattening pigs was 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 sampling 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

A micro-dilution method (Sensititre®-System, MCS-Diagnostics) was used for susceptibility testing, including the following antimicrobials: chloramphenicol, ciprofloxacin, clindamycin, erythromycin, fusidic acid, genatmicin, kanamycin, linezolid, mupirocin, 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

Recent actions taken to control the zoonoses

None

Suggestions to the European Union for the actions to be taken

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 18.1% (95%CI 14.7-22.2%). 61 isolates belonged to the genotype CC398-t034, 9 to the genotype CC398-t011, 2 to the genotype ST49-t208. 34 isolates belonging to the most commonly detected genotype CC 398-t034 shared an identical resistance profile. They showed resistance to ß-lactams , tetracycline, macrolides, lincosamides, trimethoprim, pleuromutilins, streptomycin and quinupristin/dalfopristin. 21 additional isolates were resistant to all these antimicrobials except streptomycin whereas two isolates had additional resistance to all tested aminoglycosides.

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

MRSA prevalence in fattening pigs has significantly increased over the last years. It was 2.2% (95%CI 0.9 -3.9) in 2009 and had a threefold increase in 2010 and 2011 reaching 5.9% (95% CI 3.8-8.7) and 5.6% (95% CI 3.6 - 8.4), respectively. The marked increase is due to a spread of a single clone of CC398-t034 within the Swiss population of fattening pigs.

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 2012) on the FVO website www.bvet.admin.ch. / Overesch G, Büttner S, Rossano A, Perreten V: The increase of methicillin-resistant Staphylococcus aureus (MRSA) and the presence of an unusual sequence type ST49 in slaughter pigs in Switzerland. BMC Veterinary Research 2011, 7:30 / Overesch G, Büttner S, Perreten V: Evolution of methicillin-resistant Staphylococcus aureus (MRSA). Fleischwirtschaft International 6/2012, 61-63

Table Antimicrobial susceptibility testing of S. aureus, meticillin resistant (MRSA) - spa-type t011 - CC398 in Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications - 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

CC398	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	72																									
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	9	2											7				2								
Aminoglycosides - Kanamycin	8	9	2													6	1			2						
Aminoglycosides - Streptomycin	16	9	4													3	1	1	4							
Amphenicols - Chloramphenicol	16	9	0													3	5	1								
Fluoroquinolones - Ciprofloxacin	1	9	3									6			2		1									
Tetracyclines - Tetracycline	1	9	9															9								
Trimethoprim	2	9	3												6				3							
Antimycobacterial drugs - Rifampicin	0.032	9	0					9																		
Cephalosporins - Cefoxitin	4	9	9														4	5								
Fusidanes - Fusidic acid	0.5	9	0										9													
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	2	9	0											9												
Lincosamides - Clindamycin	0.25	9	4								5					4										
Macrolides - Erythromycin	1	9	4									4	1				4									
Monocarboxylic acid - Mupirocin	1	9	0										9													
Oxazolidines - Linezolid	4	9	0											4	5											
Penicillins - Penicillin	0.125	9	9												9											
Pleuromutilins - Tiamulin	2	9	1										8			1										

Table Antimicrobial susceptibility testing of S. aureus, meticillin resistant (MRSA) - spa-type t011 - CC398 in Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - nasal swab - quantitative data [Dilution method]

CC398	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications																								
Isolates out of a monitoring program (yes/no)																									
Number of isolates available in the laboratory	72																								
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
Streptogramins - Quinupristin/Dalfopristin	1	9	2										6	1	1	1									
Sulfonamides - Sulfamethoxazol	128	9	0																	9					

CC398	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	72	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	1	16
Aminoglycosides - Kanamycin	4	64
Aminoglycosides - Streptomycin	4	32
Amphenicols - Chloramphenicol	4	64
Fluoroquinolones - Ciprofloxacin	0.25	8
Tetracyclines - Tetracycline	0.5	16
Trimethoprim	2	32
Antimycobacterial drugs - Rifampicin	0.016	0.25
Cephalosporins - Cefoxitin	0.5	16

Table Antimicrobial susceptibility testing of S. aureus, meticillin resistant (MRSA) - spa-type t011 - CC398 in Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - nasal swab - quantitative data [Dilution method]

CC398	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	72	
Antimicrobials:	lowest	highest
Fusidanes - Fusidic acid	0.5	4
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	1	16
Lincosamides - Clindamycin	0.12	4
Macrolides - Erythromycin	0.25	8
Monocarboxylic acid - Mupirocin	0.5	2
Oxazolidines - Linezolid	1	8
Penicillins - Penicillin	0.12	2
Pleuromutilins - Tiamulin	0.5	4
Streptogramins - Quinupristin/Dalfopristin	0.5	4
Sulfonamides - Sulfamethoxazol	64	512

Table Antimicrobial susceptibility testing of S. aureus, meticillin resistant (MRSA) - spa-type t034 - CC398 in Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications - 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

CC398	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications																								
Isolates out of a monitoring program (yes/no)																									
Number of isolates available in the laboratory	72																								
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	61	3											58				3								
Aminoglycosides - Kanamycin	8	61	3													57	1			3						
Aminoglycosides - Streptomycin	16	61	36													8	17		36							
Amphenicols - Chloramphenicol	16	61	0													21	40									
Fluoroquinolones - Ciprofloxacin	1	61	0									50	11													
Tetracyclines - Tetracycline	1	61	61															61								
Trimethoprim	2	61	59												2				59							
Antimycobacterial drugs - Rifampicin	0.032	61	1					59	1			1														
Cephalosporins - Cefoxitin	4	61	61														7	54								
Fusidanes - Fusidic acid	0.5	61	0										61													
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	2	61	0											60	1											
Lincosamides - Clindamycin	0.25	61	60									1				60										
Macrolides - Erythromycin	1	61	60									1					60									
Monocarboxylic acid - Mupirocin	1	61	1										60		1											
Oxazolidines - Linezolid	4	61	0											23	38											
Penicillins - Penicillin	0.125	61	61												61											
Pleuromutilins - Tiamulin	2	61	59										2			59										

Table Antimicrobial susceptibility testing of S. aureus, meticillin resistant (MRSA) - spa-type t034 - CC398 in Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - nasal swab - quantitative data [Dilution method]

CC398	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications																								
Isolates out of a monitoring program (yes/no)																									
Number of isolates available in the laboratory	72																								
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
Streptogramins - Quinupristin/Dalfopristin	1	61	58										1	2	9	49									
Sulfonamides - Sulfamethoxazol	128	61	1																	60			1		

CC398	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	72	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	1	16
Aminoglycosides - Kanamycin	4	64
Aminoglycosides - Streptomycin	4	32
Amphenicols - Chloramphenicol	4	64
Fluoroquinolones - Ciprofloxacin	0.25	8
Tetracyclines - Tetracycline	0.5	16
Trimethoprim	2	32
Antimycobacterial drugs - Rifampicin	0.016	0.25
Cephalosporins - Cefoxitin	0.5	16

Table Antimicrobial susceptibility testing of S. aureus, meticillin resistant (MRSA) - spa-type t034 - CC398 in Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - nasal swab - quantitative data [Dilution method]

CC398	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	72	
Antimicrobials:	lowest	highest
Fusidanes - Fusidic acid	0.5	4
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	1	16
Lincosamides - Clindamycin	0.12	4
Macrolides - Erythromycin	0.25	8
Monocarboxylic acid - Mupirocin	0.5	2
Oxazolidines - Linezolid	1	8
Penicillins - Penicillin	0.12	2
Pleuromutilins - Tiamulin	0.5	4
Streptogramins - Quinupristin/Dalfopristin	0.5	4
Sulfonamides - Sulfamethoxazol	64	512

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

A big outbreak occurred back in 1983 when 12 flocks of sheeps apparently shedding C. burnetii were descending from mountain pastures. Over 400 human cases were registered. Most of them lived close to the roads where the sheep passed through.
From 1989 to 1991, 32 to 52 cases were reported per year. Mandatory notification was discontinued in 1999 as the number of reported cases decreased. After a small outbreak in 2012 notification of Q-fever was reintroduced in November 2012 (ordinance of the FDHA on medical doctor and laboratory reporting).

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 be detected in bovine milk samples (17 of 359 (4.7%)) 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. In 2007, 431 of 872 (49,5%) bulk tank milk samples, each representing one farm) were positive using a different PCR method with a higher sensitivity. The prevalence of C. burnetii in bovine bulk tank milk was estimated to be between 30% and 50% (Baumgartner 2011).

Coxiellosis in animals is notifiable (TSV, Article 5: disease to be monitored). Abortions in cattle after three months of pregnancy and every abortion in sheep, goats and pigs have to be reported to a veterinarian. 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, cattle, sheep and goats undergo laboratory investigation. If clinically suspected cases are confirmed by a laboratory, the cantonal veterinarian is notified. At the beginning of the 1990s numbers per year were high with about 100 reported cases a year. Numbers then steadily declined to about 40 cases per year in 1996 until 2005. From 2006 on coxiellosis cases rose again to about 70 cases per year and stayed at this level since then. Cases concern mainly cattle, while in sheep and goats only isolated cases are reported. From the 638 coxiellosis cases in the last ten years, 82% were in cattle, 12% in goats and 6% in sheep.

The seroprevalence of the pathogen is estimated about 30% in cattle and about 1–3% in sheep and goats (data from the Swiss reference laboratory). In a recent study conducted 2011 a herd seroprevalence of coxiellosis was determined by ELISA of 11.11% for goats and 5% for sheep from a representative sample of 72 goat and 100 sheep farms. At animal level the seroprevalence was 3.43% (11/321) in goats and 1.8% (9/500) in sheep, respectively. In 97 collected abortion samples (43 from goats and 54 from sheep) the bacterial load was quantified by real-time PCR. In 13.4% of the tested samples a high amount of >104 bact/mg placenta was detected.

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

From February to August 2012, 17 human Q-Fever cases were registered in the canton of Vaud, of which 10 people were hospitalised. In 12 cases an epidemiological link could be established to an infected sheep herd with roughly 200 sheeps. Only 4 cases lived next to this sheep herd, most other patients came from the surrounding area.
2012 86 cases of coxiellosis in ruminants (71 in cattle, 9 in goats and 6 in sheep) were reported to the FVO by cantonal veterinarians, which is within the range of the past 7 years with a slight tendency to increase in the last 4 years.

In veterinary diagnostic laboratories 4229 tests for Coxiella spp. were carried out in the context of clinical investigations. Samples were derived from cattle (89%), sheep (6%) and goats (4%).

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

Coxiella burnetii as abortion cause seem to be more frequent in cattle. However, infected cattle are less dangerous for humans than infected sheep and goats. Although the seroprevalence of C. burnetii in the Swiss small ruminant population is rather low, Q-fever in small ruminants remains under certain epidemiological circumstances and given the high shedding amount during abortion events a public health threat.

Recent actions taken to control the zoonoses

Due to the outbreak in 2012 Q-Fever in humans is again notifiable since November 2012.
Efforts to strengthen disease awareness, to motivate farmers to send abortion material to the laboratories for further investigation as well as to improve knowledge how to avoid infections 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. Baumgartner, A., Niederhauser, I., Schaeren, W.2011: Occurrence of Coxiella burnetii DNA in bulk tank milk samples in Switzerland. Archiv für Lebensmittelhygiene 62, 200-204.
4. 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	Unspecified	Not applicable	animal sample	Domestic		Animal	2	0	0	
Cattle (bovine animals) - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic		Animal	3782	49	49	
Deer - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic		Animal	1	0	0	
Goats - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic		Animal	180	18	18	
Monkeys - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic		Animal	2	0	0	
Other animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic		Animal	3	0	0	
Pigs - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic		Animal	11	0	0	
Sheep - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic		Animal	247	6	6	
Wild animals - Clinical investigations	FVO	Unspecified	Not applicable	animal sample	Domestic		Animal	1	0	0	

Footnote:

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

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

Tularemia in humans (ordinance of the FDHA on medical doctor and laboratory reporting) and animals (TSV, Art. 5: disease to be monitored) is notifiable. In animals, monitoring is based on voluntary testing of wild animals found dead or hunted as well as animals showing clinical signs consistent with tularemia.

Results of the investigation

Before 2008 reported human cases were always below 10 confirmed cases per year. Since then cases were usually over 10 cases per year (with the exception of 2009 with 4 cases per year). In 2012, the FOPH registered 40 confirmed cases in humans which is 2.5 times as many cases then the years before (2011: 14 cases). Most cases were reported in the cantons of Zürich (16 cases; 2011: 3 cases) and Aargau (7 cases; 2011: 4 cases).

In animals, never more than 8 cases per year were reported. In the past ten years (2003-2012) it were 18 cases in total15 in hares and 3 in monkeys. In 2012 a total of 8 cases were reported: 6 in hares and 2 in monkeys (originating from zoos or animal parks).

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

Tularemia in humans is sporadic. It seems that a rising trend in humans is occurring since 2007. The augmentation of reported cases might be the result of an increased disease awareness as well as improved diagnostic methods (use of PCR for confirmation). One third of the human cases coincide with a tick bite during the incubation period. Thus the SPIEZ LABORATORY and the NBC-EOD Centre of Competence collected 2009 at 165 different locations about 60000 ticks. 0,01% (6 samples) were positive for F. tularensis. In 2012, another 14000 ticks were collected at these 6 positive locations from 2009. Now 0.1% (18 samples) were positive for F. tularensis, the minimum expected. Most positive samples were found in the canton of Zürich, a densely populated region, indicating that this might be an endemic area for F. tularensis in Switzerland.

Voluntary testing of wild animals found dead or hunted is clearly a big challenge of the monitoring in place. Results of the passive surveillance in wild animals need to be considered as rather poor and inconsistent. It can only be concluded, that tularemia is present in the Swiss wild hare population. Most of the cases 2012 were detected in the frame of an ongoing research project at the University of Bern (see additional information below) which is most likely the reason of the increased number of reported cases in 2012 compared to the past years.

Furthermore, wild mice which had died in a research barn in the canton of Zurich were tested positive for F. tularensis. The wild mice have free access to go in and out of this barn. None of the researchers from the research barn in the canton of Zurich developed tularemia and there was no link to any of the human cases reported in the canton of Zürich.

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

Tularemia affects mainly wild animals, especially hares and rodents but also zoo animals. Contact to wild

animals might be an important source of infection to humans. Other sources of infection can be bites of ticks or insects as well as the inhalation of dust/aerosol and contaminated water or food. Those at risk are mainly gamekeepers, hunters, people who work in agriculture or forestry, wild animal veterinary practitioners and laboratory staff.

Additional information

1. During the last years, an increased number of tularemia cases in humans and animals was observed in Switzerland. However, the source of infection remains virtually unknown as well as the ecology of this bacterium including the maintenance of F. tularensis and its boosting in the environment. To better understand these issues which are a matter of biological safety, a project aiming to dissect the life cycle of this microorganism senso lato started on June, 1st 2012 at the University of Bern (Paola Pilo: “Ecology of Francisella tularensis and its impact on biological safety”).
The study is based on four approaches: The identification of the infection route in hares; the assessment of beaver’s role, and other aquatic mammals, in the maintenance of F. tularensis in the environment; the assessment of tick cell lines as supportive substrate for F. tularensis survival and evaluation of its cytotoxicity; investigation of freshwater protozoa as reservoir.
Unpublished preliminary data of positive animals tested for F. tularensis 2012 were: 24 mice, 18 hares, 2 monkeys and 1 stone marten.
2. Investigations in ticks will continue at the SPIEZ LABORATORY in early summer 2013. In an epidemiological study it is planned in collaboration with national and international partners to compare isolates from humans, wild animals and ticks using whole genome sequencing.
3. 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 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.

Notification system in place

Cyyticercosis in animals is not notifiable. However, data on carcasses with massiv lesions which needed to be condemned due to cyticerci during meat inspection according to the ordinance of 23 November 2005 on hygiene in the slaughter process (VhyS; SR 817.190.1) are documented in the FLEKO (meat inspection statistics), however without precise species diagnosis. No data exist on carcasses with mild lesions which needed to be frozen.

Results of the investigation

Studies in six Swiss abattoirs from 2002 until 2005 showed that in about 0.58% of livestock animals lesions in the muscles caused by T. saginata cysticerci were found. This estimate was constant in these years. The animals most heavily infested were cows. However, the routinely performed standard meat inspection protocol has a low diagnostic sensitivity for the detection of T. saginata cysticerci infections. In an abattoir trial 2008/2009 several additional heart incisions were performed in 1088 slaughtered cattle originating from 832 farms throughout Switzerland. With the EU-approved routine meat inspection, bovine cysticercosis was diagnosed in 1.8% (20/1088) of the slaughtered animals. Additional incisions into the heart muscle revealed a further 29 cases, indicating that the prevalence was at least 4.5%. All infected animals originated from individual farms (Eichenberger et al. 2011).
Data of the Fleko (meat inspection statistics) from 2006 until 2012 support that cows are the most affected species: of 195 carcasses with massive lesions 81% were cattle, 14% sheep, 4% pigs and 1% goats. However, a precise species diagnosis in the slaughterhouses is not reported. In pigs, T. hydatigena, which can be morphologically differentiated from the zoonotic T. suis, is found.
2012, 44 cases were entered in the Fleko (41 cattle, 2 sheep and 1 pig). Each year about 30 cases with massiv lesions are detected which correspond at most to 0.004% of the total slaughtered population. Data on cases with mild lesions which are frozen are not systematically collected.

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

Intestinal Taenia infections in humans are occasionally treated in Switzerland, but no prevalence has so far been recorded. No autochthon cases of cysticercosis caused by T. solium are known, but single

imported cases do occur.
Numbers of carcasses condemned due to massive lesions of cyticerci were constant since 2006. As data on cases with mild lesions are not gathered in the Fleko, general data are lacking to describe the whole picture. A modeled prevalence in dairy cows was recently estimated to be 16.5% (Eichenberger et al. 2013). A case-control study in 2005/2006 considered the risk of infection for bovines to be primarily dependent on external factors: pastures bordering a railway line, the location of the pasture close to a recreational area with parking spaces and leisure activities, farmyard visitors and raw feed that has been bought to be statistically significant risk factors. 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 for intestinal Taenia saginata infections in humans is mostly of mild character and can be treated. Taenia saginata cysticercus infection in cattle remains an economically important parasitic disease for the livestock industry by affecting food safety. Based on the routine abattoir reports the prevalence of this zoonotic parasite in the cattle population is underestimated. Only a fraction of infected slaughter cattle are identified during meat inspection. The sensitivity of the used methods at slaughter is estimated to be 15.6% (95% CI; 13-21; Eichenberger et al. 2013). The sensitivity could be improved with additional several heart incisions.

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. Eichenberger, R.M., Stephan, R., Deplazes, P., 2011. Increased sensitivity for the diagnosis of Taenia saginata cysticercus infection by additional heart examination compared to the EU-approved routine meat inspection. Food Control 22, 989-992.
3. Eichenberger et al., (2013) Multi-test analysis and model-based estimation of the prevalence of Taenia saginata cysticercus infection in naturally infected dairy cows in the absence of a gold standard reference test. International Journal for Parasitology, in press
4. Further information can be found on the FVO website www.bvet.admin.ch.

2.16 WEST NILE VIRUS INFECTIONS

2.16.1 General evaluation of the national situation

2.16.2 West Nile Virus Infections in humans

A. West Nile Virus in Humans

Notification system in place

WNF in humans is notifiable since 2006 (ordinance of the FDHA on medical doctor and laboratory reporting).

History of the disease and/or infection in the country

Up to date no autochthonous cases in humans were detected in Switzerland.

Results of the investigation

Since 2010 one or two imported cases per year were registered by the Federal Office of Public Health.

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

If cases in animals or humans appear, the responsible Federal Offices will inform themselves immediately, as laid down in a concept of how to deal with WNF when it first occurs in Switzerland. In addition, the Veterinary Federal Office and the Federal Office of Public Health publish every year an evaluation of the WNF situation, with a special focus on its neighbouring countries.

Additional information

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

2.16.3 West Nile Virus in animals

A. West Nile Virus in Animals

Vaccination policy

A vaccine for horses was approved in 2011.

Notification system in place

WNF in animals is notifiable since 2011 (TSV, Article 5: disease to be monitored).

Results of the investigation

Up to date no autochthonous cases in animals were detected in Switzerland. In 2012, one WNF-suspicious horse and two dead found wild birds were tested negative. No mass mortality in wild birds was observed.

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

Because there were no cases detected by passive surveillance so far, it can be assumed that WNF is not a major health threat in Switzerland. However, there is no active surveillance in place and it cannot be excluded that WNV is not circulating at all at least in the wild bird or mosquito populations in Switzerland. As WNF is endemic in Italy and in 2012 WNV was found again in two dead found wild birds in Vienna, Austria, disease awareness in Switzerland needs to be strengthened further.

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

If cases in animals or humans appear, the responsible Federal Offices will inform themselves immediately, as laid down in a concept of how to deal with WNF when it first occurs in Switzerland. In addition, the Veterinary Federal Office and the Federal Office of Public Health publish every year an evaluation of the WNF situation, with a special focus on its neighbouring countries.

Additional information

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

Table West Nile Virus in Animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample origin	Vaccination status	Analytical Method	Sampling unit	Region	Units tested	Total units positive for West Nile Virus
Birds - wild - Monitoring - passive	FVO	Unspecified	Not applicable	animal sample	Domestic	no	Real-Time PCR	Animal	Schweiz/Suisse/Svizzera	2	0
Solipeds, domestic - horses - at farm - Clinical investigations [1)]	FVO	Unspecified	Not applicable	animal sample	Domestic	no	Real-Time PCR	Animal	Schweiz/Suisse/Svizzera	1	0

Comments:

[1)] The horse was aslo serologically tested with an ELISA.

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 208 samples from fattening pigs, 202 samples from cattle and 218 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. 168 of these samples from broilers, 171 of these samples from fattening pigs and 170 of these samples from cattle were additionally screened for ESBL/AmpC producers by selective methods.

Type of specimen taken

Rectum anal swabs from pigs and cattle, cloacal swabs from broilers. BTM samples from dairy cows.

Methods of sampling (description of sampling techniques)

Faecal samples from cattle 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.

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

A micro-dilution method (Sensititre®-System, MCS-Diagnostics) was used for susceptibility testing, including the following antimicrobials: 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 / clavulanic acid, cefoxitin, cefpodoxime,ceftazidime, ceftazidime / clavulanic acid, ceftriaxon, cephalotin, chloramphenicol, ciprofloxacin, colistin, florfenicol, gentamicin, imipinem, kanamycin, meropenem, nalidixic acid, sulfamethoxazole, streptomycin, trimethoprim, tetracycline

Cut-off values used in testing

Whenever possible the epidemiological cut-off values according to EUCAST were used. If these values were not defined or lied out of test-range clinical breakpoints according to EUCAST or according to CLSI (M100-S21) were used.

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.

Control program/mechanisms

The control program/strategies in place

None

Recent actions taken to control the zoonoses

None

Suggestions to the European Union for the actions to be taken

None

Measures in case of the positive findings or single cases

None

Notification system in place

None

Results of the investigation

185 isolates from broiler herds, 185 isolates from pigs, 187 isolates from cattle (1-2 years old) were subjected to susceptibility testing. Resistance is common in E. coli from all three animal species. Moderate to high levels of resistance were found for tetracycline, sulfamethoxazole, streptomycin, ampicillin and trimethoprim. In broilers levels of resistance were also high for ciprofloxacin and nalidixic acid (45.9% for both). With the unselective culture method four ESBL/AmpC producing E. coli from broilers and two from pigs could be found, whereas with selective methods 32.6% of the broiler herds, 11.7% of the pigs and 4.1% of the cattle turned out to carry E.coli with resistance to third generation cephalosporins. These isolates showed additionally very high to extremely high resistance levels for ciprofloxacin, nalidixic acid, sulfamethoxazole and tetracycline in all three animal species. Resistance levels were also extremely high for streptomycin and trimethoprim in pigs and cattle and for gentamicin and kanamycin in cattle. No resistance against carbapenems was found. According to susceptibility testing most of these isolates were suspicious for the production of beta-Lactamases of the CTX-M-type (54). There was also a group of isolates that seemed to be pAmC-producers (3) and another that seemed to be ESBL producers of the TEM- or SHV-type (31).

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

Prevalence of resistance to ciprofloxacin and nalidixic acid showed a significant increasing trend in isolates from broilers. The results for E. coli from pigs were similar to those of previous years. In 2011

resistance in E. coli from cattle significantly increased for ampicillin, sulfamethoxazole, streptomycin and tetracycline. These levels slightly decreased again last year. 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. It was in the same range than last year for broiler herds and pigs and significantly decreased for cattle.

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

The increasing prevalence of resistance to ciprofloxacin and nalidixic acid in E. coli from broilers is a potential public health concern. The occurrence 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 2012) on the FVO website www.bvet.admin.ch

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - active - 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 - active																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	61																									
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	61	0									2	13	43	3											
Aminoglycosides - Kanamycin	8	61	1													57	3				1					
Aminoglycosides - Streptomycin	16	61	12													9	33	7	8	3	1					
Amphenicols - Chloramphenicol	16	61	7												3	34	17		3	4						
Amphenicols - Florfenicol	16	61	0												3	41	13	4								
Cephalosporins - Cefotaxime	0.25	61	61												12	49										
Fluoroquinolones - Ciprofloxacin	0.06	61	33			1	21		5	1	4	25	3				1									
Penicillins - Ampicillin	8	61	61																61							
Quinolones - Nalidixic acid	16	61	32													27	2			32						
Tetracyclines - Tetracycline	8	61	35											7	17	2				35						
Trimethoprim	2	61	17										36	5	3	1			16							
Carbapenems - Imipenem	0.5	61	0										61													
Carbapenems - Meropenem	4	61	0											61												
Cephalosporins + ß lactamase inhibitores - Cefotaxime + Clavulanic acid	8	61	3								48	8	2					2	1							
Cephalosporins + ß lactamase inhibitores - Ceftazidime + Clavulanic acid	0.25	61	3								58							3								
Cephalosporins - Cefazolin	8	61	61															61								
Cephalosporins - Cefepime	4	61	13											28	12	8	8	5								
Cephalosporins - Cefoxitin	8	61	3													55	3			3						

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - active - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

E.coli, non-pathogenic, unspecified	Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - active																								
Isolates out of a monitoring program (yes/no)																									
Number of isolates available in the laboratory	61																								
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
Cephalosporins - Cefpodoxime	2	61	61														3	9	49							
Cephalosporins - Ceftazidim	0.5	61	55									1	5	9	7	7	23	9								
Cephalosporins - Ceftriaxon	1	61	61												2	19	8	5	4	9	14					
Cephalosporins - Cephalothin	8	61	61															61								
Polymyxins - Colistin	2	61	0												61											
Sulfonamides - Sulfamethoxazol	64	61	32														3	8	18		1				31	

E.coli, non-pathogenic, unspecified	Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - active	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	61	
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

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - active - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

E.coli, non-pathogenic, unspecified	Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - active	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	61	
Antimicrobials:	lowest	highest
Penicillins - Ampicillin	0.5	32
Quinolones - Nalidixic acid	4	64
Tetracyclines - Tetracycline	1	64
Trimethoprim	0.5	32
Carbapenems - Imipenem	0.5	8
Carbapenems - Meropenem	1	8
Cephalosporins + ß lactamase inhibitores - Cefotaxime + Clavulanic acid	0.12	128
Cephalosporins + ß lactamase inhibitores - Ceftazidime + Clavulanic acid	0.12	64
Cephalosporins - Cefazolin	8	16
Cephalosporins - Cefepime	1	16
Cephalosporins - Cefoxitin	4	64
Cephalosporins - Cefpodoxime	0.25	32
Cephalosporins - Ceftazidim	0.25	16
Cephalosporins - Ceftriaxon	1	128
Cephalosporins - Cephalothin	8	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - active - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - active - Objective sampling - Official sampling - animal sample - rectum-anal swab - 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 - unspecified - weaners to growers - at slaughterhouse - Monitoring - active																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	20																									
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	20	10									1	2	6	1			1	9							
Aminoglycosides - Kanamycin	8	20	9													9	2	1	6	1	1					
Aminoglycosides - Streptomycin	16	20	16													2	1	1		3	13					
Amphenicols - Chloramphenicol	16	20	4												1	11	3	1	3	1						
Amphenicols - Florfenicol	16	20	0												1	13	5	1								
Cephalosporins - Cefotaxime	0.25	20	20												1	19										
Fluoroquinolones - Ciprofloxacin	0.06	20	12				6		2			1					11									
Penicillins - Ampicillin	8	20	20																20							
Quinolones - Nalidixic acid	16	20	11													8	1			11						
Tetracyclines - Tetracycline	8	20	14											1	5					14						
Trimethoprim	2	20	16										4						16							
Carbapenems - Imipenem	0.5	20	0										20													
Carbapenems - Meropenem	4	20	0											20												
Cephalosporins + ß lactamase inhibitores - Cefotaxime + Clavulanic acid	8	20	0								8	12														
Cephalosporins + ß lactamase inhibitores - Ceftazidime + Clavulanic acid	0.25	20	0								20															
Cephalosporins - Cefazolin	8	20	20															20								
Cephalosporins - Cefepime	4	20	15											3		2	10	5								

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - active - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

E.coli, non-pathogenic, unspecified	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - active																								
Isolates out of a monitoring program (yes/no)																									
Number of isolates available in the laboratory	20																								
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
Cephalosporins - Cefoxitin	8	20	0													17	3								
Cephalosporins - Cefpodoxime	2	20	20															2	18						
Cephalosporins - Ceftazidim	0.5	20	20											2	1	1	7	9							
Cephalosporins - Ceftriaxon	1	20	20													2	1		1	5	11				
Cephalosporins - Cephalothin	8	20	20															20							
Polymyxins - Colistin	2	20	0												20										
Sulfonamides - Sulfamethoxazol	64	20	18															1	1					18	

E.coli, non-pathogenic, unspecified	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - active	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	20	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128
Amphenicols - Chloramphenicol	2	64

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - active - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

E.coli, non-pathogenic, unspecified	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - active	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	20	
Antimicrobials:	lowest	highest
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
Carbapenems - Imipenem	0.5	8
Carbapenems - Meropenem	1	8
Cephalosporins + ß lactamase inhibitores - Cefotaxime + Clavulanic acid	0.12	128
Cephalosporins + ß lactamase inhibitores - Ceftazidime + Clavulanic acid	0.12	64
Cephalosporins - Cefazolin	8	16
Cephalosporins - Cefepime	1	16
Cephalosporins - Cefoxitin	4	64
Cephalosporins - Cefpodoxime	0.25	32
Cephalosporins - Ceftazidim	0.25	16

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - active - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

E.coli, non-pathogenic, unspecified	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - active	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	20	
Antimicrobials:	lowest	highest
Cephalosporins - Ceftriaxon	1	128
Cephalosporins - Cephalothin	8	16
Polymyxins - Colistin	2	4
Sulfonamides - Sulfamethoxazol	8	1024

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	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	1										49	128	7				1							
Aminoglycosides - Kanamycin	8	185	4													174	7				4					
Aminoglycosides - Streptomycin	16	185	27													27	121	10	6	7	14					
Amphenicols - Chloramphenicol	16	185	2												3	59	113	8		2						
Amphenicols - Florfenicol	16	185	0												6	77	97	5								
Cephalosporins - Cefotaxime	0.25	185	4							148	28	5				4										
Fluoroquinolones - Ciprofloxacin	0.06	185	85			8	72		19	1	13	49	7	5	1	1	9									
Penicillins - Ampicillin	8	185	60											8	45	65	7		60							
Quinolones - Nalidixic acid	16	185	85													100			4	81						
Tetracyclines - Tetracycline	8	185	62											16	91	15	1		4	58						
Trimethoprim	2	185	23										142	16	4				23							
Cephalosporins - Ceftazidim	0.5	185	4									177	4	2	1		1									
Polymyxins - Colistin	2	185	0												185											
Sulfonamides - Sulfamethoxazol	64	185	46														35	44	43	17	4		1		41	

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	185	
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 - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - rectum-anal swab - 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 - unspecified - weaners to growers - 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									4	65	101	13	1			1							
Aminoglycosides - Kanamycin	8	185	3													174	8				3					
Aminoglycosides - Streptomycin	16	185	86													20	73	6	12	24	50					
Amphenicols - Chloramphenicol	16	185	9												4	53	109	10	5	4						
Amphenicols - Florfenicol	16	185	1												6	66	108	4		1						
Cephalosporins - Cefotaxime	0.25	185	2							161	21	1			1	1										
Fluoroquinolones - Ciprofloxacin	0.06	185	5			16	131		32	1		5														
Penicillins - Ampicillin	8	185	37											6	56	83	3		37							
Quinolones - Nalidixic acid	16	185	6													176	2	1		6						
Tetracyclines - Tetracycline	8	185	54											19	91	17	4		4	50						
Trimethoprim	2	185	45										124	14	2	2			43							
Cephalosporins - Ceftazidim	0.5	185	2									180	3			2										
Polymyxins - Colistin	2	185	0												185											
Sulfonamides - Sulfamethoxazol	64	185	72														36	29	33	15	5	1			66	

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

E.coli, non-pathogenic, unspecified	Pigs - fattening pigs - unspecified - weaners to growers - 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	0.25	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 - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

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 - rectum-anal swab - 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	187																									
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	187	11									2	75	97	2			4	7							
Aminoglycosides - Kanamycin	8	187	14													166	7				14					
Aminoglycosides - Streptomycin	16	187	46													38	101	2	7	9	30					
Amphenicols - Chloramphenicol	16	187	7												2	49	122	7	1	6						
Amphenicols - Florfenicol	16	187	2												2	77	103	3		2						
Cephalosporins - Cefotaxime	0.25	187	1							159	27					1										
Fluoroquinolones - Ciprofloxacin	0.06	187	6			24	136		21		1	4			1											
Penicillins - Ampicillin	8	187	27											3	32	111	14	1	26							
Quinolones - Nalidixic acid	16	187	6													179	2			6						
Tetracyclines - Tetracycline	8	187	46											17	106	17	1		1	45						
Trimethoprim	2	187	21										151	13	2				21							
Cephalosporins - Ceftazidim	0.5	187	0									181	6													
Polymyxins - Colistin	2	187	0												187											
Sulfonamides - Sulfamethoxazol	64	187	49														45	53	32	8	3		1		45	

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 - rectum-anal swab - 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	187	
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 - rectum-anal swab - quantitative data [Dilution method]

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 - active - Objective sampling - Official sampling - animal sample - rectum-anal swab - 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 - active																									
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	2	7	5										1	1					5							
Aminoglycosides - Kanamycin	8	7	5													2			1	3	1					
Aminoglycosides - Streptomycin	16	7	7																1		6					
Amphenicols - Chloramphenicol	16	7	3													3	1			3						
Amphenicols - Florfenicol	16	7	0												1	4	2									
Cephalosporins - Cefotaxime	0.25	7	7											1		6										
Fluoroquinolones - Ciprofloxacin	0.06	7	6						1			1	1				4									
Penicillins - Ampicillin	8	7	7																7							
Quinolones - Nalidixic acid	16	7	4													1	2			4						
Tetracyclines - Tetracycline	8	7	7																	7						
Trimethoprim	2	7	5										2						5							
Carbapenems - Imipenem	0.5	7	0										7													
Carbapenems - Meropenem	4	7	0											7												
Cephalosporins + ß lactamase inhibitores - Cefotaxime + Clavulanic acid	8	7	0								2	5														
Cephalosporins + ß lactamase inhibitores - Ceftazidime + Clavulanic acid	0.25	7	0								7															
Cephalosporins - Cefazolin	8	7	7															7								
Cephalosporins - Cefepime	4	7	6											1			2	4								

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 - active - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

E.coli, non-pathogenic, unspecified	Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - active																									
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
Cephalosporins - Cefoxitin	8	7	0													4	3									
Cephalosporins - Cefpodoxime	2	7	7													1			6							
Cephalosporins - Ceftazidim	0.5	7	7													1	3	3								
Cephalosporins - Ceftriaxon	1	7	7												1						6					
Cephalosporins - Cephalothin	8	7	7															7								
Polymyxins - Colistin	2	7	0												7											
Sulfonamides - Sulfamethoxazol	64	7	7																						7	

E.coli, non-pathogenic, unspecified	Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - active	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	7	
Antimicrobials:	lowest	highest
Aminoglycosides - Gentamicin	0.25	32
Aminoglycosides - Kanamycin	4	128
Aminoglycosides - Streptomycin	2	128

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 - active - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

E.coli, non-pathogenic, unspecified	Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - active	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	7	
Antimicrobials:	lowest	highest
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
Carbapenems - Imipenem	0.5	8
Carbapenems - Meropenem	1	8
Cephalosporins + ß lactamase inhibitores - Cefotaxime + Clavulanic acid	0.12	128
Cephalosporins + ß lactamase inhibitores - Ceftazidime + Clavulanic acid	0.12	64
Cephalosporins - Cefazolin	8	16
Cephalosporins - Cefepime	1	16
Cephalosporins - Cefoxitin	4	64

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 - active - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

E.coli, non-pathogenic, unspecified	Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - active	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	7	
Antimicrobials:	lowest	highest
Cephalosporins - Cefpodoxime	0.25	32
Cephalosporins - Ceftazidim	0.25	16
Cephalosporins - Ceftriaxon	1	128
Cephalosporins - Cephalothin	8	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

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin		2	
	Streptomycin		16	
Amphenicols	Chloramphenicol		16	
Cephalosporins	Cefotaxime		0.25	
Fluoroquinolones	Ciprofloxacin		0.03	
Penicillins	Ampicillin		8	
Quinolones	Nalidixic acid		16	
Sulfonamides	Sulfonamides		256	
Tetracyclines	Tetracycline		8	
Trimethoprim	Trimethoprim		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		2	
	Streptomycin		16	
Amphenicols	Chloramphenicol		16	
Cephalosporins	Cefotaxime		0.25	
Fluoroquinolones	Ciprofloxacin		0.03	
Penicillins	Ampicillin		8	
Quinolones	Nalidixic acid		16	
Sulfonamides	Sulfonamides		256	
Tetracyclines	Tetracycline		8	
Trimethoprim	Trimethoprim		2	

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		2	
	Streptomycin		16	
Amphenicols	Chloramphenicol		16	
Cephalosporins	Cefotaxime		0.25	
Fluoroquinolones	Ciprofloxacin		0.03	
Penicillins	Ampicillin		8	
Quinolones	Nalidixic acid		16	
Sulfonamides	Sulfonamides		256	
Tetracyclines	Tetracycline		8	
Trimethoprim	Trimethoprim		2	

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 398 samples from fattening pigs, 393 samples from cattle and 249 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.

Type of specimen taken

Rectal-anal-swaps from pigs and cattle, cloacal swaps from broilers.

Methods of sampling (description of sampling techniques)

Rectal-anal-samples from cattle 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.

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

A micro-dilution method (Sensititre®-System, MCS-Diagnostics) was used for susceptibility testing, including the following antimicrobials: ampicillin, amoxicillin/clavulanic acid (2:1), bacitracin, chloramphenicol, ciprofloxacin, erythromycin, florfenicol, gentamicin, linezolid, neomycin, nitrofurantoin, salinomycin, streptomycin, quinupristin/dalfopristin, tetracycline, vancomycin

Cut-off values used in testing

Whenever 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.

Control program/mechanisms

The control program/strategies in place

None

Recent actions taken to control the zoonoses

None

Suggestions to the European Union for the actions to be taken

None

Measures in case of the positive findings or single cases

None

Notification system in place

None

Results of the investigation

158 Enterococcus faecalis and 32 Enterococcus faecium isolates from broilers, 103 Enterococcus faecalis and 44 Enterococcus faecium from pigs, 118 Enterococcus faecalis and 50 Enterococcus faecium isolates from cattle were subjected to susceptibility testing. Resistance were commonly found in Enterococci from all three animal species. Extremely high levels of resistance to neomycin were observed in E. faecalis and high to very high levels in E. faecium from all three animal species. High to very high levels of resistance were also found to tetracycline in E. faecalis and to quinupristin/dalfopristin in E. faecium, with the exception of quinupristin/dalfopristin resistance rate in cattle, that was low. High levels of resistance were found to erythromycin in E. faecalis from broilers, pigs and cattle . No resistance to ampicillin was found in E. faecalis and only low levels in E. faecium from broilers and pigs. None of the isolates was resistant against vancomycin or linezolid.

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

In comparison with the results of the last year, resistance levels for bacitracin decreased significantly in E. faecalis from all three animal species and showed a decreasing trend in E. faecium, too. Prevalence of resistance for tetracycline and erythromycin decreased significantly in E. faecalis from broilers and showed a decreasing trend in E. faecium from broilers, pigs and cattle.

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

Enterococci in the intestine of food producing animals are considered as a potential reservoir of resistance genes. Decreasing trends in resistance for some antimicrobials have to be confirmed in future surveillance.

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 2012) on the FVO website www.bvet.admin.ch

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	32																									
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	32	0																		31	1				
Aminoglycosides - Neomycin	16	32	19														1	12	14	3	2					
Aminoglycosides - Streptomycin	128	32	1																		31					1
Amphenicols - Chloramphenicol	32	32	0													7	19	6								
Amphenicols - Florfenicol	8	32	0												9	22	1									
Fluoroquinolones - Ciprofloxacin	4	32	0										1	10	9	12										
Penicillins - Ampicillin	4	32	2												22	8	2									
Tetracyclines - Tetracycline	4	32	7											24	1		1	1	5							
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	32	32	20														5	5	2	5	2	13				
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	32	0											30	2											
Ionophores - Salinomycin	8	32	1											4	1	2	24	1								
Macrolides - Erythromycin	4	32	4										8	16	1	3		4								
Nitroimidazoles and Nitrofurans - Nitrofurantoin	256	32	0																14	9	8	1				
Oxazolidines - Linezolid	4	32	0											3	17	12										
Penicillins - Amoxicillin / Clavulanic acid	4	32	0												29	3										
Streptogramins - Quinupristin/Dalfopristin	1	22	18										1	3	3	13	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	32	
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 Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

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

E. faecalis	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	103																									
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	103	7																		93	2	1		2	5
Aminoglycosides - Neomycin	16	103	97														2	4	10	41	46					
Aminoglycosides - Streptomycin	512	103	36																		62	4	1		2	34
Amphenicols - Chloramphenicol	32	103	8												1	25	64	5		8						
Amphenicols - Florfenicol	8	103	0												60	42	1									
Fluoroquinolones - Ciprofloxacin	4	103	1										12	78	12				1							
Penicillins - Ampicillin	4	103	0												102	1										
Tetracyclines - Tetracycline	4	103	56											47			1	2	53							
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	32	103	37														10	22	34	29	4	4				
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	103	0											49	40	14										
Ionophores - Salinomycin	8	103	0											91	12											
Macrolides - Erythromycin	4	103	28										23	27	22	3		28								
Nitroimidazoles and Nitrofurans - Nitrofurantoin	32	103	5																98	5						
Oxazolidines - Linezolid	4	103	0										1	35	64	3										
Penicillins - Amoxicillin / Clavulanic acid	4	103	0												103											

Table Antimicrobial susceptibility testing of E. faecalis in Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

E. faecalis	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	103	
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 Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - rectum-anal swab - 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	158																								
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	158	0																		157		1			
Aminoglycosides - Neomycin	16	158	154															4	34	102	18					
Aminoglycosides - Streptomycin	512	158	1																		153	4				1
Amphenicols - Chloramphenicol	32	158	0												2	30	123	3								
Amphenicols - Florfenicol	8	158	1												64	90	3	1								
Fluoroquinolones - Ciprofloxacin	4	158	0										47	100	9	2										
Penicillins - Ampicillin	4	158	0												158											
Tetracyclines - Tetracycline	4	158	68											88	2				68							
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	32	158	71														1	33	53	44	5	22				
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	158	0											92	61	5										
Ionophores - Salinomycin	8	158	0											140	11	5	2									
Macrolides - Erythromycin	4	158	35										28	68	19	8	1	34								
Nitroimidazoles and Nitrofurans - Nitrofurantoin	32	158	4																154	3	1					
Oxazolidines - Linezolid	4	158	0											30	124	4										
Penicillins - Amoxicillin / Clavulanic acid	4	158	0												158											

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	158	
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 Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

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

E. faecium	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications																									
Isolates out of a monitoring program (yes/no)																										
Number of isolates available in the laboratory	44																									
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	44	0																		44					
Aminoglycosides - Neomycin	16	44	19														11	14	12	7						
Aminoglycosides - Streptomycin	128	44	1																		43				1	
Amphenicols - Chloramphenicol	32	44	0													21	19	3	1							
Amphenicols - Florfenicol	8	44	1												26	16	1		1							
Fluoroquinolones - Ciprofloxacin	4	44	1										13	16	6	8	1									
Penicillins - Ampicillin	4	44	2												39	3	2									
Tetracyclines - Tetracycline	4	44	7											37			1		6							
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	32	44	22														6	5	11	12	8	2				
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	44	0											35	9											
Ionophores - Salinomycin	8	44	0											26	18											
Macrolides - Erythromycin	4	44	1										15	5	12	11		1								
Nitroimidazoles and Nitrofurans - Nitrofurantoin	256	44	0																17	23	4					
Oxazolidines - Linezolid	4	44	0											7	28	9										
Penicillins - Amoxicillin / Clavulanic acid	4	44	0												42	2										
Streptogramins - Quinupristin/Dalfopristin	1	40	27										3	10		22	2	3								

Table Antimicrobial susceptibility testing of E. faecium in Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - rectum-anal swab - quantitative data [Dilution method]

E. faecium	Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications	
Isolates out of a monitoring program (yes/no)		
Number of isolates available in the laboratory	44	
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 - unspecified - weaners to growers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - rectum-anal swab - 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 - rectum-anal swab - 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	50																									
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	50	0																		49	1				
Aminoglycosides - Neomycin	16	50	12														11	27	10	1	1					
Aminoglycosides - Streptomycin	128	50	0																		50					
Amphenicols - Chloramphenicol	32	50	0													10	38	2								
Amphenicols - Florfenicol	8	50	1												7	36	6	1								
Fluoroquinolones - Ciprofloxacin	4	50	1										7	20	10	12	1									
Penicillins - Ampicillin	4	50	0												49	1										
Tetracyclines - Tetracycline	4	50	4											45	1				4							
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	32	50	32														4	4	10	19	9	4				
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	50	0											45	2	3										
Ionophores - Salinomycin	8	50	0											27	20	2	1									
Macrolides - Erythromycin	4	50	5										7	9	9	20	4	1								
Nitroimidazoles and Nitrofurans - Nitrofurantoin	256	50	0																6	42	2					
Oxazolidines - Linezolid	4	50	0												35	15										
Penicillins - Amoxicillin / Clavulanic acid	4	50	0												50											
Streptogramins - Quinupristin/Dalfopristin	1	10	5										1	4		4	1									

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 - rectum-anal swab - 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	50	
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 - rectum-anal swab - 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	50	
Antimicrobials:	lowest	highest
Streptogramins - Quinupristin/Dalfopristin	0.5	32

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 - rectum-anal swab - 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	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	11																		53					11
Aminoglycosides - Neomycin	16	64	60														2	2	8	26	26					
Aminoglycosides - Streptomycin	512	64	25																		38	1				25
Amphenicols - Chloramphenicol	32	64	19												1	6	38			19						
Amphenicols - Florfenicol	8	64	0												25	36	3									
Fluoroquinolones - Ciprofloxacin	4	64	0										12	44	8											
Penicillins - Ampicillin	4	64	0												63	1										
Tetracyclines - Tetracycline	4	64	35											28	1				35							
Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin	32	64	16														4	21	23	6	1	9				
Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin	4	64	0											26	28	10										
Ionophores - Salinomycin	8	64	0											60	3		1									
Macrolides - Erythromycin	4	64	27										12	14	10	1		27								
Nitroimidazoles and Nitrofurans - Nitrofurantoin	32	64	6																58	6						
Oxazolidines - Linezolid	4	64	0											13	49	2										
Penicillins - Amoxicillin / Clavulanic acid	4	64	1												63		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 - rectum-anal swab - 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	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

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 - rectum-anal swab - 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		32	
	Streptomycin		512	
Amphenicols	Chloramphenicol		32	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin		4	
Macrolides	Erythromycin		4	
Oxazolidines	Linezolid		4	
Penicillins	Ampicillin		4	
Streptogramins	Quinupristin/Dalfopristin		32	
Tetracyclines	Tetracycline		2	

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		32	
	Streptomycin		512	
Amphenicols	Chloramphenicol		32	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin		4	
Macrolides	Erythromycin		4	
Oxazolidines	Linezolid		4	
Penicillins	Ampicillin		4	
Streptogramins	Quinupristin/Dalfopristin		32	
Tetracyclines	Tetracycline		2	

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		32	
	Streptomycin		512	
Amphenicols	Chloramphenicol		32	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin		4	
Macrolides	Erythromycin		4	
Oxazolidines	Linezolid		4	
Penicillins	Ampicillin		4	
Streptogramins	Quinupristin/Dalfopristin		32	
Tetracyclines	Tetracycline		2	

Table Cut-off values for antibiotic resistance of E. faecium in Animals

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin		32	
	Streptomycin		128	
Amphenicols	Chloramphenicol		32	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin		4	
Macrolides	Erythromycin		4	
Oxazolidines	Linezolid		4	
Penicillins	Ampicillin		4	
Streptogramins	Quinupristin/Dalfopristin		1	
Tetracyclines	Tetracycline		2	

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		32	
	Streptomycin		128	
Amphenicols	Chloramphenicol		32	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin		4	
Macrolides	Erythromycin		4	
Oxazolidines	Linezolid		4	
Penicillins	Ampicillin		4	
Streptogramins	Quinupristin/Dalfopristin		1	
Tetracyclines	Tetracycline		2	

Table Cut-off values for antibiotic resistance of E. faecium in Food

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin		32	
	Streptomycin		128	
Amphenicols	Chloramphenicol		32	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin		4	
Macrolides	Erythromycin		4	
Oxazolidines	Linezolid		4	
Penicillins	Ampicillin		4	
Streptogramins	Quinupristin/Dalfopristin		1	
Tetracyclines	Tetracycline		2	

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 the case of intoxication with Bacillus cereus. 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	1	1
Salmonella - Other serovars	0	unknown	unknown	unknown	0	0
Campylobacter	0	unknown	unknown	unknown	2	2
Listeria - Listeria monocytogenes	0	unknown	unknown	unknown	0	0
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	1	1
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	0	unknown	unknown	unknown	0	0
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	0	unknown	unknown	unknown	0	0
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	0	0
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	1	27	0	0	0	1

Table Foodborne Outbreaks: detailed data for Bacillus

Please use CTRL for multiple selection fields

B. cereus

	Value
FBO Code	
Number of outbreaks	1
Number of human cases	8
Number of hospitalisations	8
Number of deaths	0
Food vehicle	Cereal products including rice and seeds/pulses (nuts, almonds)
More food vehicle information	
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Camp, picnic
Place of origin of problem	Temporary mass catering (fairs, festivals)
Origin of food vehicle	Domestic
Contributory factors	Storage time/temperature abuse
Mixed Outbreaks (Other Agent)	
Additional information	

Table Foodborne Outbreaks: detailed data for Campylobacter

Please use CTRL for multiple selection fields

C. jejuni

	Value
FBO Code	
Number of outbreaks	1
Number of human cases	20
Number of hospitalisations	3
Number of deaths	1
Food vehicle	Broiler meat (Gallus gallus) and products thereof
More food vehicle information	poultry liver mousse
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Residential institution (nursing home, prison, boarding school)
Place of origin of problem	Unknown
Origin of food vehicle	Unknown
Contributory factors	Storage time/temperature abuse
Mixed Outbreaks (Other Agent)	
Additional information	

C. jejuni

	Value
FBO Code	
Number of outbreaks	1
Number of human cases	24
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Broiler meat (Gallus gallus) and products thereof
More food vehicle information	
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	General
Setting	Temporary mass catering (fairs, festivals)
Place of origin of problem	Restaurant/Café/Pub/Bar/Hotel/Catering service
Origin of food vehicle	Domestic
Contributory factors	Cross-contamination
Mixed Outbreaks (Other Agent)	
Additional information	

Table Foodborne Outbreaks: detailed data for Salmonella

Please use CTRL for multiple selection fields

S. Enteritidis

	Value
FBO Code	
Number of outbreaks	1
Number of human cases	4
Number of hospitalisations	1
Number of deaths	0
Food vehicle	Eggs and egg products
More food vehicle information	
Nature of evidence	Descriptive epidemiological evidence
Outbreak type	Household / domestic kitchen
Setting	Household / domestic kitchen
Place of origin of problem	Unknown
Origin of food vehicle	Domestic
Contributory factors	Storage time/temperature abuse
Mixed Outbreaks (Other Agent)	
Additional information	