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 2008

INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Country: **Switzerland**

Reporting Year:

Laboratory name	Description	Contribution
FVO	Swiss Federal Veterinary Office	Swiss Zoonoses Report
FOPH	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 Monitoring
IPB	Institute of Parasitology, Vetsuisse Faculty and Faculty of Medicine University of Bern	National Reference Laboratory for Trichinellosis, Toxoplasmosis
SRC	Swiss Rabies Center at 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
Agroscope Liebefeld-Posieux ALP	Research Station	Official feed inspection service

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 2008 .

The information covers the occurrence of these diseases and agents in humans, animals, foodstuffs and in some cases also in feedingstuffs. In addition the report includes data on antimicrobial resistance in some zoonotic agents and commensal bacteria as well as information on epidemiological investigations of foodborne outbreaks. Complementary data on susceptible animal populations in the country is also given. The information given covers both zoonoses that are important for the public health in the whole European Community as well as zoonoses, which are relevant on the basis of the national epidemiological situation.

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

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

The information covered by this report is used in the annual Community Summary Report on zoonoses that is published each year by EFSA.

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

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1. ANIMAL POPULATIONS

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

A. Information on susceptible animal population

Sources of information:

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

Dates the figures relate to and the content of the figures:

Number of animals hold in farms in Switzerland at 5th of May 2008.
Number of animals slaughtered in the year 2008.

Definitions used for different types of animals, herds, flocks and holdings as well as

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

The number of farms holding large animals is decreasing on a yearly basis between 1% and 3% what corresponds to the yearly decrease of all farms. Holdings of pigs (-8.0%) decreased since 2007 above average. 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. 52 holdings with more than 100 breeding hens keep 90% of all breeding hens. The number of laying hens is stable since years. Broiler production increased since 2007 by 6%. The production of turkeys decreased by 49%. With 1'368 tons of turkey meat its share in poultry remains marginal (2.2% of all produced poultry meat).

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

Average size of the farms in 2008: 37 cattle. 156 pigs, 43 sheep, 12 goats, 185 laying hens, 5256 broilers.

Table Susceptible animal populations

		Number of herds or flocks		Number of slaughtered animals		Livestock numbers (live animals)		Number of holdings	
Animal species	**Category of animals**		**Year**		**Year**		**Year**		**Year**
Cattle (bovine animals)	**in total**			621376		1605951		43267	
Gallus gallus (fowl)	**breeding flocks, unspecified - in total**					154257		1186	
	broilers			48535714		5292579		1007	
	laying hens					3028064		16397	
Goats	**in total**			31948		80497		6520	
Pigs	**in total**			2645288		1530389		9780	
Sheep	**in total**			245940		439299		10333	
Solipeds, domestic	**horses - in total**			2971		54246		9547	
Turkeys	**meat production flocks**					58042		260	

2. INFORMATION ON SPECIFIC ZOONOSES AND ZOONOTIC AGENTS

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

2.1 SALMONELLOSIS

2.1.1 General evaluation of the national situation

A. General evaluation

History of the disease and/or infection in the country

Salmonellosis in humans is a notifiable disease. The detection of Salmonella spp. must be reported by the laboratory within one week (ordinance of the FDHA on doctor and laboratory reports). In the 80s Salmonellosis was the most reported food borne disease in humans. After reaching a peak in 1992 with 113,6 reports per 100,000 inhabitants the incidence declined steadily resulting in a takeover of Campylobacteriosis as the most reported food borne disease in humans in 1995. Depart from 2004 the incidence was never over 30,0 reports per 100,000 inhabitants. S. Enteritidis has always been the most frequently isolated serovar followed by S. Typhimurium.

Salmonellosis in animals is a notifiable diseases and classified as animal diseases to be controlled (Swiss ordinance of epizootics (TSV), Article 222-227). Animal keepers, livestock inspectors, AI technicians, animal health advisory services, meat inspectors, abattoir personnel, police and customs officers are under an obligation to report any suspected case of salmonellosis in animals to a veterinarian. If Salmonella are confirmed in a suspected case by a diagnostic laboratory, this must be reported to the cantonal veterinarian who is responsible for the livestock. 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.
In general, salmonellosis cases in animals are frequently reported (between 43 and 126 cases per year). From 1991 until 2008 1474 salmonellosis cases were recorded to the FVO by cantonal veterinarians which occurred in cattle (909), dogs (91), snakes (87), chicken (74), cats (56), lizards (52), pigeons (43), sheep (37), pigs (29), wild birds (24), horses (19), “other animals” (16), parrots (8), goats (6), hedgehogs (5), monkeys (2), rabbits (2), donkey (1), parakeet (1) and lynx (1). The highest rates occurred in 1996, 1997 and 1999. From 2002 onwards cases declined steadily and reached a low in 2006 with 54 cases. In

2007 number of reported cases went up to 74, however in 2008 the numbers declined again to the level of 2006.

In addition, from 1995 until 2006 the infection of chicken with S. Enteritidis was notifiable and a control program was in place for breeding flocks and laying hens flocks (TSV, Article 255-261). During this period the incidence of S. Enteritidis infection in breeding flocks and laying hen flocks has steadily declined from 38 to 3 infected flocks per year. This control program was expanded 2007 to other serovars and species (TSV, Article 255-261) according to the regulation 2160/2003 of the European community.

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

In 2008, the incidence for salmonellosis in humans increased slightly the first time after many years from 23,7 to 26,6 reports per 100,000 inhabitants. However, it is still about one third of the reported campylobacteriosis cases (101,5 reports per 100,000 inhabitants in 2008). 869 (42.4%) of the 2051 reported cases were caused by S. Enteritidis and 470 (22.9%) by S. Typhimurium. S. Infantis (30 reports), S. Virchow (29 reports) und S. Hadar (11 reports) play a minor role in Switzerland.

S. Typhimurium increased by 60% compared to the previous year. Further analyses of the data indicated that in the months May and June 5 times more cases of S. Typhimurium were reported in 2008 than in the previous year. This epidemic was traced back and about one third of these cases could be related to the consumption of pig meat products. Next to this foodborne outbreak two other Salmonella Enteritidis outbreaks occurred 2008, namely S. Enteritidis where eggs in the form of ice cream and fish pastry were determined as their cause (see also chapter about foodborne outbreaks).

Regarding salmonellosis in animals 56 cases were reported to the FVO by cantonal veterinarians in 2008 (16 in cows, 19 in reptiles, 12 in dogs and cats, 2 in birds, one case each in pigs, chicken, sheep and monkey as well as 3 cases in other, unspecified animals).

Furthermore, in veterinary diagnostic laboratories 5255 tests for salmonellosis were carried out in the context of clinical investigations, mainly in cattle (1903), dogs (1307), cats (791) and pigs (510). 180 animals were tested positive for Salmonella (cattle (86), other animals (53), dogs (13), cats (10), birds (7), pigs (6), sheep (3) and wild animals (2)).

The incidence of Salmonella infection in breeding flocks and laying hens remained on the low level of 3 infected flocks in 2007 and 4 infected flocks in 2008.

The baseline study in laying hens resp. in broilers – which were carried out in Switzerland in 2006 resp. 2007 – showed, that the Salmonella prevalence in laying hens and broilers is low (1,3 % resp. 0.3%). The baseline study on the prevalence and antimicrobial resistance of Campylobacter spp. in broiler flocks and on the prevalence of Campylobacter spp. and Salmonella spp. in broiler carcasses carried out in 2008 resulted in a prevalence of Salmonella in broiler carcasses of 2,6%.
A study in broiler meat at retail in 2007 showed, that Swiss products from poultry had a low Salmonella prevalence (products originating from Switzerland had a prevalence of 0.4% compared to 15.3% within imported products).
In 2007 and 2008 two baseline studies were conducted, one in slaughter pigs and one in breeding pigs. The prevalence in slaughter pigs was with 2,3% on an equal level as in previous research studies. The prevalence in herds of breeding pigs was 12.9%. As breeding pigs have not been addressed in recent research this prevalence cannot be compared with previous data. Studies to be conducted in the future will deliver data for trend analysis.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases

Since many years most cases in humans are caused by S. Enteritidis and S. Typhimurium.
In the slaughter pigs survey, 60% of the detected serovars (9 of 15 serovars) were either S. Enteritidis or S. Typhimurium proving once again the clear presence of these two serovars in the pig population. In the breeding pig population the presence of these two serovars was with 27% (8 of 30 serovars) significantly less dominant.
An increased number of S. Typhimurium cases were reported between May and June. Investigations involved 72 cases. Results of PFGE typing identified several outbreak strains, the dominating one present in 43 of the 72 isolates. Strains affecting one third of the cases were also found in animal samples, in particular in pork. However, no specific food source could be identified.

Recent actions taken to control the zoonoses

Baseline studies in laying hens (2006), broilers (2007), slaughter pigs (2007/2008) and breeding pigs (2008) were carried out to be able to realise adequate control programs.
National control programs have been set up for breeding poultry flocks according to Commission Regulation (EC) No. 1003/2005 and for flocks of laying hens according to Commission Regulation (EC) No. 1168/2006.

Additional information

1. Imported poultry meat from third countries is controlled by the border veterinarian service and randomly sampled for Campylobacter and Salmonella. The number of meat products analysed as well as their results can be found in the relevant chapters.
2. The poultry industry takes responsibility for the monitoring of broilers and

poultry meat production in a system of self-auditing. More information can be found in the relevant chapters.
3. Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

2.1.2 Salmonellosis in humans

Table Salmonella in humans - Age distribution

Age Distribution	S. Enteritidis			S. Typhimurium			Salmonella spp.		
	All	M	F	All	M	F	All	M	F
Age unknown	869			470			712		
Total:	869	0	0	470	0	0	712	0	0

Table Salmonella in humans - Seasonal distribution

Month	S. Enteritidis	S. Typhimurium	Salmonella spp.
	Cases	Cases	Cases
not known	869	470	712
Total:	869	470	712

2.1.3 Salmonella in foodstuffs

A. Salmonella spp. in broiler meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

Baseline study on the prevalence and antimicrobial resistance of Campylobacter spp. in broiler flocks and on the prevalence of Campylobacter spp. and Salmonella spp. in broiler carcasses referring to the Commission Regulation (EC) No. 2160/2003 and Commission Decision 2007/516/EG, see chapter Campylobacter.

At retail

A survey of Salmonella in broiler meat preparations was carried out at retail from 4 June 2008 to 1 October 2008. In total 179 samples of broiler meat preparations were collected by the food safety inspectors of nine cantonal laboratories in randomly selected retail stores. 53% of the samples were from domestic production (94 samples) and 28% were imported broiler meat preparations (50 samples). The origin of 20% was not given (35 samples). The samples were parts of the chicken such as breast, cutlet, legs and wings. In addition, as meat preparations intended to be barbecued were in the focus of this study, most of the samples were marinated or spiced.

Frequency of the sampling

At slaughterhouse and cutting plant

see Campylobacter

At retail

Samples were taken from 4 June 2008 to 1 October 2008.

Type of specimen taken

At slaughterhouse and cutting plant

see Campylobacter

At retail

Meat preparations

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

see Campylobacter

At retail

For the official sampling of broiler meat preparations the retail stores in which the samples were taken were randomly selected. However, the study was not representative for Switzerland nor for broiler meat preparations in general, as the

samples were not evenly distributed over all regions in Switzerland and as mainly marinated and spiced meat preparations were tested.

Definition of positive finding

At slaughterhouse and cutting plant

Growth in microbiological culture and identification of Salmonella in a sample of 10 grams, according to the ordinance of Hygiene (HyV, SR 817.024.1).

At retail

Growth in microbiological culture and identification of Salmonella.

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

According to Commission Decision 2007/516/EG, for the detection of Salmonella in the (neck) skin samples Annex D of ISO 6579:2002: 'Detection of Salmonella spp. in animal faeces and in samples of the primary production stage' was applied.

At retail

According to the descriptions of the Swiss Food Manual 2005 (Chapter 56) that corresponds to ISO 6579 (2002) with minor deviation.

Preventive measures in place

Vaccination is prohibited.

Measures in case of the positive findings or single cases

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

Notification system in place

Cantonal food safety authorities are obliged to report positive cases to the FOPH.

Results of the investigation

At slaughterhouse
10 from 390 valid (neck) skin samples (2.6%) for the detection of Salmonella in carcasses in the frame of the baseline study according to 2007/516/EG were Salmonella positive. Following serovars were found: 4x S. Infantis, 3x S. Typhimurium, 1x S. Agona, 1x S. Braenderup and 1x S. enterica 4,12:i:- .

At retail
5 from the 179 samples (2,8%) were Salmonella positive. All positive samples were imported products from the EU, thus in all 94 samples originating from Switzerland no Salmonella were detected. Following serovars were found: 2x S. Hadar, 1x S. Infantis, 1x S. Indiana and 1x S. Mbandaka. The 5 positive imported samples derived from France, Germany and Hungary.

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

The two studies carried out in 2007 resulting in a Salmonella prevalence of 0,3% in broiler flocks and 0,4% in poultry meat originating from Switzerland indicate that the risk of salmonella infection for humans from domestic poultry production is low. The results from the afore-mentioned studies (2,6% Salmonella prevalence on carcasses at slaughterhouse and no positive findings in domestic broiler meat preparations) in 2008 endorse this proposition.

Additional information

1. Imported poultry meat from third countries is controlled by the border veterinarian service (2008 in total 19 698 tons were imported mainly from Brazil (96%) and the remaining 4% from Argentina, Israel and Chile) and randomly sampled for Campylobacter and Salmonella. To test for Campylobacter spp., 38 samples (20 from Brazil and 18 from Argentina) were taken in 2008. In 2 sample (5,2%) Salmonella were detected, namely S. Heidelberg und S. Enteritidis.
2. The industry takes responsibility for the surveillance of poultry meat in a system of self-auditing. Results of the Salmonella surveillance are available from the largest poultry producers and abattoirs covering more than 90% of the production. Samples are taken several times a year at random. Next to the domestic production, also imported fresh poultry meat, poultry meat preparations and poultry meat products were tested at different stages such as slaughterhouse, cutting plant and processing plant (see poultry meat table). In total 3273 tests were done (including single as well as pooled samples) of which 85 proved positive for Salmonella spp. (7x S. Typhimurium, 5x S. Virchow, 5x S. Agona, 4x S. Enteritidis, 2x S. Senftenberg, 6x S. Infantis, 1x S. Saintpaul, 1x S. Newport and 54x Salmonella spp. unspecified). The poultry industry made a special remark for 5x S. Virchow, 1x S. Infantis, 1x S. Saintpaul and 46 unspecified Salmonella spp. to be imported poultry meat or products thereof.
3. Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

B. Salmonella spp. in pig meat and products thereof

Monitoring system

Sampling strategy

At retail

The sampling of pig meat preparations was carried out at retail from 4. June 2008 to 1. October 2008. In total 148 samples of pig meat preparations and 16 minced meat samples were collected by the food safety inspectors of nine cantonal laboratories in randomly selected retail stores. 66,9% of the samples were from domestic production (99 samples). As meat preparations intended to be barbecued were in the focus of this study, most of the samples were marinated or spiced.

Frequency of the sampling

At retail

Samples were taken from 4. June 2008 to 1. October 2008.

Type of specimen taken

At retail

meat preparations

Methods of sampling (description of sampling techniques)

At retail

For the official sampling of pig meat preparations the retail stores in which the samples were taken were randomly selected. However, the study was not representative for Switzerland nor for pig meat preparations in general, as the samples were not evenly distributed over all regions in Switzerland and as mainly marinated and spiced meat preparations were tested.

Definition of positive finding

At retail

Growth in microbiological culture and identification of Salmonella in a sample of 10 grams, according to the Ordinance of Hygiene (HyV, SR 817.024.1).

Diagnostic/analytical methods used

At retail

According to the descriptions of the Swiss Food Manual 2005 (Chapter 56) that corresponds to ISO 6579 (2002) with minor deviation.

Preventive measures in place

Vaccination is prohibited.

Measures in case of the positive findings or single cases

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

Notification system in place

Cantonal food safety authorities are obliged to report positive cases to the

FOPH.

Results of the investigation

All 164 samples derived from pigs were Salmonella negative.

Additional information

Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

C. 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

In the national monitoring program of dairy products producers of cheese and other milk products from all over Switzerland are inspected by official food control on a regular basis. On the occasion of the inspection samples of dairy products are taken at the end of the production lane. Enterprises to be sampled are selected randomly.

Frequency of the sampling

Selected enterprises are visited once a year.

Type of specimen taken

Specimens are taken from soft and cream cheeses made from cow and goat milk (25 g) at the end of the production, before it is sold to the trader or to the consumer.

Methods of sampling (description of sampling techniques)

A single sample of one cheese is taken.

Definition of positive finding

Analysis is done in 25 grams of cheese. Growth in microbiological culture and identification of Salmonella.

Diagnostic/analytical methods used

Detection of Salmonella spp. according to the descriptions of the Swiss Food Manual 2005 (Chapter 56) that corresponds to ISO 6579 (2002) with minor deviation.

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.

Results of the investigation

187 cheeses were tested, all with a negative result.

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

Salmonella is involved in the national monitoring program of dairy products on an irregular basis.

Additional information

Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

Table Salmonella in poultry meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Agona	S. Brandenburg	S. Enteritidis	S. Hadar	S. Indiana	S. Infantis
Meat from broilers (Gallus gallus) - carcass - - neck skin - Surveillance - HACCP and own checks	poultry	flock	not given	457	9	1					5
Meat from broilers (Gallus gallus) - carcass - - neck skin - Survey - EU baseline survey	FVO	animal	27g	390	10	1	1				4
Meat from broilers (Gallus gallus) - fresh - at cutting plant - Surveillance - HACCP and own checks [1)]	poultry	single	10g/25g	666	46						
Meat from broilers (Gallus gallus) - fresh - at processing plant - Surveillance - HACCP and own checks	poultry	single	25g	105	0						
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Surveillance - HACCP and own checks	poultry	single	10g/25g	311	2	1		1			
Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - at processing plant - Surveillance - HACCP and own checks [2)]	poultry	single	10g/25g	694	18			2			
Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - at retail - Monitoring - official sampling - objective sampling [3)]	FOPH	single	10g	179	5				2	1	1
Meat from broilers (Gallus gallus) - meat products - cooked, ready-to-eat - at processing plant - Surveillance - HACCP and own checks [4)]	poultry	batch	25g	456	0						
Meat from broilers (Gallus gallus) - mechanically separated meat (MSM) - at cutting plant - Surveillance - HACCP and own checks [5)]	poultry	single	10g	238	7	3		4			
Meat from broilers (Gallus gallus) - minced meat - intended to be eaten cooked - at processing plant - Surveillance - HACCP and own checks	poultry	single	10g	10	0						

Table Salmonella in poultry meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Agona	S. Brandenburg	S. Enteritidis	S. Hadar	S. Indiana	S. Infantis
Meat from turkey - fresh - at cutting plant - Surveillance - HACCP and own checks	poultry	single	10g/25g	85	1			1			
Meat from turkey - fresh - at processing plant - Surveillance - HACCP and own checks [6)]	poultry	single	25g	23	2						1
Meat from turkey - fresh - at slaughterhouse - Surveillance - HACCP and own checks	poultry	single	10g/25g	24	0						
Meat from turkey - meat preparation - intended to be eaten cooked - at processing plant - Surveillance - HACCP and own checks	poultry	single	10g/25g	32	0						
Meat from turkey - mechanically separated meat (MSM) - at cutting plant - Surveillance - HACCP and own checks	poultry	single	10g	1	0						
Meat from turkey - minced meat - intended to be eaten cooked - at processing plant - Surveillance - HACCP and own checks [7)]	poultry	single	10g/25g	171	0						

	S. Mbandaka	S. Newport	S. Saintpaul	S. Senftenberg	S. Typhimurium	S. Virchow	S. 4,12:i:-	Salmonella spp., unspecified
Meat from broilers (Gallus gallus) - carcass - - neck skin - Surveillance - HACCP and own checks		1						2
Meat from broilers (Gallus gallus) - carcass - - neck skin - Survey - EU baseline survey					3		1	
Meat from broilers (Gallus gallus) - fresh - at cutting plant - Surveillance - HACCP and own checks [1)]								46
Meat from broilers (Gallus gallus) - fresh - at processing plant - Surveillance - HACCP and own checks								

Table Salmonella in poultry meat and products thereof

	S. Mbandaka	S. Newport	S. Saintpaul	S. Senftenberg	S. Typhimurium	S. Virchow	S. 4,12:i:-	Salmonella spp., unspecified
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Surveillance - HACCP and own checks								
Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - at processing plant - Surveillance - HACCP and own checks [2)]				2	3	5		6
Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - at retail - Monitoring - official sampling - objective sampling [3)]	1							
Meat from broilers (Gallus gallus) - meat products - cooked, ready-to-eat - at processing plant - Surveillance - HACCP and own checks [4)]								
Meat from broilers (Gallus gallus) - mechanically separated meat (MSM) - at cutting plant - Surveillance - HACCP and own checks [5)]								
Meat from broilers (Gallus gallus) - minced meat - intended to be eaten cooked - at processing plant - Surveillance - HACCP and own checks								
Meat from turkey - fresh - at cutting plant - Surveillance - HACCP and own checks								
Meat from turkey - fresh - at processing plant - Surveillance - HACCP and own checks [6)]			1					
Meat from turkey - fresh - at slaughterhouse - Surveillance - HACCP and own checks								
Meat from turkey - meat preparation - intended to be eaten cooked - at processing plant - Surveillance - HACCP and own checks								
Meat from turkey - mechanically separated meat (MSM) - at cutting plant - Surveillance - HACCP and own checks								

Table Salmonella in poultry meat and products thereof

	S. Mbandaka	S. Newport	S. Saintpaul	S. Senftenberg	S. Typhimurium	S. Virchow	S. 4,12:i:-	Salmonella spp., unspecified
Meat from turkey - minced meat - intended to be eaten cooked - at processing plant - Surveillance - HACCP and own checks [7)]								

Comments:

[1)] 88% of these samples were imported and all 46 positive results concerned imported poultry meat.

[2)] 1 of 150 single samples and 17 of 544 pooled samples (including 5 single samples) were positive. The 5 S. Virchow were found in imported products.

[3)] sampling of mainly marinated and spiced breasts,legs and wings from June to October 2008. 53% were domestic production, 28% imported and 20% unknown origin. All positive samples were imported from France, Germany or Hungary.

[4)] 5 pooled samples

[5)] 195 samples were pooled samples including 5 single samples and all 7 positives were pooled samples

[6)] The 2 positive samples were found in imported turkey meat.

[7)] 125 samples were pooled samples including 5 single samples

Table Salmonella in milk and dairy products

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Cheeses made from cows' milk - soft and semi-soft - at processing plant - Monitoring - official sampling - objective sampling	National	single	25g	25	0			
Cheeses made from cows' milk - soft and semi-soft - made from pasteurised milk - at processing plant - Monitoring - official sampling - objective sampling	National	single	25g	51	0			
Cheeses made from goats' milk - soft and semi-soft - at processing plant - Monitoring - official sampling - objective sampling	National	single	25g	6	0			
Cheeses made from goats' milk - soft and semi-soft - made from pasteurised milk - at processing plant - Monitoring - official sampling - objective sampling	National	single	25g	12	0			

Table Salmonella in red meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Meat from pig - meat preparation - intended to be eaten cooked - at retail - Monitoring - official sampling - objective sampling (sampling of mainly marinated and spiced pig meat preparations from June to October 2008) [1)]	FOPH	single	10g	148	0			
Meat from pig - minced meat - intended to be eaten cooked - at retail - Monitoring - official sampling - objective sampling (sampling from June to October 2008)	FOPH	single	10g	16	0			

Comments:

[1)] 67% were domestic production

2.1.4 Salmonella in animals

A. Salmonella spp. in pigs

Monitoring system

Sampling strategy

Breeding herds

Baseline study on the prevalence of Salmonella spp. and Methicillin-resistant Staphylococcus aureus in herds of breeding pigs referring to the Commission Regulation (EC) No. 2160/2003 and Commission Decision 2008/55/EC. In total 225 breeding pig holdings were tested in a stratified and randomized sample scheme from 01.01.2008 until 31.12.2008.

Fattening herds

Baseline study on the prevalence of Salmonella in slaughter pigs referring to the Commission Regulation (EC) No. 2160/2003 and Commission Decision 2006/668/EC. In total 615 slaughter pigs were tested in a randomized sample scheme at the slaughter house from 01.10.2007 until 30.09.2008.

Frequency of the sampling

Breeding herds

Sampling distributed evenly throughout the year

Fattening herds at slaughterhouse (herd based approach)

Sampling distributed evenly throughout the year

Type of specimen taken

Breeding herds

Faeces

Fattening herds at slaughterhouse (herd based approach)

Organs: lymph nodes

Methods of sampling (description of sampling techniques)

Breeding herds

According to Commission Decision 2008/55/EC.

Fattening herds at slaughterhouse (herd based approach)

According to Commission Decision 2006/668/EC.

Case definition

Breeding herds

Growth in microbiological culture and identification of Salmonella.

Fattening herds at slaughterhouse (herd based approach)

Regarding the lymph nodes: growth in microbiological culture and identification of Salmonella.

Diagnostic/analytical methods used

Breeding herds

For the detection of Salmonella in feaces samples Annex D of ISO 6579:2002: 'Detection of Salmonella spp. in animal faeces and in samples of the primary production stage.' was applied.

Fattening herds at slaughterhouse (herd based approach)

For the detection of Salmonella in lymph nodes Annex D of ISO 6579:2002: 'Detection of Salmonella spp. in animal faeces and in samples of the primary production stage.' was applied using MSRV as the single selective enrichment medium.

Vaccination policy

Breeding herds

Vaccination is prohibited.

Fattening herds

Vaccination is prohibited.

Control program/mechanisms

The control program/strategies in place

Breeding herds

At present there is no control program in place. However, as soon as the EU has set a target for Salmonella in breeding pigs a control program to reach this target will be implemented in Switzerland.

Fattening herds

At present there is no control program in place. However, as soon as the EU has set a target for Salmonella in slaughter pigs a control program to reach this target will be implemented in Switzerland.

Notification system in place

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

Results of the investigation

Breeding herds

29 holdings of the 225 were Salmonella positive. The prevalence of Salmonella spp. of breeding pig herdss is thus 12,9%. Various serovars have been found (as on one holding two serovars were found, there are 30 serovars in total): S. Typhimurium (6), S. Derby (4), S. Brandenburg (3), S. Bredeney (3), S. Enteritidis (2), S. Amsterdam (2), S. Livingstone (2), S. Ohio (2), S. Tennessee (1), S. Javiana (1), S. Muenchen (1), S. enterica 4,12:d:- (1), S. enterica 4,12:i:- (1) and S. enterica rough:-:- (1).

Fattening pigs at slaughterhouse

14 of the 615 slaughter pigs tested were Salmonella positive. The prevalence of Salmonella spp. in slaughter pigs is thus 2,3%. Following serovars have been found (one pig proved positive for two serovars): S. Typhimurium (5), S. Enteritidis (4), S. enterica 4,12:i:- (2), S. Derby (1), S. Eboko (1), S. Szentes (1) and S. Ealing (1).

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

Breeding herds
The baseline study carried out in 2008 showed that Salmonella prevalence in breeding pigs with 12.9% is significantly higher than in the slaughter pig population with 2,3%. Furthermore, the serovar types found in breeding pigs seem to be slightly different from those in slaughter pigs and their range in variety higher. However, this might be influenced by the greater rate of Salmonella findings in the breeding pig population.

Fattening pigs at slaughterhouse
The baseline study carried out in 2007/2008 features that Salmonella prevalence in slaughter pigs with 2,3% is comparable to findings in earlier research studies and therefore has not changed much over the recent years.

Additional information

1. Concerning the baseline study in slaughter pigs Switzerland took next to the lymph nodes meat juice samples as well. For detection of Salmonella antibodies a commercial testkit (Salmotype Pig Screen® ELISA, Labor Diagnostik Leipzig) was used. A slaughter pig was Salmonella antibody positive if the cut off value was over 20%. In total, from the 610 valid results 38 slaughter pigs were clearly Salmonella antibody positive (6%), 47 had an inconclusive result (8%) and 525 were negative (86%). Comparing the positive bacteriological lymph node results with the findings in the meat juice of these pigs the compliance was low. Only in 4 pigs the antibody test results were positive as well.
2. Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

B. Salmonella spp. in Gallus Gallus - breeding flocks

Vaccination policy

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

Vaccination is prohibited.

Control program/mechanisms

The control program/strategies in place

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

Control measures according to the Swiss ordinance of epizootics (TSV, Article 255-261) and Commission Regulation (EC) No. 1003/2005.

Measures in case of the positive findings or single cases

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

In the event of a definitive positive finding, a simple first-degree quarantine is imposed on the flock (Article 69 TSV): To prevent the disease from spreading, animal movements are prohibited. All direct contact between birds that issubject to the quarantine and birds from other flocks is forbidden. The quarantined flocks must not be changed either by moving animals to other flocks or by introducing animals from other flocks. The diseased flocks must be slaughtered or culled. The empty premises are cleaned and disinfected. The freedom from Salmonella of the premises has to be proven by official sampling after disinfection.

Notification system in place

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

Results of the investigation

In the control programme none of the tested breeding flocks were positive for salmonella.

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

Since many years tested breeding flocks were always negative for Salmonella.

Additional information

1. The industry takes responsibility for the surveillance of breeding and broiler flocks in their system of self-auditing. 2008 several breeding flocks for meat production and broiler flocks were tested at different production stages using different materials (see tables). All results were negative.

2. Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

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

Vaccination policy

Laying hens flocks

Vaccination is prohibited.

Control program/mechanisms

The control program/strategies in place

Laying hens flocks

Control measures according to the Swiss ordinance of epizootics (TSV, Article 255-261) and Commission Regulation (EC) No. 1168/2006.

Measures in case of the positive findings or single cases

Laying hens flocks

In the event of a definitive positive finding, a simple first-degree quarantine is imposed on the flock (Article 69 TSV): To prevent the disease from spreading, animal movements are prohibited. All direct contacts between birds that are subject to the quarantine and birds from other flocks is forbidden. The quarantined flocks must not be changed either by moving animals to other flocks or by introducing animals from other flocks. The diseased flocks must be slaughtered or culled.The empty premises are cleaned and disinfected. The freedom from Salmonella of the premises has to be proven by official sampling after disinfection.

Notification system in place

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

Results of the investigation

From the tested laying hen flocks with more than 1000 birds 3 proved positive for Salmonella (2x S. Enteritidis and 1x S. Typhimurium).
According to the notification system in place, in total (independent from the size of the flocks) 4 laying hen flocks were reported Salmonella positive (3x S. Enteritidis and 1x S. Typhimurium) by cantonal veterinarians.

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

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

Additional information

Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

D. 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 according to the Swiss ordinance of epizootics (TSV, Article 255-261) and Commission Regulation (EC) No. 646/2007 were implemented and will be in force depart from 01.01.2009.

Notification system in place

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

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

The baseline study conducted in broiler flocks in 2007 showed that Salmonella prevalence in broilers in Switzerland is low (0,3%). Switzerland wants to maintain the current situation by implementing the afore-mentioned control measures.

Additional information

1. The industry takes responsibility for the monitoring of breeding and broiler flocks in their system of self-auditing. 2008 several breeding flocks for meat production and broiler flocks were tested at different production stages using different materials (see tables). All results were negative.
2. Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

Table Salmonella in breeding flocks of Gallus gallus

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Hadar	S. Infantis	S. Typhimurium	S. Virchow	Salmonella spp., unspecified
Gallus gallus (fowl) - breeding flocks for meat production line - at hatchery - Surveillance - HACCP and own checks [1)]		poultry	flock	977	0						
Gallus gallus (fowl) - breeding flocks for meat production line - day-old chicks - - organ/tissue - Surveillance - HACCP and own checks		poultry	flock	29	0						
Gallus gallus (fowl) - breeding flocks for meat production line - day-old chicks - at farm - environmental sample - Surveillance - HACCP and own checks [2)]		poultry	flock	70	0						
Gallus gallus (fowl) - breeding flocks for meat production line - during production period - - blood - Surveillance - HACCP and own checks		poultry	flock	21	0						
Gallus gallus (fowl) - breeding flocks for meat production line - during production period - - faeces - Surveillance - HACCP and own checks		poultry	flock	2	0						
Gallus gallus (fowl) - breeding flocks for meat production line - during production period - at farm - environmental sample - Surveillance - HACCP and own checks [3)]		poultry	flock	39	0						
Gallus gallus (fowl) - breeding flocks for meat production line - during production period - at farm - environmental sample - boot swabs - Surveillance - HACCP and own checks		poultry	flock	231	0						
Gallus gallus (fowl) - breeding flocks for meat production line - during production period - at farm - environmental sample - dust - Surveillance - HACCP and own checks		poultry	flock	74	0						
Gallus gallus (fowl) - breeding flocks for meat production line - during rearing period - - blood - Surveillance - HACCP and own checks		poultry	flock	36	0						

Table Salmonella in breeding flocks of Gallus gallus

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Hadar	S. Infantis	S. Typhimurium	S. Virchow	Salmonella spp., unspecified
Gallus gallus (fowl) - breeding flocks for meat production line - during rearing period - - faeces - Surveillance - HACCP and own checks		poultry	flock	63	0						
Gallus gallus (fowl) - breeding flocks for meat production line - during rearing period - - organ/tissue - Surveillance - HACCP and own checks		poultry	flock	49	0						
Gallus gallus (fowl) - breeding flocks for meat production line - during rearing period - at farm - environmental sample - boot swabs - Surveillance - HACCP and own checks		poultry	flock	94	0						
Gallus gallus (fowl) - breeding flocks for meat production line - during rearing period - at farm - environmental sample - dust - Surveillance - HACCP and own checks		poultry	flock	47	0						
Gallus gallus (fowl) - parent breeding flocks for egg production line - day-old chicks - at farm - Control and eradication programmes - official sampling - census sampling [4)]		cantonal	flock	19	0						
Gallus gallus (fowl) - parent breeding flocks for egg production line - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - industry sampling - census sampling		cantonal	flock	10	0						
Gallus gallus (fowl) - parent breeding flocks for egg production line - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - census sampling		cantonal	flock	32	0						
Gallus gallus (fowl) - parent breeding flocks for egg production line - during rearing period - - faeces - Control and eradication programmes - official sampling - census sampling		cantonal	flock	34	0						

Table Salmonella in breeding flocks of Gallus gallus

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Hadar	S. Infantis	S. Typhimurium	S. Virchow	Salmonella spp., unspecified
Gallus gallus (fowl) - parent breeding flocks for meat production line - day-old chicks - at farm - Control and eradication programmes - official and industry sampling - census sampling [5)]		cantonal	flock	15	0						
Gallus gallus (fowl) - parent breeding flocks for meat production line - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - industry sampling - census sampling		cantonal	flock	20	0						
Gallus gallus (fowl) - parent breeding flocks for meat production line - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - census sampling		cantonal	flock	57	0						
Gallus gallus (fowl) - parent breeding flocks for meat production line - during rearing period - - faeces - Control and eradication programmes - official sampling - census sampling		cantonal	flock	19	0						

Comments:

[1)] samples included 512 hatching dust, 218 basket liners, 240 hygiene control samples and 7 broken eggs media
[2)] environmental samples include 46 basket liners as well as 24 hygiene control samples
[3)] hygiene control samples
[4)] dead chicks and basket liners
[5)] dead chicks and basket liners

Footnote:

The number of existing flocks is unknown. However 40 farms were holding more than 250 birds.

Table Salmonella in other poultry

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Agona	S. Enteritidis	S. Infantis	S. Newport	S. Typhimurium	Salmonella spp., unspecified
Gallus gallus (fowl) - broilers - before slaughter - at farm - environmental sample - Surveillance - HACCP and own checks	6476	poultry	flock	176	2			1	1		
Gallus gallus (fowl) - broilers - before slaughter - at slaughterhouse - animal sample - Surveillance - HACCP and own checks (cloacal swab)	6476	poultry	flock	97	1						1
Gallus gallus (fowl) - broilers - before slaughter - at slaughterhouse - animal sample - caecum - Surveillance - HACCP and own checks	6476	poultry	flock	122	1	1					
Gallus gallus (fowl) - broilers - during rearing period - at farm - feed sample - Surveillance - HACCP and own checks	6476	poultry	flock	2	0						
Gallus gallus (fowl) - laying hens - during production period - - blood - Control and eradication programmes - industry sampling - census sampling	511	cantonal	flock	13	0						
Gallus gallus (fowl) - laying hens - during production period - - eggs - Control and eradication programmes - industry sampling - census sampling	511	cantonal	flock	145	0						
Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - industry sampling - census sampling	511	cantonal	flock	244	0						
Gallus gallus (fowl) - laying hens - during production period - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - census sampling [1)]	511	cantonal	flock	306	2		2				
Gallus gallus (fowl) - laying hens - during rearing period - at farm - environmental sample - boot swabs - Control and eradication programmes - official sampling - census sampling		cantonal	flock	224	1					1	

Table Salmonella in other poultry

Comments:

[1)] Notification of regional authorities was missing in some of the herds under surveillance.

Table Salmonella in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella spp.	S. Amsterdam	S. Brandenburg	S. Bredeney	S. Derby	S. Enteritidis	S. Javiana	S. Livingstone
Alpacas - Clinical investigations	ILD	animal	21	0							
Birds - Clinical investigations	ILD	animal	268	7							
Buffalos - Clinical investigations	ILD	animal	1	0							
Camels - Clinical investigations	ILD	animal	4	0							
Cats - Clinical investigations	ILD	animal	791	10							
Cattle (bovine animals) - unspecified - Clinical investigations	ILD	animal	1903	86							
Deer - Clinical investigations	ILD	animal	3	0							
Dogs - Clinical investigations	ILD	animal	1307	13							
Other animals - Clinical investigations	ILD	animal	329	53							
Pigs - breeding animals - - faeces - Survey - EU baseline survey [1)]	FVO	holding	225	29	2	3	3	4	2	1	2
Pigs - unspecified - Clinical investigations	ILD	animal	510	6							
Rabbits - Clinical investigations	ILD	animal	40	0							
Sheep	ILD	animal	58	3							
Wild animals - Clinical investigations	ILD	animal	20	2							

	S. Muenchen	S. Ohio	S. Tennessee	S. Typhimurium	S. 4,12:d:-	S. 4,12:i:-	Salmonella spp., unspecified
Alpacas - Clinical investigations							
Birds - Clinical investigations							7
Buffalos - Clinical investigations							

Table Salmonella in other animals

	S. Muenchen	S. Ohio	S. Tennessee	S. Typhimurium	S. 4,12:d:-	S. 4,12:i:-	Salmonella spp., unspecified
Camels - Clinical investigations							
Cats - Clinical investigations							10
Cattle (bovine animals) - unspecified - Clinical investigations							86
Deer - Clinical investigations							
Dogs - Clinical investigations							13
Other animals - Clinical investigations							53
Pigs - breeding animals - - faeces - Survey - EU baseline survey [1)]	1	2	1	6	1	1	
Pigs - unspecified - Clinical investigations							6
Rabbits - Clinical investigations							
Sheep							3
Wild animals - Clinical investigations							2

Comments:

[1)] in the 29 positive holdings 30 serovars were found (in one holding positive for S. Bredeney also S. enterica rough:-:- was found as well)

Footnote:

ILD = "Informationssystem Labordiagnostik in der Schweiz" (information system of laboratory diagnostics)

2.1.5 Salmonella in feedingstuffs

Table Salmonella in other feed matter

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Feed material of cereal grain origin - maize - at feed mill - Surveillance - official controls	ALP	single	800g	13	0			
Feed material of cereal grain origin - wheat derived - at feed mill - Surveillance - official controls	ALP	single	800g	1	0			
Feed material of oil seed or fruit origin - linseed derived - at feed mill - Surveillance - official controls	ALP	single	800g	1	0			
Feed material of oil seed or fruit origin - palm kernel derived - at feed mill - Surveillance - official controls	ALP	single	800g	1	0			
Feed material of oil seed or fruit origin - rape seed derived - at feed mill - Surveillance - official controls	ALP	single	800g	4	0			
Feed material of oil seed or fruit origin - soya (bean) derived - at feed mill - Surveillance - official controls	ALP	single	800g	22	0			
Feed material of oil seed or fruit origin - sunflower seed derived - at feed mill - Surveillance - official controls	ALP	single	800g	2	0			
Other feed material - other plants - at feed mill - Surveillance - official controls [1)]	ALP	single	800g	7	0			

Comments:

[1)] manioc (2), yeast (2), peeling of cacao (3)

Table Salmonella in compound feedingstuffs

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella spp.	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Compound feedingstuffs for cattle - final product - at feed mill - domestic production - Surveillance - official controls [1)]	ALP	single	800g	119	0			
Compound feedingstuffs for fish - final product - at feed mill - domestic production - Surveillance - official controls	ALP	single	800g	2	0			
Compound feedingstuffs for pigs - final product - at feed mill - domestic production - Surveillance - official controls [2)]	ALP	single	800g	11	0			
Compound feedingstuffs for poultry (non specified) - final product - at feed mill - domestic production - Surveillance - official controls [3)]	ALP	single	800g	4	0			
Compound feedingstuffs for poultry - laying hens - final product - at feed mill - domestic production - Surveillance - official controls	ALP	single	800g	22	0			
Compound feedingstuffs for sheep - final product - at feed mill - domestic production - Surveillance - official controls	ALP	single	800g	2	0			
Compound feedingstuffs for turkeys - at feed mill - domestic production - Surveillance - official controls	ALP	single	800g	2	0			
Compound feedingstuffs, not specified - final product - at feed mill - domestic production - Surveillance - official controls (compound feed for deer)	ALP	single	800g	1	0			
Compund feedingstuffs for poultry - broilers - final product - at feed mill - domestic production - Surveillance - official controls	ALP	single	800g	11	0			

Comments:

[1)] feed for milk cows (108), calves (2), young cattle (2) and feeder cattle (7)

[2)] feed for piglets (2) and fattening pigs (9)

Table Salmonella in compound feedingstuffs

[3] feed for chicks

2.1.6 Antimicrobial resistance in Salmonella isolates

A. Antimicrobial resistance in Salmonella in pigs

Sampling strategy used in monitoring

Frequency of the sampling

Sampling in the framework of the baseline studies. See: Salmonella spp. in pigs (2.1.3.A)

Type of specimen taken

fattening pigs: lymph nodes; breeding pigs: fecal samples. See: Salmonella spp. in pigs (2.1.3.A)

Methods of sampling (description of sampling techniques)

See: Salmonella spp. in pigs (2.1.3.A)

Procedures for the selection of isolates for antimicrobial testing

All positive Salmonella isolates were submitted to susceptibility testing.

Methods used for collecting data

Salmonella strains were isolated in one laboratory (Gally-Valerio) See: Salmonella spp. in pigs (2.1.3.A).
The isolates were sent to the Centre for Zoonoses, Bacterial Animal Diseases and Antibiotic Resistance, University of Bern, Switzerland for phenotypical verification, serotyping and susceptibility testing.

Laboratory methodology used for identification of the microbial isolates

See: Salmonella spp. in pigs (2.1.3.A)

Laboratory used for detection for resistance

Antimicrobials included in monitoring

Ampicillin, Apramycin, Amoxicillin/Clavulanic Acid(2:1), Cephalotin, Chloramphenicol, Ciprofloxacin, Colistin, Florfenicol, Gentamicin, Nalidixic Acid, Neomycin, Sulfamethoxazole, Spectinomycin, Streptomycin, Trimethoprim/Sulfamethoxazole (1:19), Tetracyclin, Ceftiofur

Breakpoints used in testing

Ampicillin, 4 µg/ml; Apramycin, 32 µg/ml; Amoxicillin/ Clavulanic Acid, 32 µg/ml; Cephalotin, 32 µg/ml; Chloramphenicol, 32 µg/ml; Ciprofloxacin, 0.125 µg/ml; Colistin, 16 µg/ml; Florfenicol, 32 µg/ml; Gentamicin, 16 µg/ml; Nalidixic Acid 32 µg/ml; Neomycin, 16 µg/ml; Sulfamethoxazole, 512 µg/ml; Spectinomycin, 128 µg/ml; Streptomycin, 32 µg/ml; Trimethoprim/Sulfamethoxazole, 4µg/ml; Tetrazyklin, 16 µg/ml; Ceftiofur, 8 µg/ml

Preventive measures in place

No specific 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

See: Salmonella spp. in pigs (2.1.3.A)

Recent actions taken to control the zoonoses

See: Salmonella spp. in pigs (2.1.3.A)

Suggestions to the Community for the actions to be taken

Currently no specific action necessary.

Measures in case of the positive findings or single cases

No measures.

Notification system in place

No notification system.

Results of the investigation

16 isolates from fattening pigs and 30 isolates from breeding pigs were available for susceptibility testing The highest proportions of resistant isolates were found for florfenicol, sulfamethoxazol, streptomycin, tetrazykline, ampicillin and spectinomycin, with prevalences between 10.0 – 37.5%.
Strains from fatting pigs showed higher proportions of resistance and only 37.5% of the isolates were fully sensitive for all tested antimicrobials whereas 53.3% of the isolates from breeding pigs were fully susceptible.

If epidemiological cut-off values are used only two isolates are resistant to florfenicol. With the old breakpoint 16 isolates seem to be resistant.

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

There were only 46 strains available for susceptibility testing and no comparable data is yet available to evaluate the national trend.

Relevance of the findings in animals to findings in foodstuffs and to human cases

Consumption of pork amounted to 25.1 kg per person in the year 2008. This corresponds to 47.1% of the total meat consumption. 90% of the consumed pork meat is domestically produced. Salmonella prevalence in slaughtered pigs is relatively low (2.3%). In general, the resistance situation of the Salmonella strains isolated from pigs in Switzerland is relatively favorable compared with results in other countries. Resistance was most frequently observed against

antimicrobials that have been used in food animals for many years, such as sulfonamides, tetracycline, streptomycin and ampicillin. Resistance against newer antimicrobials more critical for public health (fluoroquinolones, cephalosporins) was rare.

Additional information

See: Antibiotikaresistenzmonitoring 2008 - Jahresbericht on www.bvet.admin.ch

B. Antimicrobial resistance in Salmonella in foodstuff derived from poultry

Sampling strategy used in monitoring

Frequency of the sampling

Sampling in the framework of the baseline study. See: Salmonella spp. in broiler meat and products thereof (2.1.2.A)

Type of specimen taken

Neck skin. See: Salmonella spp. in broiler meat and products thereof (2.1.2.A)

Methods of sampling (description of sampling techniques)

See: Salmonella spp. in broiler meat and products thereof (2.1.2.A)

Procedures for the selection of isolates for antimicrobial testing

All positive Salmonella isolates were 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

See: Salmonella spp. in broiler meat and products thereof (2.1.2.A)

Laboratory used for detection for resistance

Antimicrobials included in monitoring

Ampicillin, Apramycin, Amoxicillin/Clavulanic Acid(2:1), Cephalotin, Chloramphenicol, Ciprofloxacin, Colistin, Florfenicol, Gentamicin, Nalidixic Acid, Neomycin, Sulfamethoxazole, Spectinomycin, Streptomycin, Trimethoprim/Sulfamethoxazole (1:19), Tetracyclin, Ceftiofur

Breakpoints used in testing

Ampicillin, 4 µg/ml; Apramycin, 32 µg/ml; Amoxicillin/ Clavulanic Acid, 32 µg/ml; Cephalotin, 32 µg/ml; Chloramphenicol, 32 µg/ml; Ciprofloxacin, 0.125 µg/ml; Colistin, 16 µg/ml; Florfenicol, 32 µg/ml; Gentamicin, 16 µg/ml; Nalidixic Acid 32 µg/ml; Neomycin, 16 µg/ml; Sulfamethoxazole, 512 µg/ml; Spectinomycin, 128 µg/ml; Streptomycin, 32 µg/ml; Trimethoprim/Sulfamethoxazole, 4µg/ml; Tetrazyklin, 16 µg/ml; Ceftiofur, 8 µg/ml

Preventive measures in place

No specific 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

See: Salmonella spp. in broiler meat and products thereof (2.1.2.A)

Recent actions taken to control the zoonoses

See: Salmonella spp. in broiler meat and products thereof (2.1.2.A)

Suggestions to the Community for the actions to be taken

Currently no specific action necessary.

Measures in case of the positive findings or single cases

No measures.

Notification system in place

No notification system.

Results of the investigation

10 isolates were tested, 4 of them were fully susceptible, 4 isolates showed resistance against one antimicrobial (1x ampicillin, 3x florfenicol), 1 against two (nalidixic acid, streptomycin) and 1 isolate against 5 antimicrobials (ampicillin, florfenicol, streptomycin, sulfamethoxazol, tetracyline).

If epidemiological cut-off values are used, all isolates are susceptible to Florfenicol. With the old breakpoint 4 isolates seem to be resistant.

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

Salmonella prevalence in Swiss broilers is low, therefore only a few strains were available for susceptibility testing. There are no comparable data available to estimate the national trend but compared with the results of the susceptibility testing of 24 Salmonella-strains isolated from imported broiler meat in 2007, the prevalence of antimicrobial resistance was significantly lower in the 10 the strains isolated in Swiss slaughterhouses.

Relevance of the findings in animals to findings in foodstuffs and to human cases

Consumption of poultry meat was 10.9 kg per person in 2008, which corresponds to 20.4% of total meat consumption. About 50% of the poultry meat consumed in Switzerland is imported. Salmonella prevalence and prevalence of antimicrobial resistance is relatively low in broilers of domestic production.

Additional information

See: Antibiotikaresistenzmonitoring 2008 - Jahresbericht on www.bvet.admin.ch

Table Antimicrobial susceptibility testing of Salmonella in animals

Salmonella spp.		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Turkeys		Gallus gallus (fowl) - laying hens		Gallus gallus (fowl) - broilers		Pigs - breeding animals - - faeces - Survey - EU baseline survey		Pigs - fattening pigs - - lymph nodes - Survey - EU baseline survey	
Isolates out of a monitoring program (yes/no)														yes		yes	
Number of isolates available in the laboratory														30		16	
Antimicrobials:		N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n
Aminoglycosides	Apramycin													30	0	16	0
	Gentamicin													30	0	16	0
	Neomycin													30	1	16	0
	Spectinomycin													30	5	16	2
	Streptomycin													30	6	16	5
Amphenicols	Chloramphenicol													30	3	16	2
	Florfenicol													30	10	16	6
Cephalosporins	Ceftiofur													30	1	16	0
	Cephalothin													30	1	16	0
Fluoroquinolones	Ciprofloxacin													30	2	16	0
Fully sensitive	Fully sensitive													30	16	16	6
Penicillins	Amoxicillin / Clavulanic acid													30	0	16	0
	Ampicillin													30	3	16	4
Polymyxins	Colistin													30	0	16	0
Quinolones	Nalidixic acid													30	1	16	0
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial													30	6	16	3
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials													30	1	16	2
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials													30	1	16	1

Table Antimicrobial susceptibility testing of Salmonella in animals

Salmonella spp.		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Turkeys		Gallus gallus (fowl) - laying hens		Gallus gallus (fowl) - broilers		Pigs - breeding animals - - faeces - Survey - EU baseline survey		Pigs - fattening pigs - - lymph nodes - Survey - EU baseline survey	
Isolates out of a monitoring program (yes/no)														yes		yes	
Number of isolates available in the laboratory														30		16	
Antimicrobials:		N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials													30	2	16	2
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials													30	4	16	2
Sulfonamides	Sulfamethoxazol													30	7	16	6
Tetracyclines	Tetracyclin													30	4	16	5
Trimethoprim + sulfonamides	Trimethoprim + Sulfamethoxazol													30	5	16	1

Table Antimicrobial susceptibility testing of Salmonella spp. in Pigs - fattening pigs - at slaughterhouse - animal sample - lymph nodes - Survey - EU baseline survey - quantitative data [Dilution method]

Salmonella spp.		Pigs - fattening pigs - - lymph nodes - Survey - EU baseline survey																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		16																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Apramycin	16	16	0									15		1											
	Gentamicin	8	16	0							16															
	Kanamycin		0	0																						
	Neomycin	8	16	0								16														
	Spectinomycin	64	16	2												2	7	5		2						
	Streptomycin	16	15	5									3		5	2	2	1	2							
Amphenicols	Chloramphenicol	16	16	2										2	12			1	1							
	Florfenicol	4	16	6										10	4	1		1								
Cephalosporins	3rd generation cephalosporins		0	0																						
	Ceftiofur	4	16	0						7		9														
	Cephalothin	16	16	0								1		12	3											
Fluoroquinolones	Ciprofloxacin	0.06	16	0			14	2																		
	Enrofloxacin		0	0																						
Penicillins	Amoxicillin / Clavulanic acid	16	16	0								12			3	1										
	Ampicillin	16	16	4							5		7					4								
Polymyxins	Colistin	8	16	0									16													
Quinolones	Nalidixic acid	16	16	0										16												
Sulfonamides	Sulfamethoxazol	256	16	6													10						6			
	Sulfonamide		0	0																						

Table Antimicrobial susceptibility testing of Salmonella spp. in Pigs - fattening pigs - at slaughterhouse - animal sample - lymph nodes - Survey - EU baseline survey - quantitative data [Dilution method]

Salmonella spp.		Pigs - fattening pigs - - lymph nodes - Survey - EU baseline survey																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		16																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Tetracyclines	Tetracyclin	8	16	5								9		2				5								
Trimethoprim	Trimethoprim		0	0																						
Trimethoprim + sulfonamides	Trimethoprim + Sulfamethoxazol	2	16	1							15					1										
	Trimethoprim + sulfonamides		0	0																						

Table Antimicrobial susceptibility testing of Salmonella spp. in Pigs - breeding animals - at farm - animal sample - faeces - Survey - EU baseline survey - quantitative data [Dilution method]

Salmonella spp.		Pigs - breeding animals - - faeces - Survey - EU baseline survey																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		30																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Apramycin	16	30	0									30													
	Gentamicin	8	30	0							28		1		1											
	Kanamycin		0	0																						
	Neomycin	8	30	1								29						1								
	Spectinomycin	64	30	5												4	21			5						
	Streptomycin	16	30	6									5		9	10	1	2	3							
Amphenicols	Chloramphenicol	16	30	3								1		2	24				3							
	Florfenicol	4	30	10										20	9		1									
Cephalosporins	3rd generation cephalosporins		0	0																						
	Ceftiofur	4	30	1						7		22				1										
	Cephalothin	16	30	1								1		15	10	3			1							
Fluoroquinolones	Ciprofloxacin	0.06	30	2			8	20	1			1														
	Enrofloxacin		0	0																						
Penicillins	Amoxicillin / Clavulanic acid	16	30	0								27		1	1	1										
	Ampicillin	16	30	3							14		13					3								
Polymyxins	Colistin	8	30	0									30													
Quinolones	Nalidixic acid	16	30	1										25		4	1									
Sulfonamides	Sulfamethoxazol	256	30	7													22		1				7			
	Sulfonamide		0	0																						

Table Antimicrobial susceptibility testing of Salmonella spp. in Pigs - breeding animals - at farm - animal sample - faeces - Survey - EU baseline survey - quantitative data [Dilution method]

Salmonella spp.		Pigs - breeding animals - - faeces - Survey - EU baseline survey																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		30																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Tetracyclines	Tetracyclin	8	30	4								7		18	1			4								
Trimethoprim	Trimethoprim		0	0																						
Trimethoprim + sulfonamides	Trimethoprim + Sulfamethoxazol	2	30	5							25					5										
	Trimethoprim + sulfonamides		0	0																						

Table Antimicrobial susceptibility testing of Salmonella spp. in food

Salmonella spp.		Meat from bovine animals		Meat from pig		Meat from broilers (Gallus gallus)		Meat from other poultry species	
Isolates out of a monitoring program (yes/no)						yes			
Number of isolates available in the laboratory						10			
Antimicrobials:		N	n	N	n	N	n	N	n
Aminoglycosides	Apramycin					10	0		
	Gentamicin					10	0		
	Neomycin					10	0		
	Spectinomycin					10	0		
	Streptomycin					10	2		
Amphenicols	Chloramphenicol					10	0		
	Florfenicol					10	4		
Cephalosporins	Ceftiofur					10	0		
	Cephalothin					10	0		
Fluoroquinolones	Ciprofloxacin					10	0		
Fully sensitive	Fully sensitive					10	4		
Penicillins	Amoxicillin / Clavulanic acid					10	0		
	Ampicillin					10	2		
Polymyxins	Colistin					10	0		
Quinolones	Nalidixic acid					10	1		
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial					10	4		
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials					10	1		
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials					10	0		
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials					10	0		
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials					10	1		

Table Antimicrobial susceptibility testing of Salmonella spp. in food

Salmonella spp.		**Meat from bovine animals**		**Meat from pig**		**Meat from broilers (Gallus gallus)**		**Meat from other poultry species**	
Isolates out of a monitoring program (yes/no)						yes			
Number of isolates available in the laboratory						10			
Antimicrobials:		**N**	**n**	**N**	**n**	**N**	**n**	**N**	**n**
Sulfonamides	**Sulfamethoxazol**					10	1		
Tetracyclines	**Tetracyclin**					10	1		
Trimethoprim + sulfonamides	**Trimethoprim + Sulfamethoxazol**					10	0		

Table Antimicrobial susceptibility testing of Salmonella spp. in fresh - Meat from broilers (Gallus gallus) - chilled - at slaughterhouse - animal sample - neck skin - Survey - EU baseline survey - quantitative data [Dilution method]

Salmonella spp.		Meat from broilers (Gallus gallus) - fresh - chilled - - neck skin - Survey - EU baseline survey																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		10																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Apramycin	16	10	0									10													
	Gentamicin	8	10	0							10															
	Kanamycin		0	0																						
	Neomycin	8	10	0								10														
	Spectinomycin	64	10	0													10									
	Streptomycin	16	10	2											4	4	1		1							
Amphenicols	Chloramphenicol	16	10	0											10											
	Florfenicol	4	10	4										6	4											
Cephalosporins	3rd generation cephalosporins		0	0																						
	Ceftiofur	4	10	0						1		9														
	Cephalothin	16	10	0									2	5	3											
Fluoroquinolones	Ciprofloxacin	0.06	10	0			2	8																		
	Enrofloxacin		0	0																						
Penicillins	Amoxicillin / Clavulanic acid	16	10	0								8			1	1										
	Ampicillin	16	10	2							3		5					2								
Polymyxins	Colistin	8	10	0									10													
Quinolones	Nalidixic acid	16	10	1										9			1									
Sulfonamides	Sulfamethoxazol	256	10	1													8			1			1			
	Sulfonamide		0	0																						

Table Antimicrobial susceptibility testing of Salmonella spp. in fresh - Meat from broilers (Gallus gallus) - chilled - at slaughterhouse - animal sample - neck skin - Survey - EU baseline survey - quantitative data [Dilution method]

Salmonella spp.		Meat from broilers (Gallus gallus) - fresh - chilled - - neck skin - Survey - EU baseline survey																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		10																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Tetracyclines	Tetracyclin	8	10	1								3		6				1								
Trimethoprim	Trimethoprim		0	0																						
Trimethoprim + sulfonamides	Trimethoprim + Sulfamethoxazol	2	10	0							10															
	Trimethoprim + sulfonamides		0	0																						

Table Breakpoints for antibiotic resistance testing

Test Method Used	
Disc diffusion	○
Agar dilution	○
Broth dilution	◉
E-test	○

Standards used for testing
NCCLS

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Apramycin**	Danmap	16		16	4	64				
	Gentamicin	CLSI	4	8	8	1	32				
	Neomycin	CLSI	8		8	2	32				
	Spectinomycin	Danmap	64		64	4	128				
	Streptomycin	Danmap	16		16	4	64				
Amphenicols	**Chloramphenicol**	CLSI	8	16	16	2	64				
	Florfenicol	ARBAO-II	2	4	4	2	64				
Cephalosporins	**Ceftiofur**	ARBAO-II	2	4	4	2	64				
	Cephalothin	CLSI	8	16	16	2	64				
Fluoroquinolones	**Ciprofloxacin**	EUCAST	0.03	0.06	0.06	0.03	4				
Penicillins	**Amoxicillin / Clavulanic acid**	CLSI	8	16	16	2	32				
	Ampicillin	CLSI	8	16	16	2	32				
Polymyxins	**Colistin**	Danmap	8		8	4	64				
Quinolones	**Nalidixic acid**	CLSI	16		16	8	128				

Table Breakpoints for antibiotic resistance testing

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Sulfonamides	**Sulfamethoxazol**	CLSI	256		256	64	1024				
Tetracyclines	**Tetracyclin**	CLSI	4	8	8	2	32				
Trimethoprim + sulfonamides	**Trimethoprim + Sulfamethoxazol**	CLSI	2		2	1	8				

Table Breakpoints for antibiotic resistance testing

Test Method Used	
Disc diffusion	○
Agar dilution	○
Broth dilution	◉
E-test	○

Standards used for testing
NCCLS

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Apramycin**	Danmap	16		16	4	64				
	Gentamicin	CLSI	4	8	8	1	32				
	Neomycin	CLSI	8		8	2	32				
	Spectinomycin	Danmap	64		64	4	128				
	Streptomycin	Danmap	16		16	4	64				
Amphenicols	**Chloramphenicol**	CLSI	8	16	16	2	64				
	Florfenicol	ARBAO-II	2	4	4	2	64				
Cephalosporins	**Ceftiofur**	ARBAO-II	2	4	4	0.5	8				
	Cephalothin	CLSI	8	16	16	2	64				
Fluoroquinolones	**Ciprofloxacin**	EUCAST	0.03	0.06	0.06	0.03	4				
Penicillins	**Amoxicillin / Clavulanic acid**	CLSI	8	16	16	2	32				
	Ampicillin	CLSI	8	16	16	2	32				
Polymyxins	**Colistin**	Danmap	8		8	4	64				
Quinolones	**Nalidixic acid**	CLSI	16		16	8	128				

Table Breakpoints for antibiotic resistance testing

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Sulfonamides	**Sulfamethoxazol**	CLSI	256		256	64	1024				
Tetracyclines	**Tetracyclin**	CLSI	4	8	8	2	32				
Trimethoprim + sulfonamides	**Trimethoprim + Sulfamethoxazol**	CLSI	2		2	1	8				

2.2 CAMPYLOBACTERIOSIS

2.2.1 General evaluation of the national situation

A. Thermophilic Campylobacter general evaluation

History of the disease and/or infection in the country

Campylobacteriosis in humans is a notifiable disease. Laboratories have to report cases within one week of Campylobacter spp. being detected (ordinance of the FDHA on doctor and laboratory reporting). Since 1995 campylobacteriosis is the main food-associated infection in Switzerland. After reaching a peak in 2000 with 105,1 reports per 100,000 inhabitants the incidence declined steadily until 2005, but always remained over 70 reports per 100,000 inhabitants. Depart from 2006 the campylobacteriosis cases are rising again. C. jejuni has always been the most isolated species in humans.

Campylobacteriosis is an animal disease to be monitored (TSV, Article 5), i.e. the suspicion of occurrence of such a disease must be reported to the cantonal veterinarian. In general, campylobacteriosis cases reported to the FVO by cantonal veterinarians in animals are low (between 2 and 15 cases per year) with highest numbers in 1999, 2004 and 2008. From 1991 until 2008 70 campylobacteriosis cases were reported which occurred in dogs (37), cattle (21), cats (7), sheep (2), chicken (1), monkeys (1) and pigs (1). Thus 63% of the cases concerned dogs and cats and 30% cattle. Diseased cattle were mainly reported from 1996 to 2003 with a peak of 9 campylobacteriosis cases in 1999.

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

In 2008 the campylobacteriosis cases in humans increased significantly compared to previous years and climbed over 100 reports per 100,000 inhabitants. However, the incidence of 101.5 per 100,000 inhabitants was still lower than the last peak in 2000 with 105,1 reports per 100,000 inhabitants. 53% of the cases were caused by C. jejuni, 3% by C. coli and in 35% either by C. jejuni or C. coli (no further differentiation was done). Other species such as C. fetus (23 cases) or C. lari (2 cases) were detected very rarely and in 9% the causing species remained unknown.

In animals, 12 cases of campylobacteriosis were reported to the FVO by cantonal veterinarians in 2008 (11 in dogs and 1 in cattle).
Furthermore, in veterinary diagnostic laboratories 2822 tests for campylobacteriosis were carried out in the context of clinical investigations in 2008, mainly in dogs (1379) and cats (930), but also in cattle (267), “other animals” (76), birds (57), horses (42), goats (17), sheep (14), pigs (8), hares

(19), alpacas (5), wild animals (5) and fur animals (3). 88 animals were tested positive for Campylobacter (dogs (48), cattle (20), cats (11), “other animals” (3), birds (2), sheep (1), goat (1), horse (1), and wild animal (1)).

In 2008 the monitoring programme for antibiotic resistance concerning Campylobacter in poultry was included in the baseline study on the prevalence and antimicrobial resistance of Campylobacter spp. in broiler flocks and on the prevalence of Campylobacter spp. and Salmonella spp. in broiler carcasses.

Furthermore, in 2008 campylobacter in cattle was analysed in the surveillance programme for antibiotic resistance likewise in 2006. Between February und April 2008 faecal samples were collected from 100 cattle just before slaughter at the biggest cattle slaughter house in Switzerland. The number of positive samples decreased slightly from 14% in 2006 to 10% in 2008. In both years only C. jejuni was detected. More information can be found in the chapter “Antimicrobial resistance in Campylobacter jejuni and coli in foodstuff derived from cattle”.

A study in broiler meat at retail in 2007 showed, that campylobacter is found in 43,7% of the available poultry products. Products originating from Switzerland had a slightly higher prevalence than the imported products (45.7 versus 41.1%). In ¾ of the cases C. jejuni and in ¼ C. coli was found.

The baseline study on the prevalence and antimicrobial resistance of Campylobacter spp. in broiler flocks and on the prevalence of Campylobacter spp. and Salmonella spp. in broiler carcasses carried out in 2008 resulted in a positive proportion of 60% in broiler flocks in the period May until December 2008 and a prevalence of Campylobacter in broiler carcasses of 70% for a qualitative and 52% for a quantitative approach.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases

Campylobacteriosis occurs most commonly in young adults (20-29 years). Infants, especially those aged 0-4 years, are the second most commonly affected group and thus, like young adults, are at above-average risk of contracting campylobacteriosis. It is suspected 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.

Recent actions taken to control the zoonoses

The results of the baseline study on the prevalence and antimicrobial resistance of Campylobacter spp. in broiler flocks and on the prevalence of Campylobacter spp. and Salmonella spp. in broiler carcasses will be the basis for implementing

adequate control programs within the next few years. An important approach to control the rate of infection in humans is the reduction of the colonisation of broilers by Campylobacter.

Additional information

1. Imported poultry meat from third countries is controlled by the border veterinarian service and randomly sampled for Campylobacter and Salmonella. The number of meat products analysed including their results can be found in the relevant chapters.
2. The industry takes responsibility for the surveillance of poultry meat production in a system of self-auditing. More information can be found in the relevant chapters.
3. Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

2.2.2 Campylobacteriosis in humans

Table Campylobacter in humans - Species/serotype distribution

Campylobacter	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.	Unknown status
	4370	0	0	0	0	0	0
C. coli	223						
C. jejuni	4147						

Table Campylobacter in humans - Age distribution

Age Distribution	C. coli			C. jejuni			Campylobacter spp., unspecified		
	All	M	F	All	M	F	All	M	F
Age unknown	223			4174			3420		
Total:	223	0	0	4174	0	0	3420	0	0

Table Campylobacter in humans - Seasonal distribution

Month	C. coli	C. jejuni	Campylobacter spp., unspecified
	Cases	Cases	Cases
not known	223	4174	7817
Total:	223	4174	7817

2.2.3 Campylobacter in foodstuffs

A. Thermophilic Campylobacter in Broiler meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

Baseline study on the prevalence and antimicrobial resistance of Campylobacter spp. in broiler flocks and on the prevalence of Campylobacter spp. and Salmonella spp. in broiler carcasses referring to the Commission Regulation (EC) No. 2160/2003 and Commission Decision 2007/516/EC. In total 408 carcasses were tested in a stratified and randomized sample scheme from 01.01.2008 until 31.12.2008.

Frequency of the sampling

At slaughterhouse and cutting plant

Sampling distributed evenly throughout the year

Type of specimen taken

At slaughterhouse and cutting plant

neck skin

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

At least 27g (neck) skin of one carcass of the same flock of which caecal samples were taken were collected immediately after chilling but before processing.

Definition of positive finding

At slaughterhouse and cutting plant

Bacterial growth and identification by interpretation of gram staining, oxidase-katalyse-tests and hippurat- and indoxylacetate-hydrolysis.

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

According to ISO 10272-1: 2006.

Preventive measures in place

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

Control program/mechanisms

The control program/strategies in place

At present there is no control program in place. However, as soon as the EU sets a target for Campylobacter in broilers a control program to reach this target

will be implemented in Switzerland as well.

Results of the investigation

286 from the 408 carcasses (70%) were qualitative Campylobacter positive. These positive samples were further characterized and 68% were found to be positive for C. jejuni, 25% for C. coli and in 7% of the positive samples both types could be detected. Furthermore, a quantitative approach was conducted. Here, 212 from the 408 carcasses (52%) were quantitative Campylobacter positive, from which 67% were C. jejuni, 26% were C. coli and again in 7% of the positive samples both types could be detected.

Additional information

1. Imported poultry meat from third countries is controlled by the border veterinarian service (2008 in total 19 698 tons were imported mainly from Brazil (96%) and the remaining 4% from Argentina, Israel and Chile) and randomly sampled for Campylobacter and Salmonella. To test for Campylobacter spp., 38 samples (20 from Brazil and 18 from Argentina) were taken in 2008. All samples were Campylobacter negative.
2. The industry takes responsibility for the surveillance of poultry meat production in a system of self-auditing. Results of the Campylobacter surveillance of the largest poultry producers and abattoirs are available covering more than 90% of the production. Samples are taken several times a year at random. Next to the domestic production, also imported fresh poultry meat, poultry meat preparations and poultry meat products were tested at different stages such as slaughterhouse, cutting plant and processing plant (see Campylobacter poultry meat table). In total 1501 tests were done (including single as well as pooled samples) of which 450 proved positive for Campylobacter (C. jejuni (134), C. coli (10), unspecified (306)). The poultry industry made a special remark for 170 unspecified Campylobacter spp. to be imported fresh poultry meat.
3. Swiss zoonoses report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

Table Campylobacter in poultry meat

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for thermophilic Campylobacter spp.	C. coli	C. jejuni	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Meat from broilers (Gallus gallus) - carcass - - neck skin - Survey - EU baseline survey (1 carcass per flock) [1)]	FVO	animal	27g	408	286	92	214			
Meat from broilers (Gallus gallus) - fresh - at cutting plant - Surveillance - HACCP and own checks	poultry	single	10g	89	37		36			1
Meat from broilers (Gallus gallus) - fresh - at processing plant - Surveillance - HACCP and own checks [2)]	poultry	single	10g/25g	424	209					209
Meat from broilers (Gallus gallus) - fresh - at slaughterhouse - Surveillance - HACCP and own checks [3)]	poultry	single	10g/25g	243	134	10	74			50
Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - at processing plant - Surveillance - HACCP and own checks	poultry	single	10	122	34		13			21
Meat from broilers (Gallus gallus) - meat products - cooked, ready-to-eat - at processing plant - Surveillance - HACCP and own checks [4)]	poultry	batch	25g	456	0					
Meat from turkey - fresh - at cutting plant - Surveillance - HACCP and own checks	poultry	single	10g	25	10					10
Meat from turkey - fresh - at processing plant - Surveillance - HACCP and own checks	poultry	single	10g	89	23		8			15
Meat from turkey - fresh - at slaughterhouse - Surveillance - HACCP and own checks	poultry	single	10g	24	1		1			
Meat from turkey - meat preparation - intended to be eaten cooked - at processing plant - Surveillance - HACCP and own checks	poultry	single	10g	25	1		1			
Meat from turkey - minced meat - intended to be eaten cooked - at processing plant - Surveillance - HACCP and own checks	poultry	single	10g	4	1		1			

Table Campylobacter in poultry meat

Comments:

[1)] From the 286 positive results in the qualitative approach, 72 were C. coli, 194 C. jejuni and 20 were C. coli and C.jejuni. Furthermore, in the quantitative approach 212 of the 408 samples were positive (143 C. jejuni, 55 C. coli and 14 both C. jejuni and C. coli.

[2)] 319 of the 424 samples were imported poultry meat of which 170 were Campylobacter positive.

[3)] 97 positive of 163 single samples and 34 positive of 80 pooled samples

[4)] 5 samples were pooled

2.2.4 Campylobacter in animals

A. Thermophilic Campylobacter in Gallus gallus

Monitoring system

Sampling strategy

Baseline study on the prevalence and antimicrobial resistance of Campylobacter spp. in broiler flocks and on the prevalence of Campylobacter spp. and Salmonella spp. in broiler carcasses referring to the Commission Regulation (EC) No. 2160/2003 and Commission Decision 2007/516/EC. In total 412 caecal samples were collected in a stratified and randomized sample scheme. However, from January to April 2008 unfortunately the investigations of the caecal samples didn't give valid results for Campylobacter. The reason was an additional enrichment step in the preparation of the samples in the laboratory used at that time. The procedure was changed as soon as the problem was identified and thus results from May ongoing were reliable.

Frequency of the sampling

At slaughter

Due to invalid results from January to April, results of the sampling were no longer distributed evenly throughout the year. The 296 valid samples were collected from May to December 2008 at 5 abattoirs representing more than 95% of the Swiss broiler production.

Type of specimen taken

At slaughter

caecal samples

Methods of sampling (description of sampling techniques)

At slaughter

In total 10 intact and full caeca (one each from 10 different broilers) per slaughter batch were collected at the time of evisceration.

Case definition

At slaughter

Bacterial growth and identification by interpretation of gram staining, oxidase-katalyse-tests and hippurat- and indoxylacetate-hydrolysis.

Diagnostic/analytical methods used

At slaughter

At the laboratory, caecal contents were aseptically removed and pooled to one composite sample. Direct culture was carried out on a selective medium suitable for Campylobacter (m CCDA as well as Campylosel). Identification of Campylobacter was carried out according to ISO 10272-1: 2006.

Vaccination policy

No vaccination available.

Other preventive measures than vaccination in place

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

Measures in case of the positive findings or single cases

Mandatory notification; no measures are taken.

Notification system in place

Campylobacteriosis is a notifiable disease in animals according to Swiss ordinance of epizootics (TSV, Art. 5).

Results of the investigation

176 of the 296 samples tested in 2008 in the frame of the baseline study on the prevalence and antimicrobial resistance of Campylobacter spp. in broiler flocks were Campylobacter positive of which 68% were C. jejuni and 32% were C. coli. The raw proportion of positive findings in the period May until December is thus 60%.

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

Since 2002 the raw proportions of Campylobacter spp. in broiler production was evaluated in the national antimicrobial resistance monitoring programme. Samples were not taken evenly distributed throughout the year but roughly from February until May. In 2002 42% of the cloacal samples were positive followed by a stable period from 2003 until 2005 with roughly 25% positive samples (2006: 26%; 2005: 23%; 2004: 26%; 2003: 25%). In 2007 the level of 2002 was reached again 43% positive results. The findings in the baseline study indicate that it is important to distribute samples evenly throughout the year as the season does have an impact on the results. It is expected that the 60% Campylobacter prevalence obtained from the sampling from May until December are overestimated as four months with an anticipated lower raw proportion of positive results could not be considered. However, it seems that the prevalence of Campylobacter is higher than expected until now, especially during the summer months July and August.

Additional information

Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

Table Campylobacter in animals

	Source of information	Sampling unit	Units tested	Total units positive for thermophilic Campylobacter spp.	C. coli	C. jejuni	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Alpacas - Clinical investigations	ILD	animal	5	0					
Birds - Clinical investigations	ILD	animal	53	2					2
Cats - Clinical investigations	ILD	animal	929	11					11
Cattle (bovine animals) - meat production animals - - faeces - Monitoring - official sampling - objective sampling	National	animal	100	10		10			
Cattle (bovine animals) - unspecified - Clinical investigations	ILD	animal	267	20					20
Dogs - Clinical investigations	ILD	animal	1366	47					47
Fur animals - Clinical investigations	ILD	animal	3	0					
Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey [1)]	FVO	flock	296	176	56	120			
Goats - Clinical investigations	ILD	animal	17	1					1
Hares - Clinical investigations	ILD	animal	19	0					
Other animals - Clinical investigations	ILD	animal	76	3					3
Pigs - Clinical investigations	ILD	animal	8	0					
Sheep - Clinical investigations	ILD	animal	14	1					1
Solipeds, domestic - Clinical investigations	ILD	animal	42	1					1
Wild animals - Clinical investigations	ILD	animal	5	1					1

Comments:

[1)] 10 caeca per flock. Valid results from May until December 2008.

Footnote:

ILD = "Informationssystem Labordiagnostik in der Schweiz" (information system of laboratory diagnostics)

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

As a part of the permanent national monitoring scheme for antimicrobial resistance in Swiss food-producing animals 100 cattle were sampled from October to December 2008 at a major abattoir. Slaughter groups were randomly selected, one animal per group was included in the monitoring.

Type of specimen taken

Fecal samples.

Methods of sampling (description of sampling techniques)

The samples were taken from the colon along the slaughter line after the evisceration of the carcasses using a swab in standard transportation medium (Transport Swabs, Oxoid TS0001A, AMIES W/O CH). Immediately after collection, the samples were cooled and brought 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. Enrichment of bacteria during 24h at 43°C with Campylobacter Enrichment Broth (Biolife) and cultivation on Campylosel agar plates (bioMérieux, France).

Laboratory used for detection for resistance

Antimicrobials included in monitoring

Ampicillin, Amoxicillin/Clavulanic acid, Chloramphenicol, Ciprofloxacin, Erythromycin, Florfenicol, Gentamicin, Meropenem, Nalidixic acid, Neomycin, Streptomycin, Tetracycline

Breakpoints used in testing

Resistance was defined following the breakpoints published in approved literature (ARBAO-II 2005, CLSI M7-A6 and M100-S15, DANMAP 2004 and FDA 2002): Ampicillin, 32 µg/ml; Amoxicillin/Clavolanic acid, 32 µg/ml; Chloramphenicol, 32 µg/ml; Ciprofloxacin, 4 µg/ml; Erythromycin, 32 µg/ml; Florfenicol, 32 µg/ml; Gentamicin, 16 µg/ml; Meropenem, 16

µg/ml; Nalidixic acid, 64 µg/ml; Neomycin, 16 µg/ml; Streptomycin, 16 µg/ml; Tetracycline, 16 µg/ml

Preventive measures in place

No specific preventive measures for antimicrobial resistance in campylobacter. 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

-

Suggestions to the Community for the actions to be taken

Currently no specific action necessary.

Measures in case of the positive findings or single cases

No measures.

Notification system in place

No notification system.

Results of the investigation

10 Campylobacter jejuni strains were isolated and submitted to susceptibility testing. Only one isolate was resistant against ampicillin, all other isolates were fully susceptible to all tested antimicrobials.

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

The data on resistance of Campylobacter in adult cattle needs to be interpreted with caution, because only 10 isolates were available for susceptibility testing. Compared with the situation in 2006 the occurrence of resistance seems to have decreased.

Relevance of the findings in animals to findings in foodstuffs and to human cases

Consumption of beef amounted to 11.3 kg per person in the year 2008. This corresponds to 21.2% of the total meat consumption. Campylobacter in cattle has a relatively low prevalence (10%), which is further reduced during meat processing. Prevalence of resistance in Campylobacter of adult cattle is low, too. Therefore beef is likely to be of minor relevance as a source of resistant Campylobacter for humans.

Additional information

See: Antibiotikaresistenzmonitoring 2008 - Jahresbericht on www.bvet.admin.ch

B. Antimicrobial resistance in Campylobacter jejuni and coli in poultry

Sampling strategy used in monitoring

Frequency of the sampling

Sampling in the framework of the baseline study. See: Thermophilic Campylobacter in Gallus gallus (2.2.3.A)

Type of specimen taken

Caecal samples. See: Thermophilic Campylobacter in Gallus gallus (2.2.3.A)

Methods of sampling (description of sampling techniques)

See: Thermophilic Campylobacter in Gallus gallus (2.2.3.A)

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 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

See: Thermophilic Campylobacter in Gallus gallus (2.2.3.A)

Laboratory used for detection for resistance

Antimicrobials included in monitoring

Ampicillin, Amoxicillin/Clavulanic acid, Chloramphenicol, Ciprofloxacin, Erythromycin, Florfenicol, Gentamicin, Meropenem, Nalidixic acid, Neomycin, Streptomycin, Tetracyclin

Breakpoints used in testing

Resistance was defined following the breakpoints published in approved literature (ARBAO-II 2005, CLSI M7-A6 and M100-S15, DANMAP 2004 and FDA 2002): Ampicillin, 32 µg/ml; Amoxicillin/Clavulanic acid, 32/16 µg/ml; Chloramphenicol, 32 µg/ml; Ciprofloxacin, 4 µg/ml; Erythromycin, 32 µg/ml; Florfenicol, 32 µg/ml; Gentamicin, 16 µg/ml; Meropenem, 16 µg/ml; Nalidixic acid, 64 µg/ml; Neomycin, 16 µg/ml; Streptomycin, 16 µg/ml; Tetracycline, 16 µg/ml

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

See: Thermophilic Campylobacter in Gallus gallus (2.2.3.A)

Recent actions taken to control the zoonoses

See: Thermophilic Campylobacter in Gallus gallus (2.2.3.A)

Suggestions to the Community for the actions to be taken

Currently no specific action necessary.

Measures in case of the positive findings or single cases

No measures.

Notification system in place

No notification system.

Results of the investigation

115 C. jejuni and 50 C. coli isolates from broilers were subjected to susceptibility testing.

The highest proportions of resistant isolates were found for ciprofloxacin, nalidixic acid, tetracycline and ampicillin with prevalences between 13 – 19.1 %. For C. coli additionally relatively high levels of resistance for streptomycin (32%) could be detected.

69.6 % of the C. jejuni isolates and 56 % 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. Since then different trends can be observed for different antimicrobials. Prevalence of resistance is constantly low for erythromycin, amoxicillin and gentamicin. After a decrease in 2007, the prevalence of resistance to ampicillin and streptomycin increased again to slightly over 10%. The occurrence of resistance to tetracycline and ciprofloxacin is not significantly different from last year.

Relevance of the findings in animals to findings in foodstuffs and to human cases

Consumption of poultry meat was 10.9 kg per person in 2008, which corresponds to 20.4% of total meat consumption. About 50% of the poultry meat consumed in Switzerland is imported (38.7 % from Brazil, 21.6% from Germany, 10.5% from France, 9.4% from Hungary 4.1% from Italy, and 15.7 from different other countries). 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 the favorable resistance situation in campylobacter in broilers. In addition to Swiss broiler meat production, imported poultry meat should be monitored for antimicrobial resistance. A survey performed in 2002 and in 2007 showed a higher prevalence of resistance in

imported poultry meat compared to Swiss production.

Additional information

See: Antibiotikaresistenzmonitoring 2008 - Jahresbericht on www.bvet.admin.ch

Table Antimicrobial susceptibility testing of C. coli in broilers - Gallus gallus (fowl) - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey - quantitative data [Dilution method]

C. coli		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		50																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	8	50	0					38		12														
	Neomycin	8	50	0							48		1	1											
	Streptomycin	8	50	16							32		2			5	5	2	4						
Amphenicols	Chloramphenicol	16	50	0							1		11	20	17	1									
	Florfenicol	16	50	0						2		11	22	15											
Carbapenems	Meropenem	8	50	0					49			1													
Fluoroquinolones	Ciprofloxacin	2	50	9				12	24	5				2		5	2								
Macrolides	Erythromycin	16	50	2					10		14	6	15	3				2							
Penicillins	Amoxicillin / Clavulanic acid	16	50	0							1	10	17	20	2										
	Ampicillin	16	50	2						2			3	16	15	12	1	1							
Quinolones	Nalidixic acid	32	50	9									1	18	19	3			6	3					
Tetracyclines	Tetracyclin	8	50	6					4		17	18	3		2		2	4							

Table Antimicrobial susceptibility testing of C. coli - qualitative data

C. coli		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey	
Isolates out of a monitoring program (yes/no)		yes	
Number of isolates available in the laboratory		50	
Antimicrobials:		N	n
Aminoglycosides	Gentamicin	50	0
	Neomycin	50	0
	Streptomycin	50	16
Amphenicols	Chloramphenicol	50	0
	Florfenicol	50	0
Carbapenems	Meropenem	50	0
Fluoroquinolones	Ciprofloxacin	50	9
Fully sensitive	Fully sensitive	50	28
Macrolides	Erythromycin	50	2
Penicillins	Amoxicillin / Clavulanic acid	50	0
	Ampicillin	50	2
Quinolones	Nalidixic acid	50	9
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	50	11
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	50	4
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials	50	3

Table Antimicrobial susceptibility testing of C. coli - qualitative data

C. coli		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey	
Isolates out of a monitoring program (yes/no)		yes	
Number of isolates available in the laboratory		50	
Antimicrobials:		N	n
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials	50	4
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials	50	0
Tetracyclines	Tetracyclin	50	6

Table Antimicrobial susceptibility testing of C. jejuni in Cattle (bovine animals) - meat production animals - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

C. jejuni		Cattle (bovine animals) - meat production animals - - faeces - Monitoring - official sampling - objective sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		10																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	8	10	0					10																
	Neomycin	8	10	0							9		1												
	Streptomycin	8	10	0							9		1												
Amphenicols	Chloramphenicol	16	10	0							1		5	4											
	Florfenicol	16	10	0								5	5												
Carbapenems	Meropenem	8	10	0					10																
Fluoroquinolones	Ciprofloxacin	2	10	0				2	8																
Macrolides	Erythromycin	16	10	0					1		9														
Penicillins	Amoxicillin / Clavulanic acid	16	10	0								7	3												
	Ampicillin	16	10	1									1	8				1							
Quinolones	Nalidixic acid	32	10	0										10											
Tetracyclines	Tetracyclin	8	10	0					4		6														

Table Antimicrobial susceptibility testing of C. jejuni - qualitative data

C. jejuni		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey		Cattle (bovine animals) - meat production animals - - faeces - Monitoring - official sampling - objective sampling	
Isolates out of a monitoring program (yes/no)		yes		yes	
Number of isolates available in the laboratory		115		10	
Antimicrobials:		N	n	N	n
Aminoglycosides	Gentamicin	115	0	10	0
	Neomycin	115	0	10	0
	Streptomycin	115	2	10	0
Amphenicols	Chloramphenicol	115	1	10	0
	Florfenicol	115	0	10	0
Carbapenems	Meropenem	115	0	10	0
Fluoroquinolones	Ciprofloxacin	115	21	10	0
Fully sensitive	Fully sensitive	115	80	10	9
Macrolides	Erythromycin	115	0	10	0
Penicillins	Amoxicillin / Clavulanic acid	115	0	10	0
	Ampicillin	115	15	10	1
Quinolones	Nalidixic acid	115	21	10	0
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	115	11	10	1
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	115	10	10	0
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials	115	5	10	0

Table Antimicrobial susceptibility testing of C. jejuni - qualitative data

C. jejuni		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey		Cattle (bovine animals) - meat production animals - - faeces - Monitoring - official sampling - objective sampling	
Isolates out of a monitoring program (yes/no)		yes		yes	
Number of isolates available in the laboratory		115		10	
Antimicrobials:		N	n	N	n
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials	115	9	10	0
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials	115	0	10	0
Tetracyclines	Tetracyclin	115	22	10	0

Table Antimicrobial susceptibility testing of C. jejuni in broilers - Gallus gallus (fowl) - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey - quantitative data [Dilution method]

C. jejuni		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		115																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	8	115	0					113		2														
	Neomycin	8	115	0							114		1												
	Streptomycin	8	115	2							112		1			2									
Amphenicols	Chloramphenicol	16	115	1							2		63	44	4	1			1						
	Florfenicol	16	115	0						1		44	63	7											
Carbapenems	Meropenem	8	115	0					115																
Fluoroquinolones	Ciprofloxacin	2	115	21			3	45	38	7	1				6	11	4								
Macrolides	Erythromycin	16	115	0					22		69	20	4												
Penicillins	Amoxicillin / Clavulanic acid	16	115	0					1		3	59	49	3											
	Ampicillin	16	115	15						2		2	11	67	17	1	6	9							
Quinolones	Nalidixic acid	32	115	21									7	75	12				7	14					
Tetracyclines	Tetracyclin	8	115	22					19		67	7					2	20							

Table Breakpoints used for antimicrobial susceptibility testing

Test Method Used	
Disc diffusion	○
Agar dilution	○
Broth dilution	◉
E-test	○

Standards used for testing
NCCLS

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Gentamicin**	ARBAO-II	8		8	0.25	32				
	Neomycin	ARBAO-II	8		8	1	64				
	Streptomycin	ARBAO-II	8		8	1	64				
Amphenicols	**Chloramphenicol**	ARBAO-II	16		16	1	64				
	Florfenicol		16		16	0.5	64				
Carbapenems	**Meropenem**	FDA 2002	4	8	8	0.25	32				
Fluoroquinolones	**Ciprofloxacin**	ARBAO-II	2		2	0.03	16				
Macrolides	**Erythromycin**	ARBAO-II	16		16	0.25	32				
Penicillins	**Amoxicillin / Clavulanic acid**	ARBAO-II	16		16	0.25	32				
	Ampicillin	ARBAO-II	16		16	0.5	32				
Quinolones	**Nalidixic acid**	ARBAO-II	32		32	1	128				
Tetracyclines	**Tetracyclin**	ARBAO-II	8		8	0.25	32				

2.3 LISTERIOSIS

2.3.1 General evaluation of the national situation

A. Listeriosis general evaluation

History of the disease and/or infection in the country

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

Listeriosis in animals falls into the category of animal diseases to be monitored (TSV, Article 5), i.e. the suspicion or occurrence of such a disease must be reported to the cantonal veterinarian. From 1991 until 2008 303 listeriosis cases were reported to the FVO by cantonal veterinarians which occurred in cattle (112), sheep (107), goats (64), chicken (5), “other animals” (4), wild birds (2), foxes (2), deer (2), monkeys (1), rabbits (1), donkeys (1), pigs (1) and cats (1). From 1991 until 1995 never more than 3 cases of listeriosis were reported. Most cases occurred in the time period 1999 until 2004 with cases between 27 to 34 per year. Since 2005 until today listeriosis cases seem to be stable with roughly 20 cases per year. The only exception was 2007 where cases were very low, namely 6 listeriosis cases only. It is not known whether there really were far fewer cases of listeriosis among animals in 2007, or whether more cases went undetected or unreported.

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

After a significant increase in human listeriosis cases in 2005 and 2006 registered by the Federal Office of Public Health and/or the Centre National de Référence des Listérias (CNRL) the number of reported cases in 2007 fell back to the level of 2004 (58 cases) and in 2008 declined further to 45 cases. The people mainly affected are babies less than one year old and also people aged over 60. However, 2008 was the first year in which no cases in newborns were reported. The incidence decreased thus from 1,0 in 2006 to 0,8 in 2007 and 0,6 in 2008 per 100,000 inhabitants. There was no food-borne outbreak reported due to Listeria.

In animals, the number of listeriosis cases reported to the FVO by cantonal veterinarians in 2008 reached again the level of 2005 and 2006 with 19 cases (12 in sheep, 4 in goats and 3 in cattle) after having far less reported listeriosis cases in animals in 2007 than the years before.

Furthermore, in veterinary diagnostic laboratories 77 tests for listeriosis were carried out in the context of clinical investigations in 2008, mainly in sheep (27), cattle (26) and goats (13). 41 animals (23 sheep, 10 cattle, 7 goats and 1 cat) were positive for Listeria due to either detection of antigen or histological changes characteristic of listeriosis.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases

The afore-mentioned outbreaks indicate that milk products and cheeses seem to be a major source of infection. Monitoring the occurrence of Listeria at different stages in the food chain is extremely important to prevent infections with contaminated food.

Recent actions taken to control the zoonoses

In the dairy industry, a Listeria Monitoring Programme (LMP) has been set up by the research institute of Agroscope Liebefeld-Posieux (ALP) with which contaminations can be rapidly identified. Products are tested for Listeria at ALP as part of quality assurance programmes. By taking part in the LMP, customers provide important evidence to ensure compliance with legal requirements (CH law and EU hygiene regulations). Unfortunately data from 2008 are not yet available. In 2007, a total of 4373 samples were tested for Listeria as part of the LMP. Seventy-six samples (1.6%) - namely 3 milk, 2 butter, 6 hard cheese, 38 semi-hard cheese samples and 27 environmental samples - proved positive for Listeria monocytogenes. Most of the cheese samples showed contamination of the cheese surface. Only in 2 samples of semi-hard cheese did the body of the cheese contain L. monocytogenes. While Listeria of various species were detected in a further 168 samples (3.8%), the bacteria involved were not Listeria

monocytogenes – which is the only Listeria species that can be pathogenic to humans. This result, designated in the test report as “other Listeria”, serves as an important warning to the producers and should sensitise those responsible to check production processes and to urge increased vigilance among staff.
In addition, a Listeria Advisory Team is provided by the ALP. The team can be called in for planning and consultation in partial or total decontamination of facilities enabling businesses to return to the market. The team further provides a checkup of companies safety concepts for any weaknesses or deficits. An evaluation of the last 12 years showed that consultations by the ALP Listeria Advisory Team are having a sustainable impact: in 85% of cases, the measures taken proved successful over the subsequent years of operation.

Additional information

Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

2.3.2 Listeriosis in humans

Table Listeria in humans - Species/serotype distribution

Listeria	Cases	Cases Inc.
	44	0
L. monocytogenes	44	

Table Listeria in humans - Age distribution

Age Distribution	L. monocytogenes		
	All	M	F
Age unknown	44		
Total:	44	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-

Monitoring system

Sampling strategy

In a national monitoring programme producers of cheese and other milk products from all over Switzerland are inspected by official food control on a regular basis. On the occasion of the inspection samples are taken of all dairy products at the end of the production lane. Enterprises to be sampled are selected randomly.

Frequency of the sampling

At the production plant

Selected enterprises are visited once a year.

Type of specimen taken

At the production plant

Specimens are taken from soft and semi soft cheeses made from cow milk (25 g) at the end of the production, before it is sold to the trader or to the consumer.

Methods of sampling (description of sampling techniques)

At the production plant

A single sample of one cheese is taken.

Definition of positive finding

At the production plant

Analysis is done in 25 grams of cheese. Growth in microbiological culture and identification of Listeria monocytogenes (> 100 per g).

Diagnostic/analytical methods used

At the production plant

Detection of Listeria monocytogenes according to the descriptions of the Swiss Food Manual 2005 (Chapter 56) that corresponds to ISO 11290-1 (2002) with minor deviation.

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.

Notification system in place

Cantonal food authorities are obliged to report positive cases to the FOPH.

Results of the investigation

578 samples were tested, two of them (0,3%) were positive.

Table Listeria monocytogenes in milk and dairy products

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for L.monocytogenes	Units tested with detection method	Listeria monocytogenes presence in x g	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 pasteurised milk - at processing plant - Monitoring - official sampling - objective sampling	National	single	25g	126	0	126	0	0		
Cheeses made from cows' milk - soft and semi-soft - made from raw or low heat-treated milk - at processing plant - Monitoring - official sampling - objective sampling	National	single	25g	394	2	394	2	0		
Cheeses made from goats' milk - soft and semi-soft - made from pasteurised milk - at processing plant - Monitoring - official sampling - objective sampling	National	single	25g	12	0	12	0	0		
Cheeses made from goats' milk - soft and semi-soft - made from raw or low heat-treated milk - at processing plant - Monitoring - official sampling - objective sampling	National	single	25g	46	0	46	0	0		

2.3.4 Listeria in animals

Table Listeria in animals

	Source of information	Sampling unit	Units tested	Total units positive for Listeria spp.	L. monocytogenes	Listeria spp., unspecified
Alpacas - Clinical investigations	ILD	animal	2	0		
Birds - Clinical investigations	ILD	animal	1	0		
Cats - Clinical investigations	ILD	animal	2	1		1
Cattle (bovine animals) - Clinical investigations	ILD	animal	26	10		10
Fish - Clinical investigations	ILD	animal	1	0		
Goats	ILD	animal	13	7		7
Other animals - Clinical investigations	ILD	animal	3	0		
Sheep	ILD	animal	27	23		23
Wild animals - Clinical investigations	ILD	animal	2	0		

Footnote:

ILD = "Informationssystem Labordiagnostik in der Schweiz" (information system of laboratory diagnostics)

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

Enterohaemorrhagic Escherichia coli (EHEC) infections in humans are notifiable since 1999. Laboratories report the detection of EHEC and physicians report EHEC diseases within one week to the cantonal health authorities and to the Federal Office of Public Health (FOPH).

Since the first reporting in 1999 confirmed human VTEC cases are fluctuating between 28 and 67 cases per year. The incidence of VTEC infections was never above 0,9 reports per 100,000 inhabitants. Babies and infants aged up to 4 years old are the most frequently affected and disease often develops to the severe form of haemolytic-uraemic syndrome (HUS). From 114 cases occurring from 1997 to 2004 81,5% involved pre-school children suggesting that VTEC is primarily a paediatric problem.

In May to July 2003, an unusual cluster of HUS cases was reported to the FOPH affecting 21 children aged from 7 months to 13 years, as well as 3 adults (60 – 64 years). The cluster of diseases observed was probably associated with the sustained period of high temperatures in the summer of 2003. It was assumed that bathing water (e.g. swimming pools or local ponds) as well as contact with animals or their faeces (e.g. fields where fertilise) were contributing to this cluster.
In July 2005, increased cases of diarrhoea were reported from a valley in Canton Fribourg. Several people were found to be infected with EHEC. The likely cause of the infections was identified as drinking water from the shared water supply network. The contamination of the drinking water probably came – accompanied by heavy rainfall – from an area where there were a large number of cows at the time in question.

Figures from food producing animals show that ruminants, especially small ruminants, are an important reservoir for STEC infections in Switzerland. However, in food only few data are available.
A study in the 1990s showed that 2.4% of minced meat samples and 21.6% of uncooked, deep-frozen hamburgers were positive for STEC.

A survey at slaughter in 2000 showed that 14% of faecal samples from cattle, 30% from sheep and 22% from pigs were STEC-positive In bovine species, it

was also found that younger animals excrete more STEC than older animals. Caution is therefore needed when interpreting average figures on the occurrence of STEC for the whole cattle population. In swine the virulence factors of the majority of the found strains seem to be of low virulence.

Raw milk cheese was tested for STEC in 2006 and 2007 as part of the “national monitoring program for dairy products” (Stephan et al. 2008). In 796 samples of raw milk cheese from all over Switzerland, STEC strains could be isolated from 16 of these cheeses in cultures involving 12 semi-hard cheeses from cow’s milk, two soft cheeses from goat’s milk and one soft cheese from cow’s milk and one semi-hard cheese from goat’s milk. Following serotypes were detected: O2:H27 (3), O15:H16, O22:H8, O22:HNB, O91:H21 (2), O109:H16, O113:H4, O174:H21, ONT:H9 (2), O rough:H45, O rough:HNT, ONT:HNM, thus none of the isolated strains belonged to the classical STEC serotypes O26:H11, O103:H2 and O157:H7. None of the strains tested positive for eae (intimin).

Furthermore, it is known that VTEC infections also occur frequently after trips abroad to warmer climes. From 1999 to 2006 in 249 cases of EHEC diseases it was found that 62.7% of the patients had been abroad in the week before the onset of the disease. The most common regions mentioned were Southern Europe (incl. Turkey), North Africa, Central America and India.

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

Since 2006 VTEC cases in humans increased slightly reaching 67 cases in 2008, but situation was more or less stable in the last years. However underreporting is anticipated to be very likely, especially as most microbiological laboratories in Switzerland do not routinely test for STEC. Thus the true importance of VTEC in Switzerland is probably underestimated.
In 2008, 84 detections of STEC were reported of which 67 were confirmed by a supplementary report from the treating physician (definition for confirmed case: typical symptoms, STEC-positive laboratory finding). Babies and infants aged up to 4 years old were alike previous years the most frequently affected.

The data from the national monitoring program for dairy products confirm a low prevalence of STEC-strains in semi-hard and soft cheese from raw milk. All isolated strains belonged to non-O157 serotypes. These findings confirm that raw milk cheese may constitute a possible source of infection for STEC.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases

In view of the low infectious dose of STEC (<100 microorganisms) an infection via contaminated food is easily possible. Thorough cooking of critical foods prevents infection with the STEC originally present in the raw products. Furthermore, it is extremely important to comply with milking hygiene to keep the contamination of raw milk to a minimum. The effectiveness of heat treatment, as it is often used in the production of raw milk cheese, requires further systematic

investigation.

Additional information

1. Federal Office of Public Health (2008). Enterohämorrhagische Escherichia coli (EHEC), epidemiologische Daten in der Schweiz von 1996 bis 2006. Bulletin of the FOPH; No. 14: 240-246.
2. Stephan et al., Schweiz. Arch. Tierheilkd. 142, 110-114 (2000), Zweifel et al., Int. J. Food Microbiol. 92, 45-53 (2004), Kaufmann et al., J. Food. Prot. 69/2, 260-266 (2006).
3. Stephan et al. (2008). Prevalence and characteristics of Shiga toxin-producing Escherichia coli in Swiss Raw Milk Cheeses Collected at Producer Level. Journal of Dairy Science. 91, 2561-2565.
4. Rusch (2005). Studies on various microbiological parameters in raw milk and raw milk cheese of an organic cheese makers' cooperative over a period of one year. Thesis for Vetsuisse Faculty Zurich.
5. Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008).

2.4.2 E. coli infections in humans

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

Age Distribution	Verotoxigenic E. coli (VTEC)		
	All	M	F
Age unknown	67		
Total:	67	0	0

2.4.3 Escherichia coli, pathogenic in foodstuffs

A. Verotoxigenic E. coli (VTEC) in food

Monitoring system

Sampling strategy

In the national monitoring program of dairy products producers of cheese from all over Switzerland are inspected by official food control on a regular basis. On the occasion of the inspection samples of cheese and other dairy products are taken at the end of the processing lane. Enterprises to be sampled are selected randomly.

Frequency of the sampling

Selected enterprises are visited once a year.

Type of specimen taken

Specimens are taken from hard, semi-soft and soft cheeses made from raw cow and from raw goat milk (50 g) at the end of the production, before it is sold to the trader or to the consumer.

Methods of sampling (description of sampling techniques)

A single sample of cheese is taken.

Definition of positive finding

Isolation of STEC strains by colony hybridization in samples where shiga toxin gen was detected by PCR and in the 25 g of cheese.

Diagnostic/analytical methods used

For the detection of shigatoxine producing E. coli (STEC assay), cultivated strains of E. coli were evaluated by polymerase chain reaction (PCR) with primers based on sequences targeting a region conserved between stx1 and stx2 genes. For the cultivation of E. coli 25 g cheese were enriched in 225 ml brilliant green bile broth (BBL, Cockeysville, Md.) at 37 °C for 24 h. The enrichment samples were streaked onto sheep blood agar (Difco Laboratories, Detroit, Mich.; 5% sheep blood Oxoid Ltd., Hampshire, UK), and after incubation at 37 °C for another 24 h, the colonies were washed off with 2 ml of 0.85% saline solution.
From PCR positive samples, STEC strains were isolated by colony hybridization. Strains were confirmed as E. coli by biochemical properties. By PCR, all strains were examined for the presence of stx1, stx2, rfbE, eae and ehxA genes.

Results of the investigation

697 samples of hard, semi-soft and soft cheeses made from raw cow and from raw goat milk were tested, 13 had a positive result. The following serotypes were detected: O22:H16, O148:H8, O2:H27, O9:H21, O86:H21, O91:H10, O174:H21, O15:H16, O8:H20, O116:H28. None of the strains tested positive for the eae

gene, which is regarded as a virulence factor for classical EHEC.

Table VT E. coli in food

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Verotoxigenic E. coli (VTEC)	Verotoxigenic E. coli (VTEC)-VTEC O157	Verotoxigenic E. coli (VTEC)-VTEC non-O157	Verotoxigenic E. coli (VTEC)-VTEC, unspecified
Cheeses made from cows' milk - hard - made from raw or low heat-treated milk - at processing plant - Monitoring - official sampling - objective sampling	National	single	25g	235	0			
Cheeses made from cows' milk - soft and semi-soft - made from raw or low heat-treated milk - at processing plant - Monitoring - official sampling - objective sampling [1)]	National	single	25g	404	11		11	
Cheeses made from goats' milk - soft and semi-soft - made from raw or low heat-treated milk - at processing plant - Monitoring - official sampling - objective sampling [2)]	National	single	25g	58	2		2	

Comments:

[1)] the 11 VTEC were O22:H16, O148:H8, O2:H27 (4x), O9:H21, O86:H21, O91:H10, O174:H21, O15:H16

[2)] the 2 VTEC were O8:H20, O116:H28

2.4.4 Escherichia coli, pathogenic in animals

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 a notifiable disease. It must be reported by doctors and laboratories within a week of the mycobacteria of the Mycobacterium tuberculosis complex being detected in culture, as must the start of treatment with more than 3 different antituberculosis agents by doctors (ordinance of the FDHA on doctor and laboratory reporting). It should be noted that among the reported tuberculosis cases each year, the proportion of tuberculosis cases attributable to Mycobacterium bovis has been constantly lower than 2% since many years.

In animals, tuberculosis is defined as the detection of Mycobacterium bovis or Mycobacterium tuberculosis (TSV, Articles 158 – 159) and falls into the category of animal diseases to be eradicated (TSV, Article 3).
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 (whole holdings older than 6 months) were tuberculin tested. In 72 farms tests had to be repeated. All farms were negative.
From 1991 until 2008 in total 11 tuberculosis cases in animals were reported to the FVO by cantonal veterinarians which occurred in cattle (5), in cats (2), in birds (1), in chicken (1) and monkeys (1). Never more than 2 cases per year were reported.
In addition, official meat inspection is investigating each carcass, its organs and lymphatic tissue on the prevalence of abnormal alterations. Carcasses showing clinical signs of tuberculosis have to be destroyed.
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).

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

In 2008, the Federal Office of Public Health received reports of 520 cases of tuberculosis. Among these cases, Mycobacterium tuberculosis was isolated in 358 patients, Mycobacterium bovis in 5 patients and Mycobacterium africanum in 3 patients (provisional figures).

Humans can be infected by tuberculosis through the consumption of food containing mycobacteria (milk, raw meat etc.). However, it should be noted that in the recent years not more than 2% of the human tuberculosis cases had bovine origin. And as Swiss cattle are recognised as free from tuberculosis this transmission route is considered to be of no relevance for aforementioned foods originating of Switzerland.
No cases of tuberculosis in cattle were reported to the FVO by the cantonal veterinarians in 2008.
Furthermore, in veterinary diagnostic laboratories 10 animals (7 cattle, 2 cats and 1 pig) were tested for Mycobacterium bovis and/or Mycobacterium tuberculosis in the context of clinical investigations by antigen assay, all with negative results.
There are no observations that would challenge the freedom of Swiss cattle from tuberculosis.

Additional information

Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

2.5.2 Tuberculosis, mycobacterial diseases in humans

Table Mycobacterium in humans - Species/serotype distribution

Mycobacterium	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.
	5	0	0	0	0	0
M. bovis	5					

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 (whole holdings older than 6 months) 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. Bovine tuberculosis is regulated as zoonoses to be eradicated (Swiss ordinance of epizootics, TSV Art. 158 - Art. 165). Notification of suspicious cases is mandatory. Actions to be taken in suspicious farms are ban of all animal traffic and investigation of the whole herd. In confirmed cases (herds) all diseased or suspicious cattle has to be slaughtered and the milk of them is disposed. The barn has to be disinfected.

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

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

Table Tuberculosis in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Mycobacterium spp.	M. bovis	M. tuberculosis	Mycobacterium spp., unspecified
Cats - Clinical investigations	ILD	animal	2	0			
Cattle (bovine animals) - Clinical investigations	ILD	animal	7	0			
Pigs - Clinical investigations	ILD	animal	1	0			

Footnote:

ILD = "Informationssystem Labordiagnostik in der Schweiz" (database laboratory diagnostics)

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

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 examinations	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	43267	1605951	43267	100	0	0	5	111394	0	0	0
Total	43267	1605951	43267	100.0	0	0.0	5	111394	0	0	0
Total - 1											

Footnote:

The last survey was done in 1997. Data of the last survey indicated.

2.6 BRUCELLOSIS

2.6.1 General evaluation of the national situation

A. Brucellosis general evaluation

History of the disease and/or infection in the country

Brucellosis in humans is a notifiable disease. Laboratories must report the detection of Brucella within one week (ordinance of the FOHA on doctor and laboratory reports). The number of detections of Brucella spp. in humans have been rare for many years.
Brucellosis in animals falls into the category of a “disease to be eradicated“ (TSV, Article 3). Government measures are applied to control brucellosis in sheep and goats (Brucella melitensis, TSV, Articles 190-195), in cattle (Brucella abortus, TSV, Articles 150-157) and in pigs (Brucella suis as well as Brucella abortus and Brucella melitensis, TSV, Articles 207 – 211). These animal species must be tested for brucellosis in cases where the causes of abortion are being investigated (TSV, Article 129). Bovine brucellosis is notifiable since 1956, in sheep and goats since 1966.
Switzerland is officially recognised as free of brucellosis in sheep and goats, cattle and pigs. The last case of bovine Brucella abortus infection was reported in 1996, the last case of Brucella melitensis infection in small ruminants in 1985 and the last case of Brucella suis infection in 2001 in a wild boar.
Freedom from bovine brucellosis has been proven the last time in 1997 conducting a survey in a randomized sample of 4874 farms. 139‘655 cows (in general older than 24 months) were tested using a serological test. There were no positive findings in these samples.
Since 1998 the freedom of the sheep and goat population from disease is documented annually in National Surveys with serological testing (TSV, Article 130). The farms to be tested are randomly selected. EU regulation 91/68/EEC that defines populations of sheep and goat as one epidemiological unit is the basis of the survey.
Vaccination is prohibited since 1961. Requirements of section 3.2.1.5 of the OIE International Animal Health Code are fulfilled since 1963. Free status is recognised by EU (Bilateral Agreement on Agriculture, Veterinary Annex).

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

In humans 5 brucellosis cases was reported in 2008 of which 2 had been identified as Brucella melitensis.
Human infections with Brucella through the consumption of Swiss raw milk or dairy products from non-heat-treated milk (for example sheep or goat’s cheese) is considered to be of no relevance in Switzerland, because the Swiss animal population is free of this pathogen. Cases of brucellosis in humans are

anticipated to be attributable either to stays abroad or to the consumption of foreign products. No change in the situation is expected in the years to come.
In the yearly National Survey, in 2008 a total of 607 sheep and 358 goat farms were tested negative for Brucella melitensis. Furthermore, no cases of brucellosis in sheep and goat were reported to the FVO by the cantonal veterinarians in 2008.
In addition, in diagnostic laboratories in total 1758 animals were tested in 2008 including mainly cattle (1630), but also sheep (39), pigs (38), goats (25), horses (8), wild animals (7), dogs (2), buffalo (1) and "other animals" (8). Regarding the wild animals, 1 hare and 1 wild boar were tested positive for brucellosis.
It is expected that the status of being “officially recognised as free” of disease can probably be maintained in the years to come as there are no observations that would challenge the freedom of Swiss cattle, sheep or goats populations from brucellosis.

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.

Additional information

Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

2.6.2 Brucellosis in humans

Table Brucella in humans - Species/serotype distribution

Brucella	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.
	5	0	0	0	0	0
B. abortus	3					
B. melitensis	2					

Table Brucella in humans - Age distribution

Age Distribution	B. abortus			B. melitensis		
	All	M	F	All	M	F
Age unknown	3			2		
Total:	3	0	0	2	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

In confirmed cases (herds) all diseased cattle has to be killed. All placentas, abortion material and the milk of diseased and suspicious cows has to be disposed. The barn has to be disinfected.
Furthermore, 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 (Swiss ordinance of epizootics, TSV Art. 150 - Art. 157). Notification of suspicious cases is mandatory. Actions to be taken in suspicious farms are ban of all animal traffic and investigation of the whole herd as well as the placenta of calving cows.

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 sheep

Status as officially free of ovine brucellosis during the reporting year

The entire country free

see Brucella melitensis in goats.

C. Brucella melitensis in goats

Status as officially free of caprine brucellosis during the reporting year

The entire country free

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

Additional information

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

Vaccination policy

Vaccination is prohibited since 1961.

Measures in case of the positive findings or single cases

In confirmed cases (herds) the whole herd has to be killed immediately. All placentas, abortion material and the milk of diseased and suspicious animals have to be disposed. The barn has to be disinfected.

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 (Swiss ordinance of epizootics, TSV Art. 190 - Art. 195). Notification of suspicious cases is mandatory. Actions to be taken in suspicious farms are ban of all animal traffic and the investigation of the whole herd.

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.

Results of the investigation

In 2008 a randomized sample of 607 farms with sheep and 358 farms with goats were included in the survey. 8’436 samples from sheep and 2’778 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.

Table Brucellosis in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Brucella spp.	B. abortus	B. melitensis	B. suis	Brucella spp., unspecified
Buffalos - Clinical investigations	ILD	animal	1	0				
Cattle (bovine animals) - Clinical investigations	ILD	animal	1630	0				
Dogs - Clinical investigations	ILD	animal	2	0				
Goats - Clinical investigations	ILD	animal	25	0				
Other animals - Clinical investigations	ILD	animal	8	0				
Pigs - Clinical investigations	ILD	animal	38	0				
Sheep - Clinical investigations	ILD	animal	39	0				
Solipeds, domestic - Clinical investigations	ILD	animal	8	0				
Wild animals - Clinical investigations [1)]	ILD	animal	7	2	1		1	

Comments:

[1)] 1 wild boar (B. suis) and 1 hare (B. abortus) were Brucella spp. positive.

Footnote:

ILD = "Informationssystem Labordiagnostik in der Schweiz" (database laboratory diagnostics)

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

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 serologic al blood tests	Number of suspende d herds	Number of positive animals		Number of animals examined microbio logically	Number of animals positive microbio logically
																		Sero logically	BST		
Schweiz/Suisse/Svizzera	43267	1605951	43267	100	0	0	4847	31042	0	4847	18952	0									
Total	43267	1605951	43267	100.0	0	0.0	4847	31042	0	4847	18952	0	0	0	0	0	0	0	0	0	0
Total - 1																					

Footnote:

The last survey was done in 1997. Data from the last survey indicated.

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

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	16853	519796	16853	100	0	0	965	11214	0	0	0	0	0	0
Total	16853	519796	16853	100.0	0	0.0	965	11214	0	0	0	0	0	0
Total - 1														

Footnote:

A randomized sample of 607 farms with sheep and 358 farms with goats were included in the survey. 8’436 samples from sheep and 2’778 samples from goats were tested using serological test. There were no positive findings in these samples.

2.7 YERSINIOSIS

2.7.1 General evaluation of the national situation

A. Yersinia enterocolitica general evaluation

History of the disease and/or infection in the country

Yersiniosis in humans is not a notifiable disease. Therefore no data on the incidence of such infections are available.

In animals, yersiniosis falls into the category of diseases to be monitored (TSV, Article 5) and, if the disease is either diagnosed or suspected, it must be reported to the cantonal veterinarian (TSV, Article 291), who may issue an order for a suspected case to be investigated. In most cases, yersiniosis is caused by Yersinia enterocolitica and, in rare cases, also by Yersinia pseudotuberculosis.
From 1995 until 2008 20 yersioniosis cases in animals were reported to the FVO by cantonal veterinarians which occurred in monkeys (8), rabbits (2), cattle (1), sheep (1) and “other animals” ((8 such as guinea-pigs (5), mice (1), prairie dogs (1) and unknown (1)). From 1995 until 1998 no yersioniosis cases and from 1999 until 2008 never more than 3 yersiniosis cases were reported.

Furthermore, research of yersinia in slaughter pigs conducted in 2003-2004 showed low rates of infection in this period in slaughter pigs.

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

Like in 2007 the cantonal veterinarians reported 1 case of yersiniosis to the FVO in 2008, which involved a monkey. The number of reported cases in the recent years has been at a constantly low level.

Furthermore, in veterinary diagnostic laboratories 2153 tests for yersiniosis were carried out in the context of clinical investigations in 2008, mainly in dogs (874), cats (824) and cattle (244), but also in horses (43) birds (36), hares (19), goats (17), sheep (14), pigs (7), wild animals (6), alpacas (5), fur animals (3) and “other animals” (61) (see table). Except for 1 cat and 1 dog, all laboratory results were negative.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases

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

Recent actions taken to control the zoonoses

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

Additional information

Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

2.7.2 Yersiniosis in humans

2.7.3 Yersinia in animals

Table Yersinia in animals

	Source of information	Sampling unit	Units tested	Total units positive for Yersinia spp.	Y. enterocolitica	Yersinia spp., unspecified	Y. enterocolitica-O:3	Y. enterocolitica-O:9	Y. enterocolitica-unspecified
Alpacas - Clinical investigations	ILD	animal	5	0					
Birds - Clinical investigations	ILD	animal	36	0					
Cats - Clinical investigations	ILD	animal	824	1		1			
Cattle (bovine animals) - Clinical investigations	ILD	animal	244	0					
Dogs - Clinical investigations	ILD	animal	874	1		1			
Fur animals - Clinical investigations	ILD	animal	3	0					
Goats - Clinical investigations	ILD	animal	17	0					
Hares - Clinical investigations	ILD	animal	19	0					
Other animals - Clinical investigations	ILD	animal	61	0					
Pigs - Clinical investigations	ILD	animal	7	0					
Sheep - Clinical investigations	ILD	animal	14	0					
Solipeds, domestic - Clinical investigations	ILD	animal	43	0					
Wild animals - Clinical investigations	ILD	animal	6	0					

Footnote:

ILD = "Informationssystem Labordiagnostik in der Schweiz" (information system of laboratory diagnostics)

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 not a notifiable disease in Switzerland. Although there are no relevant epidemiological data available, it is suggested that Trichinella infections acquired in Switzerland have probably not occurred in humans for years in this country.

Trichinella infections in animals fall in the category of animal diseases to be monitored (TSV, Article 5). Trichinella infections and suspicion of Trichinella infections in animals are notifiable since 1966. From 1999 until 2007, 14 cases were reported to the FVO by cantonal veterinarians concerning the following species: lynx (12), foxes (1) and wolves (1). The nematodes involved were of a single species, namely Trichinella britovi. In general not more than 2 Trichinella infections in wild carnivores were reported per year (1999 and 2000 with 4 resp. 3 cases were an exception).

Trichinella infections in pigs have not been detected in Switzerland for many decades. From 2001 to 2004, between 400,000 and 490,000 pigs (15 to 19% of all slaughtered pigs) were tested every year without any positive findings being obtained. Since 2005 the number of pigs tested in abattoirs increased steadily, all with negative results: 916,791 pigs in 2005 (34% of the pigs slaughtered) and 1,25 Mio pigs in 2006 (44% of the pigs slaughtered).

Especially lynx and fox are known to harbour Trichinella britovi in Switzerland (see also reported cases by cantonal veterinarians above). Thus a study of the University of Berne conducted from 1999 until 2007 found that 15 (27.3%) of 55 assessed lynxes harbored Trichinella britovi larvae. Furthermore, in 2006/2007 21 (1.6%) of 1298 assessed foxes proved positive for Trichinella britovi larvae (Frey et al., Veterinary Parasitology, 2009).

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

In order to have data about trichinellosis cases in humans in the future, it was decided to re-classify trichinellosis in humans as a notifiable disease again as from 1 January 2009.

Trichinellosis in animals is notifiable. No cases of Trichinella infections were

reported to the FVO by the cantonal veterinarians in 2008. Since 2001 reported cases range between 0 and 2 cases per year and always concerned carnivorous wildlife, never domestic animals.

As Switzerland is aequivalent with the regulations in the EU as from 01 January 2007 and Commission Regulation (EC) No. 2075/2005 requires a full study of all slaughtered pigs, testing on trichinellosis of all slaughter pigs became mandatory. Exceptions from this obligation are only made for slaughterhouses with a small capacity who do not export to the EU. Meat of pigs which have not been tested for trichinellosis is labeled with a special stamp, so it can be guaranteed that such meat is not exported to the EU. In 2007 and 2008 almost 90% of the slaughtered pigs were tested for Trichinella with a negative result (about 2,42 Mio pigs in 2007 and 2,36 Mio pigs in 2008). Due to this extensive testing of the last years with only negative results, Swiss slaughter pigs are projected to be free of Trichinella.

A study of the University of Berne conducted in 2008 indicates that Trichinella nematodes play a minor role in wild boar (Frey et al., Schweiz. Archiv für Tierheilkunde, submitted). Although all 1458 wild boars have been tested negative for Trichinella by artificial digestion, 3 wild boars had antibodies against Trichinella (seroprevalence 0.2%) illustrating that wild boars can have contact with this nematode.

Additional information

Jakob et al., Schweiz. Arch. Tierheilk. 136: 298-308,1994
Frey et al., Veterinary Parasitology, 2009
Frey et al., Schweiz. Archiv für Tierheilkunde, submitted

2.8.2 Trichinellosis in humans

2.8.3 Trichinella in animals

A. 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

All slaughtered pigs, with the exception of pigs slaughtered in small slaughterhouses and only produced for the local market, are tested 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 falls in the category of animal diseases to be monitored (TSV, Article 5).

Results of the investigation including description of the positive cases and the

In 2008, about 2,36 Mio slaughter pigs (almost 90% of the total slaughter population) were tested and no Trichinella larvae were found.
In addition, 4145 wild animals (including mainly wild boars, but also fox, lynx, wolf, etc.) 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

Trichinella may be transmitted from animals to humans through raw or insufficiently cooked meat. To prevent infections, slaughter carcasses of potentially affected animal species are tested for Trichinella spp. larvae. As all results were negative since many years, it is highly unlikely that Trichinella infections acquired in Switzerland do occur.

Additional information

Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

B. Trichinella in horses

Monitoring system

Sampling strategy

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

Frequency of the sampling

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

Type of specimen taken

Piece of tongue

Case definition

Detection of Trichinella spp. larvae.

Diagnostic/analytical methods used

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

Results of the investigation including the origin of the positive animals

Unfortunately up to date Switzerland has no database where all trichinellosis testings on horses are gathered. Therefore only data from a part of all testings is available. It can be stated that in 2008 at least 1743 horses were tested for Trichinella with negative results.

Notification system in place

Trichinellosis in animals falls in the category of animal diseases to be monitored (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

Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

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

Alveolar echinococcosis (AE) is caused by the “dangerous” fox tapeworm Echinococcus multilocularis. Exact figures on the incidence of infestation in humans were collected in Switzerland since 1956 at the Institute of Parasitology of the University of Zurich being the National Reference Centre for echinococcosis. Data originates from cohorts of the large treatment centres as well as analysis of seropositive patients originating from the 3 centres for serodiagnosis of the disease. As Alveolar echinococcosis had been a notifiable disease until 1997 these data were also included. Currently incidence of human cases from 2006-2008 is being evaluated, thus this data cannot be provided yet.

Compared with previous years, incidence from the beginning of 2001 to the end of 2005 showed a 2.4-fold increase (11-29 new cases occurred every year).

In animals, echinococcosis falls in the category of animal diseases to be monitored (TSV, SR 916.401, Article 291).
From 1995 until 2008 41 echinococcosis cases were reported to the FVO by cantonal veterinarians which occurred in dogs (20), foxes (9), monkeys (5), “other animals” (4), horses (1), pigs (1) and sheep (1). From 1995 until 2002 never more than 3 cases of echinococcosis were reported. Most cases occurred in the time period 2002 until 2008 with 3 up to 6 cases per year.

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

The pathogen Echinococcus granulosus is not of relevance in Switzerland. An infection of humans with Echinococcus multilocularis, the causative agent in AE, remains rare.

In the year 2008 6 cases were reported to the FVO by the cantonal chief veterinarians (3 foxes, 2 dogs and 1 monkey) which is in the range of the last 10 years.
Furthermore, in veterinary diagnostic laboratories 80 tests for echinococcosis were carried out in the context of clinical investigations mainly in dogs and wild animals. 9 dogs (out of 44), 6 foxes and 1 wild boar (7 out of 33 wild animals) as well as 1 monkey and 1 gibbon proved positive for Echinococcus multilocularis.

Findings from recent years indicate that also urban population is exposed to a

higher risk. Therefore the Institute of Parasitology of the University of Zurich tested mice and feacal fox samples in the region of Zurich in the years 2007 and 2008. About 17% of the mice (100 mice from 634 in 2007 resp. 66 from 393 in 2008) were positive for E. multilocularis. In the faecal fox samples the number of positive samples declined from 26% in 2007 to 19% in 2008 (361 from 1376 in 2007 resp. 202 from 1044 in 2008). However, faecal fox samples from regions without deworming bait containing praziquantel remained at the level of the previous year (63 from 254 (25%) samples were positive).

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases

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.

The burden of infection from E. multilocularis has increased in the recent years because 1) the fox population has increased after having eradicated fox rabies from 1984 to 2000 by a factor of 2.6 (mean numbers of foxes shot or found dead: 19’500 from 1977-1987 and 51’500 from 1997-2007), and

2) foxes have extended their habitat to urban areas. This means that besides the traditionally exposed rural population also the urban population is exposed to a higher risk.

Indeed, data collected by the Institute of Parasitology of the University of Zurich show that in the years 2001-2005 the number of new cases of alveolar echinococcosis has increased 2,4 fold compared to years before 2001 (1991-2000 median case number 9, range 3-10; 2001-2005 median case number 22, range 11-29).

Recent actions taken to control the zoonoses

An infection of humans with Echinococcus multilocularis, the causative agent in AE, remains rare, but when it does occur it results in disease with severe consequences for the person concerned. For this reason, the FVO is funding a project entitled ‘Control of alveolar echinococcosis & management of foxes in urban areas’. New methods in the management of urban foxes are to be tried out along with active communication to encourage dealing with foxes in a way that is appropriate to wild animals.

Additional information

1. Information on fox tapeworm: www.paras.uzh.ch/infos.

2. Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

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

2.9.2 Echinococcosis in humans

2.9.3 Echinococcus in animals

Table Echinococcus in animals

	Source of information	Sampling unit	Units tested	Total units positive for Echinococcus spp.	E. granulosus	E. multilocularis	Echinococcus spp., unspecified
Cats - Clinical investigations	ILD	animal	1	0			
Dogs - Clinical investigations	ILD	animal	44	9		9	
Monkeys - Clinical investigations	ILD	animal	1	1		1	
Other animals - Clinical investigations [1)]	ILD	animal	1	1		1	
Wild animals - Clinical investigations [2)]	ILD	animal	33	7		7	

Comments:

[1)] gibbon

[2)] Animals tested are mainly foxes. From the 7 positive results 6 were foxes and one was a wild boar.

Footnote:

ILD = "Informationssystem Labordiagnostik in der Schweiz" (information system of laboratory diagnostics)

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 a notifiable disease, thus does not have to be reported to the Federal Office of Public Health, even when the suspicion of toxoplasmosis is substantiated. Therefore no data on the incidence of such infections are available.

In animals, toxoplasmosis falls in the category of animal diseases to be monitored (TSV, Article 5). Veterinarians must report any suspected cases of toxoplasmosis to the cantonal veterinarian, who may issue an order for the suspected cases to be investigated (TSV, Article 291).
From 1995 until 2008 in total 20 cases were reported to the FVO by cantonal veterinarians which occurred in sheep (7), goats (5), cats (3), cattle (2), monkey (2) and “other animal” (1). In the years 1995 and 1996 no toxoplasmosis cases and from 1997 until 2008 never more than 5 cases of toxoplasmosis were reported.

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

In 2008, the cantonal veterinarians reported 1 case of toxoplasmosis in animals to the FVO, namely in sheep.
Furthermore, in veterinary diagnostic laboratories 445 tests for toxoplasmosis were carried out in the context of clinical investigations in 2008, mainly in cats (427), but also in sheep (7), goats (4), wild animals (3), pigs (1), dogs (1), cattle (1) and “other animal” (1) (see table). 5 animals were tested positive for toxoplasmosis (3 cats, 1 sheep and 1 “other animal”).
Generally speaking, there are some sporadic cases of toxoplasmosis in humans and animals. However, due to a lack of surveillance data, the knowledge about the prevalence of the infection in humans and animals is scarce.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases

In non-immune sheep and goats (first-time infection) Toxoplasma gondii is regarded as a major cause of abortion and loss of lambs.

Additional information

Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

2.10.2 Toxoplasmosis in humans

2.10.3 Toxoplasma in animals

Table Toxoplasma in animals

	Source of information	Sampling unit	Units tested	Total units positive for Toxoplasma	T. gondii	Toxoplasma spp., unspecified
Cats - Clinical investigations	ILD	animal	427	3		3
Cattle (bovine animals) - Clinical investigations	ILD	animal	1	0		
Dogs - Clinical investigations	ILD	animal	1	0		
Goats - Clinical investigations	ILD	animal	4	0		
Other animals - Clinical investigations	ILD	animal	1	1		1
Pigs - Clinical investigations	ILD	animal	1	0		
Sheep - Clinical investigations	ILD	animal	7	1		1
Wild animals - Clinical investigations	ILD	animal	3	0		

Footnote:

ILD = "Informationssystem Labordiagnostik in der Schweiz" (information system of laboratory diagnostics)

2.11 RABIES

2.11.1 General evaluation of the national situation

A. Rabies general evaluation

History of the disease and/or infection in the country

Rabies in humans is a notifiable disease. It has to be reported within one day of rabies being clinically suspected by a doctor or the Lyssavirus being detected in culture by a laboratory (ordinance of the FDHA on doctor and laboratory reporting).

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.

The European fox rabies epizootic starting in 1939 at the eastern border of Poland reached Switzerland on March 3, 1967. Rabies spread over large parts of the country until 1977, the year it caused three human deaths. In 1978 the first field trial world-wide for the oral immunization of foxes against rabies was conducted in Switzerland. Initially, the expansion of the vaccination area led to a rapid reduction in rabies cases. However, the 1990s were characterized by a recrudescence of rabies in spite of regular oral immunization of foxes. The last endemic case of rabies was diagnosed in 1996 after an adaptation of the vaccination strategy.

In the period from 1967 until 1999 a total of 17’108 rabies cases, of which 73% in foxes and 14% in domestic animals were diagnosed, leading to an estimated number of some 25 000 postexposure treatments in humans. To eliminate rabies, a total of 2.8 million baits containing a modified live virus were distributed - mostly by hand - in the field. The last case of fox rabies occurred in 1996.

According to the definitions of the OIE and WHO (no cases for at least two years) Switzerland has been officially recognised as 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, it is highly unlikely that this indicates a focus of rabies infection in Switzerland.

(Re-)Import conditions for cats, dogs and ferrets were implemented in 2003 and adapted in 2004 according to the EU regulation 998/2003/EC.

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

In 2008, one human salivary sample was tested for rabies virus as a differential diagnosis with negative results. Furthermore 559 human sera were analysed, of which 337 were a control after a rabies vaccination, 166 a control of postexposure treatments and three as clinical suspects) were tested, if the level of protecting antibodies is sufficient.

Switzerland and most of the neighboring countries were free from European fox rabies in 2008. Only in Italy two foxes were diagnosed positive in October 2008, however an oral immunization campaign was announced. Therefore the Swiss fox population should not be at risk to be re-infected by immigrating infected foxes at the moment.

The national reference laboratory for rabies investigated 103 animal samples in the year 2008, all of which proved negative for the presence of Lyssavirus in the brain. The samples came mostly from foxes (45%), dogs and cats (33%) and bats (18%). Single samples were tested from squirrels (2), badgers (1), beech martens (1) and rabbits (1).

The 2003 implemented import conditions reduce the risk of imported rabies cases in domestic animals to a very low level. In the Swiss Rabies Center an adequate protection against rabies infection was determined by detection of neutralising antibodies in a total of 2399 serum samples from dogs and cats that accompanied their owners on trips. However, illegal imports remain a certain risk of importing rabies to Switzerland.

Bat rabies has been diagnosed in 3 cases in the past fifteen years (1992, 1993, 2002). Therefore, bat rabies remains a source, albeit little, of infection for animals and humans.

Recent actions taken to control the zoonoses

Rabies testing on animals with suspect symptoms. Vaccination of the Swiss dog population is recommended (and common), but not mandatory. (Re-)Import conditions for cats, dogs and ferrets according to the EU regulation 998/2003/EC.

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. Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

2.11.2 Rabies in humans

2.11.3 Lyssavirus (rabies) in animals

A. Rabies in dogs

Monitoring system

Case definition

An animal is rabies diseased if the analytical method (see 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
3. Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

Table Rabies in animals

	Source of information	Sampling unit	Units tested	Total units positive for Lyssavirus (rabies)	Unspecified Lyssavirus	Classical rabies virus (genotype 1)	European Bat Lyssavirus - unspecified
Badgers - wild - Clinical investigations	Swiss Rabies	animal	1	0			
Bats - wild - Clinical investigations	Swiss Rabies	animal	18	0			
Cats - Clinical investigations	Swiss Rabies	animal	13	0			
Dogs - Clinical investigations	Swiss Rabies	animal	21	0			
Foxes - wild - Clinical investigations	Swiss Rabies	animal	46	0			
Marten - wild - Clinical investigations	Swiss Rabies	animal	1	0			
Rabbits - Clinical investigations	Swiss Rabies	animal	1	0			
Squirrels - Clinical investigations	Swiss Rabies	animal	2	0			

2.12 Q-FEVER

2.12.1 General evaluation of the national situation

A. Coxiella burnetii (Q-fever) general evaluation

History of the disease and/or infection in the country

Q fever (pathogen: Coxiella burnetii) is not a notifiable disease in humans. There are thus no data available on the frequency of the illness.

The last study in animals and in predestinated humans was performed in 1983. Results are published in Metzler AE et al., 1983: Distribution of Coxiella burnetii: a seroepidemiological study of domestic animals and veterinans [in German]. Schweizer Archiv für Tierheilkunde, 125, 507-517.

In 2005/2006 a screening program for Coxiella brunettii in bulk milk samples from cows, sheep and goats and in shell eggs was conducted. In total, 17 of 359 (4.7%) of analysed bovine milk samples from two randomly selected cheese diaries were tested positive for Coxiella brunetii by nested PCR. 110 ovine and caprine milk samples as well as 504 shell eggs were all tested negative. (Fretz R. et al. (2007) Screening of various foodstuffs for occurrence of Coxiella brunetii in Switzerland. Int. J. of Food Microbiology 116, 414-418).

Coxiellosis in animals is a notifiable disease and falls under the category of diseases to be controlled (TSV, Article 4). Coxiella brunetii plays a certain role as a causative pathogen for abortions in biungulate animals. Following specifications in TSV, Articles 217-221 abortions in cattle after three months of pregnancy have to be reported to a veterinarian. In sheep, goats and pigs, every abortion must be reported. If more than one animal in a holding of ruminants aborts within the space of four months, or if an abortion occurs in a dealer’s stable or during alpine pasturing, then cattle, sheep and goats amongst other also undergo laboratory investigation for Coxiella burnetii (TSV, Article 129). If clinically suspected cases are confirmed by laboratory diagnostic tests, the cantonal veterinary office is notified.

From 1991 until 2008 997 coxiellosis cases were reported to the FVO by cantonal veterinarians which occurred mainly in cattle (868), but also in goats (77) and sheep (52). Especially in the first two years in the 1990s numbers per year where high with about 100 reported cases a year. In the years 1993 to 1995 numbers declined to roughly 70 cases per year and decreased further to about 40 cases per year in the period 1996 until 2005. In 2006 reported coxiellosis cases rose again to the level of almost 70 cases per year and stayed

at this level in 2007 and 2008.

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

67 cases of coxiellosis in ruminants were reported to the FVO by cantonal veterinarians in 2008 of which 57 cases occurred in cattle, 6 in goats and 4 in sheep.

Furthermore, in veterinary diagnostic laboratories 2982 tests for coxiellosis were carried out in the context of clinical investigations, mainly in cattle (2660), sheep (141) and goats (139), but also in pigs (19), horses (4), wild animals (3), dog (1), buffalo (1) and other species (4).
75 animals (64 cattle, 9 goats, 2 sheep) were positive for Coxiella burnetii.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases

In cases of abortion among ruminants coxiellosis is especially important in cattle.

Additional information

Swiss Zoonoses Report 2008 (www.bvet.admin.ch > Documentation > Publications > FVO Reports > Reports 2008)

2.12.2 Coxiella (Q-fever) in foodstuffs

2.12.3 Coxiella (Q-fever) in animals

Table Coxiella burnetii (Q fever) in animals

	Source of information	Sampling unit	Units tested	Total units positive for Coxiella (Q-fever)	C. burnetii	Coxiella spp., unspecified
Buffalos - Clinical investigations	ILD	animal	1	0		
Cattle (bovine animals) - Clinical investigations	ILD	animal	2660	64		64
Dogs - Clinical investigations	ILD	animal	1	0		
Goats - Clinical investigations	ILD	animal	139	9		9
Other animals - Clinical investigations	ILD	animal	4	0		
Pigs - Clinical investigations	ILD	animal	19	0		
Sheep - Clinical investigations	ILD	animal	141	2		2
Solipeds, domestic - Clinical investigations	ILD	animal	14	0		
Wild animals - Clinical investigations	ILD	animal	3	0		

Footnote:

ILD = "Informationssystem Labordiagnostik in der Schweiz" (information system of laboratory diagnostics)

3. INFORMATION ON SPECIFIC INDICATORS OF ANTIMICROBIAL RESISTANCE

3.1 ENTEROCOCCUS, NON-PATHOGENIC

3.1.1 General evaluation of the national situation

3.1.2 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 200 samples from cattle and 420 samples from broilers.
The samples from cattle were collected in the context of the permanent national monitoring scheme for antimicrobial resistance in Swiss food-producing animals. The samples from broilers were taken in the framework of the baseline study (See: Thermophilic Campylobacter in Gallus gallus).

Type of specimen taken

Fecal samples from cattle, caecal samples from broilers.

Methods of sampling (description of sampling techniques)

Fecal samples 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 cooled and brought to the laboratory for analysis. For broilers see: Thermophilic Campylobacter in Gallus gallus (2.2.3.A).

Procedures for the selection of isolates for antimicrobial testing

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

Methods used for collecting data

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

Laboratory methodology used for identification of the microbial isolates

Samples were cultured for Enterococcus spp. within 72 h after sampling using standard microbiological procedures.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

Ampicillin, Amoxicillin/Clavulanic acid (2:1), Bacitracin, Chloramphenicol, Ciprofloxacin, Erythromycin, Florfenicol, Flavofosfolipol, Gentamicin, Neomycin,

Nitrofurantoin, Salinomycin, Streptomycin, Quinupristin/Dalfopristin, Tetracyclin, Vancomycin

Breakpoints used in testing

Ampicillin, 16 µg/ml; Amoxicillin/Clavolanic acid, 16 µg/ml; Bacitracin, 128 µg/ml; Chloramphenicol, 32 µg/ml; Ciprofloxacin, 4 µg/ml; Erythromycin, 8 µg/ml; Florfenicol, 32 µg/ml; Flavofosfolipol, 16 µg/ml; Gentamicin, 1024 µg/ml; Neomycin, 32 µg/ml; Nitrofurantoin, 128 µg/ml; Salinomycin, 16 µg/ml; Streptomycin, 2048 µg/ml; Quinupristin/Dalfopristin, 4 µg/ml; Tetracycline, 16 µg/ml; Vancomycin, 32 µg/ml

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

Suggestions to the Community for the actions to be taken

Currently no specific action necessary.

Measures in case of the positive findings or single cases

No measures.

Notification system in place

No notification system.

Results of the investigation

33 Enterococcus faecalis and 116 Enterococcus faecium isolates from broilers as well as 8 Enterococcus faecalis and 19 Enterococcus faecium isolates from cattle were subjected to susceptibility testing.

Relatively high levels of resistance to bacitracin, erythromycin, neomycin and tetracycline were observed in E. faecalis and E. faecium from broilers, with prevalences from 31% – 81.8%. Additionally a relatively high percentage of E. faecium isolates from broilers showed resistance to ciprofloxacin and nitrofurantoin (>30%).
In Enterococcus strains from cattle resistance to neomycin, nitrofurantion, ciprofloxacin and bacitracin were most prevalent (12.5-78.9%).

Resistance against vancomycin was rare, only one strain isolated from poultry showed resistance.

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

In general, the resistance situation of indicator bacteria in Switzerland is favourable. The results are similar to those in 2006 and 2007.

Relevance of the findings in animals to findings in foodstuffs and to human cases

Non-pathogenic Enterococci from food animals may serve as a reservoir for resistance genes which could potentially be transmitted to human pathogens.

Additional information

See: Antibiotikaresistenzmonitoring 2008 - Jahresbericht on http://www.bvet.admin.ch

Table Antimicrobial susceptibility testing of E. faecium in broilers - Gallus gallus (fowl) - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey - quantitative data [Dilution method]

E. faecium		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		116																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	512	116	0														115		1					
	Neomycin	16	115	21										35		59	18			3					
	Streptomycin	1024	116	4														109			1	2	4		
Amphenicols	Chloramphenicol	16	116	0										15	90	11									
	Florfenicol	16	116	0								21		86	7	2									
Fluoroquinolones	Ciprofloxacin	2	116	41						2		20	53	39	2										
Glycolipids	Flavofosfolipol	8	116	108									1	2	5	8	6	94							
Glycopeptides (Cyclic peptides, Polypeptides)	Bacitracin	64	116	63										18		3	2	30	18	4	41				
	Vancomycin	16	116	1							113		1	1				1							
Ionophores	Salinomycin	8	116	1							20		8	18	69	1									
Macrolides	Erythromycin	4	116	23						37		31	19	6	4		19								
Nitroimidazoles and Nitrofurans	Nitrofurantoin	64	116	35												36		45	28	7					
Penicillins	Amoxicillin / Clavulanic acid	8	116	0								100		15	1										
	Ampicillin	8	116	2								75		29	10	1	1								
Streptogramins	Quinupristin/Dalfopristin	2	116	34						8		43	31	29	3	2									
Tetracyclines	Tetracyclin	8	116	36							73		3	1	3	4	2	30							
	Tetracyclines		0	0																					

Table Antimicrobial susceptibility testing of E. faecium in Cattle (bovine animals) - meat production animals - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

E. faecium		Cattle (bovine animals) - meat production animals - - faeces - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		19																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	512	19	0														19								
	Neomycin	16	19	4										11		4	3	1								
	Streptomycin	1024	19	0														19								
Amphenicols	Chloramphenicol	16	19	0										1	12	6										
	Florfenicol	16	19	0								2		14	3											
Fluoroquinolones	Ciprofloxacin	2	19	11								2	6	10	1											
Glycolipids	Flavofosfolipol	8	19	19														19								
Glycopeptides (Cyclic peptides, Polypeptides)	Bacitracin	64	19	15														4	13	2						
	Vancomycin	16	19	0							17		2													
Ionophores	Salinomycin	8	19	0							17		2													
Macrolides	Erythromycin	4	19	0						4		2	11	2												
Nitroimidazoles and Nitrofurans	Nitrofurantoin	64	19	6												1		12	5	1						
Penicillins	Amoxicillin / Clavulanic acid	8	19	0								19														
	Ampicillin	8	19	0								16		3												
Streptogramins	Quinupristin/Dalfopristin	2	19	3						2		10	4	3												
Tetracyclines	Tetracyclin	8	19	0							15		4													
	Tetracyclines		0	0																						

Table Antimicrobial susceptibility testing of E. faecium - qualitative data

E. faecium		Cattle (bovine animals) - meat production animals - - faeces - Monitoring - official sampling - objective sampling		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey	
Isolates out of a monitoring program (yes/no)		yes		yes	
Number of isolates available in the laboratory		19		116	
Antimicrobials:		N	n	N	n
Aminoglycosides	Gentamicin	19	0	116	4
	Neomycin	19	4	116	21
	Streptomycin	19	0	116	4
Amphenicols	Chloramphenicol	19	0	116	0
	Florfenicol	19	0	116	0
Fluoroquinolones	Ciprofloxacin	19	11	116	41
Fully sensitive	Fully sensitive	19	0	116	0
Glycolipids	Flavofosfolipol	19	19	116	108
Glycopeptides (Cyclic peptides, Polypeptides)	Bacitracin	19	15	116	63
	Vancomycin	19	0	116	1
Ionophores	Salinomycin	19	0	116	1
Macrolides	Erythromycin	19	0	116	23
Nitroimidazoles and Nitrofurans	Nitrofurantoin	19	6	116	35
Penicillins	Amoxicillin / Clavulanic acid	19	0	116	0
	Ampicillin	19	0	116	2

Table Antimicrobial susceptibility testing of E. faecium - qualitative data

E. faecium		Cattle (bovine animals) - meat production animals - - faeces - Monitoring - official sampling - objective sampling		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey	
Isolates out of a monitoring program (yes/no)		yes		yes	
Number of isolates available in the laboratory		19		116	
Antimicrobials:		N	n	N	n
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	19	1	116	15
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	19	3	116	22
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials	19	9	116	28
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials	19	6	116	33
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials	19	0	116	18
Streptogramins	Quinupristin/Dalfopristin	19	3	116	34
Tetracyclines	Tetracyclin	19	0	116	36

Table Antimicrobial susceptibility testing of E. faecalis - qualitative data

E. faecalis		Cattle (bovine animals) - meat production animals - - faeces - Monitoring - official sampling - objective sampling		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey	
Isolates out of a monitoring program (yes/no)		yes		yes	
Number of isolates available in the laboratory		8		33	
Antimicrobials:		N	n	N	n
Aminoglycosides	Gentamicin	8	0	33	0
	Neomycin	8	2	33	27
	Streptomycin	8	0	33	3
Amphenicols	Chloramphenicol	8	1	33	0
	Florfenicol	8	0	33	0
Fluoroquinolones	Ciprofloxacin	8	1	33	0
Fully sensitive	Fully sensitive	8	0	33	0
Glycolipids	Flavofosfolipol	8	1	33	1
Glycopeptides (Cyclic peptides, Polypeptides)	Bacitracin	8	1	33	8
	Vancomycin	8	0	33	0
Ionophores	Salinomycin	8	0	33	0
Macrolides	Erythromycin	8	0	33	11
Nitroimidazoles and Nitrofurans	Nitrofurantoin	8	1	33	0
Penicillins	Amoxicillin / Clavulanic acid	8	0	33	0
	Ampicillin	8	0	33	0

Table Antimicrobial susceptibility testing of E. faecalis - qualitative data

E. faecalis		Cattle (bovine animals) - meat production animals - - faeces - Monitoring - official sampling - objective sampling		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey	
Isolates out of a monitoring program (yes/no)		yes		yes	
Number of isolates available in the laboratory		8		33	
Antimicrobials:		N	n	N	n
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	8	5	33	1
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	8	1	33	5
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials	8	2	33	13
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials	8	0	33	12
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials	8	0	33	2
Streptogramins	Quinupristin/Dalfopristin	8	6	33	33
Tetracyclines	Tetracyclin	8	0	33	25

Table Antimicrobial susceptibility testing of E. faecalis in broilers - Gallus gallus (fowl) - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey - quantitative data [Dilution method]

E. faecalis		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		33																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	512	33	0														33							
	Neomycin	16	33	27												6	26	1							
	Streptomycin	1024	33	3														29		1			3		
Amphenicols	Chloramphenicol	16	33	0										1	29	3									
	Florfenicol	16	33	0								3		30											
Fluoroquinolones	Ciprofloxacin	2	33	0								28	5												
Glycolipids	Flavofosfolipol	8	33	1						1	13	14	4					1							
Glycopeptides (Cyclic peptides, Polypeptides)	Bacitracin	64	33	8										1			5	19	2		6				
	Vancomycin	16	33	0							3		20	10											
Ionophores	Salinomycin	8	33	0							22		2	7	2										
Macrolides	Erythromycin	4	33	11						11		7	4		1		10								
Nitroimidazoles and Nitrofurans	Nitrofurantoin	64	33	0												30		3							
Penicillins	Amoxicillin / Clavulanic acid	8	33	0								33													
	Ampicillin	8	33	0								33													
Streptogramins	Quinupristin/Dalfopristin	2	33	33										1	3	26	3								
Tetracyclines	Tetracyclin	8	33	25							7		1					25							
	Tetracyclines		0	0																					

Table Antimicrobial susceptibility testing of E. faecalis in Cattle (bovine animals) - meat production animals - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

E. faecalis		Cattle (bovine animals) - meat production animals - - faeces - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		8																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Gentamicin	512	8	0														8								
	Neomycin	16	8	2										4		2	2									
	Streptomycin	1024	8	0											8											
Amphenicols	Chloramphenicol	16	8	1										1	6		1									
	Florfenicol	16	8	0								3		4	1											
Fluoroquinolones	Ciprofloxacin	2	8	1						3		3	1	1												
Glycolipids	Flavofosfolipol	8	8	1						1		2	2	1	1	1										
Glycopeptides (Cyclic peptides, Polypeptides)	Bacitracin	64	8	1										4		1		2	1							
	Vancomycin	16	8	0							4		3	1												
Ionophores	Salinomycin	8	8	0							8															
Macrolides	Erythromycin	4	8	0						5		1	1	1												
Nitroimidazoles and Nitrofurans	Nitrofurantoin	64	8	1												7			1							
Penicillins	Amoxicillin / Clavulanic acid	8	8	0								8														
	Ampicillin	8	8	0								8														
Streptogramins	Quinupristin/Dalfopristin	2	8	6						1		1			3	3										
Tetracyclines	Tetracyclin	8	8	0							7		1													
	Tetracyclines		0	0																						

Table Breakpoints for antibiotic resistance of Enterococcus, non-pathogenic

Test Method Used	
Disc diffusion	○
Agar dilution	○
Broth dilution	◉
E-test	○

Standards used for testing
NCCLS

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Gentamicin**	Danmap	512		512	128	2048				
	Neomycin	ARBAO-II	16		16	8	128				
	Streptomycin	Danmap	1024		1024	128	2048				
Amphenicols	**Chloramphenicol**	CLSI	8	16	16	2	64				
	Florfenicol	CLSI	8	16	16	2	32				
Fluoroquinolones	**Ciprofloxacin**	CLSI	1	2	2	0.5	32				
Glycolipids	**Flavofosfolipol**	Danmap	8		8	0.5	32				
Glycopeptides (Cyclic peptides, Polypeptides)	**Bacitracin**	ARBAO-II	64		64	8	256				
	Vancomycin	CLSI	4	16	16	1	32				
Ionophores	**Salinomycin**	Danmap	8		8	1	32				
Macrolides	**Erythromycin**	CLSI	0.5	4	4	0.5	16				
Nitroimidazoles and Nitrofurans	**Nitrofurantoin**	CLSI	32	64	64	32	256				
Penicillins	**Amoxicillin / Clavulanic acid**	CLSI	8		8	2	64				
	Ampicillin	CLSI	8		8	2	128				

Table Breakpoints for antibiotic resistance of Enterococcus, non-pathogenic

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Streptogramins	**Quinupristin/Dalfopristin**	CLSI	1	2	2	0.5	32				
Tetracyclines	**Tetracyclin**	CLSI	4	8	8	1	32				

3.2 ESCHERICHIA COLI, NON-PATHOGENIC

3.2.1 General evaluation of the national situation

3.2.2 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 analyzed for antimicrobial resistance in 100 samples from cattle and 420 samples from broilers. The samples from cattle were collected in the context of the permanent national monitoring scheme for antimicrobial resistance in Swiss food-producing animals. The samples from broilers were taken in the framework of the baseline study (See: Thermophilic Campylobacter in Gallus gallus).

Type of specimen taken

Fecal samples from cattle, caecal samples broilers.

Methods of sampling (description of sampling techniques)

Fecal samples 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 cooled and brought to the laboratory for analysis. For broilers see: Thermophilic Campylobacter in Gallus gallus (2.2.3.A).

Procedures for the selection of isolates for antimicrobial testing

From each sample positive for E. coli, 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.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

Ampicillin, Apramycin, Amoxicillin/Clavulanic Acid(2:1), Cephalotin, Chloramphenicol, Ciprofloxacin, Colistin, Florfenicol, Gentamicin, Nalidixic Acid,

Neomycin, Sulfamethoxazole, Spectinomycin, Streptomycin, Trimethoprim/Sulfamethoxazole (1:19), Tetracyclin, Ceftiofur

Breakpoints used in testing

Ampicillin, 4 µg/ml; Apramycin, 32 µg/ml; Amoxicillin/ Clavulanic Acid, 32 µg/ml; Cephalotin, 32 µg/ml; Chloramphenicol, 32 µg/ml; Ciprofloxacin, 4 µg/ml; Colistin, 16 µg/ml; Florfenicol, 32 µg/ml; Gentamicin, 16 µg/ml; Nalidixic Acid 32 µg/ml; Neomycin, 16 µg/ml; Sulfamethoxazole, 512 µg/ml; Spectinomycin, 128 µg/ml; Streptomycin, 32 µg/ml; Trimethoprim/Sulfamethoxazole, 4 µg/ml; Tetrazyklin, 16 µg/ml; Ceftiofur, 8 µg/ml

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

Suggestions to the Community for the actions to be taken

Currently no specific action necessary.

Measures in case of the positive findings or single cases

No measures.

Notification system in place

No notification system.

Results of the investigation

149 isolates from broilers and 80 isolates from cattle were subjected to susceptibility testing.
Prevalence of resistance in broilers is significantly higher than in cattle. The highest levels of resistance were found for tetracycline, sulfomethoxacol, nalidixic acid, streptomycin, ampicillin and trimethoprim/sulfomethoxacol.

If epidemiological cut-off values are used, none of the isolates from cattle and only one of the isolates from broilers are resistant to florfenicol. With the old breakpoint 132 isolates seem to be resistant.

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

In general, the resistance situation of indicator bacteria in Switzerland is favorable. Resistance was most frequently observed against antimicrobials that have been used in food animals for many years, such as trimethoprim/sulfonamide, tetracycline and streptomycin.

The results were similar to those of 2006 and 2007.

Relevance of the findings in animals to findings in foodstuffs and to human cases

The relatively high prevalence of resistance to nalidixic acid in E. coli from broilers, is a potential public health concern and should be monitored in future years.

Additional information

See: Antibiotikaresistenzmonitoring 2008 - Jahresbericht on www.bvet.admin.ch

Table Antimicrobial susceptibility testing of E. coli in broilers - Gallus gallus (fowl) - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey - quantitative data [Dilution method]

E. coli		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		149																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Apramycin	16	149	0									107		37	5										
	Gentamicin	8	149	1							141		7					1								
	Kanamycin		0	0																						
	Neomycin	8	149	2								143		4		1		1								
	Spectinomycin	64	149	2												85	60	2		2						
	Streptomycin	16	149	32									69		40	8	9	12	11							
Amphenicols	Chloramphenicol	16	149	1										26	94	28			1							
	Florfenicol	4	149	95								3		51	81	13	1									
Cephalosporins	3rd generation cephalosporins		0	0																						
	Ceftiofur	4	149	0						148		1														
	Cephalothin	16	149	4								3		20	85	37	4									
Fluoroquinolones	Ciprofloxacin	2	149	2			108	1	3	26	6	3			2											
	Enrofloxacin		0	0																						
Penicillins	Amoxicillin / Clavulanic acid	16	149	0								33		77	33	6										
	Ampicillin	16	149	23							5		41	74	6			23								
Polymyxins	Colistin	8	149	0									148		1											
Quinolones	Nalidixic acid	16	149	40										109			1	4	14	21						
Sulfonamides	Sulfamethoxazol	256	149	40													109						40			
	Sulfonamide		0	0																						

Table Antimicrobial susceptibility testing of E. coli in broilers - Gallus gallus (fowl) - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey - quantitative data [Dilution method]

E. coli		Gallus gallus (fowl) - broilers - sampling in the framework of the broiler baseline study - at slaughterhouse - animal sample - caecum - Survey - EU baseline survey																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		149																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Tetracyclines	**Tetracyclin**	8	149	53								74		17	5		3	50							
Trimethoprim	**Trimethoprim**		0	0																					
Trimethoprim + sulfonamides	**Trimethoprim + Sulfamethoxazol**	2	149	18							130		1				18								
	Trimethoprim + sulfonamides		0	0																					

Table Antimicrobial susceptibility testing of E. coli in Cattle (bovine animals) - meat production animals - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

E. coli		Cattle (bovine animals) - meat production animals - - faeces - Monitoring - official sampling - objective sampling																								
Isolates out of a monitoring program (yes/no)		yes																								
Number of isolates available in the laboratory		80																								
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Aminoglycosides	Apramycin	16	80	0									78		2											
	Gentamicin	8	80	1							78		1			1										
	Kanamycin		0	0																						
	Neomycin	8	80	1								78		1				1								
	Spectinomycin	64	80	5												58	15	2	4	1						
	Streptomycin	16	80	4									67		6	3	2		2							
Amphenicols	Chloramphenicol	16	80	1										20	58	1			1							
	Florfenicol	4	80	37								1		42	36	1										
Cephalosporins	3rd generation cephalosporins		0	0																						
	Ceftiofur	4	80	0						80																
	Cephalothin	16	80	2										7	59	12	1	1								
Fluoroquinolones	Ciprofloxacin	2	80	1			77	2							1											
	Enrofloxacin		0	0																						
Penicillins	Amoxicillin / Clavulanic acid	16	80	0								8		51	19	2										
	Ampicillin	16	80	2									19	54	5			2								
Polymyxins	Colistin	8	80	0									80													
Quinolones	Nalidixic acid	16	80	1										79						1						
Sulfonamides	Sulfamethoxazol	256	80	6													74						6			
	Sulfonamide		0	0																						

Table Antimicrobial susceptibility testing of E. coli in Cattle (bovine animals) - meat production animals - at slaughterhouse - animal sample - faeces - Monitoring - official sampling - objective sampling - quantitative data [Dilution method]

E. coli		Cattle (bovine animals) - meat production animals - - faeces - Monitoring - official sampling - objective sampling																							
Isolates out of a monitoring program (yes/no)		yes																							
Number of isolates available in the laboratory		80																							
Antimicrobials:		break points	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Tetracyclines	Tetracyclin	8	80	5								69		6				5								
Trimethoprim	Trimethoprim		0	0																						
Trimethoprim + sulfonamides	Trimethoprim + Sulfamethoxazol	2	80	6							74					6										
	Trimethoprim + sulfonamides		0	0																						

Table Antimicrobial susceptibility testing of E. coli in animals

E. coli		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Turkeys	
Isolates out of a monitoring program (yes/no)		yes				yes			
Number of isolates available in the laboratory		80				149			
Antimicrobials:		N	n	N	n	N	n	N	n
Aminoglycosides	Apramycin	80	0			149	0		
	Gentamicin	80	1			149	1		
	Neomycin	80	1			149	2		
	Spectinomycin	80	5			149	2		
	Streptomycin	80	4			149	32		
Amphenicols	Chloramphenicol	80	1			149	1		
	Florfenicol	80	37			149	95		
Cephalosporins	Ceftiofur	80	0			149	0		
	Cephalothin	80	2			149	4		
Fluoroquinolones	Ciprofloxacin	80	1			149	2		
Fully sensitive	Fully sensitive	80	38			149	19		
Penicillins	Amoxicillin / Clavulanic acid	80	0			149	0		
	Ampicillin	80	2			149	23		
Polymyxins	Colistin	80	0			149	0		
Quinolones	Nalidixic acid	80	1			149	40		
Resistant to 1 antimicrobial	Resistant to 1 antimicrobial	80	33			149	46		
Resistant to 2 antimicrobials	Resistant to 2 antimicrobials	80	4			149	37		
Resistant to 3 antimicrobials	Resistant to 3 antimicrobials	80	0			149	18		
Resistant to 4 antimicrobials	Resistant to 4 antimicrobials	80	1			149	16		
Resistant to >4 antimicrobials	Resistant to >4 antimicrobials	80	4			149	13		

Table Antimicrobial susceptibility testing of E. coli in animals

E. coli		Cattle (bovine animals)		Pigs		Gallus gallus (fowl)		Turkeys	
Isolates out of a monitoring program (yes/no)		yes				yes			
Number of isolates available in the laboratory		80				149			
Antimicrobials:		N	n	N	n	N	n	N	n
Sulfonamides	Sulfamethoxazol	80	6			149	40		
Tetracyclines	Tetracyclin	80	5			149	53		
Trimethoprim + sulfonamides	Trimethoprim + Sulfamethoxazol	80	6			149	18		

Table Breakpoints used for antimicrobial susceptibility testing

Test Method Used	
Disc diffusion	○
Agar dilution	○
Broth dilution	◉
E-test	○

Standards used for testing
NCCLS

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Aminoglycosides	**Apramycin**	Danmap	16		16	4	64				
	Gentamicin	CLSI	4	8	8	1	32				
	Neomycin	Danmap	8		8	2	32				
	Spectinomycin	Danmap	64		64	4	128				
	Streptomycin	Danmap	16		16	4	64				
Amphenicols	**Chloramphenicol**	CLSI	8	16	16	2	64				
	Florfenicol	ARBAO-II	2	4	4	2	64				
Cephalosporins	**Ceftiofur**	ARBAO-II	2	4	4	0.5	8				
	Cephalothin	CLSI	8	16	16	2	64				
Fluoroquinolones	**Ciprofloxacin**	CLSI	1	2	2	0.03	4				
Penicillins	**Amoxicillin / Clavulanic acid**	CLSI	8	16	16	2	32				
	Ampicillin	CLSI	8	16	16	2	32				
Polymyxins	**Colistin**	Danmap	8		8	4	64				
Quinolones	**Nalidixic acid**	CLSI	16		16	128					

Table Breakpoints used for antimicrobial susceptibility testing

			Breakpoint concentration (microg/ml)			Range tested concentration (microg/ml)		Disk content	Breakpoint Zone diameter (mm)		
		Standard for breakpoint	Susceptible <=	Intermediate	Resistant >	lowest	highest	microg	Susceptible >=	Intermediate	Resistant <=
Sulfonamides	**Sulfamethoxazol**	CLSI	256		256	64	1024				
Tetracyclines	**Tetracyclin**	CLSI	4	8	8	2	32				
Trimethoprim + sulfonamides	**Trimethoprim + Sulfamethoxazol**	CLSI	2		2	1	8				

4. INFORMATION ON SPECIFIC MICROBIOLOGICAL AGENTS

4.1 HISTAMINE

4.1.1 General evaluation of the national situation

4.1.2 Histamine in foodstuffs

4.2 ENTEROBACTER SAKAZAKII

4.2.1 General evaluation of the national situation

4.2.2 Enterobacter sakazakii in foodstuffs

4.3 STAPHYLOCOCCAL ENTEROTOXINS

4.3.1 General evaluation of the national situation

4.3.2 Staphylococcal enterotoxins in foodstuffs

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

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. 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 two laboratories designated by the FOPH are currently operating, the National Centre for Enteropathogenic Bacteria (NENT) and the National Centre for Listeria (CNRL). These reference laboratories dispose 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.

According to a revision of the food legislation in the year 2007, cantonal authorities of food control must report relevant data of outbreaks in a standardized format to the FOPH as soon as the investigations are finished. This improvement allows the FOPH to obtain more complete information on food- and waterborne outbreaks in Switzerland.

Description of the types of outbreaks covered by the reporting:

In the data possible and verified outbreaks are included.

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 outbreaks in the past 10 years decreased by around 50% in comparison to the first half of 1990 ies. One reason for that is certainly the successful eradication of S. Enteritidis in layer flocks where the current prevalence is around 0.85%. The implementation of HACCP-systems in food businesses may also have had an influence.

Relevance of the different causative agents, food categories and the agent/food category combinations

Enteritic salmonella were still the most frequent causative agent (4 of 11 outbreaks) followed by Campylobacter with 2 outbreaks.

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. There was only one nationwide outbreak with commercial foods and one waterborne outbreak in a medium size community due to a technical problem in the drinking water plant.

Evaluation of the severity and clinical picture of the human cases

The available clinical data are not very good since this aspect is not in the main focus of the competent authorities. Surprisingly, there were also short hospitalizations in cases of intoxications with histamines and SET. Probably, persons with symptoms more often directly go to emergency stations of hospitals.

Descriptions of single outbreaks of special interest

There was a nationwide outbreak caused by S. Typhimurium. Molecular typing of clinical and food isolates revealed that pork or pork products must have been at least partially responsible for the infections. More detailed information is available in Eurosurveillance, Vol. 13, Issue 44, October 30, 2008.

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. An additional improvement of the situation

could be possible by actions to lower the infection frequencies with Campylobacter in life stock animals. However, rapid success in this field cannot be expected. There is also a permanent effort of the competent authorities to inform the consumers about the hygienically correct handling of foods.

Suggestions to the community for the actions to be taken

In the coming years, ways must be found to reduce the high prevalence of Campylobacter especially in poultry flocks. Also, further efforts are needed to reduce the prevalence of S. Enteritidis in layer flocks.

Foodborne Outbreaks: summarized data

	Total number of outbreaks	Outbreaks	Human cases	Hospitalized	Deaths	Number of verified outbreaks
Bacillus	1	1	5	0	0	0
Campylobacter	2	1	2	1	0	1
Clostridium	0	0	unknown	unknown	unknown	0
Escherichia coli, pathogenic	0	0	unknown	unknown	unknown	0
Foodborne viruses	1	1	80	1	0	0
Listeria	0	0	unknown	unknown	unknown	0
Other agents	1	0	unknown	unknown	unknown	1
Parasites	0	0	unknown	unknown	unknown	0
Salmonella	4	1	20	3	0	3
Staphylococcus	1	0	unknown	unknown	unknown	1
Unknown	1	1	4	0	0	0
Yersinia	0	0	unknown	unknown	unknown	0

Verified Foodborne Outbreaks: detailed data

S. Enteritidis

	Value
Code	
Subagent Choice	
Outbreak type	General
Human cases	13
Hospitalized	8
Deaths	0
Foodstuff implicated	Eggs and egg products
More Foodstuff	fish pastry with egg
Type of evidence	Laboratory detection in implicated food, Laboratory characterization of food and human isolates, Laboratory detection in human cases
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of foodstuff	Domestic
Contributory factors	Inadequate chilling
Outbreaks	1
Comment	

S. Enteritidis

	Value
Code	
Subagent Choice	
Outbreak type	General
Human cases	3
Hospitalized	0
Deaths	0
Foodstuff implicated	Eggs and egg products
More Foodstuff	Ice cream
Type of evidence	Laboratory detection in human cases, Laboratory characterization of food and human isolates, Laboratory detection in implicated food
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Unknown
Origin of foodstuff	Unknown
Contributory factors	
Outbreaks	1
Comment	

S. Typhimurium

	Value
Code	
Subagent Choice	
Outbreak type	General
Human cases	150
Hospitalized	unknown
Deaths	unknown
Foodstuff implicated	Pig meat and products thereof
More Foodstuff	About 34% of the of the human cases were infected with strains which were also demonstrated in quality control samples of pork from a particular company, on a pig carcass from a slaughterhouse and in an imported (from Germany) spare rib sample. (Eurosurveillance, Vol. 13, 30 October 2008)
Type of evidence	Laboratory detection in implicated food, Laboratory detection in human cases, Laboratory characterization of food and human isolates, Analytical epidemiological evidence
Setting	Household
Place of origin of problem	Unknown
Origin of foodstuff	Intra community trade
Contributory factors	
Outbreaks	1
Comment	

Verified Foodborne Outbreaks: detailed data

C. jejuni

	Value
Code	1
Subagent Choice	Campylobacter; C. jejuni
Outbreak type	General
Human cases	185
Hospitalized	unknown
Deaths	0
Foodstuff implicated	Tap water, including well water
More Foodstuff	
Type of evidence	Analytical epidemiological evidence, Laboratory detection in human cases
Setting	Household
Place of origin of problem	Water distribution system
Origin of foodstuff	Domestic
Contributory factors	
Outbreaks	1
Comment	Also human infections with Norovirus, VTEC, ETEC.

Verified Foodborne Outbreaks: detailed data

S. aureus

	Value
Code	
Subagent Choice	
Outbreak type	General
Human cases	5
Hospitalized	4
Deaths	0
Foodstuff implicated	Other or mixed red meat and products thereof
More Foodstuff	Kebab
Type of evidence	Analytical epidemiological evidence, Laboratory detection in implicated food
Setting	Take-away or fast-food outlet
Place of origin of problem	Take-away
Origin of foodstuff	Domestic
Contributory factors	Cross-contamination
Outbreaks	1
Comment	

Verified Foodborne Outbreaks: detailed data

Histamine

	Value
Code	
Subagent Choice	
Outbreak type	Household
Human cases	11
Hospitalized	3
Deaths	0
Foodstuff implicated	Fish and fish products
More Foodstuff	Marinated fish
Type of evidence	Analytical epidemiological evidence, Laboratory detection in implicated food
Setting	Household
Place of origin of problem	Unknown
Origin of foodstuff	Imported from outside EU
Contributory factors	Storage time/temperature abuse
Outbreaks	1
Comment	