European Food Safety Authority

ZOONOSES MONITORING

ICELAND

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

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

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

IN 2012

INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Country: Iceland

Reporting Year: 2012

Laboratory name	Description	Contribution
Icelandic Food and Veterinary Authority, MAST	The Icelandic Food and Veterinary Authority (MAST) is the competent authority for the purpose of Directive 2003/99/EC of the European Parliament and of the Council. MAST carries out administration, surveillance, training and services to fisheries, agriculture, businesses and consumers in order to promote animal health and welfare, plant health and safety of food.	Data and text. The reporting officer is employed at MAST.
Institute for Experimental Pathology, Keldur	Institute for Experimental Pathology, Keldur conducts research and supplies research based advisory support to the Icelandic authorities concerning animal health. They provide diagnostic and analytical services and cover all disciplines relating to infectious diseases: Pathology, bacteriology, virology, parasitology, immunology vaccinology and serology. Keldur serves as a national reference laboratory.	Data
Matis ltd., Matís ohf	Matis is an independent research institute on food and Biotechnology. Matis serves as a testing laboratory for food and feed.	Data
Syni Laboratory service, Sýni ehf	Syni Laboratory Service Ltd. is a privately owned company with a testing laboratory for food and feed.	Data

INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Laboratory name	Description	Contribution
ProMat, Rannsóknaþjónustan ProMat ehf	ProMat Laboratory service Ltd is a privately owned testing laboratory for fish and food.	Data

PREFACE

This report is submitted to the European Commission in accordance with Article 9 of Council Directive 2003/99/ EC*. The information has also been forwarded to the European Food Safety Authority (EFSA).

The report contains information on trends and sources of zoonoses and zoonotic agents in Iceland during the year 2012 .

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

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

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

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

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

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1. ANIMAL POPULATIONS

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

A. Information on susceptible animal population

Sources of information

Information is taken from the livestock database BUSTOFN where all animals and animal owners are registered. The Icelandic Food and Veterinary Authority (MAST) is responsible for the database. Information regarding slaughtered animals comes from the register of slaughtered animals which is hosted at the Farmers Association. Information for number of poultry for meat production comes from the Veterinary Officer for Poultry diseases.

Dates the figures relate to and the content of the figures

The figures for livestock and herds relate to the year 2012 (31.12.2012). As not all the animal groups mentioned exist in Iceland there are no figures on some animal groups in the report. For Poultry the number of flocks is cumulative for the year 2012.

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

Herd means an animal or group of animals kept on a holding as an epidemiological unit. In Iceland, there is generally only one herd of the same animal species execpt for poultry.

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

When evaluating the number of susceptible populations the figures are relatively accurate, considering that these figures have been confirmed during annual on the spot controls for all herds. Livestock officers are responsible for confirming the accuracy of the figures for each animal owner. There has been a general downward trend in the figures for dairy cows, there are fewer holdings but at the same time each holding is getting bigger. Population numbers for sheep and horses have been stable for the past decade.

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

All existing animal groups in Iceland are relatively evenly spread around the agricultural lowland areas. There are no herds or holdings in the highlands, which cover over 80 % of the island. In the summer, from June to September, the flocks of sheep and herds of horses are grazing in the highlands.

Table Susceptible animal populations

* Only if different than current reporting year

		Number of herds or flocks		Number of slaughtered animals		Livestock numbers (live animals)		Number of holdings	
Animal species	Category of animals	Data	Year*	Data	Year*	Data	Year*	Data	Year*
Cattle (bovine animals)	meat production animals	180				7042		180	
	dairy cows and heifers	689				64146		689	
	calves (under 1 year)	23				313		23	
	mixed herds	41				5076		41	
	- in total	933				76577		933	
Deer	farmed - in total	0		0		0		0	
Ducks	meat production flocks	13		13				1	
	parent breeding flocks	1		1				1	
Gallus gallus (fowl)	parent breeding flocks for egg production line	5				3800		3	
	parent breeding flocks for meat production line	35		39702		61000		4	
	laying hens	46		16458		191000		12	
	broilers	657		4965469		737000		28	
Goats	- in total	89				857		89	

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	Data	Year*	Data	Year*	Data	Year*	Data	Year*
Pigs	breeding animals	4		1590		1451		4	
	fattening pigs	15		71860		24659		15	
	- in total	19		73450		26110		19	
Sheep	meat production animals	2646		45991		476262		2646	
	animals under 1 year (lambs)			537317					
	- in total	2646		585398		476262		2646	
Solipeds, domestic	horses - in total	2552		11350		77380		2552	
Turkeys	meat production flocks	28		40982		12000		4	
	parent breeding flocks	2		1795		790		1	
Wild boars	farmed - in total	0		0		0		0	

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

Salmonella is endemic in the pig production but prevalence of Salmonella on pig carcasses has been low since 2007 (0,5 – 2,7%) except for the year 2009 where the prevalence rose to 11,2%.

The situation regarding Salmonella in the poultry meat production has been very good, with prevalence under 1% in poultry flocks for many years and 0% prevalence for three consecutive years (2005 – 2007). In 2009 – 2011, however, an increase in positive poultry flocks was seen. Salmonella in breeding flocks (Gallus gallus) has never been confirmed in the last decade.

Salmonella infections in sheep holdings have not been investigated but clinical outbreaks have sporadically occurred.

A study in 2010 on Salmonella in bovine animals revealed very low prevalence (<0,5%) with no samples positive.

As for sheep, sporadic clinical cases and outbreaks of Salmonella have occurred in horses.

The situation regarding Salmonella in pork and poultry products is considered good.

Spread of Salmonella into the pig production has likely occurred by raw feed materials. PFGE investigations indicate that some Salmonella serotypes have spread into poultry production with compound feed but the mechanism of spread is not known.

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

Since 2009 total cases of human salmonellosis have been relatively few. Numbers of cases acquired abroad have gone down most likely because of less travelling of Icelanders after the past few years. The number of domestic cases was relatively stable in this same period.

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

Because of very strict control programmes for reducing salmonella in the pig and poultry production and low numbers of human cases of salmonellosis, domestic food products of animal origin are considered to represent a small risk to the consumer in regard to Salmonella. This assumption is supported by the experience in 2009 and 2010 where the prevalence of Salmonella in pig and poultry meat production rose significantly but where the prevalence of human cases of salmonellosis did not alter in the same direction. Instead the opposite development was observed.

Because of changes (see recent actions) in the feed production in 2010 spread of Salmonella seems not to be as important as before. Instead, permanent local infections in some premises seem to be the main cause for maintaining the prevalence in the poultry flocks at approximately 1 – 2%.

Recent actions taken to control the zoonoses

Heat treatment of raw soya material (2010) before shipment to pig holdings and replacing an old feed mill (2010) with a new one with excellent bio security are two major factors that have contributed to less spread of Salmonella by feed.

2.1.2 Salmonellosis in humans

A. Salmonellosis in humans

Reporting system in place for the human cases

Yes it is a reportable disease

Case definition

Yes the EU case defintion

Notification system in place

Yes

Relevance as zoonotic disease

High

Table Salmonella in humans - Species/serotype distribution

Species/serotype Distribution	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.	Unknown status
Salmonella	18	6	7	3	6	2	5
S. Enteritidis	9	3	2	1	6	2	1
S. Typhimurium	9	3	5	2	0	0	4

Table Salmonella in humans - Age distribution

Age distribution	S. Enteritidis			S. Typhimurium			Salmonella spp.		
	All	M	F	All	M	F	All	M	F
<1 year	0	0	0	0	0	0	1	1	0
1 to 4 years	0	0	0	1	0		1	1	0
5 to 14 years	0	0	0	0	0	0	0	0	0
15 to 24 years	1	1	0	1	1	0	3	2	1
25 to 44 years	1	0	1	3	1	2	5	4	1
45 to 64 years	7	5	2	2	1	1	8	3	5
65 years and older	0	0	0	2	0	2	3	0	3
Age unknown	0	0	0	0	0	0	0	0	0
Total :	9	6	3	9	3	5	21	11	10

Table Salmonella in humans - Seasonal distribution

Seasonal Distribution Months	S. Enteritidis Cases	S. Typhimurium Cases	Salmonella spp. Cases
January	0	1	1
February	1	0	0
March	0	1	0
April	1	1	0
May	0	0	1
June	0	0	1
July	3	6	3
August	1	0	5
September	1	0	5
October	0	0	4
November	2	0	0
December	0	0	1
not known	0	0	0
Total :	9	9	21

2.1.3 Salmonella in foodstuffs

A. Salmonella spp. in broiler meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

Until june 2012, the DVO were sampling each slaughter batch. From juli 1. 2012, the FBO are sampling each slaughter batch

At meat processing plant

No official sampling
Sampling according to 2073/2005 by FBO is verified under the regular offical control of the FBO.

At retail

The local competent authorities (LCA) are responsible for sampling at retail. Samples were taken in July and August by one LCA in the most populated area.
For Matís survey: Fully packed products were shipped to the lab at the same time as distribution to retail was being done. Samples were stored at 4°C for few days until analysis was performed.

Frequency of the sampling

At slaughterhouse and cutting plant

Each broiler slaughter batch is sampled

At meat processing plant

The frequency of sampling of minced meat and meat preparation by the FBO is according to the production capacity per week. More than 3 tons / week; 5 samples per week. 1 - 3 tons per week; 5 samples every second week. 500 kg - 1 ton; 5 samples 4 times per year. Frequency can be reduced when results have been negative for 30 weeks. Processing plants producing less the 500 kg / week does not need to take samples if they can demonstrate good hygiene practices.

At retail

Depend on the survey
For Matís survey: Samples were collected once every month at random dates and from random producer but with consideration of market share (three main producers in Iceland).

Type of specimen taken

At slaughterhouse and cutting plant

Neck skin

At meat processing plant

Minced meat and meat preparation

At retail

Packed broiler meat and products there of
For Matís survey: Three types of samples: Neck skin, whole skinned loin, wing cuts with skin

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

From each slaughter batch, 50 neck skin samples, each sample consisting of 2-3g, are pooled into one

sample. At the laboratory, a subsample of 25g is taken for further culturing.

At meat processing plant

Each sample is 25 g of minced meat or meat preparations.

At retail

Packed products
For Matís survey: For each type of sample type; 15 packs were received and pool sample prepared from 3 packs resulting in 5 measurments of each sample type. This was done every month

Definition of positive finding

At slaughterhouse and cutting plant

A sample positive for Salmonella spp.

At meat processing plant

Sample is considered to be positive when salmonella spp. is detected.

At retail

Sample is considered to be positive when salmonella spp. is detected.

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

Bacteriological method: NMKL No 71:1999, 5th edition

At meat processing plant

NMKL 71, 5th ed., 1999

At retail

NMKL 71, 5th ed., 1999 ISO 6579:2002 Wellcolex- serogroup identification

Preventive measures in place

All broiler flocks are sampled before slaughter and salmonella positive flocks are destroyed since t is prohibited to slaughter salmonella positive flocks. Haccp activities are verified during official control of FBO. According to national legislation there is a warning note on each package containing raw poultry meat. This note recommends the consumer to prevent cross contamination when handling raw poultry meat.

Control program/mechanisms

The control program/strategies in place

As described before

Measures in case of the positive findings or single cases

When salmonella is detected in a slaughter batch or in a product, the batch is withdrawn from the market.

Notification system in place

The FBO and the laboratory have to report a detection of salmonella spp. immediately to MAST.

Results of the investigation

Results from the FBOs own checks according to 2073/2005 are not available.

33 samples were taken of packed products were taken in retail. Salmonella was not detected in the samples.

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

The FBO should have taken samples according to a guidance on 2073/2005 issued by MAST in april 2012. Detection of salmonella in minced meat and meat preparation was not notified to MAST 2012.

B. Salmonella spp. in pig meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

The information needed is whether carcasses are contaminated with Salmonella or not. Therefore are all slaughter batches from all holdings tested for Salmonella. The sampling is a part of permanent control programme and is objective, official and performed by the CA (MAST).

Samples are taken from carcasses after cooling where the number of samples depend on the size of the slaughter batch.

At meat processing plant

No offical sampling
Sampling according to 2073/2005 by FBO is verified under the regular offical control of the FBO.

At retail

No offical sampling
The local health authorities (LHA) are responsible for sampling at retail. No survey in 2012

Frequency of the sampling

At slaughterhouse and cutting plant

Every herd is sampled at each slaughter. From every herd ten randomly chosen carcasses from the slaughter batch are swabbed if 40 or fewer pigs are slaughtered, twenty carcasses are swabbed if 41 - 120 pigs are slaughtered and thirty carcasses are swabbed if more than 120 pigs are slaughtered. By this number of samples it can be declared by 95% confidence level that at least one positive sample will be detected in the batch if the prevalence in the batch is 10 – 15% or higher.

At meat processing plant

The frequency of sampling of minced meat and meat preparation by the FBO is according to the production capacity per week. More than 3 tons / week; 5 samples per week. 1 - 3 tons per week; 5 samples every second week. 500 kg - 1 ton; 5 samples 4 times per year. Frequency can be reduced when results have been negative for 30 weeks. Processing plants producing less the 500 kg / week does not need to take samples if they can demonstrate good hygiene practices.

At retail

Depend on the survey

Type of specimen taken

At slaughterhouse and cutting plant

Surface of carcass

At meat processing plant

Minced meat and meat preparation

At retail

Depends on the survey.

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

At slaughtering, the pig carcasses are split into two parts along the vertebrate. After cooling both carcass parts are swabbed in three designated areas. One cotton swab is used for both carcass parts. Two of the three areas on each part cover approx. 10 x 10 cm. The third area covers approx. 100 cm2. The three different areas on each side of the carcass cover the following sites:

Area I: Anus region, inside of the thigh and the pelvis region
Area II: The cut surface of the breast and abdomen, underbelly
Area III: Inside the cranial part of thorax and the adjacent transected bones/ribs

Swabs from 10 carcasses are pooled together in on sample.

At meat processing plant

Each sample is 25 g of minced meat or meat preparations. Samples can be pooled into one samples (225g).

At retail

Depends on the survey.

Definition of positive finding

At slaughterhouse and cutting plant

The swabs tests are Tecra Rapid tests (antibody/antigen test). A positive test according to the protocol for the test and before confirmation by culturing, is regarded as positive for Salmonella. Confirmation by culturing is not needed, but at least one swab from each slaughter batch is serotyped and tested for antimicrobial resistance. If a positive Tecra test is negative by bacteriological culturing, the result has no influence on actions already taken regarding next slaughter from the respective herd.

At meat processing plant

Sample is considered to be positive when salmonella spp. is detected.

At retail

Sample is considered to be positive when salmonella spp. is detected.

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

Salmonella Tecra Unique Rapid Test. (Enrichment immunocapture immunoenrichment and detection steps)
Bacteriological method: NMKL 187:2007
Bacteriological method: NMKL 71:1999

At meat processing plant

Bacteriological method: NMKL 71:1999

At retail

Bacteriological method: NMKL 71:1999

Preventive measures in place

Sanitary slaughtering is performed when herds are categorised as level 3 herds. Organs from pigs originating from level 2 or 3 herds are considered not fit for processing or consumption.
Haccp activities are verified under official control of FBO.

Control program/mechanisms

The control program/strategies in place

The mandatory national control programme for Salmonella in pigs is approved by the Competent Authority, MAST. The aim of the programme is to prevent salmonella in pork and thereby mitigate the risk of human salmonellosis.

The surveillance programme is constructed to monitor salmonella infections at farm level by measuring antibodies against Salmonella in meat juice test, to survey salmonella contamination on pig carcasses at slaughtering and to monitor Salmonella serotypes in faecal and swab samples. Salmonella serotypes are also tested for antimicrobial resistance.

Measures in case of the positive findings or single cases

Finding one positive sample from a level 1 herd initiates reactions. In case of a positive sample all carcasses from the respective herd must be swabbed at next slaughter and quarantined whilst waiting for the results from the swab test. All positive carcasses must be heat treated before entering the market.

All carcasses from level 2 and 3 herds are swabbed and quarantined at the slaughterhouse and cannot enter the market unless swabs are negative. Carcasses positive for Salmonella must be heat treated.

When salmonella is detected in a product, the product is withdrawn from the market.

Notification system in place

Salmonella is a notifiable disease, according to national legislation on animal diseases No. 25/1993 and according to the national Food Law No. 93/1995. The Competent Authority, MAST, receives all results from the respective laboratories regarding Salmonella testing (including serotyping and antimicrobial resistance) on samples from pig production, slaughtering and from FBO own checks in slaughterhouses, cutting plants and processing plants.

Results of the investigation

Swabs taken at the slaughterhouses were 0,3% positive for Salmonella. In swab samples Salmonella Worthington, Salmonella Brandenburg and Salmonella Kedougou were found.

Results from the FBOs own checks according to 2073/2005 are not available.

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

The prevalence for Salmonella positive swab samples was 1,1%, 0,5%, 1,4% in 2006, 2007 and 2008. The prevalence rose to 11,2% in 2009 but declined in the two consecutive years i.e. in 2011 and 2012 to 1,3% and 0,3% respectively. Despite of the increase in Salmonella in the pig production and on pig carcasses salmonellosis in humans in the same period did not alter in the same direction. On the contrary domestic cases of salmonellosis in humans were fewer in 2009 and 2010 compared to domestic cases in the previous years.

Detection of salmonella in minced meat and meat preparation (pig meat) was not notified to MAST 2012

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

Salmonella on pig carcasses seems not to be a major source for human infections.

C. Salmonella spp. in bovine meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

No official sampling.
Sampling according to 2073/2005 by FBO is verified under the regular offical control of the FBO.

At meat processing plant

No official sampling.
Sampling according to 2073/2005 by FBO is verified under the regular offical control of the FBO.

At retail

No official sampling.

Frequency of the sampling

At slaughterhouse and cutting plant

The frequency of sampling by FBO is proportional to the slaughterhouse's througput.
Slaughtering of beef and horses. >10.000 carcasses / year; 5 samples every second week. 2000- 10000 carcases; /year 5 samples per month. 500-2000 carcasses / month 5 samples 4 times a year. < 500 carcasses no sampling if GHP can be demonstrated.
Slaugtering of lamb / sheep. > 100.000 carcasses / slaughtering periode of 6- 8 weeks; 5 samples 5 times during the periode. 50.000- 100.000 carcasses / slaughtering periode of 6- 8 weeks; 5 samples 4 times during the periode. 10.000- 50.000 carcasses / slaughtering periode of 6- 8 weeks; 5 samples 2 times during the periode. < 10.000 no sampling if GHP can be demonstrated.

At meat processing plant

The frequency of sampling of minced meat and meat preparation by the FBO is according to the production capacity per week. More than 3 tons / week; 5 samples per week. 1 - 3 tons per week; 5 samples every second week. 500 kg - 1 ton; 5 samples 4 times per year. Frequency can be reduced when results have been negative for 30 weeks. Processing plants producing less the 500 kg / week does not need to take samples if they can demonstrate good hygiene practices (GHP).

At retail

The local health authorities (LHA) are responsible for sampling at retail
No official sampling 2012.

Type of specimen taken

At slaughterhouse and cutting plant

Surface of carcass

At meat processing plant

Each sample is 25 g of minced meat or meat preparations.

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

According to MAST guidance the slaughterhouses should swab the carcass before chilling in four designated areas with a sponge. Each area 10 x 10 cm; total 400 cm2. Swabs of 5 carcasses can be

pooled to one sample.

At meat processing plant

Each sample is 25 g of minced meat or meat preparations. Samples can be pooled into one sample (225 g)

Definition of positive finding

At slaughterhouse and cutting plant

Sample is considered to be positive when salmonella spp. is detected.

At meat processing plant

Sample is considered to be positive when salmonella spp. is detected.

At retail

Sample is considered to be positive when salmonella spp. is detected.

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

NMKL No 71:1999, 5th edition

At meat processing plant

NMKL No 71:1999, 5th edition

At retail

NMKL No 71:1999, 5th edition

Preventive measures in place

HACCP activities are verified under official control of FBO.

Measures in case of the positive findings or single cases

Meat should be withdrawn from the market.

Notification system in place

Laboratories as well as the FBO analysing salmonella should notify any detection of Salmonella to MAST. Salmonella is a notifiable disease, according to national legislation on animal diseases No. 25/1993 and according to the national Food Law No. 93/1995. The Competent Authority, MAST, receives all positive results from the respective laboratories regarding Salmonella testing (including serotyping and antimicrobial resistance) on samples from FBO own checks in slaughterhouses, cutting plants and processing plants.

Results of the investigation

The results from the FBO own checks are not available. There is no indication that Salmonella is a problem in bovine meat production
Salmonella has not been notified by FBO to MAST the competent authority.

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

Detection of salmonella in minced meat and meat preparation (bovine meat) was not notified to MAST 2012

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

Salmonella on bovine carcasses seems not to be a major source for human infections.

D. Salmonella spp. in turkey meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

Until june 2012, the DVO were sampling each slaughter batch. From juli 1. 2012, the FBO are sampling each slaughter batch.
Sampling at cutting plant according to 2073/2005 by FBO is verified under the regular offical control of the FBO.

At meat processing plant

No official sampling
Sampling according to 2073/2005 by FBO is verified under the regular offical control of the FBO.

At retail

No official sampling

Frequency of the sampling

At slaughterhouse and cutting plant

Each turkey slaughter batch is sampled

At meat processing plant

The frequency of sampling of minced meat and meat preparation by the FBO is according to the production capacity per week. More than 3 tons / week; 5 samples per week. 1 - 3 tons per week; 5 samples every second week. 500 kg - 1 ton; 5 samples 4 times per year. Frequency can be reduced when results have been negative for 30 weeks. Processing plants producing less the 500 kg / week does not need to take samples if they can demonstrate good hygiene practices.

Type of specimen taken

At slaughterhouse and cutting plant

Neck skin

At meat processing plant

Minced meat and meat preparation

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

From each slaughter batch, 50 neck skin samples, each sample consisting of 2-3g, are pooled into one sample. At the laboratory, a subsample of 25g is taken for further culturing.

At meat processing plant

Each sample is 25 g of minced meat or meat preparations.

Definition of positive finding

At slaughterhouse and cutting plant

A sample positive for Salmonella spp.

At meat processing plant

Sample is considered to be positive when salmonella spp. is detected.

At retail

Sample is considered to be positive when salmonella spp. is detected.

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

Bacteriological method: NMKL No 71:1999, 5th edition

At meat processing plant

NMKL No 71:1999, 5th edition

At retail

NMKL No 71:1999, 5th edition

Preventive measures in place

All flocks are sampled before slaughter and salmonella positive flocks are destroyed since it is prohibited to slaughter salmonella positive flocks. Haccp activities are verified during official control of FBO.

Measures in case of the positive findings or single cases

When salmonella is detected in a slaughter batch or in a product, the batch is withdrawn from the market.

Notification system in place

The FBO and the laboratory have to report a detection of salmonella spp. immediately to MAST.

Results of the investigation

Results from the FBOs own checks according to 2073/2005 are not available.

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

The FBO should have taken samples according to a guidance on 2073/2005 issued by MAST in april 2012. Detection of salmonella in minced meat and meat preparation was not notified to MAST 2012

E. Salmonella spp. in eggs and egg products

Monitoring system

Sampling strategy

Flocks of laying hens are monitored see under salmonella spp. in flocks of laying hens
No official sampling

Frequency of the sampling

Eggs at egg packing centres (foodstuff based approach)

No official sampling

Eggs at retail

No official sampling

Raw material for egg products (at production plant)

No official sampling

Egg products (at production plant and at retail)

No official sampling

Table Salmonella in poultry meat and products thereof

	Source of information	Sampling strategy	Sampler	Sample type	Sample origin	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium
Meat from broilers (Gallus gallus) - carcase - at slaughterhouse - Surveillance	Keldur	Census	Official and industry sampling	food sample > neck skin	Domestic	Batch	25g	868	2		
Meat from broilers (Gallus gallus) - fresh - at retail - Surveillance	Matís laboratory	Objective sampling	Official sampling	feed sample	Domestic	Single	25	15	0		
Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - at retail - Surveillance	Matís laboratory	Objective sampling	Official sampling	food sample	Domestic	Single		18	0		
Meat from turkey - carcase - at slaughterhouse - Surveillance	Keldur	Census	Official and industry sampling	food sample > neck skin	Domestic	Batch	25	67	0		
Meat from duck - carcase - at slaughterhouse - Surveillance	Keldur	Census	Official and industry sampling	food sample > neck skin	Domestic	Batch	25g	14	0		
Meat from broilers (Gallus gallus) - fresh - chilled - at retail - Survey - national survey (neck skin of whole chicken)	Matís	Convenience sampling	Industry sampling	food sample > neck skin	Domestic	Single	25g	117	0		
Meat from broilers (Gallus gallus) - fresh - skinned - at retail - Survey - national survey (Skinned loines) [1)]	Matís	Convenience sampling	Industry sampling	food sample	Domestic	Single	90 mL	117	0		
Meat from broilers (Gallus gallus) - fresh - with skin - at retail - Survey (wings with skin) [2)]	Matís	Convenience sampling	Industry sampling	food sample	Domestic	Single	90 mL	117	0		

Table Salmonella in poultry meat and products thereof

	S. 1,4,[5],12:i:-	Salmonella spp., unspecified
Meat from broilers (Gallus gallus) - carcase - at slaughterhouse - Surveillance		2
Meat from broilers (Gallus gallus) - fresh - at retail - Surveillance		
Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - at retail - Surveillance		
Meat from turkey - carcase - at slaughterhouse - Surveillance		
Meat from duck - carcase - at slaughterhouse - Surveillance		
Meat from broilers (Gallus gallus) - fresh - chilled - at retail - Survey - national survey (neck skin of whole chicken)		
Meat from broilers (Gallus gallus) - fresh - skinned - at retail - Survey - national survey (Skinned loines) [1)]		
Meat from broilers (Gallus gallus) - fresh - with skin - at retail - Survey (wings with skin) [2)]		

Comments:

[1)] Samples were rinsed in 100 mL BPW

[2)] Samples were rinsed in 100 mL BPW

Table Salmonella in red meat and products thereof

	Source of information	Sampling strategy	Sampler	Sample type	Sample origin	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium
Meat from pig - carcase - at slaughterhouse - Surveillance	MAST	Objective sampling	Official sampling	food sample > carcase swabs	Domestic	Batch	2 x 3 x 100 cm2	2172	7		

	S. 1,4,[5],12:i:-	Salmonella spp., unspecified	S. Brandenburg	S. Kedougou	S. Worthington
Meat from pig - carcase - at slaughterhouse - Surveillance			2	2	3

2.1.4 Salmonella in animals

A. Salmonella spp. in Gallus Gallus - breeding flocks

Monitoring system

Sampling strategy

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

The monitoring of salmonella in breeding flocks of Gallus gallus is applied to the whole country.
Every breeding flock consisting of 250 animals or more is sampled. During primary production samples are both taken by the food business operator (FBO) and by the competent authority (CA) in accordance with the national control programme.

In 2012, all samples from breeding flocks are taken at farm level. When a breeder flock is slaughtered official samples are taken from each slaughter batch at the time of slaughter, after evisceration but before chilling. The sampling strategy is according to national requirements that were implemented in 2001 and 2002 and a national control programme that was first implemented in 2008 in accordance with reg. (EC) no. 2130/2003.

In Iceland there are only parent flocks.

Frequency of the sampling

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

Every flock is sampled

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

At the age of 4 weeks and again 2 weeks before moving to the laying phase.

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

Every 2 weeks.
If eggs from a breeding flocks are not incubated monthly or more often, then samples have to be taken each time before eggs are sent for incubation, and the result must be available before eggs are shipped to the hatchery.

Type of specimen taken

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

Hatched eggs

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

Socks/ boot swabs

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

Until march 2012: eggshell samples.
Socks / boots wabs, or boot swabs/dust sample, or fecal sample

Methods of sampling (description of sampling techniques)

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

From each breeding flock (paternal line and maternal line separately) one sample is taken during hatching. The pooled sample consists of 10 g of broken eggshells taken from a total of 25 separate hatcher baskets, which in total is at least 250g of broken eggshells.

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

From each breeding flock two pairs of boot swabs are collected and pooled into one sample, both at the age of 4 weeks and two weeks before moving to the laying phase.

Breeding flocks: Production period

Industry samples: On their choice, there are either taken 5 pairs of bootswabs (2 pooled samples) or one pair of bootswab and one dustsample, the dust sample is cultured separately. In case it is not possible to take bootswab samples, 2 pooled samples of in total 300 individual fecal samples are taken.

The official samples are taken in the same way as the industry samples:two pooled samples with either 5 pairs of bootswabs or one pair of bootswabs and one dust sample, or 300 fecal samples. The samples are taken at the beginning and the end of the laying phase and once in beetween.

In january and february 2012, there were also taken eggshell samples at the hatchery according to the NCP which was reviewed in february 2012.

Case definition

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

A sample positive for salmonella spp. In cases where the CA has suspicion of a false positive result, the CA can confirm a first positive finding, and if it is not possible to confirm, the flock will be calculated as negative.

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

A sample positive for salmonella spp. In cases where the CA has suspicion of a false positive result, the CA can confirm a first positive finding, and if it is not possible to confirm, the flock will be calculated as negative.

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

A sample positive for salmonella spp., always confirmed by the CA. If it is not possible to confirm a first positive finding in two consecutive samples taken by the CA, the flock will be calculated as negative.

Diagnostic/analytical methods used

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

Bacteriological method: NMKL No 71:1999, 5th edition

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

Bacteriological method: NMKL No 71:1999, 5th edition

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

Bacteriological method: NMKL No 71:1999, 5th edition

Vaccination policy

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

Vaccination of poultry flocks against salmonella is not allowed according to the national control program.

Other preventive measures than vaccination in place

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

Preventive measures include specific requirements regarding biosecurity in accordance with national legislation.

Preventive treatment with antibiotics is not practiced in Iceland, and although the treatment is not specifically prohibited it is however against Icelandic policy regarding the use of antimicrobials.

Control program/mechanisms

The control program/strategies in place

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

A national control programme was published by the Competent Authority on 1.11.2008 and reviewed in february 2012 for the control of salmonella in poultry. The control programme was developed according to reg. (EC) nr. 2130/2003 and reg. (EC) no. 213/2009.

The industry bears all the cost of the sampling. They also bear the cost of official sampling.

According to reg. (IS) no. 688/2002 and according to instructions published by the CA for the implementation of reg. (EC) nr. 2073/2005, samples are taken by the FBO from each slaughter batch by taking one pooled sample consisting of 50 neck skins.

The industry bears the cost of all sampling, also of sampling by the CA.

According to Icelandic legal act no. 25/1993 it is prohibited to import poultry to Iceland. Exception can however be given when quarantine is possible, which is the case for hatching eggs or day old chicks for parent stock.

Measures in case of the positive findings or single cases

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

According to Icelandic legal act no. 25/1993 and reg. (IS) no. 665/2001 birds from a flock that has been tested positive may not be moved from the farm. It is not allowed to hatch eggs from a positive parent flock. According to reg. (IS) no. 688/2002 a positive flock cannot be sent to the slaughterhouse and must be culled at the farm.

Notification system in place

Salmonella is a notifiable disease according to Icelandic legal act nr. 25/1993.
The laboratory sends an immediate notification to the CA when there is a positive salmonella finding.

Results of the investigation

No Salmonella spp. was found in breeding flocks of Gallus gallus.

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

No Salmonella spp. was found in breeding flocks of Gallus gallus.

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

No salmonella spp. was found in breeding flocks of Gallus gallus and they are not considered as a source of infection in boilers, other animals, foodstuffs or humans.

B. Salmonella spp. in Gallus Gallus - broiler flocks

Monitoring system

Sampling strategy

Broiler flocks

The sampling strategy is according to a control programme that was implemented in 2008 in accordance with reg. (EC) no. 646/2007 and it applies to all of Iceland. The national control program was reviewed in february 2012, but as regards boilers, no changes had been made.

Samples are taken by the food business operator (FBO). Official samples are taken by the competent authority from 10% of all broiler farms every year. Samples are taken from one flock per farm. Samples are also taken by the FBO from each slaughter batch (slaughter flock) at the time of slaughter, after evisceration but before chilling.

Frequency of the sampling

Broiler flocks: Before slaughter at farm

3 weeks prior to slaughter

Broiler flocks: At slaughter (flock based approach)

Every flock is sampled

Type of specimen taken

Broiler flocks: Before slaughter at farm

Other: Boot/sock swabs. According to the National Control Program it is also allowed to take one sock sample and one dust sample but it is not practiced.

Broiler flocks: At slaughter (flock based approach)

Neck skin

Methods of sampling (description of sampling techniques)

Broiler flocks: Before slaughter at farm

From each broiler flock two pairs of boot swabs are collected and pooled into one sample. In case one sock sample and one dust sample are taken, the two samples are pooled into one sample.

The official sample consists of one sock sample and one dust sample, and the samples are cultured separately.

Broiler flocks: At slaughter (flock based approach)

From each slaughter flock one pooled sample consisting of 50 neck skin samples is taken, with each neck skin sample weighting between 3 - 5 g.

Case definition

Broiler flocks: Before slaughter at farm

A flock is considered positive when Salmonella spp. is found in a sample. According to the national control programme, no confirming samples have to be taken. But as a part of the FBO’s own controls, usually a confirmatory sample is taken. When salmonella is not found in two subsequent samples and not in a third sample taken by the CA, the flock is considered to be negative for salmonella.

Broiler flocks: At slaughter (flock based approach)

A sample positive for Salmonella spp.

Diagnostic/analytical methods used

Broiler flocks: Before slaughter at farm

Bacteriological method: NMKL No 71:1999, 5th edition

Broiler flocks: At slaughter (flock based approach)

Bacteriological method: NMKL No 71:1999, 5th edition

Vaccination policy

Broiler flocks

Vaccination of poultry flocks against salmonella is not practiced in Iceland and not allowed according to the National Control Program.

Other preventive measures than vaccination in place

Broiler flocks

Preventive measures include specific requirements regarding biosecurity in accordance with national legislation.

Control program/mechanisms

The control program/strategies in place

Broiler flocks

A national control programme was published by the Competent Authority on 1.11.2008 for the control of salmonella in poultry. The NCP was reviewed in february 2012. The control programme was developed according to reg. (EC) no. 2130/2003. It describes sampling of each broiler flock at the farm three weeks prior to slaughter.

According to reg. (IS) no. 688/2002 and according to instructions published by the CA for the implementation of reg. (EC) nr. 2073/2005, samples are taken by the FBO from each slaughter batch by taking one pooled sample consisting of 50 neck skins.

The industry bears the cost of all sampling, also of sampling by the CA.

According to Icelandic legal act no. 25/1993 it is prohibited to import poultry to Iceland. Exception can however be given when quarantine is possible. No broilers and no broiler hatching eggs are imported to Iceland.

Measures in case of the positive findings or single cases

Broiler flocks: Before slaughter at farm

According Icelandic legal act no. 25/1993 and reg. (IS) no. 665/2001 birds from a flock that has been tested positive may not be moved from the farm. According to reg. (IS) no. 688/2002 a positive flock cannot be sent to the slaughterhouse and is therefore culled at the farm.

Broiler flocks: At slaughter (flock based approach)

According to reg. (IS) no. 688/2002 all meat from a slaughter flock with a positive neck skin sample has to be destroyed or heat treated before further distribution. All raw meat from the flock that has already been distributed is also withdrawn from the market.

Notification system in place

Salmonella is a notifiable disease according to Icelandic legal act no. 25/1993.
The laboratory sends an immediate notification to the CA when there is a positive salmonella finding.

Results of the investigation

Prevalence of salmonella has been low in the last years. but rose after 2008.

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

Since 1997 salmonella prevalence in broiler flocks at the farm level has been below 1%. After 2008 however, the prevalence of salmonella in broiler flocks rose and reached a peak in 2010. In 2012, reinfection of broiler flocks in previously contaminated houses was a major source of infection.

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

In Iceland it is not allowed to slaughter salmonella positive poultry flocks. Therefore, the main sources of contaminated poultry meat are flocks with a negative pre-slaughter sample but a positive sample at the time of slaughter. Cross contamination between negative and positive flocks at the slaughterhouse is also a source. Salmonella prevalence in slaughter flocks has been far below 1% since sampling started in 1998 and up until 2010 (except for 2001 when prevalence was 1,8%). In 2010 and 2011, prevalence in slaughter flocks rose to 4,1% and 1,3%, respectively. No S. enteritidis or S. typhimurium were however found in broilers during this time and there have been no reports or indications of human infections from infected broiler products in the past two years.

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

Monitoring system

Sampling strategy

Laying hens flocks

The monitoring of salmonella in laying hens covers the whole country. All flocks of more than 50 laying hens are under surveillance.

At primary production the samples are taken by the Food Buisness Operator (FBO). Official samples are also taken by the Competent Authority (CA) once a year from each farm with more than 1000 hens. Samples are taken one flock per farm.

All samples from primary production are taken at the farm. If a flock of laying hens is slaughtered, samples are taken by the FBO from each slaughter batch at the time of slaughter, after evisceration but before chilling. The sampling strategy is according to national requirements that were implemented in 2001 and 2002 and a national control programme that was first implemented in 2008 in accordance with reg. (EC) no. 2160/2003.

Frequency of the sampling

Laying hens: Day-old chicks

Every flock is sampled

Laying hens: Rearing period

At the age of 2-4 weeks, and at the age of 12 - 15 weeks.

Laying hens: Production period

Every 15 weeks.

Laying hens: Before slaughter at farm

2 weeks prior to slaughter.

Laying hens: At slaughter

Every flock is sampled

Type of specimen taken

Laying hens: Day-old chicks

internal linings of delivery boxes or fabric swabs

Laying hens: Rearing period

Faeces or sock samples

Laying hens: Production period

Faeces or sock samples.
Official samples consist of one dust sample and one sock sample or fecal sample

Laying hens: Before slaughter at farm

Faeces or sock samples, or faeces/sock sample and one dust sample

Laying hens: At slaughter

Neck skin

Methods of sampling (description of sampling techniques)

Laying hens: Day-old chicks

One pooled sample of internal linings from 5 delivery boxes.

Laying hens: Rearing period

One pooled sample consisting of 2x150g fecal samples. Or one pooled sample with two pairs of sock samples.

Laying hens: Production period

One pooled sample consisting of 2x150g fecal samples or of two pairs of sock samples.
Official samples: one pooled sample consisting of 2x150 g of fecal samples, or one pair of boot swabs and 1 x 100g of dust sample.

Laying hens: Before slaughter at farm

One pooled sample consisting of 2x150g fecal samples or of two pairs of sock samples.

Laying hens: At slaughter

One pooled sample consisting of 50 neck skin samples, each neck skin sample weighting between 3-5 g.

Case definition

Laying hens: Day-old chicks

A sample positive for Salmonella spp.

Laying hens: Rearing period

A sample positive for Salmonella spp.

Laying hens: Production period

Fecal and/or dust sample positive for Salmonella spp. If confirmation samples are taken according to reg. nr. (EC) 2160/2003, the flock is considered to be negative.

Laying hens: Before slaughter at farm

A sample positive for Salmonella spp.

Laying hens: At slaughter

A sample positive for Salmonella spp.

Diagnostic/analytical methods used

Laying hens: Rearing period

Bacteriological method: NMKL No 71:1999, 5th edition

Laying hens: Production period

Bacteriological method: NMKL No 71:1999, 5th edition

Laying hens: Before slaughter at farm

Bacteriological method: NMKL No 71:1999, 5th edition

Laying hens: At slaughter

Bacteriological method: NMKL No 71:1999, 5th edition

Vaccination policy

Laying hens flocks

Vaccination of poultry flocks against salmonella is not practiced and not allowed according to the NCP.

Other preventive measures than vaccination in place

Laying hens flocks

Preventive measures include specific requirements regarding biosecurity in accordance with national legislation.
Preventive treatment with antibiotics is not practiced in Iceland, and although the treatment is not specifically prohibited it is however against Icelandic policy regarding the use of antimicrobials.

Control program/mechanisms

The control program/strategies in place

Laying hens flocks

A national control programme was published by the Competent Authority on 1.11.2008 for the control of salmonella in poultry. The NCP was reviewed in february 2012. The control programme was developed according to reg. (EC) no. 2160/2003.

According to reg. (IS) no. 688/2002 and according to instructions published by the CA for the implementation of reg. (EC) nr. 2073/2005, samples are taken by the FBO from each slaughter batch by taking one pooled sample consisting of 50 neck skins.

The industry bears the cost of all sampling, also of sampling by the CA.

According to Icelandic legal act no. 25/1993 it is prohibited to import poultry to Iceland. Exception can however be given when quarantine is possible. No laying hens and no hatching eggs for laying hens are imported to Iceland.

Measures in case of the positive findings or single cases

Laying hens flocks

According to Icelandic legal act no. 25/1993 and reg. (IS) no. 665/2001 birds from a salmonella positive flock may not be moved from the farm and it is forbidden to distribute eggs from a salmonella infected flock. According to reg. (IS) no. 688/2002 it is not allowed to send a salmonella positive flock to the slaughterhouse. Therefore a positive flock will be culled at the farm.

Notification system in place

Salmonella is a notifiable disease according to Icelandic legal act no. 25/1993. The laboratory sends an immediate notification to the CA when there is a positive salmonella finding.

Results of the investigation

No salmonella spp. has been found in flocks of laying hens in 2012.

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

After the implementation of the national control programme in 2008, salmonella has only been detected twice, once in an official dust sample on a commercial laying hen farm in 2010 and once in fecal samples taken by an FBO in a backyard flock in 2011. Official samples taken for confirmation were however in both cases all negative. Salmonella had never been detected in flocks of laying hens before 2008. The source of the infection in both cases remains unclear.

Salmonella has been found only twice in laying hens since reg. (IS) no. 904/2001 was implemented and

there has never been any evidence that eggs from these flocks caused any human infections.

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

There is no indication that salmonella in Icelandic table eggs or egg products is a major source of infections in humans. Salmonella Enteritidis has never been found in laying hens and is not frequently found in humans. Table eggs have never been suspected as the source of foodborne outbreaks in humans after 2002.

D. Salmonella spp. in bovine animals

Monitoring system

Sampling strategy

No regular sampling

E. Salmonella spp. in pigs

Monitoring system

Sampling strategy

Breeding herds

There are neither breeding herds nor multiplying herds as such in Iceland which produce purebred pigs (f.exs. Landrace , Yorkshire) or hybrid pigs (f.exs. LY, HD) for sale. Breeding or improvement of the stock is done by import of frozen semen from Norway. Therefore all pig herds produce their own purebreds (sows and boars) and hybrid pigs (sows and boars) mostly by insemination.

All pig holdings produce pigs for slaughtering, but some holdings can have separate herds with purebred/hybrid production, sow herds with piglet production or herds with fattening pigs.

All sow herds with piglet production and all herds with purebred/hybrid production shall be faecal sampled once pr. year.

The official sampling is a part of a permanent surveillance programme and performed by the CA (MAST).

Multiplying herds

See breeding herds.

Fattening herds

See also breeding herds.

Surveillance of all slaughter pig herds is carried out at the slaughterhouses by continuous serologic testing of meat juice from all herds. The sampling is objective and random meat samples are collected from carcasses after cooling. Number of samples and frequency of sampling depend on herd size.

Sixty, seventy five or one hundred samples shall be taken from herds slaughtering for less than 2000 pigs pr. year, 2001 – 5000 pigs pr. year and over 5001 pigs pr. year respectively.

A Salmonella index is calculated for each herd based on the weighted average of positive meat juice samples from the previous thirteen weeks, where results from the current period (last five weeks) weigh three times as much as the two previous ones (2 periods each consisting of 4 weeks).

Once or twice a month finisher herds are classified into levels; level one, two or three, according to their Salmonella index. Herds having indexes lower than 39 are categorised into level one, into level two having indexes between 40 and 69 and into level three having indexes higher than 70.

The surveillance programme for detection of Salmonella infection in pig herds was implemented 1st of October 2006.

All herds shall be faecal sampled once pr. year and more often if needed. The official sampling is a part of the surveillance programme and is performed by the CA (MAST).

Frequency of the sampling

Breeding herds

Once a year

Fattening herds at farm

Other: Once a year and when needed

Fattening herds at slaughterhouse (herd based approach)

Other: Depends on herd size

Type of specimen taken

Breeding herds

Faeces

Fattening herds at farm

Faeces

Fattening herds at slaughterhouse (herd based approach)

Meat juice

Methods of sampling (description of sampling techniques)

Breeding herds

The number of faecal samples depends on the herd size. Herds with > 400 animals collect 20 samples and herds with 100 – 400 animals collect 4 – 16 samples.

Fattening herds at farm

The number of faecal samples depends on the herd size. Herds with > 400 animals collect 20 samples and herds with 100 – 400 animals collect 4 – 16 samples.

Fattening herds at slaughterhouse (herd based approach)

Meat samples are collected from carcasses after cooling. The meat samples are collected in special meat juice containers. Number of samples and frequency of sampling depend on herd size.

Case definition

Breeding herds

A herd is considered positive when Salmonella has been isolated from feacal samples.

Fattening herds at farm

A herd is considered positive when Salmonella has been isolated from feacal samples.

Fattening herds at slaughterhouse (herd based approach)

An individual sample is considered seropositive if OD% > 10

Diagnostic/analytical methods used

Breeding herds

Bacteriological method: NMKL No 71:1999

Fattening herds at farm

Bacteriological method: NMKL No 71:1999

Fattening herds at slaughterhouse (herd based approach)

Serological method: SALMOTYPE Pig Screen LDL ELISA

Vaccination policy

Breeding herds

No salmonella vaccination occur

Fattening herds

No salmonella vaccination occur

Other preventive measures than vaccination in place

Breeding herds

In national regulation regarding pigs there are provisions on bio security demanding special facilities for entering the herd, isolation of and delivering pigs.

Multiplying herds

See breeding pigs.

Fattening herds

See breeding pigs.

Separate transport of pigs to slaughterhouse and separate slaughtering of pigs in level three herds.
In national regulation regarding pigs there are provisions on bio security demanding special facilities for entering the herd, isolation of and delivering pigs.

Control program/mechanisms

The control program/strategies in place

Fattening herds

The surveillance programme is constructed to monitor salmonella infections at farm level by measuring antibodies against Salmonella in meat juice test, to survey salmonella contamination on pig carcasses at slaughtering and to monitor Salmonella serotypes in faecal and swab samples. Salmonella serotypes are also tested for antimicrobial resistance.

The mandatory national control programme for Salmonella in pigs is approved by the Competent Authority, MAST. The aim of the programme is to prevent salmonella in pork and thereby mitigate the risk of human salmonellosis.

In order to control Salmonella infections at farm, the national regulation on pig health and housing No. 353/2011 stipulates preventive measures to be implemented.

Recent actions taken to control the zoonoses

The ongoing national control programme for Salmonella in pigs was implemented 1st of October 2006. Because of the nature of the pig production in Iceland especially the feeding system where pig producers bought unheated raw materials from feed mills for feed production the pig production as a whole was considered as a risk for human salmonellosis. When an increase in positive meat juice samples were clearly noted in the years 2009 and 2010 the then national regulation for pig health and housing was amended and entered into force 6th of April 2011 in order to control Salmonella infections at farm level.

Measures in case of the positive findings or single cases

Measures are taken (described in Salmonella spp in pig meat and products therof) when herds are moved between levels or categories i.e. when a herd is downgraded from level 1 to level 2 or 3. Sanitary slaughtering is performed when herds are categorised as level 3 herds.

Level 2 and 3 herds are obliged to be faecal sampled within fifteen days after being scaled down from the above level.

Notification system in place

Salmonella is a notifiable disease, according to national legislation on animal diseases No. 25/1993. The Competent Authority, MAST, receives all results from the respective laboratories regarding Salmonella testing (including serotyping and antimicrobial resistance) on samples from pig production and slaughtering.

Results of the investigation

Salmonella is endemic in the pig production. Of all meat juice samples 14,8% were positive for Salmonella. At farm Salmonella Brandenburg, Salmonella Kedougou, Salmonella Infantis, Salmonella Schwarzenburg, Salmonella Worthington and Salmonella sp. were found.

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

Meat juice samples have been taken since 2004 even though this test method was first used as an official method for Salmonella monitoring after 1st of October 2006. A fluctuation was seen in positive meat juice samples from the year 2004 to the year 2008 but within the limits of 1 - 5%.

In the next consecutive years i.e. in 2009 and 2010 the prevalence ascended significantly (12,7% and 23,4%). In 2011 the prevalence descended again and was in 2012 14,8%.

Despite of the increase in Salmonella in the pig production salmonellosis in humans in the same period did not alter equally. On the contrary domestic cases of salmonellosis in humans were fewer in 2009 and 2010 compared to domestic cases in the previous years.

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

Salmonella in pig production seems not to be a major source for human infections.

F. Salmonella spp. in ducks - breeding flocks and meat production flocks

Monitoring system

Sampling strategy

Breeding flocks

Breeding flocks are not monitored.

Every breeding flock comprising 250 animals or more is sampled. At primary production samples are both taken by the Food Buisness Operator (FBO) and by the Competent Authority (CA) in accordance with the national control programme.

According to import regulations breeder flocks are also under surveillance at the time of rearing during quarantine.

At the time of rearing samples are taken at the farm, and during production samples are taken at the hatchery. If a breeder flock is slaughtered, official samples are taken from each slaughter batch at the time of slaughter, after evisceration but before chilling.

The sampling strategy is according to national requirements that were implemented in 2001 and 2002 and a national control programme that was first implemented in 2008, in accordance with reg. (EC) no. 1003/2005

In Iceland, there are only parent flocks.

Meat production flocks

The monitoring of salmonella is in accordance with a national control programme that was implemented in 2008 and applies to the country as a whole.

Each flock is sampled at the farm less than 3 weeks prior to slaughter. Samples are also taken from each slaughter batch at the time of slaughter, after evisceration but before chilling.
Samples are taken by the FBO.

Frequency of the sampling

Meat production flocks: Before slaughter at farm

3 weeks prior to slaughter.

Meat production flocks: At slaughter (flock based approach)

Every flock is sampled

Type of specimen taken

Meat production flocks: Before slaughter at farm

Socks / boot swabs

Meat production flocks: At slaughter (flock based approach)

Neck skin

Methods of sampling (description of sampling techniques)

Meat production flocks: Before slaughter at farm

From each broiler flock, one pooled sample consisting of two pairs of boot swabs or one pooled sample consisting of 60 fecal samples are taken.

Meat production flocks: At slaughter (flock based approach)

From each flock, one pooled sample consisting of 50 neck skin samples is taken with each neck skin sample weighting between 3-5 g. These samples are collected from several slaughter batches.

Case definition

Breeding flocks: Day-old chicks

In case a sample is taken, a flock will be positive if Salmonella spp. is detected.

Breeding flocks: Rearing period

In case a sample is taken, a flock will be positive if Salmonella spp. is detected.

Breeding flocks: Production period

In case a sample is taken, a flock will be positive if Salmonella spp. is detected.

Meat production flocks: Before slaughter at farm

A flock is considered positive when Salmonella spp. is found in a sample. According to the national control programme, no confirming samples have to be taken. But as a part of the FBO's own controls, usually a confirmatory sample is taken. When salmonella is not found in two subsequent samples and not in a third sample taken by the CA, the flock is considered to be negative for salmonella.

Meat production flocks: At slaughter (flock based approach)

A sample positive for Salmonella spp.

Diagnostic/analytical methods used

Meat production flocks: Before slaughter at farm

Bacteriological method: NMKL No 71:1999, 5th edition

Meat production flocks: At slaughter (flock based approach)

Bacteriological method: NMKL No 71:1999, 5th edition

Vaccination policy

Breeding flocks

Vaccination of poultry flocks against salmonella is not allowed according to the national control program.

Meat production flocks

Vaccination of poultry flocks against salmonella is not practiced and there is no intention that it will become a part of control strategies.

Other preventive measures than vaccination in place

Breeding flocks

Preventative measures include specific requirements regarding biosecurity in accordance with national legislation.

Preventative treatment with antibiotics is not practiced in Iceland, and although the treatment is not specifically prohibited it is however against Icelandic policy regarding the use of antimicrobials.

Meat production flocks

Preventative measures include specific requirements regarding biosecurity in accordance with national legislation.

Preventative treatment with antibiotics is not practiced in Iceland, and although the treatment is not

specifically prohibited it is however against Icelandic policy regarding the use of antimicrobials.

Control program/mechanisms

The control program/strategies in place

Breeding flocks

According to Icelandic legal act no. 25/1993 it is prohibited to import poultry to Iceland. Exception can however be given when quarantine is possible, which is the case for hatching eggs or day old chicks for parent stock.

Meat production flocks

A national control programme was published by the Competent Authority on 1.11.2008 and reviewed in february 2012 for the control of salmonella in poultry. The control programme was developed according to reg. (EC) nr. 2130/2003 and reg. (EC) no. 213/2009.

The industry bears all the cost of the sampling. They also bear the cost of official sampling.

According to reg. (IS) no. 688/2002 and according to instructions published by the CA for the implementation of reg. (EC) nr. 2073/2005, samples are taken by the FBO from each slaughter batch by taking one pooled sample consisting of 50 neck skins.

The industry bears the cost of all sampling, also of sampling by the CA.

According to Icelandic legal act no. 25/1993 it is prohibited to import poultry to Iceland. Exception can however be given when quarantine is possible. No ducks and hatching eggs for ducks for meat production are not imported.

Measures in case of the positive findings or single cases

At the farm:
According Icelandic legal act no. 25/1993 and reg. (IS) no. 665/2001 birds from a flock that has been tested positive may not be moved from the farm. According to reg. (IS) no. 688/2002 a positive flock cannot be sent to the slaughterhouse and is therefore culled at the farm.

At the time of slaughter:
According to reg. (IS) no. 688/2002 all meat from a slaughter flock with a positive neck skin sample has to be destroyed or heat treated before further distribution. All raw meat from the flock that is already distributed is also withdrawn and recalled from the market.

Notification system in place

Salmonella is a notifiable disease according to Icelandic legal act no. 25/1993.
The laboratory sends an immediate notification to the CA when there is a positive salmonella finding.

Results of the investigation

No salmonella was found in flocks of ducks in 2012.

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

Since 1997 salmonella prevalence in flocks of ducks both from samples taken at the farm level and at the time of slaughter has been below 1%. In 2011 salmonella was found in one flock but the source of the contamination could not be established.

As flocks have been sampled both at the farm and at the time of slaughter since 2001, no new information has been gained regarding the prevalance of salmonella with the implementation of the new sampling strategy in 2008.

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

Icelandic duck meat is not known to be a source of infections of humans with salmonella.

G. Salmonella spp. in geese - breeding flocks and meat production flocks

Notification system in place

There is no commercial geese meat production ongoing in Iceland. However, there are a few backyard flocks used for private consumption.
In case samples would be taken and salmonella would be detected, movement of all birds in the flock will be restricted according to icelandic laws.

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

Monitoring system

Sampling strategy

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

The monitoring of salmonella in breeding flocks of Gallus gallus is applied to the whole country. Every breeding flock consisting of 250 animals or more is sampled. During primary production samples are both taken by the food business operator (FBO) and by the competent authority (CA) in accordance with the national control programme.

In 2012, all samples from breeding flocks are taken at farm level. When a breeder flock is slaughtered official samples are taken from each slaughter batch at the time of slaughter, after evisceration but before chilling. The sampling strategy is according to national requirements that were implemented in 2001 and 2002 and a national control programme that was first implemented in 2008 in accordance with reg. (EC) no. 2130/2003.

In Iceland there are only parent flocks.

Meat production flocks

The sampling strategy is according to a control programme that was implemented in 2008 in accordance with reg. (EC) no. 2160/2003 and it applies to all of Iceland. The national control program was reviewed in february 2012, but as regards fattening turkeys, no changes had been made.

Samples are taken by the food business operator (FBO). Samples are also taken by the FBO from each slaughter batch (slaughter flock) at the time of slaughter, after evisceration but before chilling.

Official samples are taken by the competent authority from one flock on one farm once a year (from 10% of all farms with over 500 fattening turkeys).

Frequency of the sampling

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

Every flock is sampled

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

At the age of 4 weeks and again two weeks before moving to the laying house.

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

Every 3 weeks.

Meat production flocks: Before slaughter at farm

3 weeks prior to slaughter.

Meat production flocks: At slaughter (flock based approach)

Every batch is sampled.

Type of specimen taken

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

Hatched eggs

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

Socks/ boot swabs

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

Socks / boot swabs

Meat production flocks: Before slaughter at farm

Socks / boot swabs

Meat production flocks: At slaughter (flock based approach)

Neck skin

Methods of sampling (description of sampling techniques)

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

From each breeding flock (paternal line and maternal line separately) one sample is taken during hatching. The pooled sample consists of 10 g of broken eggshells taken from a total of 25 separate hatcher baskets, which in total is at least 250g of broken eggshells.

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

From each breeding flock two pairs of boot swabs are collected and pooled into one sample, both at the age of 4 weeks and two weeks before moving to the laying phase.

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

Industry samples: On the choice of the FBO, there are either taken 5 pairs of bootswabs (2 pooled samples) or one pair of bootswab and one dustsample, the dust sample is cultured separately.

The official samples are taken in the same way as the industry samples: either 5 pairs of bootswabs or one pair of bootswabs and one dust sample. The samples are taken from one flock once a year (all flocks from 10% of farms with more than 250 adult breeding turkeys).

Meat production flocks: Before slaughter at farm

From each broiler flock two pairs of boot swabs are collected and pooled into one sample. In case one sock sample and one dust sample are taken, the two samples are pooled into one sample.

Meat production flocks: At slaughter (flock based approach)

From each slaughter flock one pooled sample consisting of 50 neck skin samples is taken, with each neck skin sample weighting between 3 - 5 g.

Case definition

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

A sample positive for salmonella spp. In cases where the CA has suspicion of a false positive result, the CA can confirm a first positive finding, and if it is not possible to confirm, the flock will be calculated as negative.

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

A sample positive for salmonella spp., always confirmed by the CA. If it is not possible to confirm a first positive finding in two consecutive samples taken by the CA, the flock will be calculated as negative.

Meat production flocks: Before slaughter at farm

A flock is considered positive when Salmonella spp. is found in a sample. According to the NCP, no confirming samples have to be taken. But as a part of the FBO’s own controls, usually a confirmatory sample is taken. When salmonella is not found in two subsequent samples and not in a third sample taken by the CA, the flock is considered to be negative for salmonella.

Meat production flocks: At slaughter (flock based approach)

A sample positive for Salmonella spp.

Diagnostic/analytical methods used

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks

Bacteriological method: NMKL No 71:1999, 5th edition

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

Bacteriological method: NMKL No 71:1999, 5th edition

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

Bacteriological method: NMKL No 71:1999

Meat production flocks: Before slaughter at farm

Bacteriological method: NMKL No 71:1999

Meat production flocks: At slaughter (flock based approach)

Bacteriological method: NMKL No 71:1999

Vaccination policy

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

Vaccination of poultry flocks against salmonella is not allowed according to the national control program.

Meat production flocks

Vaccination of poultry flocks against salmonella is not allowed according to the national control program.

Other preventive measures than vaccination in place

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

Preventive measures include specific requirements regarding biosecurity in accordance with national legislation.
Preventive treatment with antibiotics is not practiced in Iceland, and although the treatment is not specifically prohibited it is however against Icelandic policy regarding the use of antimicrobials.

Meat production flocks

Preventive measures include specific requirements regarding biosecurity in accordance with national legislation.

Control program/mechanisms

The control program/strategies in place

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

A national control programme was published by the Competent Authority on 1.11.2008 and reviewed in february 2012 for the control of salmonella in poultry. The control programme was developed according to reg. (EC) nr. 2130/2003.

The industry bears all the cost of the sampling. They also bear the cost of official sampling.

According to reg. (IS) no. 688/2002 and according to instructions published by the CA for the implementation of reg. (EC) nr. 2073/2005, samples are taken by the FBO from each slaughter batch by taking one pooled sample consisting of 50 neck skins.

The industry bears the cost of all sampling, also of sampling by the CA.

According to Icelandic legal act no. 25/1993 it is prohibited to import poultry to Iceland. Exception can however be given when quarantine is possible, which is the case for hatching eggs or day old chicks for parent stock.

Meat production flocks

A national control programme was published by the Competent Authority on 1.11.2008 for the control of salmonella in poultry. The NCP was reviewed in february 2012. The control programme was developed according to reg. (EC) no. 2130/2003. It describes sampling of each flock of fattening turkeys at the farm three weeks prior to slaughter.

According to reg. (IS) no. 688/2002 and according to instructions published by the CA for the implementation of reg. (EC) nr. 2073/2005, samples are taken by the FBO from each slaughter batch by taking one pooled sample consisting of 50 neck skins.

The industry bears the cost of all sampling, also of sampling by the CA.

According to Icelandic legal act no. 25/1993 it is prohibited to import poultry to Iceland. Exception can however be given when quarantine is possible. No fattening turkeys and no hatching eggs for fattening turkeys are imported to Iceland.

Measures in case of the positive findings or single cases

It is not allowed to hatch eggs from a positive parent flock.

Before moving to the slaughterhouse:
According Icelandic legal act no. 25/1993 and reg. (IS) no. 665/2001 birds from a flock that has been tested positive may not be moved from the farm. According to reg. (IS) no. 688/2002 a positive flock cannot be sent to the slaughterhouse and is therefore culled at the farm.

At the time of slaughter:
According to reg. (IS) no. 688/2002 all meat from a slaughter flock with a positive neck skin sample has to be destroyed or heat treated before further distribution. All raw meat from the flock that is already distributed is also withdrawn and recalled from the market.

Notification system in place

Salmonella is a notifiable disease according to Icelandic legal act no. 25/1993.
The laboratory sends an immediate notification to the CA when there is a positive salmonella finding.

Results of the investigation

In 2012, Salmonella spp. was not found in turkey parent flocks or in flocks of fattening turkeys.

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

Prevalence of salmonella in flocks of fattening turkey has been 0% or below 1% or not more than one infected flock per year in the last years. In 2009 and 2010 there was one infected flock detected each year. In 2011 there was no salmonella found in turkey flocks.

As flocks have been sampled both at the farm and at the time of slaughter since 2001 there has been no new information received through implementation of the new sampling strategy in 2008.

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

In Iceland it is not allowed to slaughter salmonella positive poultry flocks. Therefore, the main sources of contaminated poultry meat are flocks with a negative pre-slaughter sample but a positive sample at the time of slaughter, which has not been the case for turkey flocks. In recent years there have been no indications of any human infections from infected icelandic turkey meat.

Table Salmonella in breeding flocks of Gallus gallus

	No of flocks under control programme	Source of information	Sampling strategy	Sampler	Sample type	Sample origin	Target Verification	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis
Gallus gallus (fowl) - breeding flocks, unspecified - adult - Control and eradication programmes			Census	Official and industry sampling			yes				
Gallus gallus (fowl) - parent breeding flocks for egg production line - day-old chicks - Control and eradication programmes	2	Keldur	Census	Industry sampling	animal sample > eggshells	Domestic	no	Flock	2	0	
Gallus gallus (fowl) - parent breeding flocks for egg production line - during rearing period - Control and eradication programmes	2	Keldur	Census	Industry sampling	environmental sample > boot swabs	Domestic	no	Flock	2	0	
Gallus gallus (fowl) - parent breeding flocks for egg production line - adult - Control and eradication programmes [1)]	5	Keldur	Census	Official and industry sampling	animal sample > faeces	Domestic	yes	Flock	5	0	
Gallus gallus (fowl) - parent breeding flocks for broiler production line - day-old chicks - Control and eradication programmes	7	Keldur	Census	Industry sampling	animal sample > eggshells	Domestic	no	Flock	7	0	
Gallus gallus (fowl) - parent breeding flocks for broiler production line - during rearing period - Control and eradication programmes	14	Keldur and Matís	Census	Industry sampling	environmental sample > boot swabs	Domestic	no	Flock	14	0	
Gallus gallus (fowl) - parent breeding flocks for broiler production line - adult - Control and eradication programmes [2)]	35	Keldur and Matís	Census	Official and industry sampling	environmental sample > boot swabs	Domestic	yes	Flock	35	0	

Table Salmonella in breeding flocks of Gallus gallus

	S. Hadar	S. Infantis	S. Typhimurium	S. Virchow	S. 1,4,[5],12:i:-	Salmonella spp., unspecified
Gallus gallus (fowl) - breeding flocks, unspecified - adult - Control and eradication programmes						
Gallus gallus (fowl) - parent breeding flocks for egg production line - day-old chicks - Control and eradication programmes						
Gallus gallus (fowl) - parent breeding flocks for egg production line - during rearing period - Control and eradication programmes						
Gallus gallus (fowl) - parent breeding flocks for egg production line - adult - Control and eradication programmes [1)]						
Gallus gallus (fowl) - parent breeding flocks for broiler production line - day-old chicks - Control and eradication programmes						
Gallus gallus (fowl) - parent breeding flocks for broiler production line - during rearing period - Control and eradication programmes						
Gallus gallus (fowl) - parent breeding flocks for broiler production line - adult - Control and eradication programmes [2)]						

Comments:

[1)] some flocks are also sampled with boot swab samples and/or boot swab sample/dust sample

[2)] from some flocks, also boot swabs/dust sample are taken. In the beginning of the year, eggshells were taken at the hatchery

Table Salmonella in breeding flocks of Gallus gallus

Table Salmonella in other animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample origin	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	S. 1,4,[5],12:i:-
Pigs - breeding animals - at farm - Monitoring	MAST	Selective sampling	Official sampling	animal sample > faeces	Domestic	Herd	2	2			
Pigs - fattening pigs - at farm - Monitoring	MAST	Selective sampling	Official sampling	animal sample > faeces	Domestic	Herd	10	7			
Pigs - fattening pigs - at slaughterhouse - Monitoring	MAST	Objective sampling	Official sampling	animal sample > meat juice	Domestic	Animal	1342	198			

	Salmonella spp., unspecified	S. Brandenburg	S. Infantis	S. Kedougou	S. Schwarzengrund	S. Worthington
Pigs - breeding animals - at farm - Monitoring				1	1	
Pigs - fattening pigs - at farm - Monitoring		2	1	2		2
Pigs - fattening pigs - at slaughterhouse - Monitoring	198					

Table Salmonella in other poultry

	No of flocks under control programme	Source of information	Sampling strategy	Sampler	Sample type	Sample origin	Target Verification	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis
Gallus gallus (fowl) - laying hens - day-old chicks - Control and eradication programmes	87	Keldur	Census	Industry sampling	environmental sample > delivery box liner	Domestic	no	Flock	36	0	
Gallus gallus (fowl) - laying hens - during rearing period - Control and eradication programmes	25	Keldur	Census	Industry sampling	animal sample > faeces	Domestic	no	Flock	11	0	
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes [1)]	46	Keldur	Census	Official and industry sampling	animal sample > faeces	Domestic	yes	Flock	46	0	
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes [2)]	657	Keldur and Matís	Census	Official and industry sampling	environmental sample > boot swabs	Domestic	yes	Flock	657	10	
Turkeys - breeding flocks, unspecified - day-old chicks - at farm - Control and eradication programmes	2	Keldur	Census	Industry sampling	animal sample > eggshells	Domestic	no	Flock	2	0	
Turkeys - breeding flocks, unspecified - during rearing period - at farm - Control and eradication programmes	2	Keldur	Census	Industry sampling	environmental sample > boot swabs	Domestic	no	Flock	2	0	
Turkeys - breeding flocks, unspecified - adult - at farm - Control and eradication programmes	2	Keldur	Census	Official and industry sampling	environmental sample > boot swabs and dust	Domestic	no	Flock	2	0	
Turkeys - fattening flocks - before slaughter - at farm - Control and eradication programmes [3)]	28	Keldur	Census	Official and industry sampling	environmental sample > boot swabs	Domestic	yes	Flock	28	0	
Ducks - meat production flocks [4)]	13	Keldur	Census	Industry sampling	animal sample > faeces	Domestic	yes	Flock	13	0	

Table Salmonella in other poultry

	S. Typhimurium	S. 1,4,[5],12:i:-	Salmonella spp., unspecified
Gallus gallus (fowl) - laying hens - day-old chicks - Control and eradication programmes			
Gallus gallus (fowl) - laying hens - during rearing period - Control and eradication programmes			
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes [1)]			
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes [2)]			10
Turkeys - breeding flocks, unspecified - day-old chicks - at farm - Control and eradication programmes			
Turkeys - breeding flocks, unspecified - during rearing period - at farm - Control and eradication programmes			
Turkeys - breeding flocks, unspecified - adult - at farm - Control and eradication programmes			
Turkeys - fattening flocks - before slaughter - at farm - Control and eradication programmes [3)]			
Ducks - meat production flocks [4)]			

Comments:

[1)] From some flocks boot swabs or bootswabs/dust sample are taken

[2)] From some flocks boot swab/dust sample or fecal samples are taken

[3)] from some flocks fecal samples or boot swab/dust sample were taken

Table Salmonella in other poultry

Comments:

[4)] from some flocks, boot swabs were taken

2.1.5 Salmonella in feedingstuffs

Table Salmonella in compound feedingstuffs

	Source of information	Sampling strategy	Sampler	Sample type	Sample origin	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium
Compound feedingstuffs for cattle - final product - at feed mill - Surveillance	LUFA	Objective sampling	Official sampling	feed sample	Domestic	Single	25	1	0		
Compound feedingstuffs for poultry - laying hens - final product - at feed mill - Surveillance	LUFA	Objective sampling	Official sampling	feed sample	Domestic	Single	25	3	0		
Compound feedingstuffs for fish - final product - pelleted - at feed mill - Surveillance	LUFA	Objective sampling	Official sampling	feed sample	Domestic	Single	25	1	0		

	S. 1,4,[5],12:i:-	Salmonella spp., unspecified
Compound feedingstuffs for cattle - final product - at feed mill - Surveillance		
Compound feedingstuffs for poultry - laying hens - final product - at feed mill - Surveillance		
Compound feedingstuffs for fish - final product - pelleted - at feed mill - Surveillance		

Table Salmonella in feed material of animal origin

	Source of information	Sampling strategy	Sampler	Sample type	Sample origin	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium
Feed material of marine animal origin - fish meal - at processing plant - Surveillance	LUFA	Objective sampling	Official sampling	feed sample	Domestic	Single	25	11	0		

	S. 1,4,[5],12:i:-	Salmonella spp., unspecified
Feed material of marine animal origin - fish meal - at processing plant - Surveillance		

Table Salmonella in other feed matter

	Source of information	Sampling strategy	Sampler	Sample type	Sample origin	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium
Feed material of cereal grain origin - barley derived - at feed mill - Surveillance	LUFA	Objective sampling	Official sampling	feed sample	Imported from outside EU	Single	25	1	0		
Feed material of oil seed or fruit origin - soya (bean) derived - at feed mill - Surveillance	LUFA	Objective sampling	Official sampling	feed sample	Imported from outside EU	Single	25	3	0		

	S. 1,4,[5],12:i:-	Salmonella spp., unspecified
Feed material of cereal grain origin - barley derived - at feed mill - Surveillance		
Feed material of oil seed or fruit origin - soya (bean) derived - at feed mill - Surveillance		

2.1.6 Salmonella serovars and phagetype distribution

The methods of collecting, isolating and testing of the Salmonella isolates are described in the chapters above respectively for each animal species, foodstuffs and humans. The serotype and phagetype distributions can be used to investigate the sources of the Salmonella infections in humans. Findings of same serovars and phagetypes in human cases and in foodstuffs or animals may indicate that the food category or animal species in question serves as a source of human infections. However as information is not available from all potential sources of infections, conclusions have to be drawn with caution.

Table Salmonella serovars in animals

Serovar	Cattle (bovine animals)				Pigs				Gallus gallus (fowl)				Other poultry
Sources of isolates	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program
Number of isolates in the laboratory						11			10	8			
Number of isolates serotyped						11			10				
Number of isolates per serovar													
S. Agona									7				
S. Brandenburg						2							
S. Infantis						1			1				
S. Kedougou						3							
S. Kentucky									2				
S. Schwarzengrund						1							

Table Salmonella serovars in animals

Serovar / Sources of isolates	Cattle (bovine animals)				Pigs				Gallus gallus (fowl)				Other poultry
	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program	Monitoring	Clinical	Surveillance	Control program
Number of isolates in the laboratory						11			10	8			
Number of isolates serotyped						11			10				
Number of isolates per serovar													
S. Species						2							
S. Worthington						2							

Serovar / Sources of isolates	Other poultry		
	Monitoring	Clinical	Surveillance
Number of isolates in the laboratory			
Number of isolates serotyped			
Number of isolates per serovar			
S. Agona			
S. Brandenburg			
S. Infantis			
S. Kedougou			

Table Salmonella serovars in animals

Serovar	Other poultry		
Sources of isolates	Monitoring	Clinical	Surveillance
Number of isolates in the laboratory			
Number of isolates serotyped			
Number of isolates per serovar			
S. Kentucky			
S. Schwarzengrund			
S. Species			
S. Worthington			

Table Salmonella serovars in food

Serovar	Meat from bovine animals		Meat from pig		Meat from broilers (Gallus gallus)		Meat from other poultry species		Other products of animal origin	
Sources of isolates	Monitoring	Surveillance	Monitoring	Surveillance	Monitoring	Surveillance	Monitoring	Surveillance	Monitoring	Surveillance
Number of isolates in the laboratory				7	2					
Number of isolates serotyped				7	2					
Number of isolates per serovar										
S. Agona					1					
S. Brandenburg				2						
S. Corvallis					1					
S. Kedougou				2						
S. Worthington				3						

2.1.7 Antimicrobial resistance in Salmonella isolates

A. Antimicrobial resistance in Salmonella in pigs

Sampling strategy used in monitoring

Frequency of the sampling

Salmonella found in pig herds in the Icelandic Salmonella Monitoring Programme is included in the resistance monitoring (at least one isolate per herd). All herds are to be sampled once pr. year.

Type of specimen taken

Salmonella isolates from faecal samples are susceptibility testet. Isolates from all herds are tested, i.e. breeding herds, piglet production herds and herds with fattening pigs.

Methods of sampling (description of sampling techniques)

For description of the Icelandic Salmonella Control programme, see the parts describing Salmonella in pigs. Other sampling methods vary depending on the situation.

Procedures for the selection of isolates for antimicrobial testing

At least one isolate per herd is selected for antimicrobial testing. Salmonella is isolated at various laboratories and sent to the National Hospital in Reykjavík for testing of antimicrobial susceptibility.

Methods used for collecting data

The laboratories send regularly data to MAST or as soon as results are obtained.

Laboratory methodology used for identification of the microbial isolates

NMKL No 71:1999

Laboratory used for detection for resistance

Antimicrobials included in monitoring

Ampicillin, Ceftriaxone, Chloramphenicol, TMP/Sulfa, (Nalidixic acid), Ciprofloxacin.

Cut-off values used in testing

The values used are clinical cut-off values.
Ampicillin: R <= 13
Ceftriaxone: R <=19
Chloramphenicol: R <=12
TMP/Sulfa: R <=10
Nalidixic acid: R <=13
Ciprofloxacin: R <=20

Preventive measures in place

If multiresistant Salmonella Typhimurium is found in a herd the pigs from the herd are sanitary slaughtered.

Control program/mechanisms

The control program/strategies in place

The Salmonella isolates from pigs originate from the Icelandic Salmonella surveillance programme. The results of a serosurveillance at the slaughterhouses appoint risk herds to be further examined by analyzing pen-faecal samples from finisher herds at level 2 and level 3 farms.

Recent actions taken to control the zoonoses

See Salmonella in pigs.

Measures in case of the positive findings or single cases

According to the national control programme no specific actions are taken regarding antimicrobial resistance unless multiresistant Salmonella Typhimurium is detected at farm. If multiresistant Salmonella Typhimurium is found at farm the pigs from the respective herd are sanitary slaughtered.

Notification system in place

See Salmonella in pigs.

Results of the investigation

Resistance to Ampicillin and TMP/Sulfa was found in 5 isolates from 5 epidemiological units that were serotyped as Salmonella Brandenburg (2 isolates) and Salmonella Kedougou (3 isolates).

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

The isolates investigated are virtually all sensitive to the tested antimicrobials. Only two serotypes were resistant to two antimicrobials. It must be kept in mind that results are interpreted from clinical cut-off values but not from epidemiological cut-off values.

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

See Salmonella spp. in pigs.

B. Antimicrobial resistance in Salmonella in poultry

Sampling strategy used in monitoring

Frequency of the sampling

Salmonella found in poultry in samples taken according to the Icelandic Salmonella Control Programme is included in the resistance monitoring. All positive samples are serotyped and tested for antimicrobial sensitivity.

Type of specimen taken

See Chapter Salmonella spp. in Gallus Gallus - breeding flocks, broiler flocks and flocks of leaying hens and Chapter Salmonella spp. in ducks and turkey - breeding flocks and meat production flocks.

Methods of sampling (description of sampling techniques)

See Chapter Salmonella spp. in Gallus Gallus - breeding flocks, broiler flocks and flocks of leaying hens and Chapter Salmonella spp. in ducks and turkey - breeding flocks and meat production flocks.

Procedures for the selection of isolates for antimicrobial testing

At least one isolate per positive flock is submitted for antimicrobial testing.

Methods used for collecting data

The laboratories send regularly data to MAST or as soon as results are obtained.

Laboratory methodology used for identification of the microbial isolates

NMKL No 71:1999

Laboratory used for detection for resistance

Antimicrobials included in monitoring

Ampicillin, Ceftriaxone, Chloramphenicol, TMP/Sulfa, Nalidixic acid, Ciprofloxacin.

Cut-off values used in testing

The values used are clinical cut-off values.
Ampicillin: R <= 13
Ceftriaxone: R <=19
Chloramphenicol: R <=12
TMP/Sulfa: R <=10
Nalidixic acid: R <=13
Ciprofloxacin: R <=20

Preventive measures in place

See Chapter Salmonella spp. in Gallus Gallus - breeding flocks, broiler flocks and flocks of leaying hens and Chapter Salmonella spp. in ducks and turkey - breeding flocks and meat production flocks.

Control program/mechanisms

The control program/strategies in place

See Chapter Salmonella spp. in Gallus Gallus - breeding flocks, broiler flocks and flocks of leaying hens and Chapter Salmonella spp. in ducks and turkey - breeding flocks and meat production flocks.

Recent actions taken to control the zoonoses

See Chapter Salmonella spp. in Gallus Gallus - breeding flocks, broiler flocks and flocks of leaying hens and Chapter Salmonella spp. in ducks and turkey - breeding flocks and meat production flocks.

Measures in case of the positive findings or single cases

According to the Icelandic animal health legislation MAST (CA) can take any measures that are needed if multiresistant isulates are found.

Notification system in place

See Chapter Salmonella spp. in Gallus Gallus - breeding flocks, broiler flocks and flocks of leaying hens and Chapter Salmonella spp. in ducks and turkey - breeding flocks and meat production flocks.

Results of the investigation

No resistance was found in the isolates to the tested antimicrobials.

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

See Chapter Salmonella spp. in Gallus Gallus - breeding flocks, broiler flocks and flocks of leaying hens and Chapter Salmonella spp. in ducks and turkey - breeding flocks and meat production flocks.

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

See Chapter Salmonella spp. in Gallus Gallus - breeding flocks, broiler flocks and flocks of leaying hens and Chapter Salmonella spp. in ducks and turkey - breeding flocks and meat production flocks.

C. Antimicrobial resistance in Salmonella in foodstuff derived from pigs

Sampling strategy used in monitoring

Frequency of the sampling

Salmonella found on pig carcasses in the Icelandic Salmonella Control Programme is included in the resistance monitoring. All herds are always objective sampled but in a case of a positive sample the herd is census sampled. At least one serotype is tested for antimicrobial sensitivity.

Type of specimen taken

The carcasses are swabbed with cotton swabs. Isolates from positve swabs are tested.

Methods of sampling (description of sampling techniques)

See Salmonella spp. in pig meat and products thereof.

Procedures for the selection of isolates for antimicrobial testing

Salmonella is isolated at various laboratories and sent to the National Hospital in Reykjavík for testing of antimicrobial susceptibility.

Methods used for collecting data

The laboratories send regularly data to MAST or as soon as results are obtained.

Laboratory methodology used for identification of the microbial isolates

The Salmonella Tecra Unique Rapid Test is used for detection of Salmonella (Enrichment immunocapture immunoenrichment and detection steps). When Salmonella is detected in the Tecra test, the Bacteriological method used is: NMKL 187:2007

Laboratory used for detection for resistance

Antimicrobials included in monitoring

Ampicillin, Ceftriaxone, Chloramphenicol, TMP/Sulfa, Nalidixic acid, Ciprofloxacin.

Cut-off values used in testing

The values used are clinical cut-off values.
Ampicillin: R <= 13
Ceftriaxone: R <=19
Chloramphenicol: R <=12
TMP/Sulfa: R <=10
Nalidixic acid: R <=13
Ciprofloxacin: R <=20

Preventive measures in place

See Salmonella in pigs.

Control program/mechanisms

The control program/strategies in place

See Salmonella spp. in pig meat and products thereof.

Recent actions taken to control the zoonoses

See Salmonella in pigs.

Measures in case of the positive findings or single cases

According to the national control programme no specific actions are taken regarding antimicrobial resistance unless multiresistant Salmonella Typhimurium is detected at farm. If multiresistant Salmonella

Typhimurium is found at farm the pigs from the respective herd are sanitary slaughtered.

Notification system in place

See Salmonella spp. in pig meat and products thereof.

Results of the investigation

Resistance was found in one isolate to AMP and TMP/S which was serotyped as Salmonella Brandenburg. Resistance was also found in one isolate of Salmonella Kedougou to AMP and to AMP and TMP/S in another isolate of Salmonella Kedougou.

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

See Salmonella spp. in pig meat and products thereof.

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

See Salmonella spp. in pig meat and products thereof.

D. Antimicrobial resistance in Salmonella in foodstuff derived from poultry

Sampling strategy used in monitoring

Frequency of the sampling

Salmonella found on poultry carcasses in samples taken according to the Icelandic Salmonella Control Programme is included in the resistance monitoring. All positive samples are serotyped and tested for antimicrobial sensitivity.

Type of specimen taken

See chapter Salmonella spp. in broiler meat and products thereof and chapter Salmonella spp. in ducks and turkey - breeding flocks and meat production flocks.

Methods of sampling (description of sampling techniques)

See chapter Salmonella spp. in broiler meat and products thereof and chapter Salmonella spp. in ducks and turkey - breeding flocks and meat production flocks.

Procedures for the selection of isolates for antimicrobial testing

Salmonella is isolated at various laboratories and sent to the laboratory at the National Hospital in Reykjavík for testing of antimicrobial susceptibility.

Methods used for collecting data

The laboratories send regularly data to MAST or as soon as results are obtained.

Laboratory methodology used for identification of the microbial isolates

NMKL No 71:1999

Laboratory used for detection for resistance

Antimicrobials included in monitoring

Ampicillin, Ceftriaxone, Chloramphenicol, TMP/Sulfa, Nalidixic acid, Ciprofloxacin.

Cut-off values used in testing

The values used are clinical cut-off values.
Ampicillin: R <= 13
Ceftriaxone: R <=19
Chloramphenicol: R <=12
TMP/Sulfa: R <=10
Nalidixic acid: R <=13
Ciprofloxacin: R <=20

Preventive measures in place

See chapter Salmonella spp. in broiler meat and products thereof and chapter Salmonella spp. in ducks and turkey - breeding flocks and meat production flocks.

Control program/mechanisms

The control program/strategies in place

See chapter Salmonella spp. in broiler meat and products thereof and chapter Salmonella spp. in ducks and turkey - breeding flocks and meat production flocks.

Recent actions taken to control the zoonoses

See chapter Salmonella spp. in broiler meat and products thereof and chapter Salmonella spp. in ducks and turkey - breeding flocks and meat production flocks.

Measures in case of the positive findings or single cases

According to the Icelandic animal health legislation MAST (CA) can take any measures that are needed if

multiresistant isulates are found.

Notification system in place

See Chapater Salmonella spp. in broiler meat and products thereof and chapter Salmonella spp. in ducks and turkey - breeding flocks and meat production flocks.

Results of the investigation

No resistance was found in the isolates to the tested antimicrobials.

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

See chapter Salmonella spp. in broiler meat and products thereof and chapter Salmonella spp. in ducks and turkey - breeding flocks and meat production flocks.

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

See chapter Salmonella spp. in broiler meat and products thereof and chapter Salmonella spp. in ducks and turkey - breeding flocks and meat production flocks.

Table Antimicrobial susceptibility testing of Salmonella in Pigs

Salmonella	S. Typhimurium		S. 1,4,[5],12:i:-		S. Derby		S. Agona		Salmonella spp.		S. Brandenburg		S. Infantis		S. Kedougou		S. Schwarzengrund		S. Worthington	
Isolates out of a monitoring program (yes/no)									yes		yes		yes		yes		yes		yes	
Number of isolates available in the laboratory									2		2		1		3		1		2	
Antimicrobials:	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n
Amphenicols - Chloramphenicol									2	0	2	0	1	0	3	0	1	0	2	0
Fluoroquinolones - Ciprofloxacin									2	0	2	0	1	0	3	0	1	0	2	0
Penicillins - Ampicillin									2	0	2	2	1	0	3	3	1	0	2	0
Quinolones - Nalidixic acid									1	0			1	0	1	0	1	0	1	0
Fully sensitive									2	0			1	0			1	0	2	0
Resistant to 1 antimicrobial											1	1			1	1				
Resistant to 2 antimicrobials											1	1			2	2				
Cephalosporins - Ceftriaxon									2	0	2	0	1	0	3	0	1	0	2	0
Trimethoprim + Sulfonamides									2	0	2	1	1	0	3	2	1	0	2	0

Footnote:

Clinical cut-off

Table Antimicrobial susceptibility testing of Salmonella in meat from pig

Salmonella	S. Typhimurium		S. 1,4,[5],12:i:-		S. Derby		S. Agona		Salmonella spp.		S. Brandenburg		S. Kedougou		S. Worthington	
Isolates out of a monitoring program (yes/no)											yes		yes		yes	
Number of isolates available in the laboratory											2		2		3	
Antimicrobials:	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n
Amphenicols - Chloramphenicol											2	0	2	0	3	0
Fluoroquinolones - Ciprofloxacin											2	0	2	0	3	0
Penicillins - Ampicillin											2	1	2	2	3	0
Quinolones - Nalidixic acid													1	0	3	0
Fully sensitive											1	0			3	0
Resistant to 1 antimicrobial													1	1		
Resistant to 2 antimicrobials											1	1	1	1		
Cephalosporins - Ceftriaxon											2	0	2	0	3	0
Trimethoprim + Sulfonamides											2	1	2	1	3	0

Footnote:

Clinical cut-off

Table Antimicrobial susceptibility testing of Salmonella in meat from broilers (Gallus gallus)

Salmonella	S. Enteritidis		S. Typhimurium		S. 1,4,[5],12:i:-		S. Java		S. Agona		S. Virchow		S. Hadar		S. Kentucky		S. Infantis		Salmonella spp.		S. Corvallis	
Isolates out of a monitoring program (yes/no)									yes												yes	
Number of isolates available in the laboratory									1												1	
Antimicrobials:	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n
Amphenicols - Chloramphenicol									1	0											1	0
Cephalosporins - 3rd generation cephalosporins									1	0											1	0
Fluoroquinolones - Ciprofloxacin									1	0											1	0
Penicillins - Ampicillin									1	0											1	0
Sulfonamides									1	0											1	0
Trimethoprim									1	0											1	0
Fully sensitive									1	0											1	0

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

Salmonella	S. Enteritidis		S. Typhimurium		S. 1,4,[5],12:i:-		S. Java		S. Agona		S. Virchow		S. Hadar		S. Kentucky		S. Infantis		Salmonella spp.	
Isolates out of a monitoring program (yes/no)									yes						yes		yes			
Number of isolates available in the laboratory									7						2		1			
Antimicrobials:	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n
Amphenicols - Chloramphenicol									7	0					2	0	1	0		
Cephalosporins - 3rd generation cephalosporins									7	0					2	0	1	0		
Fluoroquinolones - Ciprofloxacin									7	0					2	0	1	0		
Penicillins - Ampicillin									7	0					2	0	1	0		
Sulfonamides									7	0					2	0	1	0		
Trimethoprim									7	0					2	0	1	0		
Fully sensitive									7	0					2	0	1	0		

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

Test Method Used	Standard methods used for testing
Disc diffusion	NCCLS/CLSI

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin	EFSA	2	
	Streptomycin	EFSA	32	
Amphenicols	Chloramphenicol	EFSA	16	12
Cephalosporins	3rd generation cephalosporins			19
	Cefotaxime	EFSA	0.5	
Fluoroquinolones	Ciprofloxacin	EFSA	0.06	20
Penicillins	Ampicillin	EFSA	4	13
Quinolones	Nalidixic acid	EFSA	16	13
Sulfonamides	Sulfonamides	EFSA	256	10
Tetracyclines	Tetracycline	EFSA	8	
Trimethoprim	Trimethoprim	EFSA	2	10

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

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin	EFSA	2	
	Streptomycin	EFSA	32	
Amphenicols	Chloramphenicol	EFSA	16	
Cephalosporins	Cefotaxime	EFSA	0.5	
Fluoroquinolones	Ciprofloxacin	EFSA	0.06	
Penicillins	Ampicillin	EFSA	4	
Quinolones	Nalidixic acid	EFSA	16	
Sulfonamides	Sulfonamides	EFSA	256	
Tetracyclines	Tetracycline	EFSA	8	
Trimethoprim	Trimethoprim	EFSA	2	

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

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin	EFSA	2	
	Streptomycin	EFSA	32	
Amphenicols	Chloramphenicol	EFSA	16	
Cephalosporins	Cefotaxime	EFSA	0.5	
Fluoroquinolones	Ciprofloxacin	EFSA	0.06	
Penicillins	Ampicillin	EFSA	4	
Quinolones	Nalidixic acid	EFSA	16	
Sulfonamides	Sulfonamides	EFSA	256	
Tetracyclines	Tetracycline	EFSA	8	
Trimethoprim	Trimethoprim	EFSA	2	

2.2 CAMPYLOBACTERIOSIS

2.2.1 General evaluation of the national situation

A. Thermophilic Campylobacter general evaluation

History of the disease and/or infection in the country

Icelandic studies have shown that many species of wild birds, farmed animals and pets are frequent carriers of a thermophilic Campylobacter spp. A pilot study done in 1999 (July-Oct) showed that 25% of broiler flocks in Iceland were infected and that the prevalence in broiler meat on the market in Iceland was 45%.

In 1998 the incidence of campylobacteriosis in humans began to increase, from 34,5 in 1997 to 79,8 in 1998. In 1999 the incidence was 155,9, where 116,8 were identified as being of domestic origin. In 1996 it was authorized for the first time to sell and distribute chilled broiler meat, where in the decades before only frozen broiler meat had been available and no poultry meat was imported to Iceland. Following the marketing of chilled broiler meat the yearly consumption increased from 6 kg pr. Inhabitant in 1996 to 11 kg pr. Inhabitant in 1999. Icelandic veterinary and human health authorities came to the conclusion that the major increase of human campylobacteriosis in Iceland in 1999 was linked to the consumption and handling of chilled broiler meat.

In cooperation with the poultry industry in Iceland the authorities implemented a national surveillance programme for Campylobacter in poultry. It began as a voluntary programme in May 2000, but by late 2001 and early 2002 it was implemented into national legislation. The objective of the programme is to prevent the distribution of chilled poultry carcasses or poultry meat that is known to be Campylobacter positive.

Therefore all positive poultry flocks and all positive slaughter batches are either frozen or heat treated before distribution, however as the results from the slaughter samples are not available until two days after slaughter, campylobacter positive carcasses or chilled meat can occasionally be distributed, (approx. 4,5% of the total broiler production). Only carcasses from poultry flocks that are negative prior to slaughter can be distributed from the slaughterhouses as chilled meat.

The Icelandic consumer prefers chilled poultry meat to frozen and is willing to pay more for it. In Iceland there are three poultry companies and each company owns allt the establishments throughout the processing chain (i.e. the hatchery, farm, slaughterhouse, cutting plant and processing plants for meat and ready-to-eat products).

With regard to the surveillance programme the poultry companies have to produce Campylobacter negative broilers if they want to sell and distribute chilled broiler meat, as all Campylobacter positive broilers must be frozen or heat-treated before distribution and marketing. This is why the Icelandic surveillance programme is the driving force for all on farm efforts to eradicate Campylobacter; see Chapter on Campylobacter in Gallus gallus.

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

After the implementation of the national surveillance programme in 2000 the prevalence in broiler flocks, slaughter groups and the incidence in humans decreased dramatically. The Campylobacter trend in the last decade has been that it is decreasing in all three stages (i.e. in broilers, slaughter batches and humans).

Before the implementation of the surveillance programme the prevalence in broiler flocks was about 25%. However, in recent years it has been as follows: 4,5% (2005), 9,5% (2006), 6,3% (2007), 8,5% (2008), 4,2% (2009) and 7,0% (2010).

Before the implementation of the surveillance programme the prevalence in broiler meat on the market was about 45%. However, in recent years the prevalence in broiler slaughter batches has been as follows: 10,4% (2005), 12,3% (2006), 8,9% (2007), 11,6% (2008), 7,5% (2009) and 13,2% (2010).

It is assumed that the implementation of the surveillance programme has decreased the human incidence of campylobacteriosis which now varies between 29,5 to 77,8, where between 10,4 to 42,6 are identified as of domestic origin (2001-2008). These results have been achieved despite the fact that yearly consumption of broiler meat has increased from 6 kg pr. inhabitant in 1996 to 24 kg pr. inhabitant in 2009 and that approximately 70% of all broiler meat on the market is sold chilled. Hardly any broiler meat is imported and only frozen products can be imported.

The Icelandic national surveillance programme has since its implementation prevented large quantities of Campylobacter positive broiler meat from entering the market as chilled meat. The programme is assumed to be very effective to reduce Campylobacter in broilers and campylobacteriosis in humans, by preventing as much as possible that consumers get in contact with or handle positive chilled poultry meat.

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

Consumption and handling of poultry and poultry products is not believed to be the primary source of human campyloabacteriosis in Iceland any longer. The use of untreated water, especially in summerhouses and during camping, is however believed to be an important source of human campylobacteriosis in Iceland.

Recent actions taken to control the zoonoses

The implementation of the Icelandic surveillance programme for Campylobacter in poultry was a direct response from the food and veterinary authority and the poultry industry to the major increase in human campylobacteriosis in 1999. The programme is almost the same as it was when implemented in 2000 and only minor changes have been made. The national surveillance programme is believed to be very effective in preventing campylobacteriosis in humans.

2.2.2 Campylobacteriosis in humans

Table Campylobacter in humans - Species/serotype distribution

Species/serotype Distribution	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.	Unknown status
Campylobacter	60	19	21	7	30	9	9
C. coli	0	0	0	0	0	0	0
C. jejuni	60	19	21	7	30	9	9
C. upsaliensis	0	0	0	0	0	0	0

Table Campylobacter in humans - Age distribution

Age distribution	C. coli			C. jejuni			Campylobacter spp., unspecified		
	All	M	F	All	M	F	All	M	F
<1 year	0	0	0	0	0	0	0	0	0
1 to 4 years	0	0	0	3	2	1	0	0	0
5 to 14 years	0	0	0	2	2	0	0	0	0
15 to 24 years	0	0	0	12	4	8	0	0	0
25 to 44 years	0	0	0	19	10	9	0	0	0
45 to 64 years	0	0	0	19	13	6	0	0	0
65 years and older	0	0	0	5	3	2	0	0	0
Age unknown	0	0	0	0	0	0	0	0	0
Total :	0	0	0	60	34	26	0	0	0

Table Campylobacter in humans - Seasonal distribution

Seasonal Distribution / Months	C. coli	C. jejuni	C. upsaliensis	Campylobacter spp., unspecified
	Cases	Cases	Cases	Cases
January	3	0	0	0
February	2	0	0	0
March	3	0	0	0
April	2	0	0	0
May	5	0	0	0
June	4	0	0	0
July	13	0	0	0
August	15	0	0	0
September	6	0	0	0
October	5	0	0	0
November	0	0	0	0
December	2	0	0	0
Total :	60	0	0	0

2.2.3 Campylobacter in foodstuffs

A. Thermophilic Campylobacter in Broiler meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

See text form on thermophilic campylobacter in Gallus gallus

At meat processing plant

No

At retail

The local health authorities (LHA) are responsible for sampling at retail. Samples were taken in July and August by one LHA in the most populated area.

Frequency of the sampling

At slaughterhouse and cutting plant

See text form on thermophilic campylobacter in Gallus gallus

At retail

Depending on the survey

Type of specimen taken

At slaughterhouse and cutting plant

See text form on thermophilic campylobacter in Gallus gallus

At retail

Broiler meat and products there of

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

See text form on thermophilic campylobacter in Gallus gallus

At retail

Packed products

Definition of positive finding

At slaughterhouse and cutting plant

See text form on thermophilic campylobacter in Gallus gallus

At retail

A sample were Campylobacter spp. is detected

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

Bacteriological method: Campy-Cefex direct plate Method

At retail

NMKL 3rd ed., 2007

Preventive measures in place

Meat from positive flocks should be frozen or cooked before it is placed on the marked. HACCP activities are verified under official control of FBO. According to national legislation there is a warning note on each package containing raw poultry meat. This note recommends the consumer to prevent cross contamination when handling raw poultry meat.

Control program/mechanisms

The control program/strategies in place

See text form on thermophilic campylobacter in Gallus gallus

Recent actions taken to control the zoonoses

See text form on thermophilic campylobacter in Gallus gallus

Measures in case of the positive findings or single cases

See text form on thermophilic campylobacter in Gallus gallus

Notification system in place

All results from samples taken from slaughter batches are as a part of the surveillance programme reported directly to the authorities from the laboratories, both negative and positive results.

Results of the investigation

Of 33 samples taken at retail one was found positive for Campylobacter jejuni

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

The trend in the last decade has been that the Campylobacter prevalence in broiler slaughter batches is decreasing.

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

See text form on thermophilic campylobacter in Gallus gallus

Table Campylobacter in poultry meat

	Source of information	Sampling strategy	Sampler	Sample type	Sample origin	Sampling unit	Sample weight	Units tested	Total units positive for Campylobacter	C. coli	C. jejuni
Meat from broilers (Gallus gallus) - fresh - at retail	Matís laboratory	Objective sampling	Official sampling	feed sample	Domestic	Single	25 g analysed	15	0		
Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - at retail	Matís laboratory	Objective sampling	Official sampling	food sample	Domestic	Single	25 g analysed	18	1		1
Meat from broilers (Gallus gallus) - fresh - chilled - at retail - Survey - national survey (25g neck skin of whole chicken)	Matis	Convenience sampling	Industry sampling	food sample	Domestic	Single	25g	117	0		
Meat from broilers (Gallus gallus) - fresh - skinned - at retail - Survey (Skinned loins) [1)]	Matis	Convenience sampling	Industry sampling	food sample	Domestic	Single	0,5 mL	117	0		
Meat from broilers (Gallus gallus) - fresh - with skin - at retail - Survey - national survey (wings with skin) [2)]	Matis	Convenience sampling	Industry sampling	food sample	Domestic	Batch	0,5 mL	117	0		

	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Meat from broilers (Gallus gallus) - fresh - at retail			
Meat from broilers (Gallus gallus) - meat preparation - intended to be eaten cooked - at retail			
Meat from broilers (Gallus gallus) - fresh - chilled - at retail - Survey - national survey (25g neck skin of whole chicken)			

Table Campylobacter in poultry meat

	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Meat from broilers (Gallus gallus) - fresh - skinned - at retail - Survey (Skinned loins) [1)]			
Meat from broilers (Gallus gallus) - fresh - with skin - at retail - Survey - national survey (wings with skin) [2)]			

Comments:

[1)] three loins rinsed in 100mL BPW

[2)] nine loins rinsed in 100mL BPW

2.2.4 Campylobacter in animals

A. Thermophilic Campylobacter in Gallus gallus

Monitoring system

Sampling strategy

According to the Icelandic Campylobacter national surveillance programme every broiler flock is sampled at the farm 2 to 5 days prior to slaughter. Other poultry flocks are sampled 14 days prior to slaughter. Samples are taken by the food business operator (FBO).
In july 2012, a reviewed control programme was implemented. From that time on only poultry flocks from which the meat is intended to be distributed unfrozen and unheattreated is sampled 2 - 5 days prior to slaughter and at slaughter.

Frequency of the sampling

Before slaughter at farm

After july 1: Every flock from which the meat is intended to be distributed unfrozen and unheattreated is sampled by the FBO, 2-5 days before slaughter.

At slaughter

After july 1: Annually, from march 1 to october 31, every batch is sampled by the FBO, if the meat from the flock is intended to be distributed unheattreated and unfrozen.
If at slaughter no pre-slaughter sample is available, but it is intended to distribute meat from the batch unheattreated and unfrozen, samples are taken at slaughter and it is not allowed to distribute meat from the batch until results from slaughter samples are available and negative.

Type of specimen taken

Before slaughter at farm

Faeces

At slaughter

Caecas

Methods of sampling (description of sampling techniques)

Before slaughter at farm

10 individual fresh faecal droppings are taken by the FBO 2 to 5 days before slaughter. They are sent as one pooled sample to the laboratory.

At slaughter

2 x 10 caecae are sampled at the slaughter line by the OV, pooled to 2 samples at the laboratory.
After july 1: 1x10 caecas are sampled at the slaughter line by the FBO, pooled into one sample.

Case definition

Before slaughter at farm

A flock is considered positive when Campylobacter spp. is detected.

At slaughter

A slaughter batch is considered positive when Campylobacter spp. is detected.

Diagnostic/analytical methods used

Before slaughter at farm

Bacteriological method: Campy-Cefex direct plate Method

At slaughter

Bacteriological method: Campy-Cefex direct plate Method

Vaccination policy

There is no vaccination against Campylobacter in Iceland.

Other preventive measures than vaccination in place

Generally the freezing policy is the driving force for all preventive measures at farm level. All positive flocks must be either frozen or heat treated directly after slaughter. As only flocks that test negative for Campylobacter prior to slaughter can be processed as fresh chilled products the farmers aim to produce negative flocks, as the fresh chilled products have the highest market value.

The most important interventions done at the farm level are no thinning and very high biosecurity all year round. In 2005 many farmers began to slaughter the broilers at a younger age (approx. 30 days) during the summer period (June-September) as younger broilers have lower campylobacter prevalence. The rest of the year broilers are slaughtered at the age of approx. 36 days. The latest preventative measure (since 2008) is to use fly nets on the broiler house inlets during the summer period on high risk farms (i.e. where “all in - all out” method cannot be implemented at farm level).

All preventative measures at the farm level are voluntary interventions.

Control program/mechanisms

The control program/strategies in place

The Campylobacter national surveillance programme is based on Reg. no. 260/1980 (amended by Reg. no 688/2002) and Reg. no. 251/1995 (amended by Reg. no 904/2001). The Icelandic Campylobacter surveillance programme is build on the freezing policy which means that all poultry flocks positive in the pre-slaugher sample are submitted to freezing or are heat treated before distribution. If campylobacter is detected in a slaughter batch, no further meat will be distributed from the slaughter house unless frozen or heat treated, but meat already distributed is not withdrawn from the market. Only carcasses from poultry flocks that are negative prior to slaughter can be processed as chilled meat from the slaughterhouses. The objective of the programme is to prevent distribution of poultry carcasses or poultry meat that is known to be Campylobacter positive as chilled products.

The surveillance programme started in the year 2000 as a voluntary programme in collaboration with the poultry industry. In 2002 it was implemented into national legislation.

Recent actions taken to control the zoonoses

The Campylobacter national surveillance programme has been running almost the same since the year 2000 and is believed to be very effective to protect humans against campylobacteriosis.

Measures in case of the positive findings or single cases

Carcasses from flocks that test positive for thermophilic Campylobacter sp. based upon the pre-slaughter sampling are either subjected to heat-treatment or frozen.

Notification system in place

All results from samples taken from broiler flocks are as a part of the surveillance programme reported directly to the authorities from the laboratories, both negative and positive results.

Results of the investigation

The prevalence of Campylobacter sp. in broiler flocks in 2012 before slaughter was 4% which is similar to the results from previous years.
In 2012, until end of october, around 2,3% of broiler meat distributed unfrozen and unheattreated was positive for campylobacter (calculated from prevalence in pre slaugher samples and slaughter samples).

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

The trend in the last decade has been that the Campylobacter prevalence in broiler flocks is decreasing.

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

There is a strong seasonal variation with a peak occurring during the summer and autumn months both in broilers and humans, while very low prevalence/incidences can be found during the winter months. The Icelandic food and veterinary authority collects monthly poultry production data with regard to campylobacter. This enables calculations of the possible maximum amounts of Campylobacter positive broiler meat that might have been distributed as chilled products on the market each month. However when compared to human campylobacteriosis during the same period, it has been shown that in months where no Campylobacter positive chilled broiler meat was distributed on the market there were still some cases of campylobacteriosis of domestic origin. This indicates that other sources of Campylobacter sp. are also important.

Table Campylobacter in animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample origin	Sampling unit	Units tested	Total units positive for Campylobacter	C. coli	C. jejuni	C. lari
Gallus gallus (fowl) - broilers - at farm - Monitoring	Keldur and Matís	Census	Industry sampling	animal sample > faeces	Domestic	Flock	645	28			
Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring	Keldur	Census	Official and industry sampling	animal sample > caecum	Domestic	Slaughter batch	589	26			
Turkeys - at farm - Monitoring	Keldur	Census	Industry sampling	animal sample > faeces	Domestic	Flock	27	2			
Turkeys - at slaughterhouse - Monitoring	Keldur	Census	Official and industry sampling	food sample > neck skin	Domestic	Slaughter batch	52	4			
Ducks - at farm - Monitoring	Keldur	Census	Industry sampling	animal sample > faeces	Domestic	Flock	7	6			
Ducks - at slaughterhouse - Monitoring	Keldur	Census	Official and industry sampling	animal sample > caecum	Domestic	Flock	11	11			

	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Gallus gallus (fowl) - broilers - at farm - Monitoring		28
Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring		26
Turkeys - at farm - Monitoring		2
Turkeys - at slaughterhouse - Monitoring		4

Table Campylobacter in animals

	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Ducks - at farm - Monitoring		6
Ducks - at slaughterhouse - Monitoring		11

2.2.5 Antimicrobial resistance in Campylobacter isolates

A. Antimicrobial resistance in Campylobacter jejuni and coli in poultry

Control program/mechanisms

The control program/strategies in place

At the moment, there is no monitoring on antimicrobial resistance in Campylobacter spp. in poultry or poultry products.

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

Test Method Used	Standard methods used for testing

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

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

Test Method Used	Standard methods used for testing

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

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

Test Method Used	Standard methods used for testing

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

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

Test Method Used	Standard methods used for testing

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

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

Test Method Used	Standard methods used for testing

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

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

Test Method Used	Standard methods used for testing

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

2.3 LISTERIOSIS

2.3.1 General evaluation of the national situation

A. Listeriosis general evaluation

History of the disease and/or infection in the country

The prevalence of Listeria monocytogenes in smoked and gravad fish was determined in a survey 2011. The results were: The probability (95%) to find Listera monocytogenes in smoked and gravad fish on the marked is 3.83% – 7.16% and there is 95% probability that cfu/g is >100 in 1.99% – 4.6% of smoked and gravad fish.

Recent actions taken to control the zoonoses

The requirements of the Regulation (EC) No 2073/2005 apply, i.e., monitoring of the production process, shelf-life studies when deemed appropriate, withdrawal from the market when unsatisfactory results and taking measures to prevent the recurrence of the contamination, such as reviewing the production routines and shelf life of the product. Dietary advice is given to pregnant women.

2.3.2 Listeriosis in humans

A. Listeriosis in humans

Reporting system in place for the human cases

Yes it is a reportable disease

Case definition

The EU case defintion

Notification system in place

Yes

Table Listeria in humans - Species/serotype distribution

Species/serotype Distribution	Cases	Cases Inc.
Listeria	0	0
Listeria spp., unspecified	0	0
Congenital cases	0	0
Number of deaths	0	0

Table Listeria in humans - Age distribution

Age distribution	L. monocytogenes			Listeria spp., unspecified		
	All	M	F	All	M	F
<1 year	0	0	0	0	0	0
1 to 4 years	0	0	0	0	0	0
5 to 14 years	0	0	0	0	0	0
15 to 24 years	0	0	0	0	0	0
25 to 44 years	0	0	0	0	0	0
45 to 64 years	0	0	0	0	0	0
65 years and older	4	2	2	0	0	0
Age unknown	0	0	0	0	0	0
Total :	4	2	2	0	0	0

2.3.3 Listeria in foodstuffs

A. Listeria in Food

Monitoring system

Sampling strategy

No continuous monitoring of foodstuffs takes place. Surveys are occasionally performed. Last survey was in 2011 on LM in smoked and gravad fish. The FBO should follow the EU requirements regarding testing for L. monocytogenes in ready-to-eat foods (Regulation (EC) NO 2073/2005). Samples are taken as part of internal control programmes in the food producing industry and sampling is verified in regular official control.

Frequency of the sampling

At the production plant

Not known. It is the FBO that should decide the frequency.

Type of specimen taken

At the production plant

Ready to eat products.

Definition of positive finding

At the production plant

Samples positive for Listeria monocytogenes are considered positive.

Preventive measures in place

HACCP activities are verified under official control. Dietary advice is given to pregnant women.

Notification system in place

The laboratories and the FBO operators should notify to MAST if they detect Listeria monocytogenes in ready to eat food.

Results of the investigation

2012 Listeria monocytogenes in ready to eat food has not been notified to MAST.

2.3.4 Listeria in animals

A. Listeria in Animals

Monitoring system

Sampling strategy

There is no active surveillance in animals regarding L. monocytogenes.

Notification system in place

Listeriosis in animals is a notifiable disease.

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

Based on notifications little changes are seen in the prevalence of listeriosis in animals.

Table Listeria in animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample origin	Sampling unit	Units tested	Total units positive for Listeria	L. monocytogenes	Listeria spp., unspecified
Cattle (bovine animals) - at farm - Monitoring [1)]										
Cattle (bovine animals) - dairy cows - at farm - Monitoring [2)]										
Sheep - at farm - Monitoring [3)]										
Goats - at farm - Monitoring [4)]										
Pigs - at farm - Monitoring [5)]										
Gallus gallus (fowl) - at farm - Monitoring [6)]										
Turkeys - at farm - Monitoring [7)]										

Comments:

[1)] No monitoring

[2)] No monitoring

[3)] No monitoring

[4)] No monitoring

[5)] No monitoring

[6)] No monitoring

[7)] No monitoring

2.4 E. COLI INFECTIONS

2.4.1 General evaluation of the national situation

2.4.2 E. coli infections in humans

A. Verotoxigenic Escherichia coli infections in humans

Reporting system in place for the human cases

Yes it is a reportable disease

Case definition

Yes the EU case definition

Notification system in place

Yes

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

Species/serotype Distribution	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.
Escherichia coli, pathogenic						
E.coli infect. (except HUS)	1	0	1	0	0	0
- clinical cases	1	0	1	0	0	0
- laboratory confirmed	1	0	1	0	0	0
- caused by 0157 (VT+)	1	0	1	0	1	0
- caused by other VTEC	0	0	0	0	0	0

Footnote:

HUS is not reportable in Iceland, therfore no data

Table Escherichia coli, pathogenic in humans - Age distribution

Age distribution	Verotoxigenic E. coli (VTEC)			Verotoxigenic E. coli (VTEC) - VTEC O157:H7			Verotoxigenic E. coli (VTEC) - VTEC non-O157		
	All	M	F	All	M	F	All	F	M
<1 year	0	0	0	0	0	0	0	0	0
1 to 4 years	0	0	0	0	0	0	0	0	0
5 to 14 years	0	0	0	0	0	0	0	0	0
15 to 24 years	0	0	0	0	0	0	0	0	0
25 to 44 years	1	1	0	0	1	0	0	0	0
45 to 64 years	0	0	0	0	0	0	0	0	0
65 years and older	0	0	0	0	0	0	0	0	0
Age unknown	0	0	0	0	0	0	0	0	0
Total :	1	1	0	0	1	0	0	0	0

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

No regular monitoring but sporadic monitoring from 1923 until 1971 was negative and there are no positive findings in slaughterhouses. Mycobacterium bovis is almost unknown in Iceland. The only clinical sample in cattle was in 1922

2.5.2 Tuberculosis, mycobacterial diseases in humans

Table Mycobacterium in humans - Species/serotype distribution

Species/serotype Distribution	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.
Mycobacterium	11	3	0	0	0	0
M. bovis	0	0	0	0	0	0
M. tuberculosis	11	3				

Table Mycobacterium in humans - Age distribution

Age distribution	M. bovis		
	All	M	F
<1 year	0	0	0
1 to 4 years	0	0	0
5 to 14 years	0	0	0
15 to 24 years	0	0	0
25 to 44 years	0	0	0
45 to 64 years	0	0	0
65 years and older	0	0	0
Age unknown	0	0	0
Total :	0	0	0

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

The entire country is free.

Monitoring system

Sampling strategy

B. Mycobacterium bovis in farmed deer

Monitoring system

Sampling strategy

No deer in the country

Table Tuberculosis in other animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample origin	Sampling unit	Units tested	Total units positive for Mycobacterium	M. bovis	M. tuberculosis	Mycobacterium spp., unspecified
Sheep		Suspect sampling	Official sampling	animal sample > organ/tissue	Domestic	Animal	0	0			
Goats		Suspect sampling	Official sampling	animal sample > organ/tissue	Domestic	Animal	0	0			
Pigs		Suspect sampling	Official sampling	animal sample > organ/tissue	Domestic	Animal	0	0			
Badgers [1)]											

Comments:

[1)] No badgers in the country

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

Brucella abortus is never found i Iceland

2.6.2 Brucellosis in humans

A. Brucellosis in humans

Reporting system in place for the human cases

Yes, it is a reportable disease

Case definition

Yes, EU case defintion

Notification system in place

Yes

History of the disease and/or infection in the country

No cases during last the decades in Iceland

Table Brucella in humans - Species/serotype distribution

Species/serotype Distribution	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.
Brucella	0	0	0	0	0	0
B. abortus	0	0	0	0	0	0
B. melitensis	0	0	0	0	0	0
B. suis	0	0	0	0	0	0
Occupational cases	0	0	0	0	0	0

Table Brucella in humans - Age distribution

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

Footnote:

Zero cases

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

yes

Monitoring system

Sampling strategy

Blood samples from 5 cows in 16 heards

Frequency of the sampling

Every year

Type of specimen taken

Serum

Diagnostic/analytical methods used

Brucella abortus (agg) antibody examination by agglutination

B. Brucella melitensis in goats

Status as officially free of caprine brucellosis during the reporting year

The entire country free

Yes

C. Brucella melitensis in sheep

Status as officially free of ovine brucellosis during the reporting year

The entire country free

Yes

Monitoring system

Methods of sampling (description of sampling techniques)

Blood samples taken fom rams in a semen station last 12 years. In 2010 was taken 100 blood samples from 19 heards. All samples are negative.

Table Brucellosis in other animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample origin	Sampling unit	Units tested	Total units positive for Brucella	B. abortus	B. melitensis	B. suis
Pigs		Suspect sampling	Official sampling	animal sample > blood	Domestic	Animal	0	0			

	Brucella spp., unspecified
Pigs	

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

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

Region	Total number of existing bovine		Officially free herds		Infected herds		Surveillance						Investigations of suspect cases								
							Serological tests			Examination of bulk milk			Information about			Epidemiological investigation					
	Herds	Animals	Number of herds	%	Number of herds	%	Number of bovine herds tested	Number of animals tested	Number of infected herds	Number of bovine herds tested	Number of animals or pools tested	Number of infected herds	Number of notified abortions whatever cause	Number of isolations of Brucella infection	Number of abortions due to Brucella abortus	Number of animals tested with serological blood tests	Number of suspended herds	Number of positive animals		Number of animals examined microbio logically	Number of animals positive microbio logically
																		Sero logically	BST		
Ísland	805	69438	805	100	0	0	9	45	0	0	0	0	0	0	0	0	0	0	0	0	0
Total : [1)]	805	69438	805	100	0	0	9	45	0	0	0	0	0	0	0	0	0	0	0	0	0

Comments:

[1)] N.A.

2.7 YERSINIOSIS

2.7.1 General evaluation of the national situation

2.7.2 Yersiniosis in humans

A. Yersinosis in humans

Reporting system in place for the human cases

Yes it is a reportable

Case definition

The EU case defintion

Notification system in place

Yes

History of the disease and/or infection in the country

A very rare disease in Iceland, only sporadic cases with many years between cases

Table Yersinia in humans - Species/serotype distribution

Species/serotype Distribution	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.
Yersinia	0	0	0	0	0	0
Y. enterocolitica	0	0	0	0	0	0
Y. enterocolitica - O:3	0	0	0	0	0	0
Y. enterocolitica - O:9	0	0	0	0	0	0

Table Yersinia in humans - Age distribution

Age distribution	Y. enterocolitica			Yersinia spp., unspecified		
	All	M	F	All	M	F
<1 year	0	0	0	0	0	0
1 to 4 years	0	0	0	0	0	0
5 to 14 years	0	0	0	0	0	0
15 to 24 years	0	0	0	0	0	0
25 to 44 years	0	0	0	0	0	0
45 to 64 years	0	0	0	0	0	0
65 years and older	0	0	0	0	0	0
Age unknown	0	0	0	0	0	0
Total :	0	0	0	0	0	0

Table Yersinia in humans - Seasonal distribution

Seasonal Distribution / Months	Y. enterocolitica	Yersinia spp., unspecified
	Cases	Cases
January	0	0
February	0	0
March	0	0
April	0	0
May	0	0
June	0	0
July	0	0
August	0	0
September	0	0
October	0	0
November	0	0
December	0	0
not known	0	0
Total :	0	0

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

Regular, systematic surveillance of Trichinella sp. has not been done so far in Iceland, but as of January 1st 2012 samples are taken from all slaughtered pigs and horses according to Commission Regulation (EC) No 2075/2005.

When particularly looked for Trichinella has neither been found in live stock nor in domestic wild animals (foxes, minks) in Iceland. Three cases of Trichinella sp. in stray polar bears are known from the years 1963, 2008 and 2010. In 1963 Trcihinella sp. was found in a stray polar bear which came ashore in the north-western part of the country, in 2008 Trichinella native was found in another polar bear that came ashore in the northern part of the country and in 2010 Trichinella sp. was found in the third animal which was detected in the north-eastern part of Iceland.

When exporting horse meat some purchasers demand Trichinella testing at slaughter and prior to export. As a result of these demands approx. 1.600 samples from horses had been investigated up until the year 2008, which were negative with regard to Trichinella sp.

Trichinella has never been diagnosed in humans in Iceland.

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

The risk of Trichinella spp. beeing introduced into Icelandic wildlife does exist because of occasional stray polar bears coming ashore. The probability of the risk is however very low because polar bears are euthanized and their carcasses removed as soon as they are detected.

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

The probability of contracting trichinellosis from food producing animals of Icelandic origin is close to zero.

Recent actions taken to control the zoonoses

None, other than euthanizing and removing polar bears from the environment and disposing of the carcasses after post-mortem investigations.

2.8.2 Trichinellosis in humans

A. Trichinellosis in humans

Reporting system in place for the human cases

Yes it is a reportable disease

Case definition

Yes, the Eu case defintion

Notification system in place

Yes

History of the disease and/or infection in the country

No cases during the last decades

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

Zero cases in humans

Table Trichinella in humans - Species/serotype distribution

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

Table Trichinella in humans - Age distribution

Age distribution	Trichinella spp., unspecified		
	All	M	F
<1 year	0	0	0
1 to 4 years	0	0	0
5 to 14 years	0	0	0
15 to 24 years	0	0	0
25 to 44 years	0	0	0
45 to 64 years	0	0	0
65 years and older	0	0	0
Age unknown	0	0	0
Total :	0	0	0

Footnote:

Zero cases

2.8.3 Trichinella in animals

A. Trichinella in horses

Monitoring system

Sampling strategy

Samples weretaken from all slaughtered horses intended to be put on the marked.

Frequency of the sampling

Samples were taken from all horses.

Type of specimen taken

Tongue or masseter muscle.

Methods of sampling (description of sampling techniques)

Methods used were in accordance with Regulation (EC) No 2075/2005. For analyses, 5 g per animal is included in a pooled sample of maximum 100 g.

Case definition

An animal with a positive test result in the official examination.

Diagnostic/analytical methods used

Artificial digestion method of pooled samples.

Results of the investigation including the origin of the positive animals

No cases of Trichinellosis were reported among slaughtered horses.

Control program/mechanisms

The control program/strategies in place

Sampling was according to 2075/2005 and is monitored by official vets.

Measures in case of the positive findings or single cases

In case of a positive sample the horse carcasses will be retested individually. Pursuant to the Law on Animal Health No 25/1993, the Minister can issue national regulation on any necessary measures to be taken in order to find the source of the infection, restrict movement of animals, hinder the spread of and eradicate the disease.

Notification system in place

According to the national Law on Animal Health, no. 25/1993, trichinellosis is a list B disease that must be notified.

Monitoring system

Sampling strategy

For categories of holdings officially recognised Trichinella-free

There is no categorization of holdings.

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

No cases have been reported in Iceland, neither in humans nor in animals.

B. Trichinella in pigs

Number of officially recognised Trichinella-free holdings

All holdings are considered trichinella - free.

Categories of holdings officially recognised Trichinella-free

No categorization of holdings.

Monitoring system

Sampling strategy

General

Samples were taken from all slaughtered pigs intended to be placed on the market.

Frequency of the sampling

General

Samples were taken from all pigs slaughtered.

For categories of holdings officially recognised Trichinella-free

Type of specimen taken

General

Muscle clip from the pillar of diaphragma.

Methods of sampling (description of sampling techniques)

General

Samples are taken according to 2075/2005 by trained employee of the slaughterhouse under the supervision of the official vet. 1g of muscle clip from the pillar of diaphragma (max 100 pigs per anlyse).

Case definition

General

An animal where Trichinella spp. larvae has been detected.

Diagnostic/analytical methods used

General

Artificial digestion method of pooled samples.

Preventive measures in place

Controlled housing condition in pig farms. Regular official control of farms and slaughterhouses.

Control program/mechanisms

The control program/strategies in place

Sampling of all slaughtered pigs.

Summary results of the inspections of Trichinella-free holdings including information on farmer compliance

Not applicable

Recent actions taken to control the zoonoses

None

Measures in case of the positive findings or single cases

In case of a positive sample the pig carcasses will be retested according to the regulation 2075/2005. Pursuant to the Law on Animal Health No 25/1993, the Minister can issue national regulation on any necessary measures to be taken in order to find the source of the infection, restrict movement of animals, hinder the spread of and eradicate the disease.

The contingency plan in place

Is under preparation but not issued yet.

Notification system in place

According to the national Law on Animal Health, no. 25/1993, trichinellosis is a list B disease that must be notified.

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

No positive result on trichinella from the samples taken.

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

No cases have been reported in Iceland, neither in humans nor in animals.

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

None

Table Trichinella in animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample origin	Sampling unit	Units tested	Total units positive for Trichinella	T. spiralis	Trichinella spp., unspecified
Pigs - fattening pigs [1)]	Keldur and Promat laboratories	Census	Official sampling	animal sample > organ/tissue	Domestic	Animal	72146	0	0	0
Solipeds, domestic - horses - at slaughterhouse - Surveillance [2)]	Keldur and Promat laboratories	Census	Official sampling	animal sample > organ/tissue	Domestic	Animal	10307	0	0	0

Comments:

[1)] All pigs total 903 samples

[2)] Total 620 samples

2.9 ECHINOCOCCOSIS

2.9.1 General evaluation of the national situation

A. Echinococcus spp. general evaluation

History of the disease and/or infection in the country

Echinococcus multilocularis has never been diagnosed. Echinococcus granulosus used to be quite frequent but has now apparently been eradicated, the last incidence detected in animals was in 1979 and in humans in 1988.

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

Emphasis is put on keeping the country free from Echinococcus. Annual treatment of dogs with anthelmintics is required and all carcasses at slaughterhouses are checked visually. The risk of introduction of Echinococcus multilocularis is considered moderate or low as the main definitive host, the red fox (Vulpes vulpes) is not present in the country and not wolfes or coyotes neither. The same applies for many common intermediate hosts such as vole, lemming and muskrat. The only fox in Iceland is the arctic fox (Vulpes lagopus), which is seldom seen in the vicinity of residential areas.

2.9.2 Echinococcosis in humans

A. Echinococcus spp. in humans

Reporting system in place for the human cases

Yes it is a reportable disease

Case definition

Yes the EU case defintion

Notification system in place

Yes

History of the disease and/or infection in the country

Zero cases during the last decades

Table Echinococcus in humans - Species/serotype distribution

Species/serotype Distribution	Cases	Cases Inc.	Autochthon cases	Autochthon Inc.	Imported cases	Imported Inc.
Echinococcus	0	0	0	0	0	0
E. granulosus	0	0	0	0	0	0
E. multilocularis	0	0	0	0	0	0
Echinococcus spp., unspecified	0	0	0	0	0	0

Table Echinococcus in humans - Age distribution

Age distribution	E. granulosus			E. multilocularis			Echinococcus spp., unspecified		
	All	M	F	All	M	F	All	M	F
<1 year	0	0	0	0	0	0	0	0	0
1 to 4 years	0	0	0	0	0	0	0	0	0
5 to 14 years	0	0	0	0	0	0	0	0	0
15 to 24 years	0	0	0	0	0	0	0	0	0
25 to 44 years	0	0	0	0	0	0	0	0	0
45 to 64 years	0	0	0	0	0	0	0	0	0
65 years and older	0	0	0	0	0	0	0	0	0
Age unknown	0	0	0	0	0	0	0	0	0
Total :	0	0	0	0	0	0	0	0	0

2.9.3 Echinococcus in animals

Table Echinococcus in animals

	Source of information	Sampling strategy	Sampler	Sample type	Sample origin	Sampling unit	Region	Units tested	Total units positive for Echinococcus	E. granulosus	E. multilocularis
Cattle (bovine animals) - at slaughterhouse - Surveillance		Suspect sampling	Official sampling	animal sample	Domestic	Animal	Ísland	0	0		
Sheep - at slaughterhouse - Surveillance		Suspect sampling	Official sampling	animal sample	Domestic	Animal	Ísland	0	0		
Goats - at slaughterhouse - Surveillance		Suspect sampling	Official sampling	animal sample	Domestic	Animal	Ísland	0	0		
Pigs - at slaughterhouse - Surveillance		Suspect sampling	Official sampling	animal sample	Domestic	Animal	Ísland	0	0		
Solipeds, domestic - horses - at slaughterhouse - Surveillance		Suspect sampling	Official sampling	animal sample	Domestic	Animal	Ísland	0	0		
Reindeers - at slaughterhouse - Surveillance		Suspect sampling	Official sampling	animal sample	Domestic	Animal	Ísland	0	0		
Raccoon dogs [1)]							Ísland	0	0		
Dogs		Suspect sampling	Official sampling	animal sample	Domestic	Animal	Ísland	0	0		

	Echinococcus spp., unspecified
Cattle (bovine animals) - at slaughterhouse - Surveillance	
Sheep - at slaughterhouse - Surveillance	
Goats - at slaughterhouse - Surveillance	

Table Echinococcus in animals

	Echinococcus spp., unspecified
Pigs - at slaughterhouse - Surveillance	
Solipeds, domestic - horses - at slaughterhouse - Surveillance	
Reindeers - at slaughterhouse - Surveillance	
Raccoon dogs [1)]	
Dogs	

Comments:

[1)] No raccoon dogs in the country

2.10 TOXOPLASMOSIS

2.10.1 General evaluation of the national situation

2.10.2 Toxoplasmosis in humans

A. Toxoplasmosis in humans

Reporting system in place for the human cases

Yes it is a reportable disease

Case definition

Yes the EU case defintion

Notification system in place

Yes

Table Toxoplasma in humans - Species/serotype distribution

Species/serotype Distribution	Cases	Cases Inc.
Toxoplasma	0	0
Toxoplasma spp., unspecified	0	0
Congenital cases	0	0

Table Toxoplasma in humans - Age distribution

Age distribution	Toxoplasma spp., unspecified		
	All	M	F
<1 year	0	0	0
1 to 4 years	0	0	0
5 to 14 years	0	0	0
15 to 24 years	0	0	0
25 to 44 years	0	0	0
45 to 64 years	0	0	0
65 years and older	0	0	0
Age unknown	0	0	0
Total :	0	0	0

2.11 RABIES

2.11.1 General evaluation of the national situation

2.11.2 Rabies in humans

A. Rabies in humans

Reporting system in place for the human cases

Yes it is a reportable disease

Case definition

Yes the EU case defintion

Notification system in place

Yes

History of the disease and/or infection in the country

Zero cases during the last decades

2.12 STAPHYLOCOCCUS INFECTION

2.12.1 General evaluation of the national situation

2.13 Q-FEVER

2.13.1 General evaluation of the national situation

2.14 WEST NILE VIRUS INFECTIONS

2.14.1 General evaluation of the national situation

3. INFORMATION ON SPECIFIC INDICATORS OF ANTIMICROBIAL RESISTANCE

3.1 ESCHERICHIA COLI, NON-PATHOGENIC

3.1.1 General evaluation of the national situation

3.1.2 Antimicrobial resistance in Escherichia coli, non-pathogenic

Table Cut-off values used for antimicrobial susceptibility testing of Escherichia coli, non-pathogenic in Animals

Test Method Used	Standard methods used for testing

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

Table Cut-off values used for antimicrobial susceptibility testing of Escherichia coli, non-pathogenic in Animals

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Tetracyclines	Tetracycline		8	
Trimethoprim	Trimethoprim		2	

Table Cut-off values used for antimicrobial susceptibility testing of Escherichia coli, non-pathogenic in Feed

Test Method Used	Standard methods used for testing

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

Table Cut-off values used for antimicrobial susceptibility testing of Escherichia coli, non-pathogenic in Food

Test Method Used	Standard methods used for testing

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

3.2 ENTEROCOCCUS, NON-PATHOGENIC

3.2.1 General evaluation of the national situation

3.2.2 Antimicrobial resistance in Enterococcus, non-pathogenic isolates

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

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin		32	
	Streptomycin		512	
Amphenicols	Chloramphenicol		32	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin		4	
Macrolides	Erythromycin		4	
Oxazolidines	Linezolid		4	
Penicillins	Ampicillin		4	
Streptogramins	Quinupristin/Dalfopristin		32	

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

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Tetracyclines	Tetracycline		2	

Table Cut-off values for antibiotic resistance of E. faecalis in Feed

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin		32	
	Streptomycin		512	
Amphenicols	Chloramphenicol		32	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin		4	
Macrolides	Erythromycin		4	
Oxazolidines	Linezolid		4	
Penicillins	Ampicillin		4	
Streptogramins	Quinupristin/Dalfopristin		32	
Tetracyclines	Tetracycline		2	

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

Test Method Used	Standard methods used for testing

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Aminoglycosides	Gentamicin		32	
	Streptomycin		512	
Amphenicols	Chloramphenicol		32	
Glycopeptides (Cyclic peptides, Polypeptides)	Vancomycin		4	
Macrolides	Erythromycin		4	
Oxazolidines	Linezolid		4	
Penicillins	Ampicillin		4	
Streptogramins	Quinupristin/Dalfopristin		32	
Tetracyclines	Tetracycline		2	

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

Test Method Used	Standard methods used for testing

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

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

Test Method Used	Standard methods used for testing

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

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

Test Method Used	Standard methods used for testing

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

4. INFORMATION ON SPECIFIC MICROBIOLOGICAL AGENTS

4.1 ENTEROBACTER SAKAZAKII

4.1.1 General evaluation of the national situation

4.2 HISTAMINE

4.2.1 General evaluation of the national situation

A. Histamine General evaluation

History of the disease and/or infection in the country

No cases reported 2012.

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

Scromboid species like herring and mackerel are produced in Iceland. Rapil cooling on board vessel is effictive preventive measure. Regular testing of selected species is required as an internal part of food business operator’s quality and the testing is verified under regular official control.
assurance system. Surveys are performed occasionally. No survey in 2012. In former surveys the levels of histamine were under the detection limit.

Recent actions taken to control the hazard

Information to the FBO on preventive measures like rapid cooling and sampling for analysing of histamine (2073/2005) has been issued. The results are checked by inspectors in official control.

4.2.2 Histamine in foodstuffs

A. Histamine in foodstuffs

Monitoring system

Sampling strategy

No official sampling.

4.3 STAPHYLOCOCCAL ENTEROTOXINS

4.3.1 General evaluation of the national situation

A. Staphylococcal enterotoxins general evaluation

History of the disease and/or infection in the country

No cases of footborne outbreaks due to staphylococcal enterotoxins have been reported 2012. One outbreak with 12 cases was registrated in 2010 due to staphylococcal enterotoxins. The cause of the outbreak was a homemade meal.

4.3.2 Staphylococcal enterotoxins in foodstuffs

A. Staphylococcal enterotoxins in foodstuffs

Monitoring system

Sampling strategy

No official sampling.

5. FOODBORNE

Foodborne outbreaks are incidences of two or more human cases of the same disease or infection where the cases are linked or are probably linked to the same food source. Situation, in which the observed human cases exceed the expected number of cases and where a same food source is suspected, is also indicative of a foodborne outbreak.

A. Foodborne outbreaks

System in place for identification, epidemological investigations and reporting of foodborne outbreaks

LCAs, the Food and Veterinary authority (MAST) shall inform the chief epidemiologist immediately if they become aware of a risk of infections. Laboratories detecting zonoosis in food should report to MAST. Phycisians and laboratories analysing human samples are required, according to article 3 in the Act on Health Security and Communicable Diseases no. 1997/19 to report notifiable diseases and diseases subject to registration to the the Chief epidemiologist. The Chief epidemiologist monitor the data and shall report suspected foodborne outbreaks to MAST and the relevant LCAs. MAST, chief epidemiologist and LCA if relevant work together in investigations of food borne outbreak. The chief epidemiologist is responsible for epidemiological investigation of humans and MAST is responsible investigation of animals, food, FBO and coordination of the relvant LCAs.

Description of the types of outbreaks covered by the reporting:

All suspected foodborne outbreaks are notifiable. The definition of a foodborne outbreak is two or more human cases with the same infection where the cases are linked or are probably linked to the same food source, or when observed number of human cases exceeds the expected number of cases during the same time period and place, and food is a likely vehicle.

National evaluation of the reported outbreaks in the country:

Trends in numbers of outbreaks and numbers of human cases involved

Food borne outbreaks of domestic origin are very few (1-5) each year. The situation has been stable the past 10 years.

Table Foodborne Outbreaks: summarised data

	Weak evidence or no vehicle outbreaks					
	Number of outbreaks	Human cases	Hospitalized	Deaths	Strong evidence Number of Outbreaks	Total number of outbreaks
Salmonella - S. Typhimurium	0	unknown	unknown	unknown	0	0
Salmonella - S. Enteritidis	0	unknown	unknown	unknown	0	0
Salmonella - Other serovars	1	3	unknown	unknown	0	1
Campylobacter	0	unknown	unknown	unknown	0	0
Listeria - Listeria monocytogenes	0	unknown	unknown	unknown	0	0
Listeria - Other Listeria	0	unknown	unknown	unknown	0	0
Yersinia	0	unknown	unknown	unknown	0	0
Escherichia coli, pathogenic - Verotoxigenic E. coli (VTEC)	0	unknown	unknown	unknown	0	0
Bacillus - B. cereus	0	unknown	unknown	unknown	0	0
Bacillus - Other Bacillus	0	unknown	unknown	unknown	0	0
Staphylococcal enterotoxins	0	unknown	unknown	unknown	0	0
Clostridium - Cl. botulinum	0	unknown	unknown	unknown	0	0
Clostridium - Cl. perfringens	0	unknown	unknown	unknown	1	1

	Weak evidence or no vehicle outbreaks					
	Number of outbreaks	Human cases	Hospitalized	Deaths	Strong evidence Number of Outbreaks	Total number of outbreaks
Clostridium - Other Clostridia	0	unknown	unknown	unknown	0	0
Other Bacterial agents - Brucella	0	unknown	unknown	unknown	0	0
Other Bacterial agents - Shigella	0	unknown	unknown	unknown	0	0
Other Bacterial agents - Other Bacterial agents	0	unknown	unknown	unknown	0	0
Parasites - Trichinella	0	unknown	unknown	unknown	0	0
Parasites - Giardia	0	unknown	unknown	unknown	0	0
Parasites - Cryptosporidium	0	unknown	unknown	unknown	0	0
Parasites - Anisakis	0	unknown	unknown	unknown	0	0
Parasites - Other Parasites	0	unknown	unknown	unknown	0	0
Viruses - Norovirus	2	28	unknown	unknown	0	2
Viruses - Hepatitis viruses	0	unknown	unknown	unknown	0	0
Viruses - Other Viruses	0	unknown	unknown	unknown	0	0
Other agents - Histamine	0	unknown	unknown	unknown	0	0
Other agents - Marine biotoxins	0	unknown	unknown	unknown	0	0
Other agents - Other Agents	0	unknown	unknown	unknown	0	0

	Weak evidence or no vehicle outbreaks					
	Number of outbreaks	Human cases	Hospitalized	Deaths	Strong evidence Number of Outbreaks	Total number of outbreaks
Unknown agent	0	unknown	unknown	unknown	0	0

Athuga hvar er taflan sem á að skrá í þegar hægt er að tengja við matvæli Strong evidenceþ Cl perfringens eitrun á að fara inn á hana.

Table Foodborne Outbreaks: detailed data for Clostridium

Please use CTRL for multiple selection fields

C. perfringens

	Value
FBO Code	
Number of outbreaks	1
Number of human cases	25
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Crustaceans, shellfish, molluscs and products thereof
More food vehicle information	Mixed heated dish containing shrimps, scallops, catfish, onion, spices and fresh coriander
Nature of evidence	Detection of causative agent in food chain or its environment - Symptoms and onset of illness pathognomonic to causative agent
Outbreak type	General
Setting	Take-away or fast-food outlet
Place of origin of problem	Transport of food
Origin of food vehicle	Unknown
Contributory factors	Inadequate chilling;Inadequate heat treatment;Storage time/temperature abuse
Mixed Outbreaks (Other Agent)	
Additional information	