European Food Safety Authority

ZOONOSES MONITORING

NORWAY

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 2010

INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Country: Norway

Reporting Year:

Laboratory name	Description	Contribution
Norwegian Veterinary Institute	The Norwegian Veterinary Institute (NVI) is a governmental agency funded by the Ministry of Agriculture and Food, Ministry of Fisheries and Coastal Affairs and the Norwegian Research Council. The primary function is the supply of independent research based advisory support to the governing authorities regarding animal health, fish health and food safety.	Contributing with data and text. The reporting officer is employed at the Zoonosis Centre at NVI.
Norwegian Food Safety Authority	The Norwegian Food Safety Authority (NFSA) is the competent authority for the purpose of Directive 2003/99/EC of the European Parliament and of the Council.	Contributing with data and text.
National Institute of Nutrition and Seafood Research	The National Institute of Nutrition and Seafood Research (NIFES) is a research institute with administrative tasks. The institute is linked directly to the Ministry of Fisheries and Coastal Affairs and act as an advisor to the Ministry in matters concerning the fjord to fork production chain of seafood (both wild and farmed). NIFES also provides independent and research based advisory support to other governmental bodies and to the Norwegian fisheries and aquaculture industries.	Contributing with data and text.

INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Laboratory name	Description	Contribution
Norwegian Institute of Public Health	The Norwegian Institute of Public Health (NIPH) is the national governmental centre for communicable disease prevention and control. The institute performs research and surveillance of communicable diseases in man and advices governmental and municipal authorities and the public on the prevention of communicable diseases, outbreaks and antimicrobial resistance. The institute also has responsibilities concerning chronic disease epidemiology, environmental medicine and forensic toxicology.	Contributing with data and text.

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 Norway during the year 2010 .

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

Data on herds and animals: Register of Production Subsidies.

Data on slaughtered animals: Register of Slaughtered Animals.

Dates the figures relate to and the content of the figures

Data on herds and animals: As of 31 July 2010.

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 (article 2.3(a) of Regulation (EC) No 2160/2003). In Norway, there is generally only one herd of the same animal species per holding.

A flock (poultry) is defined as all poultry of the same health status kept on the same premises or in the same enclosure and constituting a single epidemiological unit; in the case of housed poultry, this includes all birds sharing the same airspace (article 2.3(b) of Regulation (EC) No 2160/2003).

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

For cattle, swine, sheep, goat and poultry (layers and broilers) there has been a downward trend in the number of herds/holdings during the last decade. However, the average number of animals per herd/holding has increased.

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

Cattle: Most of the cattle herds are dairy herds, the average herd size being 21.4 cows. There are also a number of specialized beef herds with an average number of suckling cows of 14.6. A few herds are combined dairy and beef herds. The cattle herds are distributed throughout Norway with the main part being in the western and middle parts of Norway.

Swine: The Norwegian swine population is relatively small with products destined for the national market. A national breeding program is organized by the industry. Approximately 120 approved elite and multiplier breeding herds house 11% of the live sows in the population, while more than 95% of the sows producing piglets for fattening and slaughter are raised in these herds. The swine population is denser in some counties and about 60% of the swine production is concentrated in four counties in the southern and middle part of Norway.

Sheep: The Norwegian sheep flocks are widely distributed over the country, with the largest population found in the south-west. The sheep population consists of combined meat and wool producing breeds, with various Norwegian breeds predominating.

Goat: The Norwegian goat population is principally composed of one Norwegian breed. The main product is milk used for cheese production. The goat flocks are located in some mountainous regions in the southern part of the country, in the fjord districts of the western part, and in the northern counties.

Poultry: The Norwegian poultry production has a hierarchical structure and is strictly regulated. Egg and broiler meat production are the most important branches, but the number of holdings keeping turkey and

other species is increasing. The Norwegian layer population consists of two strains (Lohmann white and Shaver white). The layer population is located throughout Norway. The commercial broiler production consists of one strain (Ross). The broiler production is mainly located in five counties in the southern and middle part of Norway.

Additional information

The livestock production in Norway is targeted for the national market. Until 1999 there was a general ban on the import of live animals and animal products to Norway. Following the extension of the European Economic Area (EEA) Agreement 1 January 1999 regarding Veterinary and Phytosanitary matters, the general ban was lifted. However, imports of live animals remained limited.

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					61500		4200	
	mixed herds					32100		950	
	dairy cows and heifers					213800		10200	
	- in total			306900		872100		16800	
Deer	farmed - in total					7100		80	
Ducks	parent breeding flocks	2							
Gallus gallus (fowl)	grandparent breeding flocks for egg production line	3						2	
	parent breeding flocks for egg production line	20						11	
	broilers	4600		60194500				600	
	laying hens [1)]	988		882400		3808900		660	
	parent breeding flocks for meat production line	140						68	
Goats	milk goats					36900		400	
	- in total			24300		67600		1300	

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					57800		1400	
	fattening pigs					461400		2200	
	- in total			1565700		846700		2400	
Sheep	animals over 1 year					887600		14600	
	- in total			1228100		2296900		14800	
Solipeds, domestic	horses - in total			1500					
Turkeys	parent breeding flocks	15							
	- in total [2)]			1295700		363200		79	

Comments:

[1)] Only flocks >250 birds

[2)] Including small numbers of ducks and geese. Only flocks >25 birds

Footnote:

Numbers between 100 and 1000 rounded to the nearest ten, numbers >1000 rounded to the nearest hundred.

Column "Number of herds or flocks" are only used for poultry flocks. For other animal species, number of herds equals number of holdings and such data and data on poultry holdings are given in column "Number of holdings".

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

The situation regarding Salmonella in feedingstuffs, animals and food produced in Norway has for many years been very good. Approximately 75-80% of the cases of salmonellosis in humans are acquired abroad.

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

There is no alarming development in the number of salmonellosis cases in humans, neither for domestic nor imported cases. However, there seem to be have been a slightly increasing trend in domestic infections during the last decade.

For feedingstuffs and animals, the situation is very good and has been so for many years. Regarding food, the food produced in Norway is virtually free from Salmonella. Risk of exposure is mainly associated with international trade in food.

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

The Norwegian Salmonella Control Programmes have documented that live cattle, swine, and poultry in Norway as well as domestically produced food products of animal origin are virtually free from Salmonella. Each year, approximately 75-80% of reported cases of salmonellosis in humans have acquired the infection abroad. This illustrates that domestic food products of animal origin represent a small risk to the consumer in regard to Salmonella, an assumption that is supported by case-control studies.

2.1.2 Salmonellosis in humans

A. Salmonellosis in humans

Reporting system in place for the human cases

Human cases are reported to the Norwegian Surveillance System for Communicable Diseases (MSIS), from microbiological laboratories as well as from clinical doctors. The system distinguishes between domestic and imported cases. The severity of the disease at the time of reporting is also recorded. However, the surveillance system does not follow individual patients over time to record further disease development and final outcome.

Case definition

A case from which Salmonella other than S. Typhi and S. Paratyphi has been isolated or a clinical compatible case with either an epidemiological link to a culture confirmed case or serology indicating recent infection.

Diagnostic/analytical methods used

Bacteriology (isolation of the agent from a clinical sample) followed by confirmation, including serotyping and sometimes genotyping, at the National Reference Laboratory.

Notification system in place

According to the Communicable Disease Act, human cases are notifiable to the Norwegian Surveillance System for Communicable Diseases (MSIS) since 1975.

History of the disease and/or infection in the country

The recorded incidence of salmonellosis in Norway has increased during the last three decades with a sharp rise in the early 1980s due to the emergence of S. Enteritidis. In the majority of cases of salmonellosis (approximately 80%), the patients have acquired the disease abroad. The number of reported cases of salmonellosis corresponds well with charter tourism to foreign countries; in years with an increased charter tourism, such as in the mid-1980s and in the period 1992-1998, the incidence of salmonellosis also increased, whereas in years with a lower charter tourism activity due to economical depression, such as in the period 1988-1991, the incidence of salmonellosis dropped. Since 1998, the incidence of salmonellosis has leveled off. However, an increase was noted during 2001, mostly due to a few large outbreaks.

Since 1984, S. Enteritidis has become the most common serovar reported, except in 1987 when it was surpassed by S. Typhimurium due to a domestic outbreak traced to contaminated chocolate bars. While S. Typhimurium predominated in earlier years, S. Enteritidis has increased substantially from a low level in 1975-1982 to a higher level from the mid-1990s. No increase of similar magnitude has been observed for any other serovar.

The proportion of imported cases of S. Enteritidis infections is particularly high (approximately 90% among patients with known place of acquisition) as this pathogen is not established in the Norwegian poultry production. Among domestic cases, S. Typhimurium is the most common serovar. This serovar, although not established among food producing animals in Norway, does occur in the Norwegian environment such as in wild birds and hedgehogs.

Results of the investigation

In 2010, a total of 1367 cases of salmonellosis were reported (incidence rate 27.8 per 100 000), of which 229 (17%) were infected in Norway. Altogether 583 (43%) of the cases were due to S. Enteritidis, of which 57 (10%) were infected in Norway. Altogether, 164 (12%) of the cases were due to S. Typhimurium, of which 57 (35%) were domestic cases.

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

There was a decrease in the overall number of Salmonella-infections in 2010. Most of the reduction is in the number of patients who have contracted the infection abroad.

For domestically aquired infections, 2006 and 2007 were record years when nearly 400 cases contracted salmonellosis inside Norway, - the highest recorded number since 1987. However, both in 2008 and in 2009, there has been a decrease in the number of patients who get the infection without travelling prior to getting ill. This decrease is probably linked to the decrease in cases who contract salmonellosis abroad, since we assume that a number of the domestic cases are secondary cases to imported infections.

In 2010 three small outbreaks of salmonellosis were recorded in Norway. During the autumn, ten persons were reported ill with Salmonella Poona and 8 persons with Salmonella Napoli. In the same period Sweden also registered several cases of Salmonella Poona with identical MLVA profile as the Norwegian cases. An investigation was done in cooperation with Sweden, but the source of infection is so far not found. In addition one small outbreak of S.Typhimurium was reported from a private household where meat bought abroad was the suspected source. Domestic outbreaks of salmonellosis recorded in recent years illustrate that many kinds of foods may be involved in outbreaks, also those of non-animal origin, including imported foods.

Relevance as zoonotic disease

The Norwegian Salmonella Control Programmes have documented that live cattle, swine, and poultry in Norway as well as domestically produced food products of animal origin are virtually free from Salmonella. Each year, approximately 75-80% of reported cases of salmonellosis in humans have acquired the infection abroad. This illustrates that domestic food products of animal origin represent a small risk to the consumer in regard to Salmonella, an assumption that is supported by case-control studies.

However, data show that S. Typhimurium occurs endemically in the environment representing a risk for spread through wild animals and untreated water. In defined areas, where an endemic situation in the hedgehog and passerine bird populations has been established, annually minor outbreaks and sporadic cases occur.

Additional information

Patients whose work represents a risk for spread of the disease, e.g., in food production and health care, are advised to stay away from work as long as they have symptoms. It is recommended that for these patients three consecutive faecal samples examined after the symptoms have disappeared should be negative before resuming work.

2.1.3 Salmonella in foodstuffs

A. Salmonella spp. in pig meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

The Norwegian Salmonella Control Programme: Each year, a number of carcass swabs and lymph node samples are collected randomly from the pig population by slaughter and proportional to the slaughterhouses' throughput. The sampling of carcass swabs is described in this chapter, while the sampling of lymph nodes is described in the chapter on Salmonella in animals.

Samples of crushed meat are each year collected according to production capacity of cutting plants.

At meat processing plant

Until 1st of March 2010 when the Commission Regulation (EC) No 2073/2005 and Regulation (EC) No 853/2004 of the European Parliament and of the Council came into force, minced meat and meat preparations were sampled according to Council Directive 94/65/EC.

Frequency of the sampling

At slaughterhouse and cutting plant

At slaughterhouse: Detection of an annual prevalence of 0.1% by 95% confidence level. At cutting plant: According to production capacity: less than 2 tons; twice a year, 2-20 tons: once a month, greater than 20 tons: once a week.

At meat processing plant

According to Council Directive 94/65/EC until the new regulations were implemented. Thereafter according to Regulation 2073/2005. The frequencies may, however, vary according to the origin of the raw material and the demonstrated regional or national salmonella prevalence in the corresponding animal populations.

Type of specimen taken

At slaughterhouse and cutting plant

At slaughterhouse: Surface of carcass. At cutting plant: Crushed meat from equipment or trimmings.

At meat processing plant

Minced meat or meat preparations.

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

The upper inner part of the hind legs/pelvic entrance and the cut surface area of the abdomen and chest are swabbed, covering an area of approximately 1400 cm2 of each carcass.

Cutting plant: Each sample consists of 25 grams of meat.

At meat processing plant

Each sample consists of 25 grams of minced meat or meat preparations.

Definition of positive finding

At slaughterhouse and cutting plant

A positive sample is a sample from which Salmonella has been isolated.

At meat processing plant

A positive sample is a sample from which Salmonella has been isolated.

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

Bacteriological method: NMKL No 71:1999

At meat processing plant

Bacteriological method: NMKL No 71:1999

Control program/mechanisms

The control program/strategies in place

The Norwegian Salmonella Control Programme is mandatory. Detection of Salmonella, irrespective of serovar, is notifiable.

Measures in case of the positive findings or single cases

Whenever Salmonella is detected in samples taken in the National Control Programmes, the competent authorities must be notified without delay. Actions will be taken to identify and eliminate the source of the contamination in order to prevent further spread.

When Salmonella is detected in food already on the market, contaminated food will be withdrawn from the market and destroyed or, exceptionally, submitted to processing by a treatment eliminating the hazard. Investigation into the source of the contamination is initiated if relevant. If Salmonella is detected in food controls at the Border Inspection Posts, the consignments will be either rejected or destroyed or, exceptionally, submitted to processing by a treatment eliminating the hazard.

Notification system in place

The Norwegian Salmonella Control Programme is mandatory. Detection of Salmonella, irrespective of serovar, is notifiable.

Results of the investigation

In 2010, a total of 1811 carcasses were swabbed, all were negative. None of the samples of crushed meat from pig were positive. For details, see tables.

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

The Norwegian Salmonella Control Programmes document that domestically produced food products of animal origin are virtually free from Salmonella. The surveillance data indicate that the overall prevalence is below 0.1%.

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

Red and white meat produced in Norway is virtually free from Salmonella, and the risk of contracting Salmonella from domestically produced animal products is small. A connection between meat or meat products of domestic origin and human infection has never been established.

B. Salmonella spp. in bovine meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

The Norwegian Salmonella Control Programme: Each year, a number of carcass swabs and lymph node samples are collected randomly from the cattle population by slaughter and proportional to the slaughterhouses' throughput. The sampling of carcass swabs is described in this chapter, while the sampling of lymph nodes is described in the chapter on Salmonella in animals.

Samples of crushed meat are each year collected according to production capacity of cutting plants.

At meat processing plant

Until 1st of March 2010 when the Commission Regulation (EC) No 2073/2005 and Regulation (EC) No 853/2004 of the European Parliament and of the Council came into force, minced meat and meat preparations were sampled according to Council Directive 94/65/EC.

Frequency of the sampling

At slaughterhouse and cutting plant

At slaughterhouse: Detection of an annual prevalence of 0.1% by 95% confidence level. At cutting plant: According to production capacity: less than 2 tons: twice a year, 2-20 tons: once a month, greater than 20 tons: once a week.

At meat processing plant

According to Council Directive 94/65/EC until the new regulations were implemented. Thereafter according to Regulation 2073/2005. The frequencies may, however, vary according to the origin of the raw material and the demonstrated regional or national salmonella prevalence in the corresponding animal populations.

Type of specimen taken

At slaughterhouse and cutting plant

At slaughterhouse: Surface of carcass. At cutting plant: Crushed meat from equipment or from trimmings.

At meat processing plant

Minced meat or meat preparations.

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

Slaughterhouse: The upper inner part of the hind legs/pelvic entrance and the cut surface area of the abdomen and chest are swabbed, covering an area of approximately 1400 cm2 of each carcass.

Cutting plant: Each sample consists of 25 grams of meat.

At meat processing plant

Each sample consists of 25 grams of minced meat or meat preparations.

Definition of positive finding

At slaughterhouse and cutting plant

A positive sample is a sample from which Salmonella has been isolated.

At meat processing plant

A positive sample is a sample from which Salmonella has been isolated.

Diagnostic/analytical methods used

At slaughterhouse and cutting plant

Bacteriological method: NMKL No 71:1999

At meat processing plant

Bacteriological method: NMKL No 71:1999

Control program/mechanisms

The control program/strategies in place

The Norwegian Salmonella Control Programme is mandatory. Detection of Salmonella, irrespective of serovar, is notifiable.

Measures in case of the positive findings or single cases

Whenever Salmonella is detected in samples taken in the National Control Programmes, the competent authorities must be notified without delay. Actions will be taken to identify and eliminate the source of the contamination in order to prevent further spread.

When Salmonella is detected in food already on the market, contaminated food will be withdrawn from the market and destroyed or, exceptionally, submitted to processing by a treatment eliminating the hazard. Investigation into the source of the contamination is initiated if relevant. If Salmonella is detected in food controls at the Border Inspection Posts, the consignments will be either rejected or destroyed or, exceptionally, submitted to processing by a treatment eliminating the hazard.

Notification system in place

The Norwegian Salmonella Control Programme is mandatory. Detection of Salmonella, irrespective of serovar, is notifiable.

Results of the investigation

In 2010, a total of 1626 carcasses were swabbed, all were negative for Salmonella. None of the samples of crushed bovine meat were positive. For details, see tables.

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

The Norwegian Salmonella Control Programmes document that domestically produced food products of animal origin are virtually free from Salmonella. The surveillance data indicate that the overall prevalence is below 0.1%.

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

Red and white meat produced in Norway is virtually free from Salmonella, and the risk of contracting Salmonella from meat and meat products of domestic origin is negligible.

C. Salmonella spp. in broiler meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

Broiler meat and products thereof are monitored indirectly by testing all broiler flocks before slaughter - see chapter on Salmonella spp. in Gallus gallus - breeding flocks for meat production and broiler flocks. Additional testing at the slaughterhouses or cutting plants is not required.

Surveys are performed occasionally.

D. Salmonella spp. in eggs and egg products

Monitoring system

Sampling strategy

Eggs and egg products are monitored indirectly by monitoring of the layer population, see chapter on Salmonella spp. in Gallus gallus - breeding flocks for egg production and flocks of laying hens.

Additional testing of egg products is carried out by the food business operators as an integral part of their own check procedures.

E. Salmonella spp. in turkey meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

Turkey meat and products thereof are monitored indirectly by testing all turkey flocks before slaughter - see chapter on Salmonella spp. in turkey - breeding flocks and meat production flocks. Additional testing at the slaughterhouses or cutting plants is not required.

Occasionally, surveys are performed.

F. Salmonella spp. in food - Meat from sheep

Monitoring system

Methods of sampling (description of sampling techniques)

Table Salmonella in other food

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Crustaceans (Cooked)	NIFES	Single	25 g	14	0			
Crustaceans (Raw)	NIFES	Single	25 g	15	0			
Fats and oils (excluding butter) - oils (Fish oil)	NIFES	Single	25 g	17	0			
Fish (Farmed)	NIFES	Single	25 g	20	0			
Fish (Wild catch)	NIFES	Single	25 g	172	0			
Molluscan shellfish - cooked	NIFES	Single	25 g	1	0			
Molluscan shellfish - raw	NIFES	Single	25 g	99	0			

Table Salmonella in red meat and products thereof

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified
Meat from bovine animals - fresh - at slaughterhouse [1)]	NSCP	Single	swab	1626	0			
Meat from pig - fresh - at slaughterhouse [2)]	NSCP	Single	swab	1811	0			
Meat, red meat (meat from bovines, pigs, goats, sheep, horses, donkeys, bison and water buffalos) - at cutting plant [3)]	NSCP	Single	25 g	1656	0			

Comments:

[1)] Carcass swabs

[2)] Carcass swabs

[3)] Crushed meat from pig and cattle

Footnote:

NSCP = Norwegian Salmonella Control Programme

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 Norwegian Salmonella Control Programme established pursuant fo Article 5 of Regulation (EC) 2160/2003 and approved by the EFTA Surveillance Authority (ESA) (364/07/COL) includes all poultry breeding flocks. Sampling takes place at the initiative of the food business operator and by the Competent Authority according to Regulation (EC) 1003/2005 (in force throughout 2010).

Other strategies: Animals are tested in relation to clinical surveillance and import. Norway is also granted additional guaranties according to Commission decision 2003/644/EC.

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

Every flock is sampled twice

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

Every second week

Type of specimen taken

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

Internal linings of delivery boxes

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

Methods of sampling (description of sampling techniques)

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

All flocks: Transport crates are tested (crate liners or swabs).

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

All flocks: Tested at 4 weeks of age and 2 weeks before moving by two pairs of socks.

Breeding flocks: Production period

All flocks: Tested every 2nd week by two pairs of socks (caged birds: faecal samples) and one dust sample.

Case definition

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

A positive flock is a flock from which Salmonella (irrespective of serovar) has been isolated from at least one sample.

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

A positive flock is a flock from which Salmonella (irrespective of serovar) has been isolated from at least one sample.

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

A positive flock is a flock from which Salmonella (irrespective of serovar) has been isolated from at least one sample.

Diagnostic/analytical methods used

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

Bacteriological method: ISO 6579:2002

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

Bacteriological method: ISO 6579:2002

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

Bacteriological method: ISO 6579:2002

Vaccination policy

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

Vaccination against Salmonella is prohibited in Norway.

Control program/mechanisms

The control program/strategies in place

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

The Norwegian Salmonella Control Programme is mandatory. Detection of Salmonella, irrespective of serovar, is notifiable.

Measures in case of the positive findings or single cases

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

Whenever Salmonella is detected, the competent authorities must be notified without delay. Also, relevant food business operators, such as slaughterhouses, hatcheries, and egg collecting centers receiving animals or animal products from an infected animal holding must be informed. Stringent restrictions including cleaning and disinfection, control of animal movement and control of person admission will be imposed on an infected animal holding. Infected animals must be isolated from other animals. Whenever Salmonella is detected, epidemiological investigations also including the feed suppliers will be initiated in order to identify and eliminate the source of infection. If Salmonella is detected, the flock will be destroyed or subjected to sanitation slaughter. Eggs from hatcheries where Salmonella has been detected will be destroyed or pasteurized. If Salmonella is detected in chicks, all chicks from the same hatchery machine must be destroyed. Farms that have received infected chicks will be considered infected and restrictions will be imposed on these farms as well. Restrictions will be lifted when infected rooms have been cleaned and disinfected, bacteriological testing following cleaning and disinfection gives a negative test result, and the rooms have been empty for at least 30 days .

Notification system in place

The Norwegian Salmonella Control Programme is mandatory. Detection of Salmonella, irrespective of serovar, has been notifiable since 1965.

Results of the investigation

In 2010, a total of 105 rearing flocks and 156 production flocks were tested, all were negative for

Salmonella.

In addition to the Control Programme, samples have been taken in relation to clinical problems, follow up or various projects. None of these samples were positive for Salmonella. For details, see table.

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

The favourable salmonella situation in Norwegian poultry is partly dependent upon an efficient control of breeding flocks. Due to extensive surveillance during many years, stringent measures in case of positive findings, and restricted import, poultry breeding flocks in Norway are virtually free from Salmonella. S. Agona was found in a broiler parent flock in 2001.

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

The Norwegian Salmonella Control Programmes have documented that so far poultry in Norway as well as domestically produced poultry products are virtually free from Salmonella. Each year, approximately 75 -80% of reported cases of salmonellosis in humans have acquired the infection abroad. This illustrates that domestic food products of animal origin represent a small risk to the consumer in regard to Salmonella, an assumption that is supported by case-control studies.

B. Salmonella spp. in Gallus Gallus - broiler flocks

Monitoring system

Sampling strategy

Broiler flocks

The Norwegian Salmonella Control Programme: All poultry flocks are tested before slaughter. Sampling takes place at the initiative of the food business operator and once a year by the Competent Authority according to Regulation (EC) 646/2007.If poultry for slaughter are imported, additional guaranties according to 95/410/EC applies.

Frequency of the sampling

Broiler flocks: Before slaughter at farm

Every flock is sampled

Type of specimen taken

Broiler flocks: Before slaughter at farm

Sock/boot swabs and dust swabs.

Methods of sampling (description of sampling techniques)

Broiler flocks: Before slaughter at farm

Every flock is sampled by one pair of socks and one dust sample.

Case definition

Broiler flocks: Before slaughter at farm

A positive flock is a flock from which Salmonella (irrespective of serovar) has been isolated from at least one sample.

Diagnostic/analytical methods used

Broiler flocks: Before slaughter at farm

Bacteriological method: ISO 6579:2002

Vaccination policy

Broiler flocks

Vaccination against Salmonella is prohibited in Norway.

Control program/mechanisms

The control program/strategies in place

Broiler flocks

Every flock is sampled before slaughter.

Measures in case of the positive findings or single cases

Broiler flocks: Before slaughter at farm

Whenever Salmonella is detected, the competent authorities must be notified without delay. Also, relevant food business operators, such as slaughterhouses, hatcheries, and egg collecting centers receiving animals or animal products from an infected animal holding must be informed. Stringent restrictions including cleaning and disinfection, control of animal movement and control of person admission will be imposed on an infected animal holding. Infected animals must be isolated from other animals. Whenever Salmonella is detected, epidemiological investigations also including the feed suppliers will be initiated in order to identify and eliminate the source of infection. If Salmonella is detected, the flock will be destroyed

or subjected to sanitation slaughter. Eggs from hatcheries where Salmonella has been detected will be destroyed or pasteurized. If Salmonella is detected in chicks, all chicks from the same hatchery machine must be destroyed. Farms that have received infected chicks will be considered infected and restrictions will be imposed on these farms as well. Restrictions will be lifted when infected rooms have been cleaned and disinfected, bacteriological testing following cleaning and disinfection gives a negative test result, and the rooms have been empty for at least 30 days .

Notification system in place

The Norwegian Salmonella Control Programme is mandatory. Detection of Salmonella, irrespective of serovar, has been notifiable since 1965.

Results of the investigation

In 2010, 4549 broiler flocks (batches for slaughter) were investigated, and two were positive (S. Senftenberg and S. Brandenburg respectively). These two flocks were also positive in the follow up sampling. For details, see table.

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

The favourable salmonella situation in Norwegian poultry is partly dependent upon an efficient control of breeding flocks. Due to extensive surveillance during many years, stringent measures in case of positive findings, and restricted import, poultry breeding flocks in Norway are virtually free from Salmonella. S. Agona was found in a broiler parent flock in 2001. S. Enteritidis was for the first time detected in Norwegian poultry production in a broiler flock in 2007.

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

The Norwegian Salmonella Control Programmes have documented that so far poultry in Norway as well as domestically produced poultry products are virtually free from Salmonella. Each year, approximately 75 -80% of reported cases of salmonellosis in humans have acquired the infection abroad. This illustrates that domestic food products of animal origin represent a small risk to the consumer in regard to Salmonella, an assumption that is supported by case-control studies.

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

Monitoring system

Sampling strategy

Laying hens flocks

The Norwegian Salmonella Control Programme: All laying hen flocks are tested at the farm. Sampling takes place at the initiative of the food business operator and by the Competent Authority according to Regulation (EC) 1168/2006.
Other strategies: Animals are tested in relation to clinical surveillance and import. Additional guaranties according to Commission decision 2004/235/EC also applies to Norway.

Frequency of the sampling

Laying hens: Day-old chicks

Every flock is sampled

Laying hens: Rearing period

2 weeks prior to moving

Laying hens: Production period

Every 15 weeks

Laying hens: Before slaughter at farm

Every flock for slaughter is sampled

Type of specimen taken

Laying hens: Day-old chicks

Internal linings of delivery boxes

Laying hens: Rearing period

Socks/ boot swabs

Laying hens: Production period

Socks/boot swabs or faeces (caged birds).

Laying hens: Before slaughter at farm

Socks/boot swabs or faeces (caged birds).

Methods of sampling (description of sampling techniques)

Laying hens: Day-old chicks

All flocks: Transport crates are tested (crate liners or swabs).

Laying hens: Rearing period

All flocks: Tested two weeks before moving by 2 pair of socks (caged birds: faeces).

Laying hens: Production period

All flocks: Tested every 15 weeks by two pairs of socks (caged birds: faeces).

Laying hens: Before slaughter at farm

All flocks for slaughter: Tested before slaughter by 2 pair of socks (caged birds: faeces).

Case definition

Laying hens: Day-old chicks

A positive flock is a flock from which Salmonella (irrespective of serovar) has been isolated from at least one sample.

Laying hens: Rearing period

A positive flock is a flock from which Salmonella (irrespective of serovar) has been isolated from at least one sample.

Laying hens: Production period

A positive flock is a flock from which Salmonella (irrespective of serovar) has been isolated from at least one sample.

Laying hens: Before slaughter at farm

A positive flock is a flock from which Salmonella (irrespective of serovar) has been isolated from at least one sample.

Diagnostic/analytical methods used

Laying hens: Day-old chicks

Bacteriological method: ISO 6579:2002

Laying hens: Rearing period

Bacteriological method: ISO 6579:2002

Laying hens: Production period

Bacteriological method: ISO 6579:2002

Laying hens: Before slaughter at farm

Bacteriological method: ISO 6579:2002

Vaccination policy

Laying hens flocks

Vaccination against Salmonella is prohibited in Norway.

Control program/mechanisms

The control program/strategies in place

Laying hens flocks

The Norwegian Salmonella Control Programme is mandatory. Detection of Salmonella, irrespective of serovar, is notifiable.

Measures in case of the positive findings or single cases

Laying hens flocks

Whenever Salmonella is detected, the competent authorities must be notified without delay. Also, relevant food business operators, sch as slaughterhouses, hatcheries, and egg collecting centers receiving animals or animal products from an infected animal holding must be informed. Stringent restrictions including cleaning and disinfection, control of animal movement and control of person admission will be imposed on an infected animal holding. Infected animals must be isolated from other animals. Whenever Salmonella is detected, epidemiological investigations also including the feed suppliers will be initiated in order to identify and eliminate the source of infection. If Salmonella is detected, the whole flock will be destroyed or subjected to sanitation slaughter. Eggs from hatcheries where Salmonella has been detected will be destroyed or pasteurized. If Salmonella is detected in chicks, all chicks from the same hatchery machine must be destroyed. Farms that have received infected chicks will be considered infected and restrictions will be imposed on these farms as well. Restrictions will be lifted when infected rooms have been cleaned and disinfected, bacteriological testing following cleaning and disinfection gives a negative

test result, and the rooms have been empty for at least 30 days .

Notification system in place

The Norwegian Salmonella Control Programme is mandatory. Detection of Salmonella, irrespective of serovar, has been notifiable since 1965.

Results of the investigation

In 2010, a total of 146 rearing and 981 adult flocks were tested, all were negative.

For details, see table.

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

The favourable salmonella situation in Norwegian poultry is partly dependent upon an efficient control of breeding flocks. Due to extensive surveillance during many years, stringent measures in case of positive findings, and restricted import, poultry breeding flocks in Norway are virtually free from Salmonella. S. Enteritidis has never been detected in Norwegian breeding flocks or in laying hens.

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

The Norwegian Salmonella Control Programmes have documented that so far poultry in Norway as well as domestically produced poultry products are virtually free from Salmonella. Each year, approximately 75 -80% of reported cases of salmonellosis in humans have acquired the infection abroad. This illustrates that domestic food products of animal origin represent a small risk to the consumer in regard to Salmonella, an assumption that is supported by case-control studies.

D. Salmonella spp. in bovine animals

Monitoring system

Sampling strategy

The Norwegian Salmonella Control Programme: Each year, a number of lymph node samples and carcass swabs are collected by slaughter and proportionally distributed according to the slaughterhouses' capacities. The sampling of lymph nodes is described in this chapter, while the sampling of carcass swabs is described in the chapter on Salmonella in foodstuffs.

Other strategies: Animals are tested in relation to clinical surveillance and import.

Frequency of the sampling

Animals at slaughter (herd based approach)

Detection of an animal prevalence level of 0.1% by 95% confidence

Type of specimen taken

Animals at slaughter (herd based approach)

Lymph nodes

Methods of sampling (description of sampling techniques)

Animals at farm

If there are clinical problems with diarrhoea, faecal samples will be taken.

Animals at slaughter (herd based approach)

From each carcass at least five ileo-caecal lymph nodes are aseptically removed and pooled in a plastic bag. All samples are kept refrigerated during the period of sampling and sent to the laboratory the same day.

Case definition

Animals at farm

A positive sample is a sample from which Salmonella has been isolated.

Animals at slaughter (herd based approach)

A positive sample is a sample from which Salmonella has been isolated.

Diagnostic/analytical methods used

Animals at farm

Bacteriological method: ISO 6579:2002

Animals at slaughter (herd based approach)

Bacteriological method: NMKL No 71:1999

Vaccination policy

Vaccination against Salmonella is prohibited in Norway.

Control program/mechanisms

The control program/strategies in place

The Norwegian Salmonella Control Programme is mandatory. Detection of Salmonella, irrespective of serovar, has been notifiable since 1965.

Measures in case of the positive findings or single cases

Whenever Salmonella is detected, the competent authorities must be notified without delay. Actions will be taken to identify and eliminate the source of the contamination in order to prevent further spread. Also, slaughterhouses, dairies, and food production facilities receiving animals or animal products from an infected animal holding must be informed. Stringent restrictions including cleaning and disinfection, control of animal movement and control of person admission will be imposed on an infected animal holding.

Infected animals must be isolated from other animals. Animals are not allowed to be sent to slaughter without permission from the Food Safety Authority and if sent to slaughter, the slaughterhouse must be notified so that sanitation slaughtering can be conducted. Milk from infected herds must be pasteurised.

Whenever Salmonella is detected, epidemiological investigations also including the feed suppliers will be initiated in order to identify and eliminate the source of infection. There will be intensified sampling, also on farms that have had contact with the infected holding. Restrictions will be lifted when all animals have been tested with a negative test result in two consecutive samplings with a minimum interval of 30 days. Following lifting of the restrictions, retesting will be conducted after approx. six months.

Notification system in place

The Norwegian Salmonella Control Programme is mandatory. Detection of Salmonella, irrespective of serovar, has been notifiable since 1965.

Results of the investigation

In 2010, a total of 1854 animals were sampled (lymph node samples) in the Norwegian Salmonella Control Programme. All samples were negative for Salmonella.

In addition, 1266 samples from 186 different herds were investigated, mainly due to follow up of positive findings. Three herds were positive for S. Bovismorbificans. One of the herds also had swine positive for S. Bovismorbificans.

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

The Norwegian Salmonella Control Programmes document that Norwegian food producing animals are virtually free from Salmonella. The surveillance data indicate that the overall prevalence is below 0.%.

E. Salmonella spp. in pigs

Monitoring system

Sampling strategy

Breeding herds

The Norwegian Salmonella Control Programme: All elite breeding herds are tested.

Other strategies: Animals are tested in relation to clinical surveillance and import.

Multiplying herds

The Norwegian Salmonella Control Programme: Each year, a number of lymph node samples and carcass swabs are collected randomly from the sow population at slaughterhouse according to the slaughter volume. The sampling of lymph nodes is described in this chapter, the sampling of carcass swabs is described in the chapter on Salmonella in foodstuffs.

Other strategies: Animals are tested in relation to clinical surveillance and import.

Fattening herds

The Norwegian Salmonella Control Programme: Each year, a number of lymph node samples and carcass swabs are collected by slaughter and proportionally distributed according to the slaughterhouses' capacities. The sampling of lymph nodes is described in this chapter, while the sampling of carcass swabs is described in the chapter on Salmonella in foodstuffs.

Other strategies: Animals are tested in relation to clinical surveillance and import.

Frequency of the sampling

Breeding herds

Once a year

Fattening herds at slaughterhouse (herd based approach)

Detection of an animal prevalence level of 0.1% by 95% confidence

Type of specimen taken

Breeding herds

Faeces

Fattening herds at slaughterhouse (herd based approach)

Lymph nodes

Methods of sampling (description of sampling techniques)

Breeding herds

Faecal samples are taken.

Fattening herds at slaughterhouse (herd based approach)

From each carcass at least five ileo-caecal lymph nodes are aseptically removed and pooled in a plastic bag. All samples are kept refrigerated during the period of sampling and sent to the laboratory the same day.

Case definition

Breeding herds

A positive sample is a sample from which Salmonella has been isolated.

Multiplying herds

A positive sample is a sample from which Salmonella has been isolated.

Fattening herds at farm

A positive sample is a sample from which Salmonella has been isolated.

Fattening herds at slaughterhouse (herd based approach)

A positive sample is a sample from which Salmonella has been isolated.

Diagnostic/analytical methods used

Breeding herds

Bacteriological method: ISO 6579:2002

Multiplying herds

Bacteriological method: ISO 6579:2002

Fattening herds at farm

Bacteriological method: ISO 6579:2002

Fattening herds at slaughterhouse (herd based approach)

Bacteriological method: NMKL No 71:1999

Vaccination policy

Breeding herds

Vaccination against Salmonella is prohibited in Norway.

Multiplying herds

Vaccination against Salmonella is prohibited in Norway.

Fattening herds

Vaccination against Salmonella is prohibited in Norway.

Control program/mechanisms

The control program/strategies in place

Breeding herds

The Norwegian Salmonella Control Programme is mandatory. Detection of Salmonella, irrespective of serovar, has been notifiable since 1965.

Multiplying herds

See "breeding herds".

Fattening herds

See "breeding herds".

Measures in case of the positive findings or single cases

Whenever Salmonella is detected, the competent authorities must be notified without delay. Actions will be taken to identify and eliminate the source of the contamination in order to prevent further spread. Also, slaughterhouses and food production facilities receiving animals or animal products from an infected animal holding must be informed. Stringent restrictions including cleaning and disinfection, control of animal movement and control of person admission will be imposed on an infected animal holding.

Infected animals must be isolated from other animals. Animals are not allowed to be sent to slaughter without permission from the Food Safety Authority and if sent to slaughter, the slaughterhouse must be

notified so that sanitation slaughtering can be conducted.

Whenever Salmonella is detected, epidemiological investigations also including the feed suppliers will be initiated in order to identify and eliminate the source of infection. There will be intensified sampling, also on farms that have had contact with the infected holding. Restrictions will be lifted when all animals have been tested with a negative test result in two consecutive samplings with a minimum interval of 30 days. Following lifting of the restrictions, retesting will be conducted after approx. six months.

Notification system in place

The Norwegian Salmonella Control Programme is mandatory. Detection of Salmonella, irrespective of serovar, has been notifiable since 1965.

Results of the investigation

In 2010, lymph node samples from a total of 2226 animals were tested in the Norwegian Salmonella Control Programme. One sample was positive for S. Bovismorbificans. None of the 117 herds tested with faecal samples (2090 samples in total) were positive.

In addition, 628 samples from 61 different herds were investigated, mainly due to follow up of positive findings. Three herds were positive (S. Typhimurium (2), S. Bovismorbificans (1)). The herd positive for S. Bovismorbificans was the same as the herd found positive for S. Bovismorbificans in the Norwegian Salmonella Control Programme. This herd also had cattle positive for S. Bovismorbificans. The two herds with S. Typhimurium had contact with each other.

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

The Norwegian Salmonella Control Programmes document that Norwegian food producing animals are virtually free from Salmonella. The surveillance data indicate that the overall prevalence is below 0.1%.

F. Salmonella spp. in animal

Monitoring system

Sampling strategy

Described here is Salmonella in sheep and goats and other animal species than food producing animals, such as pets, zoo animals, reptiles and wild life.

Sampling is done in relation to clinical surveillance and import.

Case definition

Animals at farm

A positive animal is an animal from which Salmonella, irrespective of serovar, has been isolated.

Vaccination policy

Vaccination against Salmonella is prohibited in Norway.

Measures in case of the positive findings or single cases

Whenever Salmonella is detected, the competent authorities must be notified without delay. Unless the finding is in a wild animal, epidemiological investigations will be initiated in order to identify and eliminate the source of infection.

Notification system in place

Detection of Salmonella, irrespective of serovar, has been notifiable since 1965.

Results of the investigation

For details - see table. In addition to the results presented above and in the tables, animals may have been sampled due to clinical problems, follow up or various projects. None of these samples have been positive.

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

A substantial proportion of the S. Typhimurium infections in humans are indigenous. This serovar, although not established among food animals in Norway, does occur in Norwegian wild birds and hedgehogs, and these two sources have been described to be the source for almost half of all indigenous S. Typhimurium cases. These two sources probably also constitutes a risk for food producing animals. Also, reptiles kept as pets pose a risk for transmission to humans.

G. Salmonella spp. in animal - Poultry (Ducks, Geese and Turkeys (not Gallus gallus))

Monitoring system

Sampling strategy

The Norwegian Salmonella Control Programme established pursuant fo Article 5 of Regulation (EC) 2160/2003 and approved by the EFTA Surveillance Authority (ESA) (364/07/COL) also includes all breeder flocks of ducks, geese, turkeys and guinea fowl. Sampling takes place at the initiative of the food business operator and by the Competent Authority according to Regulation (EC) 1003/2005 (in force throughout 2010).
Other strategies: Animals are tested in relation to clinical surveillance and import. Norway is also granted additional guaranties according to Commission decision 2003/644/EC.

Frequency of the sampling

Animals at farm

See the description of the programme in Gallus gallus

Type of specimen taken

Animals at farm

See the description of the programme in Gallus gallus

Methods of sampling (description of sampling techniques)

Animals at farm

See the description of the programme in Gallus gallus.

Animals at slaughter (herd based approach)

See the description of the programme in Gallus gallus.

Case definition

Animals at farm

A positive flock is a flock from which Salmonella (irrespective of serovar) has been isolated from at least one sample.

Animals at slaughter (herd based approach)

A positive flock is a flock from which Salmonella (irrespective of serovar) has been isolated from at least one sample.

Diagnostic/analytical methods used

Animals at farm

Bacteriological method: ISO 6579:2002

Vaccination policy

Vaccination against Salmonella is prohibited in Norway.

Control program/mechanisms

The control program/strategies in place

The Norwegian Salmonella Control Programme is mandatory. Detection of Salmonella, irrespective of serovar, has been notifiable since 1965.

Measures in case of the positive findings or single cases

Whenever Salmonella is detected, the competent authorities must be notified without delay. Also, slaughterhouses and food production facilities receiving animals or animal products from an infected

animal holding must be informed. Stringent restrictions including cleaning and disinfection, control of animal movement and control of person admission will be imposed on an infected animal holding. Infected animals must be isolated from other animals. Whenever Salmonella is detected, epidemiological investigations also including the feed suppliers will be initiated in order to identify and eliminate the source of infection. If Salmonella is detected, the whole flock will be destroyed or subjected to sanitation slaughter. Eggs from hatcheries will be destroyed or pasteurised. If Salmonella is detected in chicks, all chicks from the same hatchery machine must be destroyed. Farms that have received infected chicks will be considered infected and restrictions will be imposed on these farms as well.

Restrictions will be lifted when infected rooms have been cleaned and disinfected, bacteriological testing following cleaning and disinfection gives a negative test result, and the rooms have been empty for at least 30 days.

Notification system in place

The Norwegian Salmonella Control Programme is mandatory. Detection of Salmonella, irrespective of serovar, has been notifiable since 1965.

Results of the investigation

In 2010, none of the Norwegian breeder flocks were positive. None of the production flocks were positive.

In addition to the Control Programme, samples have been taken in relation to clinical problems, follow up or various projects. None of these samples were positive for Salmonella. For details, see table.

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

The duck, geese, turkey and guinea fowl populations in Norway are small. A few times, positive commercial flocks have been found, the last time in 2000, when two turkey flocks were positive for S. Aberdeen and S. Typhimurium, respectively.

Table Salmonella in breeding flocks of Gallus gallus

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Hadar	S. Infantis	S. Typhimurium	S. Virchow	S. 1,4,[5],12:i:-
Gallus gallus (fowl) - parent breeding flocks for egg production line - during rearing period	14	NSCP	Flock	14	0						
Gallus gallus (fowl) - parent breeding flocks for egg production line - adult	20	NSCP	Flock	20	0						
Gallus gallus (fowl) - grandparent breeding flocks for egg production line - adult	3	NSCP	Flock	3	0						
Gallus gallus (fowl) - parent breeding flocks for broiler production line - during rearing period	91	NSCP	Flock	91	0						
Gallus gallus (fowl) - parent breeding flocks for broiler production line - adult	136	NSCP	Flock	136	0						

	Salmonella spp., unspecified
Gallus gallus (fowl) - parent breeding flocks for egg production line - during rearing period	
Gallus gallus (fowl) - parent breeding flocks for egg production line - adult	
Gallus gallus (fowl) - grandparent breeding flocks for egg production line - adult	
Gallus gallus (fowl) - parent breeding flocks for broiler production line - during rearing period	
Gallus gallus (fowl) - parent breeding flocks for broiler production line - adult	

Table Salmonella in breeding flocks of Gallus gallus

Table Salmonella in other birds

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Infantis
Quails	NVI	Holding	2	1				1
Birds - pet animals - Clinical investigations	NVI	Animal	21	0				
Birds - wild - Clinical investigations	NVI	Animal	14	2		2		

Table Salmonella in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	S. 1,4,[5],12:i:-	Salmonella spp., unspecified	S. Bovismorbificans	S. Brandenburg	S. Cotham
Cattle (bovine animals) [1)]	NVI	Herd	186	3					3		
Goats	NVI	Animal	3	0							
Pigs [2)]	NVI	Herd	61	3		2			1		
Sheep [3)]	NVI	Animal	103	18							
Solipeds, domestic	NVI	Animal	54	0							
Alpacas - farmed	NVI	Animal	67	0							
Cats [4)]	NVI	Animal	126	2							
Cattle (bovine animals) - at slaughterhouse - Surveillance - official controls - objective sampling (Lymph nodes)	NSCP	Animal	1854	0							
Dogs [5)]	NVI	Animal	453	11	1	2	3			2	
Pet animals, all (Small pets (rabbits, chinchillas etc.))	NVI	Animal	14	0							
Pigs - at slaughterhouse - Surveillance - official controls - objective sampling (Lymph nodes)	NSCP	Animal	2226	1					1		
Pigs - breeding animals - at farm - animal sample - faeces - Surveillance - official controls	NSCP	Herd	117	0							
Reptiles - pet animals (Including turtles) [6)]	NVI	Animal	8	5							1
Wild animals [7)]	NVI	Animal	4	1							
Zoo animals, all [8)]	NVI	Animal	38	6							

Table Salmonella in other animals

	S. Dublin	S. IIIb 61:k:1,5,(7)	S. Infantis	S. Livingstone	S. Meleagridis	S. Muenchen	S. Nyeko	S. Paratyphi B	S. Putten	S. Schwarzengrund	S. Senftenberg
Cattle (bovine animals) [1]											
Goats											
Pigs [2]											
Sheep [3]		18									
Solipeds, domestic											
Alpacas - farmed											
Cats [4]	2										
Cattle (bovine animals) - at slaughterhouse - Surveillance - official controls - objective sampling (Lymph nodes)											
Dogs [5]			1	1	1				1		
Pet animals, all (Small pets (rabbits, chinchillas etc.))											
Pigs - at slaughterhouse - Surveillance - official controls - objective sampling (Lymph nodes)											
Pigs - breeding animals - at farm - animal sample - faeces - Surveillance - official controls											
Reptiles - pet animals (Including turtles) [6]						2		1			
Wild animals [7]											
Zoo animals, all [8]						1	1			1	1

Table Salmonella in other animals

	S. Tennessee	S. Wedding	S. Yoff	S. enterica subsp. arizonae	S. enterica subsp. diarizonae	S. enterica subsp. houtenae	S. enterica subsp. indica
Cattle (bovine animals) [1)]							
Goats							
Pigs [2)]							
Sheep [3)]							
Solipeds, domestic							
Alpacas - farmed							
Cats [4)]							
Cattle (bovine animals) - at slaughterhouse - Surveillance - official controls - objective sampling (Lymph nodes)							
Dogs [5)]							
Pet animals, all (Small pets (rabbits, chinchillas etc.))							
Pigs - at slaughterhouse - Surveillance - official controls - objective sampling (Lymph nodes)							
Pigs - breeding animals - at farm - animal sample - faeces - Surveillance - official controls							
Reptiles - pet animals (Including turtles) [6)]	1			1			1
Wild animals [7)]					1		
Zoo animals, all [8)]		1	1			1	

Comments:

Table Salmonella in other animals

Comments:

[1)] A total of 1266 samples

[2)] A total of 628 samples.

[3)] A total of 50 sampled herds

[4)] The two positive animals were two aborted fetuses from the same household

[5)] One dog had double infection with S. Brandenburg and S. Enteritidis.

[6)] Excluding reptiles from zoos. One animal had triple infection with S. Tennessee + S. Cotham + S. arizonae 44:z4z32:-.

[7)] S. enterica subsp. diarizonae 38 : k : z35 found in a Racoon Dog.

[8)] Animals from 8 zoos and similar holdings. One animal had double infction with S. Schwarzengrund and S. Yoff.

Footnote:

Footnote:
NSCP = Norwegian Salmonella Control Programme.

The samples reported from NVI (Norwegian Veterinary Institute) include clinical investigations, follow up of positive findings, import controls and other reasons for sampling. Animal species where the number of samples were <10 and all samples were negative are not reported.

Table Salmonella in other poultry

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	S. 1,4,[5],12:i:-	Salmonella spp., unspecified	S. Brandenburg	S. Senftenberg
Gallus gallus (fowl) - laying hens - during rearing period	146	NSCP	Flock	146	0						
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official and industry sampling	981	NSCP	Flock	981	0						
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - sampling by industry	981	NSCP	Flock	885	0						
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - objective sampling	981	NSCP	Flock	197	0						
Gallus gallus (fowl) - laying hens - adult - at farm - Control and eradication programmes - official sampling - suspect sampling	981	NSCP	Flock	0	0						
Gallus gallus (fowl) - broilers - before slaughter - at farm - Control and eradication programmes - official and industry sampling	4549	NSCP	Flock	4549	2					1	1
Turkeys - breeding flocks, unspecified - adult - at farm - Control and eradication programmes - official and industry sampling	15	NSCP	Flock	15	0						
Turkeys - fattening flocks - before slaughter - at farm - Control and eradication programmes - official and industry sampling		NSCP	Slaughter batch	385	0						
Ducks - breeding flocks, unspecified [1)]	4	NSCP	Flock	4	0						
Ducks - meat production flocks	73	NSCP	Slaughter batch	73	0						

Table Salmonella in other poultry

	Number of existing flocks	Source of information	Sampling unit	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	S. 1,4,[5],12:i:-	Salmonella spp., unspecified	S. Brandenburg	S. Senftenberg
Geese - meat production flocks	3	NSCP	Slaughter batch	3	0						
Ducks - unspecified - Clinical investigations		NVI	Flock	4	0						
Gallus gallus (fowl) - unspecified - Clinical investigations (Including follow up sampling of positive findings)		NVI	Holding	28	2					1	1
Geese - unspecified - Clinical investigations		NVI	Flock	1	0						
Turkeys - unspecified - Clinical investigations		NVI	Flock	12	0						

Comments:

[1)] including rearing flocks

Footnote:

The type of flock (breeding, production) for clinical investigations are unknown and number of existing flocks are therefore not given.

NSCP = Norwegian Salmonella Control Programme.

The two positive holdings were the same as the holdings with positive flocks in the NSCP.

2.1.5 Salmonella in feedingstuffs

A. Salmonella spp. in feed

History of the disease and/or infection in the country

Norway has for many years performed an extensive surveillance of feedingstuffs and imposed stringent measures in case of positive findings. The import of animal feedingstuffs has also been restricted for many years. The result is that the feedingstuffs given to Norwegian livestock for many years have virtually been free from Salmonella.

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

Extensive surveillance systems for Salmonella in regard to feedingstuffs are established in order to prevent animals from being exposed to contaminated feed. Feedingstuffs for both terrestrial animals and fish are covered by surveillance programmes. The surveillance programmes document a low prevalence of Salmonella in domestically produced animal compound feedingstuffs. However, data from process control, including environmental sampling, indicates that there are certain serovars that sometimes contaminate production facilities, especially those producing fish feed.

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

The favourable Salmonella situation in animals and humans in Norway is partly dependent upon the efficient control of animal feedingstuffs. The number of animals infected through feedingstuffs is probably very low, and this route of infection probably represents a negligible risk to humans.

Recent actions taken to control the zoonoses

Detection of Salmonella is notifiable and the establishment must take immediate actions to prevent the distribution of contaminated feed. Contaminated feed will either be destroyed, heat or acid treated.

In general, complete feedingstuffs and protein concentrates (supplementary feedingstuffs) intended for poultry, pigs, and cattle are exposed to heat treatment of at least 81 degrees Celsius core temperature and the production has to take place in a production line where all the other feedingstuffs are heat treated. According to the regulations for production of feedingstuffs, feed mills are required to have in place a system to monitor the acceptability of the process including a sampling scheme for Salmonella consisting of minimum 3 samples every forthnight (all poultry feed mills and pig and cattle feed mills with a capacity above 10,000 tons per year) or every fourth week (pig and cattle feed mills with a capacity below 10,000 tons per year). Samples include raw materials and scrapings from control points. Establishments preparing feed for fur animals are required to analyse a minimum of one sample for Salmonella per month. The national production of meat and bone meal is subject to a continuous process control that includes analyses for Salmonella. Through an official surveillance programme random samples of feedingstuffs for terrestrial animals are collected and analysed for the presence of Salmonella.

Establishments producing fish feed are required to establish and maintain an internal (process) control based on the HACCP-system according to the regulation for fish feed. A minimum of four samples per 14 days should be examined with respect to Salmonella. Through an official surveillance programme described in the regulation for feedingstuffs for fish, random samples of feedingstuffs for fish are collected at the establishments and analysed for the presence of Salmonella.

Establishments producing fish meal or fish oil are required to establish and maintain an internal (process) control based on the HACCP-system according to the regulation for fish meal and fish oil. A minimum of

one sample per 50 tons must be tested for the presence of Salmonella.

Imported feed materials of vegetable origin must be subjected to control for Salmonella before distribution or use. The number of samples depends on the size of the load and whether the feedingstuffs are classified as high-risk (soy beans, maize, cotton seed, etc.) or low-risk materials. Imported feed of animal origin, predominantly pet feed, is controlled at one of the Border Inspection Posts according to Council Directives 97/78/EEC and 89/662/EEC. Dog treats made from hides that are imported from third countries must be accompanied with a certificate that documents that the lot has been controlled for Salmonella. At the Border Inspection Posts, sampling is done according to a specific scheme. Feed materials, including fish meal, imported from third countries must be subjected to control for Salmonella according to a specified plan before distribution or use. A minimum of one sample per 50 tons must be tested for the presence of Salmonella.

In addition to the surveillance run by the government or the industry itself, feedingstuffs are also subjected to analyses for Salmonella in relation to epidemiological investigations and specific surveys and studies.

Table Salmonella in compound feedingstuffs

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Lexington	S. Mbandaka
Compound feedingstuffs for pigs - final product [1)]	NFSA	Batch	25 g	34	0					
Compound feedingstuffs for fish - Monitoring - industry sampling - objective sampling	NFSA	Batch	25 g	1050	37			31	5	1
Compound feedingstuffs for fish - Monitoring - industry sampling - objective sampling (single samples)	NFSA	Single	100 g	372	1			1		
Compound feedingstuffs for fish - Monitoring - industry sampling - selective sampling	NFSA	Batch	25 g	321	153			153		
Compound feedingstuffs for fish - Monitoring - industry sampling - selective sampling (Single samples)	NFSA	Single	100 g	55	0					
Compound feedingstuffs for fish - process control - at feed mill - Monitoring - industry sampling - objective sampling (including samples from the environment)	NFSA	Single	swab - 100 g	2088	52		2	48	2	
Compound feedingstuffs for fish - process control - at feed mill - Monitoring - industry sampling - selective sampling (including samples from the environment)	NFSA	Single	10 - 100 g	286	27			24	3	
Compound feedingstuffs for fur animal - Monitoring - official sampling - objective sampling	NFSA	Batch	500 g	381	0					
Compound feedingstuffs for horses - Monitoring - official sampling - objective sampling	NFSA	Batch	25 g	1	0					
Compound feedingstuffs for poultry (non specified) - Monitoring - official sampling - objective sampling	NFSA	Batch	25 g	44	0					

Table Salmonella in compound feedingstuffs

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Lexington	S. Mbandaka
Compound feedingstuffs, not specified - Monitoring - industry sampling - objective sampling (cattle, swine, poultry)	NFSA	Batch	25 g	457	0					
Compound feedingstuffs, not specified - process control - at feed mill - Monitoring - industry sampling - objective sampling (feed mills producing feed for land animals, including samples from the environment and transport vehicles)	NFSA	Single	25 - 100 g	9361	44	2	1	40	1	
Compound feedingstuffs, not specified - process control - at feed mill - Monitoring - industry sampling - selective sampling (feed mills producing feed for land animals, including samples from the environment and transport vehicles)	NFSA	Single	100 g	126	0					
Compound feedingstuffs, not specified - process control - at feed mill - Monitoring - official sampling - objective sampling (feed mills producing feed for land animals, including samples from the environment and transport vehicles)	NFSA	Batch	25 g	149	0					

Comments:

[1)] Official sampling, objective sampling

Table Salmonella in feed material of animal origin

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Havana	S. Ohio	S. Senftenberg
Feed material of land animal origin - bone meal [1)]	NFSA	Batch	25 g	277	4				4		
Feed material of marine animal origin - fish oil [2)]	NFSA	Batch	100 g	1	0						
Feed material of land animal origin - bone meal - at processing plant - environmental sample - Monitoring - industry sampling	NFSA	Single	25 g	330	1				1		
Feed material of marine animal origin - fish meal - Monitoring - industry sampling (Norwegian origin)	NFSA	Batch	100 g	3	0						
Feed material of marine animal origin - fish meal - Monitoring - industry sampling (imported)	NFSA	Batch	25 - 100 g	93	3					2	1

Comments:

[1)] Industry sampling - objective sampling

[2)] Industry sampling - objective sampling

Table Salmonella in other feed matter

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Mbandaka	S. Senftenberg
Feed material of cereal grain origin - barley derived [1)]	NFSA	Single	25 g	24	0					
Feed material of cereal grain origin - maize - derived [2)]	NFSA	Batch	25 g	336	0					
Feed material of cereal grain origin - wheat derived [3)]	NFSA	Batch	25 - 100 g	461	0					
Feed material of oil seed or fruit origin - rape seed derived [4)]	NFSA	Batch	25 g	268	1					1
Feed material of oil seed or fruit origin - soya (bean) derived [5)]	NFSA	Batch	25 g	304	0					
Feed material of oil seed or fruit origin - sunflower seed derived [6)]	NFSA	Batch	25 - 100 g	36	0					
Other feed material - legume seeds and similar products [7)]	NFSA	Batch	25 g	54	0					
Other feed material - other seeds and fruits [8)]	NFSA	Single	25 g	6	0					
Other feed material - tubers, roots and similar products [9)]	NFSA	Single	25 g	8	0					
Feed material of cereal grain origin - oat derived [10)]	NFSA	Single	25 g	11	0					
Feed material of oil seed or fruit origin - soya (bean) derived - at processing plant - Surveillance - HACCP and own checks (Imported material) [11)]	NFSA	Batch		336	59			40	14	5

Table Salmonella in other feed matter

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Salmonella	S. Enteritidis	S. Typhimurium	Salmonella spp., unspecified	S. Mbandaka	S. Senftenberg
Feed material of oil seed or fruit origin - soya (bean) derived - at processing plant - domestic production - Monitoring - industry sampling - objective sampling [12)]	NFSA	Batch	60 - 120 g	2496	0					
Feed material of oil seed or fruit origin - soya (bean) derived - at processing plant - environmental sample - Surveillance - HACCP and own checks (Clean side)	NFSA	Batch	200 g	799	3				3	
Feed material of oil seed or fruit origin - soya (bean) derived - at processing plant - environmental sample - Surveillance - HACCP and own checks (unclean side, inside and outside) [13)]	NFSA	Batch	swab - 200 g	246	19			10	8	1
Other feed material - Monitoring - official sampling	NFSA	Batch	25 g	2	0					

Comments:

[1)] Industry sampling, imported material

[2)] Industry sampling, imported material

[3)] Industry sampling, imported material

[4)] Industry sampling, imported material

[5)] Industry sampling, imported material

[6)] industry sampling, imported material

[7)] Industry sampling, Norwegian origin

[8)] Industry sampling, imported material

Table Salmonella in other feed matter

Comments:

[9)] Industry sampling, imported material

[10)] Industry sampling, imported material

[11)] Dust from boat shipments, 14 ships in total (24 single samples (approx 5 g) from each ship pooled). The 40 isolates in column "Salmonella unspecified" consists of 12 different serovars.

[12)] Samples of Norwegian origin taken from boats, trucks and production facilities

[13)] The 10 isolates in column "salmonella unspecified" consists of 5 different serovars

Footnote:

Industry sampling contains data from both fish and land animal feed industry

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	3				2		1		2				
Number of isolates serotyped	3	0	0	0	2	0	1	0	2	0	0	0	0
Number of isolates per serovar													
S. Bovismorbificans	3				1								
S. Brandenburg									1				
S. Senftenberg									1				
S. Typhimurium					1		1						

Table Salmonella serovars in animals

Serovar	Other poultry		
Sources of isolates	Monitoring	Clinical	Surveillance
Number of isolates in the laboratory			
Number of isolates serotyped	0	0	0
Number of isolates per serovar			
S. Bovismorbificans			
S. Brandenburg			
S. Senftenberg			
S. Typhimurium			

2.1.7 Antimicrobial resistance in Salmonella isolates

A. Antimicrobial resistance of Salmonella spp. in animal

Sampling strategy used in monitoring

Frequency of the sampling

All Salmonella found in production animals, irrespective if they are found in the Norwegian Salmonella Control Programmes or in connection with clinical problems, surveys or other investigations, are included in the resistance monitoring (only one isolate per herd). Salmonella isolated from other animals may be susceptibility tested as well. Exceptions from the rules described above are that not all S. diarizonae from sheep or S. Typhimurium from wild birds and wild animals or Salmonella from reptiles, wild animals or zoo animals are tested every year.

Type of specimen taken

Salmonella isolates collected through the Norwegian Salmonella Control programmes, which include those animal species required by the Commission Decision No 2007/407/EC on the harmonised monitoring of antimicrobial resistance in Salmonella. Isolates from other samples taken vary depending on the situation.

Methods of sampling (description of sampling techniques)

For description of the Norwegian Salmonella Control programmes, see the parts describing Salmonella in the various animal species. Other sampling methods vary depending on the situation.

Procedures for the selection of isolates for antimicrobial testing

One isolate per herd is selected for antimicrobial testing.

Methods used for collecting data

Salmonella is isolated at various laboratories and sent to the Norwegian Veterinary Institute in Oslo for the testing of antimicrobial susceptibility.

Laboratory methodology used for identification of the microbial isolates

Normally, ISO 6579:2002 or NMKL No 71:1999 are used for isolation of Salmonella. However, isolates may have been obtained by other methods as well.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

The VetMIC microdilution method (Dept. of Antibiotics, National Veterinary Institute, Sweden) is used for the susceptibility testing of all isolates. The antimicrobials included are listed in the tables.

Cut-off values used in testing

For interpretation of results epidemiological cut-off values recommended by EFSA were applied.

Control program/mechanisms

The control program/strategies in place

The resistance testing of Salmonella isolated from animals is a part of the Norwegian monitoring programme for antimicrobial resistance in feed, food and animals - NORM-VET.

Table Antimicrobial susceptibility testing of Salmonella in Cattle (bovine animals)

Salmonella	S. Enteritidis		S. Typhimurium		Salmonella spp.		S. Bovismorbificans	
Isolates out of a monitoring program (yes/no)							yes	
Number of isolates available in the laboratory							3	
Antimicrobials:	N	n	N	n	N	n	N	n
Amphenicols - Chloramphenicol							3	0
Fluoroquinolones - Ciprofloxacin							3	0
Quinolones - Nalidixic acid							3	0
Trimethoprim							3	0
Aminoglycosides - Streptomycin							3	0
Aminoglycosides - Gentamicin							3	0
Penicillins - Ampicillin							3	0
Tetracyclines - Tetracycline							3	0
Fully sensitive							3	3

Table Antimicrobial susceptibility testing of Salmonella in Pigs

Salmonella	S. Enteritidis		S. Typhimurium		Salmonella spp.		S. Bovismorbificans	
Isolates out of a monitoring program (yes/no)			yes				yes	
Number of isolates available in the laboratory			2				1	
Antimicrobials:	N	n	N	n	N	n	N	n
Amphenicols - Chloramphenicol			2	0			1	0
Fluoroquinolones - Ciprofloxacin			2	0			1	0
Quinolones - Nalidixic acid			2	0			1	0
Trimethoprim			2	2			1	0
Aminoglycosides - Streptomycin			2	2			1	0
Aminoglycosides - Gentamicin			2	0			1	0
Penicillins - Ampicillin			2	1			1	0
Tetracyclines - Tetracycline			2	1			1	0
Fully sensitive			2	0				
Resistant to 1 antimicrobial			2	0				
Resistant to 2 antimicrobials			2	1				
Resistant to 3 antimicrobials			2	0				
Resistant to 4 antimicrobials			2	1				

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

Salmonella	S. Enteritidis		S. Typhimurium		Salmonella spp.		S. Brandenburg		S. Senftenberg	
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
Amphenicols - Chloramphenicol							1	0	1	0
Fluoroquinolones - Ciprofloxacin							1	0	1	0
Quinolones - Nalidixic acid							1	0	1	0
Trimethoprim							1	0	1	0
Aminoglycosides - Streptomycin							1	0	1	0
Aminoglycosides - Gentamicin							1	0	1	0
Penicillins - Ampicillin							1	0	1	0
Tetracyclines - Tetracycline							1	0	1	0
Fully sensitive							1	1	1	1

Table Antimicrobial susceptibility testing of S. Bovismorbificans in Cattle (bovine animals) - quantitative data [Dilution method]

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

S. Bovismorbificans	Cattle (bovine animals)																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	3																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	3	0										2	1										
Tetracyclines - Tetracycline	8	3	0							1	1	1												
Fluoroquinolones - Ciprofloxacin	0.06	3	0			2	1																	
Quinolones - Nalidixic acid	16	3	0										2	1										
Trimethoprim	2	3	0						2	1														
Aminoglycosides - Streptomycin	32	3	0											3										
Aminoglycosides - Gentamicin	2	3	0							3														
Penicillins - Ampicillin	4	3	0								2	1												
Cephalosporins - Cefotaxim	0.5	3	0				2	1																
Sulphonamides	256	3	0													2	1							

Table Antimicrobial susceptibility testing of S. Bovismorbificans in Pigs - quantitative data [Dilution method]

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

S. Bovismorbificans	Pigs																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	1																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	1	0										1												
Tetracyclines - Tetracycline	8	1	0							1															
Fluoroquinolones - Ciprofloxacin	0.06	1	0			1																			
Quinolones - Nalidixic acid	16	1	0										1												
Trimethoprim	2	1	0						1																
Aminoglycosides - Streptomycin	32	1	0											1											
Aminoglycosides - Gentamicin	2	1	0							1															
Penicillins - Ampicillin	4	1	0								1														
Cephalosporins - Cefotaxim	0.5	1	0				1																		
Sulphonamides	256	1	0													1									

Table Antimicrobial susceptibility testing of S. Typhimurium in Pigs - quantitative data [Dilution method]

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

S. Typhimurium	Pigs																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	2																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	2	0										2												
Tetracyclines - Tetracycline	8	2	1								1						1								
Fluoroquinolones - Ciprofloxacin	0.06	2	0			1	1																		
Quinolones - Nalidixic acid	16	2	0									1	1												
Trimethoprim	2	2	2														2								
Aminoglycosides - Streptomycin	32	2	2														1	1							
Aminoglycosides - Gentamicin	2	2	0							2															
Penicillins - Ampicillin	4	2	1								1							1							
Cephalosporins - Cefotaxim	0.5	2	0				1	1																	
Sulphonamides	256	2	0													2									

Table Antimicrobial susceptibility testing of S. Senftenberg in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

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

S. Senftenberg	Gallus gallus (fowl) - broilers																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	1																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	1	0										1												
Tetracyclines - Tetracycline	8	1	0								1														
Fluoroquinolones - Ciprofloxacin	0.06	1	0			1																			
Quinolones - Nalidixic acid	16	1	0										1												
Trimethoprim	2	1	0							1															
Aminoglycosides - Streptomycin	32	1	0										1												
Aminoglycosides - Gentamicin	2	1	0							1															
Penicillins - Ampicillin	4	1	0								1														
Cephalosporins - Cefotaxim	0.5	1	0					1																	
Sulphonamides	256	1	0												1										

Table Antimicrobial susceptibility testing of S. Brandenburg in Gallus gallus (fowl) - broilers - quantitative data [Dilution method]

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

S. Brandenburg	Gallus gallus (fowl) - broilers																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	1																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	1	0										1												
Tetracyclines - Tetracycline	8	1	0								1														
Fluoroquinolones - Ciprofloxacin	0.06	1	0			1																			
Quinolones - Nalidixic acid	16	1	0										1												
Trimethoprim	2	1	0						1																
Aminoglycosides - Streptomycin	32	1	0											1											
Aminoglycosides - Gentamicin	2	1	0								1														
Penicillins - Ampicillin	4	1	0								1														
Cephalosporins - Cefotaxim	0.5	1	0					1																	
Sulphonamides	256	1	0														1								

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

Test Method Used	Standard methods used for testing
Broth dilution	NCCLS/CLSI

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

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 <=
Amphenicols	Chloramphenicol		16	
Tetracyclines	Tetracycline		8	
Fluoroquinolones	Ciprofloxacin		0.06	
Quinolones	Nalidixic acid		16	
Trimethoprim	Trimethoprim		2	
Sulphonamides	Sulphonamides		256	
Aminoglycosides	Streptomycin		32	
	Gentamicin		2	
Cephalosporins	Cefotaxim		0.5	
Penicillins	Ampicillin		4	

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 <=
Amphenicols	Chloramphenicol		16	
Tetracyclines	Tetracycline		8	
Fluoroquinolones	Ciprofloxacin		0.06	
Quinolones	Nalidixic acid		16	
Trimethoprim	Trimethoprim		2	
Sulphonamides	Sulphonamides		256	
Aminoglycosides	Streptomycin		32	
	Gentamicin		2	
Cephalosporins	Cefotaxim		0.5	
Penicillins	Ampicillin		4	

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

Norwegian studies have shown that many species of wild birds, especially crows and seagulls, are frequent carriers of thermophilic Campylobacter spp. Thermophilic Campylobacter spp. have also been isolated from poultry, dogs, cats, pigs, sheep, cattle, and flies, and sporadically from wild mammals. Before 2001, when the surveillance programme in broilers was implemented, the prevalence of thermophilic Campylobacter spp. in Norwegian broiler flocks had been studied twice. In 1990, 18% of the flocks tested were infected, whereas this proportion in 1997-1998 had decreased to 4%. This reduction was attributed to an increased focus on the importance of biosecurity.

The Action Plan against Campylobacter in broilers that started in 2001 has shown that the yearly incidence of broiler flocks being positive for Campylobacter has varied between 3.3% and 6.3% in the years 2002-2007. The data from 2008 - 2010 are not directly comparable to previous years because in 2008 the sampling was redused to sampling prior to slaughter only and in 2009 the surveillance was altered from full year surveillance to the period between 1st May to the end of October when the incidence is highest. estimated full year prevalence of positive flocks in 2008 was probably approximately the same as in 2007 and the results from 2009 and 2010 probably gradually improving.

The number of flocks going positive out on the market has been reduced from 127 in 2002 to 58 in 2007.The number of positive flocks out on the market was probably similar to 2007 in 2008 and slightly higher in 2009 and 2010.

In 1998, campylobacteriosis for the first time surpassed salmonellosis as the most frequently reported bacterial cause of acute human gastroenteritis in Norway, and since then the reported incidence of campylobacteriosis has been above that of salmonellosis. Since the beginning of the 1990s and until it peaked in 2001, there was a major increase in the incidence of campylobacteriosis in Norway, both in domestic and imported cases. Usually, 50-60% of the cases are imported.

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

The reported human incidence in 2010 was slightly lower than the incidence reported in 2009. The data on prevalence in broiler flocks in 2010 were not as complete as the date from the period 2001 – 2007, but we assume that there is no major change in the prevalence. We also assume that in 2010, as in earlier years, the majority of the positive flocks were detected before slaughter, and were therefore treated (i.e. frozen or heat treated) before they went on the market. The use of untreated water is considered an important source of campylobacteriosis in Norway.

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

The poultry production and poultry consumption has increased during the last years. Even if the Norwegian action plan against Campylobacter in broilers have largely reduced the number of Campylobacter positive broiler carcasses entering the market, there are still positive broiler carcasses on the market. In addition, other food products may also be positive for Campylobacter. An important source of human campylobacteriosis in Norway is the use of untreated water in private homes and cottages and

during camping and hiking.

Recent actions taken to control the zoonoses

The implementation of the Norwegian action plan against Campylobacter in broilers in 2001 was a direct response from the authorities, scientific institutions and the industry to the major increase in human campylobacteriosis that was seen during the late 1990s and up to 2001.

2.2.2 Campylobacteriosis in humans

A. Thermophilic Campylobacter in humans

Reporting system in place for the human cases

Human cases are reported to the Norwegian Surveillance System for Communicable Diseases (MSIS), from microbiological laboratories as well as from clinical doctors. The system distinguishes between domestic and imported cases. The severity of the disease at the time of reporting is also recorded. However, the surveillance system does not follow individual patients over time to record further disease development and final outcome.

Case definition

A case from which Campylobacter spp. has been isolated or a clinical compatible case with an epidemiological link to a culture confirmed case.

Diagnostic/analytical methods used

Bacteriology (isolation of Campylobacter species from faecal samples) followed by voluntary confirmation (species identification and biotyping) at the National Reference Laboratory. Due to the methods applied, C. lari and C. upsaliensis are probably underdiagnosed.

Notification system in place

According to the Communicable Disease Act, human cases are notifiable to the Norwegian Surveillance System for Communicable Diseases (MSIS) since 1991.

History of the disease and/or infection in the country

Since the beginning of the 1990s and until it peaked in 2001, there was a significant increase in the incidence of campylobacteriosis in Norway. From 1997 to 2001, the incidence increased by ~145%. In 1998, campylobacteriosis for the first time surpassed salmonellosis as the most frequently reported bacterial cause of acute gastroenteritis in Norway, and since then the reported incidence of campylobacteriosis has been above that of salmonellosis. Usually, 50-60% of the cases are imported. The increased incidences observed throughout the 1990s and until 2001 were due to a rising number of both domestic and imported cases. The number of cases, both domestic and imported declined in 2002 and was stable during the period from 2002 to 2004. In 2005, the number of cases increased again and the number of domestic and imported cases were for the first time almost the same. In 2006 the number of imported cases were stable and the number of domestic cases decreased compared to 2005. Also in 2007, the incidence of imported cases raised compared to the domestic cases. The number of imported cases decreased again in 2009 and the number of domestic cases increased to the same level as in 2001 and 2005. Most cases are sporadic. A case control study conducted in Norway during 1999-2000 identified consumption of untreated drinking water, consumption of poultry meat purchased fresh, consumption of barbecued meat, and professional contact with animals as significant risk factors in regard to campylobacteriosis. Daily contact with dogs/cats was identified as a risk factor in case control studies conducted during the early 1990s, but was not identified as a risk factor in the 1999-2000 study. Studies indicate that the vast majority (~95%) of reported cases are due to C. jejuni, and that C. coli is the cause of most of the remaining cases.

Results of the investigation

In 2010, a total of 2673 cases (incidence rate 54.3 per 100 000) were reported of which 1371 (51%) were known to be imported, 998 (37%) were domestic and 304 (11%) had an unknown place of infection.

Altogether, five smaller foodborne outbreaks of campylobacteriosis were registered. No deaths due to campylobacteriosis were reported.

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

The number of reported domestic cases decreased in 2010 compared to 2009. The incidence of domestic human campylobacteriosis has been relatively stable during the last five years. As the overall occurrence of positive broiler flocks is low, there must be other important sources to human campylobacteriosis apart from poultry products in Norway, untreated drinking water probably being the most important one.

Relevance as zoonotic disease

Campylobacter is the most frequently reported cause of bacterial gastroenteritis in Norway. Every year, approx. half of the reported cases have acquired the infection in Norway.

Additional information

Patients whose work represents a risk for spread of the disease, e.g., in food production and health care, are advised to stay away from such work while they are having symptoms. It is recommended that for these patients two consecutive faecal samples examined after the symptoms have disappeared should be negative before returning to work.

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 chapter on Campylobacter in Gallus gallus.

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

See chapter on Campylobacter in Gallus gallus.

Definition of positive finding

At slaughterhouse and cutting plant

See chapter on Campylobacter in Gallus gallus.

Preventive measures in place

In the surveillance programme, the broiler flocks found positive before slaughter are subjected to freezing for at least 3 weeks or heat treatment.

Control program/mechanisms

The control program/strategies in place

The Norwegian action plan against Campylobacter in broilers is a surveillance programme agreed upon by the Norwegian Food Safety Authority, scientific institutions and the poultry industry.

Recent actions taken to control the zoonoses

The establishment of the Norwegian action plan against Campylobacter in broilers was a direct response to the major increase in the incidence of human campylobacteriosis during the 1990s.

Measures in case of the positive findings or single cases

See chapter on Campylobacter in Gallus gallus.

Notification system in place

All findings in the Norwegian action plan against Campylobacter in broilers are reported and published as summary reports.

Results of the investigation

The results from the Norwegian action plan against Campylobacter in broilers are presented in the chapter on Campylobacter in Gallus gallus.

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

The Norwegian campylobacteriosis situation is a concern for the authorities. The establishment of the Norwegian action plan against Campylobacter sp. in broilers in 2001 was a response to the urgent situation. This action plan has since it was established and through 2010 prevented millions of Campylobacter positive broiler carcasses from entering the market raw.

2.2.4 Campylobacter in animals

A. Thermophilic Campylobacter in Gallus gallus

Monitoring system

Sampling strategy

A surveillance programme in broilers was implemented in May 2001 (part of the Norwegian action plan against Campylobacter in broilers).

Frequency of the sampling

Before slaughter at farm

Between 1 May and 31 October, which corresponds with the high season for Campylobacter positive flocks, every flock is sampled.

At slaughter

Flocks where the result from the pre slaughter sample are lacking at the time of slaughter are sampled by staff at the Norwegian Food Safety Authority.

Type of specimen taken

Before slaughter at farm

Faeces

At slaughter

Caecum

Methods of sampling (description of sampling techniques)

Before slaughter at farm

10 swabs from fresh faecal droppings are taken by the owner maximum four days before slaughter. They are transported dry as one pooled sample to the laboratory.

At slaughter

10 caecae are sampled at the slaughter line. The 10 samples are pooled to one at the laboratory.

Case definition

Before slaughter at farm

A flock where Campylobacter spp. is found.

At slaughter

A slaughter batch where Campylobacter spp. is found.

Diagnostic/analytical methods used

Before slaughter at farm

Real time PCR.

At slaughter

Bacteriological method: ISO 10272:2006 (parts 1-3)

Vaccination policy

There is no vaccination against Campylobacter in Norway.

Other preventive measures than vaccination in place

Farms producing Campylobacter positive flocks are subject to follow-up visits from the advisors in the industry and veterinary supervisors from the Norwegian Food Safety Authority to assist in implementing measures preventing further flocks to be infected with Campylobacter.

Control program/mechanisms

The control program/strategies in place

The Norwegian action plan against Campylobacter in broilers is a surveillance programme agreed upon by the Norwegian Food Safety Authority, scientific institutions and the poultry industry. The surveillance programme is compulsory.

Recent actions taken to control the zoonoses

The establishment of the Norwegian action plan against Campylobacter in broilers was a direct response to the major increase in the incidence of human campylobacteriosis during the 1990s.

Measures in case of the positive findings or single cases

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

The poultry industry uses data from the surveillance programme as an incentive for improving the hygienic conditions on broiler farms.

Notification system in place

All positive flocks in the surveillance programme are reported to the authorities.

Results of the investigation

In 2010, in the period 1 May – 31 October, a total of 2170 samples (representing approx 2170 flocks, and covering virtually all slaughtered flocks in Norway in that period) were taken approximately four days before slaughter. A total of 110 samples (5.1%) were positive for Campylobacter spp. In addition - one sample (negative) was taken at slaughter due to lack of results from the pre-slaughter sample.

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

The poultry production has increased in Norway during the last years. The yearly prevalence of flocks being positive for Campylobacter from 2002 to 2007 was between 3.3 and 6.3%, 4.9%, 3.3%, 3.6%, 4.9% and 5.7%, respectively. The results from 2008 - 2010 are not directly comparable to previous years, but the prevalence was probably approximately the same in 2008 as in 2007 and gradually decreasing in 2009 and 2010.

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

The overall occurrence of positive broiler flocks is low, but there is a large seasonal variation with a peak during the summer and autumn, and the surveillance programme is therefore covering that period of the year. Even though approximately 75% of the positive flocks are discovered before slaughter, and thereby subject to compulsory freezing or heat treatment, the number of Campylobacter positive broiler carcasses on the market during the summer can be considerable.

Table Campylobacter in animals

	Source of information	Sampling unit	Units tested	Total units positive for Campylobacter	C. coli	C. jejuni	C. lari	C. upsaliensis	Thermophilic Campylobacter spp., unspecified
Cats	NVI	Animal	97	9		3		4	2
Dogs	NVI	Animal	386	122	2	17		94	9
Gallus gallus (fowl) - broilers - at farm	NACB	Flock	2170	110					110
Sheep	NVI	Animal	16	6		5			1
Cattle (bovine animals) - unspecified	NVI	Animal	121	26	1	17			8

Footnote:

NACB = = Norwegian Action plan against Campylobacter in Broilers. Only covering the peak season 1 May – 31 October. There is no data available on the Campylobacter species because the method used is a Real time PCR method where no isolates are obtained.

NVI = Norwegian Veterinary Institute: Diagnostic samples.

2.2.5 Antimicrobial resistance in Campylobacter isolates

A. Antimicrobial resistance in Campylobacter jejuni and coli in cattle

Sampling strategy used in monitoring

Frequency of the sampling

Samples from healthy animals included in various surveys were investigated for occurrence of Campylobacter spp. One isolate per positive farm was included for susceptibility testing.

Type of specimen taken

Faecal samples collected at farm.

Procedures for the selection of isolates for antimicrobial testing

One isolate of Campylobacter jejuni from each positive holding was selected for antimicrobial testing.

Methods used for collecting data

Strains were isolated and tested for the antimicrobial susceptibility at the Norwegian Veterinary Institute in Oslo.

Laboratory methodology used for identification of the microbial isolates

NMKL No 119 without enrichment.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

The VetMIC microdilution method (Dept. of Antibiotics, National Veterinary Institute, Sweden) was used for the susceptibility testing of all isolates. The antimicrobials included are listed in the table.

Cut-off values used in testing

Epidemiological cut-off values recommended by EUCAST were used.

Results of the investigation

The qualitative data are presented in the table. Quantitative data as well as data on breakpoints and range of testing are presented in the NORM/NORM-VET 2010 report.

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

Campylobacter	Campylobacter spp., unspecified		C. jejuni	
Isolates out of a monitoring program (yes/no)			yes	
Number of isolates available in the laboratory			11	
Antimicrobials:	N	n	N	n
Fluoroquinolones - Ciprofloxacin			11	1
Quinolones - Nalidixic acid			11	1
Aminoglycosides - Gentamicin			11	0
Macrolides - Erythromycin			11	0
Tetracyclines - Tetracycline			11	0
Fully sensitive			11	10
Resistant to 3 antimicrobials			11	1
Aminoglycosides - Streptomycin			11	1

Table Antimicrobial susceptibility testing of C. jejuni in Cattle (bovine animals) - quantitative data [Dilution method]

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

C. jejuni	Cattle (bovine animals)																							
Isolates out of a monitoring program (yes/no)	yes																							
Number of isolates available in the laboratory	11																							
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Tetracyclines - Tetracycline	2	11	0					2	7	2														
Fluoroquinolones - Ciprofloxacin	1	11	1				1	6	3						1									
Quinolones - Nalidixic acid	16	11	1										4	4	2			1						
Aminoglycosides - Streptomycin	2	11	1								2	8						1						
Aminoglycosides - Gentamicin	1	11	0							6	5													
Macrolides - Erythromycin	4	11	0							8	3													

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 <=
Tetracyclines	Tetracycline		2	
Fluoroquinolones	Ciprofloxacin		1	
Aminoglycosides	Gentamicin		2	
	Streptomycin		4	
Macrolides	Erythromycin		16	

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 <=
Tetracyclines	Tetracycline		2	
Fluoroquinolones	Ciprofloxacin		1	
Aminoglycosides	Gentamicin		2	
	Streptomycin		4	
Macrolides	Erythromycin		16	

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 <=
Tetracyclines	Tetracycline		2	
Fluoroquinolones	Ciprofloxacin		1	
Aminoglycosides	Gentamicin		2	
	Streptomycin		4	
Macrolides	Erythromycin		16	

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

Test Method Used
Broth dilution

Standard methods used for testing
NCCLS/CLSI

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

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 <=
Tetracyclines	Tetracycline		2	
Fluoroquinolones	Ciprofloxacin		1	
Aminoglycosides	Gentamicin		1	
	Streptomycin		2	
Macrolides	Erythromycin		4	

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 <=
Tetracyclines	Tetracycline		2	
Fluoroquinolones	Ciprofloxacin		1	
Aminoglycosides	Gentamicin		1	
	Streptomycin		2	
Macrolides	Erythromycin		4	

2.3 LISTERIOSIS

2.3.1 General evaluation of the national situation

A. Listeriosis general evaluation

History of the disease and/or infection in the country

Listeriosis is endemic in Norway with sporadic clinical cases in humans and animals, especially among sheep.

Since 1982, the number of notified human cases has varied from 2-50. The incidence rate has varied from 0.05-1.07 per 100 000. Most of the cases are sporadic, occurring in old people or persons with an underlying disease. A few congenital cases have been reported.

An outbreak occurred in 1992 which involved six reported cases and was traced back to contaminated, vacuum packed cold cuts from a Norwegian meat producer. In 2005 a hospital outbreak occurred with 3 cases, probably linked to cold cuts (the same strain of L. monocytogenes as isolated from the patients was found on the slicing machine in the hospital kitchen). In 2007 an outbreak with 21 verified cases occurred and was caused by contaminated soft cheese.

In a survey conducted in 1994, the prevalence of L. monocytogenes in samples of vacuum packed cold cuts and smoked salmon was 1.7% and 7.8%, respectively. The prevalence in smoked salmon was 3.4% in a survey conducted in 1996-1997. In 2002 4.3% of 703 samples of domestically produced fish and fish products, mainly unprocessed and smoked salmon, were positive for L. monocytogenes. In 2003, 8.6% of 990 samples of smoked salmon taken at retail level were positive for L. monocytogenes. The level of contamination was less than 10 CFU/g in 53 samples, between 10 and 100 in 20 samples, between 100 and 1000 in 10 samples and more than 1000 CFU/g in two samples. In a survey conducted in 1995 involving ready-to-eat poultry products, the prevalence of L. monocytogenes was 0.4%.

A survey of domestically produced raw milk products conducted in 1999 revealed that one out of 282 samples (0.4%) was positive for L. monocytogenes. A survey of raw bulk milk at Norwegian dairy farms, also conducted in 1999, did not detect any L. monocytogenes in 336 samples from cattle bulk milk, whereas four of 100 samples from goat bulk milk were positive for L. monocytogenes. This illustrates that products made of raw milk might be risk products with regard to L. monocytogenes.

Fermented trout is a traditional food product in Norway that is consumed without heat treatment. Studies have shown that fermented trout frequently is contaminated with L. monocytogenes, sometimes in high concentrations (up to 2000 CFU per gram). Former guidelines issued by the Food Safety Authority recommended a maximum level of 1000 CFU per gram for this particular product combined with information about risk products to vulnerable consumers. Recent studies have shown that it is possible to produce fermented trout without L. monocytogenes if hygienic precautionary measures, including temperature control and appropriate salt levels, are implemented throughout the process.

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

Listeriosis is endemic in Norway with sporadic clinical cases in animals, especially among sheep. However, listeriosis is not a common disease in humans in Norway. Most cases are sporadic and seen in the elderly or in patients with underlying disease.

Ready-to-eat products have been identified as a source for human listeriosis.

Recent actions taken to control the zoonoses

Until the Regulation (EC) No 2073/2005 on microbiological criteria was implemented in March 2010, the Norwegian Food Safety Authority recommended that findings of L. monocytogenes in ready-to-eat food products with a shelf life longer than 15 days and in which the bacteria easily could grow, should result in recall from the market of the corresponding lot. Since then 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 by 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

Human cases are reported to the Norwegian Surveillance System for Communicable Diseases (MSIS), from microbiological laboratories as well as from clinical doctors. The system distinguishes between domestic and imported cases. The severity of the disease at the time of reporting is also recorded. However, the surveillance system does not follow individual patients over time to record further disease development and final outcome.

Case definition

A case from which L. monocytogenes has been detected in blood, cerebrospinal fluid or other normally sterile sites or a case with serology indicating recent infection.

Diagnostic/analytical methods used

Bacteriology (isolation of L. monocytogenes from a normally sterile site) followed by voluntary confirmation (species identification and serotyping) at the National Reference Laboratory.

Notification system in place

According to the Communicable Disease Act, human cases are notifiable to the Norwegian Surveillance System for Communicable Diseases (MSIS) since 1975.

History of the disease and/or infection in the country

Since 1982, the number of notified cases has varied from 2-50. The incidence rate has varied from 0.05-1.07 per 100 000. Most of the cases are sporadic, occurring in elderly individuals or persons with underlying disease. A few congenital cases are also being reported. The first recorded outbreak of listeriosis in Norway occured in 1992, involving six reported cases. The outbreak was linked to vacuum packed cold cuts. In 2005, an outbreak occured in a hosptal in the middle of Norway. Three cases were reported, and the outbreak was linked to cold cuts. Another outbreak occured in 2007, involving 21 reported cases of whom two died. The outbreak was linked to a Norwegian pasteurised soft-cheese.

Results of the investigation

In 2009, a total of 31 confirmed cases of listeriosis were notified (incidence rate 0.6 per 100 000), 24 cases were infected in Norway, and none of the cases reported having been infected abroad. One of the cases was pregnancy-associated. Four deaths were recorded.

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

Listeriosis in humans is a relatively rare disease in Norway and has been so for many years. Most of the cases are sporadic, occurring in elderly individuals or persons with underlying diseases. There is, however, an increasing trend if we look at the number of recorded cases over a twenty year period. The increase is not seen in pregnancy-associated cases. The reason for this increasing trend is unknown, but could be related both to an increase in the number of in elderly individuals and persons with other underlying diseases, and to increased exposure to L. monocytogenes in consumed food.

Relevance as zoonotic disease

Listeriosis in humans is a relatively rare disease in Norway.

2.3.3 Listeria in foodstuffs

A. Listeria spp. in food

Monitoring system

Sampling strategy

No continuous monitoring of foodstuffs takes place. Surveys are occasionally performed. Norway follows 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.

Definition of positive finding

At the production plant

A positive sample is a sample from which Listeria spp. has been isolated.

Diagnostic/analytical methods used

At the production plant

NMKL No 136:2007

At retail

NMKL No136:2007, ISO 1129-1/Amd 2004, ISO 11290-2:1998

Control program/mechanisms

The control program/strategies in place

No official control programmes in place. When relevant, monitoring and control take place as an integral part of food business operators' internal control systems.

Measures in case of the positive findings

Previously, the Norwegian Food Safety Authority recommends that findings of L. monocytogenes in ready-to-eat food products with a shelf life longer than 15 days and in which the bacteria could easily grow, should result in recall from the market of the corresponding lot. Since 1st March 2011 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 by unsatisfactory results and taking measures to prevent the recurrence of the contamination, such as reviewing the production routines and shelf life of the product.

Results of the investigation

In 2010, a total of 85 samples of fish from wild stock and 28 samples of farmed fish were investigated. A total of three samples of farmed fish were positive for L. monocytogenes, but in very low concentrations.

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

In general, the occurrence of L. monocytogenes in food products is low.

Table Listeria monocytogenes in other foods

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for L. monocytogenes	Units tested with detection method	Listeria monocytogenes presence in x g	Units tested with enumeration method	> detection limit but <= 100 cfu/g	L. monocytogenes > 100 cfu/g
Fish - raw (Farmed fish)	NIFES	Single	25 g	28	3	28	3	28	0	0
Fish - raw (Fish from wild stocks)	NIFES	Single	25 g	85	0	85	0	85	0	0

2.3.4 Listeria in animals

A. Listeria spp., unspecified in animal - All animals

Monitoring system

Sampling strategy

Listeriosis is a notifiable disease in animals.

There are no active surveillance regarding L. monocytogenes in animals. Information is achieved through clinical and laboratory reports.

Frequency of the sampling

When there is a suspected case.

Case definition

A case may be defined by 1) positive histopathology combined with clinical signs, 2) positive bacteriology.

Diagnostic/analytical methods used

Bacteriology, histopathology and immunohistochemistry.

Measures in case of the positive findings or single cases

Normally none.

Notification system in place

Listeriosis has been a list C disease according to the Animal Disease Act since 1965.

Results of the investigation

In 2010, a total of 85 samples of fish from wild stock and 28 samples of farmed fish were investigated. A total of three samples of farmed fish were positive for L. monocytogenes, but in very low concentrations.

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

Listeria spp. is present in the environment and also in food-producing animals. However, there is no epidemiological evidence that listeriosis in humans are linked to listeriosis in animals.

Table Listeria in animals

	Source of information	Sampling unit	Units tested	Total units positive for Listeria	L. monocytogenes	Listeria spp., unspecified
Cattle (bovine animals)	NVI	Animal	unknown	4	4	
Goats	NVI	Animal	unknown	25	25	
Sheep	NVI	Animal	unknown	35	35	
Alpacas	NVI	Animal	unknown	1	1	

2.4 E. COLI INFECTIONS

2.4.1 General evaluation of the national situation

A. Verotoxigenic Escherichia coli infections general evaluation

History of the disease and/or infection in the country

The reported incidence of VTEC infections in humans in Norway has so far been low. Approximately half of the cases are acquired domestically. In 2006 there was a severe outbreak caused by VTEC O103:H25 with 17 patients, out of which 10 developed HUS and one died. In 2009 there was another outbreak, cased by sorbitol fermenting E. coli O157:H-. There were 19 cases, out of which 9 developed HUS and one died. In 2010, another outbreak occurred, with 3 cases infected with the same strain as in the 2009-outbreak.

A study conducted in 1995 revealed a low prevalence of VTEC O157 among Norwegian dairy cattle; animal prevalence 0.3% and herd prevalence 1.0%. In a survey conducted in 1998-1999, one out of 574 dairy cattle herds were positive for VTEC O157 (herd prevalence 0.2%, animal prevalence between 0.02 and 0.06%).

In 2000, none of the tested 1435 beef cattle from 165 herds were positive for VTEC O157. A survey in 2002, in which 453 pooled faecal samples from 155 beef cattle herds were tested for the presence of VTEC O26, O103, O111, O145 and O157, revealed five pooled samples from five herds positive for VTEC O103, all eae negative.

In the surveillance programme for VTEC O157 in cattle, sheep, and goat carcasses running in the period 1998-2004, the total carcass prevalence was 0.06% for cattle and 0.03% for sheep. None of the 510 goat carcasses tested were positive.

In a national survey in sheep conducted in 2006-2007, samples from 585 flocks were analysed, 94 flocks from 2006 and 491 flocks from 2007. VTEC O103:H2 (stx1 and eae positives) were detected in 0.7% and VTEC O157:H7 (stx2 and eae positives, one was also stx1 positive) in 0.9% of the flocks. Only the 2007 samples were analysed for E. coli O26, and VTEC O26 were detected in 0.8% of the flocks. In addition stx negative and eae positive E. coli O26 were detected in 16.1%, stx negative and eae positive E. coli O103:H2 in 3.1%, and stx negative and eae positive E. coli O103:H25 in 5.8% of the flocks.

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

Although the annual incidence in humans in Norway up to 2006 was low and predominantly involved sporadic cases, the fear that the incidence might increase in the future, and that outbreaks may occur proved valid in 2006. Data show that VTEC O157 is present in the cattle and sheep populations, and although the prevalences seem to be low, this reservoir represents a source of possible human infection. The 2006 outbreak caused by VTEC O103:H25 showed that other VTEC than the "high five" (VTEC O26, O103:H2, O111, O145 and O157) may be of potential danger to humans.

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

Although the prevalence of VTEC O157 in the cattle and sheep populations seems to be low, there are other VTEC where the knowledge is sparse. In general, there is always a potential for contamination in the food chain, which requires alertness at all steps from primary production, through processing, and retail

and food preparation, as well as alertness among physicians and diagnostic laboratories.

2.4.2 E. coli infections in humans

A. Verotoxigenic Escherichia coli infections in humans

Reporting system in place for the human cases

Human cases are reported to the Norwegian Surveillance System for Communicable Diseases (MSIS), from microbiological laboratories as well as from clinical doctors. The system distinguishes between domestic and imported cases. The severity of the disease at the time of reporting is also recorded. However, the surveillance system does not follow individual patients over time to record further disease development and final outcome.

Haemolytic uremic syndrome (HUS) became a notifiable disease in December 2006. Before that, HUS was not notifiable per se, but was reported in relation to an EHEC diagnosis.

Case definition

A case from which enterohaemorrhagic E. coli or its toxins have been detected from faecal samples.

Diagnostic/analytical methods used

Clinical microbiological laboratories use plating on selective media (such as SMAC) in order to detect presumptive VTEC O157 and/or genetic methods directed towards detection of Shiga toxin genes followed by isolation of VTEC and confirmation at the National Reference Laboratory. Confirmation includes examination for the presence of Shiga toxin genes and other virulence factors.

Notification system in place

According to the Communicable Disease Act, human cases are notifiable to the Norwegian Surveillance System for Communicable Diseases (MSIS) since 1995. Haemolytic uremic syndrome (HUS) became a notifiable disease in December 2006.

History of the disease and/or infection in the country

The reported incidence of VTEC infections in humans in Norway has been low. The number of cases has varied between 0-51 per year, except in 2009 with 108 reported cases. Approximately half of the cases are acquired domestically. Most reported cases are caused by VTEC O157. The first foodborne VTEC outbreak in Norway occurred in 1999 and involved four culture positive patients (O157). Epidemiological investigations incriminated domestically produced lettuce as the most likely source of infection. A severe outbreak caused by VTEC O103:H25 in 2006 involved 17 patients of which 10 developed HUS and one died. In 2009, an outbreak caused by sorbitol fermenting O157:H- occurred. Thirteen children got ill, and of these nine developed HUS and one child died. The source of the outbreak was not found.

Results of the investigation

In 2010, 51 cases (incidence rate 1.0 per 100.000) of VTEC and HUS were reported. A total of 5 cases of HUS were reported; sorbitol fermenting O157:H- was isolated from 3 of the patients, O121:H? from one patient, and O26:H11 from one patient. Of the 51 cases of VTEC infections reported, the most commonly isolated serotypes were O103 (11 cases), O157 (8 cases) and O26 (2 cases). Eleven of the 51 cases reported contracting the infection abroad. There was one outbreak with HUS counting 3 cases.

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

The number of cases reported in 2010 is much lower than the cases reported in 2009. One outbreak counting three HUS cases was reported, as opposed to the seven outbreaks reported last year. Many of the notified cases in 2009 were detected because of increased attention and testing due to the outbreaks. The laboratory methods have probably improved since the O103 outbreak Norway experienced in 2006.

Even though there is a decrease from 2009 to 2010, the 51 cases of VTEC and 5 cases of HUS reported in 2010 reflects an increasing trend for EHEC in Norway. The reason for this increase is unknown.

Relevance as zoonotic disease

Data show that VTEC is present in the cattle and sheep populations, although the prevalences seem to be low. However, there is also a reservoir of E. coli with eae, but stx negative, that may be of concern as human pathogenics (aEPEC) or as precursors for VTEC. Thus, there is a potential for contamination in the food chain or by direct animal contact, which requires alertness at all steps from primary production, through processing, and retail and food preparation, as well as alertness among physicians and diagnostic laboratories.

Additional information

Patients whose work represents a risk for spread of the disease, e.g., people working with food production, children in day-care and health care personell, are advised to stay away from work while they have symptoms. It is recommended that for these patients five consecutive faecal samples examined after the symptoms have disappeared should be negative before returning to work.

2.4.3 Escherichia coli, pathogenic in foodstuffs

Table VT E. coli in food

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Verotoxigenic E. coli (VTEC)	Verotoxigenic E. coli (VTEC) - VTEC O157	Verotoxigenic E. coli (VTEC) - VTEC non-O157	Verotoxigenic E. coli (VTEC) - VTEC, unspecified	Verotoxigenic E. coli (VTEC) - VTEC O26	Verotoxigenic E. coli (VTEC) - VTEC O26 - eae positive vtx1 positive
All foodstuffs - unspecified - Clinical investigations (Taken in relation to outbreaks in humans. Mainly from patients' homes. Includes a small amount of environmental samples including samples from animals.) [1)]	NVI	Single		203	1		1			1

Comments:

[1)] 188 samples investigated for O157, 10 samples investigated for O26 and 5 samples investigated for O103. The positive sample was isolated from faeces from calves.

2.4.4 Escherichia coli, pathogenic in animals

A. Verotoxigenic E. coli (VTEC) in animal - All animals (Ruminants)

Monitoring system

Sampling strategy

Prevalence surveys in cattle, sheep and goats have been conducted occasionally since 1998. In 2006-2007 a survey regarding VTEC in sheep was conducted, with a total of 593 flocks sampled. Single faecal samples were collected from the 50 youngest animals in each flock.

Type of specimen taken

Animals at farm

Faeces

Methods of sampling (description of sampling techniques)

Animals at farm

Faecal samples

Case definition

Animals at farm

An animal or herd from which VTEC is isolated.

Diagnostic/analytical methods used

Animals at farm

Modification of NMKL No 164:1999 with IMS (or IMS-ELISA) followed by virulence characterization by PCR.

Measures in case of the positive findings or single cases

If VTEC O157 or other VTEC that can pose a health risk for humans is detected in an official survey among live animals, the Norwegian Food Safety Authority and Municipal Medical Officer are notified. Restrictions may be imposed on livestock holdings where such VTEC is detected.

The holdings sampled in the survey of sheep flocks in 2006-2007 were anonymized.

Notification system in place

Findings in carcasses of VTEC O157 or other VTEC that can pose a health risk to humans lead to condemnation of the carcasses and notification to the authorities. Findings of such VTEC in samples from live animals are not notifiable as an animal disease, but since VTEC is a pathogen that can be transmitted from animals to humans, competent authorities have to be informed about positive findings.

Results of the investigation

In 2010 more than 200 samples, mainly from food but also some from animals and environment were investigated at the Norwegian Veterinary Institute due to follow up of human cases. Definite links between human cases and the samples from food, animals and environment were not identified except for one case in a young child where the same O26 strain was found in faeces from calves at a petting zoo the child had visited.

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

The prevalence of human pathogenic VTEC O157, O103, O26, O45 and O111 is still considered low in Norwegian cattle, sheep and goats.

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

Norway has been granted the officially tuberculosis-free status of bovine herds by the EFTA Surveillance Authority (ESA) (EFTA Surveillance Authority Decision No 28/07/COL) as Norway fulfills the requirements laid down in Council Directive 64/432/EEC as amended.

Bovine tuberculosis (M. bovis) was declared eliminated in cattle in Norway in 1963 as a result of an official eradication programme against the disease. During the period 1895-1896, 26% of 2195 tuberculin-tested herds were positive. In 1950, 18 herds were registered as being infected, while in the beginning of the 1960s only one or two infected herds were reported annually. Since bovine tuberculosis was declared eliminated, it has only been recorded three times; in 1984 in two cattle herds and in 1986 in one cattle herd. These herds were in the same geographical area and the origin of the infection in these herds was probably a man with tuberculosis. Tuberculosis caused by M. bovis in other animal species than cattle has not been recorded in Norway after the disease was eliminated from cattle in 1963.

Tuberculosis in humans caused by M. bovis is only sporadically recorded in Norway, and since 1977 the few recorded cases have been imported except for one case of reactivation in 1994.

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

As Norway is officially free from bovine tuberculosis, the probability of contracting M. bovis infection from Norwegian animals or animal products of Norwegian origin is close to zero.

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

There have been no findings of M. bovis in animals or foodstuffs. The probability of contracting M. bovis infection from Norwegian animals or animal products of Norwegian origin is close to zero.

2.5.2 Tuberculosis, mycobacterial diseases in humans

A. Tuberculosis due to Mycobacterium bovis in humans

Reporting system in place for the human cases

Human cases are reported to the Norwegian Surveillance System for Communicable Diseases (MSIS), from microbiological laboratories as well as from clinical doctors. The system distinguishes between Norwegian and foreign born cases. The severity of the disease at the time of reporting is also recorded. The surveillance system includes individual treatment outcome data for all tuberculosis patients.

Case definition

A confirmed case of M. bovis, M. tuberculosis, or M. africanum is a case that has been confirmed by isolation of M. bovis, M. tuberculosis, or M. africanum, respectively. Cases of tuberculosis that are diagnosed without laboratory confirmation (diagnoses based on clinical symptoms and X-ray examination) are also notified and included in the statistics.

Diagnostic/analytical methods used

Clinical indications: Bacteriology, X-ray, pathology.

Screening: Miniature X-ray, tuberculin skin testing, Interferon-gamma release assays.

Notification system in place

According to the Communicable Disease Act, human cases caused by bacilli belonging to the M. tuberculosis complex (including M. tuberculosis, M. bovis, and M. africanum) are notifiable to the Norwegian Surveillance System for Communicable Diseases (MSIS) since 1975, and before that notifiable to a separate Tuberculosis Register since 1900.

History of the disease and/or infection in the country

The incidence of human tuberculosis (M. bovis and M. tuberculosis) has steadily decreased during the last 50 years in persons of Norwegian origin. BCG vaccination was introduced in 1947 and was mandatory until 1995. Pasteurisation of milk for commercial sale became mandatory in 1951. Since 1977, the annual incidence rate in persons born in Norway has decreased from 11 to 1.4 per 100 000, and most cases in this part of the population are recurrent cases in elderly patients. Along with increased immigration to Norway, the proportion of tuberculosis cases involving persons born outside Norway has increased during the last two decades (from less than 10% in 1977 to 81% in 2006).

Since bovine tuberculosis in cattle was eliminated in Norway in 1963, almost all bacteriologically confirmed cases in humans have been caused by M. tuberculosis. The last domestic case of tuberculosis caused by M. bovis was reported in 1994 in a 100-year old woman infected in her youth. Apart from this case, no indigenous cases of tuberculosis caused by M. bovis in humans have been reported since 1977. Imported cases of tuberculosis caused by M. bovis are sporadically reported; in 2010 in one patient from Africa, in 2005 in two patients from Somalia and Afghanistan, respectively, in 2002 one patient from Somalia, in 2001 one patient from Tanzania, in 2000 two patients from Somalia and Morocco, respectively, in 1999 one patient from Sri Lanka, in 1998 one patient from Somalia, and in 1994 one patient infected in India.

Results of the investigation

In 2010, one case with tuberculosis caused by M. bovis was notified. The patient was infected in Africa.

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

Tuberculosis caused by M. bovis is only sporadically recorded in Norway, and except for a case of reactivation in 1994, the few recorded cases reported since 1977 have been imported.

Relevance as zoonotic disease

As Norway is officially free from bovine tuberculosis, the probability of contracting M. bovis infection from Norwegian animals or animal products of Norwegian origin is close to zero.

Additional information

In Norway, the child vaccination programme has included vaccination against tuberculosis since 1947. The BCG vaccine (live attenuated M. bovis) is offered to unvaccinated and tuberculin negative persons belonging to certain risk groups; immigrants from countries with high prevalence of tuberculosis, persons travelling to highendemic areas for a prolonged timeperiod, teachers, health personnel, personnel on ships and in offshore industry, and military personnel.
In addition, the BCG vaccine is offered to all children during junior high school (13-14 years old). In general, the immunisation coverage in Norwegian children is high; for the BCG vaccine it is estimated to be 99%. In Norway, the BCG vaccine is estimated to give 80% protection against tuberculosis.
Tuberculin skin test is mandatory for immigrants coming to Norway from high prevalence countries. Immigrants who are 15 years or older must also undergo chest radiograph screening. Screening for tuberculosis in certain risk populations is sometimes conducted.

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

Norway has been granted the officially tuberculosis-free status of bovine herds by the EFTA Surveillance Authority (ESA) (EFTA Surveillance Authority Decision No 28/07/COL) as Norway fulfills the requirements laid down in Council Directive 64/432/EEC as amended.

Monitoring system

Sampling strategy

Every slaughtered animal, except animals slaughtered for on-the-farm consumption, is subjected to meat inspection regarding tuberculosis (lymph node examination) according to Regulation (EC) No 854/2004 (until the 1st of March: Council Directive 64/433/EEC). All breeding bulls are tuberculin tested several times. Imported animals are tuberculin tested if considered relevant based upon individual assessment. If suspicion arises whether an animal may have tuberculosis (sick or dead animal), relevant tests will be carried out.

Frequency of the sampling

All slaughtered animals are subject to meat inspection.

Imported animals are tested during week 22 of the six months long isolation period.

Breeding bulls are tuberculin tested before being transferred to a semen collection centre and thereafter subject to yearly testing.

Type of specimen taken

Animals for slaughter: Lymph nodes. Breeding animals and imported animals: Tuberculin testing.

Methods of sampling (description of sampling techniques)

Slaughtered animals: Meat inspection at the slaughterhouse; lymph node examination.

Imported animals and breeding animals: Tuberculin testing.

Clinical indications: Methods will vary depending on the problem.

Case definition

A single animal from which M. bovis or M. tuberculosis has been isolated. The herd is the epidemiological unit.

Diagnostic/analytical methods used

Slaughtered animals: Meat inspection regarding tuberculosis (lymph node examination) according to Regulation (EC) No 854/2004 (until the 1st of March: Council Directive 64/433/EEC) If indicated: bacteriology and histology. Clinical indications: Tuberculin testing (intradermal comparative test), pathology, and/or bacteriology. Breeding animals and imported animals: Tuberculin testing (intradermal comparative test).

Vaccination policy

Vaccination of animals against tuberculosis is prohibited in Norway.

Control program/mechanisms

The control program/strategies in place

Every slaughtered animal, except animals slaughtered for on-the-farm consumption, is subjected to meat inspection regarding tuberculosis (lymph node examination) according to Regulation (EC) No 854/2004 (until the 1st of March: Council Directive 64/433/EEC).

Measures in case of the positive findings or single cases

Norway would as a minimum implement the measures as laid down in Council Directive 64/432/EEC as amended in case of positive findings or if suspicion of tuberculosis in bovine animals should arise.

Notification system in place

Tuberculosis caused by M. bovis or M. tuberculosis of all species has been a notifiable List B disease according to the Animal Diseases Act since 1894.

Results of the investigation

In 2010, two slaughtered bovine animals had findings at slaughter indicating tuberculosis, and was submitted for examination for Mycobacterium sp. The samples were negative.
A total of 275 bulls owned by a breeding company all had negative tuberculin tests.

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

Bovine tuberculosis was declared eliminated in cattle in 1963.

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

There have been no findings of M. bovis in animals or foodstuffs. The risk for humans contracting tuberculosis from livestock within the country is negligible.

B. Mycobacterium bovis in farmed deer

Monitoring system

Sampling strategy

Every slaughtered animal, except animals slaughtered for on-the-farm consumption, is subjected to meat inspection regarding tuberculosis (lymph node examination) by an official veterinarian according to Regulation (EC) No 854/2004 (until the 1st of March: Council Directive 64/433/EEC) Imported deer are tuberculin tested if considered relevant based upon individual assessment. If suspicion arises whether an animal may have tuberculosis (sick or dead animal), relevant tests will be carried out.

Frequency of the sampling

All slaughtered animals are subject to meat inspection.

Imported deer are tested during week 5 of the two months long isolation period.

Type of specimen taken

Animals for slaughter: Lymph nodes. Imported animals: Tuberculin testing.

Methods of sampling (description of sampling techniques)

Slaughtered animals: Meat inspection at the slaughterhouse; lymph node examination.

Imported animals: Tuberculin testing.

Clinical indications: Methods will vary depending on the problem.

Case definition

A single animal from which M. bovis or M. tuberculosis has been isolated. The herd is the epidemiological unit.

Diagnostic/analytical methods used

Slaughtered animals: Meat inspection regarding tuberculosis (lymph node examination) by an official veterinarian according to Regulation (EC) No 854/2004 (until the 1st of March: Council Directive 64/433/EEC). If indicated: bacteriology and histology. Imported animals: Tuberculin testing (intradermal comparative test). Clinical indications: Tuberculin testing (intradermal comparative test), pathology, and/or bacteriology.

Vaccination policy

Vaccination of animals against tuberculosis is prohibited in Norway.

Control program/mechanisms

The control program/strategies in place

Every slaughtered animal, except animals slaughtered for on-the-farm consumption, is subjected to meat inspection regarding tuberculosis (lymph node examination) by an official veterinarian according to Regulation (EC) No 854/2004 (until the 1st of March: Council Directive 64/433/EEC). Required autopsy of animals older than 12 months of age that die or are killed because of a disease.

Measures in case of the positive findings or single cases

Norway would as a minimum implement the measures as laid down in Council Directive 64/432/EEC as amended in case of positive findings or if suspicion of tuberculosis should arise.

Notification system in place

Tuberculosis caused by M. bovis or M. tuberculosis of all species has been a notifiable List B disease according to the Animal Diseases Act since 1894.

Results of the investigation

In 2010, material from one farmed deer was submitted for examination for Mycobacterium sp. The sample was negative.

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

Bovine tuberculosis has not been diagnosed in farmed deer in Norway. The population of farmed deer is very small in Norway.

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

There have been no findings of M. bovis in animals or foodstuffs. The risk for humans contracting tuberculosis from livestock within the country is negligible.

C. Mycobacterium spp. in animal

Monitoring system

Sampling strategy

For cattle and farmed deer, see the respective chapters. Every slaughtered animal, except poultry and animals slaughtered for on-the-farm consumption, is subjected to meat inspection regarding tuberculosis (lymph node examination) by an official veterinarian according to Regulation (EC) No 854/2004 (until the 1st of March: Council Directive 64/433/EEC). Imported animals are tuberculin tested if considered relevant based upon individual assessment. Boars selected for export of semen to USA are tuberculin tested. If suspicion arises whether an animal may have tuberculosis (sick or dead animal), relevant tests will be done.

Frequency of the sampling

All slaughtered animals are subject to meat inspection.

Imported animals: Sheep and goats are tested during week 23 of the two years long isolation period. Pigs are tested during week 7 of the two months long isolation period. Lamas are tested during week 22 of the six months long isolation period.

Type of specimen taken

Animals for slaughter: Lymph nodes. Imported or exported animals: Tuberculin testing.

Methods of sampling (description of sampling techniques)

Slaughtered animals: Meat inspection at the slaughterhouse; lymph node examination.

Imported animals and breeding animals: Tuberculin testing.

Clinical indications: Methods will vary depending on the problem.

Case definition

A single animal from which M. bovis or M. tuberculosis has been isolated. The herd is the epidemiological unit.

Diagnostic/analytical methods used

Slaughtered animals: Meat inspection regarding tuberculosis (lymph node examination) by an official veterinarian according to Council Directive 64/433/EEC. If indicated: bacteriology and histology.

Tests of imports, exports: Tuberculin testing (intradermal comparative test).

Clinical indications: Tuberculin testing (intradermal comparative test), pathology, and/or bacteriology.

Vaccination policy

Vaccination of animals against tuberculosis is prohibited.

Control program/mechanisms

The control program/strategies in place

Every slaughtered animal, except poultry and animals slaughtered for on-the-farm consumption, is subjected to meat inspection regarding tuberculosis (lymph node examination) by an official veterinarian according to Regulation (EC) No 854/2004 (until the 1st of March: Council Directive 64/433/EEC).

Measures in case of the positive findings or single cases

Norway would as a minimum implement the measures as laid down in Council Directive 64/432/EEC as amended in case of positive findings or if suspicion of tuberculosis should arise.

Notification system in place

Tuberculosis caused by M. bovis or M. tuberculosis in all species has been a notifiable List B disease according to the Animal Diseases Act since 1894. Cases are to be notified to the Norwegian Food Safety Authority.

Results of the investigation

In 2010, tuberculin tests were performed on 99 breeding boars at AI stations, all were negative. Samples from four pigs, three dogs, one sheep, dog and one horse were analyzed for the presence of Mycobacterium species. The animals were negative.

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

Bovine tuberculosis was declared eliminated in cattle in 1963, and has since then not been recorded in other animal species.

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

There have been no findings of M. bovis in animals or foodstuffs. The risk for humans contracting tuberculosis from livestock within the country is negligible.

Table Tuberculosis in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Mycobacterium	M. bovis	M. tuberculosis	Mycobacterium spp., unspecified
Pigs	NVI	Animal	4	0			
Sheep	NVI	Animal	1	0			
Dogs	NVI	Animal	3	0			
Pigs - breeding animals - at AI station	Breeding company	Animal	99	0			
Solipeds, domestic	NVI	Animal	1	0			

Table Tuberculosis in farmed deer

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

Region	Total number of existing farmed deer		Free herds		Infected herds		Routine tuberculin testing		Number of tuberculin tests carried out before the introduction into the herds	Number of animals with suspicious lesions of tuberculosis examined and submitted to histopathological and bacteriological examinations	Number of animals detected positive in bacteriological examination
	Herds	Animals	Number of herds	%	Number of herds	%	Interval between routine tuberculin tests	Number of animals tested			
Norge	75	7131	75	100	0	0				1	0
Total : [1)]	75	7131	75	100	0	0	N.A.	0	0	1	0

Comments:

[1)] N.A.

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

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

Region	Total number of existing bovine		Officially free herds		Infected herds		Routine tuberculin testing		Number of tuberculin tests carried out before the introduction into the herds (Annex A(I)(2)(c) third indent (1) of Directive 64/432/EEC)	Number of animals with suspicious lesions of tuberculosis examined and submitted to histopathological and bacteriological	Number of animals detected positive in bacteriological examination
	Herds	Animals	Number of herds	%	Number of herds	%	Interval between routine tuberculin tests	Number of animals tested			
Norge	16800	872100	16800	100	0	0		275		2	0
Total : [1)]	16800	872100	16800	100	0	0	N.A.	275	0	2	0

Comments:

[1)] N.A.

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

Bovine brucellosis has been a notifiable disease since 1903. An offensive eradication programme to eliminate the disease was launched in 1935, and Norway was declared free from bovine brucellosis in 1953. Ovine, caprine, or porcine brucellosis has never been recorded in Norway. Norway has been granted official brucellosis-free status of bovine herds by the EFTA Surveillance Authority (ESA) (EFTA Surveillance Authority Decision No 28/07/COL). Also regarding Brucella melitensis, Norway fulfils the requirements for an officially free status for the disease in sheep and goats, however, a formal decision is not available.

Human brucellosis has always been a rare disease in Norway, the majority of the cases being imported, and a few cases due to laboratory infections domestically.

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

As bovine brucellosis was declared eliminated in Norway in 1953, and ovine, caprine, or porcine brucellosis has never been recorded, Norway is considered free from brucellosis in production animals.

Research studies have shown that antibodies against Brucella can be detected in marine mammals (minke whales and hooded seals) from the North Atlantic Ocean, and in polar bears from the archipelago of Svalbard and the Barents Sea. Brucella sp. different from previously described species has also been isolated from hooded seals from the Greenland Sea.

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

There have been no findings of Brucella spp. in terrestrial animals or foodstuffs. The probability of contracting brucellosis from Norwegian animals or animal products of Norwegian origin is close to zero.

2.6.2 Brucellosis in humans

A. Brucellosis in humans

Reporting system in place for the human cases

Human cases are reported to the Norwegian Surveillance System for Communicable Diseases (MSIS), from microbiological laboratories as well as from clinical doctors. The system distinguishes between domestic and imported cases. The severity of the disease at the time of reporting is also recorded. However, the surveillance system does not follow individual patients over time to record further disease development and final outcome.

Case definition

A clinically compatible case that is laboratory confirmed.

Diagnostic/analytical methods used

Serology (serum antibody test or antigen test of clinical specimen) and bacteriology (isolation).

Notification system in place

According to the Communicable Disease Act, human cases are notifiable to the Norwegian Surveillance System for Communicable Diseases (MSIS) since 1975.

History of the disease and/or infection in the country

Human brucellosis has always been a rare disease in Norway. During the period 1983-2010, only 20 cases of brucellosis were reported: In 2010 two cases infected abroad. In 2006 three cases of which two had travelled to countries outside Europe and for the third case, there was no information available. In 2005 one case infected in Africa. In 2004 two cases; one infected at work (health care/laboratory), the other infected in Cyprus. In 2003 three cases; two probably infected in Ethiopia and one probably infected in a laboratory. In 2002 three cases; from Spain, Iraq and Georgia. In 2001 two cases; both probably infected in Lebanon. In 2000 one case infected in Turkey probably through milk. In 1999 one case infected through milk in Turkey. In 1997 one immigrant from Turkey. In 1987 a Norwegian UN soldier stationed in Lebanon (B. melitensis).

Results of the investigation

In 2010 two cases were reported. Both cases were infected abroad.

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

Brucellosis is rarely recorded in Norway. Since 1983, only 18 cases have been recorded. Two of these are known to be infected in Norway, both laboratory contracted.

Relevance as zoonotic disease

As Norway is free from brucellosis in terrestrial food producing animals, the risk of humans contracting brucellosis from such animals or from Norwegian animal products is considered negligible. However, the recent findings of Brucella species in marine mammals needs further research to better understand the epidemiology and to address possible public health implications.

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

Norway is regarded as officially free from bovine brucellosis according to the EFTA Surveillance Authority (ESA) (EFTA Surveillance Authority Decision No 28/07/COL).

Monitoring system

Sampling strategy

Surveillance programme: During the years 2000-2004, the programme consisted of an active surveillance part, where 20% of the Norwegian cattle population were sampled each year, and a passive surveillance part, where aborted foetuses and blood samples from their dams were investigated. Since 20% of the Norwegian cattle population had been tested annually for five consecutive years and thereby fulfilled the requirements from the EU, the programme in 2005 was reduced to passive surveillance only. According to the programme, all abortions between the fifth month of pregnancy and 14 days before expected birth in a herd in which there has been at least two such abortions the last 12 months, should be sampled. In addition, blood samples from the cow should be examined.

All breeding bulls are tested.

Imported animals are serologically tested if considered relevant, based upon an assessment of the health status in the country of origin.

Tests are also carried out in connection with clinical indications and export.

Frequency of the sampling

All breeding bulls are tested serologically twice before being transferred to a semen collection centre, and subsequently retested within 12 months. Bulls are thereafter subject to yearly testing.

Imported cattle are tested at week 22 during the six months long isolation period.

Type of specimen taken

Blood or foetus.

Methods of sampling (description of sampling techniques)

Surveillance programme: Foetus and the foetal membranes and paired blood samples from the mother are collected.

Other monitoring systems: Blood samples.

All samples are collected at farm.

Case definition

An animal which is seropositive for Brucella spp. even after retesting at least four weeks later, or an animal from which Brucella spp. has been isolated. The herd is the epidemiological unit.

Diagnostic/analytical methods used

Foetus: Full autopsy, histopathology, bacteriology.

Blood samples from cows: Antibodies against Brucella in an indirect ELISA (Svanova). If the results are doubtful or positive, the samples are retested in duplicates. If the result still is doubtful or positive, the sample is tested with a competitive ELISA (C-ELISA, Svanova). If still positive, a complement fixation (CF) test is used. If the CF test is positive, new samples are taken four to six weeks after the initial sampling. If this is positive, or if there is a need for immediate follow up, the animal will be tested with an intracutane test using Brucellergene OCB from B. melitensis (Synbiotics).

Breeding animals, imports, exports: Serology (Rose bengal plate agglutination test, serum agglutination test or complement fixation test depending on the customers demands).

All tests are performed according to the OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals, 5th ed. 2004. The indirect ELISA is standardized against EU Directive 64/432/EEC Annex C.

Vaccination policy

Vaccination of animals against brucellosis is prohibited in Norway.

Control program/mechanisms

The control program/strategies in place

The surveillance programme in cattle herds (in accordance to Council Directive 64/432/EEC Annex I) was established in 2000.

All breeding bulls are serologically tested twice before being transferred to a semen collection centre, and subsequently within 12 months. Bulls are thereafter subjected to yearly testing.

Imported cattle are serologically tested if considered relevant based upon an individual assessment.

Tests are also carried out in connection with clinical indications and export.

Measures in case of the positive findings or single cases

Norway would as a minimum implement the measures as laid down in Council Directive 64/432/EEC as amended in case of positive findings or if suspicion of brucellosis in bovine animals should arise.

Notification system in place

Bovine brucellosis has been a notifiable List A disease according to the Animal Diseases Act since 1903. Cases are to be notified to the Norwegian Food Safety Authority.

Results of the investigation

In 2010, animals from a total of four herds were were investigated in the surveillance programme (blood samples, aborted fetuses and bulk milk). A total of 491 bulls owned by a breeding company were tested for brucellosis. All samples were negative.

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

Bovine brucellosis was eliminated from Norway in 1953. No positive cases have been found since then.

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

There have been no findings of Brucella spp. in cattle or foodstuffs from cattle. The probability of contracting brucellosis from Norwegian animals or animal products of Norwegian origin is close to zero.

B. Brucella melitensis in goats

Status as officially free of caprine brucellosis during the reporting year

The entire country free

Due to its history in regard to Brucella melitensis, Norway fulfils the requirements for an officially free status for the disease.

Monitoring system

Sampling strategy

Surveillance programme: A large proportion of herds are selected for sampling each year. The programme started in 2007.

Imported goats are serologically tested if considered relevant based upon an assessment of the health status in the country of origin.

Frequency of the sampling

Surveillance programme: A selection of herds in the population is tested every year.
Imported goats are tested for brucellosis in week 2 and 23 during the two year's isolation period.

Type of specimen taken

Blood

Methods of sampling (description of sampling techniques)

Individual blood samples are collected at farm.
Surveillance programme: In flocks with less than 30 animals, all animals are sampled; in herds with 30-100 animals, 30 are sampled; in herds with 100-200 animals, 35 are sampled; in herds with more than 200 animals, 40 animals are sampled.

Case definition

An animal showing significant antibody titre to Brucella spp. or an animal from which Brucella spp. has been isolated. The herd is the epidemiological unit.

Diagnostic/analytical methods used

Rose bengal plate agglutination test was used for initial screening. A competitive ELISA (C-ELISA, Svanova) was used to follow up unclear or positive reactions due to possible cross reactions.

Vaccination policy

Vaccination of animals against brucellosis is prohibited.

Control program/mechanisms

The control program/strategies in place

The national surveillance programme and the control of imported animals are run by the Norwegian Food Safety Authority.

Measures in case of the positive findings or single cases

Norway would as a minimum implement the measures as laid down in Council Directive 91/68/EEC in case of positive findings or if suspicion of brucellosis in caprine animals should arise.

Notification system in place

Brucellosis in all species has been a notifiable List A disease according to the Animal Diseases Act since 1903. Cases are to be notified to the Norwegian Food Safety Authority.

Results of the investigation

In 2010, in the surveillance programme, 779 animals from 25 herds were tested for antibodies against B. melitensis. All were negative.

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

Caprine brucellosis has never been recorded in Norway.

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

There have been no findings of Brucella spp. in goat or foodstuffs from goat. The probability of contracting brucellosis from Norwegian animals or animal products of Norwegian origin is close to zero.

C. Brucella melitensis in sheep

Status as officially free of ovine brucellosis during the reporting year

The entire country free

Due to its history in regard to Brucella melitensis, Norway fulfils the requirements for an officially free status for the disease.

Monitoring system

Sampling strategy

Surveillance programme: A large proportion of herds being part of the breeding system with ram circles are tested. Randomly selected flocks not being part of any ram circles are also tested.

Imported sheep are serologically tested if considered relevant based upon an assessment of the health status in the country of origin.

Frequency of the sampling

Surveillance programme: A selection of herds in the population is tested every year.

Imported sheep are tested for brucellosis at week 2 and 23 during the two year isolation period.

Type of specimen taken

Blood

Methods of sampling (description of sampling techniques)

Individual blood samples are collected at the farms.

Surveillance programme: In flocks with less than 30 animals, all animals are sampled; in herds with 30-100 animals, 30 are sampled; in herds with 100-200 animals, 35 are sampled; in herds with more than 200 animals, 40 animals are sampled.

Case definition

An animal which is seropositive for Brucella spp. or an animal from which Brucella spp. has been isolated. The herd is the epidemiological unit.

Diagnostic/analytical methods used

Rose bengal plate agglutination test is used for the initial screening. A competitive ELISA (C-ELISA, Svanova) was used to follow up unclear or positive reactions due to possible cross reactions.

Vaccination policy

Vaccination of animals against brucellosis is prohibited.

Control program/mechanisms

The control program/strategies in place

The national surveillance programme and the control of imported animals are run by the Norwegian Food Safety Authority.

Measures in case of the positive findings or single cases

Norway would as a minimum implement the measures as laid down in Council Directive 91/68/EEC in case of positive findings or if suspicion of brucellosis in ovine animals should arise.

Notification system in place

Brucellosis in all species has been a notifiable List A disease according to the Animal Diseases Act since 1903. Cases are to be notified to the Norwegian Food Safety Authority.

Results of the investigation

In 2009, in the surveillance programme, 26681 animals from 816 herds were tested for antibodies against B. melitensis. All were negative. All 140 rams tested for brucellosis were negative. All 36 animals tested in relation to export or health control were negative.

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

Ovine brucellosis has never been recorded in Norway.

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

There have been no findings of Brucella spp. in sheep or foodstuffs from sheep. The probability of contracting brucellosis from Norwegian animals or animal products of Norwegian origin is close to zero.

D. Brucella spp. in animal - Pigs

Monitoring system

Sampling strategy

All breeding boars are tested.

Imported pigs are tested if considered relevant based upon an individual assessment.

Frequency of the sampling

All breeding boars are tested twice before being transferred to a semen collection centre, and subsequently within 12 months or before slaughter.

Imported pigs are tested during week 4 of the two months long isolation period.

Type of specimen taken

Blood

Methods of sampling (description of sampling techniques)

Blood samples are taken at the farms.

Case definition

An animal which is seropositive for Brucella spp. or an animal from which Brucella spp. has been isolated. The herd is the epidemiological unit.

Diagnostic/analytical methods used

Rose Bengal plate agglutination test performed according to the latest edition of the OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals, 2.8.5 Swine.

Vaccination policy

Vaccination of animals against brucellosis is prohibited in Norway.

Control program/mechanisms

The control program/strategies in place

All breeding boars are tested.

Imported pigs are tested if considered relevant based upon an individual assessment.

Measures in case of the positive findings or single cases

If Brucella should be detected, the competent authorities must be notified without delay. Actions would be taken to identify and eliminate the source of the contamination in order to prevent further spread. Stringent restrictions including cleaning and disinfection, control of animal movement and control of person admission would be imposed on the infected holding. The whole herd would be destroyed.

Notification system in place

Brucellosis in all species has been a notifiable List A disease according to the Animal Diseases Act since 1903. Cases are to be notified to the Norwegian Food Safety Authority.

Results of the investigation

In 2010, all 1168 investigated pigs belonging to a breeding company tested negative. A total of 168 of these were tested in relation to export of live animals.

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

Porcine brucellosis has never been recorded in Norway.

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

source of infection)

There have been no findings of Brucella spp. in swine or foodstuffs from swine. The probability of contracting brucellosis from Norwegian animals or animal products of Norwegian origin is close to zero.

Table Brucellosis in other animals

	Source of information	Sampling unit	Units tested	Total units positive for Brucella	B. abortus	B. melitensis	B. suis	Brucella spp., unspecified
Pigs	Breeding company	Animal	1168	0				
Alpacas	NVI	Animal	14	0				
Dogs	NVI	Animal	27	0				

Footnote:

NVI=Norwegian Veterinary Institute (mainly tested in relation to export or import).

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

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

Region	Total number of existing		Officially free herds		Infected herds		Surveillance			Investigations of suspect cases				
	Herds	Animals	Number of herds	%	Number of herds	%	Number of herds tested	Number of animals tested	Number of infected herds	Number of animals tested with serological blood tests	Number of animals positive serologically	Number of animals examined microbio logically	Number of animals positive microbio logically	Number of suspended herds
Norge	16100	2364500	16100	100	0	0		8939	0	106	0			
Total : [1)]	16100	2364500	16100	100	0	0	0	8939	0	106	0	0	0	0

Comments:

[1)] N.A.

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

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

Region	Total number of existing bovine		Officially free herds		Infected herds		Surveillance						Investigations of suspect cases								
							Serological tests			Examination of bulk milk			Information about			Epidemiological investigation					
	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		
Norge	16800	872100	16800	100	0	0		491	0					0	0	6		0		2	0
Total : [1)]	16800	872100	16800	100	0	0	0	491	0	0	0	0	0	0	0	6	0	0	0	2	0

Comments:

[1)] N.A.

2.7 YERSINIOSIS

2.7.1 General evaluation of the national situation

A. Yersinia enterocolitica general evaluation

History of the disease and/or infection in the country

In the years 1982 - 1994, the number of notified cases in humans varied between 154 and 274 (mean 187). From 1994 there was a steady decline in the reported incidence of yersiniosis. The decline was interrupted in 1998, and since then the incidence has been between 50 and 150 notified cases per year.

Studies conducted during the 1980s revealed that a large proportion of Norwegian pigs were carriers of Y. enterocolitica serogroup O:3 and that the same variant frequently could be isolated from pig carcasses. In 1995-1996 a serological survey of all multiplier herds (n=66) belonging to the cooperative slaughterhouse organisation showed that 35.5% of the fattening pigs had antibodies against Y. enterocolitica O:3, and 80% of the herds had at least one pig (of 40 pigs tested per herd) with antibodies against Y. enterocolitica O:3. In an other survey where blood samples from 5 fatteners in each of 326 randomly selected herds were analysed for antibodies against Y. enterocolitica O:3, 53% of the pigs and 64% of the herds tested positive.

In 1997-1998, 300 samples of raw pork products were analyzed. Y. enterocolitica O:3 was isolated from 2% of the samples by a culturing method (NMKL method no. 117), while use of a PCR method indicated the presence of pathogenic Y. enterocolitica in 17% of the samples. This was lower than in a similar survey conducted in 1988-1989.

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

From 1994 to 1998, a reduction in the incidence of yersiniosis in humans was observed. This decline coincided with a gradual introduction of improved slaughter routines with the aim of preventing pig carcasses from becoming contaminated with Y. enterocolitica.

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

Pork products are generally considered the most important source of yersiniosis in humans. A Norwegian case-control study conducted in the period 1988-1990 identified consumption of such products as an important risk factor in addition to consumption of untreated drinking water and a general preference for undercooked meat.

In 2006 two smaller outbreaks of yersiniosis both linked to a traditional cold cuts pork product were reported.

Recent actions taken to control the zoonoses

During the mid 1990s, there was a gradual introduction of improved slaughter routines that aid in preventing pig carcasses from being contaminated with Y. enterocolitica. A significant reduction of reported cases of human yersiniosis was noted parallel to this.

2.7.2 Yersiniosis in humans

A. Yersinosis in humans

Reporting system in place for the human cases

Human cases are reported to the Norwegian Surveillance System for Communicable Diseases (MSIS), from microbiological laboratories as well as from clinical doctors. The system distinguishes between domestic and imported cases. The severity of the disease at the time of reporting is also recorded. However, the surveillance system does not follow individual patients over time to record further disease development and final outcome.

Cases confirmed by serology only are also reported, but due to recent changes in laboratory practices these are not included in this report.

Case definition

A case from which Yersinia enterocolitica or Y. pseudotuberculosis has been isolated or a clinical compatible case with an epidemiological link to a culture confirmed case.

Diagnostic/analytical methods used

Bacteriology (isolation of Yersinia species) followed by voluntary confirmation (species identification and serotyping) at the National Reference Laboratory.

Notification system in place

According to the Communicable Disease Act, human cases are notifiable to the Norwegian Surveillance System for Communicable Diseases (MSIS) since 1992.

History of the disease and/or infection in the country

In the years 1982-1994, the number of notified cases varied between 154 and 274 (mean 187, median 182). From 1994 there was a steady decline in yersiniosis reports. This decline coincided with a gradual introduction of improved routines when slaughtering pigs, which resulted in reduced contamination with Y. enterocolitica to pig carcasses. The decline was interrupted in 1998, and since then the incidence has been between 50 and 150 notified cases per year.

Results of the investigation

In 2009, a total of 60 cases of yersiniosis were reported (incidence rate 1.2 per 100 000). A total of 34 (57%) cases were domestic.

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

Although the incidence of yersiniosis has decreased in recent years and the number of registered cases is moderate, the disease is still the fourth most commonly recorded foodborne zoonotic infection in Norway. Moreover, the majority of the cases have acquired the infection within Norway. The vast majority of cases are sporadic. The most common serogroup is O:3. The number of cases reported in 2010 is almost the same as in 2008, which had the lowest number of reported cases since the surveillance of yersiniosis started.

Relevance as zoonotic disease

Yersiniosis is an important zoonotic disease in Norway, with the majority of cases acquired within Norway. Pigs are considered to be a major reservoir, and pork products are considered to be an important source for pathogenic Y. enterocolitica, although uncertainties still remain regarding the epidemiology.

Additional information

Patients whose work represents a risk for spread of the disease, e.g., in food production and health care, are advised to stay away from such work while as long as they have symptoms. It is recommended that for these patients two consecutive faecal samples examined after the symptoms have disappeared should be negative before returning to work.

2.7.3 Yersinia in animals

A. Yersinia enterocolitica in pigs

Monitoring system

Sampling strategy

Animals at farm

There are no official monitoring programmes for Y. enterocolitica in live animals.

Animals at slaughter (herd based approach)

There are no official monitoring programmes for Y. enterocolitica in animals at slaughter.

Control program/mechanisms

The control program/strategies in place

There are no official monitoring programmes for Y. enterocolitica in animals.

Recent actions taken to control the zoonoses

During the mid 1990s, there was a gradual introduction of improved slaughter routines that aid in preventing pig carcasses from being contaminated with Yersinia enterocolitica. A significant reduction in the incidence of reported yersiniosis in humans was noted subsequent to this action.

Measures in case of the positive findings or single cases

None.

Table Yersinia in animals

	Source of information	Sampling unit	Units tested	Total units positive for Yersinia	Y. enterocolitica	Y. pseudotuberculosis	Yersinia spp., unspecified	Y. enterocolitica - O:3	Y. enterocolitica - O:9	Y. enterocolitica - Y. enterocolitica, unspecified
Hares - wild	NVI	Animal	unknown	1		1				

Footnote:

Standard bacteriological investigation for clinical samples.

2.8 TRICHINELLOSIS

2.8.1 General evaluation of the national situation

A. Trichinellosis general evaluation

History of the disease and/or infection in the country

Trichinellosis has been found sporadically in farmed food producing animals and was last detected in two pig herds in 1994. This was the first report of trichinellosis in pigs since 1981.

Trichinellosis occurs endemically among wild red foxes in mainland Norway and among wild arctic foxes and polar bears in the archipelago of Svalbard. In a survey in red foxes killed during the licenced hunting season in 1994-1995 and 2002-2005, 4.8% of 393 examined animals were positive for Trichinella larvae. T. spiralis and T. pseudospiralis were not found in these studies. T. nativa is the most commonly found species in Norwegian foxes. Trichinellosis has also been diagnosed in farmed foxes.

Human trichinellosis acquired in Norway has not been reported since 1980. The two last reported cases of human trichinellosis, in 1996, were both imported.

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

Trichinellosis was last detected in food producing animals in 1994, in two pig herds.

Trichinellosis occurs endemically among wildlife.

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

As Norwegian food producing animals very rarely are infected with Trichinella, and all slaughtered pigs and horses are analysed for the parasite, the probability of contracting trichinellosis from food producing animals of Norwegian origin is close to zero.

2.8.2 Trichinellosis in humans

A. Trichinellosis in humans

Reporting system in place for the human cases

Human cases are reported to the Norwegian Surveillance System for Communicable Diseases (MSIS), from microbiological laboratories as well as from clinical doctors. The system distinguishes between domestic and imported cases. The severity of the disease at the time of reporting is also recorded. However, the surveillance system does not follow individual patients over time to record further disease development and final outcome.

Case definition

A clinically compatible case that is laboratory confirmed.

Diagnostic/analytical methods used

Muscle biopsy and histopathology (demonstration of Trichinella larvae in tissue) and serology.

Notification system in place

According to the Communicable Disease Act, human cases are notifiable to the Norwegian Surveillance System for Communicable Diseases (MSIS) since 1975.

History of the disease and/or infection in the country

Human trichinellosis acquired in Norway is very rare, the last case being reported in 1980. The last two cases of imported trichinellosis were reported in 1996, in immigrants from ex-Yugoslavia.

Results of the investigation

In 2010, no cases of human trichinellosis were reported.

Relevance as zoonotic disease

The risk of acquiring trichinellosis from domestic sources is considered very low because trichinellosis only has been detected twice in food producing animals since 1981, extensive surveillance programmes are in place, and the production is intensive and takes place under controlled conditions.

Additional information

If a human case should be diagnosed, epidemiological investigations will be initiated in order to identify the source and prevent further cases.

2.8.3 Trichinella in animals

A. Trichinella in horses

Monitoring system

Sampling strategy

All horses were controlled for Trichinella at slaughter in accordance with Council Directive 77/96/EEC until March 2010 and according to Regulation (EC) No 2075/2005 since 1st March 2010.

Frequency of the sampling

Every slaughtered animal is sampled.

Type of specimen taken

Tongue or masseter muscle.

Methods of sampling (description of sampling techniques)

Methods used are in accordance with Council Directive 77/96/EEC and Regulation (EC) No 2075/2005 since 1st March 2010. 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

In 2010, no cases of trichinellosis were reported among slaughtered horses.

Measures in case of the positive findings or single cases

All horse carcasses that are included in a positive pooled sample will be retested individually (samplesize 5 and 50 grams respectively). In accordance with Regulation No 732 of 27 June 2002 on measures against contagious animal diseases measures, such as movement restrictions and investigations into the source of the disease and any spread, are imposed on holdings with positive findings of Trichinella. Detection of Trichinella must be reported immediately.

Notification system in place

Trichinellosis has been a notifiable List B disease since 1965.

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

There have not been any findings of Trichinella in horses or horse meat. The risk of obtaining trichinellosis from Norwegian horse meat is negligible.

B. Trichinella in pigs

Monitoring system

Sampling strategy

General

All pigs must be controlled for Trichinella at slaughter according to Council Directive 77/96/EEC (in force until 1st March) and Regulation (EC) No 2075/2005 (as from 1st March 2010).

Frequency of the sampling

General

Every slaughtered animal is sampled.

Type of specimen taken

General

Diaphragm muscle.

Methods of sampling (description of sampling techniques)

General

Methods used are in accordance to Council Directive 77/96/EEC (still in force until 1st March 2010) and Commission regulation (EC) No 2075/2005 of 5 December 2005 laying down specific rules on official controls for Trichinella in meat. Up to 100 samples, each of 1 gram, can be analysed as a pooled sample when using a digestion method. Occasionally, the trichinoscopic method is used instead of a digestion method.

Case definition

General

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

Diagnostic/analytical methods used

General

Artificial digestion method of pooled samples. Occasionally a compression (trichinoscopic) method is used.

Preventive measures in place

It is prohibited to feed pigs with swills. Most pig herds have implemented programs for combating of rodents (rats and mice).

Control program/mechanisms

The control program/strategies in place

All pigs must be controlled for Trichinella at slaughter according to Council Directive 77/96/EEC until 1st March 2010 and Regulation (EC) No 2075/2005 thereafter.

Measures in case of the positive findings or single cases

Measures are imposed on holdings with positive findings of Trichinella in accordance with Regulations concerning measures against contagious animal diseases of 27.06.2002 no 732 (movement restrictions, epidemiological investigation into the source and possible spread of the disease). Detection of Trichinella must be reported immediately. Farms delivering positive carcasses will be identified. Animals from such farms will be given special attention at slaughter the following six months. The sample size for the digestion method will be increased to 2 grams.

Notification system in place

Trichinellosis has been a notifiable disease (List B) since 1965.

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

In 2010, no cases of trichinellosis among slaughtered pigs were reported.

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

Trichinellosis was last detected in two pig herds in 1994.

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

There have not been any findings of Trichinella in pigs or pig meat for many years. The risk of obtaining trichinellosis from Norwegian pig meat is negligible.

C. Trichinella spp., unspecified in animal - Wild animals

Monitoring system

Sampling strategy

All wild boars and bears must be controlled for Trichinella at slaughter in accordance with Council Directive 77/96/EEC and (in force at the beginning of 2010) and Regulation (EC) No 2075/2005 since 1st March 2010. This control is compulsory. Wild and farmed foxes and other species of wildlife are occasionally sampled.

Frequency of the sampling

Depending on the situation and animal species.

Type of specimen taken

Diaphragm, tongue, masseter or occasionally other muscles.

Methods of sampling (description of sampling techniques)

Depending on the situation and animal species.

Case definition

An animal with a positive test result.

Diagnostic/analytical methods used

Digestion methods or trichiniscopic (compression) method.

Measures in case of the positive findings or single cases

If trichinellosis is diagnosed in a farmed fox, the animal holding will get official restrictions in accordance with Regulations concerning measures against contagious diseases of 27.06.2002 no 732 (not allowed to sell animals and epidemiological investigation of the source and any spread of the infection).

Notification system in place

Trichinellosis has been a notifiable disease since 1965.

Results of the investigation including the origin of the positive animals

In 2009, one lynx (Lynx lynx) was investigated and found negative for Trichinella.

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

Trichinellosis occurs endemically among wildlife.

Table Trichinella in animals

	Source of information	Sampling unit	Units tested	Total units positive for Trichinella	T. spiralis	Trichinella spp., unspecified
Foxes	NVI	Animal	2	0		
Pigs		Animal	1565700	0		
Solipeds, domestic - horses		Animal	1500	0		

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

E. granulosus used to be relatively common in semi-domesticated reindeer in Nort Norway until the 1950s (approx. 10% prevalence in the 1950s). Today the parasite has virtually been eliminated as a result of systematic antihelmintic treatment of herder dogs and a reduction in the feeding of raw offal from slaughter to the herder dogs. In 2003, one reindeer had pathological findings compatible with E. granulosus infestation. E. granulosus was last reported in cattle in 1987.

E. multilocularis has never been detected in mainland Norway in any animal species. In 1999, a research project on echinococcosis in the archipelago of Svalbard detected E. multilocularis cysts in the liver of 16% of 172 sibling voles tested. In a follow-up study, faecal samples from polar foxes, dogs, and cats were collected. The parasite was diagnosed in three of six polar foxes, in one of 48 dogs, and in neither of the two cats. The methods used were coproantigen ELISA, egg isolation and PCR. The number of voles that annually tested positive between 2000-2006, varied between 19% and 96%. In mainland Norway in the period 2002-2005, a total of 314 red foxes were investigated using coproantigen ELISA, egg isolation and PCR, all were negative for E. multilocularis. An ongoing national surveillance program for E. multilocularis was implemented in red foxes in 2006. Since then, 1305 foxes have been examined using egg isolation and PCR. All of the total 1619 red foxes have tested negative for E. multilocularis.

Human echinococcosis has never been a public health problem in Norway.

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

The risk of acquiring echinococcosis in Norway is considered very low. The pathological finding compatible with E. granulosus infestation in a reindeer in 2003 is a reminder that this parasite still may be present and that this requires awareness in the reindeer industry, especialy with regard to the importance of regular treatment of herd dogs with an anti-helmintic drug.

The occurrence of E. multilocularis among animals in the archipelago of Svalbard requires alertness among health personnel, especially in this region.

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

The pathological finding compatible with E. granulosus infestation in a reindeer in 2003 is a reminder that this parasite still may be present and that this requires awareness in the reindeer industry.

As E. multilocularis has never been detected in mainland Norway in any animal species, the risk to humans of contracting E. multilocularis infection in mainland Norway is probably very low. The occurrence of E. multilocularis among animals in the archipelago of Svalbard requires alertness among health personnel in this region. Inhabitants of Svalbard have been informed about the risk.

2.9.2 Echinococcosis in humans

A. Echinococcus spp. in humans

Reporting system in place for the human cases

Human cases are reported to the Norwegian Surveillance System for Communicable Diseases (MSIS), from microbiological laboratories as well as from clinical doctors. The system distinguishes between domestic and imported cases. The severity of the disease at the time of reporting is also recorded. The surveillance system does not follow individual patients over time to record further disease development and final outcome.

Case definition

A clinical compatible case that is laboratory confirmed.

Diagnostic/analytical methods used

Serology and histopathology.

Notification system in place

According to the Communicable Disease Act, human cases are notifiable to the Norwegian Surveillance System for Communicable Diseases (MSIS) since 1 July 2003.

History of the disease and/or infection in the country

Human echinococcosis has never been a public health problem in Norway and the incidence is considered to be at most very low.

Results of the investigation

In 2010, one case of infection with E. granulosus was reported. The patient was infected abroad.

Relevance as zoonotic disease

The risk of acquiring echinococcosis in Norway is considered very low. The pathological finding compatible with E. granulosus infestation in a reindeer in 2003 is a reminder that this parasite still is around and that this requires awareness in the reindeer industry, especially as regard the importance of regular treatment of herd dogs with an antihelmintic drug. As E. multilocularis has never been detected in mainland Norway in any animal species, the risk to humans of contracting echinococcosis caused by E. multilocularis in mainland Norway is close to zero. The presence of E. multilocularis among animals in the archipelago of Svalbard requires vigilance amongst health personnel in this region. Inhabitants of Svalbard have been informed about the risk.

2.9.3 Echinococcus in animals

A. E. granulosus in animal

Monitoring system

Sampling strategy

Surveillance in intermediate hosts is achieved through the official meat inspection.

There are no official monitoring programmes for Echinococcus granulosus among the final hosts (dogs).

Frequency of the sampling

All possible intermediate hosts subject to meat inspection procedure according to Council Directive 64/433/EEC (still in force January and February 20010) and Regulation (EC) No 2075/2005 since 1st March 2010. An exception to this is wild ruminants in which there is no obligatory control if they are shot for private consumption.

Methods of sampling (description of sampling techniques)

Inspection for hydatid cysts at the abattoir.

Case definition

An animal with a positive test result.

Diagnostic/analytical methods used

Other: Macroscopic (visual) examinations of organs and parasitology.

Other preventive measures than vaccination in place

Dogs and cats imported to Norway, except those imported from Sweden and Finland, must be treated with an anthelmintic drug the last ten days before entering Norway and again one week after arrival. Treatment with an anthelmintic drug is also advocated on a general basis, especially for herd dogs in areas with reindeer.

Control program/mechanisms

The control program/strategies in place

Mandatory official meat control.

Measures in case of the positive findings or single cases

An animal with cystic echinococcosis will be condemned. Epidemiological data will be collected in order to find the source of infection and measures will be introduced to prevent further spread.

Notification system in place

Echinococcosis has been a notifiable List B disease according to the Animal Diseases Act since 1985.

Results of the investigation

In 2010, all slaughtered animals subjected to official meat control were negative for E. granulosus. No cases of infection with E. granulosus were diagnosed in carnivores.

Additional information

Methods in use when examining final hosts: Faecal material: Egg isolation (flotation) and PCR.

B. E. multilocularis in animal

Monitoring system

Sampling strategy

In 2006 a National surveillance programme regarding E. multilocularis in red foxes was started. The program also included the examination of samples from about 300 hunted foxes collected for parasitological research purposes in the period 2002-2005. In 2010, no animals were investigated. Animals hunted late 2010 will be investigated in 2011 together with animals hunted in the spring 2011. There are no official monitoring programmes for E. multilocularis in other animals.

Methods of sampling (description of sampling techniques)

Foxes: Faecal samples.

Case definition

An animal with a positive test result.

Diagnostic/analytical methods used

Faecal samples: Taeniid egg isolation and multiplex PCR techniques.

Other preventive measures than vaccination in place

Dogs and cats imported to Norway, except those imported from Sweden and Finland, must be treated with an anti-helmintic drug the last ten days before entering Norway and also one week after arrival. Treatment with an anti-helmintic drug is also advocated on a general basis. Due to findings of E. multilocularis in the archipelago of Svalbard, the Norwegian Food Safety Authority requires that dogs and cats that are introduced into mainland Norway from Svalbard must be treated with an anti-helmintic drug approved for treatment of E. multilocularis.

Control program/mechanisms

Recent actions taken to control the zoonoses

The findings of E. multilocularis in the archipelago of Svalbard in 1999 resulted in follow-up studies, requirements regarding anti-helmintic treatment of dogs and cats in regard to export, and an information campaign directed to the inhabitants of Svalbard.

Notification system in place

Echinococcosis has been a notifiable List B disease according to the Animal Diseases Act since 1985.

Results of the investigation

In 2010, one dog and one racoon dog (Nyctereutes procyonoides) were investigated. Both were negative.

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

In mainland Norway, E. multilocularis has never been detected in any animal species. The main host of E. multilocularis, the red fox, has been investigated by examining a total of 1633 foxes killed during hunting from 2002-2009. All foxes have been negative. Thus, there are so far no indications that this parasite has established in Norway. In 1999, in a research project on echinococcosis in the archipelago of Svalbard, E. multilocularis was detected in 16% of 172 sibling voles tested. In a follow-up study, the parasite was diagnosed in samples from polar foxes and one dog. Of the voles tested in 2000-2006, between 19% and 96% were positive each year.

Table Echinococcus in animals

	Source of information	Sampling unit	Region	Units tested	Total units positive for Echinococcus	E. granulosus	E. multilocularis	Echinococcus spp., unspecified
Cattle (bovine animals)		Animal		306900	0			
Dogs	NVI	Animal		1	0			
Goats		Animal		24300	0			
Pigs		Animal		1565700	0			
Sheep		Animal		1228100	0			
Raccoon dogs - wild	NVI	Animal		1	0			

2.10 TOXOPLASMOSIS

2.10.1 General evaluation of the national situation

A. Toxoplasmosis general evaluation

History of the disease and/or infection in the country

In 1994, the last year human toxoplasmosis was notifiable, 33 cases were reported (incidence rate 0.77 per 100 000 inhabitants) of which eight were children less than one year.

Toxoplasma gondii is endemic in animals in Norway with the domestic cat and wild lynx being the final hosts. Studies indicate that the parasite is relatively common among sheep; 18% of the lambs were seropositive in a survey conducted during the 1990s, and seropositive lambs were identified on 44% of the farms included. The parasite is assumed to be less common among Norwegian pigs. In the above mentioned survey, 2% of the slaughtering pigs tested were seropositive. In 2008, a survey using goat sera collected in the period 2002-2008 were tested. A total of 18.5% of the animals were positive.

Also wild ruminants (cervids) can be infected; a survey carried out among 4300 cervids killed during hunting in 1992-2000, revealed 34% seropositive roe deer, 13% seropositive moose, 8% seropositive red deer and 1% seropositive reindeer.

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

Toxoplasma gondii is endemic in Norway with the domestic cat and wild lynx being the final hosts. Studies indicate that the parasite is relatively common among sheep and goat and less common among Norwegian pigs. Also wild ruminants (cervids) can be infected. There are no data indicating recent developments in the prevalence of the infection in various species.

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

A case-control study designed to identify risk factors for maternal toxoplasma infection during pregnancy showed that the following exposures were associated with an increased risk:
Eating raw or undercooked minced meat, eating unwashed raw vegetables or fruits, eating raw or undercooked mutton, eating raw or undercooked pork, cleaning the cat litter box and washing the kitchen knife infrequently after preparing raw meat.

This implies that Norwegian farm animals and food products of Norwegian origin may well be an important source of human toxoplasmosis.

2.10.2 Toxoplasmosis in humans

A. Toxoplasmosis in humans

Reporting system in place for the human cases

Human cases are not reported to the Norwegian Surveillance System for Communicable Diseases (MSIS).

Case definition

A clinically compatible case that is laboratory confirmed.

Diagnostic/analytical methods used

Serology (antibody detection) and parasitological examination (identification of parasite in clinical specimens).

Notification system in place

Since 1995, human toxoplasmosis has not been a notifiable disease in Norway.

History of the disease and/or infection in the country

In different epidemiological surveys conducted in Norway, 7-27% of pregnant women tested have been seropositive. The percentages have been age-dependent, with the proportion of seropositive individuals increasing with age, and have also varied with region and ethnicity.

It is estimated that approximately 90% of fertile women are susceptible to the disease and that approximately two out of 1000 susceptible pregnant women are infected during pregnancy.

In 1994, the last year human toxoplasmosis was notifiable, 33 cases were reported (incidence rate 0.77 per 100 000 inhabitants) of which eight were children less than one year.

Results of the investigation

The disease is not notifiable.

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

Toxoplasma gondii is endemic in Norway although the parasite is considered to be somewhat less prevalent as compared to countries more south in Europe. The public health importance of toxoplasmosis is its potential of causing severe disease in infants who are born to women infected during pregnancy, and its potential of causing severe disease in immunocompromised individuals, such as people with AIDS. Seroprevalence surveys among pregnant women indicate that infection with Toxoplasma is common in Norway. Pregnant women are advised how to avoid infection during pregnancy.

Relevance as zoonotic disease

A case-control study designed to identify risk factors for maternal toxoplasma infection during pregnancy showed that the following exposures were associated with an increased risk:
Eating raw or undercooked minced meat, eating unwashed raw vegetables or fruits, eating raw or undercooked mutton, eating raw or undercooked pork, cleaning the cat litter box and washing the kitchen knife infrequently after preparing raw meat. This implies that Norwegian farm animals and food products of Norwegian origin may well be an important source of Toxoplasma for spread to humans.

2.10.3 Toxoplasma in animals

A. T. gondii in animal

Monitoring system

Sampling strategy

Sampling of animals is performed in case of clinical suspicion and in connection to import/export. Surveys are occasionally performed.

Frequency of the sampling

In cases of clinical suspicion or specific surveys.

Case definition

An animal with a positive test result.

Diagnostic/analytical methods used

Serology (direct agglutination test) or pathology.

Measures in case of the positive findings or single cases

Normally none.

Notification system in place

Toxoplasmosis in animals has been a List C disease according to the Animal Diseases Act since 1965.

Results of the investigation

In 2010, several animal species were investigated for Toxoplasma at the Norwegian Veterinary Institute. A total of 23 out of 49 investigated sheep were positive. For other details - see table.

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

Toxoplasma gondii is endemic in Norway. There are no data indicating recent developments in the prevalence of the infection in various species.

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

A risk for humans of contracting toxoplasmosis in Norway does exist. However, the relevance of clinical toxoplasmosis is most important in immunosuppressed persons and in pregnant women.

Table Toxoplasma in animals

	Source of information	Sampling unit	Units tested	Total units positive for Toxoplasma	T. gondii
Cats	NVI	Animal	3	1	1
Dogs	NVI	Animal	1	0	
Goats	NVI	Animal	1	1	1
Pigs	NVI	Animal	3	0	
Sheep	NVI	Animal	49	23	23

Footnote:

Clinical investigations

2.11 RABIES

2.11.1 General evaluation of the national situation

A. Rabies general evaluation

History of the disease and/or infection in the country

Rabies in animals has not been recorded in mainland Norway. An epidemic occurred in the arctic fox population in the archipelago of Svalbard in 1980, with diagnosed cases also in reindeer and one seal. Since then, sporadic cases have been diagnosed in arctic foxes, the last case in 1999. During the period 1980 – 2009, 25 animal cases were diagnosed with this disease. However, transmission of rabies to humans has never been recorded in the archipelago of Svalbard.

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

The favourable situation in mainland Norway regarding rabies is stable. However, there are concerns about the risk of introducing rabies through illegally imported dogs.

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

Rabies has sporadically been diagnosed in wild animals in the archipelago of Svalbard, the last occurrence was in 1999. Although no transmission of rabies to humans has been recorded in Svalbard, people being in contact with wild animals in Svalbard should be aware of the risk and vaccination is reccomended. In mainland Norway, the possible introduction of rabies through illegally imported animals is a concern.

2.11.2 Rabies in humans

A. Rabies in humans

Reporting system in place for the human cases

Human cases are reported to the Norwegian Surveillance System for Communicable Diseases (MSIS), from microbiological laboratories as well as from clinical doctors. The system distinguishes between domestic and imported cases. The severity of the disease at the time of reporting is also recorded. However, the surveillance system does not follow individual patients over time to record further disease development and final outcome.

Cases are also reported immediately to the Municipal Medical Officer. If a domestic animal source is suspected, the Municipal Medical Officer also informs the Norwegian Food Safety Authority. Investigations will be initiated in order to identify the source and prevent further cases.

Case definition

A clinical case that is laboratory confirmed.

Diagnostic/analytical methods used

Detection of viral antigens by an immunofluorescence test in neurological tissue (usually brain) in connection to post-mortem examination, virus isolation in cell culture, or identification of an antibody titre greater than the threshold value in serum or cerebro-spinal fluid from an unvaccinated person.

Notification system in place

According to the Communicable Disease Act, human cases are notifiable to the Norwegian Surveillance System for Communicable Diseases (MSIS) since 1975.

History of the disease and/or infection in the country

Human rabies was last described in Norway in 1815.

Results of the investigation

In 2010, no human cases were reported.

Relevance as zoonotic disease

As mainland Norway has been free from rabies for almost two centuries and stringent regulation regarding import of animals are in place, the risk of contracting rabies in mainland Norway is close to zero. Rabies has sporadically been diagnosed in wild animals in the archipelago of Svalbard, the last time in a fox found dead in 1999. Although no transmission of rabies to humans has been recorded in Svalbard, people being in contact with wild animals in Svalbard should be aware of the risk.

Additional information

Rabies vaccine containing inactivated virus is available for the following indications: Pre-exposure prophylaxis to; 1) individuals with prolonged travels to countries with high incidence of rabies; 2) individuals who will work with animals in endemic areas; 3) persons who are at frequent risk of bites from bats; 4) laboratory personnel involved in rabies diagnostics. Post-exposure prophylaxis to individuals presumably exposed to rabies virus abroad or in the archipelago of Svalbard, or who have been bitten by bats. The post-exposure prophylaxis includes specific antiserum in addition to the vaccine

2.11.3 Lyssavirus (rabies) in animals

A. Rabies in dogs

Monitoring system

Sampling strategy

There are no active surveillance programmes regarding rabies. However, being a notifiable disease, clinical suspicion of rabies must be reported immediately.

Frequency of the sampling

On clinical suspicion.

Type of specimen taken

Brain

Methods of sampling (description of sampling techniques)

The brain is removed at autopsy, and samples are taken according the procedures described in the OIE manual.

Case definition

A case that is laboratory confirmed.

Diagnostic/analytical methods used

The Fluorescent antibody test (FAT) is the OIE prescribed test for rabiesvirus antigen and is performed according to the OIE Terrestrial Manual 2010. In addition, molecular methods (real time RT-PCR, RT-PCR and gene sequencing) are used.

Vaccination policy

Vaccines containing inactivated rabies virus antigen are available for dog, cat and ferret. Vaccination is required for international transport of these animal species in compliance with national regulations. For dogs living in Svalbard vaccination is a mandatory requirement. Otherwise, vaccination against rabies is not done on a routine basis in mainland Norway.

Other preventive measures than vaccination in place

Infected animals will be destroyed and measures taken to prevent further cases.

Control program/mechanisms

The control program/strategies in place

Dogs, cats and ferrets entering Norway from countries not considered rabies free (include all third countries not listed in the annex "Listed third countries according to Regulation (EC) No 988/2003"), are subject to four months of quarantine in an officially approved station, followed by a two months period in home quarantine. However, dogs, cats and ferrets from EEA countries not considered rabies free are permitted into Norway without quarantine, provided they have been vaccinated against rabies and have been proven antibody positive according to a given protocol.

Measures in case of the positive findings or single cases

Infected animals will be destroyed and measures taken to prevent further cases.

Notification system in place

Rabies has been a notifiable List A disease according to the Animal Diseases Act since 1965. Rabies is dealt with in Council Directive 92/65/EEC, which is implemented in Regulations on animal health

conditions regarding movements, import and export of certain animals [FOR 2004-07-01 No 1105 and FOR 2004-02-20 No 464].

Results of the investigation

In 2010 no cases were reported. Two dogs were investigated and found negative.

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

Mainland Norway is recognized as rabies free. However, there are concerns regarding a possible increase in the number of illegally imported dogs. Rabies has sporadically been diagnosed in wild animals in the archipelago of Svalbard, the last time in a fox found dead in 1999. Although no transmission of rabies to dogs has been recorded in Svalbard, owners must respect and follow up the mandatory vaccination programme.

B. Rabies virus in animal - Wildlife

Monitoring system

Sampling strategy

There are no active surveillance programmes regarding rabies. However, the disease must be reported immediately on clinical suspicion.

Frequency of the sampling

On clinical suspicion. In Svalbard, dead foxes and other animals should be secured for laboratory examination.

Type of specimen taken

Brain, in bats also oral swabs.

Methods of sampling (description of sampling techniques)

The brain is removed at autopsy, and samples are taken according to the procedures described in the OIE manual.

Case definition

A case that is laboratory confirmed.

Diagnostic/analytical methods used

The Fluorescent antibody test (FAT) is the OIE prescribed test for rabiesvirus antigen and is performed according to the OIE terrestrial Manual 2010. In addition, molecular methods (real time RT_PCR, RT-PCR and gene sequencing) are used.

Measures in case of the positive findings or single cases

Infected animals will be destroyed and measures taken to prevent further cases.

Notification system in place

Rabies has been a notifiable List A disease according to the Animal Diseases Act since 1965. Rabies is dealt with in Council Directive 92/65/EEC, which is implemented in Regulations on animal health conditions regarding movements, import and export of certain animals [FOR 2004-07-01 No 1105 and FOR 2004-02-20 No 464].

Results of the investigation

In 2010, nine wild animals were tested and all were found negative. The majority of animals came from the Svalbard area (seven arctic foxes (Vulpes lagopus) and one polar bear (Ursus maritimus)). In addition one red fox (Vulpes vulpes) came from mainland Norway.

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

Mainland Norway is considered rabies-free. Rabies has sporadically been diagnosed in wild animals in the archipelago of Svalbard, the last time in a fox found dead in 1999. Although no transmission of rabies to other animal species has been recorded in Svalbard, people in Svalbard should be aware of the risk.

Table Rabies in animals

	Source of information	Sampling unit	Region	Units tested	Total units positive for Lyssavirus (rabies)	Lyssavirus, unspecified	Classical rabies virus (genotype 1)	European Bat Lyssavirus - unspecified
Dogs	NVI	Animal		2	0			
Foxes - wild [1)]	NVI	Animal		8	0			
Polar bears - wild [2)]	NVI	Animal		1	0			

Comments:

[1)] Seven arctic foxes (Vulpes lagopus) from the Svalbard area and one red fox (Vulpes vulpes) from mainland Norway

[2)] From the Svalbard area

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

A. Coxiella burnetii (Q-fever) general evaluation

History of the disease and/or infection in the country

Q-fever has not been diagnosed in animals in Norway. In a survey in 2008, bulk milk samples from 460 dairy herds and 550 blood samples from 55 suckling cattle herds were sampled in five cattle dense counties (Rogaland, Trøndelag, Hedmark, Oppland and Østfold). In surveys performed in 2009, samples from 349 goat herds (mainly bulk milk samples from 2005-2009), samples from 121 sheep herds and 45 cattle herds were analysed for Q-fever. All samples were negative.

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

C. burnetii has never been detected in animals in Norway.

2.13.2 Coxiella (Q-fever) in animals

A. C. burnetii in Animals

Monitoring system

Sampling strategy

Surveys are performed occasionally.

Case definition

Sample positive for antibodies against C. burnetii.

Diagnostic/analytical methods used

Detection of antibodies to C. burnetii in milk or serum by ELISA.

Results of the investigation

In 2010, a total of 3420 cattle from 3378 herds (mainly bulk milk samples), 49 sheep (from one herd), 15 swine (from a breeding company – export control) and 102 alpacca (from 5 imported herds) were tested for Q-fever. All samples were negative.

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

C. burnetii has never been detected in animals in Norway.

Table Coxiella burnetii (Q fever) in animals

	Source of information	Sampling unit	Units tested	Total units positive for Coxiella (Q-fever)	C. burnetii
Cattle (bovine animals) [1)]	NVI	Animal	5	0	
Sheep [2)]	NVI	Animal	49	0	
Alpacas - farmed [3)]	NVI	Animal	102	0	
Cattle (bovine animals) (Blood samples) [4)]	NVI	Animal	53	0	
Cattle (bovine animals) (In relation to export) [5)]	NVI	Animal	4	0	
Cattle (bovine animals) (bulk milk samples)	NVI	Animal	3358	0	
Pigs [6)]	NVI	Animal	15	0	

Comments:

[1)] Clinical investigations - from one herd.

[2)] All 49 animals from one herd - tested in relation to import.

[3)] The animals came from 5 herds. All were tested in relation to import.

[4)] The animals came from 17 herds.

[5)] All animals from one breeding company

[6)] All animals came from a breeding company and were tested in relation to export.

Footnote:

All samples (except from swine) were investigated with ELISA. the samples from swine were investigated by complement fixation test.

2.14 TULARAEMIA

2.14.1 General evaluation of the national situation

2.14.2 Francisella in animals

Table Francisella in Animals

	Source of information	Sampling unit	Sample weight	Units tested	Total units positive for Francisella	F. tularensis
Hares - wild - Clinical investigations	NVI	Animal		18	10	10

3. INFORMATION ON SPECIFIC INDICATORS OF ANTIMICROBIAL RESISTANCE

3.1 ESCHERICHIA COLI, NON-PATHOGENIC

3.1.1 General evaluation of the national situation

A. Escherichia coli general evaluation

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

Earlier surveys as well as data from the monitoring programme NORM-VET indicate a low to moderate prevalence of resistance in indicator E. coli from Norwegian food producing animals and food. Those resistances that are most commonly encountered are to antimicrobials that have been or still are typically used therapeutically such as streptomycin, sulphonamides, tetracycline and ampicillin. Fluoroquinolone resistance is rarely detected, which is a reflection of a very low use of such antimicrobials in food producing animals in Norway.

3.1.2 Antimicrobial resistance in Escherichia coli, non-pathogenic

A. Antimicrobial resistance of E.coli in animal - all animals - monitoring programme (NORM-VET)

Sampling strategy used in monitoring

Frequency of the sampling

The sampling of animals for isolation of indicator E. coli to be included in resistance monitoring is a part of the Norwegian monitoring programme for antimicrobial resistance in feed, food and animals, NORM-VET. The sampling is spread throughout the year and each year one or several animal species are included. In 2010, cattle and wild red fox were monitored.

Type of specimen taken

Faecal material.

Methods of sampling (description of sampling techniques)

The samples were taken as part of other surveillance programmes.

Procedures for the selection of isolates for antimicrobial testing

Only one isolate from each herd (cattle) or animal (fox) was included.

Methods used for collecting data

All samples were sent to the Norwegian Veterinary Institute in Oslo for identification and for antimicrobial susceptibility testing.

Laboratory methodology used for identification of the microbial isolates

A sample was plated directly onto the surface of lactose-saccarose-bromthymol blue agar without broth enrichment. After incubation of the agar plates at 37 C for 24 h, a typical colony was plated onto blood agar (Heart infusion agar (Difco) containing 5% bovine blood) and incubated at 37 C for 18-24 h. Colonies were identified as E. coli by typical appearance, lactose and/or saccarose fermentation and a positive indole reaction.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

The VetMIC microdilution method (Dept. of Antibiotics, National Veterinary Institute, Sweden) was used for the susceptibility testing of all isolates. The antimicrobials included are listed in the tables.

Cut-off values used in testing

For interpretation of results epidemiological cut-off values recommended by EFSA were applied. When no cut-off value was reccomended, a cut-off value was defined on basis of the actual MIC distributions obtained in the NORM-VET programme.

Control program/mechanisms

The control program/strategies in place

The sampling of animals for isolation of indicator E. coli to be included in resistance monitoring is a part of the Norwegian monitoring programme for antimicrobial resistance in feed, food and animals, NORM-VET.

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

Escherichia coli, non-pathogenic	E.coli, non-pathogenic, unspecified	
Isolates out of a monitoring program (yes/no)	yes	
Number of isolates available in the laboratory	209	
Antimicrobials:	N	n
Amphenicols - Chloramphenicol	209	0
Amphenicols - Florfenicol	209	0
Quinolones - Nalidixic acid	209	0
Trimethoprim	209	0
Sulphonamides - Sulfonamide	209	7
Aminoglycosides - Streptomycin	209	19
Aminoglycosides - Gentamicin	209	0
Penicillins - Ampicillin	209	4
Tetracyclines - Tetracycline	209	4
Fully sensitive	209	190
Resistant to 1 antimicrobial	209	10
Resistant to 2 antimicrobials	209	2
Resistant to 3 antimicrobials	209	6
Resistant to 4 antimicrobials	209	1

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Cattle (bovine animals) - Monitoring - quantitative data [Dilution method]

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

E.coli, non-pathogenic, unspecified	Cattle (bovine animals) - Monitoring																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	209																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	209	0									18	126	65											
Tetracyclines - Tetracycline	8	209	4								169	36				1	2	1							
Quinolones - Nalidixic acid	16	209	0								26	66	115	2											
Trimethoprim	2	209	0					31	103	74	1														
Aminoglycosides - Streptomycin	16	209	19									7	129	54			11	7	1						
Aminoglycosides - Gentamicin	2	209	0						2	140	67														
Penicillins - Ampicillin	8	209	4								30	154	18	3				4							
Cephalosporins - Cefotaxim	0.25	209	1		1	13	164	30		1															
Sulphonamides	256	209	7											102	85	15					7				

Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Foxes - wild - Monitoring - quantitative data [Dilution method]

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

E.coli, non-pathogenic, unspecified	Foxes - wild - Monitoring																								
Isolates out of a monitoring program (yes/no)	yes																								
Number of isolates available in the laboratory	55																								
Antimicrobials:	Cut-off value	N	n	<=0.008	0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	lowest	highest
Amphenicols - Chloramphenicol	16	55	0									4	33	18											
Tetracyclines - Tetracycline	8	55	1								35	18	1			1									
Quinolones - Nalidixic acid	16	55	1								2	20	32					1							
Trimethoprim	2	55	1					1	38	14	1				1										
Aminoglycosides - Streptomycin	16	55	2									3	37	12	1		1	1							
Aminoglycosides - Gentamicin	2	55	0					1	3	38	13														
Penicillins - Ampicillin	8	55	1								8	40	4	2				1							
Cephalosporins - Cefotaxim	0.25	55	0			1	43	11																	
Sulphonamides	256	55	3											30	21		1				3				

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

Test Method Used	Standard methods used for testing
Broth dilution	NCCLS/CLSI

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

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 <=
Amphenicols	Chloramphenicol		16	
Tetracyclines	Tetracycline		8	
Fluoroquinolones	Ciprofloxacin		0.03	
Quinolones	Nalidixic acid		16	
Trimethoprim	Trimethoprim		2	
Sulphonamides	Sulphonamides		256	
Aminoglycosides	Streptomycin		16	
	Gentamicin		2	
Cephalosporins	Cefotaxim		0.25	
Penicillins	Ampicillin		8	

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 <=
Amphenicols	Chloramphenicol		16	
Tetracyclines	Tetracycline		8	
Fluoroquinolones	Ciprofloxacin		0.03	
Quinolones	Nalidixic acid		16	
Trimethoprim	Trimethoprim		2	
Sulphonamides	Sulphonamides		256	
Aminoglycosides	Streptomycin		16	
	Gentamicin		2	
Cephalosporins	Cefotaxim		0.25	
Penicillins	Ampicillin		8	

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

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

			Concentration (microg/ml)	Zone diameter (mm)
		Standard	Resistant >	Resistant <=
Oxazolidines	Linezolid		4	

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

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

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

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

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

4. INFORMATION ON SPECIFIC MICROBIOLOGICAL AGENTS

4.1 ENTEROBACTER SAKAZAKII

4.1.1 General evaluation of the national situation

4.2 HISTAMINE

4.2.1 General evaluation of the national situation

4.2.2 Histamine in foodstuffs

A. Histamine in foodstuffs

Monitoring system

Sampling strategy

Regular testing of selected species is required as an internal part of food business operators quality assurance system.

Surveys are performed occasionally.

Definition of positive finding

Histamine values above 100 mg/kg.

Diagnostic/analytical methods used

Reverse phase HPLC/UV

Table Histamine in food

	Source of information	Sampling unit	Sample weight	Units tested	Total units in non-conformity	<= 100 mg/kg	>100 - <= 200 mg/kg	>200 - <= 400 mg/kg	> 400 mg/kg
Fish - Fishery products from fish species associated with a high amount of histidine - not enzyme maturated [1)]	NIFES	Single	5 g	25	0	25			

Comments:

[1)] All samples <5.5 mg/kg

4.3 STAPHYLOCOCCAL ENTEROTOXINS

4.3.1 General evaluation of the national situation

5. FOODBORNE

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

A. Foodborne outbreaks

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

Health personnel are required to report suspected foodborne outbreaks to the Municipal Health Officer, who is required to report to the County Governor (Fylkesmannen) and to the Norwegian Institute of Public Health. Suspected outbreaks are reported immediately to the Municipal Medical Officer who notifies the Norwegian Institute of Public Health the same day. If a domestic food or animal source is suspected, the Municipal Medical Officer also informs the local Food Safety Authority.

The Norwegian Food Safety Authority has voluntary reporting where the District Offices report foodborne outbreaks.

Norway has since 2005 a web-based reporting system called Vesuv where all outbreaks in humans are to be reported and stored in a database at the Norwegian Institute of Public Health. Vesuv came in a new version i 2010.

If an indigenous outbreak is suspected, epidemiological investigations will be initiated in order to identify the source and prevent further cases. For imported cases, the country of acquisition will be recorded. If information through international networks indicates that a case belongs to an outbreak, epidemiological investigations will be initiated.

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

The number of reported foodborne outbreaks has increased in Norway since the web-based reporting system was established in 2005 (42 in 2005, 65 in 2006 and 80 in 2007). We believe that this increasing trend is due to a higher reporting frequency rather than a real higher number of outbreaks. The number of reported outbreaks decreased again in 2008 (64) and 2009 (47) and was stable in 2010 (53).

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

Traditionally, the most common cause of foodborne outbreaks in Norway has been bacterial intoxication (Clostridium perfringens, Bacillus cereus and Staphylococcus aureus). Recently, foodborne outbreaks of norovirus caused by infected foodhandlers and imported food items have become more common. Reported domestic outbreaks of salmonellosis and campylobacteriosis have been relatively rare.

Relevance of the different type of places of food production and preparation in outbreaks

Traditionally, outbreaks have mainly been associated with inadequate handling and temperature abuse, causing food intoxication. In addition, untreated water has caused several outbreaks.

Evaluation of the severity and clinical picture of the human cases

In 2010, one severe outbreak was reported. No deaths were related to foodborne outbreaks.

Descriptions of single outbreaks of special interest

We registered one severe outbreak caused by sorbitol fermenting E. coli O157 including three children and all of them developed haemolytic uremic syndrome (HUS). The source of the outbreak was not found.

Table Foodborne Outbreaks: summarised data

	Number of outbreaks	Human cases	Hospitalized	Deaths	Strong evidence Number of Outbreaks	Total number of outbreaks
Salmonella - S. Typhimurium	1	10	3	0	0	1
Salmonella - S. Enteritidis	0	unknown	unknown	unknown	0	0
Salmonella - Other serovars	2	15	2	0	0	2
Campylobacter	5	18	0	0	0	5
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 -	1	3	3	0	0	1
Bacillus - B. cereus	2	5	0	0	0	2
Bacillus - Other Bacillus	0	unknown	unknown	unknown	0	0
Staphylococcal enterotoxins	1	3	0	0	0	1
Clostridium - Cl. botulinum	0	unknown	unknown	unknown	0	0
Clostridium - Cl. perfringens	0	unknown	unknown	unknown	0	0
Clostridium - Other Clostridia	0	unknown	unknown	unknown	0	0
Other Bacterial agents - Brucella	0	unknown	unknown	unknown	0	0

	Number of outbreaks	Human cases	Hospitalized	Deaths	Strong evidence Number of Outbreaks	Total number of outbreaks
Other Bacterial agents - Shigella	0	unknown	unknown	unknown	0	0
Other Bacterial agents - Other Bacterial	1	3	0	0	0	1
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	20	346	0	0	4	24
Viruses - Hepatitis viruses	1	5	0	0	0	1
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	15	139	0	0	0	15
Unknown agent	0	unknown	unknown	unknown	0	0

Table Foodborne Outbreaks: detailed data for Viruses

Please use CTRL for multiple selection fields

Calicivirus - norovirus (Norwalk-like virus)

	Value
FBO Code	
Number of outbreaks	1
Number of human cases	157
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Vegetables and juices and other products thereof
More food vehicle information	Lollo lettuce
Nature of evidence	Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Unknown
Place of origin of problem	Farm (primary production)
Origin of food vehicle	Intra EU trade
Contributory factors	Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	
Additional information	Imported from France

Calicivirus - norovirus (Norwalk-like virus)

	Value
FBO Code	
Number of outbreaks	1
Number of human cases	38
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Vegetables and juices and other products thereof
More food vehicle information	Mixed salad
Nature of evidence	Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	School, kindergarten
Place of origin of problem	School, kindergarten
Origin of food vehicle	Unknown
Contributory factors	Infected food handler
Mixed Outbreaks (Other Agent)	
Additional information	

Calicivirus - norovirus (Norwalk-like virus)

	Value
FBO Code	
Number of outbreaks	1
Number of human cases	10
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Crustaceans, shellfish, molluscs and products thereof
More food vehicle information	Raw oyster
Nature of evidence	Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of food vehicle	Intra EU trade
Contributory factors	Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	
Additional information	Imported from France

Calicivirus - norovirus (Norwalk-like virus)

	Value
FBO Code	
Number of outbreaks	1
Number of human cases	37
Number of hospitalisations	0
Number of deaths	0
Food vehicle	Crustaceans, shellfish, molluscs and products thereof
More food vehicle information	Raw Oyster
Nature of evidence	Detection of causative agent in food vehicle or its component - Detection of indistinguishable causative agent in humans
Outbreak type	General
Setting	Restaurant, Cafe, Pub, Bar, Hotel
Place of origin of problem	Farm (primary production)
Origin of food vehicle	Intra EU trade
Contributory factors	Unprocessed contaminated ingredient
Mixed Outbreaks (Other Agent)	
Additional information	Imported from France