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 and antimicrobial resistance in zoonotic agents

IN 2005
INFORMATION ON THE REPORTING AND MONITORING SYSTEM

Country: **Norway**

Reporting Year: **2005**

**Institutions and laboratories involved in reporting and monitoring:**

<table>
<thead>
<tr>
<th>Laboratory name</th>
<th>Description</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Veterinary Institute (NVI)</td>
<td>The National 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 supply of independent research based advisory support to the governing authorities regarding animal health, fish health and food safety.</td>
<td>Data and text. The reporting officer is employed at the Norwegian Zoonosis Centre at NVI.</td>
</tr>
<tr>
<td>National Institute of Nutrition and Seafood Research (NIFES)</td>
<td>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 &quot;fjord to fork&quot; 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.</td>
<td>Data and text.</td>
</tr>
<tr>
<td>Norwegian Institute of Public Health (NIPH)</td>
<td>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.</td>
<td>Data and text.</td>
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</tbody>
</table>
PREFACE

This report is submitted to the European Commission in accordance with Article 9 of Council Directive 2003/99/EC\(^1\). 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 2005. 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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4. FOODBORNE OUTBREAKS
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 2005.
Data on slaughtered animals: Slaughtered in 2005.

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 number of animals per herd/holding has increased for all species.

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 16.7 cows. There are also a number of specialized beef herds with an average number of suckling cows being 10.8. 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 programme is organised by the industry. The swine population is denser in some counties and about 50% 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 greatest 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 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 two most northern counties.

Poultry: The Norwegian poultry production is strictly regulated and the population has a hierarchical structure. Egg and broiler meat production are the most important branches, but the production of turkey is increasing slightly. 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 two strains (Cobb and 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 1994 there was a general ban on the import of live animals and animal products to Norway. As a consequence of the European Economic Area (EEA) agreement which came into force in 1994, the general ban on the import of these animals and animal products to Norway was lifted. But the import of live animals since 1994 has been very restricted. In 2005, no live cattle were imported, while 49 live swine, 39 live sheep and 53 live goats were imported. Regarding poultry, grand parents and parents are imported day old, mainly from Sweden.
### Table Susceptible animal populations

<table>
<thead>
<tr>
<th>Animal species</th>
<th>Category of animals</th>
<th>Number of holdings</th>
<th>Livestock numbers (live animals)</th>
<th>Number of slaughtered animals</th>
<th>Number of herds or flocks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cattle (bovine animals)</strong></td>
<td>mixed herds</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>dairy cows and heifers</td>
<td>1200</td>
<td>30700</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>meat production animals</td>
<td>14700</td>
<td>242300</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>in total</td>
<td>21500</td>
<td>930100</td>
<td>331800</td>
<td></td>
</tr>
<tr>
<td><strong>Deer</strong></td>
<td>farmed - in total (1)</td>
<td>62</td>
<td>2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gallus gallus (fowl)</strong></td>
<td>parent breeding flocks for egg production line</td>
<td>7</td>
<td>2004</td>
<td>27</td>
<td>2004</td>
</tr>
<tr>
<td></td>
<td>parent breeding flocks for meat production line</td>
<td>78</td>
<td>2004</td>
<td>172</td>
<td>2004</td>
</tr>
<tr>
<td></td>
<td>grandparent breeding flocks for egg production line</td>
<td>3</td>
<td>2004</td>
<td>4</td>
<td>2004</td>
</tr>
<tr>
<td></td>
<td>grandparent breeding flocks for meat production line</td>
<td>3</td>
<td>2004</td>
<td>10</td>
<td>2004</td>
</tr>
<tr>
<td><strong>Goats</strong></td>
<td>laying hens (2)</td>
<td>820</td>
<td>3285500</td>
<td>2195700</td>
<td></td>
</tr>
<tr>
<td></td>
<td>breeders</td>
<td>500</td>
<td>44400</td>
<td>4432760</td>
<td></td>
</tr>
<tr>
<td></td>
<td>milk goats</td>
<td>550</td>
<td>44400</td>
<td>4432760</td>
<td></td>
</tr>
<tr>
<td></td>
<td>in total</td>
<td>1300</td>
<td>72700</td>
<td>19200</td>
<td></td>
</tr>
<tr>
<td></td>
<td>breeding animals</td>
<td>2000</td>
<td>61400</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>fattening pigs</td>
<td>2900</td>
<td>432500</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>in total</td>
<td>3300</td>
<td>802800</td>
<td>1473700</td>
<td></td>
</tr>
<tr>
<td><strong>Pigs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reindeers</strong></td>
<td>farmed - in total (3)</td>
<td>16500</td>
<td>927400</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>animals over 1 year</td>
<td>16700</td>
<td>2393200</td>
<td>1248600</td>
<td></td>
</tr>
<tr>
<td></td>
<td>in total</td>
<td></td>
<td></td>
<td>1900</td>
<td></td>
</tr>
<tr>
<td><strong>Sheep</strong></td>
<td>horses - in total (4)</td>
<td>81</td>
<td>327500</td>
<td>1040300</td>
<td></td>
</tr>
</tbody>
</table>

(1): Data from the Norwegian Red Deer Centre.
(2): Only flocks >250 birds.
(3): Data from the Norwegian Food Safety Authority.
(4): Includes small amounts of ducks and geese. Data includes only flocks >25 birds.

### Footnote

For animals other than poultry, herd and holding are considered equivalent, and the numbers are reported in the column "Number of holdings". Numbers >100 are rounded to the nearest ten, numbers >1000 are rounded to the nearest hundred.
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 regarding domestic nor imported cases. 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. There is, however, an increased import of food, and this is a potential source for infections to humans as well as animals.

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 so far 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. Salmonella in foodstuffs

A. 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.

B. Salmonella spp. in broiler meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

The Norwegian Salmonella Control Programme: All broiler flocks are sampled at slaughter. Samples of crushed meat are each year collected according to production capacity at the cutting plant.

Frequency of the sampling

At slaughterhouse and cutting plant

Other: At slaughterhouse: Every batch is sampled. At cutting plant: Production <2 tons; twice a year. Production 2 - 20 tons; once a month. Production >20 tons; Once a week.

Type of specimen taken

At slaughterhouse and cutting plant

Other: At slaughterhouse: Neck skin. At cutting plant: Crushed meat from equipment or trimmings.

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

At slaughterhouse: All slaughter batches of poultry are sampled by taking neck skin at the end of the slaughter line.

At cutting plant: Each sample consists of 25 grams of meat.

Definition of positive finding

At slaughterhouse and cutting 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

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, and investigation into the source of the contamination initiated if relevant. If Salmonella is detected in food controls at the Border Inspection Posts, the consignments will be either rejected or destroyed.

Notification system in place

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

Results of the investigation

No neck skin samples from broilers were found positive for Salmonella. None of the crushed meat samples taken at meat production facilities were positive.

One broiler flock was positive for S. Montevideo before slaughter, and the flock was destroyed, see chapter on Salmonella in animals.

One neck skin sample from a layer flock was positive for S. Senftenberg. 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.

C. Salmonella spp. in turkey meat and products thereof
Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

The Norwegian Salmonella Control Programme: All turkey flocks are sampled at slaughter. Samples of crushed meat are each year collected according to production capacity at the cutting plant.

Frequency of the sampling

At slaughterhouse and cutting plant

Other: At slaughterhouse: Every batch is sampled. At cutting plant: Production <2 tons; twice a year. Production 2-20 tons; once a month. Production >20 tons; once a week.

Type of specimen taken

At slaughterhouse and cutting plant

Other: At slaughterhouse: Neck skin. At cutting plant: Crushed meat from equipment or from trimmings.

Methods of sampling (description of sampling techniques)

At slaughterhouse and cutting plant

At slaughterhouse: All slaughter batches of poultry are sampled by taking neck skin at the end of the slaughter line.
At cutting plant: Each sample consists of 25 grams of meat.

Definition of positive finding

At slaughterhouse and cutting plant

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

Diagnostic/analytical methods used

At slaughterhouse and cutting 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, and investigation into the source of the contamination initiated if relevant. If Salmonella is detected in food controls at the Border Inspection Posts, the consignments will be either rejected or destroyed.

**Notification system in place**

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

**Results of the investigation**

No neck skins from turkey were found positive for Salmonella. None of the crushed meat samples taken at meat production facilities were positive.

For details, see tables.

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

The Norwegian Salmonella Control Programme document that domestically produced food products of animal origin is 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.

**D. Salmonella spp. in pig meat and products thereof**

**Monitoring system**

**Sampling strategy**

**At slaughterhouse and cutting plant**

The Norwegian Salmonella Control Programme: A number of samples each year are collected randomly from the pig population at slaughterhouse according to the slaughter volume, both carcass swabs and lymph nodes. The sampling of carcass swabs is described in this chapter, 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**

Samples are taken according to Council Directive 95/65/EC.
Frequency of the sampling

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

At meat processing plant
Other: Samples are taken according to Council Directive 95/65/EC.

Type of specimen taken

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

At meat processing plant
Other: Samples are taken according to Council Directive 95/65/EC.

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.

At meat processing plant
Each sample consists of 25 grams of meat.

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, and investigation into the source of the contamination initiated if relevant. If Salmonella is detected in food controls at the Border Inspection Posts, the consignments will be either rejected or destroyed.

Notification system in place

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

Results of the investigation

A total of 3157 carcasses were swabbed, and none were positive. None of the crushed meat samples taken at meat production facilities 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%. Domestic outbreaks of salmonellosis recorded in recent years, illustrate that many kinds of food may be involved in outbreaks, also those of non-animal origin, including imported foods.

Relevance of the findings to 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.

E. Salmonella spp. in bovine meat and products thereof

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant

The Norwegian Salmonella Control Programme: A number of samples each year are collected randomly from the cattle population at slaughterhouse according to
the slaughter volume, both carcass swabs and lymph nodes. The sampling of carcass swabs is described in this chapter, 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

Samples are taken according to Council Directive 95/65/EC.

Frequency of the sampling

At slaughterhouse and cutting plant

Other: At slaughterhouse: Detection of an annual prevalence of 0.1% by 95% confidence level.

At meat processing plant

Other: Samples are taken according to Council Directive 95/65/EC.

Type of specimen taken

At slaughterhouse and cutting plant

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

At meat processing plant

Other: Samples are taken according to Council Directive 95/65/EC.

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.

At meat processing plant

Each sample consists of 25 grams of meat.

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, and investigation into the source of the contamination initiated if relevant. If Salmonella is detected in food controls at the Border Inspection Posts, the consignments will be either rejected or destroyed.

Notification system in place

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

Results of the investigation

A total of 2076 carcasses were swabbed, all were negative. None of the crushed meat samples taken at meat production facilities were positive. Two cattle were found positive when sampling lymph nodes. The results are described in the chapter on Salmonella in animals. 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%. Domestic outbreaks of salmonellosis recorded in recent years, illustrate that many kinds of food may be involved in outbreaks, also those of non-animal origin, including imported foods.

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.

F. Salmonella spp. in food - Meat from sheep

Monitoring system

Sampling strategy

At slaughterhouse and cutting plant: The Norwegian Salmonella Control Programme: A number of samples each year is collected randomly from the sheep population at slaughterhouse according to the slaughter volume. Samples of crushed meat are each year collected according to production capacity of cutting plants.

At meat processing plant: Samples are taken according to Council Directive 95/65/EC.

Frequency of the sampling

At slaughterhouse: Detection of an annual prevalence of 0.1% by 95% confidence level.
At cutting plant: According to production capacity: <2 tons; twice a year, 2-20 tons: once a month, >20 tons: once a week.
At meat processing plant: Samples are taken according to Council Directive 95/65/EC.

Type of specimen taken

Other: At slaughterhouse: Surface of carcass. At cutting plant: Crushed meat. At meat processing plant: Samples are taken according to Council Directive 95/65/EC.

Methods of sampling (description of sampling techniques)

At 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.

At cutting plant: Each sample consists of 25 grams of meat (crushed meat, from the equipment or from trimmings).

At meat processing plant: Samples are taken according to Council Directive 95/65/EC.

Definition of positive finding

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

Diagnostic/analytical methods used

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, and investigation into the source of the contamination initiated if relevant. If Salmonella is detected in food controls at the Border Inspection Posts, the consignments will be either rejected or destroyed.

**Notification system in place**

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

**Results of the investigation**

A total of 2692 carcasses were swabbed, and three were positive, all S. diarizonae. None of the crushed meat samples taken at meat production facilities 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%. Domestic outbreaks of salmonellosis recorded in recent years, illustrate that many kinds of food may be involved in outbreaks, also those of non-animal origin, including imported foods.
# Table Salmonella in poultry meat and products thereof

<table>
<thead>
<tr>
<th>Source of Information</th>
<th>Sampling unit</th>
<th>Sample weight</th>
<th>Units tested</th>
<th>Total units positive for Salmonella</th>
<th>S. Enteritidis</th>
<th>S. Typhimurium</th>
<th>Salmonella spp., unspecified</th>
<th>S. Senftenberg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat from poultry, unspecified carcass</td>
<td>NSCP</td>
<td>Slaughter batch</td>
<td>&gt;10g</td>
<td>6056</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>- at slaughterhouse - animal sample - neck skin - Surveillance (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- at cutting plant - environmental sample - Surveillance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSCP</td>
<td>Sample</td>
<td>25g</td>
<td>185</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1): The majority of neck skin samples are from broiler flocks. S. Senftenberg was isolated from one layer flock.

**Footnote**

NSCP: Norwegian Salmonella Control Programme
<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling unit</th>
<th>Sample weight</th>
<th>Units tested</th>
<th>Total units positive for Salmonella</th>
<th>S. Enteritidis</th>
<th>S. Typhimurium</th>
<th>Salmonella spp., unspecified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy products (excluding cheeses)</td>
<td>Industry</td>
<td>Sample</td>
<td>25g</td>
<td>1183</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheeses, made from unspecified milk or other animal milk</td>
<td>Industry</td>
<td>Sample</td>
<td>25g</td>
<td>307</td>
<td>0</td>
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</table>
Table Salmonella in red meat and products thereof

<table>
<thead>
<tr>
<th>Source of Information</th>
<th>Sampling unit</th>
<th>Sample weight</th>
<th>Units tested</th>
<th>Total units positive for Salmonella</th>
<th>S. Enteritidis</th>
<th>S. Typhimurium</th>
<th>Salmonella spp., unspecified</th>
<th>S. IIIb 61:-1,5,7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat from pig carcass</td>
<td>NSCP</td>
<td>Animal Swab</td>
<td>3157</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat from bovine animals carcass</td>
<td>NSCP</td>
<td>Animal Swab</td>
<td>2076</td>
<td>0</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat from sheep carcass</td>
<td>NSCP</td>
<td>Animal Swab</td>
<td>2692</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat, red meat (meat from bovines, pigs, goats, sheep, horses, donkeys, bison and water buffalos)</td>
<td>NSCP</td>
<td>Sample 25g</td>
<td>1541</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Footnote

NSCP: Norwegian Salmonella Control Programme
2.1.3. Salmonella in animals

A. Salmonella spp. in Gallus gallus - breeding flocks for egg production and flocks of laying hens

Monitoring system

Sampling strategy

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

The Norwegian Salmonella Control Programmes include all poultry breeding flocks. Sampling of breeding flocks of Gallus gallus is carried out in accordance with the programme laid down in Annex III of Council Directive 92/117/EEC. The Norwegian Food Safety Authority is responsible for the sampling. Other strategies: Animals are tested in relation to clinical surveillance and import.

Laying hens flocks

The Norwegian Salmonella Control Programme: All laying hen flocks are tested at farm and at slaughter. Other strategies: Animals are tested in relation to clinical surveillance and import. The baseline study in laying hens (Commission Decision 2004/665/EC) was performed according to instructions.

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

Other: Grandparents: At the age of 1-2, 4, 9-11 and 13-14 weeks. Parents: At the age of 4 weeks and 2 weeks before transfer.

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

Other: Grandparents: At hatchery: Every 2 weeks, at farm: Every 4 weeks. Parents: Hatchery: Every 2 weeks.

Laying hens: Rearing period

Other: At the age of 4 weeks and 2 weeks before transfer.
Laying hens: Production period
Other: At the age of 25-30 and 48-52 weeks.

Laying hens: Before slaughter at farm
Every flock is sampled

Laying hens: At slaughter
Every flock is sampled

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
Faeces

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Production period
Other: At hatchery: Internal linings of hatching baskets. At farm: Faeces.

Laying hens: Rearing period
Faeces

Laying hens: Production period
Faeces

Laying hens: Before slaughter at farm
Faeces

Laying hens: At slaughter
Neck skin

Methods of sampling (description of sampling techniques)

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Day-old chicks
30 internal lining of delivery boxes are sampled and pooled 5 and 5 in the laboratory. In some instances dead chickens is sampled, and the caecae from 10 birds are pooled to one sample.
Breeding flocks (separate elite, grand parent and parent flocks when necessary): Rearing period

60 faecal samples are pooled to one sample.

Breeding flocks: Production period

At hatchery: Meconium from at least 250 birds from the internal linings of hatching baskets is pooled to one sample.
At farm: 60 faecal samples are pooled to one sample.

Laying hens: Rearing period

60 faecal samples are pooled to one sample.

Laying hens: Production period

60 faecal samples are pooled to one sample.

Laying hens: Before slaughter at farm

60 faecal samples are pooled to one sample.
Baseline study (Commission Decision 2004/665/EC): Sampled and analyzed according to instructions.

Laying hens: At slaughter

At least one neck skin sample from each flock is sampled.

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): Production period

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

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.

Laying hens: At slaughter

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: NMKL No 71:1999

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

Bacteriological method: NMKL No 71:1999

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

Bacteriological method: NMKL No 71:1999

Laying hens: Day-old chicks

Bacteriological method: NMKL No 71:1999

Laying hens: Rearing period

Bacteriological method: NMKL No 71:1999

Laying hens: Production period

Bacteriological method: NMKL No 71:1999

Laying hens: Before slaughter at farm

Bacteriological method: NMKL No 71:1999
Laying hens: At slaughter
Bacteriological method: NMKL No 71:1999

Vaccination policy

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

Vaccination against Salmonella is prohibited in Norway.

**Laying hens flocks**

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.

**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

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

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 invasive Salmonella serovars (S. Gallinarum, S. Pullorum, S. Enteritidis, S. Berta, S. Typhimurium, S. Thompson, S. Infantis) are detected, the whole animal holding will be destroyed. If non-invasive serovars are detected, birds from the infected animal holding may be subjected to sanitation slaughter. Eggs from hatcheries where invasive Salmonella serovars have been detected will be destroyed. Eggs from hatcheries where non-invasive Salmonella serovars have been detected must 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 disinfecte,
bacteriological testing gives a negative test result, and the rooms have been empty for at least 30 days following cleaning and disinfection.

**Laying hens flocks**

See breeding flocks.

**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**

None of the Norwegian breeding flocks were positive. None of the layer flocks were positive when sampling before slaughter. At slaughter, one layer flock was positive for S. Senftenberg on a neck skin sample (see text and table on Salmonella in foodstuffs).

Regarding the Baseline study in laying flocks (Commission Decision 2004/665/EC), 269 flocks were sampled in 2005, all were negative.

In addition to the results presented above and in the tables, many animals have been sampled due to clinical problems or various projects. None have been positive except from four hobby flocks positive for S. Pullorum.

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

The favourable salmonella situation in Norwegian poultry is partly dependant 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 poultry production. However, Salmonella was in 2001 for the first time since the surveillance and control programme was implemented in 1995, detected in a breeding flock (S. Agona in a broiler parent flock).

**B. Salmonella spp. in Gallus gallus - breeding flocks for meat production and broiler flocks**

**Monitoring system**

**Sampling strategy**

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

The Norwegian Salmonella Control Programmes include all poultry breeding flocks. Sampling of breeding flocks of Gallus gallus is carried out in accordance with the programme laid down in Annex III of Council Directive 92/117/EEC. The Norwegian Food Safety Authority is responsible for the sampling.

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

The Norwegian Salmonella Control Programmes: All broiler flocks are tested at slaughter.

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

Other: Grandparents: At the age of 1-2, 4, 9-11 and 13-14 weeks. Parents: At the age of 4 weeks and 2 weeks before transfer.

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

Other: Grandparents: At hatchery: Every 2 weeks, at farm: Every 4 weeks. Parents: Hatchery: Every 2 weeks.

Broiler flocks: Before slaughter at farm

Every flock is sampled.

Broiler flocks: At slaughter (flock based approach)

Every flock is sampled.

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

Faeces.

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

Other: At hatchery: internal linings of hatching baskets. At farm: Faeces.

Broiler flocks: Before slaughter at farm

Faeces.
Broiler flocks: At slaughter (flock based approach)

Neck skin

Methods of sampling (description of sampling techniques)

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

30 internal lining of delivery boxes are sampled and pooled 5 and 5 in the laboratory. In some instances dead chickens is sampled, and the caeca from 10 birds are pooled to one sample.

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

60 faecal samples are pooled to one sample.

Breeding flocks: Production period

At hatchery: Meconium from at least 250 birds from the internal linings of hatching baskets is pooled to one sample.
At farm: 60 faecal samples are pooled to one sample.

Broiler flocks: Before slaughter at farm

60 faecal samples are pooled to one sample.
Baseline study (Commission Decision 2005/636/EC): Sampled and analyzed according to instructions.

Broiler flocks: At slaughter (flock based approach)

At least one neck skin sample from each flock is sampled.

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.

**Broiler flocks: Day-old chicks**

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

**Broiler flocks: Rearing period**

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

**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.

**Broiler flocks: At slaughter (flock 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**

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

Bacteriological method: NMKL No 71:1999

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

Bacteriological method: NMKL No 71:1999

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

Bacteriological method: NMKL No 71:1999

**Broiler flocks: Day-old chicks**

Bacteriological method: NMKL No 71:1999

**Broiler flocks: Rearing period**

Bacteriological method: NMKL No 71:1999

**Broiler flocks: Before slaughter at farm**

Bacteriological method: NMKL No 71:1999

**Broiler flocks: At slaughter (flock based approach)**

Bacteriological method: NMKL No 71:1999
Vaccination policy

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

Vaccination against Salmonella is prohibited in Norway.

Broiler flocks

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.

Broiler 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

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

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 invasive Salmonella serovars (S. Gallinarum, S. Pullorum, S. Enteritidis, S. Berta, S. Typhimurium, S. Thompson, S. Infantis) are detected, the whole animal holding will be destroyed. If non-invasive serovars are detected, birds from the infected animal holding may be subjected to sanitation slaughter. Eggs from hatcheries where invasive Salmonella serovars have been detected will be destroyed. Eggs from hatcheries where non-invasive Salmonella serovars have been detected must 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 gives a negative test result, and the rooms have been empty for at least 30 days following cleaning and disinfection.
Breeding flocks (separate elite, grand parent and parent flocks when necessary): Rearing period
See breeding flocks, day-old chicks.

Breeding flocks (separate elite, grand parent and parent flocks when necessary): Production period
See breeding flocks, day-old chicks.

Broiler flocks: Day-old chicks
See breeding flocks, day-old chicks.

Broiler flocks: Rearing period
See breeding flocks, day-old chicks.

Broiler flocks: Before slaughter at farm
See breeding flocks, day-old chicks.

Broiler flocks: At slaughter (flock based approach)
See breeding flocks, day-old chicks.

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
None of the Norwegian breeding flocks were positive. One broiler flock was positive on farm before slaughter with S. Montevideo. The flock was destroyed.
Regarding the baseline study in broilers (Commission Decision 2005/636/EC), 48 flocks were sampled in 2005, all were negative.
In addition to the results presented above and in the tables, many animals have been sampled due to clinical problems or various projects. None have been positive.

National evaluation of the recent situation, the trends and sources of infection
The favourable salmonella situation in Norwegian poultry is partly dependant 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 poultry production. However, Salmonella was in 2001 for the first time since the surveillance and control programme was implemented in 1995, detected in a breeding flock (S. Agona in a broiler parent flock).

C. 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: A number of samples each year are collected randomly from the sow population at slaughterhouse according to the slaughter volume, both carcass swabs and lymph nodes. 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: A number of samples each year are collected randomly from the fattening pig population at slaughterhouse according to the slaughter volume, both carcass swabs and lymph nodes. 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.

Frequency of the sampling

Breeding herds
Once a year

Fattening herds at slaughterhouse (herd based approach)
Other: 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)
Organs:Lymph nodes

Methods of sampling (description of sampling techniques)
Breeding herds

At least 10 grams of faecal material is taken from single animals. From pens with growers/finisher pigs, pooled faecal samples of at least 50 grams are taken. The samples are sent to the laboratory the same day.

Fattening herds at slaughterhouse (herd based approach)

From each carcass at least five ileo-caecal lymph nodes will be aseptically removed and pooled in a plastic bag. All samples will be 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: NMKL No 71:1999

Multiplying herds
Bacteriological method: NMKL No 71:1999

Fattening herds at farm
Bacteriological method: NMKL No 71:1999

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
All of the 3476 lymph nodes taken in the Norwegian Salmonella Control Programme were negative.
One sample positive for S. Typhimurium was detected in the beginning of 2005. This sample represented one animal, and was one out of 87 samples taken in one herd because it had contact with a herd found positive in 2004. The herd positive in 2005 was also sampled for the same reason towards the end of 2004, and was positive at that time as well. None of the 148 breeding herds were positive. In addition to the results presented above and in the tables, many animals have been sampled due to clinical problems or various projects. None have been positive.

**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%.

### D. Salmonella spp. in bovine animals

**Monitoring system**

**Sampling strategy**

The Norwegian Salmonella Control Programme: A number of samples each year are collected randomly from the cattle population at slaughterhouse according to the slaughter volume, both carcass swabs and lymph nodes. 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.

**Frequency of the sampling**

**Animals at slaughter (herd based approach)**

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

**Type of specimen taken**

**Animals at slaughter (herd based approach)**

Organs: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 will be aseptically removed and pooled in a plastic bag. All samples will be 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: NMKL No 71:1999

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

Two of the 2209 animals tested in the Norwegian Salmonella Control Programme were positive, both with S. Typhimurium. In addition to the results presented above and in the tables, many animals have been sampled due to clinical problems or various projects. None have been positive.

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%.

E. Salmonella spp. in animal

Monitoring system

Sampling strategy

Described here is Salmonella in 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

In addition to the results presented in the tables, many animals have been sampled due to clinical problems or various projects. None have been positive.

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

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

**Monitoring system**

**Sampling strategy**

The Norwegian Salmonella Control Programmes include all breeder flocks and all flocks for slaughter of ducks, geese and turkeys. Other strategies: Animals are tested in relation to clinical surveillance and import.

**Frequency of the sampling**

**Animals at farm**

Other: See the description of the programme in Gallus gallus

**Animals at slaughter (herd based approach)**

Other: Every flock is sampled.

**Type of specimen taken**

**Animals at farm**

Other: See the description of the programme in Gallus gallus

**Animals at slaughter (herd based approach)**

Other: Neck skin

**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: NMKL No 71:1999

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. 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 invasive Salmonella serovars (S. Gallinarum, S. Pullorum, S. Enteritidis, S. Berta, S. Typhimurium, S. Thompson, S. Infantis) are detected, the whole animal holding will be destroyed. If non-invasive serovars are detected, birds from the infected animal holding may be subjected to sanitation slaughter. Eggs from hatcheries where invasive Salmonella serovars have been detected will be destroyed. Eggs from hatcheries where non-invasive Salmonella serovars have been detected must 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 gives a negative test result, and the rooms have been empty for at least 30 days following cleaning and disinfection.

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

None of the Norwegian breeder flocks were positive. None of the production flocks were positive on farm or at slaughter. In addition to the results presented in the tables, many animals have been sampled due to clinical problems or various projects. None have been positive.

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

The duck, geese and turkey population in Norway is small. A few times, positive flocks have been found, the last time S. Muenchen in a turkey flock in 1999. S. Enteritidis has never been detected in Norwegian poultry production.
Table Salmonella in breeding flocks of Gallus gallus

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Salmonella</th>
<th>S. Enteritidis</th>
<th>S. Typhimurium</th>
<th>Salmonella spp., unspecified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gallus gallus (fowl)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>grandparent breeding</td>
<td>NSCP</td>
<td>Flock</td>
<td>4</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>flock for egg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>production line</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>grandparent breeding</td>
<td>NSCP</td>
<td>Flock</td>
<td>3</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>flock for meat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>production line</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>parent breeding</td>
<td>NSCP</td>
<td>Holding</td>
<td>65</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>flock, unspecified</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) : A total of 755 samples from 65 holdings with parent flocks (rearing and production) were tested for Salmonella, all were negative.

Footnote

NSCP = Norwegian Salmonella Control Programme.
## Table Salmonella in other poultry

<table>
<thead>
<tr>
<th>Source of Information</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Salmonella</th>
<th>S. Enteritidis</th>
<th>S. Typhimurium</th>
<th>Salmonella spp., unspecified</th>
<th>S. Montevideo</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gallus gallus (fowl)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>laying hens (1)</td>
<td>NSCP</td>
<td>Holding</td>
<td>732</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NVI</td>
<td>Flock</td>
<td>269</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>broilers</td>
<td>NSCP</td>
<td>Flock</td>
<td>3883</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>NVI</td>
<td>Flock</td>
<td>48</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ducks</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>breeding flocks (2)</td>
<td>NSCP</td>
<td>Holding</td>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
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<td></td>
<td>NSCP</td>
<td>Flock</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>meat production flocks</td>
<td>NSCP</td>
<td>Flock</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Geese (3)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>meat production flocks</td>
<td>NSCP</td>
<td>Holding</td>
<td>3</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NSCP</td>
<td>Flock</td>
<td>310</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Turkeys</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>breeding flocks (4)</td>
<td>NSCP</td>
<td>Holding</td>
<td>3</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NSCP</td>
<td>Flock</td>
<td>310</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) : A total of 1346 samples.
(2) : A total of 22 samples.
(3) : A total of 4 samples.
(4) : A total of 49 samples.

**Footnote**

NSCP = Norwegian Salmonella Control Programme.
All poultry flocks are in addition sampled at slaughter by neck skin samples. See table on Salmonella in poultry meat.
### Table Salmonella in other birds

<table>
<thead>
<tr>
<th>Source of Information</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Salmonella</th>
<th>S. Enteritidis</th>
<th>S. Typhimurium</th>
<th>Salmonella spp., unspecified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pigeons (1)</td>
<td>Animal</td>
<td>10</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NVI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quails</td>
<td>Animal</td>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NVI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Pheasants</td>
<td>Animal</td>
<td>7</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NVI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ostriches</td>
<td>Animal</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NVI</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Birds</td>
<td>Animal</td>
<td>49</td>
<td>8</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>wild</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) : Not including wild pigeons.

**Footnote**

Data from NVI: Mainly diagnostic submissions.
Table Salmonella in other animals

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Salmonella</th>
<th>S. Enteritidis</th>
<th>S. Typhimurium</th>
<th>Salmonella spp., unspecified</th>
<th>S. Iibb 61:-:1,57</th>
<th>S. Stanley</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cattle (bovine animals) (1)</strong></td>
<td>NSCP Animal</td>
<td>2209</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Clinical investigations</td>
<td>NVI Animal</td>
<td>180</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sheep</strong></td>
<td>NVI Animal</td>
<td>115</td>
<td>16</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Goats</strong></td>
<td>NVI Animal</td>
<td>8</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pigs</strong></td>
<td>NSCP Animal</td>
<td>1100</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>breeding animals (2)</td>
<td>NSCP Herd</td>
<td>148</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>- at farm</td>
<td>NSCP Animal</td>
<td>2376</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fattening pigs (3)</td>
<td>NVI Animal</td>
<td>127</td>
<td>0</td>
<td></td>
<td></td>
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<tr>
<td>- Clinical investigations</td>
<td>NVI Animal</td>
<td>32</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Solipeds, domestic</strong></td>
<td>NVI Animal</td>
<td>49</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cats</strong></td>
<td>NVI Animal</td>
<td>135</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dogs</strong></td>
<td>NVI Animal</td>
<td>25</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Wild animals</strong></td>
<td>NVI Animal</td>
<td>52</td>
<td>6</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Zoo animals, all (4)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) : Lymph node samples.
(2) : Lymph node samples.
(3) : Lymph node samples.
(4) : Including a few pet turtles and a pet snake. From one turtle, two serovars were isolated. The identified serovars were: S. Abony, S. Buzu, S. Montevideo, S Pomona, S. Potsdam, S. Tennessee and S. Arizona (41:z4z23:-).

Footnote

NSCP = Norwegian Salmonella Control programme.
Data from NVI: Mainly diagnostic submissions.
In addition, many samples from food producing animals were investigated due to specific research projects or as a follow up due to findings of Salmonella in the same herd or in contact herds. None of these were positive for Salmonella except for one pig in a herd that was positive in 2004, and was followed up in the beginning of 2005.
2.1.4. 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 that Norwegian livestock are exposed to for many years have been virtually 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 accordance with Council Directives 76/371/EEC, 97/78/EEC, 89/662/EEC, and 90/667/EEC 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 level 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)

Norway's favourable salmonella situation in animals and humans is partly dependant upon the efficient control of animal feedingstuffs. The number of animals infected from feedingstuffs is probably very low, and feedingstuffs thereby represents a negligible risk to humans.

Recent actions taken to control the zoonoses

Detection of Salmonella is notifiable. If Salmonella is detected in feedingstuffs, equipment, or production plants the authorities must be informed without delay. The establishment must take action according to a defined procedure to prevent the distribution of contaminated feed. Contaminated feed will be destroyed or heat-treated. In general, complete feedingstuffs and protein concentrates (supplementary feedingstuffs) intended for poultry, pigs, and cattle that are distributed must be subject to heat treatment until a core temperature of at least 81 degrees Celsius is reached. The entire batch must be heat-treated, and the production has to be performed in a production line where all the other feedingstuffs are subject to heat treatment.

According to the regulations for production of feedingstuffs, feed mills are required to have an internal (process) control programme implemented. This includes a sampling scheme for Salmonella of minimum 3 samples per 14 days. Samples include raw materials and scrapings from control points.

The national production of meat and bone meal is subject to a continuous process control that includes analyses for Salmonella.

Establishments preparing feed for fur animals are required to analyse a minimum of one sample for Salmonella per month. Through an official surveillance programme (sampling according to Council Directive 76/371/EEC) random samples of feedingstuffs for terrestrial animals are
collected and analysed 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.

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. If Salmonella is detected, the Directorate of Fisheries must be notified immediately. 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.

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.

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. This control includes analyses for Salmonella. 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 feed material of animal origin

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sample weight</th>
<th>Units tested</th>
<th>Total units positive for Salmonella</th>
<th>S. Enteritidis</th>
<th>S. Typhimurium</th>
<th>Salmonella spp., unspecified</th>
<th>S. Lexington</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed material of land animal origin</td>
<td>25g</td>
<td>668</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>meat and bone meal</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feed material of marine animal origin</td>
<td>25g</td>
<td>48</td>
<td>0</td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>
# Table Salmonella in other feed matter

<table>
<thead>
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<th>Source of Information</th>
<th>Sampling unit</th>
<th>Sample weight</th>
<th>Units tested</th>
<th>Total units positive for Salmonella</th>
<th>S. Typhimurium</th>
<th>S. Enteritidis</th>
<th>Salmonella spp., unspecified</th>
<th>S. Senftenberg</th>
<th>S. Mbandaka</th>
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(1) : Samples from soya, maize and wheat.

**Footnote**

All samples are from imported feed material. If not stated otherwise, all samples are from official surveillance programmes.
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<tr>
<th>Source of information</th>
<th>Sampling unit</th>
<th>Sample weight</th>
<th>Units tested</th>
<th>Total units positive for Salmonella</th>
<th>S. Typhimurium</th>
<th>S. Enteritidis</th>
<th>Salmonella spp., unspecified</th>
<th>S. Tennessee</th>
<th>S. Senftenberg</th>
<th>S. Agona</th>
<th>S. Brandenburg</th>
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**Table Salmonella in compound feedingstuffs**

Norway 2005 Report on trends and sources of zoonoses
<table>
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<tr>
<th>NFSA</th>
<th>Sample</th>
<th>25g</th>
<th>9900</th>
<th>17</th>
<th>3</th>
<th>7</th>
<th>3</th>
<th>2</th>
<th>2</th>
</tr>
</thead>
</table>

(1) : Including 15 samples of “Wet feed”  
(2) : Data from Norwegian Fur Breeders Association - Compulsory surveillance programme  
(3) : From feed mills producing feed for food producing land animals. Includes imported feedingstuffs. The seven isolates listed in the column Salmonella spp., unspecified are one each of S. Havana, S. Infantis, S. London, S. Mbandaka, S. Meleagridis, S. enterica subsp. diarizonae and one not typed.
2.1.5. Salmonella serovars and phagetype distribution
2.1.6. Antimicrobial resistance in Salmonella isolates

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.

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 resistance tested as well. For description of the Norwegian Salmonella Control programmes, see the parts describing Salmonella in the various animal species.

Type of specimen taken
For description of the Norwegian Salmonella Control programmes, see the parts describing Salmonella in the various animal species. 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
Only one isolate per herd is selected for antimicrobial testing.

Methods used for collecting data
Salmonella is isolated at various laboratories and sent to the National Veterinary Institute in Oslo for the testing of antimicrobial susceptibility.

Laboratory methodology used for identification of the microbial isolates
Normally, NMKL No 71:1999 is 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.

Breakpoints used in testing

Microbiological cut-off values are used to classify the isolates as resistant or susceptible. A microbiological cut-off value is defined as the highest MIC-value of isolates that belong to the original genetically unchanged population (wild-type). It classifies the isolates with a MIC-value greater than the microbiological cut-off value as resistant.

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 S. Typhimurium in All animals - quantitative data [Dilution method]

| Antimicrobials          | N  | n <=0.03 | 0.06 | 0.12 | 0.25 | 0.5  | 1   | 2   | 4   | 8   | 16  | 32  | 64  | 128 | 256 | 512 | 1024 | 2048 | 4096 | 
|-------------------------|----|----------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                         |    |          |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| **Tetracyclines**       |    |          |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
|                         | 15 | 1        |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Amphenicols             |    |          |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Chloramphenicol         | 15 | 1        |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Florfenicol             | 15 | 1        |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Cephalosporins          |    |          |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Ceftiofur               | 15 | 0        |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Fluoroquinolones        |    |          |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Enrofloxacin            | 15 | 0        |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Quinolones              |    |          |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Nalidixic acid          | 15 | 0        |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Trimethoprim            | 15 | 0        |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Sulfonamides            |    |          |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Sulfonamide             | 15 | 1        |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Aminoglycosides         |    |          |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Streptomycin            | 15 | 1        |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Gentamicin              | 15 | 0        |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Neomycin                | 15 | 0        |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Penicillins             |    |          |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Ampicillin              | 15 | 1        |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |

**Footnote**

Some of the isolates were from clinical submissions, others from the Norwegian Salmonella Control Programme. The animal species are: Wild birds (9), cattle (2), cat (2) and one each of pig and dog.
<table>
<thead>
<tr>
<th>S. Typhimurium</th>
<th>Cattle (bovine animals)</th>
<th>Pigs</th>
<th>Gallus gallus (fowl)</th>
<th>Turkeys</th>
<th>Dogs</th>
<th>Cats</th>
<th>Birds - wild</th>
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</table>

**Table Antimicrobial susceptibility testing of Salmonella in animals**

- **n** = Number of resistant isolates
- **N** = Number of isolates available in the laboratory
- **n** = Number of isolates out of a monitoring programme
Footnote

This table includes all Salmonella except S. Typhimurium. The table includes one isolate from the surveillance in poultry meat (neck skin), and three isolates from the surveillance in sheep meat (carcass swabs).

The serovars are: S. diarizonae (61:k:1.5.7) (11 sheep), S. Stanley (dog and cat), S. Pullorum (4 poultry), S. Montevideo (poultry and reptile), S. Senftenberg (poultry) and S. Abony, S. Buzu, S. Pomona, S. Potsdam, S. Tennessee and S. arizonae (41:z4z23:-)(all from reptiles).
### Table Antimicrobial susceptibility testing of Other serotypes in All animals - quantitative data [Dilution method]

Number of resistant isolates (n) and number of isolates with the concentration (µl/ml) or zone (mm) of inhibition equal to

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</table>

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## Table Breakpoints for antibiotic resistance testing of Salmonella in Animals

**Test Method Used**
- Disc diffusion
- Agar dilution
- Broth dilution
- E-test

**Standards used for testing**
- NCCLS

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<th>Breakpoint concentration (microg/ml)</th>
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### Footnote

Standard for breakpoint: M=Microbiological cut-off values. These are based on the distribution of MIC-values of a large number of strains and set as to divide the susceptible bacterial population from the resistant population.
# Table Breakpoints for antibiotic resistance testing of Salmonella in Food

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<th>Agar dilution</th>
<th>Broth dilution</th>
<th>E-test</th>
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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 has 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 bio security. Since 2002 there has been a reduction in the incidence of broiler flocks being positive for Campylobacter from 6.3% in 2002 to 3.3% in 2004. The number of flocks going positive out on the market has been reduced as well.

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. 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. In the period 2002-2004, the number of reported cases has been relatively stable.

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

The reported human incidence has increased in 2005 compared to the period 2002 to 2004, and is almost as high as the peak year in 2001. The rise from 2004 to 2005 is mostly due to an increase in the number of domestically infected cases.

The prevalence in broiler flocks declined significantly from 2002 to 2004, most probably due to the Norwegian action plan against Campylobacter in broilers. From 2004 to 2005 the percentage of positive broiler flocks increased from 3,3% to 3,7%, but the reduction in the number of positive flocks reaching the marked untreated (i.e. not frozen or heat treated) continued also in 2005.

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

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 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. Campylobacter, thermophilic in foodstuffs

A. Thermophilic Campylobacter in Broiler meat and products thereof

Monitoring system

Sampling strategy

At retail

A total of 100 samples per month are taken, 25 in each of four Norwegian cities (part of the Norwegian action plan against Campylobacter in broilers).

Frequency of the sampling

At retail

Other: 100 samples each month

Type of specimen taken

At retail

Fresh meat

Methods of sampling (description of sampling techniques)

At retail

A total of 100 samples per month (March - December) are taken at retail, 25 in each of four Norwegian cities. Each month, several shops are visited and the visits are distributed throughout the month, with the purpose to sample different production batches. 10 grams of each sample is analysed.

Definition of positive finding

At retail

A product where Campylobacter spp. is found.

Diagnostic/analytical methods used

At retail

Bacteriological method: NMKL no 119, 1990

Preventive measures in place

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

Control program/mechanisms

The control program стрategies 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**

The broiler flocks found positive in the surveillance programme before slaughter are subject to freezing for at least 3 weeks, or to heat treatment. No measures are taken upon positive findings at retail level.

**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**

A total of 938 fresh products were investigated, 56 (6.0%) were positive.

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

The Norwegian campylobacteriosis situation is a concern for the government. 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 2004 prevented more than 4 million Campylobacter positive broiler carcasses from entering the market raw. It is, however, too early to evaluate to which degree the action plan has had an effect on the incidence of domestically acquired campylobacteriosis.
Table Campylobacter in poultry meat

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling unit</th>
<th>Sample weight</th>
<th>Units tested</th>
<th>Total units positive for thermophilic Campylobacter spp.</th>
<th>C. coli</th>
<th>C. lari</th>
<th>C. jejuni</th>
<th>C. upsaliensis</th>
<th>Thermophilic Campylobacter spp., unspecified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat from broilers (Gallus gallus)</td>
<td>NACB</td>
<td>10g</td>
<td>938</td>
<td>56</td>
<td>3</td>
<td>4</td>
<td>47</td>
<td>2</td>
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<tr>
<td>fresh</td>
<td>Sample taken at retail</td>
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</tbody>
</table>

Footnote

NACB: Norwegian Action Plan against Campylobacter in Broilers
2.2.3. Campylobacter, thermophilic in animals

A. Thermophilic Campylobacter in Gallus gallus

Monitoring system

Sampling strategy
A surveillance programme in broilers (slaughtered before 50 days of age) was implemented in May 2001 (part of the Norwegian action plan against Campylobacter in broilers). The surveillance programme covers all broiler flocks slaughtered before 50 day of age (virtually all Norwegian broiler flocks).

Frequency of the sampling

Before slaughter at farm
Every flock is sampled

At slaughter
Other: Every slaughter batch is sampled

Type of specimen taken

Before slaughter at farm
Faeces

At slaughter
Organs: 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**

PCR Method published by DFVF, Denmark: Å-5-AR-531

**At slaughter**

Other: NMKL no 119:1990 with modifications (no enrichment)

**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 стрategies 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.

Farms having positive flocks are subject to follow up visits from the advisors in the industry or staff from the Norwegian Food Safety Authority to assist in implementing measures preventing further flocks to be infected with Campylobacter.

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**
Of the 3652 flocks slaughtered in Norway in 2005, 132 flocks (3.6%) were positive for Campylobacter spp. At farm, maximum four days before slaughter, a total of 90 positive flocks were discovered, and thereby subject to heat treatment or freezing for at least 3 weeks. At slaughter, all flocks (in fact all slaughter batches) were again sampled, and out of the 3899 slaughter batches, 134 (3.4%) were positive.

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

There has been a significant reduction in the prevalence of positive flocks from 2002 (6.3%) to 2005 (3.6%).

**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, the highest weekly incidence during the summer and autumn 2005 being 14.5%. With such amounts of positive flocks, of which approximately 30% is not detected before slaughter and therefore not 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

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Campylobacter, thermophilic</th>
<th>C. jejuni</th>
<th>C. coli</th>
<th>C. lari</th>
<th>C. upsaliensis</th>
<th>thermophilic Campylobacter spp., unspecified</th>
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</thead>
<tbody>
<tr>
<td><strong>Cattle (bovine animals)</strong></td>
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</table>

## Footnote

NACB: Norwegian Action Plan against Campylobacter in Broilers. All broiler flocks are slaughtered maximum four days before slaughter, and again at slaughter.

There is no information on Campylobacter species from the broiler farm samples because the method used is a PCR method where no isolates are obtained.

NVI: Diagnostic submissions.
2.2.4. Antimicrobial resistance in Campylobacter, thermophilic isolates

A. Antimicrobial resistance in Campylobacter jejuni and coli in poultry

Sampling strategy used in monitoring

**Frequency of the sampling**

The isolates of Campylobacter being included in the monitoring of antimicrobial resistance are isolated in connection with the Norwegian action plan against Campylobacter in broilers. For description of the action plan, see Thermophilic Campylobacter in Gallus gallus.

**Type of specimen taken**

See Thermophilic Campylobacter in Gallus gallus.

**Methods of sampling (description of sampling techniques)**

See Thermophilic Campylobacter in Gallus gallus.

**Procedures for the selection of isolates for antimicrobial testing**

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

**Methods used for collecting data**

Strains are isolated at different laboratories, and sent to the National Veterinary Institute in Oslo for the testing of antimicrobial susceptibility.

**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) is used for the susceptibility testing of all isolates. The antimicrobials included are listed in the tables.

**Breakpoints used in testing**

Microbiological cut-off values are used to classify the isolates as resistant or susceptible. A microbiological cut-off value is defined as the highest MIC-value of isolates that belong to the original genetically unchanged population (wild-type). It classifies the isolates with a MIC-value greater than the microbiological cut-off value as resistant.

**Control program/mechanisms**
The control program/strategies in place

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

B. Antimicrobial resistance in Campylobacter jejuni and coli in foodstuff derived from poultry

Sampling strategy used in monitoring

Frequency of the sampling

The isolates of Campylobacter being included in the monitoring of antimicrobial resistance are isolated in connection with the Norwegian action plan against Campylobacter in broilers. For description of the action plan, see Thermophilic Campylobacter in broiler meat and products thereof.

Type of specimen taken

See Thermophilic Campylobacter in broiler meat and products thereof.

Methods of sampling (description of sampling techniques)

See Thermophilic Campylobacter in broiler meat and products thereof.

Procedures for the selection of isolates for antimicrobial testing

One isolate of Campylobacter jejuni per positive batch of products is tested for antimicrobial resistance.

Methods used for collecting data

Strains are isolated at four different laboratories, and sent to the National Veterinary Institute in Oslo for testing of antimicrobial susceptibility.

Laboratory methodology used for identification of the microbial isolates

NMKL No 119.

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.

Breakpoints used in testing

Microbiological cut-off values are used to classify the isolates as resistant or susceptible. A microbiological cut-off value is defined as the highest MIC-value of isolates that
belong to the original genetically unchanged population (wild-type). It classifies the isolates with a MIC-value greater than the microbiological cut-off value as resistant.

**Control program/mechanisms**

*The control program/strategies in place*

The resistance testing of *Campylobacter jejuni* isolated from broiler meat is a part of the Norwegian monitoring programme for antimicrobial resistance in feed, food and animals - NORM-VET.
### Table Antimicrobial susceptibility testing of *C. jejuni* in *Gallus gallus* (fowl) - broilers - at slaughterhouse - Surveillance - quantitative data [Dilution method]

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<thead>
<tr>
<th>Antimicrobials</th>
<th>N</th>
<th>n ≤0.03</th>
<th>0.06</th>
<th>0.12</th>
<th>0.25</th>
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</table>

Isolates out of a monitoring programme: yes

Number of isolates available in the laboratory: 69
Table Antimicrobial susceptibility testing of C. jejuni in fresh - Meat from broilers (Gallus gallus) - chilled - at retail - Monitoring - official sampling - quantitative data [Dilution method]

<table>
<thead>
<tr>
<th>Antimicrobials</th>
<th>N</th>
<th>&lt;=0.03</th>
<th>0.06</th>
<th>0.12</th>
<th>0.25</th>
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</table>
Table Antimicrobial susceptibility testing of Campylobacter in animals

<table>
<thead>
<tr>
<th>Antimicrobials:</th>
<th>Cattle (bovine animals)</th>
<th>Pigs</th>
<th>Gallus gallus (fowl)</th>
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</thead>
<tbody>
<tr>
<td>Isolates out of a</td>
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<tr>
<td>monitoring programme</td>
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<tr>
<td>Number of isolates</td>
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<td><strong>N</strong></td>
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<tr>
<td>Tetracyclines</td>
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<tr>
<td>Fluoroquinolones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enrofloxacin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quinolones</td>
<td></td>
<td></td>
<td>69</td>
</tr>
<tr>
<td>Nalidixic acid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aminoglycosides</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gentamicin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Macrolides</td>
<td></td>
<td></td>
<td>69</td>
</tr>
<tr>
<td>Erythromycin</td>
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<tr>
<td>Penicillins</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ampicillin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fully sensitive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resistant to 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>antimicrobial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resistant to 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>antimicrobials</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
### Table Antimicrobial susceptibility testing of Campylobacter in food

<table>
<thead>
<tr>
<th></th>
<th>Campylobacter spp.</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Meat from broilers (Gallus gallus)</td>
<td>Meat from other poultry species</td>
<td>Meat from pig</td>
<td>Meat from bovine animals</td>
<td></td>
</tr>
<tr>
<td>Isolates out of a monitoring programme</td>
<td>yes</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Number of isolates available in the laboratory</td>
<td>35</td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Antimicrobials:</th>
<th>N</th>
<th>n</th>
<th>N</th>
<th>n</th>
<th>N</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetracyclines</td>
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<td>0</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Enrofloxacin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quinolones</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nalidixic acid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aminoglycosides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gentamicin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Macrolides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erythromycin</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Penicillins</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ampicillin</td>
<td>35</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Fully sensitive: 32
- Resistant to 1 antimicrobial: 3
- Resistant to 2 antimicrobials: 0
- Resistant to 3 antimicrobials: 0
- Resistant to 4 antimicrobials: 0
- Resistant to >4 antimicrobials: 0
### Table Breakpoints used for antimicrobial susceptibility testing of Campylobacter in Animals

**Test Method Used**
- Disc diffusion
- Agar dilution
- Broth dilution
- E-test

**Standards used for testing**
- NCCLS

<table>
<thead>
<tr>
<th>Campylobacter, thermophilic</th>
<th>Standard for breakpoint</th>
<th>Breakpoint concentration (microg/ml)</th>
<th>Range tested concentration (microg/ml) disk content</th>
<th>breakpoint Zone diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetracyclines</td>
<td></td>
<td>Susceptible &lt;= 2</td>
<td>Intermediate 2</td>
<td>Resistant &gt; 2</td>
</tr>
<tr>
<td>Amphenicols</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chloramphenicol</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Florfenicol</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluoroquinolones</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>M</td>
<td>0.5</td>
<td>0.5</td>
<td>0.03</td>
</tr>
<tr>
<td>Enrofloxacin</td>
<td>M</td>
<td>16</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>Quinolones</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nalidixic acid</td>
<td>M</td>
<td>16</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>Trimethoprim</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfonamides</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfonamide</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aminoglycosides</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Streptomycin</td>
<td>M</td>
<td>4</td>
<td>4</td>
<td>0.25</td>
</tr>
<tr>
<td>Gentamicin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neomycin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kanamycin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Macrolides</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erythromycin</td>
<td>M</td>
<td>8</td>
<td>8</td>
<td>0.125</td>
</tr>
<tr>
<td>Trimethoprim + sulfonamides</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cephalosporins</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd generation cephalosporins</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Penicillins</td>
<td>M</td>
<td>16</td>
<td>16</td>
<td>0.5</td>
</tr>
</tbody>
</table>

**Footnote**

Standard for breakpoint: M=Microbiological cut-off values. These are based on the distribution of MIC-values of a large number of strains and set as to divide the susceptible bacterial population from the resistant population.
### Table Breakpoints used for antimicrobial susceptibility testing of Campylobacter in Food

#### Test Method Used
- Disc diffusion
- Agar dilution
- Broth dilution
- E-test

#### Standards used for testing
- NCCLS

<table>
<thead>
<tr>
<th>Campylobacter, thermophilic</th>
<th>Standard for breakpoint</th>
<th>Breakpoint concentration (microg/ml)</th>
<th>Range tested concentration (microg/ml)</th>
<th>disk content</th>
<th>breakpoint Zone diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Susceptible &lt;=</td>
<td>Intermediate &gt;=</td>
<td>Resistant &gt;</td>
<td>lowest</td>
</tr>
<tr>
<td>Tetracyclines</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0.25</td>
<td>32</td>
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<tr>
<td>Amphenicols</td>
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<td></td>
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</tr>
<tr>
<td>Flofoxacin</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quinolones</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Fluoroquinolones</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>M</td>
<td>0.5</td>
<td>0.5</td>
<td>0.03</td>
<td>4</td>
</tr>
<tr>
<td>Enrofloxacin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trimethoprim</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfonamides</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Sulfonamide</td>
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<tr>
<td>Aminoglycosides</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Streptomycin</td>
<td>M</td>
<td>4</td>
<td>4</td>
<td>0.25</td>
<td>8</td>
</tr>
<tr>
<td>Gentamicin</td>
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<td></td>
</tr>
<tr>
<td>Neomycin</td>
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<td>Kanamycin</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Macrolides</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Erythromycin</td>
<td>M</td>
<td>8</td>
<td>8</td>
<td>0.125</td>
<td>16</td>
</tr>
<tr>
<td>Trimethoprim + sulphonamides</td>
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</tr>
<tr>
<td>Cephalosporins</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3rd generation cephalosporins</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>Penicillins</td>
<td>M</td>
<td>16</td>
<td>16</td>
<td>0.5</td>
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</tbody>
</table>

#### Footnote
Standard for breakpoint: M=Microbiological cut-off values. These are based on the distribution of MIC-values of a large number of strains and set as to divide the susceptible bacterial population from the resistant population.
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 in animals, especially among sheep. Since 1982, the number of notified cases has varied from 2-21. The incidence rate has varied from 0.05-0.5 per 100,000. Most of the cases are sporadic, occurring in elderly individuals or persons with other underlying diseases. A few congenital cases are also being 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 another outbreak was reported, this time a hospital outbreak 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 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 had decreased to 3.4% in a survey conducted in 1996-1997. In 2002 4.3% of 703 samples of domestically produced fish and fish products, mostly unprocessed and smoked salmon, were positive for L. monocytogenes. 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 raw milk and raw milk products 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 revealed that a large proportion of samples may contain L. monocytogenes, sometimes in high concentrations (up to 2000 CFU per gram). Guidelines issued by the Food Safety Authority recommend a maximum level of 1000 CFU per gram for this particular product. Information about risk products to consumers belonging to risk populations is also recommended. A recent study has 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.

Processed ready-to-eat products have been identified as a source for human listeriosis in the Nordic countries. Data indicate that the occurrence of L. monocytogenes in ready-to-eat products seem to be caused by cross-contamination in the processing environment rather than insufficient heat processing.
Recent actions taken to control the zoonoses

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 easily can grow, should result in recall from the market of the corresponding lot. The producer is recommended to review production routines and shelf-life of the product. Findings of L. monocytogenes in some specified heat-treated products (e.g., soft cheeses) would result in recall of the whole lot. Corrective actions will be taken according to the frequency of positive findings, product type, step of process at which the isolation was done, and whether the product is a ready-to-eat-product or special dietary product. Dietary advice is given to pregnant women.
2.3.2. Listeria in foodstuffs

A. Listeria spp. in food

Monitoring system

Sampling strategy
Norway follows the EU requirements regarding testing for L. monocytogenes in milk products. Internal control in the industry: Samples are taken as part of the internal control programmes.

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
Bacteriological method: NMKL 136

Control program/mechanisms

The control programestrategies in place
Norway follows the EU requirements regarding testing for L. monocytogenes in milk products. Samples are taken as part of the internal control programmes in the industry.

Measures in case of the positive findings

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 easily can grow, should result in recall from the market of the corresponding lot. The producer is recommended to review production routines and shelf-life of the product. Findings of L. monocytogenes in some specified heat-treated products (e.g., soft cheeses) would result in recall of the whole lot.

Internal control: Corrective actions will be taken according to the frequency of positive findings, product type, step of process at which the isolation was done, and whether the product is a ready-to-eat-product or special dietary product.

Results of the investigation

One out of 2358 samples of Norwegian cheese and other dairy products was positive for L. monocytogenes.
In a survey in three establishments producing salmon products, where 15 samples of raw fish and 114 other samples of products of salmon were investigated, three positive samples were
identified, one from raw salmon and two from salmon products. A hospital outbreak of listeriosis with 3 cases was registered, and samples from patients and environment analysed. The source was shown to be a slicing machine for cold cuts in the hospital kitchen where the same clone was found.

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

In general, the occurrence of L. monocytogenes in raw food products is low.
Table Listeria monocytogenes in milk and dairy products

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling unit</th>
<th>Sample weight</th>
<th>Definition used</th>
<th>Units tested</th>
<th>Total units positive for L. monocytogenes</th>
<th>L. monocytogenes presence in x g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy products (excluding cheeses)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dairy products, not specified</td>
<td>Industry Single</td>
<td>25g</td>
<td>334</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ready-to-eat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>made from pasteurized milk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Surveillance - HACCP or own checks by industry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheeses, made from unspecified milk or other animal milk</td>
<td>Industry Single</td>
<td>25g</td>
<td>2020</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>unspecified</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>made from pasteurized milk</td>
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<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>- Surveillance - HACCP or own checks by industry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table Listeria monocytogenes in other foods

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling unit</th>
<th>Sample weight</th>
<th>Definition used</th>
<th>Units tested</th>
<th>Total units positive for L. monocytogenes</th>
<th>Listeria monocytogenes presence in x g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish unspecified</td>
<td>NIFES</td>
<td>Single 25g</td>
<td>129</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

(1) : A survey in 3 establishments producing salmon products. A total of 15 of the tested and one of the positive samples were from raw fish, while the 114 other samples were from products of salmon.
2.3.3. Listeria in animals

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

Monitoring system

Sampling strategy
There are no monitoring programmes in regard to 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 as 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
Many animals are investigated with regard to L. monocytogenes and listeriosis in clinical laboratories. In 2005, five goats, 40 sheep and 10 cattle were found positive.

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 to a small degree in food-producing animals. Epidemiologically, however, cases of listeriosis in animals and humans are rarely linked.
### Table Listeria spp. in animals

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Listeria</th>
<th>L. monocytogenes</th>
<th>Listeria spp., unspecified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle (bovine animals)</td>
<td>NVI</td>
<td>Animal</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheep</td>
<td>NVI</td>
<td>Animal</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goats</td>
<td>NVI</td>
<td>Animal</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Footnote**

The investigations of clinical problems and deaths don't usually look specifically for Listeria spp., therefore, the exact number of animals analysed for Listeria is hard to define. Most positive findings were identified as L. monocytogenes, but several were also diagnosed as listeriosis, based on histopathology.
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 (0-17 cases per year, incidence rate 0-0.4 per 100,000 inhabitants). Approximately half of the cases are acquired domestically.

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 representing 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 animal prevalence was 0.06% for cattle and 0.03% for sheep. None of the 510 goats tested were positive.

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

Although the annual incidence in humans in Norway so far has been low and predominantly involved sporadic cases, it is possible that the incidence may increase in the future, and that outbreaks may occur. 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.

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 is still 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. *Escherichia coli*, pathogenic in foodstuffs

#### Table VT E.coli in food

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling unit</th>
<th>Sample weight</th>
<th>Units tested</th>
<th>Total units positive for <em>Escherichia coli</em>, pathogenic</th>
<th><em>E. coli</em> spp., unspecified</th>
<th>Verotoxigenic <em>E. coli</em> (VTEC) - VTEC O157</th>
<th>Verotoxigenic <em>E. coli</em> (VTEC) - VTEC O157:H7</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cheeses, made from unspecified milk or other animal milk</strong></td>
<td>Monitoring - sampling by industry</td>
<td>Industry</td>
<td>Sample</td>
<td>25g</td>
<td>59</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

#### Footnote

The samples from industry were investigated for *E. coli* O157.
2.4.3. Escherichia coli, pathogenic in animals

A. Verotoxigenic Escherichia coli in cattle (bovine animals)

Monitoring system

Sampling strategy
Prevalence surveys have been conducted at farm occasionally since 1998.

Type of specimen taken

Animals at farm
Faeces

Methods of sampling (description of sampling techniques)

Animals at farm
Faecal samples are taken. In several of the surveys performed, a total of nine animals in each herd have been sampled, six adults and three less than 2 years old.

Case definition

Animals at farm
An animal/herd from which VTEC is isolated.

Diagnostic/analytical methods used

Animals at farm
Bacteriological method: NMKL No 164:1999

Measures in case of the positive findings or single cases
If VTEC O157 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 VTEC O157 is detected. Herds found positive for VTEC O157 are followed up with extensive testing four times the following year, or until two negative testing rounds.

Notification system in place

Findings of VTEC O157 in carcasses lead to condemnation of the carcasses and notification to the authorities. Findings of VTEC O157 in samples from live animals are not notifiable as an animal disease, however, competent authorities have to be informed about positive findings.

National evaluation of the recent situation, the trends and sources of infection
The prevalence of VTEC O157:H7 is low in Norwegian cattle.


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 225/96/COL of December 4, 1996) as Norway fulfils 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 campaign 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.
2.5.2. 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 225/96/COL of December 4, 1996) as Norway fulfills the requirements laid down in Council Directive 64/432/EEC as amended.

Monitoring system

Sampling strategy

Animals for slaughter: 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 Community legislation (64/433/EEC).
Breeding animals: All breeding bulls are tuberculin tested several times.
Imported animals: Imported animals are tuberculin tested if considered relevant based upon individual assessment.
Clinical indications: If suspicion arises whether an animal may have tuberculosis (sick or dead animal), relevant tests will be carried out.

Frequency of the sampling

Animals for slaughter: All are subject to meat inspection.
Imported animals: Tested during week 22 of the six months long isolation period.
Breeding animals: Breeding bulls are tuberculin tested before being transferred to a semen collection centre and thereafter subject to yearly testing.

Type of specimen taken

Organs/ tissues: 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) by an official veterinarian according to Community legislation (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
Animals for slaughter: Mandatory control programme. 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 Community legislation (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 Mycobacterium bovis or M. tuberculosis of 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
A total of 331800 bovine animals were slaughtered and subject to a routine post mortem examination. Samples from one cattle were collected during post-mortem examinations at the slaughterhouse and analysed by culture for the presence of Mycobacterium species. Neither M. bovis nor M. tuberculosis were isolated.
All bulls in a breeding company 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

Animals for slaughter: 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 Community legislation (64/433/EEC).
Imported animals: Imported deer are tuberculin tested if considered relevant based upon individual assessment.
Clinical indications: If suspicion arises whether an animal may have tuberculosis (sick or dead animal), relevant tests will be carried out.

Frequency of the sampling

Animals for slaughter: All are subject to meat inspection.
Imported deer: Tested during week 5 of the two months long isolation period.

Type of specimen taken

Organs/ tissues: 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 Community legislation (64/433/EEC). If indicated: bacteriology and histology.
Clinical indications: Tuberculin testing (intradermal comparative test), pathology, and/or bacteriology.
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
Animals for slaughter: Mandatory control programme. 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 Community legislation (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 Mycobacterium bovis or M. tuberculosis of all species has been a notifiable List B disease according to the Animal Diseases Act since 1894. Cases are to be reported to the Norwegian Food Safety Authority.

Results of the investigation

None of the slaughtered deer had findings at slaughter indicating tuberculosis.

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. Animals for slaughter: 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 Community legislation (64/433/EEC).

Imported animals: Animals entering the Norwegian territory from abroad are tuberculin tested if considered relevant based upon individual assessment.

Clinical indications: If suspicion arises whether an animal may have tuberculosis (sick or dead animal), relevant tests will be carried out.

Frequency of the sampling

Animals for slaughter: All animals are subject to meat inspection. 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. Llamas are tested during week 22 of the six months long isolation period.

**Type of specimen taken**

Organs/ tissues: 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 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 Community legislation (64/433/EEC). If indicated: bacteriology and histology. Clinical indications: Tuberculin testing (intradermal comparative test), pathology, and/or bacteriology. Tests of imports, exports: Tuberculin testing (intradermal comparative test).

**Vaccination policy**

Vaccination of animals against tuberculosis is prohibited.

**Control program/mechanisms**

The control program/strategies in place

Animals for slaughter: Mandatory control programme. 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 Community legislation (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 Mycobacterium 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

Tuberculin tests were performed on 86 breeding boars at AI stations, all were negative. Samples from one pig, one horse and one ferret were analysed for the presence of Mycobacterium species. M. avium subsp. avium was isolated from the pig, and M. celatum was isolated from the ferret.

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

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Mycobacterium</th>
<th>M. bovis</th>
<th>M. tuberculosis</th>
<th>Mycobacterium spp., unspecified</th>
<th>M. celatum</th>
<th>M. avium complex - M. avium subsp. avium</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pigs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>breeding animals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- at AI station (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breeding company</td>
<td>Animal</td>
<td>86</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Solipeds, domestic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Animal</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ferrets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pet animals</td>
<td>Animal</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) : Tested by tuberculin testing.

**Footnote**

NVI: Diagnostic submissions.
**Table Bovine tuberculosis in countries and regions that do not receive Community co-financing for eradication programme**

<table>
<thead>
<tr>
<th>Region</th>
<th>Total number of existing bovine</th>
<th>Officially free herds</th>
<th>Infected herds</th>
<th>Routine tuberculin testing</th>
<th>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)</th>
<th>Number of animals with suspicious lesions of tuberculosis examined and submitted to histopathological and bacteriological examinations</th>
<th>Number of animals detected positive in bacteriological examination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Herds</td>
<td>Animals</td>
<td>Number of herds</td>
<td>%</td>
<td>Interval between routine tuberculin tests</td>
<td>Number of animals tested</td>
<td></td>
</tr>
<tr>
<td>NORGE</td>
<td>21500</td>
<td>930100</td>
<td>21500</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>21500</td>
<td>930100</td>
<td>21500</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Footnote**

All 331800 slaughtered bovine animals were subject to a routine post mortem examination. Samples from one cattle were collected during post-mortem examinations at the slaughterhouse and analysed by culture for the presence of Mycobacterium species. Neither M. bovis nor M. tuberculosis were isolated.
<table>
<thead>
<tr>
<th>Region</th>
<th>Total number of existing farmed deer</th>
<th>Free herds</th>
<th>Infected herds</th>
<th>Routine tuberculin testing</th>
<th>Number of tuberculin tests carried out before the introduction into the herds</th>
<th>Number of animals with suspicious lesions of tuberculosis examined and submitted to histopathological and bacteriological examinations</th>
<th>Number of animals detected positive in bacteriological examination</th>
</tr>
</thead>
</table>
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 campaign 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 227/96/COL of December 4, 1996). Due to its history in regard to Brucella melitensis, Norway has been granted an officially brucellosis free status for sheep and goats.

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. There is a need for more research to better understanding the epidemiology regarding Brucella species among marine mammals and to address possible public health implications.

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. Brucella in foodstuffs

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 227/96/COL of December 4, 1996).

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. 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, will be sampled.

Breeding animals: All breeding bulls are tested.

Imported animals: 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

Breeding animals: 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 animals: Cattle are tested at week 22 during the six months long isolation period.

Type of specimen taken

Other: Blood or foetuses.

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

Foetuses: 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

Breeding animals: All breeding bulls are serologically tested twice before being transferred to a semen collection centre, and subsequently within 12 months. Bulls are thereafter subject to yearly testing.
Imported animals: Animals entering the Norwegian territory from abroad 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
All 24 foetuses from 21 herds as well as blood samples from 56 cows tested negative. All 158 bulls that were tested for brucellosis at the AI stations were negative. All 13 bulls tested in relation to export 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 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 has been granted an officially brucellosis free status for small ruminants.

**Monitoring system**

**Sampling strategy**

Surveillance programme: A large proportion of herds being part of the breeding system with ram circles are tested in addition to randomly selected flocks not being part of any ram circles.

Imported animals: Animals entering the Norwegian territory from abroad 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: Herds are tested once a year. 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 and 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/EC 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 the surveillance programme, 28406 animals from 935 herds were tested for antibodies against B. melitensis. One sample gave initially a positive reaction, but this was later found to be an unspecific reaction, and the sample was therefore considered negative for B. melitensis.

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.

C. Brucella melitensis in Goat
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 has been granted an officially brucellosis free status for small ruminants.

Monitoring system

Sampling strategy

Imported animals: Animals entering the Norwegian territory from abroad are serologically tested if considered relevant based upon an assessment of the health status in the country of origin.

Frequency of the sampling

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.

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 is 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.

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

All goats tested for antibodies against B. melitensis 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.

D. Brucella spp. in animal - Pigs

Monitoring system

Sampling strategy

Breeding animals: All breeding boars are tested. Imported animals: Animals entering the Norwegian territory from abroad are tested if considered relevant based upon an individual assessment.

Frequency of the sampling

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


Vaccination policy

Vaccination of animals against brucellosis is prohibited in Norway.
Control program/mechanisms

The control program/strategies in place

Breeding animals: All breeding boars are tested.
Imported animals: Animals entering the Norwegian territory from abroad 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

All 839 pigs belonging to a breeding company tested negative. 219 of these were tested in relation to export of semen or 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

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Brucella</th>
<th>B. melitensis</th>
<th>B. abortus</th>
<th>B. suis</th>
<th>Brucella spp., unspecified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pigs</td>
<td>Breeding company</td>
<td>Animal</td>
<td>839</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dogs</td>
<td>NVI</td>
<td>Animal</td>
<td>39</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Control for export)
### Table Bovine brucellosis in countries and regions that do not receive Community co-financing for eradication programme

<table>
<thead>
<tr>
<th>Region</th>
<th>Total number of existing bovine herds</th>
<th>Officially free herds</th>
<th>Infected herds</th>
<th>Surveillance</th>
<th>Investigations of suspect cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Herds</td>
<td>Animals</td>
<td>Number of herds tested</td>
<td>Number of infected herds</td>
<td>Number of infected animals</td>
</tr>
<tr>
<td>NORGE</td>
<td>21500</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>21500</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Footnote**

The microbiological investigations were performed on 24 foetuses from 21 herds. In addition blood samples from 56 cows were analysed. All samples were negative.
## Ovine or Caprine Brucellosis in countries and regions that do not receive Community co-financing for eradication programme

<table>
<thead>
<tr>
<th>Region</th>
<th>Total number of existing ovine / caprine</th>
<th>Officially free herds</th>
<th>Infected herds</th>
<th>Surveillance</th>
<th>Investigations of suspect cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Herds</td>
<td>Animals</td>
<td>Number of herds</td>
<td>%</td>
<td>Number of animals</td>
</tr>
<tr>
<td>Norge</td>
<td>18000</td>
<td>2465900</td>
<td>18000</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>18000</td>
<td>2465900</td>
<td>18000</td>
<td>100</td>
<td>0</td>
</tr>
</tbody>
</table>

**Footnote**

The majority of herds and animals are sheep. One sample from sheep gave initially a positive reaction, but this was later found to be an unspecific reaction, and the sample was therefore considered negative for B. melitensis.
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 85 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 carcases. In 1995/96 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%. This is 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 identified. This decline coincided with a gradual introduction of improved slaughter routines with the aim of preventing pig carcases 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 as 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.

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 carcases from being contaminated with Y. enterocolitica. A significant reduction of reported cases of human yersiniosis cases was noted parallel to this.

Additional information

In diagnostic submissions, two wild hares were diagnosed with Yersinia, one with Y. pseudotuberculosis and one with Y. enterocolitica. In addition, a rabbit was also diagnosed with
Y. pseudotuberculosis.
2.7.2. Yersinia in foodstuffs

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 стрategies 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 parallel to this action.

Measures in case of the positive findings or single cases

None.
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. 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 animals are analysed for the parasite, the probability of contracting trichinellosis from food producing animals of Norwegian origin is close to zero.
2.8.2. Trichinella in animals

A. Trichinella in pigs

Monitoring system

Sampling strategy

General
All pigs must be controlled for Trichinella at slaughter according to Council Directive 64/433/EEC. This control is compulsory according to the Meat Inspection Act except for those animals slaughtered for on-the-farm consumption.

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. Up to 100 samples, each of 1 gram, can be analysed as a pooled sample when using a digestion method. Sometimes the compression 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 collective samples.

Preventive measures in place

It is prohibited to feed pigs with unsterilized household offal.

Control program/mechanisms
The control program/strategies in place

All pigs must be controlled for Trichinella at slaughter according to Council Directive 64/433/EEC. This control is compulsory according to the Meat Inspection Act except for those animals slaughtered for on-the-farm consumption.

Measures in case of the positive findings or single cases

Measures taken are according to Council Directive 64/433/EEC. Measures imposed on holdings with positive findings of Trichinella are in accordance with Regulations concerning measures against contagious animal diseases of 27.06.2002 no 732 (not allowed to sell animals, carcasses must be incinerated, epidemiological investigations will be initiated). Detection of Trichinella must be reported immediately.

Farms delivering positive carcasses will be identified. The following six months animals from such farms will be given special attention at slaughter. The sample size for the digestion method will be increased to 2 grams.

Notification system in place

Trichinellosis has been a notifiable List B disease according to the Animal Diseases Act since 1965. Cases are to be notified to the Norwegian Food Safety Authority.

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

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 animals or foodstuffs.

B. Trichinella in horses

Monitoring system

Sampling strategy

All horses must be controlled for Trichinella at slaughter according to Council Directive 64/433/EEC. This control is compulsory according to the Meat Inspection Act except for those animals slaughtered for on-the-farm consumption.

Frequency of the sampling

Every slaughtered animal is sampled.

Type of specimen taken
Methods of sampling (description of sampling techniques)

Methods used are in accordance to Council Directive 77/96/EEC. A total of 10 g per carcass is sampled. 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 collective samples.

Results of the investigation including the origin of the positive animals

No cases of trichinellosis among slaughtered horses were reported.

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 (samples of 10 g). Measures taken are in accordance to Council Directive 64/433/EEC. Measures imposed on holdings with positive findings of Trichinella are in accordance with Regulations concerning measures against contagious animal diseases of 27.06.2002 no 732 (not allowed to sell animals, carcasses must be incinerated, epidemiological investigations will be initiated). Detection of Trichinella must be reported immediately. Farms delivering positive carcasses will be identified. The following six months animals from such farms will be given special attention at slaughter.

Notification system in place

Trichinellosis has been a notifiable List B disease according to the Animal Diseases Act since 1965. Cases are to be notified to the Norwegian Food Safety Authority.

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 animals or foodstuffs. The risk of obtaining trichinellosis from Norwegian horse meat is negligible.
### Table Trichinella in animals

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total animals positive for Trichinella</th>
<th>T. spiralis</th>
<th>Trichinella spp., unspecified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pigs</td>
<td>Animal</td>
<td>1473700</td>
<td>0</td>
<td>T. spiralis</td>
<td>Trichinella spp., unspecified</td>
</tr>
<tr>
<td>Solipeds, domestic</td>
<td>Animal</td>
<td>1900</td>
<td>0</td>
<td>T. spiralis</td>
<td>Trichinella spp., unspecified</td>
</tr>
<tr>
<td>horses</td>
<td>Animal</td>
<td>3</td>
<td>0</td>
<td>T. spiralis</td>
<td>Trichinella spp., unspecified</td>
</tr>
<tr>
<td>Foxes</td>
<td>Animal</td>
<td>3</td>
<td>0</td>
<td>T. spiralis</td>
<td>Trichinella spp., unspecified</td>
</tr>
<tr>
<td>Badgers</td>
<td>Animal</td>
<td>1</td>
<td>0</td>
<td>T. spiralis</td>
<td>Trichinella spp., unspecified</td>
</tr>
</tbody>
</table>

**Footnote**

All slaughtered pigs and horses are tested.
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

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 alertness in reindeer environments, especially as regard the importance of regular treatment of herd dogs with an anti-helmintic 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 probably very low. The occurrence of E. multilocularis among animals in the archipelago of Svalbard requires alertness among health personnel, especially in this region. Inhabitants of Svalbard have been informed about the risk.

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 alertness in reindeer environments, especially as regard 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. Inhabitants of Svalbard have been informed about the risk.

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 alertness in reindeer environments, especially as regard the importance of regular treatment of herd dogs with an anti-helmintic 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 probably very low. The occurrence of E. multilocularis among animals in the archipelago of Svalbard requires alertness among health personnel, especially in this region. Inhabitants of Svalbard have been informed about the risk.
2.9.2. 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 among the final hosts (dogs).

Frequency of the sampling
All possible intermediate hosts are being subject to meat inspection procedure according to Council Directive 64/433/EEC.

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
Macroscopic (visual) examination of organs

Other preventive measures than vaccination in place
Dogs 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, especially for herd dogs in areas with reindeer.

Control program/mechanisms
The control program estratégies 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

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: Coproantigen ELISA, flotation (egg detection), and PCR.

B. E. multilocularis in animal

Monitoring system

Sampling strategy

There are no official monitoring programmes for E. multilocularis in animals.

Methods of sampling (description of sampling techniques)

Intermediate hosts: Autopsy.

Case definition

An animal with a positive test result.

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 recent findings of E. multilocularis in the archipelago of Svalbard, the Norwegian Animal Health 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 recent findings of E. multilocularis in the archipelago of Svalbard 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

A research project conducted in the archipelago of Svalbard identified E. multilocularis from 26 (32%) of 81 sibling voles tested. Of the positive animals, 24 were wintered voles, and in total
59% of the wintered voles tested were positive.

**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 although no systematic investigation has been undertaken in wild animals. In a study, serum samples from 98 farmed foxes were free from circulating antibodies to Em2 antigen. In mainland Norway the main host of *E. multilocularis*, the fox, is not suspected to harbour this parasite, and the parasite is not likely to be present in dogs and cats either.

In 1999, in a research project on echinococcosis in the archipelago of Svalbard, *E. multilocularis* was detected in 16% of 172 sibling voles tested. Pathological examinations revealed liver cysts. In a follow-up study, faecal samples from polar foxes, dogs, and cats were collected. The parasite was diagnosed in three of six faecal samples from polar foxes, in one of 48 dogs, and in none of two cats. The methods used were coproantigen ELISA, flotation (egg detection), and PCR. The findings have been followed up. Of the wintered voles tested in 2000, 2001, 2002, 2003 and 2004, 96%, 36%, 25%, 36% and 19% were positive, respectively.
### Table Echinococcus spp. in animals

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Echinococcus spp.</th>
<th>E. granulosus</th>
<th>E. multilocularis</th>
<th>Echinococcus spp., unspecified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle (bovine animals)</td>
<td>Animal</td>
<td>331800</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sheep</td>
<td>Animal</td>
<td>1248600</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Goats</td>
<td>Animal</td>
<td>19200</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pigs</td>
<td>Animal</td>
<td>1473700</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Solipeds, domestic</td>
<td>Animal</td>
<td>1900</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Reindeers</td>
<td>Animal</td>
<td>68400</td>
<td>0</td>
<td>0</td>
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<td>0</td>
</tr>
<tr>
<td>Voles</td>
<td>U</td>
<td>81</td>
<td>26</td>
<td>0</td>
<td>0</td>
<td>26</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(1) Sibling voles</td>
</tr>
</tbody>
</table>

(1) : Sibling voles

### Footnote

All farm animals are inspected for hydatid cysts at slaughter. Number of slaughtered animals are obtained from the Register of Slaughtered Animals.

U: University of Tromso - Survey in the archipelago of Svalbard.
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 abovementioned survey, 2% of the slaughtering pigs tested were seropositive.

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 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. Toxoplasma in animals

A. T. gondii in animals

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.

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
Out of 44 investigated sheep originating from 13 herds, 18 animals from 8 herds were positive. Out of 9 investigated cats, one was positive.

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

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Toxoplasma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheep (1)</td>
<td>NVI</td>
<td>Animal</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>Goats</td>
<td>NVI</td>
<td>Animal</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Cats</td>
<td>NVI</td>
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<td>9</td>
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<td>4</td>
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</table>

(1) : The 44 animals are from 13 herds. The 18 positive animals are from 8 herds.

Footnote

NVI: Mainly diagnostic submissions.
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 since the beginning of the 19th century. The disease has sporadically been diagnosed in polar fox, reindeer, and seal in the archipelago of Svalbard, the last time in a fox found dead in 1999 (25 animal cases were diagnosed during the period 1980-2003). 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 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. In mainland Norway, the possible risk for introduction of rabies through illegally imported animals could pose a risk for humans.
2.11.2. Lyssavirus (rabies) in animals

A. Rabies in dogs

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.

Type of specimen taken
Organs/ tissues: 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
Other: Fluorescent antibody test (FAT), cell culture test or mouse inoculation test. All performed according to the OIE manual, 5th ed. 2004.

Vaccination policy
Vaccines containing inactivated rabies virus antigen are available for dogs and cats intended for international transport that makes vaccination necessary or practical. Otherwise, vaccination against rabies is not done on a routine basis.

Other preventive measures than vaccination in place
Infected animals will be destroyed and measures taken to prevent further cases.

Control program/mechanisms

The control programstrategies in place
Dogs and cats entering Norway from countries not considered rabies free, are subject to four months of quarantine in an officially approved station, followed by a two months period in home quarantine. However, dogs and cats 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...
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 import and export of certain animals of 31.12.98 no. 1478.

Results of the investigation

No cases were reported. Two dogs were investigated, but were negative.

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

Mainland Norway is recognized as 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 dogs has been recorded in Svalbard, people in Svalbard should be aware of the risk.

There is a concern regarding a possible increase in the number of illegally imported dogs.

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.

A survey regarding rabies in wildlife in Svalbard is ongoing.

Frequency of the sampling

On clinical suspicion.

Type of specimen taken

Organs/ tissues: 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
Fluorescent antibody test (FAT), cell culture test or mouse inoculation test, all performed according to the OIE Manual of Diagnostic Tests and vaccines for Terrestrial Animals, 5th ed. 2004. In addition, a PCR method has been established.

**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 import and export of certain animals of 31.12.98 no. 1478.

**Results of the investigation**

All tested animals were negative; 130 polar foxes from Svalbard, 51 red foxes from mainland Norway, and one bat (Vespertilio murinus) showing aggressive behaviour.

**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

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Lyssavirus (rabies)</th>
<th>Unspecified lyssavirus</th>
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<tbody>
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<td>Dogs</td>
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<td>Bats</td>
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<td>Foxes</td>
<td>NVI Animal</td>
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<td></td>
<td>NVI Animal</td>
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<td>0</td>
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</tr>
</tbody>
</table>

(1) : Survey in the northern part of Norway, data includes four clinical submissions).  
(2) : Killed/found dead in 1998 (one fox) and 2002-2005, investigated in 2005.
3. INFORMATION ON SPECIFIC INDICATORS OF ANTIMICROBIAL RESISTANCE
3.1. ESCHERICHIA COLI, NON-PATHOGENIC

3.1.1. General evaluation of the national situation

A. E. 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 isolates

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 organized as to obtain approximately 100 isolates from each animal species. In 2005, cattle and sheep were monitored.

Type of specimen taken

Intestinal content taken at the slaughterhouse.

Methods of sampling (description of sampling techniques)

Random months were given to each slaughterhouse (all slaughterhouses slaughtering more than 1% of the total volume in 2003 were included) for the collection of the samples. The sampling started on the first slaughter day in the week chosen by the local Food Safety Authority and was taken in a frequency chosen by the sampler until the requested number of samples was taken.

Procedures for the selection of isolates for antimicrobial testing

Only one isolate from each herd was included.

Methods used for collecting data

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

Laboratory methodology used for identification of the microbial isolates

Intestinal content was gathered on swabs and 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). 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. All the testing was performed at one laboratory.
Breakpoints used in testing

Microbiological cut-off values were used to classify the isolates as resistant or susceptible. The microbiological cut-off value is defined as the highest MIC-value of isolates that belong to the original genetically unchanged population (wild-type). It classifies the isolates with a MIC-value greater than the microbiological cut-off value as resistant.

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.

B. Antimicrobial resistance of E.coli in food - all foodstuffs - monitoring programme (NORM-VET)

Sampling strategy used in monitoring

Frequency of the sampling

The sampling of food 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 organized as to obtain approximately 100 isolates from each animal species.

Type of specimen taken

Cattle: Meat (minced meat) sampled at production plants.

Methods of sampling (description of sampling techniques)

The meat samples from cattle were collected at 15 cutting plants (10 samples at each facility equally distributed over the year).

Procedures for the selection of isolates for antimicrobial testing

Only one isolate from each sample was included.

Methods used for collecting data

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

Laboratory methodology used for identification of the microbial isolates

Five grams of the meat samples were incubated in 45 ml of MacConkey broth (Oxoid). After incubation at 44C for 24 h, a small amount (approx. 10 microlitre) of broth was plated onto the surface of lactose-saccarose-bromthymol blue agar. After incubation of the agar plates at 37C for 24 h, a typical colony was plated onto blood agar (Heart infusion agar (Difco) containing 5%
bovine blood). 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,
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Breakpoints used in testing

Microbiological cut-off values were used to classify the isolates as resistant or
susceptible. The microbiological cut-off value is defined as the highest MIC-value of
isolates that belong to the original genetically unchanged population (wild-type). It
classifies the isolates with a MIC-value greater than the microbiological cut-off value as
resistant.

Control program/mechanisms

The control program/strategies in place

The sampling of food 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 Sheep - at slaughterhouse - Monitoring - quantitative data [Dilution method]

Number of resistant isolates (n) and number of isolates with the concentration (µl/ml) or zone (mm) of inhibition equal to

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</tbody>
</table>
Table Antimicrobial susceptibility testing of E. coli in Cattle (bovine animals) - at slaughterhouse - Monitoring - quantitative data [Dilution method]

|                  | N  | <=0.03 | 0.06 | 0.12 | 0.25 | 0.5  | 1    | 2    | 4    | 8    | 16   | 32   | 64   | 128  | 256  | 512  | 1024 | 2048 | >2048 | Level |
|------------------|----|--------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|
| E. coli          | 98 | 1      | 1    | 56   | 40   | 1    |      |      |      |      |      |      |      |      |      |      |      |       |        |        |
| Cattle (bovine animals) - at slaughterhouse | Monitoring |
| Isolates out of a monitoring programme | yes |
| Number of isolates available in the laboratory | 98 |

| Antimicrobials | N  | <=0.03 | 0.06 | 0.12 | 0.25 | 0.5  | 1    | 2    | 4    | 8    | 16   | 32   | 64   | 128  | 256  | 512  | 1024 | 2048 | >2048 | Level |
|----------------|----|--------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|
| Tetracyclines  | 98 |        | 1    | 10   | 63   | 24   |      |      |      |      |      |      |      |      |      |      |      |       |        |        |
| Amphenicols    |    | 0      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |        |        |
| Chloramphenicol|    |        |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |        |        |
| Florfenicol    |    |        |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |        |        |
| Cephalosporins | 98 |        | 19   | 77   | 2    |      |      |      |      |      |      |      |      |      |      |      |      |      |       |        |        |
| Cefotaxime      |    |        |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |        |        |
| Enrofloxacin    |    |        |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |        |        |
| Quinolones      | 98 |        | 2    | 51   | 44   | 1    |      |      |      |      |      |      |      |      |      |      |      |      |       |        |        |
| Norfloxacin     |    |        |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |        |        |
| Ceftiofur       |    |        |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |        |        |
| Trimethoprim    | 98 |        | 41   | 48   | 7    | 1    | 1    |      |      |      |      |      |      |      |      |      |      |       |        |        |
| Sulfonylamides  | 98 |        |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |        |        |
| Sulfamamide     |    |        |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |        |        |
| Aminoglycosides | 98 |        |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |        |        |
| Streptomycin    |    | 9      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |        |        |
| Gentamicin      | 98 | 0      | 10   | 46   | 33   | 2    | 5    | 1    | 1    |      |      |      |      |      |      |      |      |       |        |        |
| Neomycin        | 98 | 0      | 52   | 42   | 4    |      |      |      |      |      |      |      |      |      |      |      |      |       |        |        |
| Penicillins     | 98 | 2      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |        |        |
| Ampicillin      |    |        |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |        |        |
Table Antimicrobial susceptibility testing of E. coli in animals

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<th>N</th>
<th>n</th>
<th>N</th>
<th>n</th>
<th>N</th>
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Table Breakpoints used for antimicrobial susceptibility testing of E. coli in Animals

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Footnote

Standard for breakpoint: M=Microbiological cut-off values. These are based on the distribution of MIC-values of a large number of strains and set as to divide the susceptible bacterial population from the resistant population.
Table Breakpoints used for antimicrobial susceptibility testing of E. coli in Food

<table>
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<tr>
<th>Test Method Used</th>
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<th>Broth dilution</th>
<th>E-test</th>
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Footnote
Standard for breakpoint: M=Microbiological cut-off values. These are based on the distribution of MIC-values of a large number of strains and set as to divide the susceptible bacterial population from the resistant population.
4. FOODBORNE OUTBREAKS

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, epidemiological 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 a voluntary reporting system where the District Offices report foodborne outbreaks to the Head Office. 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 disease of 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

In 2005 there were as in previous years some small outbreaks of salmonellosis related to travel abroad, in addition to a few domestic outbreaks which are described below. There were three smaller domestic outbreaks of campylobacteriosis. This is similar to previous years. The suspected sources for the campylobacteriosis outbreaks were chicken in two cases and drinking water in one.

Several norovirus outbreaks were reported. However, for many of these the transmission route was unclear and could have been either foodborne or person-to-person.

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 due to bacterial intoxication (Clostridium perfringens, Bacillus cereus and Staphylococcus
Recently, foodborne outbreaks of norovirus caused by infected foodhandlers 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

No severe outbreaks were reported.

Descriptions of single outbreaks of special interest

There were two domestic outbreaks of salmonellosis of special interest: One outbreak of S. Typhimurium DT104 infections traced to meat imported from Poland, and one family outbreak of infections with S. Infantis and S. Typhimurium traced to Italian cured sausage bought in Sweden.

A hospital outbreak of listeriosis with 3 cases was registered in February 2005. Outbreak investigation was conducted, samples from patients and environment analysed and the source was shown to be a slicing machine in the hospital kitchen where the same clone was found. Isolates from 21 cases reported to the Public Health institute from June 2004 to February 2005 were then checked and altogether 10 cases were connected to the same clone that seems to be common in Norway.
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<td>x</td>
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**Norway 2005 Report on trends and sources of zoonoses**
<table>
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Footnote

Causative agent "Unknown" means gastroenteritis with unknown cause unless specified otherwise.