

ANNUAL REPORT
ON
ZOONOSES IN NORWAY

1997

(According to Article 5 Paragraph 1 of Council Directive 92/117/EEC)

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Contents

Summary	1
Introduction	1
Responsible agencies	2
Population and production data	3
Salmonellosis and the agents thereof	4
animal feed	4
live animals	6
food	9
man	10
Trichinosis	11
Brucellosis and the agents thereof	11
Tuberculosis due to <i>Mycobacterium bovis</i>	12
<i>Escherichia coli</i> O157 infection	12

Summary

This report presents incidence, annual prevalence data, information on place of acquisition and source of infection concerning zoonotic diseases in Norway during 1997. The report deals with the four zoonoses listed in the Council Directive 92/117/EEC, annex I list I; salmonellosis, trichinosis, brucellosis and tuberculosis due to *Mycobacterium bovis*. In addition infections with *Escherichia coli* O157 are included in the report. The report gives an overview of the samples examined, the agents isolated during 1997 and the incidence of disease during recent years.

Extensive monitoring and control of *Salmonella* is carried out in Norway. The monitoring confirms the low prevalence of *Salmonella* (all serovars) infections in live animals and low levels of contamination in feed stuff and food produced in Norway. The figures from 1997 are slightly lower than what was found in 1996. Registrations also show that the majority (approximately 80%) of people infected with *Salmonella* acquires the infection abroad.

Trichinosis (*Trichinella spiralis*) is found only sporadically in pigs in Norway. All pigs slaughtered in abattoirs are checked for the *Trichinella* sp. Trichinosis was last detected in pigs from two different herds in 1994. No human indigenous cases have been recorded since 1980.

Bovine brucellosis (*Brucella abortus*) has been eradicated in Norway since 1953. Porcine brucellosis (*B. suis*), ovine and caprine brucellosis (*B. melitensis*) and *B. ovis* have never been recorded in Norway.

Bovine tuberculosis (*Mycobacterium bovis*) was deemed to have been eradicated in Norway in 1963. However the disease was again detected in 1984 and 1986 in three herds. The outbreaks in these three herds were connected and one person may have been the source of the infection. The last human case in Norway of tuberculosis due to *M. bovis* was registered in 1994. 200 - 250 human cases of tuberculosis occur every year, but there is no indication that animals are the source of infection.

A survey for carriage of *E. coli* O157 in Norwegian cattle in 1995 gave a herd prevalence of 1%. In a survey in minced meat in 1996, no shigatoxin producing strains of *E. coli* O157 was found. This indicates a prevalence of less than 0.3%. *E. coli* O157 infection in man is negligible in Norway, and the last three years the incidence has been 0-10 cases.

Introduction

This report presents data on incidence and prevalence, information on the place of acquisition and source of infection for some zoonotic diseases in Norway during 1997, in accordance with Article 5 paragraph 1 of Council Directive 92/117/EEC. The report deals with the zoonotic diseases mentioned in Annex I Point 1 of the Directive, namely salmonellosis and the agents thereof, trichinosis, brucellosis and the agents thereof and tuberculosis due to *Mycobacterium bovis*. Infections with *E. coli* O157, which is not explicitly mentioned in the Directive, is also mentioned in the report.

This is the third report from Norway according to Council Directive 92/117/EEC. A few changes have been made since the first report in 1995. Infections with *E. coli* O157 are now included in the report.

The report has been compiled by the Norwegian Advisory Committee on Zoonoses in co-operation with the National Institute of Public Health, the National Veterinary Institute, the Norwegian Agricultural Inspection Service, the Norwegian Animal Health Authority, the Norwegian Food Control Authority and the Norwegian Board of Health.

Responsible agencies

Regulations concerning zoonoses in Norway are the responsibility of the Ministry of Agriculture, the Ministry of Health and Social Affairs and, with regard to the control of fish meal for salmonellosis, the Ministry of Fisheries.

Animal feed

The Norwegian Agricultural Inspection Service and the Directorate of Fisheries are responsible for the control of feed stuff for terrestrial animals and fish. Samples of animal feed examined for *Salmonella* are primarily analysed by the National Veterinary Institute, but also by the municipal food control authorities. Fish meal is analysed by the Norwegian Herring-meal Control. Until 1st July 1995 the Norwegian Grain Co-operation had a monopoly on imports of grain, and according to an agreement with the Norwegian Agricultural Inspection Service, all results of *Salmonella* controls were reported. After the monopoly was abolished, it became compulsory to report findings of *Salmonella* in animal feed to the Norwegian Agricultural Inspection Service.

Live animals

The Norwegian Animal Health Authority, of which the District Veterinary Officer is the local representative, is responsible for surveillance and control of animal diseases and the regulations concerning processing and use of animal waste. Among the notifiable diseases mentioned in this report are the list A disease brucellosis and the list B diseases salmonellosis irrespective of serovar, trichinosis and tuberculosis. Nearly all samples from animals examined for these four zoonotic agents are analysed either by the National Veterinary Institute (brucellosis, tuberculosis and salmonellosis) or by the municipal food control authorities (salmonellosis and trichinosis). When a zoonotic disease is suspected or confirmed, the District Veterinary Officer informs the local health authority and the municipal food control authority.

Food

The Norwegian Food Control Authority co-ordinates all public food control activities. Samples of food or food products are analysed by the municipal food control authorities or at various research institutes. Whenever a zoonotic agent is detected, the municipal food control authority concerned and the Norwegian Food Control Authority takes action to prevent contaminated food products from posing a human health risk and to identify the source of the contamination. The District Veterinary Officer is informed whenever there is a possibility that livestock are the source of the contamination.

Man

The medical laboratories analyse specimens from humans. All doctors in Norway are required by law to notify cases of certain diseases to the central unit of the Norwegian Notification

System for Infectious Diseases (MSIS) at the National Institute of Public Health. The notifiable conditions are classified according to reporting procedure and 44 diseases including salmonellosis, trichinosis, brucellosis, tuberculosis and enteropathogenic *Escherichia coli* have to be reported by identity of the infected person. When a case is confirmed by the microbiological laboratory, the medical practitioner is asked to fill in a questionnaire with epidemiological information such as residence, place of acquisition and suspected source of infection.

Population and production data

Norway covers an area of 323.895 square km and has a population of 4.4 million people of which about 0.8 million live in and around the capital Oslo. The livestock population and the number of animals slaughtered in 1997 are presented in Table 1. The domestic production and import of feed materials and compound feed stuff in 1997 are presented in Table 2.

Table 1. Livestock population in Norway as of July 31, 1997 (June 1, 1997 as regards sheep) and the number of animals slaughtered during 1997. The figures are preliminary and are rounded to the nearest hundred. Source: Statistics Norway and The Register of Slaughtered Animals.

	No.		No. Slaughtered animals	
	Animals	No. Herds		
Cattle	1 019 100	31 878	Cattle	350 500
Dairy cows (included in above total)	313 600	24 252		
Goats	82 600	1 578	Goats	26 200
Dairy goats (included in above total)	55 700	842		
Sheep	2 398 000	24 700	Sheep, lamb	1 244 800
Sheep >1 year (breeding animals, included in above total)	976 200	same as above		
Pigs ¹⁾ plus sows July 31, 1997	837 700	6 667	Pigs	1 358 300
Sows (included in above total)	88 700	4 233		
Egg laying hens (>20 weeks of age)	3 208 800	4 223	Hens	2 417 200
Broilers ¹⁾	13 442 100	4 554	Broilers	28 409 400
Turkeys for slaughter ¹⁾	431 100	141	Turkeys	706 200
Ducks and geese for slaughter ¹⁾	24 400	about 200	Ducks and geese	34 800

¹⁾Total number of pigs, broilers, turkeys, ducks or geese for fattening in 1997 until July 31.

Table 2. The domestic production and import of feed materials and compound feed stuff in 1997. Combined totals in tons. NA = data not available. Main source: The Norwegian Agricultural Inspection Service.

Category	Domestic production	Import
<i>Straight feed and raw materials</i>		
Straight feed of vegetable origin	1 020 000	approx.370 000
Fish meal	250 000	136 000
Meat-bone meal	NA	Less than 100
Blood meal	NA	121 ¹⁾
<i>Feed stuff</i>		
Compound feed for ruminants and pigs	1 439 309	3 420 ¹⁾
Compound feed for poultry incl. Ostriches	250 706	787 ¹⁾
Compound feed for fish	524 000	5 227 ¹⁾
Moist feed for fur animals	85 000	0
Others (compounds for pet animals and horses)	30 041	39 810

¹⁾ Source: Statistics Norway, Division for external trade, energy and industrial production statistics.

Salmonellosis and the agents thereof

Monitoring of *Salmonella* in animal feed, live animals and food has been carried out for many years. A nation-wide surveillance and control programme for *Salmonella* was launched in 1995. The programme covers both live animals (cattle, swine and poultry) and meat products (cattle, swine, sheep and poultry). The aim of the programme is to provide reliable documentation on *Salmonella* prevalence and to detect any increased occurrence of *Salmonella*-infections in Norway. When *Salmonella* is found, action is taken to prevent spread of the bacteria and an investigation is started to find the source of the infection or contamination. Nearly all isolations of *Salmonella* sp. from animal feed, live animals, food and man are referred for confirmation at National Institute of Health, Department of Bacteriology.

In Norway the prevalence of *Salmonella* (all serovars) infections in live animals and levels of contamination in domestically produced food and feed stuff is low. Epidemiological data collected by the National Institute of Public Health shows that approximately 80% of the Norwegians infected with *Salmonella* acquired the infection abroad.

Animal feed

Figures concerning the domestic production and import of feed materials and compound feed stuff in 1997 are presented in Table 2. The import of fishmeal has increased since 1996 due to an increase in domestic compound fish-feed production.

The national production of meal originating from fish and animal waste are subject to a continuous process control, while straight feed and compounds are checked by random sampling. Imported feed materials are controlled continuously according to specific rules which classify the feed stuff into high and low risk materials. When *Salmonella* is found, action is taken to prevent spread of the bacteria and investigations are carried out to identify the source of contamination.

The results from the *Salmonella* analyses are presented in three tables. Table 3 presents the results from analyses of domestic produced feed materials and compound feed stuff, while Table 4 presents the authority control analyses of imported feed materials. Table 5 presents analyses performed at local laboratories and processing plants, of which most samples are analysed as part of the "internal supervision system" of the factories. This "internal supervision system" is compulsory and described in "Least requirements for internal control regarding *Salmonella*" ("Minstekrav til egenkontroll for *Salmonella*." Rundskriv FÔR 5/96) authorised in "Act concerning inspection of feedingstuffs" of March 23, 1973.

Chewing bones (dried hide, used for pets) of different brands and sold in different parts of Norway have been checked for *Salmonella*, and have been found to have a high prevalence of *Salmonella*. All chewing bones imported to Norway from third countries are now checked for *Salmonella*. The different *Salmonella* isolated at the National Veterinary Institute are presented in the fifth row in Table 5.

Table 3. Authority control analyses of *Salmonella* of domestic produced feed materials and compound feed stuff in 1997.

Category	No. pos. Samples	No. samples	Serovars of <i>Salmonella</i>	Results 1996 No. Pos. / No. Samples
Feed material of vegetable origin	0	146		0 / 155
Fish meal (from processing plants)	84	6 128	<i>S. Senftenberg</i> , <i>S. Lexington</i>	33 / 5577
Fish meal (samples from compound plants)	0	36		0 / 42
Meat-and-bone meal	0	36		0 / 34
Compound feed for mammals and poultry	0	244		0 / 102
Moist feed for fur animals	1	909	<i>S. Typhimurium</i>	0 / 827
Compound feed for fish	5	646	<i>S. Agona</i> , <i>S. Livingstone</i>	5 / 571

Table 4. Authority control analyses of *Salmonella* of imported feed materials in 1997.

Category ¹⁾	No. Samples	No. pos. Samples	Serovars of <i>Salmonella</i>	Results 1996 No. Pos. / No. Samples
Feed material of vegetable origin	1 414	3	<i>S. sp.</i> , <i>S. Worthington</i> , <i>S. Mbandaka</i>	8 / 1120
Fish meal	220	15	<i>S. Lille</i> , <i>S. Worthington</i> , <i>S. Cerro</i> , <i>S. Anatum</i> , <i>S. Senftenberg</i> , <i>S. Ohio</i>	16 / 413

¹⁾Insignificant quantities of poultry meat meal have been imported, one consignment resulted in 3 positive samples.

Table 5. Results of *Salmonella* analysis of feed stuff performed at local laboratories and processing plants, survey programmes and samples from customers in 1997. NA= Not available.

Category	No. Pos. Samples	No. Samples	Serovars of <i>Salmonella</i>	Results 1996 No. Pos. / No. Samples
Feed material of vegetable origin	0	1 185		0 / 66
Fish meal	4	869	<i>S. enterica</i> spp. 6,7:b:-, <i>S. Ohio</i> , <i>S. Senftenberg</i>	0 / 315
Meat-and-bone meal	4 ¹⁾	1 210	<i>S. Livingstone</i> , <i>S. Orion</i> , <i>S. Isangi</i>	0 / 809
Compound feed (pig, ruminants and poultry)	0	413		0 / 340
Chewing bones made from hides for pet animals	approx. 27	NA	<i>S. Worthington</i> , <i>S. Havana</i> , <i>S. Cerro</i> , <i>S. Typhimurium</i> , <i>S. Orion</i> , <i>S. Montevideo</i> , <i>S. Oslo</i> , <i>S. Raus</i> , <i>S. Lansing</i> , <i>S. Ohio</i> , <i>S. enterica enterica</i> 3,15:y:-	25 / 44
Company survey samples from production lines	NA ²⁾	9 700	<i>S. Montevideo</i> , <i>S. Give</i> , <i>S. Cubana</i> , <i>S. Hadar</i> , <i>S. Infantis</i> , <i>S. enterica</i> spp., <i>S. Worthington</i> , <i>S. Schwarzegrund</i> , <i>S. Typhimurium</i> , <i>S. Senftenberg</i> , <i>S. Amsterdam</i> , <i>S. Mbandaka</i> , <i>S. Livingstone</i> , <i>S. Ohio</i> , <i>S. enterica diarizonae</i> , <i>S. Havana</i> , <i>S. Hadar</i> , <i>S. Agona</i> ,	7 / 2639

¹⁾incl.3 positive samples from imported poultry meat meal mentioned above.

²⁾*Salmonella* was demonstrated in 15 cases during company survey from production lines. Each case resulted in several positive samples.

Live animals

Live animals are tested for *Salmonella* both on clinical indications and in connection with control procedures such as the national surveillance and control programme for *Salmonella*, investigation of contact herds and import control. When *Salmonella* is found, restrictions are imposed on movement of animals on the farm, and investigations to identify the source of the infection are started. When invasive serovars of *Salmonella* are found in poultry, the entire flock is destroyed.

The sampling of domestic live animals in the Norwegian surveillance programme, except for poultry breeders, is described in Table 6. Annually the necessary total of samples to detect *Salmonella* at an animal prevalence level of 0.1% (with 95% confidence level) is collected from the cattle and swine population at slaughter. In addition, all elite breeding pig herds and all poultry flocks exceeding a certain size, are surveyed at herd level. Sampling of breeder flocks of *Gallus gallus* is carried out in accordance with the programme laid down in Annex III of Council Directive 92/117/EEC.

Surveillance results (Table 7) document a low prevalence of *Salmonella* in live cattle, swine and poultry in Norway. In addition to the *Salmonella*-positive herds detected in the surveillance programme, *Salmonella* has also been found in the course of routine control of healthy animals for other reasons, disease evaluation and follow ups of earlier isolations in previous years (Table 8).

The sampling scheme for *Salmonella* in imported animals is presented in Table 9 and the results in Table 10. As can be seen, *Salmonella* has not been detected during inspection of live, imported farm-animals in 1997.

The numbers of positive samples in cattle and swine during 1997 are slightly lower than what was experienced in 1996.

Table 6. Description of the sampling scheme for live animals in the *Salmonella* surveillance programme, breeder flocks of poultry not included - these sampled according to Annex III of Council Directive 92/117/EEC.

Category of animal (size of herd)	Time of sampling	Material
<i>Animals</i>		
Slaughtered pigs	random sample (3000 a year)	ileo-caecal lymph nodes
Slaughtered cattle	random sample (3000 a year)	ileo-caecal lymph nodes
Elite breeder pig herds	all herds once a year	faecal samples
<i>Poultry, table egg production</i>		
Pullets (>250)	4 weeks of age and 2 weeks before transfer	60 faecal samples
Layers (>1000 birds)	25-30 and 48-52 weeks of age	60 faecal samples
Layers (250-999 birds)	25-30 weeks of age	60 faecal samples
<i>Poultry, meat production</i>		
Broilers	1-3 weeks before slaughter	60 faecal samples
Turkeys, ducks and geese (>50 birds)	1-3 weeks before slaughter	60 faecal samples

Table 7. Results from the sampling of live animals in the surveillance programme for *Salmonella*.

Category of animal	Unit	No. pos.	No. Tested	Prev. (%)	Serovars of <i>Salmonella</i>	Results 1996 No. Pos./ No. tested
<i>Farmed animals</i>						
Slaughtered pigs	individuals	0	2 905	0		0 / 2818
Slaughtered cattle	individuals	2	2 653	0,08	<i>S. Typhimurium</i> (2)	3 / 2558
Elite breeder pig herds	herds	0	147	0		0 / 185
<i>Poultry, breeders</i>						
Parents and grandparents	herds	0	80	0		0 / 97
<i>Poultry, table egg production</i>						
Pullets (>250)	herds	0	49	0		0 / 28
Layers (>250)	herds	0	739	0		0 / 1077
<i>Poultry, meat production</i>						
Broilers	flocks	0	2 551	0		5 / 2879
Turkeys, duck and geese (>50 birds)	flocks	0	300	0		0 / 473

Table 8. Number of herds positive for *Salmonella* grouped according to reason for sampling, i.e. disease evaluation, routine control of healthy animals (the *Salmonella* surveillance programme and import control not included) and follow ups of earlier isolations in previous years.

Species	Disease evaluation	Routine control	Follow ups	Total	Serovars of <i>Salmonella</i>	Total 1996
Pigs				0		3
Cattle	3			3	<i>S. Typhimurium</i>	1
Sheep	3	1	1	5	<i>S. enterica diarizonae</i> 61:-:1,5, <i>S. enterica diarizonae</i> 61:k:1,5	2
Hen	1			1	<i>S. Pullorum/ Gallinarum</i>	
Dog	1			1	<i>S. Bareilly</i>	2
Turtle		4		4	<i>S. Kottbus</i> , <i>S. Pottsdam</i> , <i>S. enterica salamae</i> 17:gt:-, <i>S. enterica salamae</i> 58:d:z ₆ , <i>S. enterica diarizonae</i> 61:1(v):1,5, <i>S. Halle</i>	3
Snake	1			1	<i>S. enterica diarizonae</i>	NA
Wild birds	7			7	<i>S. Typhimurium</i>	NA

Table 9. Description of the sampling scheme for *Salmonella* in imported animals each week after arrival to Norway. The table starts with sampling on arrival to Norway (or at hatching for hatching eggs) and describes the sampling for every week after arrival (or hatching). w = week, F = Faecal samples, at least 10g from each imported cattle and swine, and one pooled sample consisting of 60 faecal samples from poultry. B = Blood for serologic testing. D = Every carcass of dead chicks. L = Internal lining of boxes for hatching. MD = Pooled sample of meconium taken from 250 chicks, or 50 carcasses of dead or diseased chicken and 25 environmental samples from the hatchery.

Species	At arrival / hatching	2 w	3 w	4 w	5 w	6 w	7 w	8 w	9 w
Cattle	F		F		F				
Swine	F		F & B		F				
Poultry (live animals)	D & L	D	F						F
Poultry (hatch eggs)	MD								

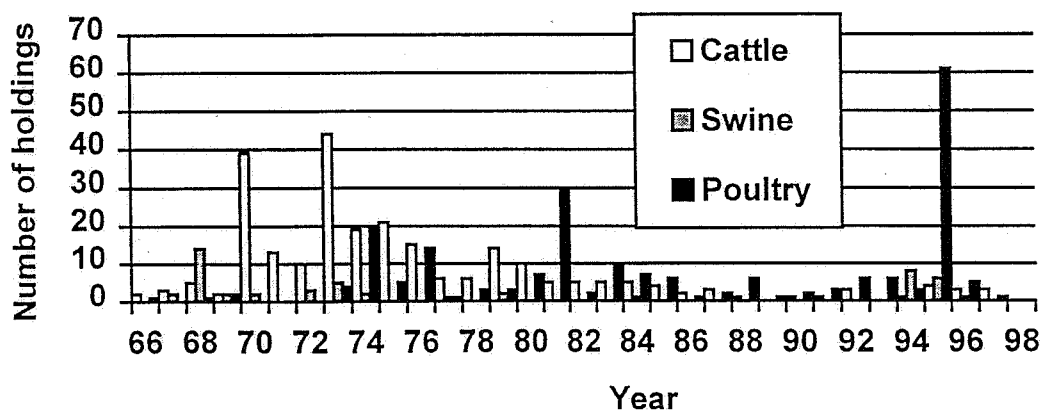
Table 10. Results from the examinations for *Salmonella* of imported live animals in 1997. NA = Not available.

Species	No. Imported animals	No. Imports	No. Submissions	No. Samples	No. Pos. Animals	No. Pos. Imports	Serovars of <i>Salmonella</i>	No. Pos. Imports 1996
Cattle	101	7	NA	287	0	0		0
Swine	30	2	2	12	0	0		1
Chicken	133 730	35	81	NA	0	0		0
Turkeys	12 100	9	24	NA	0	0		0
Ducks and geese.	Less than 1 000	NA		NA	0	0		1
Ostriches	204	9	22	NA	0	0		1
Pigeon	120	NA	0					0
Cage birds	NA	3	3	NA	0	0		NA
Turtle	NA	NA	1	2	2	1	<i>S. Kottbus</i> , <i>S. Halle</i>	NA

Following sporadic isolations of *S. enterica diarizonae*, a prevalence study was carried out on 970 healthy rams in 1993/ 94. *S. enterica diarizonae* was found in 5,1 % of the rams. The prevalence varied strongly geographically and was considerably higher in rams older than 1 year (11,3 %) than in rams younger than 1 year (1,9%). The demonstration of *S. enterica diarizonae* in healthy sheep implemented new slaughter instructions in Norwegian abattoirs. Carcasses found positive for *S. enterica diarizonae* are not used for human consumption, although the bacterium has not been found to cause human infections.

Figure 1 presents the number of new herds of cattle, pigs and poultry subjected to restrictions due to *Salmonella* during 1966 - 1997 according to the veterinary statistics. The increase in poultry herds subjected to restrictions in 1974, 1976, 1981 and 1995 is explained by the spread of *Salmonella* spp. to poultry producers when *Salmonella* was temporarily established in a hatchery.

Figure 1. Number of herds of cattle, pigs and poultry on which restrictions were imposed due to *Salmonella* during 1966 - 1997. Source: Ministry of Agriculture/ Norwegian Animal Health Authority. Veterinary statistics 1966 to 1997.



Food

Food products and food processing plants are tested for *Salmonella* when investigating possible human food-borne infections and as a part of different control measures such as hygiene control, import control and the national surveillance and control programme for *Salmonella*. Whenever *Salmonella* is detected, action is taken to prevent people from being infected by contaminated food products and to identify the source of the contamination.

The sampling of animal products in the national surveillance programme is described in Table 11. Annually, a number of samples sufficient to detect *Salmonella* at a prevalence level of 0.1% (with 95% confidence level) is collected from carcasses of cattle, swine and sheep. Extensive monitoring of cutting plants and poultry slaughterhouses is also carried out.

The results of the surveillance document the extremely low prevalence of *Salmonella* in domestically produced food products of animal origin (Table 12).

In the autumn of 1997 a survey was performed on meat from game ruminants. 332 carcasses were examined (swabs and samples of meat) for *Salmonella*. *Salmonella* was not demonstrated in any of the samples, indicating a low prevalence of *Salmonella* in meat from Norwegian game.

A survey concerning *Salmonella* in imported and domestic grain has been carried out in 1996/97. Of 1399 samples of grain only one proved to be positive. 54 samples of dust from Norwegian grain mills were also examined, resulting in 2 positive samples; *S. Montevideo* and *S. enterica diarizonae*.

Table 11. Description of the sampling scheme for food products of animal origin in the national *Salmonella* surveillance programme. Samples were pooled 5 and 5 for analysis.

Category	Time of sampling	Material
<i>Carcasses</i>		
Carcasses of pigs	random sample (3000 a year)	swabs
Carcasses of cattle	random sample (3000 a year)	swabs
Carcasses of sheep	random sample (3000 a year)	swabs
Carcasses of poultry	1 sample from every slaughter flock and at least 5 samples a day in each slaughterhouse	neck skin
<i>Cutting plants and cold stores for fresh meat and poultry meat</i>		
Production capacity <2 tons	twice a year	crushed meat
Production capacity 2-20 tons	once a month	crushed meat
Production capacity >20 tons	once a week	crushed meat

Table 12. Results from the analyses of food products of animal origin in the national *Salmonella* surveillance programme in 1997.

Category	Unit	No. pos. samples	No. Samples	Prev. %	Results 1996
					No. Pos./ No. Samples
Carcasses of pigs	carcass	0	2864	0	0 / 2768
Carcasses of cattle	carcass	0	2616	0	0 / 2616
Carcasses of sheep	carcass	0	2728	0	3 / 2802
Carcasses of poultry	neck skin	0	7591	0	0 / 6653
Crushed meat	25 gram crushed meat collected at different locations in the plant	0	2103	0	0 / 1577

During the autumn of 1997, 466 samples of imported cheese, 399 samples of imported shellfish and 53 samples of imported poultry was examined for *Salmonella* spp. *Salmonella* spp. was not demonstrated in the cheese. Two of the samples from shellfish (0,5%) and five of the samples from poultry (6%) contained *Salmonella*.

Man

Salmonellosis was diagnosed in 1391 persons in 1997 (Table 13). Of these, 194 (14%) were domestic cases, 1073 (77%) had acquired the infection abroad and in 124 cases the place of acquisition of the infection was unknown. The incidence data for salmonellosis in man in Norway during 1975 - 1997 are presented in Figure 2.

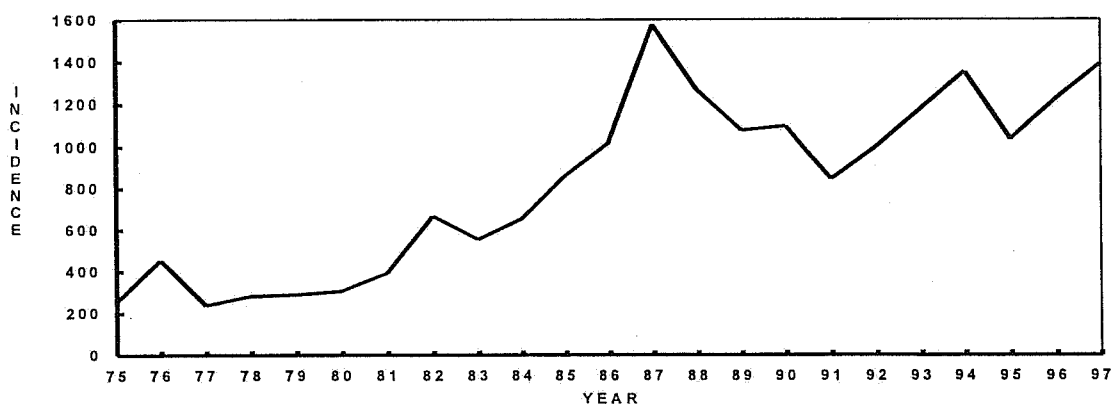
Table 13. Incidence of human cases of salmonellosis, trichinosis, brucellosis, bovine tuberculosis and *E. coli* O157 infection during the last 6 years. For 1997 the number of cases per 100.000 population is also given in brackets.

	1997	1996	1995	1994	1993	1992	1991	1990
Salmonellosis	1391 (31,7)	1225	1035	1352	1178	1001	860	1096
Trichinosis	0 (0,0)	2	0	0	0	0	0	0
Brucellosis	1 ¹⁾ (0,0)	0	0	0	0	0	0	0
Tuberculosis with <i>M. Bovis</i>	0 (0,0)	0	0	2	1	0	0	0
<i>E. coli</i> O157 infection	8 ²⁾ (0,2)	10	0	1	0	0	0	0

¹⁾ Infected in Turkey.

²⁾ 7 indigenous cases and one case infected in Morocco.

FIGURE 2. SALMONELLOSIS IN MAN BY YEAR, NORWAY, 1975 - 97, CASES NOTIFIED TO MSIS



The high incidence in 1982 was due to a domestic pepper-associated epidemic caused by *S. Oranienburg*. The peak in 1987 was due to a chocolate-associated epidemic caused by *S. Typhimurium*. The increasing annual incidence is correlated to people increasingly travelling abroad. In 1997 between 30 and 40 people were infected by *S. Enteritidis* on an air-flight from The Canary Islands to Norway. At least 10 out of the 194 domestic cases were infections acquired through ingestion of a certain brand diet-powder.

The most common serovars of *Salmonella* isolated are given in Table 14 and, for domestic cases only, in Table 15. Of the serovars also isolated from mammals and poultry (import control not included) and which are not included in Table 15, there are no human cases of domestic acquisition involving *S. enterica diarizonae* 61:-:1,5, *S. enterica diarizonae* 61:k:1,5, *S. Pullorum/Gallinarum*, *S. Bareilly*, *S. Kottbus*, *S. Potsdam*, *S. enterica salmae* 17:gt:-, *S. enterica salmae* 58:d:z6, *S. enterica diarizonae* 61

Table 14. The serovars of *Salmonella* with a human incidence higher than 10 in 1997 irrespective of place of acquisition.

No.	Serovars	1996
783	<i>S. Enteritidis</i>	614
221	<i>S. Typhimurium</i>	208
54	<i>S. Virchow</i>	66
27	<i>S. Hadar</i>	26
21	<i>S. Newport</i>	4
19	<i>S. Agona</i>	23
14	<i>S. Stanley</i>	14
13	<i>S. Heidelberg</i>	16
12	<i>S. Java</i>	21
11	<i>S. Infantis</i>	6

Table 15. The ten most common serovars of *Salmonella* isolated from domestic human cases of salmonellosis in 1997.

No.	Serovars	1996
77	<i>S. Typhimurium</i>	67
62	<i>S. Enteritidis</i>	48
7	<i>S. Java</i>	7
3	<i>S. Newport</i>	0
2	<i>S. Hadar</i>	2
2	<i>S. Litchfield</i>	0
2	<i>S. Montevideo</i>	5
2	<i>S. Oranienburg</i>	0
2	<i>S. Stanley</i>	5
2	<i>S. Thompson</i>	1

Trichinosis

Live animals and food

There is an extensive control for trichinosis (*Trichinella spiralis*) in farmed animals at slaughtering. All pigs, all horses after November 1995 and all individual animals of other susceptible species, are examined. Trichinosis is only found sporadically in farmed animals and was last found in two pig herds in 1994. This was the first report of trichinosis in pigs since 1981.

Man

In 1996 two cases of trichinosis were reported (Table 13). Both were infected in ex-Yugoslavia. Before that, the last reported case of trichinosis in man was in 1980. The place of acquisition was unknown. No cases were reported in 1997.

Brucellosis and the agents thereof

Live animals

Bovine brucellosis (*Brucella abortus*) has been eradicated from Norway since 1953. The brucellosis eradication programme is described in "Animal health standards of Norway" (Source: Ministry of Agriculture). Today some hundred blood samples are tested annually. All bulls are tested routinely before transfer to a semen collection centre and subsequently once a year. Tests are also carried out in connection with special breeding schemes, on clinical indications and in connection with import and export.

Porcine brucellosis (*B. suis*), *B. ovis* and caprine and ovine brucellosis (*B. melitensis*) have never been recorded in Norway. All breeding boars selected for semen collection centres are examined serologically for brucellosis.

Man

In 1997 one case of brucellosis in man was recorded. The patient had been infected in Turkey. Before this the last case of brucellosis in man was recorded in 1987. The person who was infected with *B. melitensis*, had acquired the infection abroad (Mediterranean area).

Tuberculosis due to *Mycobacterium bovis*

Live animals and food

Bovine tuberculosis (*Mycobacterium bovis*) was deemed to have been eradicated in Norway in 1963. The tuberculosis eradication programme is described in "Animal health standards of Norway" (Source: Ministry of Agriculture). The disease was demonstrated again in 1984 in two herds and 1986 in one herd. The herds were in the same geographical area and the origin of the infection was probably a man diagnosed with tuberculosis.

The last case of human tuberculosis (*M. tuberculosis*) in farmed animals was in a pig in 1991. It was found in a dog in 1989. The source of infection in both these cases was probably human.

Every slaughtered animal except poultry is subjected to meat inspection regarding tuberculosis (lymph node examination). If findings suspicious of tuberculosis are made, samples are submitted to the National Veterinary Institute for cultivation. Every year 150 to 200 samples (159 samples in 1997, mostly from pigs), are subjected to further examination, *M. avium* being isolated from 2/3 - 3/4 of these (145 in 1997). In addition, all breeding bulls and boars are tested routinely prior to being used as semen donors and annually thereafter at the semen collection centres.

Man

Epidemiological information is collected and measures are taken to identify the source of infection whenever a case of tuberculosis is registered. The last two cases of human infection with tuberculosis due to *M. bovis* were registered in 1994 (Table 13). One of these cases involved a 100-year old woman infected in her youth, while the other case involved a patient infected in India. The case reported in 1993 was in a foreigner. Apart from these no new domestic cases of bovine tuberculosis in man has been reported since 1977.

***Escherichia coli* O157 infection**

Live animals

In 1995 a survey in the Norwegian cattle population for shigatoxinogenic *E. coli* O157 was carried out. During July to November 1995, 1.980 faecal samples were collected from 198 herds located in three high density cattle regions in Norway. The samples were analysed by immunogenic separation of *E. coli* O157. Six animals originating from 2 herds were positive for *E. coli* O157/H-, giving a herd prevalence of 1%.

Food

In 1996 a survey of 1.319 samples of minced meat collected at cutting plants and retail outlets in different parts of Norway, were examined for *E. coli* O157. Shigatoxin producing strains of *E. coli* O157 were not found. This indicates a prevalence of shigatoxin producing *E. coli* O157 less than 0.3% in minced meat (95% confidence level) presuming a random sampling.

According to the co-ordinated programme for official controls for foodstuffs in Europe in 1996, 40 samples of smoked sausages were investigated. One sample proved positive for *E. coli* O157, however this isolate failed to produce shigatoxin.

During the autumn of 1997 another survey was performed. 357 samples of smoked sausages (in which beef was the main ingredient), 312 samples of meat from reindeer and 311 samples of frozen raw hamburgers were examined for *E. coli* O 157. Shigatoxin producing strains of *E. coli* O157 was not found, indicating a prevalence of shigatoxin producing *E. coli* O157 less than 1.0 % (95% confidence level) in the mentioned products.

Imported goods were also examined during the autumn of 1997. 285 samples of beef, 5 samples of antelope, 407 samples of cheese made from pasteurised milk and 59 samples of cheese made from unpasteurised milk were examined. *E. coli* O 157 was not found in any of these samples from imported goods.

Man

E. coli O157 infection is negligible in Norway. The last three years the incidence has been 0-10 cases (Table 13). 7 out of 8 were domestic cases in 1997, while 2 out of 10 were domestic cases in 1996.