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ANNUAL REPORT ON ZONOSSES IN NORWAY 1995

Please find enclosed the annual report on zoonoses in Norway according to Council Directive 92/117/EEC, Article 5 Paragraph 1.

Yours sincerely,

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Assistant Director General

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enclosures



ANNUAL REPORT
ON
ZOONOSES IN NORWAY 1995

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



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Summary

This report presents incidence and prevalence data, and information on place of acquisition and source of infection concerning zoonotic diseases in Norway during 1995. The report deals with the four zoonoses; salmonellosis, trichinosis, brucellosis and tuberculosis due to *Mycobacterium bovis*. The report gives an overview of the samples examined, and the agents isolated during 1995, and the incidence during recent years.

Extensive monitoring and control of *Salmonella* is carried out in Norway. The monitoring confirms the low prevalence of *Salmonella* (all serotypes) infections in live animals, and low levels of contamination in feeding stuffs and food produced in Norway. Registrations also show that the majority (80-90%) of people infected with *Salmonella* acquire the infection abroad.

Trichinosis (*Trichinella spiralis*) is found only sporadically in pigs in Norway. All pigs slaughtered in abattoirs are checked for the condition. Trichinosis was last detected in pigs from two different herds in 1994. No human 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. The last case of brucellosis in man was recorded in 1987. The person concerned, infected with *B. melitensis*, had acquired the infection abroad.

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 altogether 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 - 300 human cases of tuberculosis due to *M. tuberculosis* occur every year, but there is no indication that animals are the source of infection.

Introduction

This report presents incidence and prevalence data, and information on place of acquisition and source of infection for zoonotic diseases in Norway during 1995, 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*.

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

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

Feeding stuffs

The Norwegian Agricultural Inspection Service and the Directorate of Fisheries are responsible for the control of feeding stuffs for animals and fish respectively. Samples of animal feeding stuffs examined for *Salmonella* are mostly analysed by the State Veterinary Laboratories and partly also by the municipal food control authorities, and of fish meal 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 for findings of *Salmonella* in animal feeding stuffs to be reported to the Norwegian Agricultural Inspection Service.

Live animals

The Norwegian Veterinary Field Services of which the District Veterinary Officer is the local representative, is responsible for control measures concerning herds and animals affected by notifiable diseases. Among the notifiable diseases are the list A disease; brucellosis and the list B diseases; salmonellosis irrespective of serotype, trichinosis, and tuberculosis. Nearly all animal samples examined for these four zoonotic agents are analysed either by the State Veterinary Laboratories (brucellosis, tuberculosis and salmonellosis) or by the municipal food control authorities (salmonellosis and trichinosis).

Food

Samples of food or food products are analysed by the municipal food control authorities. 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 analysing specimens from humans, and 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 at the National Institute of Public Health. The notifiable conditions are classified according to reporting procedure and 44 diseases including salmonellosis, trichinosis, brucellosis and tuberculosis 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 and place of acquisition.

Norway covers an area of 323.895 square km and has a population of 4.3 million people of which about 0.8 million live in and around Oslo. The livestock population, and the number of animals slaughtered in 1995 are presented in Table 1.

Table 1. Total livestock population in Norway as of 31st July 1995 (December 31, 1994 as regards sheep) and the number of animals slaughtered during 1995. The figures are rounded down to the nearest hundred. Source: Agricultural statistics, (Ministry of Agriculture) and The Register of Slaughtered Animals.

	No. animals	No. herds	No. slaughtered animals	
Cattle	984.300	32.000	Cattle	339.400
Dairy cows (included in above total)	316.100	25.500		
Dairy goats	59.800	900	Goats	27.700
Winter feed sheep (breeding animals)	1.041.600	24.300	Sheep, lamb	1.255.500
Pigs	675.100	7.500	Pigs	1.215.400
Sows (included in the above total)	64.300	4.300		
Layers (>20 weeks of age)	3.556.800	4.300	Hens	2.767.800
Broilers	11.375.100	400	Broilers	23.043.300
Turkeys for slaughter	420.400	190	Turkeys	687.200

Salmonellosis and the agents thereof

In Norway, the prevalence of *Salmonella* (all serotypes) infections in live animals and levels of contamination in domestically-produced food and feeding stuffs is low. Monitoring of *Salmonella* in feeding stuffs, 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 and food products of animal origin. The aim of the programme is to provide reliable documentation of *Salmonella* prevalence, and to prevent any increased occurrence of *Salmonella*-infections in Norway. When *Salmonella* is found, action is taken to prevent spread of the bacterium, and an investigation is started to find the source of the infection or contamination. Epidemiological data collected by the National Institute of Public Health shows that of the Norwegians infected with *Salmonella*, between 80% and 90% are infected abroad.

Feeding stuffs

Figures concerning domestically-produced straight feed, raw materials and feeding stuffs, and imported raw materials are presented in Table 2. Domestically-produced raw materials originating from animals and fish are subject to continuous process control, while straight feed and feeding stuffs are checked by random sampling of representative samples. Imported raw materials and straight feed are also controlled. When *Salmonella* is found, action is taken to prevent spread of the bacteria and investigations are carried out to identify the source of contamination.

Table 2. The production and importation of straight feed, raw materials and feeding stuffs in 1995 (1993 as regards meat bone meal). Combined totals in tons.

Category	Production / importation
<i>Straight feed and raw materials</i>	
Straight feed of vegetable origin, domestic production	ca. 1.100.000 tons
Straight feed of vegetable origin, imported	ca. 400.000 tons
Fish meal, domestic production	227.000 tons
Fish meal, imported	Not available
Meat-bone meal (domestic production only)	32.000 tons
<i>Feeding stuffs</i>	
Compound feed for ruminants and pigs	1.342.500 tons
Moist feed for fur animals	Not available
Compound feed for poultry	253.000 tons
Compound feed for fish	438.000 tons
Others	13.500 tons

Table 3. Results of *Salmonella* analyses of straight feed and raw materials, feeding stuffs and environment samples from processing plants. The totals include both control analyses and analyses performed when investigating instances of contamination. (*See text for information)

Category	No. samples	No. pos. samples	Serotypes of <i>Salmonella</i>
<i>Straight feed of vegetable origin</i>			
domestic production	48	0	
imported	319	37*	<i>S. Typhimurium</i> , <i>S. Livingstone</i> , <i>S. Amsterdam</i> , <i>S. Berta</i> , <i>S. Anatum</i> , <i>S. Yoruba</i> , <i>S. Cerro</i> , <i>S. Senftenberg</i> , <i>S. Tennessee</i> , <i>S. Earling</i> , <i>S. Apapa</i> , <i>S. Cubana</i> , <i>S. Kampala</i> , <i>S. Bergen</i> , <i>S. Oranienburg</i> , <i>S. sp</i> (6,7),
<i>Fish meal</i>			
domestic production	6180	19*	<i>S. Livingstone</i> , <i>S. Stanley</i>
imported	600	6	<i>S. Anatum</i> , <i>S. Agona</i> , <i>S. Bergen</i> , <i>S. Oranienburg</i> , <i>S. Senftenberg</i>
<i>Meat bone meal</i>			
domestic production (no imports)	951	29*	<i>S. Typhimurium</i> , <i>S. Amsterdam</i> , <i>S. Livingstone</i> , <i>S. Subsp.I</i>
<i>Protein concentrates for further mixing</i>	78	8	<i>S. Amsterdam</i> , <i>S. Livingstone</i> , <i>S. Subsp.I</i>
<i>Feeding stuffs</i>			
Compound feed for mammals and poultry	664	0	
Moist feed for fur animals	405	1	<i>S. Montevideo</i>
Compound feed for fish	1113	5	<i>S. Livingstone</i>
<i>Environment samples</i>			
Processing plants	662	18	<i>S. Typhimurium</i> , <i>S. Livingstone</i> , <i>S. Amsterdam</i> , <i>S. Senftenberg</i> , <i>S. Newport</i> , <i>S. Oukam</i> , <i>S. Subsp.I</i>

The results of the *Salmonella* analyses are presented in Table 3. The total number of samples includes sampling with regard to control analyses as well as analyses carried out when investigating instances of contamination. The total number samples presented is probably underestimated as it has not been possible to collect information on all analyses with negative result from all local food control authority laboratories. It is therefore not possible to calculate the prevalence of contamination.

No *Salmonella* were found when controlling nationally produced straight feed of vegetable origin. *Salmonella* representing altogether 16 different serotypes were found in 37 samples of imported straight feed. These samples originated from four different imported batches, 28 of the samples originating from one batch of cotton seed meal.

Fish meal production in Norway is subject to a continuous process control. When *Salmonella* is found, the batch is heat-moisture treated and samples analysed once again before delivery. The 19 positive samples found in 1995 derived from 11 different batches of fish meal originating from two different processing plants.

Meat-bone meal production in Norway is also subject to a continuous process control, which is supervised by a veterinary officer. There is no importation of meat-bone meal. Most of the samples analysed in 1995 were taken when investigating the source of contaminated meat-bone meal at one processing plant. At this plant, three different serotypes were found, namely *S. Amsterdam*, *S. Livingstone* and *S. Subsp.I*. The plant had supplied meat-bone meal to 14 feed compounders, and at least one of the three serotypes was isolated from eight of these establishments. *Salmonella* were only isolated from the unclean zones of the feed compounders. *Salmonella* could not be isolated from samples of compound feed checked at these plants. All feed which had not been heat treated, was nevertheless destroyed.

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 serotypes of *Salmonella* are found in poultry, the entire flock is destroyed.

The sampling of live animals in the Norwegian surveillance programme, except for poultry breeders, is described in Table 4. Annually the necessary total of samples to detect *Salmonella* at a prevalence level of 0.1% (with 95% confidence level) is collected from the cattle and swine population at slaughter. In addition, all breeding pig herds and all poultry herds exceeding a certain size, are surveyed at herd level. Sampling of breeder flocks of poultry is carried out in accordance with the programme laid down in Annex III of Council Directive 92/117/EEC.

Table 4. 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
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

Samples from poultry herds and pig herds were first collected in February, sampling of lymph nodes starting in late March. Because of the complexity of the programme, it took some time before all parts of the programme were being implemented as intended. In particular, it has taken time to incorporate existing monitoring systems of slaughter poultry and poultry breeders into the programme in such a way that all negative results are reported to a central registration point. Therefore it has not been possible to calculate prevalences in breeder flocks and slaughter turkey, ducks and geese. It is expected that the programme will run completely as planned in 1996.

Surveillance results (Table 5) document the low prevalence of *Salmonella* in live animals in Norway. In addition to the *Salmonella*-positive herds detected in the surveillance programme, *Salmonella* has also been found in the course of import control, and when investigating contact herds (Table 6). None of the findings of *Salmonella* in farmed animals have been associated with clinical signs in the herds in question.

The four positive hen herds are all breeder herds for broilers, three of them belonging to a single enterprise with a common hatchery. These three herds thus constituted one epidemiological unit. In July and August 1995, *S. Livingstone* and *S. Berta* were found in this broiler unit. All deliveries from this unit were stopped for several weeks, and infected flocks were destroyed. 17 broiler herds which originated from this unit were found to be infected with *S. Livingstone*. More than 30 other contact herds were subjected to official restrictions and enhanced sampling in order to rule out infection.

Table 5. Results from the sampling of live animals in the surveillance programme for *Salmonella*. Due to incomplete reporting of negative results, it has not been possible to calculate prevalences in poultry breeders and slaughter turkeys, duck and geese. For the same reason, the figures given for the number of slaughter broiler flocks tested and the prevalence of *Salmonella* in these flocks are only estimates

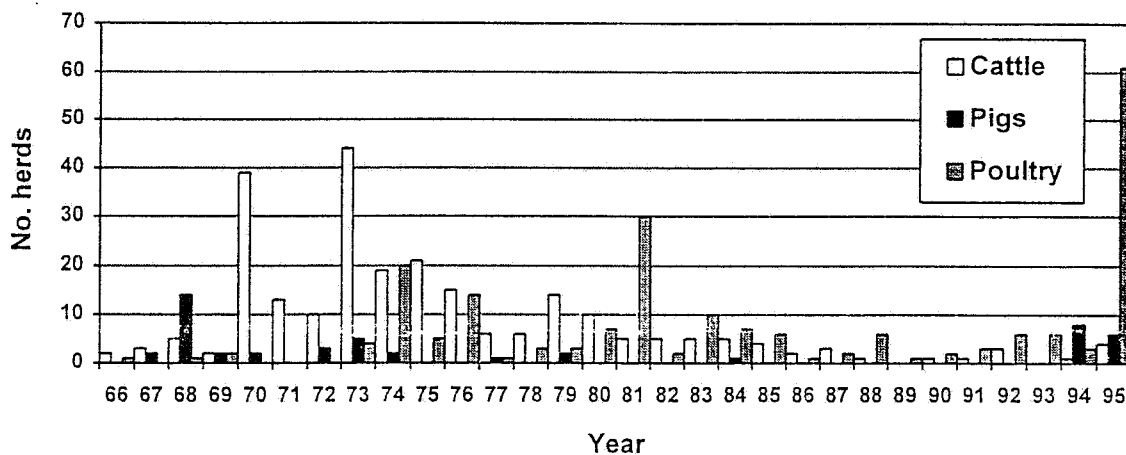
Category of animal	Unit	No. tested	No. pos.	Prev. (%)	Serotype of <i>Salmonella</i>
<i>Farmed animals</i>					
Slaughter pigs	Individuals	3207	4	0.12	<i>S. Diarizona</i> (1), <i>S. Typhimurium</i> v. Copenhagen (3)
Slaughter cattle	Individuals	2786	3	0.11	<i>S. Typhimurium</i> (2), <i>S. Dublin</i> (1)
breeder pig herds	Herds	175	1	0.57	<i>S. Agona</i> (1)
<i>Poultry, breeders</i>					
Parents and Grandparents	Herds	62	1		<i>S. Brandenburg</i>
<i>Poultry, table egg production</i>					
Pullets (>250)	Herds	20	0	0	
Layers (>250)	Herds	1207	1	0.08	<i>S. Brandenburg</i> (1)
<i>Poultry, meat production</i>					
Broilers	Slaughter flocks	~2300	21	~0,9	<i>S. Amsterdam</i> (1), <i>S. Livingstone</i> (17), <i>S. Newport</i> (3), <i>S. Muenchen</i> (1)
Turkeys, duck and geese (>50 birds)	Herds	82	0		

Table 6. Number of herds positive for *Salmonella*, detected by sampling not forming part of the *Salmonella* surveillance programme, according to whether the samples had been taken at import, were follow-ups of earlier isolations in previous years, or had been taken as routine control or from diseased animals in herds in which *Salmonella* had been registered for the first time in 1995.

	Imported animals	First isolation in 1995	Follow ups	Total	serotypes of <i>Salmonella</i>
pigs	1 (2 imports)		2	3	<i>S. Derby</i> (2), <i>S. Brandenburg</i> , <i>S. Typhimurium</i> v. Copenhagen, <i>S. Typhimurium</i>
cattle		1		1	<i>S. Typhimurium</i>
goat		1		1	<i>S. Agona</i>
sheep			14	14	<i>S. Diarizona</i>
red fox		1		1	<i>S. Typhimurium</i> v. Copenhagen
hen	1	4		5	<i>S. Ealing</i> (1), <i>S. Livingstone</i> (4), <i>S. Berta</i> (2), <i>S. Newport</i> (1), <i>S. Muenchen</i> (1)
turkey	1			1	<i>S. Reading</i>
dog		1		1	<i>S. Montevideo</i>
turtle	1	1		2	<i>S. Poona</i> , <i>S. Hartford</i>
pigeons		1		1	<i>S. Typhimurium</i> v. Copenhagen

Figure 1 presents the number of herds of cattle, pigs and poultry subjected to restrictions due to *Salmonella* during 1966 - 1995 according to the veterinary statistics. The slight increase in cattle herds subjected to restrictions in 1995 is probably due to increased sampling, and not to a real increased incidence of *Salmonella* in the population. The same is probably true for the increase in pig herds subjected to restrictions in 1994 and 1995. The increase in poultry herds subjected to restrictions is explained by the above-mentioned spread of *Salmonella* Livingstone from one hatchery to broiler producers. Similar situations were recorded in 1974, 1976 and 1981 when also *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 - 1995. Source: Ministry of Agriculture. Veterinary statistics 1966 to 1995.



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 7. 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.

Table 7. 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	45 samples of meat
production capacity 2-20 tons	once a month	45 samples of meat
production capacity >20 tons	once a week	45 samples of meat

Sampling was started in late March. The results of the surveillance document the extremely low prevalence of *Salmonella* in domestically produced food products of animal origin (Table 8). The one finding of *Salmonella* in pork meat was at the same time and plant as the same serotype of *Salmonella* was isolated from a lymph node in a slaughtered pig. *Salmonella* in neck skin was isolated in samples from two poultry slaughterhouses which received most of the chickens from the broiler herds infected with *Salmonella* Livingstone. Whenever *Salmonella* was found, the meat was condemned as unfit for human consumption and destroyed.

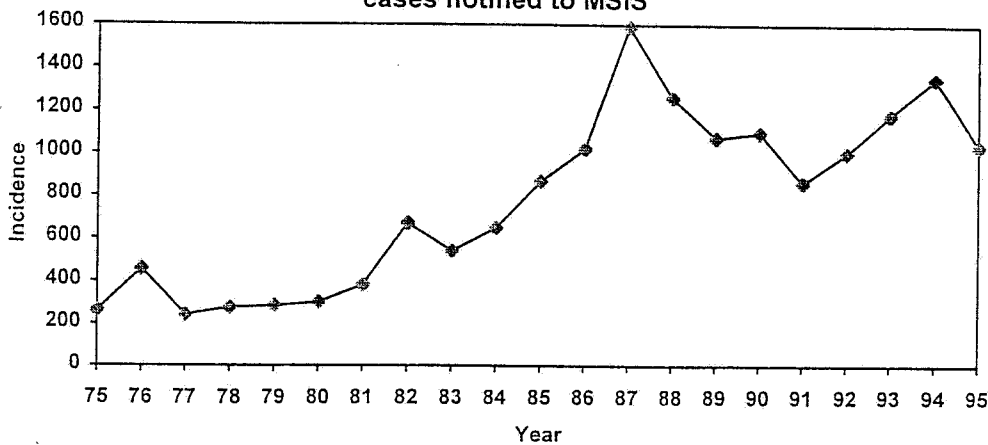
Table 8. Results from the analyses of food products of animal origin in the national *Salmonella* surveillance programme. The material is as described in Table 6.

	Unit	No. samples	No. pos. samples	Prev. %	Serotypes of <i>Salmonella</i>
Carcasses of pigs	Carcass	3175	0	0	
Carcasses of cattle	Carcass	2729	0	0	
Carcasses of sheep	Carcass	2587	0	0	
Carcasses of poultry	5 pooled samples	904	12	1.3	<i>S. Livingstone</i>
meat	5 pooled samples	2875	1	<0.1	<i>S. Typhimurium</i>

Man

Salmonellosis was diagnosed in 1035 people in 1995 (table 9). Of these, 104 (10%) were domestic cases, 867 (84%) had acquired the infection abroad, and in 64 cases the place of acquisition of the infection was unknown. The incidence data for salmonellosis in man in Norway during 1975 - 1995 are presented in Figure 2. 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.

Figure 2. Samonellosis in man by year, Norway, 1975-1995, cases notified to MSIS



The most common serotypes of *Salmonella* isolated are given in Table 10 and, for domestic cases only, in Table 11. Of the serotypes also isolated from mammals and poultry, and which are not included in table 11, there is no recordings of domestic acquisition with the serotypes *S. Livingstone*, *S. Amsterdam*, *S. Muenchen* and only two recorded cases involving *S. Newport*.

Table 9. Incidence of human cases of salmonellosis, brucellosis, trichinosis and tuberculosis with *M. bovis* the last during 5 years. For 1995 the number of cases per 100.000 population is also given in brackets.

	1995	1994	1993	1992	1991	1990
Salmonellosis	1035 (23.9)	1352	1178	1001	860	1096
Trichinosis	0	0	0	0	0	0
Brucellosis	0	0	0	0	0	0
Tuberculosis with <i>M. bovis</i>	0	2	1	0	0	0

Table 10. The serotypes of *Salmonella* with a human incidence higher than 10 in 1995 irrespective of place of acquisition.

No.	Serotypes
563	<i>S. Enteritidis</i>
130	<i>S. Typhimurium</i>
43	<i>S. Virchov</i>
31	<i>S. Infantis</i>
28	<i>S. Hadar</i>
22	<i>S. Agona</i>
15	<i>S. Stanley</i>
13	<i>S. Montevideo</i>
12	<i>S. Bareilly</i>
11	<i>S. Java</i>
11	<i>S. Newport</i>

Table 11. The ten most common serotypes of *Salmonella* isolated from domestic human cases of salmonellosis.

No.	Serotypes
59	<i>S. Enteritidis</i>
34	<i>S. Typhimurium</i>
9	<i>S. Bareilly</i>
7	<i>S. Virchov</i>
6	<i>S. Java</i>
5	<i>S. Agona</i>
5	<i>S. Dublin</i>
5	<i>S. Infantis</i>
5	<i>S. Stanley</i>
4	<i>S. Heidelberg</i>

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

The last reported case of trichinosis in man was in 1980. The place of acquisition was unknown, but the patient had been abroad.

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 each year. All bulls are tested routinely before entering an semen collection centre and subsequently once annually. 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

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 with diagnosed tuberculosis. The man had died at the time of the outbreak.

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

Every slaughtered animal except poultry is submitted to a post mortem examination regarding tuberculosis (lymph node examination). If findings suspicious of tuberculosis are made, samples are submitted to the State Veterinary Laboratory for cultivation. Every year 150 to 200 samples (210 samples in 1995), mostly from pigs, are subjected to further examination, *M. avium* being isolated from 2.3 - 3/4 of these (170 in 1995). 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

Whenever a case of tuberculosis is registered epidemiological information is collected and measures are taken to identify the infection source. The last two cases of human infection with tuberculosis due to *M. bovis* were registered in 1994. One of these cases involved a 100-years 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 had been reported since 1977.