MINISTRY OF FAMILY
AND CONSUMER AFFAIRS

Danish Veterinary
and Food Administration

Animal Health
in Denmark

1999–2005

Animal Health
in Denmark

1999–2005

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PREFACE

I am delighted to present the first Danish Annual Report on animal health since 1998.

I have chosen to make a report covering the years from 1999 to 2005. In future, it is our intention to publish the report on an annual basis.

The report provides a comprehensive overview of developments in the field of animal health in the period 1999-2005. Within this period, considerable development and improvement of the animal health status and veterinary preparedness have been achieved.

The Annual Report includes statistical information and overviews of surveillance that may be useful for reference and details on the three main topics:

- BSE, as Denmark found the first native case in 2000
- Protective measures to prevent the spread of foot and mouth disease to Denmark in 2001, and
- Newcastle disease, as Denmark had an epidemic in 2002.

I hope that you will find the information you need in this Annual Report, but if you need further information, please visit our website: www.dvfa.dk and choose the English version. If you cannot find what you need, please do not hesitate to contact my staff or me.

Preben Willeberg
Chief Veterinary Officer

1.0 LIVESTOCK DISEASE STATUS

The health status of the Danish livestock has continued to improve during the period 1999-2005.

The two major disease events in the period were the detection of the first case of bovine spongiform encephalopathy (BSE) and the Newcastle disease epidemic. The first case of BSE in a Danish-born cow was diagnosed in February 2000, and a total of 17 cases of BSE had been confirmed in Danish-born cows by the end of 2005. The outbreaks of Newcastle disease in July/August 2002 were successfully eradicated within one and a half months even though 135 establishments were affected.

The introduction of other highly contagious animal diseases to Denmark has been avoided during the major animal health crisis in our neighbouring countries in the European Union (EU) in the period 1999-2005 (e.g. foot and mouth disease in the United Kingdom, Ireland, the

Netherlands and France in 2001, and avian influenza in the Netherlands, Belgium and Germany in 2003). Numerous precautionary measures were introduced to respond to these disease epidemics, and they are considered to be important factors in the successful avoidance of having these diseases introduced to Denmark.

In order to keep up the good animal health status of our country, the Danish Veterinary and Food Administration (DVFA) is in the process of revising the contingency plans. In 2003 the contingency plans for classical swine fever and African swine fever were revised, and the contingency plans for Rinderpest, peste de petit ruminants, swine vesicular disease, sheep and goat pox, vesicular stomatitis, lumpy skin disease, Rift Valley fever, African horse sickness and bluetongue were drafted. In 2004 the contingency plan for foot and mouth disease was revised, the contingency plan for bovine spongiform encephalopathy was elaborated and a real-time alert simulation exercise on classical swine fever was performed. In 2005 Denmark participated in the inter-Nordic foot and mouth disease simulation exercise.

In July 2004 the Danish Ministry of Food, Agriculture and Fisheries decided to change the control strategy for Newcastle disease from a non-vaccination strategy to a vaccination strategy, which was implemented in the autumn 2004. The change of control strategy is based on a risk analysis, which was performed because the Danish poultry industry wished to change the control strategy after the outbreaks of Newcastle disease in Denmark in 2002. The contingency plan for Newcastle disease will therefore be revised in the near future.

The Danish Veterinary and Food Administration initiated a screening programme for avian influenza in 2002 in connection with the epidemiological investigations of the four primary outbreaks of Newcastle disease. The screening programme included testing of samples from wild birds. The screening programme for avian influenza continued in revised forms in 2003, 2004 and 2005.

Epidemiological evaluations of the major surveillance programme have also been performed, and based on the conclusions of these evaluations the surveillance programmes for Aujeszky's disease, enzootic bovine leucosis and infectious bovine rhinotracheitis have been modified.

Information on the Danish strategies for prevention and control of animal diseases is available on the website of the Danish Veterinary and Food Administration: www.dvfa.dk

1.1 MULTIPLE SPECIES DISEASES

The Danish Veterinary and Food Administration was in a state of high alert in 2001 due to the foot and mouth disease (FMD) epidemic in the European Union. Several precautionary measures were introduced, and the spread of FMD to Denmark was successfully avoided. Anthrax and Aujeszky's disease have not occurred in Denmark for more than a decade, and neither of these diseases was diagnosed in Denmark in the period 1999–2005. Sylvatic rabies has not been recorded in Denmark since March 1982, but European bat lyssavirus continues to be diagnosed in a few bats almost every year. The only other OIE multiple species diseases that have occurred in Denmark during 1999 to 2005 were paratuberculosis, Q-fever and leptospirosis.

Foot and mouth disease (FMD)

Foot and mouth disease has not occurred in Denmark since 1983, and Denmark is recognised by the OIE as an FMD-free country, where vaccination is not practised.

In the period 1999–2005 there were 13 official suspicions of FMD. All suspicions resulted in official restrictions on the herd affected while laboratory tests were conducted, but none of the suspicions was confirmed.

In response to the FMD outbreaks in the EU in 2001, the entire Danish veterinary control and surveillance system was in a state of high alert, and numerous precautionary measures were taken to prevent the transfer of FMD to Denmark. The most important precautionary measures were:

Practising veterinarians

- Veterinarians were obliged immediately to report any signs of disease to the DVFA, and all veterinarians received instructions on mandatory actions in case of a suspected outbreak of FMD on a Danish farm.

Imports to Denmark of live cloven-hoofed animals were suspended

- Any imports of live cloven-hoofed animals, semen and embryos from France, the United Kingdom, the Netherlands and Ireland were prohibited.
- All market operators were recommended to suspend any imports to Denmark of live cloven-hoofed animals, semen and embryos.
- The Danish Veterinary and Food Administration was to authorise any imports of live cloven-hoofed animals to Denmark in advance. Clearly, imports that constituted a risk of spreading of FMD were not allowed.

Movements of live cloven-hoofed animals were restricted

- Movements of live cloven-hoofed animals within Denmark were restricted and kept under close supervision by the veterinary authorities.
- All vehicles transporting live cloven-hoofed animals were washed and disinfected after each transport.
- Markets with live cloven-hoofed animals were temporarily prohibited.

Contacts with farms were kept at a minimum

- Farmers were recommended to keep visits to the farm at an absolute minimum. Visits by veterinarians followed specific guidelines. A change of clothes, washing and disinfection were required in every case.
- A 48-hour quarantine was recommended for all persons who had been in contact with live cloven-hoofed animals. The same requirement applied to visitors from foreign countries before they were allowed access to Danish herds.
- Farmers had to keep logbooks on all visitors to farms such as veterinarians, artificial insemination technicians, feedstuff suppliers, counsellors, guests, etc.

Restrictions on feed to cloven-hoofed animals

- Direct imports of feed to cloven-hoofed animals to the farm from EU Member States with declared outbreaks of FMD were prohibited.
- The prohibition on swill feeding was reiterated.
- Animal food products and kitchen refuse from various means of transport arriving from countries with declared FMD outbreaks were destroyed.

Other precautionary measures

- Vehicles which returned to Denmark after transporting feed or live animals were washed and disinfected at the Danish border.
- All private imports of meat and milk products for domestic use were prohibited.

- Hygiene rules were tightened with respect to the handling of meat waste and products.
- Farmers were recommended to wash and disinfect hired machines used to spread manure before returning the machine.

Information and surveillance

- Veterinary authorities, other relevant authorities, industry and farmers' organisations were in close contact, and information was communicated smoothly.
- DVFA decided to conduct a serological survey for FMD antibodies in all slaughtered sheep and goats with a carcass weight > 18 kg. The blood samples were collected from April 2001 until July 2001, a total of 2,025 samples. The sample size was selected to give at least 99% confidence of detecting FMD if it was present at the 0.2% prevalence level in Danish sheep and goat populations. All herds were negative.
- Simulation models for airborne transmission of FMD virus were made and revealed that the concentration of the virus over Danish territory had been significantly below the critical value.

In the autumn of 2001, approximately 60 government officials, laboratory experts, private practitioners and representatives from the industry and farmers' organisations were involved in a project aimed at describing the lessons learned, making recommendations for the improvement of the FMD contingency plan and evaluating the eradication strategy. These recommendations were implemented in the contingency plan, which was subject to a major revision in 2004.

Table 1: Number of blood samples examined in the surveillance programme for Aujeszky's disease, 1999–2005.

Year	No. of samples
1999	43,199
2000	44,010
2001	46,258
2002	48,342
2003	66,030
2004	59,706
2005	48,707

The revised contingency plan was tested at the inter-Nordic FMD simulation exercise in 2005. The inter-Nordic FMD simulation exercise concluded that the Danish contingency plan for FMD was satisfactory although some minor adjustments should be incorporated. It also showed that the structure of the competent authority allows for proper functioning over several days with steadily rising pressure on staff with regard to challenges, functions and duties and with regard to the numerous links to stakeholders and the outside society.

Table 2: Number of meat samples examined in the surveillance programme for trichinellosis, 1999–2005.

Year	Number of meat samples from pigs	Number of meat samples from farmed wild boars	Number of meat samples from horses
1999	20,100,000	–	–
2000	20,501,000	752	1,136
2001	21,516,771	1,678	1,245
2002	22,044,781	1,354	1,441
2003	22,375,420	1,280	1,441
2004	24,945,030	1,141	1,278
2005	22,147,738	1,552	1,476

Aujeszky's disease

Aujeszky's disease has not occurred in Denmark since 1991. Since December 1992 Denmark has been recognised by the European Union as being free from Aujeszky's disease (Commission Decision 2001/618/EC).

A serological surveillance programme for demonstrating the absence of Aujeszky's disease was carried out on blood samples collected in slaughterhouses and artificial insemination centres. Based on the conclusions of an epidemiological evaluation of the surveillance programme, a new sampling strategy was implemented in July 2004:

- Until June 2004, all breeding boars, boars over 140 kg (live weight) and 10% of sows were tested before slaughter or export in the southern parts of the country. In the rest of the country, 10% of the boars and 5% of the sows were tested.
- After July 2004, blood from 10% of boars with a live weight of over 140 kg and 5% of sows are tested before slaughter or export.

The number of blood samples examined in each year is given in table 1 at page 9.

The Aujeszky's disease control and eradication programme was described in the 1989 and 1992 editions of this publication.

Rabies

Sylvatic rabies has not been recorded in Denmark since March 1982. However, in September 1985, bat rabies was diagnosed for the first time in Denmark, and the occurrence of bat rabies has been monitored since then. The monitoring of the occurrence of rabies in bats is based on the submission of dead bats for examinations. European bat lyssavirus is diagnosed in a few bats almost every year.

Trichinellosis

Trichinellosis is notifiable in animals in Denmark, and the infection has not been reported in domestic animals since 1930.

The Danish surveillance programme for demonstrating the absence of *Trichinella spp.* infections in domestic animals consists of an examination of meat samples from all pigs and horses slaughtered at Danish export-approved slaughterhouses (table 2, page 10). In 2001 a single parasite larva resembling Trichinella was found. The finding could neither be confirmed by further examination of the larva nor by testing of the 15 herds related to the slaughter batch.

Table 3: The year of last recorded occurrence of other OIE multiple species diseases in Denmark.

Anthrax	1988
Bluetongue	Never recorded
Echinococcosis/hydatidosis	1996
Heartwater*	Never recorded
Leptospirosis**	Serological indication [1]
Q fever**	Reported present
Paratuberculosis*	Known to be present [2]
Screwworm*	Never recorded
Lumpy skin disease	Never recorded
Rift Valley fever	Never recorded
Vesicular stomatitis	Never recorded

* The disease is not notifiable in Denmark.
** The disease was made notifiable in Denmark in December 2004.
1. Serological examinations of bovine and porcine sera indicate a low incidence of leptospirosis.
2. The disease is not controlled officially; since 1979 it has been possible for owners of cattle herds with clinical problems to use vaccination, subject to permission from the Veterinary Service.


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1.2 CATTLE DISEASES

The major cattle disease event in the period 1999–2005 was the detection of the first case of bovine spongiform encephalopathy (BSE) in a Danish-born cow in February 2000. In total, 17 cases of BSE had been confirmed in Danish cows by the end of 2005. Denmark maintained its status given by the European Union regarding bovine herds as officially free of brucellosis, tuberculosis and enzootic bovine leucosis. None of these diseases has been diagnosed in cattle for more than a decade. Denmark is also recognised as free from infectious bovine rhinotracheitis (IBR) by the European Union. However IBR was diagnosed in four herds and in one imported animal in 2002, and was diagnosed in one herd in 2003 and in one herd in 2005. Furthermore Denmark is in the final stages of the successful eradication of bovine virus diarrhoea.

Bovine spongiform encephalopathy (BSE)

The first case of BSE in a Danish-born cow was diagnosed in February 2000. In Denmark, 17 cases of BSE have been found in Danish-born cows, three of which were found in cattle exported to other countries.

BSE was made notifiable in 1990, and the surveillance for the disease in 1999 was limited to testing of animals with clinical signs of BSE. After finding the first positive BSE case, the surveillance was extended to include random sampling of about 15,000 cattle from different risk groups (fallen stock, emergency slaughter etc.) for BSE testing. According to EU regulations, the surveillance programme was later altered to include:

- All healthy slaughter animals older than 30 months (initiated on 1 January 2001). These animals must test negative for BSE before being released for consumption.

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The removal of SRM from all slaughtered animals is considered to be the most important consumer protection factor.

- All fallen stock older than 24 months (initiated on 1 July 2001).
- All emergency-slaughtered animals older than 24 months (initiated on 1 January 2001).
- AM animals older than 24 months (initiated on 1 July 2001). AM animals are cattle which, at the ante-mortem inspection at the slaughterhouse, are suspected of having a disease that can spread to other animals or humans, or which show signs of a disease that could make the meat unsuitable for human consumption.
- Animals imported from the United Kingdom (initiated in 1996). These animals were imported to Denmark before 1990, when importation from the United Kingdom was prohibited. Only one animal imported to Denmark from the United Kingdom is still alive.
- Feeding cohort animals (initiated in 2000). These animals are cattle born between 1 August 1995 and 31 July 1997 and have been fed the same feed as the livestock in which the first positive BSE case occurred in February 2000. Initially this cohort consisted of approximately 11,000 animals. Because all the remaining animals are now older than 30 months, they are automatically tested for BSE when sent for slaughter. So a special surveillance procedure for feeding cohort animals no longer exists.
- All animals above 24 months of age from a BSE-positive herd (initiated in 2001).
- Animals with clinical symptoms of BSE (initiated in 1990).

The results of the surveillance programme for BSE for the period 2001–2005 are summarised in table 4 at page 15.

Immediately after finding the first positive BSE case, Denmark started removing specified risk material (SRM) from carcases of slaughtered animals. The removal of SRM from all slaughtered animals is considered to be the most important consumer protection factor. Further

Table 4: The Danish BSE surveillance programme, 2001–2005.

Target group	2001		2002		2003		2004		2005	
	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.
Fallen stock	20,296	2	34,289	2	38,037	0	36,163	1	36,224	1
Emergency slaughter	1,797	0	1,680	0	1,682	0	1,803	0	2,024	0
AM animals	99	0	24	0	16	0	7	0	9	0
Healthy slaughter animals	250,408	3	254,667	1	250,358	1	246,156	0	216,687	0
UK animals and animals from BSE suspected or positive herds	4,025	0	2,640	0	1,967	0	95	0	6	0
Clinical suspects	70	1	38	0	37	1	18	0	11	0
Total	276,695	6	293,338	3	292,097	2	284,242	1	254,961	1

consumer protection was obtained through a ban on mechanically recovered meat and a ban on pithing. On 1 January 2001, the Danish Veterinary and Food Administration introduced a total ban on feeding of processed animal protein (including meat and bone meal (MBM), fish meal, etc.) to animals that are kept, fattened or bred for the production of food. This total feed ban was a further tightening of the two previous feed bans

Table 5: Data regarding the 17 Danish BSE cases.

Case no.	Date of birth	Age in months	Surveillancecategory	Average age per year (months)	Year of diagnosis
1	1996-07-01	42	Clinical suspect	-	2000
2	1993-07-01	90	Fallen stock	62	2001
3	1997-02-08	48	Clinical suspect		
4	1996-02-23	65	Healthy slaughter		
5	1996-03-12	65	Fallen stock		
6	1996-06-25	64	Healthy slaughter		
7	1998-05-23	41	Healthy slaughter		
8	1996-06-17	70	Healthy slaughter	63	2002
9	1996-01-03	80	Fallen stock		
10	1998-12-08	46	Fallen stock		
Exp. P*	1999-03-15	39	Healthy slaughter		
Exp. I**	1996-04-13	80	Healthy slaughter		
11	1997-08-25	67	Clinical suspect	76	2003
12	1996-03-01	84	Healthy slaughter		
Exp. P*	1996-12-19	78	Fallen stock		
13***	1990	168	Fallen stock	-	2004
14	1996-03-01	113	Fallen stock	-	2005

* Export Portugal, ** Export Italy, ***Diagnosed as "Atypical BSE".

prohibiting feeding ruminant MBM to ruminants (1990) and feeding mammalian MBM to ruminants (1997).

Additionally, all animal waste from cattle (including animals killed in the BSE eradication programme, SRM from slaughter animals, etc.) is processed as SRM at an

incineration plant by high-pressure sterilisation using 133°C for 20 minutes at a 3-bar pressure. The resulting fat and MBM is subsequently incinerated. SRM is not allowed to re-enter the food or feed chain.

The tests applied in the surveillance programme are tests approved by the European Union. In case of a suspicion of BSE, the herd of origin is immediately placed under movement restrictions, and movement restrictions are also imposed on animals with relation to this herd. Additionally, if a rapid test of a slaughter animal is found positive all parts of the animal are destroyed as SRM irrespective of the result of the verification test. The carcases of one animal before and two animals after the relevant animal in the slaughter line are also destroyed as SRM due to the risk of contamination with tissue from the animal tested positive in the slaughter process.

Until 2005, Denmark used a herd culling strategy in the eradication of the disease. All animals on holdings where BSE was diagnosed were killed and incinerated as SRM together with animals related to these holdings. Due to the documented low prevalence of the disease, Denmark has altered the eradication policy in 2005 to cohort culling. This cohort culling was used when handling the 17th case of BSE in a Danish-born cow, which was diagnosed in September 2005. In Denmark, samples are taken from

Figure 1: The geographical distribution of BSE cases in Denmark.

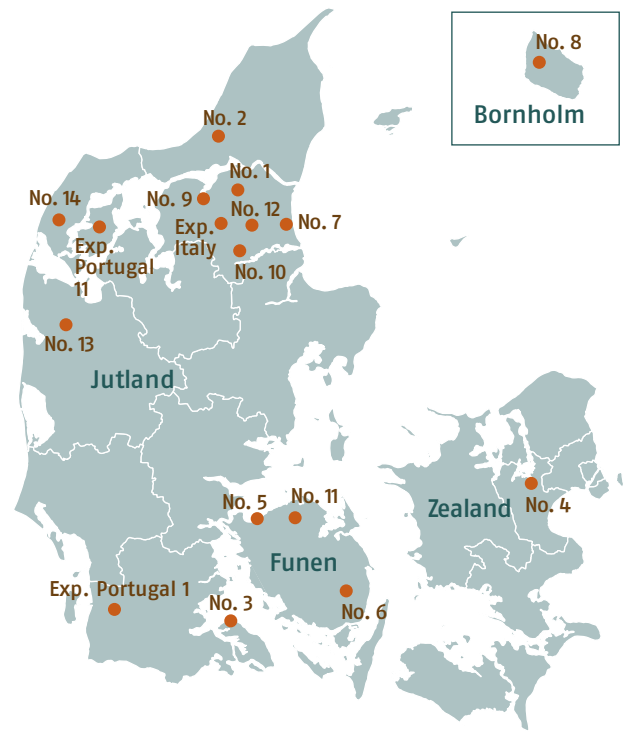
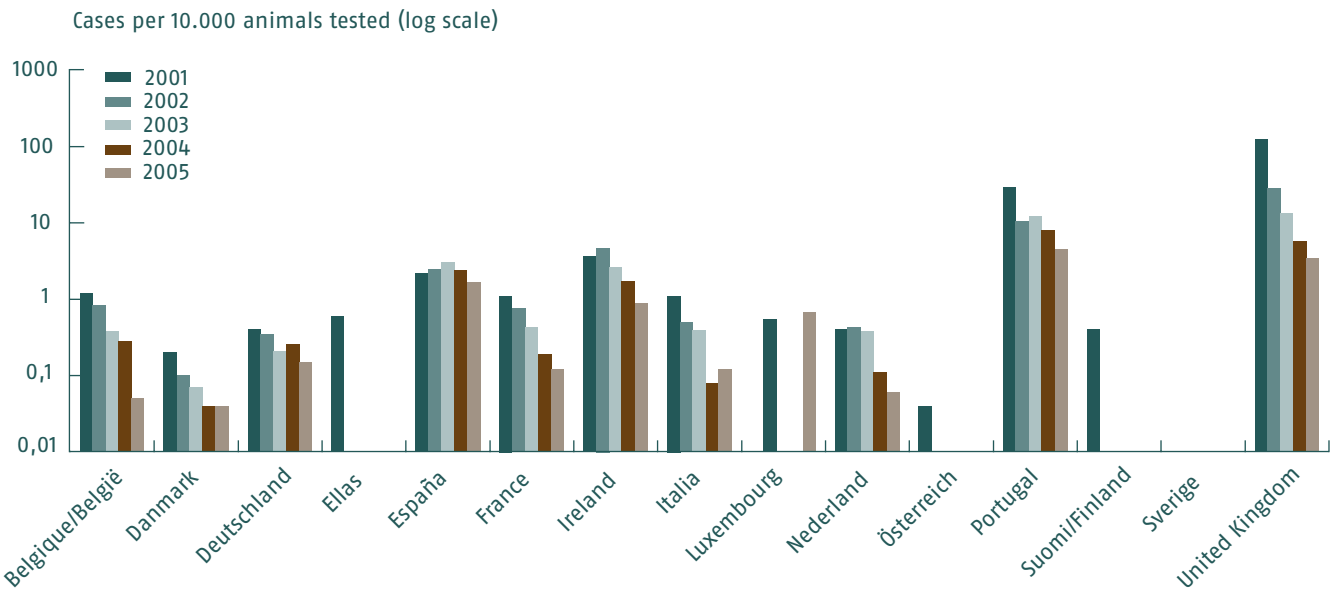


Figure 2: Bovine Spongiform Encephalopathy in the European Union, 2001–2005. Source: EU Commission.



animals older than 24 months for BSE testing prior to the incineration. So far no animals in Denmark have tested positive for BSE in this group.

The Danish BSE cases break down into three clinical cases, seven fallen stock and seven healthy slaughter animals – the youngest case being born in 1999 (healthy slaughter) and the oldest in 1990 (fallen stock). Most (10) of the Danish cases were born in 1996. Table 5 at page 16 summarises data regarding the 17 Danish BSE cases, and figure 1 at page 17 shows the geographical distribution.

Compared to the other EU Member States, Denmark can document a low and significantly downward prevalence of the disease as illustrated by figure 2, page 18.

The National Veterinary Institute has made a prognosis indicating that, as at 1 January 2006, the total number of new BSE cases for the period 2006–2010 will be 0.14.

Infectious bovine rhinotracheitis (IBR/IPV)

Denmark is recognised as free from infectious bovine rhinotracheitis (IBR) by the European Union (EC Commission Decision 2004/558/EC).

National control measures to prevent the infection from spreading were implemented in April 1984. As from February 1991, the infection was considered eradicated. In December 1992 Denmark was recognised as free from IBR by the European Union and has since then maintained this disease-free status.

A serological surveillance programme, sufficient to provide a 99% level of confidence of detecting IBR/IPV if present at a prevalence rate exceeding 0,2% of the cattle herds, is carried out by testing of bulk milk samples and blood samples from slaughterhouses. The sampling strategy was changed on the basis of an epidemiological evaluation of the surveillance programme and because a recently established on-line identification system at the slaughterhouses made it possible to select individual cattle for testing. The new sampling strategy was implemented in June 2004:

- Before June 2004 quarterly bulk milk samples from all dairy herds and blood samples from every sixth slaughter animal above eight months were tested.
- After June 2004 bulk milk samples from all dairy herds in Denmark (excluding Southern Jutland County) are tested four times a year, and bulk milk samples from all dairy herds in Southern Jutland County are tested

Table 6: Number of bulk milk samples and blood samples examined under the surveillance programme for infectious bovine rhinotracheitis (IBR/IPV), 1999–2005.

Year	No. of bulk milk samples	No. of blood samples
1999	45,717	115,433
2000	47,533	109,015
2001	39,960	112,628
2002	38,425	116,547
2003	34,425	120,550
2004	32,296	65,560
2005	30,002	34,078

Figure 3: Geographical distribution of the herd outbreaks of IBR in Denmark in 2002 (●), in 2003 (●), in 2005 (●) and location of the imported animal with IBR antibodies (●).

each month. Monthly bulk milk samples from dairy herds that have imported livestock are tested in the six months following importation. Blood samples from slaughter animals above eight months of age, with a probability of random selection for testing of 15% in the summer half-year and 25% in the winter half-year, from all beef herds in Denmark (excluding Southern Jutland County) are tested. All beef herds in Southern Jutland County and all beef herds that have imported cattle within the last six months which have sent cattle for slaughter have to test one blood sample from an animal older than eight months per herd per month in the 2nd and 3rd quarters, and two blood samples from an animal older than eight months per herd per month in the 1st and 4th quarters.

The number of bulk milk samples and blood samples examined in each year is given in table 6, page 19.

In 2002 IBR was diagnosed in four herds and in one imported animal:

- In April 2002, IBR was diagnosed in three dairy herds, which were located in the southern part of Jutland. All animals from the three herds were subsequently slaughtered and the holdings were cleaned and disinfected. The three infected herds were all found by

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In December 1992 Denmark was recognised as free from IBR by the European Union and has since then maintained this disease-free status.

serological tests. None of the animals showed any clinical signs. No common factor was found that explained the introduction and transmission of the infection to the three positive herds. All contact herds and all herds in a 2-km zone around the infected herds were tested and found to be IBR negative. The three outbreaks were diagnosed within 10 days; the distance from each herd to the German border is less than 21 km.

- On 15 August 2002, a calf imported from the Netherlands reacted seropositive for IBR and the farm was put under restrictions. The seropositive calf was slaughtered and all other cattle on the farm were tested 30 days later – all with a negative result. The restrictions on the herd were subsequently lifted.
- On 14 November 2002, a cow was found positive for IBR by detection of antibodies for IBR in a slaughter blood sample. The herd of origin, a herd near Bylderup Bov in the southern part of Jutland, was placed under restrictions and all cattle in the herd were blood tested with a negative result. Thirty days after this first blood test, all the animals were tested again for IBR and again with a negative result. On 13 December 2002, the restrictions on the herd were lifted.

In 2003, IBR was diagnosed in one herd. The IBR-positive herd was detected on 8 September 2003. All animals in the herd were subsequently slaughtered and the holding was cleaned and disinfected.

On the 2 September 2005, a cow was found positive for IBR by detection of antibodies for IBR in a slaughter blood sample. The herd of origin was placed under restrictions and all cattle in the herd were blood tested with a negative result. Thirty days after this first blood test, all the animals were tested again for IBR and again with a negative result, and the restrictions on the herd were lifted.

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The eradication of bovine tuberculosis in Denmark was initiated already in 1893.

Bovine brucellosis

Since 1979 Denmark has been declared officially free of brucellosis as regards bovine herds by the European Union (EC Commission Decision 2004/320/EC).

The official eradication programme for bovine brucellosis began in 1948, and all cattle herds were registered as free from brucellosis in 1959. Bovine brucellosis has not occurred in Denmark since 1962.

Bovine tuberculosis

Since 1980 Denmark has been declared officially free of tuberculosis as regards bovine herds by the European Union (EC Commission Decision 2004/320/EC).

The eradication of bovine tuberculosis in Denmark was initiated already in 1893. A surveillance programme replaced the eradication programme in 1959 due to the fact that the eradication was so advanced that few outbreaks were diagnosed each year. In 1980 Denmark was declared officially free of tuberculosis as regards bovine herds by the European Union.

The Danish surveillance programme for demonstrating the absence of tuberculosis in cattle consists of clinical examination in conjunction with meat inspections and tuberculin tests of selected animals. All slaughter animals are examined in the meat inspection for possible clinical signs of tuberculosis. Furthermore, bulls are tuberculin tested prior to introduction into a bull station, and cattle are tuberculin tested prior to exportation.

Tuberculosis has not been diagnosed in cattle since 1988, when a cow with clinical symptoms of tuberculosis was identified at the meat inspection. The laboratory examinations confirmed the suspicion of bovine tuberculosis.

The herd of origin was examined, but the disease was not confirmed in any other animal from the herd.

In 1988 bovine tuberculosis was diagnosed in farmed fallow deer. The herd in question was heavily affected, and all animals were destroyed. A national programme for eradication of bovine tuberculosis in farmed deer was initiated, and during 1988 and 1989 the presence of the disease was confirmed in another 12 herds. One infected herd was found in 1991, one in 1993 and yet another in 1994, making a total of 16 infected deer herds. Restrictions have been lifted on all 16 infected premises, and at present no herds are considered infected. The Danish surveillance programme for demonstrating the absence of tuberculosis in farmed deer consists of clinical examination in conjunction with meat inspections, and all slaughter animals are examined in the meat inspection for possible clinical signs of tuberculosis.

Enzootic bovine leucosis

Enzootic bovine leucosis has not occurred in Denmark since 1990, and Denmark has been declared officially free of enzootic bovine leucosis since 1991 by the European Union (EC Commission Decision 2004/320/EC).

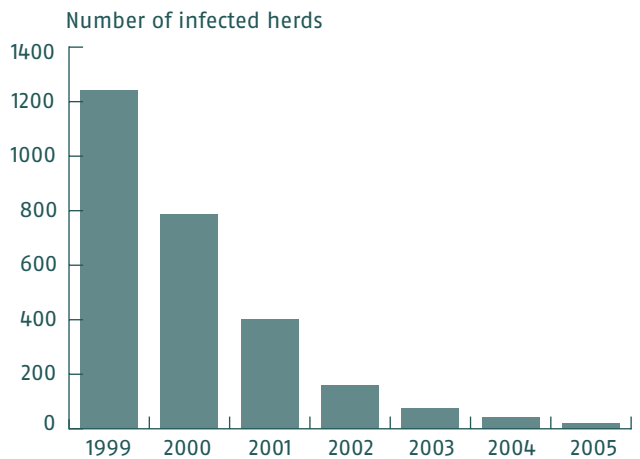
Enzootic bovine leucosis has been a notifiable disease since 1959, and a control programme was initiated the same year. In 1989 a few seropositive animals were identified in five herds. Since then no new reactors have been found. As a result of the control programme the country was declared free from enzootic bovine leucosis by the European Union in July 1991.

Table 7: Number of bulk milk samples and blood samples examined in the surveillance programme for enzootic bovine leucosis, 1999–2005.

Year	No. of bulk milk samples	No. of blood samples
1999	11,534	115,433
2000	0	109,015
2001	0	112,628
2002	8,645	116,547
2003	0	121,852
2004	0	46,944
2005	5,830	20,053

A serological surveillance programme for demonstrating the absence of enzootic bovine leucosis is carried out by testing of bulk milk samples and blood samples from slaughterhouses. The sampling strategy was changed on the basis of an epidemiological evaluation of the surveil–

Figure 4: The number of bovine virus diarrhoea-infected herds in Denmark, 1999-2005.



lance programme and because a recently established on-line identification system at the slaughterhouses made it possible to select individual cattle for testing. The new sampling strategy was implemented in June 2004:

- Before June 2004 bulk milk samples from all dairy herds were tested every third year and blood samples from every sixth slaughter animal above eight months were tested.
- After June 2004 bulk milk samples from all dairy herds are tested every third year, and bulk milk samples are tested six months after the introduction of imported cattle into dairy herds. Furthermore, blood samples from every sixth slaughtered animal above the age of two years are tested from all beef herds, and from all beef herds that have imported livestock and sent cattle for slaughter, a minimum of two samples per herd per month have to be tested in the following 12-month period.

The number of bulk milk samples and blood samples examined in each year is given in table 7, page 23.

Bovine virus diarrhoea (BVD)

A voluntary control programme for bovine virus diarrhoea was implemented in Denmark in 1994. The voluntary programme was replaced in 1996 by a compulsory programme carried out jointly by the Danish Veterinary and Food Administration and the Danish Cattle Federation. The legislation has been continuously adjusted according to the evolution in the BVD programme. The decrease in the number of infected herds is presented in figure 4.

Table 8: The year of last recorded occurrence of other OIE cattle diseases in Denmark.

Bovine anaplasmosis*	Never recorded
Bovine babesiosis*	Suspected to be present
Bovine cysticercosis	Reported present[1]
Bovine genital campylobacteriosis*	1995
Contagious bov. pleuropneumonia	1886
Dermatophilosis*	Never recorded
Haemorrhagic septicaemia*	Never recorded
Malignant catarrhal fever*	Known to be present
Rinderpest	1782
Theileriosis*	Never recorded
Trichomonosis*	1990
Trypanosomosis*	Never recorded

* The disease is not a notifiable disease in Denmark.
1. The disease occurs with a low sporadic prevalence.

1.3 SHEEP AND GOAT DISEASES

Denmark is recognised as being officially free of Brucella melitensis by the European Union and the disease has never been recorded in Denmark. The only OIE sheep and goat diseases that have occurred in Denmark from 1999 to 2005 are Maedi-visna and Caprine arthritis/encephalitis. Both diseases are included in the voluntary control programme for Lentivirus.

Caprine and ovine brucellosis *(Brucella melitensis)*

The disease has never been recorded in Denmark, and since 1995 Denmark has been recognised as being officially free of *Brucella melitensis* by the European Union (EC Commission Decision 94/877/EEC).

A serological surveillance programme for demonstrating the absence of *B. melitensis* is carried out by testing of blood samples collected under the voluntary control programme for Maedi-visna. The number of blood samples examined in each year is given in table 9.

Table 9: Number of blood samples examined in the surveillance programme for Brucella melitensis, 1999-2005.

Year	No. of blood samples
1999	7,245
2000	6,540
2001	5,839
2002	5,829
2003	4,731
2004	4,588
2005	4,492

Table 10: The Danish TSE surveillance programme for sheep, 2002–2005.

	2002		2003		2004		2005	
	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.
Fallen stock	369	0	1,152	0	5,253	0	3,986	0
Animals for slaughter	563	0	880	0	91	0	60	0
Clinical suspects	6	0	3	0	5	0	0	0
Total	938	0	2,035	0	5,349	0	4,046	0

Caprine arthritis-encephalitis

The disease, which has an enzootic occurrence, is mostly recorded as serological findings, as it is included in the voluntary control programme for Maedi-visna (cf. below).

Maedi-visna

A voluntary control programme for lentivirus (Maedi-visna in sheep and caprine arthritis-encephalitis in goat) has existed since 1979. The programme is run by the agricultural organisations. Sheep and goat herds can gain a free status by repeated serological examinations. It requires at least two years to gain the free status. At present, approximately 3,000 herds of sheep and goats have free status.

Transmissible spongiform encephalopathy (TSE)

Scrapie was made notifiable in 1988. The naturally occurring TSE in sheep and goat is scrapie and is not believed to threaten humans, although experiments have shown that BSE can be passed on to small ruminants with the risk of spreading the disease to man.

Table 11: The Danish TSE surveillance programme for goats, 2002–2005.

	2002		2003		2004		2005	
	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.
Fallen stock	95	0	317	0	1,294	0	826	0
Animals for slaughter	51	0	94	0	26	0	241	0
Clinical suspects	4	0	3	0	0	0	3	0
Total	150	0	414	0	1,320	0	1,070	0

In 1995 a voluntary surveillance programme for scrapie was initiated, resulting in testing of a number of small ruminants from holdings that wanted to export animals to other EU countries. In the period 1999–2005 the surveillance underwent several alterations. In 2002, the national surveillance programme was initiated on the basis of EU legislation in the field. The national surveillance programme included testing of a random sample of fallen stock and healthy slaughter animals. In October 2003, Denmark applied to the EU Commission for approval of an extended national surveillance programme including testing of all fallen ovine and caprine animals older than 18 months in Denmark and excluding testing of healthy slaughter animals. The EU granted the permission in January 2004, and by the end of 2004 the surveillance for TSE in sheep and goats in Denmark included testing of all animals with clinical symptoms of TSE and all fallen stock older than 18 months. The diagnosis of a French goat with BSE in the beginning of 2005 resulted in an amendment of the TSE regulations requiring a TSE test of all healthy slaughter goats. By the end of 2005, the Danish surveillance programme included TSE testing of all fallen stock older than 18 months, all healthy slaughter goats older than 18 months and all animals with clinical symptoms of TSE.

"

The diagnosis of a French goat with BSE in the beginning of 2005 resulted in an amendment of the TSE regulations requiring a TSE test of all healthy slaughter goats.

The results for the period 2002–2005 for sheep and goats are summarised in tables 10, page 28 and table 11, page 29.

Scrapie has never been diagnosed in Denmark, and the population of sheep and goats is quite small. Nevertheless the potential human health risk is among the reasons for introducing preventive measures and establishing surveillance and breeding programmes for small ruminants.

Some of the preventive measures for BSE in cattle (see chapter 1.2) also apply to small ruminants. The removal of specified risk material (SRM) from carcases of slaughtered animals was also implemented for small ruminants in 2001. Furthermore the feed bans applied for cattle are also valid for sheep and goats.

When a small ruminant in Denmark is suspected of having TSE, all animals in the herd and all contact animals and contact herds are placed under movement restrictions. So far all Danish suspicions have been disproved, but in the case of verification all animals will be killed and incinerated as SRM. In addition, small ruminants will not be allowed on the holding of the infected animal and contact holdings for a period of several years.

Table 12: The year of the last recorded occurrence of other OIE sheep and goat diseases in Denmark.

Contagious agalactia*	Never recorded
Contagious caprine pleuropneumonia*	Never recorded
Enzootic abortion of ewes*	Never recorded
Nairobi sheep disease*	Never recorded
Ovine epididymitis *(B. ovis)*	Never recorded
Ovine pulmonary ademonatosis	1998
Peste des petits ruminants	Never recorded
Salmonellosis *(S. abortus ovis)*	Never recorded
Sheep pox and goat pox	1879

* The disease is not a notifiable disease in Denmark.

1.4

EQUINE DISEASES

Contagious equine metritis

Taylorella equigenitalis was not isolated in 1999, 2000, 2004, nor in 2005. However *Taylorella equigenitalis* was identified in a stallion in 2001, in two horses in 2002 and in a horse in 2003. Approximately 350 samples were examined each year in the period 1999–2005.

Dourine

Dourine has never been recorded in Denmark. Serological examinations are performed in connection with international trade in horses and horse's semen. Approximately 200 blood samples were examined each year in the period 1999–2005.

Equine infectious anaemia

Equine infectious anaemia has not been recorded in Denmark since 1928. Serological examinations are performed in connection with international trade in horses and horse's semen. Approximately 300 blood samples were examined each year in the period 1999–2005.

Glanders

Glanders has not been recorded in Denmark since 1928. Serological examinations are performed in connection with international trade in horses and horse's semen. Approximately 200 blood samples were examined each year in the period 1999–2005.

Horse mange

Sarcoptic and psoroptic mange have not been recorded in horses since 1987. One case of sarcoptic mange in a horse was diagnosed in 1987, and the last case prior to that one was in 1955.

Table 13: The year of last recorded occurrence of other OIE equine diseases in Denmark.

African horse sickness	Never recorded
Epizootic lympangitis	1945
Equine encephalitis[1]	Never recorded
Equine influenza*	+[2]
Equine piroplasmosis*	Not recorded
Equine rhinopneumonitis*	+
Equine viral arteritis*	+
Horse pox*	Not recorded
Surra *(Trypanosoma evansi)**	Never recorded

* The disease is not a notifiable disease in Denmark.

1. Including equine encephalomyelitis (eastern and western), Japanese encephalitis and Venezuelan equine encephalomyelitis.
2. Vaccination of competition horses and racehorses is comprehensively performed. Consequently cases among these horses are rare and of a mild nature.

1.5 SWINE DISEASES

Classical swine fever (CSF)

The last reported occurrence of classical swine fever was in 1933.

A serological surveillance programme is in place in order to demonstrate the absence of CSF. The serological surveillance programme is a combination of a structured population-based survey and targeted testing of boars at artificial insemination centres (table 14).

Table 14: Number of pigs examined in the surveillance programme for classical swine fever, 1999-2005.

Year	No. of samples
1999	27,743
2000	28,711
2001	29,207
2002	32,879
2003	57,380
2004	32,792
2005	35,972

All suspicions resulted in official restrictions on the affected herd while laboratory tests were conducted, but none of the suspicions were confirmed.

During the period 1999–2005 there were 31 official suspicions of CSF. All suspicions resulted in official restrictions on the affected herd while laboratory tests were conducted, but none of the suspicions were confirmed.

Porcine brucellosis

Brucella suis, biotype 2 (hare brucellosis) was diagnosed in a free range herd of pigs in 1999. The diagnosis was made following clinical signs of disease in boars (swollen testes) and sows (abortions). All pigs in the herd were killed and destroyed. The herd was probably infected by transmission of *Brucella suis*, biotype 2 from European brown hares in the area. This strain of the bacteria occurs sporadically in hares in some areas of the country. In 2002, *Brucella suis*, biotype 2 was isolated from two hares found dead.

All boars at artificial insemination centres are tested according to EC Directive 90/429.

Porcine respiratory and reproductive syndrome (PRRS)

PRRS was first diagnosed in Denmark in March 1992. The disease is endemic. Both European and US strains of the virus are present in the pig population.

Table 15: Occurrence of other OIE swine diseases in Denmark.

African swine fever	Never recorded
Atrophic Rhinitis*	Reported present[1]
Enterovirus encephalomyelitis	Never recorded
Porcine cysticercosis	Not reported[2]
Swine vesicular disease	Never recorded
Transmissible gastroenteritis	Never recorded

* The disease is not a notifiable disease in Denmark.
1. The disease occurs with a low sporadic prevalence.
2. Year of last outbreak is not known.

1.6 POULTRY DISEASES

The major poultry disease event in the period 1999–2005 was the Newcastle disease epidemic in 2002. A total of 135 outbreaks were registered during the epidemic, but despite the many outbreaks the disease was successfully eradicated using a stamping out policy within one and a half months after the initial detection of the disease. Newcastle disease also occurred in 2005, when a single outbreak was confirmed. A screening programme for avian influenza was initiated in 2003. The presence of low pathogenic avian influenza was detected in September 2003 in a holding with mallard ducks, but highly pathogenic avian influenza has never been reported in Denmark. All other poultry diseases listed by OIE, except mycoplasmosis, occurred in Denmark in the period 1999–2005. However all these diseases have a low sporadic occurrence, and the diseases mainly occur in ornamental, hobby and backyard birds.

Newcastle disease (ND)

In the summer of 2002 a Newcastle disease epidemic occurred in Denmark. At that time, the disease had not been diagnosed in Denmark since February 1998. A total of 135 outbreaks were registered during the epidemic. Four primary outbreaks and 131 secondary outbreaks were identified. Most outbreaks were found in the central and southern parts of Jutland, but a single outbreak occurred on the Island of Sejerø in the County of West Zealand (figure 5, page 41). Most outbreaks (126) were observed in backyard flocks. Only nine commercial flocks were infected. All infected commercial flocks were layers or pullets, whereas no broiler holdings became infected.

The first outbreak was confirmed by virus isolation and ICPI-determination on 26 July 2002, and the last outbreak was confirmed on 28 August 2002. However, eradication of infected flocks, establishment of protection and sur-

In July 2004, the Danish Ministry of Food, Agriculture and Fisheries decided to change the control strategy for Newcastle disease from a non-vaccination strategy to a vaccination strategy.

veillance zones and restrictions on poultry movements were initiated for precautionary reasons already on 16 July, *i.e.* 10 days before the first virological confirmation was obtained. The preliminary diagnosis was based on clinical signs and serological reactions. Positive serology could be used as an indicator of ND infection because at that time Denmark applied a non-vaccination policy for ND. All poultry on holdings on which the disease was diagnosed were killed and destroyed.

In most of the outbreaks, no obvious clinical symptoms were observed. Among all 135 outbreaks, only poultry in 13 outbreaks revealed clinical symptoms such as ataxia, torticollis and egg drop. Seven of these were outbreaks in commercial flocks. The pathological lesions were also limited, as was the spread by any other means than movement of pullets already infected.

As a consequence of the very slow in-vitro growth of the virus involved, the diagnostic methods were primarily based on serology in order to ensure rapid eradication of the outbreaks. Avian paramyxovirus-1 (APMV-1) was isolated from three flocks of commercial poultry, but not from any of the backyard flocks. The two isolates tested both belonged to antigenic group C1 viruses.

Based on the epidemiological investigations, one of the primary outbreaks was linked to all of the 131 secondary outbreaks. This was due to the involvement of two poultry dealers, and the infection was spread among backyard flocks through trade in infected pullets. Thereby, this primary outbreak and the related contacts comprised one large epidemiological cluster of infected flocks.

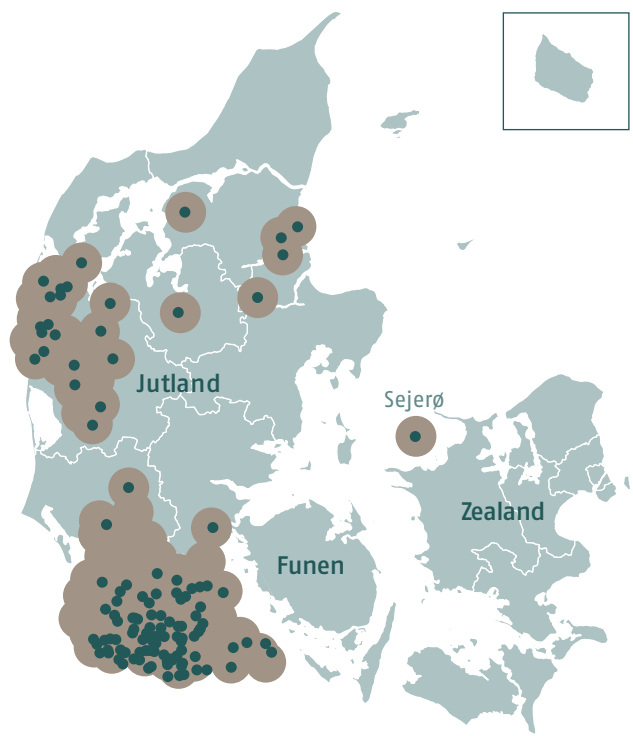
The epidemiological investigations did not succeed in identifying a common source of infection with regard to the four primary outbreaks in commercial flocks. These were all situated less than 2 km from the coastline. The waterfowl populations in the vicinity of these holdings were investigated in attempt to locate the potential source of infection, but the results were inconclusive.

Following preliminary cleaning and disinfection of the affected premises, a serological screening of the more than 600 flocks in the vicinity of the outbreaks was carried out. A limited prevalence of low serological titres was found in 39 of these flocks, and no virus could be isolated.

During the progress of the eradication process, six regionalisations of Denmark were carried out in order to successively re-open the export of live poultry and hatching eggs from ND-free regions of Denmark. All restrictions were lifted by 1 January 2003 and Denmark regained its ND-free status according to the Office International des Epizooties (OIE) standards by 1 March 2003.

In July 2004, the Danish Ministry of Food, Agriculture and Fisheries decided to change the control strategy for Newcastle disease from a non-vaccination strategy to a vaccination strategy. The implementation of the vaccination

Figure 5: Geographic distribution of the outbreaks of Newcastle disease in Denmark in 2002. Blue dots indicate locations of outbreaks and the hatched areas are the 10-km surveillance zones around the outbreaks.



strategy began in the autumn 2004, and approximately one year later the poultry population in Denmark was vaccinated. The change of control strategy was based on a risk analysis, which was performed because the Danish poultry industry wished to change the control strategy after the outbreaks of Newcastle disease in Denmark in 2002.

In October 2005, an outbreak of ND occurred in a layer poultry flock with 41,000 hens. The flock was established before the beginning of the implementation of the Danish ND-vaccination strategy. The outbreak was confirmed by virus isolation and ICPI-determination (ICPI=1.79) on 28 October 2005. However, eradication of infected flocks, establishment of protection and surveillance zones and restrictions on poultry movements were initiated for precautionary reasons already on 21 October 2005. The preliminary diagnosis was based on clinical signs, serological reactions and PCR results. Culling of the infected herd was finalised on 24 October 2005, and the establishment was subsequently cleaned and disinfected. Six farms were examined for Newcastle disease, because they had received day-old chickens from the infected establishment. The results of these investigations did not show any evidence (neither clinical nor laboratory) that the disease had spread to these farms. All restrictions were lifted by 4 December 2005 and Denmark regained its ND-free status according to the Office International des Epizooties (OIE) standards by 25 April 2006.

Further information about the Newcastle disease outbreaks in Denmark in 2002 is available in a final report of the whole epidemic, which can be downloaded from DVFA's website: www.dvfa.dk

Avian influenza

Highly pathogenic avian influenza has never been reported in Denmark.

The first screening programme for avian influenza in Denmark was carried out in the autumn of 2002 and was performed on samples taken in connection with the epidemiological investigations of the Newcastle disease outbreaks. The screening included samples from backyard flocks and wild birds. The backyard flocks were examined both serologically and by virology. Blood samples from 53 backyard flocks that had been sampled in August 2002 were tested, and none was positive. In addition, 102 backyard flocks were examined virologically in August 2002, and the virus isolation performed did not show any presence of virus in the samples. The screening of the wild birds included 1,730 fresh droppings collected from wild birds (cormorants, geese, seagulls, jackdaws, rooks and crows) near the four primary outbreaks of

The first screening programme for avian influenza in Denmark was carried out in the autumn of 2002 and was performed on samples taken in connection with the epidemiological investigations of the Newcastle disease outbreaks.

Newcastle disease and 240 cloacal swabs from hunted game birds (mallards and pheasants). The bird droppings were sampled in September and October 2002, and the cloacal swabs were sampled in December 2002. The samples were pooled in pools of five samples and tested virologically. Avian influenza virus could be isolated from three of the 394 pools, and the avian influenza virus subtypes found were H2N3 (mallard) and H16N3 (seagull and cormorant).

The screening programme for avian influenza in poultry was considerably more comprehensive in 2003, when the screening programme was expanded to include samples from the major poultry types in Denmark, i.e. fattening turkeys, chicken breeders, broilers, layers and ducks (table 16, page 44). The screening programme in poultry was only slightly revised in 2004, the two changes being that only free range broilers were sampled and ducks were examined serologically. The screening programme in poultry was also only slightly revised in 2005, when the main change was that all holdings with free range laying hens were examined. All test results from the screening programme for avian influenza in poultry were negative (table 16, page 44).

The screening programme for avian influenza in wild birds was also more comprehensive in 2003, with both a wider temporal and geographic covering. Bird droppings were sampled in both spring/summer (March to June) and autumn/winter (September to December) and were sampled from 20 locations. The bird droppings were collected from cormorant, lapwing, Bewick's swan, mallard, widgeon, teal and six different goose species. The samples were pooled in pools of five samples and

Table 16: Number of samples examined in the screening programmes for avian influenza in poultry in 2003, 2004 and 2005. All samples were examined serologically for subtypes H5 and H7, except for ducks in 2003, which were examined virologically.

Type of poultry	2003		2004		2005	
	Nsamples	Npositive	Nsamples	Npositive	Nsamples	Npositive
Fattening turkey	120	0	320	0	300	0
Chicken breeders	690	0	480	0	440	0
Broilers	578	0	60[1]	0	50[1]	0
Layers	40	0	550	0	1858	0
Ducks	330[2]	3	540	0	806	0

1. Only free range broilers were sampled in the screening in 2004 and 2005.
2. Five samples were pooled and examined virologically.

tested virologically (by both virus isolation and RT-PCR). Avian influenza virus was detected by RT-PCR in 34 of 579 pools and could be isolated in 15 pools (table 17, page 45). The avian influenza virus was mainly found in the duck species in the autumn months. Neither H5 nor H7 subtypes of avian influenza virus could be isolated, but low pathogenic H5 and H7 subtypes were detected with RT-PCR (table 17, page 45). The following avian influenza virus subtypes isolated in the 15 pools were: H1N1, H3N2, H3N6, H3N8, H4N6, H6N5, H6N8 and H10N7.

The screening programme for avian influenza in wild birds was slightly revised in 2004, when bird droppings were sampled in September to December from 16 locations. The bird droppings were only collected from mallard, widgeon, teal and pintail. The samples were pooled in pools of five samples and tested by both virus isolation and RT-PCR. Avian influenza virus was detected by RT-PCR in 131 of 696 pools and 65 individual samples and could be isolated in 14 samples (table 17, page 45). Low pathogenic avian influenza virus subtype H5N2 was

Table 17: Results of the screening programmes for avian influenza in wild birds. Five samples were pooled and examined virologically.

	2002	2003	2004	2005
Number of pools (Number of samples)	394 (1,970)	579 (2,895)	761 (3,545)	558 (2,790)
AIV isolation (No. of pools) – LPAI subtype H5 or H7	3 0	15 0	14 2	16 3
AIV detection by RT-PCR (No. of pools) – LPAI subtype H5 or H7	-	34 6	131 13	140 27

isolated from two pools, and low pathogenic avian influenza virus subtype H5 could be detected with RT-PCR in 13 pools. The H7 subtype was neither isolated, nor was it detected with RT-PCR. The following avian influenza virus subtypes isolated in the 15 pools were: H2N3, H3N2, H3N8, H5N2 (low pathogenic), H6N2, H8N1 and H8N4.

The screening programme for avian influenza in wild birds was slightly revised in 2005, when the bird droppings were sampled in August to December from two locations. The bird droppings were collected from mallard, teal, widgeon, goose and pheasant. The samples were pooled in pools of five samples and tested by both virus isolation and RT-PCR. Avian influenza virus was detected by RT-PCR in 140 of 558 pools and could be isolated in 16 samples (table 17). Low pathogenic avian influenza virus subtype H5 or H7 was isolated from three pools, and low pathogenic avian influenza virus subtype H5 or H7 could be detected with RT-PCR in 27 pools. All the H5 and H7 positive findings were from mallards. The following

Table 18: Number of outbreaks of other OIE poultry diseases that are notifiable, 1999–2005. The year of last occurrence (in brackets) if no outbreaks of a disease occurred in a year.

Poultry disease	1999	2000	2001	2002	2003	2004	2005
Avian infectious laryngotracheitis	5	9	2	11	8	4	4
Avian tuberculosis	4	7	4	3	1	(2003)	2
Fowl cholera	...	1	1	(2001)	(2001)	1	(2004)
Fowl pox	(1996)	(1996)	2	1	(2002)	1	(2004)
Fowl typhoid	(1994)	(1994)	(1994)	1	(2002)	(2002)	(2002)
Avian clamydiosis	21	19	15	8	8	16	11
Pullorum disease	2	1	2	4	2	5	5

avian influenza virus subtypes isolated in the 16 pools were: H1N1, H1N9, H3N8, H4N6, H5Nx (low pathogenic), H7N5 (low pathogenic), H7N7 (low pathogenic), H9N1 and H11N9.

In addition to the results from the screening programme, the presence of LPAI was detected on 4 September 2003 in a holding with mallard ducks, which was examined due to elevated mortality. The presence of LPAI subtype H5N7 was detected by virus isolation during the laboratory diagnostic examination of the holding. There were 11,000 mallard ducks on the holding, which were raised for restocking for hunting purposes. The elevated mortality was noted on 25 August 2003. The infected flock was further examined by virus isolation and serology. The Danish Veterinary and Food Administration decided for precautionary reasons to cull and destroy the affected flock. All free range poultry flocks within a radius of 10 km from the infected holding were clinically examined and serologically tested. Furthermore, all contact flocks were traced and clinically inspected and examined by virus isolation and serology. All tests were negative for avian influenza virus, and none of the inspected animals showed any signs of disease. This and other evidence

Table 19: Occurrence of other OIE poultry diseases that are not notifiable, 1999–2005.

Avian infectious bronchitis	Known to be present[1]
Duck virus hepatitis	Known to be present[1]
Duck virus enteritis	Known to be present
Infectious bursal disease (Gumboro)	Reported present[2]
Marek's disease	Known to be present[1]
Mycoplasmosis *(M. gallisepticum)*	1967

1. Has a low sporadic occurrence and is controlled by vaccination.
2. Last known occurrence in Denmark was in 2003.

supports the assumption that the clinical signs found in the flock of mallards were not caused by the LPAI virus strain. Isolation of the H5N7 strain is considered to be a coincidental event.

Other poultry diseases

All other poultry diseases listed by OIE, except mycoplasmosis, occurred in Denmark in the period 1999–2004 (table 18, page 46 and table 19). However these diseases have a low sporadic occurrence (table 18, page 46), and the diseases mainly occur in ornamental, hobby and backyard birds.

1.7 LAGOMORPH DISEASES

Myxomatosis

Myxomatosis, which had not been diagnosed during the period from 1962 to 1984, reappeared in 1985, and since then there has been a limited number of outbreaks of the disease in small rabbit farms.

Table 20: Number of outbreaks of myxomatosis, 1999–2004.

Year	No. of outbreaks
1999	0
2000	2
2001	0
2002	2
2003	5
2004	2
2005	0

Tularaemia

Tularaemia has never been recorded in Denmark.

Rabbit haemorrhagic disease

Rabbit haemorrhagic disease has not been recorded in Denmark since 1990.

In 1990, rabbit haemorrhagic disease was diagnosed for the first time in two rabbit farms. One of the rabbit farms was located in the southern part of Jutland, and the other one on the island of Lolland. All rabbits on the two farms were killed, and the premises were subsequently cleaned and disinfected.

Serological examination of wild rabbits has revealed seroreactors in the wild population of rabbits in the southern part of Jutland in 1990, and on the island of Lolland in the years of 1990, 1991 and 1992. No seroreactors have been reported since 1992.

1.8 FISH DISEASES

Denmark has 378 freshwater trout farms and 37 marine fish farms where the main production is rainbow trout. A few land-based marine fish farms have a minor turbot production, and in addition to these there are 12 eel farms. Since 1970, Denmark has had an official disease surveillance programme on all fish farms in the country. Since common EU legislation on animal health conditions governing the placing on the market of aquaculture animals was introduced with Council Directive 91/67/EEC, the surveillance programme has been conducted according to the provisions laid down in this directive.

Viral haemorrhagic septicaemia (VHS)

Since 1970, Denmark has conducted an official surveillance and eradication programme for VHS, which has made it possible to eradicate the disease in 327 of the 378 Danish freshwater fish farms. As a result of this programme, the northern part of Jutland containing 159 fish farms obtained the status of being an approved VHS-free zone in 1992 (figure 6, page 52). The programme is run in close collaboration with the aquaculture industry.

During the period 1999-2005 a varying number of outbreaks occurred (table 21, page 52). In August 2000 an outbreak occurred in one remote trout farm in the centre of the EU-approved VHS-free zone. The source of the outbreak remains unknown. The other outbreaks were in fish farms in the unapproved zone and mainly in the western part of the zone – Skjern Å and Omme Å – where the disease has been difficult to eradicate.

Figure 6: Distribution of VHS in Denmark. EU-approved VHS-free zone (dark area) and VHS-infected water-courses (orange lines)

Table 21: Number of VHS outbreaks in Denmark.

Year	No. of outbreaks
1999	6
2000	13
2001	9
2002	16
2003	18
2004	8
2005	6

Infectious haemorrhagic necrosis (IHN)

IHN has never been recorded in Denmark and the country has the status of EU-approved continental zone free of IHN.

Infectious pancreas necrosis (IPN)

Since 1970 Denmark has conducted a voluntary IPN surveillance programme and has so far registered 44 IPN-free fish farms. Most of these farms are situated along small river systems and their water source is mainly well water. Twenty-six of the 44 IPN free farms have brood stock and deliver eggs, fry and fingerlings to Danish trout farms as well as for export.

Table 22: Number of outbreaks of fish diseases in Denmark, 1999–2005.

Viral haemorrhagic septicaemia	76[1]
Infectious haemorrhagic necrosis	Never recorded
Spring viraemia of carp	3[2]
Epizootic haematopoietic necrosis	Never recorded
Oncorhynchus masou virus disease	Never recorded

1. One case in the EU approved VHS-free zone in 2000.
2. In imported ornamental carps.

Spring viraemia of carp (SVC)

Denmark has three carp farms registered as free of SVC. Denmark reported one outbreak of SVC in 2002 and two in 2003. All these outbreaks were in imported ornamental carps. SVC-infected fish have not been released into Danish freshwater sources.

1.9 MOLLUSC DISEASES

For decades, there has been an intensive commercial fishery on natural mussel stocks (Mytilus edulis) with annual landings of 90,000–100,000 tons. Natural stocks of European flat oyster (Oestrea edulis) only exist in the Limfjord. Through the 1990s, the oyster stock increased due to optimal climatic conditions for reproduction. In 2002, the stock had reached a size at which commercial utilisation was allowed, and in 2003 approximately 2 million oysters were landed. Aquaculture production of mussels and oysters started on an experimental basis in 2000 and the experience gained from these experiments began being transferred to a commercial scale from 2003.

Bonamiosis *(Bonamia ostreae)* and Marteiliosis *(Marteilia refringens)*

In the middle of the 1990s, commercial interests in utilising the flat oyster as a resource for aquaculture purposes were considered. This was the background for establishing a scientifically based disease surveillance programme for Bonamiosis and Marteiliosis in the Limfjord in 1996. This surveillance programme focused on the wild oyster population, as there had been no aquaculture activities in this field until the middle of 2000.

Since the autumn of 2000, when the first experiments of artificial cultivation of oysters were launched, an official disease surveillance programme for Bonamiosis and Marteiliosis has been conducted on the cultivated as well as on wild stocks following the provisions laid down by the EU Commission. The programme was conducted in order to obtain an official EU-approved Bonamiosis and Marteiliosis-free status for the Limfjord.

During the first two years, biannual sampling of 150 oysters from three different sites was conducted. The sampling was either from aquaculture production sites or from the natural stock if the number of active aquaculture production sites was insufficient. From the autumn of 2002, the sampling was reduced to two annual samplings of 30 oysters from three sites according to Directive 91/67/EEC.

Bonamia ostreae or Marteilia refringens have never been detected in the flat oyster stock of the Limfjord.

Table 23: Mollusc disease

Haplosporidiosis[1]	Never recorded
Perkinsosis[1]	Never recorded
Microcytosis	Never recorded
Iridovirosis[1]	Never recorded
Marteiliosis	Never recorded
Bonamiosis	Never recorded

1. Host not present in Denmark

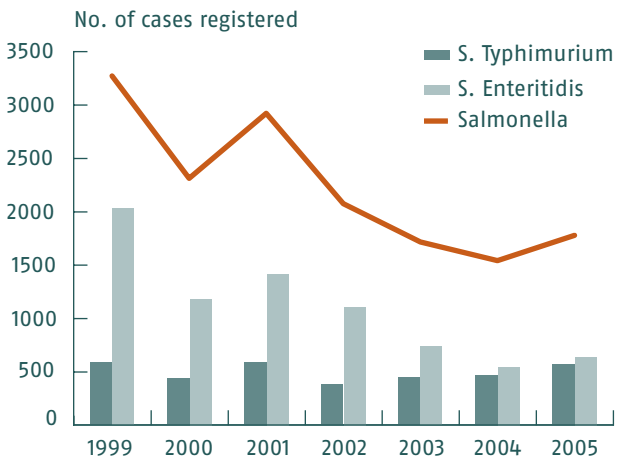
1.10 FOOD-BORNE ZOONOSES

The Danish control of food-borne zoonoses is based on a stable to table-strategy implying that the approach is to prevent, monitor and control zoonoses at all levels of the food production, i.e. in feedstuffs, live animals, slaughterhouses and food. The Danish Veterinary and Food Administration mainly deals with the monitoring, surveillance and eradication of zoonoses in live animals and with the monitoring, surveillance and control of zoonoses at the slaughterhouses.

The zoonotic agents salmonella and campylobacter cause the majority of food-borne infections in Denmark. For many years, salmonella has been a major cause of human cases of zoonotic enteritis in Denmark. However, since 1997 the overall trend has been a decrease in the number of cases of human salmonellosis in Denmark, and this trend continued in the period 1999-2005 (figure 7, page 58). Campylobacter has become the most common cause of acute bacterial enteritis in humans in Denmark, as in many other developed countries. Despite the numerous sources of human infections, poultry meat is believed to be a major cause of human campylobacteriosis in Denmark.

Information on the trends and sources of zoonotic infections in humans and animals are published in the Annual Reports on Zoonoses in Denmark. These reports are available on the website of the National Veterinary Institute: www.vet.dtu.dk

Figure 7: Registered cases of human salmonellosis, 1999-2005.



Salmonella in poultry

In 1996 the Danish Ministry of Food, Agriculture and Fisheries implemented a comprehensive national surveillance and control plan for salmonella in poultry for a three-year period. This plan included all types of flocks in the broiler and layer sector. In 1999, it was decided to prolong the plan for additionally three years. From 1 January 2003 the Danish Poultry Council took over the responsibility for the administration of the plan under continuous surveillance and control by the Danish Veterinary and Food Administration (DVFA).

All salmonella serotypes (except for the host-specific *Salmonella pullorum* and *S. gallinarum*) are encompassed by the plan. The Danish sampling programme combines bacteriological (birds, faecal droppings, socks, crate material and dust) and serological (egg and blood) analyses in order to optimise the chance of detecting infected flocks as soon as possible. All suspected or confirmed isolations of salmonella must be reported to DVFA.

Upon a positive surveillance sample, a regional veterinary officer performs additional sampling of the flock (i.e. 'suspicion sampling'). If the suspicion is confirmed, the flock is declared infected with salmonella. Official veterinary restrictions are imposed on all farms housing suspected and/or infected flocks, as follows:

1. If a *Salmonella typhimurium* or *S. enteritidis* infection is verified in a breeding flock of poultry, the birds are slaughtered or destroyed immediately. Brood eggs are either destroyed or heat-treated (pasteurised).
2. In all other cases, farms housing flocks infected with salmonella are subjected to a number of veterinary restrictions, including isolation of infected flocks, de-

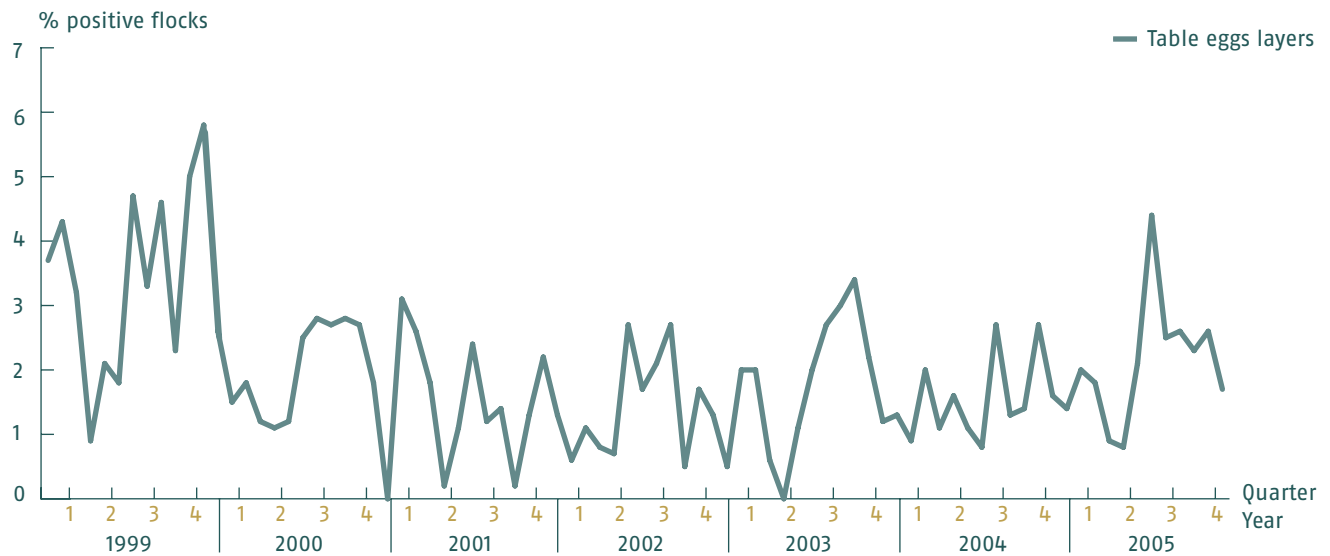
Figure 8: Percentage of newly salmonella-infected commercial egg layer and rearing flocks in Denmark, 1999-2005.

struction or heat treatment of eggs from the time of suspicion and extra hygienic measures. The infected flocks can be slaughtered for consumption at an authorised poultry slaughterhouse when accompanied by a notification that the flock is infected.

The regional veterinary officer inspects and approves proper cleaning and disinfection after stamping out of infected flocks.

The public plan (1996-2002) has been successful, as the number of salmonella-positive commercial egg layer and

Figure 9: Percentage of salmonella-positive broiler flocks, 1999-2005.



broiler flocks have decreased considerably. The level of salmonella-infected commercial egg layer herds has been reduced from an annual prevalence of 13.4% in 1998 to 1.1% in 2005. Figure 8, page 59 illustrates the decrease in the percentage of infected commercial egg layer and rearing flocks from 1999-2005. In the broiler production the percentage of salmonella-positive flocks has decreased from 12.9% in 1997 to less than 2.1% in 2005 as shown in figure 9.

Further information about the course and results of the public plan is available in a report which was published in 2004 and can be downloaded from DVFA's website: www.dvfa.dk

Salmonella in pigs

Since 1995, a serological surveillance programme for the detection of salmonella in slaughter pig herds has been implemented as the basis of the surveillance and control plan. The plan is based on the categorisation of herds into three levels, based on the proportion of seropositive meat juice samples over the last three months.

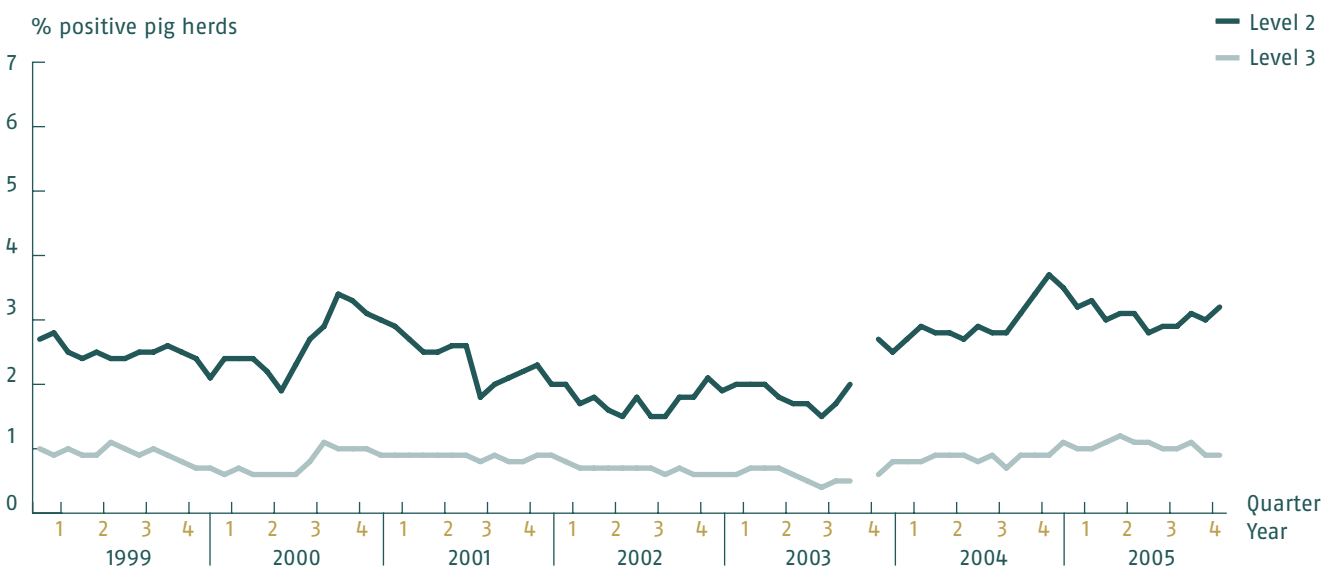
- Level 1: None or small proportion of positive samples.
- Level 2: Higher proportion of positive samples.
- Level 3: Unacceptably high proportion of positive samples.

The programme has been adjusted over the years, the last time in 2004. The adjustments have been made in response to the continuing reduction in the level of salmonella in the pig production. One of the major changes in the period 1999-2005 has been introduction of the weighted index. This means that the results from the most recent month are weighted more heavily than those from the previous months. Initially, DVFA handled the administration of the plan, but by May 2002 this task was passed on to the Danish Bacon and Meat Council. Based on a report from the technical expert committee, the DVFA in 2004 decided to alter the surveillance by meat juice samples to risk-based surveillance. This means that herds that have been seronegative for a certain period of time will have fewer samples taken compared to seropositive herds.

Herds at level 3, which are herds with an unacceptably high proportion of seropositive samples, are slaughtered under special hygienic precautions. Herds at levels 2 and 3 are obliged to collect faecal samples from the pigpens (pen-faecal samples) in order to determine the distribution and type of salmonella infection. Sow herds supplying piglets to slaughter pig herds at level 2 or 3 are also obliged to collect pen-faecal samples in order to determine the distribution and type of salmonella infection and clarify any transmission of salmonella from the sow herd to the slaughter pig herd. Breeding and multiplying herds are monitored monthly by serological testing of blood samples. If a specific cut-off level is reached, the herd owner is obliged to collect pen-faecal samples.

Figure 10, page 62 shows an overall decrease in the proportion of herds at level 2 from 1999 to 2005 with a peak increase in the last six months of 2000 and a subsequent decline until the autumn of 2003. From the autumn of 2003, the number of herds at level 2 has been rising again. There is no evidence that the increase at the herd level has affected the number of human cases of salmonellosis. The number of human cases related to pork was

Figure 10: Percentage of slaughter pig herds with salmonella at levels 2 and 3 in Denmark, 1999-2005. The criteria for assignment to levels 2 and 3 were changed in August 2001. The gap in the curves is a result of technical laboratory problems at the National Veterinary Institute.



decreasing until 2002. In 2003 the numbers increased a little, after which they have been relatively stabile.

Clinical disease in combination with the detection of Salmonella is recorded in approximately 30-50 herds of Danish pigs per year; in 2005 the number was 32. Approximately half of these are placed under official veterinary supervision due to salmonellosis. Animals from these herds are slaughtered under special hygienic precautions.

Salmonella in cattle

In 2002, DVFA and the cattle industry implemented a plan of action for control of salmonella in cattle herds with emphasis on *S. dublin*. The primary aim was to reduce the prevalence of S. dublin in Danish cattle and beef and thereby enhance food safety for the consumers. The emphasis on *S. dublin* is due to the fact that it is the most common salmonella serotype in cattle in Denmark affecting both calves and adults, and it often causes protracted infections in the herds due to asymptomatic carriers.

The surveillance programme uses the blood and milk samples collected for the surveillance of BVD and IBR to test for antibodies for *S. dublin*. Based on antibody level or detection of the bacteria, the herds are categorised into three levels:

- Level 1: Probably free of *S. dublin*.
- Level 2: Probably infected based on the antibody level, or status unknown.
- Level 3: *S. dublin* has been isolated from the herd.

Unlike most other control plans, no restrictions are associated with the plan, except for herds at level 3, which must be slaughtered under special hygienic precautions.

The surveillance and categorisation into levels are an aid to herd owners enabling them to buy animals from herds most likely free from the infection. In addition, it provides an opportunity to focus the control effort against *S. dublin* on herds that constitute a risk to food safety. Finally, it enables continuous monitoring of the *S. dublin* status at herd level. Thereby, it provides herd owners, the industry and veterinarians with a tool to be used in the reduction of *S. dublin* in beef and, consequently, in the number of human cases.

The main effect of the plan has been an alteration in the trade pattern among herds, the number of cattle trades from levels 2 and 3 to level 1 having decreased, and the number of trades among herds at the same level having increased.

Clinical disease in combination with the detection of Salmonella is recorded in approximately 50–100 herds of Danish cattle per year, 57 in 2005. Approximately half of these are placed under official veterinary supervision due to salmonellosis. Animals from these herds are slaughtered under special hygienic precautions.

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At farm level, farmers have been advised about good hygienic practice, and guidelines for preventing the introduction of Campylobacter in the broiler flocks have been prepared.

Campylobacter in poultry

Campylobacter has become the most common cause of acute bacterial enteritis in humans in Denmark as in many other developed countries. Despite the numerous sources of human infections, poultry meat is believed to be the major cause of human campylobacteriosis in Denmark.

In 2003, the Danish Veterinary and Food Administration developed a strategy against Campylobacter in collaboration with the National Veterinary Institute, the Danish Poultry Council and the Danish Consumer Council. The strategy aims at reducing Campylobacter in broilers and in chicken meat and also focuses on communicating information on Campylobacter to the consumers.

Since the late 1990s a voluntary programme has been implemented by the poultry industry. At farm level, farmers have been advised about good hygienic practice, and guidelines for preventing the introduction of Campylobacter in the broiler flocks have been prepared. The farmers are rewarded if they produce Campylobacter-free flocks and/or follow the hygienic procedures described by the industry.

All broiler flocks are sampled (faeces/sock samples) approximately one week prior to slaughter, and contaminated flocks are allocated to the production of frozen chicken meat, where possible.

In 2002, the Danish Veterinary and Food Administration launched a consumer campaign on Campylobacter. The campaign focused on cross contamination in private kitchens and was aimed at young people, since that group of the population accounts for a high number of cases.

Since the mid-90s the prevalence of Campylobacter in Danish broiler flocks and in fresh and frozen chicken meat has been monitored. Samples from the flocks are collected at the time of slaughter and encompass ten cloacal swabs from each flock/batch. A distinct seasonal distribution has been observed, with a high prevalence during the summer months (July/August) and a low prevalence in March/April. Samples of chicken meat are collected at slaughterhouse, wholesale and retail levels.

Since these interventions were introduced, there has been a marked decrease both in the number of Campylobacter-positive broiler flocks (from 43% in 2002 to 30% in 2005) and in the prevalence of Campylobacter in Danish-produced, fresh, chilled chicken meat (from 44% in 2003 to 20% in 2005). In 2002 and 2003, the number of human Campylobacter infections decreased by approximately 25%. The incidence increased in 2004, followed by a decline in 2005.

The reason for the limited effect on human campylobacteriosis in 2004 and 2005 may be increased imports of chicken meat, which is more contaminated with Campylobacter than the chicken meat produced in Denmark. The situation is carefully monitored and the necessary steps are taken to improve the voluntary intervention programme in slaughterhouses for allocating contaminated flocks to frozen products.

2.0 LIVESTOCK STATISTICS

In 2001, the Danish Veterinary and Food Administration decided to change the source of livestock population statistics from Statistics Denmark to the Central Husbandry Register. The reason for changing the source was mainly the difference in herd definitions and the exclusion of small herds in the data from Statistics Denmark. Statistics Denmark lacks information about the goat and farmed deer population, and therefore no information is available for these populations for 1999 and 2000.

Table 24: Livestock population. Number of herds and animals in Denmark, 1999–2005. Source: Statistics Denmark (1999–2000) & Central Husbandry Register (2001–2005).

		1999	2000	2001	2002	2003	2004	2005
Cattle	N animals	1,887,057	1,867,937	1,879,089	1,835,960	1,759,192	1,732,657	1,626,758
	N herds	24,188	23,031	35,007	34,693	28,270	26,700	25,543
Sheep	N animals	142,880	145,492	200,164	199,405	199,060	209,020	194,341
	N herds	3,591	3,241	8,394	8,654	10,279	10,870	10,557
Goats	N animals	–	–	18,503	18,259	18,817	22,099	21,464
	N herds	–	–	1,546	1,632	2,449	2,866	3,056
Horses	N animals	40,485	39,737	43,143	38,136	42,707	39,209	47,332
	N herds	8,455	7,959	8,276	7,379	7,442	6,955	8,388
Farmed deer	N animals	–	–	20,404	19,934	19,201	19,303	18,399
	N herds	–	–	650	650	638	642	631
Pigs	N animals	11,626,043	11,921,573	12,607,545	12,732,035	12,554,538	12,868,394	14,537,698
	N herds	15,483	13,231	20,580	20,151	18,693	15,681	14,223
Poultry	N animals	21,010,135	21,830,273	–	–	–	29,812,776	29,812,776
	N herds	6,748	5,807	2,674	2,488	2,097	1,888	1,888

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 • 1. udgave, 1. oplag • Januar 2007
Pris: 85,00 kr. • ISBN: 978-87-91716-88-1 • Oplag: 5000
Design: ESSENSEN.COM • Foto: BioPix, Lars Bahl, Lars Wittrock • Tryk: Schultz Grafisk

ISBN 978-87-91716-88-1
9 788791 716881