EPI-NEWS NATIONAL SURVEILLANCE OF COMMUNICABLE DISEASES
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PRION DISEASES IN CATTLE

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Among naturally occurring prion diseases in animals, only the acquired form has been described. Mutations of the prion-protein gene that can result in disease, as seen in man, have not been described in animals. In sheep, the prion geno-type determines susceptibility to bovine spongiform encephalopathy (BSE), the prion disease of sheep known as scrapie and the spread of the resistant prion protein in lymphoid tissue. In cattle, no mutations of the prion-protein gene have been shown to correlate with the occurrence of BSE.

Occurrence of BSE

BSE was observed for the first time in England in 1985, and up to the end of 2000 a total of 181,501 cases have been diagnosed in UK cattle. Epidemiological studies of the BSE epidemic suggest that BSE has been spread by fodder containing meat and bone meal contaminated with resistant prion protein. The process used to prepare meat and bone meal was and is inadequate to completely inactivate the resistant prion protein. Even if the organs containing the highest concentration of infective material are removed at slaughter as specified risk material and incinerated, it remains important to break any potential chain of infection by ensuring that ruminants are not given fodder prepared from ruminant tissues. In the EU, excluding the UK, a total of 1818 cases of BSE have been demonstrated since 1985, including four cases in Denmark, three of which were animals born in Denmark.

Infective tissues

After experimental feeding of calves with BSE-containing material, the misfolded prion protein has been demonstrated in the ileum, including Peyer's patches. Other lymphoid tissues have been studied but found negative for the prion protein. The method used to demonstrate the presence of infective material is a bioassay in which the material is injected into the brains of mice which are then observed for the development of signs of the disease. This method has only about 1/1000th of the sensitivity of intracerebral injection in calves. The first results of the calf test carried out on lymph nodes and spleen from calves fed with BSE material have been negative. Testing of other tissues is still in progress. These results differ from those found in both variant CJD (vCJD) and experimental BSE in sheep and monkeys, in which infectivity is widespread in the lymphoid tissue.
It is presumed that, in cattle, the misfolded prion protein spreads from the intestine to the intestinal innervation, whence it travels through the autonomic nervous system to the ganglia, spinal cord and brain.

Cow-to-calf infection

Studies on the transmission of BSE from cow to calf have shown that the incidence of BSE in calves from cows that were found to have BSE within one year of calving is about 10% higher than in calves from cows not found to have BSE. It has not been determined whether calves are infected before, during or after birth.

Surveillance of BSE

BSE is a notifiable disease, which means that cattle farmers and veterinary surgeons are required to notify animals showing clinical signs suggestive of BSE. On 1 October 2000 a surveillance programme was initiated which, apart from including animals with clinically suspected disease, comprises sampling of cattle that have died naturally, testing of all cattle slaughtered because of disease and testing of all animals that have been given the same fodder as the first Danish-born cow shown to have BSE. These tests are performed at the Danish Veterinary Laboratory (DVL). In addition, testing of all slaughtered cattle over 30 months of age has been started from January 2001 at the private laboratories of the Danish Meat Research Institute and Stein's Laboratory. DVL is the reference laboratory for these private-sector laboratories.

Test methods for BSE

The classical diagnostic test for the transmissible spongiform encephalopathies is the histopathological, i.e. microscopic morphological examination of brain sections. More recent methods aim to demonstrate the resistant prion protein in the brain or spinal cord. This can be done by means of immunohistochemical studies on brain sections or by biochemical methods such as Western blotting or ELISA techniques applied to homogenized, proteinase-treated central nervous tissue.
The private laboratories have chosen an ELISA method, which has the advantage of being rapid. However, as with other ELISA methods, false positives may occur, at the moment in the order of about 1 per 6000 tests. For the surveillance programme, DVL has chosen a Western blotting method that has been thoroughly evaluated, with good results, in the Swiss surveillance programme. Doubtful results may occur, but false positives will be extremely rare. In cases of doubtfully positive and positive results, the EU has ruled that the specimens must be examined by the classical test, i.e. by histopathology, possibly supplemented by immunohistochemistry, immunoblotting or electron microscopy.

Combating BSE

BSE can be combated. The UK ban from 1988 on feeding ruminants with fodder produced from ruminants led after 4-5 years to the beginning of a decline in the annual number of diagnosed BSE cases. The regulations were tightened in 1996, which is hoped to ensure that the UK should be free of cattle with BSE born after 1996. With an average incubation period of about five years, it is too early to say whether these measures have been successful. In the year 2000, a total of 1101 animals with BSE were found in the UK; one of these animals was born after 1 August 1996, Table 1.

Table 1. No. of BSE cases in UK in cattle born after 1987

Year of birth	No. of cases
1988	11.949
1989	12.628
1990	5.617
1991	4.510
1992	2.973
1993	2.245
1994	1.066
1995	200
1996	1

(R. Hoff-Jørgensen, Danish Veterinary Laboratory)

28 March 2001

Patients with laboratory-diagnosed chlamydia, by sex and county

4th quarter 2000

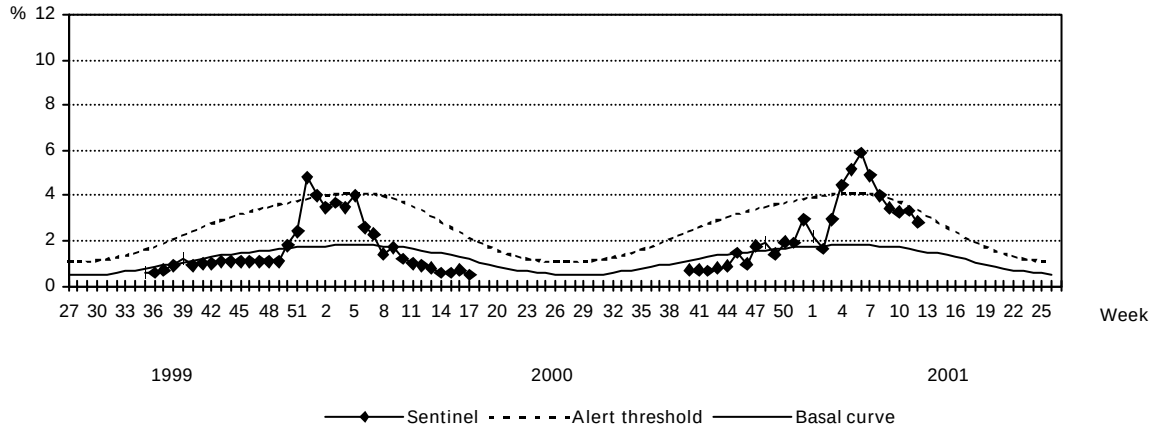
	Chlamydia, 4th quarter			
	2000			1999
County	M	F	Total	
Cph. and Frb. Municip.	258	467	725	580 *
Copenhagen	77	277	354	334 *
Frederiksborg	72	145	217	158
Roskilde	32	67	99	95
West Zealand	69	154	233	183 *
Storstrøm	25	97	123 *	97
Bornholm	4	12	16	18
Funen	102	232	334	336
South Jutland	42	127	169	137
Ribe	38	72	110	139
Vejle	56	169	225	183
Ringkøbing	67	138	205	161 *
Aarhus	190	434	625 *	623
Viborg	49	94	143	124
North Jutland	114	320	434	375 *
Whole Country	1195	2808	4006	3543

*Sex not stated in some cases

(Dept. of Respiratory Infections, Meningitis and STI's)

Sentinel surveillance of influenza activity

Weekly percentage of consultations, 1999/2000/2001



Sentinel: Influenza consultations as % of total consultations

Basal curve: Expected frequency of influenza consultations under non-epidemic conditions

Alert threshold: Possible incipient epidemic

(Dept. of Epidemiology)