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SCIENTIFIC OPINION

Updated risk for human and animal health related to the revision of the BSE monitoring regime in some Member States[1]

Scientific Opinion of the Panel on Biological Hazards

(Question No EFSA-Q-2008-712, EFSA-Q-2008-753)

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SUMMARY

Following a request from the European Commission, the Panel on Biological Hazards (BIOHAZ) was asked to deliver an updated scientific opinion on the risk for human and animal health related to the revision of the BSE monitoring regime in some Member States (MS).

The European Food Safety Authority (EFSA) published on 17 July 2008 an opinion related to the revision of the BSE monitoring regime in some MS[2].

This opinion analyzed the data related to the BSE surveillance in the first 15 MS to join the European Union (EU15)[3] during the period 2001 – 2007 and developed a statistical model of the future trend of the BSE epidemic in those countries. Age options between 30 and 60 months for BSE testing of healthy slaughtered cattle and between 24 months to 60 months for testing of at risk cattle in EU 15 were considered and different scenarios were compared.

In 2008 Slovenia and Cyprus applied for a revision of their BSE monitoring systems but, as new MS, their epidemiological data were not considered in the abovementioned EFSA

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[2] EFSA (European Food Safety Authority), 2008. Risk for Human and Animal Health related to the revision of the BSE Monitoring regime in some Member States. *The EFSA Journal*. 762, 1 - 47

[3] Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, Sweden, United Kingdom.

opinion, and there was therefore no indication of the level of additional risk that would exist if Slovenia and Cyprus implemented a revised BSE monitoring regime.

Assuming that Slovenia and Cyprus were in a position to comply with the legal criteria for having their BSE monitoring systems revised[4], and taking into account that the stringent preventive measures against BSE (Specified Risk Material removal and total feed ban) will continue to apply in the future in Slovenia and Cyprus, the BIOHAZ Panel was requested to provide an updated opinion on the risk for human and animal health related to the revision of the BSE monitoring regime in EU 15 MS, Slovenia and Cyprus (EU17).

The same general considerations and methodology applied in the previous EFSA opinion were used for this assessment. Moreover, the latter should be read together with the above-mentioned opinion in order to have a description of the methodology used and to fully appreciate the implications of setting different age limits for BSE monitoring in cattle.

It was assumed that all countries considered for this mandate, including Cyprus and Slovenia, had implemented a BSE surveillance system and control measures as set out in the Regulation (EC) 999/2001 (as amended) for at least six years. If this assumption cannot be verified, the conclusions of the opinion will not apply to the respective country.

In its approach the Panel first considered BSE epidemic trends in all the separate MS. All MS showed decreasing trends or low incidence rates[5]. For this reason the assessment was carried out collectively and the statistical model developed with the previous EFSA opinion was updated considering the data on BSE surveillance in EU17 during the period 2001 – 2008. Moreover, new information about Atypical BSE was also taken into account.

It was highlighted that the grouping of the countries to be assessed using the methodology developed for this specific mandate is considered to be valid only when the epidemiological features[6] of each single country are in line with the features of the other countries to be considered in the group.

The BIOHAZ Panel confirmed that in both the joint EU17 and in each of the individual EU17 countries in which sufficient case data were available[7], the BSE epidemic has been declining and is converging to the sensitivity limit of a surveillance system that uses currently approved rapid BSE tests. In healthy slaughtered animals aged respectively up to 36, 48 or 60 months, less than one case for the first two age limits, and less than two cases for the third age limit, can be expected to be detected annually in EU17 by an active surveillance system that uses currently approved rapid BSE tests. Furthermore, in at risk animals aged respectively up to 30, 36, 48 or 60 months, less than one case for the first three age limits, and less than three cases for the fourth age limit, can be expected to be detected annually in EU17 by an active surveillance system that uses currently approved rapid BSE tests. Although the likelihood of detecting new cases in specific age groups is very low, there remains a small probability of detecting one or more cases in some of these groups.

The Panel noticed that in the context of the continuous decline of the Classical BSE epidemic, the proportion of Atypical BSE cases among the total number of detected BSE cases can be

[4] Missions from the Food and Veterinary Office (FVO) in Slovenia and Cyprus were scheduled respectively on January and March 2009 to consider these aspects.

[5] Even if the incidence slightly increased in Portugal in 2008 compared to 2007 (19.3 compared to 15.7 per million animals above 24 months) it only consisted of animals born before the total feed ban (2001).

[6] In particular the age and birth cohort distribution of the BSE cases, the incidence rate and its evolution.

[7] A minimum number of 50 cases was considered necessary to obtain statistically reliable estimates.

expected to increase and future risk assessments on BSE would benefit from separate reporting of Classical and Atypical BSE.

Moreover, the Panel highlighted that an age limit of 24 months in at risk animals would result in: (i) an increased sensitivity of surveillance in case of BSE re-emergence, and (ii) a possibly improved system for early detection of emerging new TSEs in cattle.

The BIOHAZ Panel recommended to monitor and report separately Classical and Atypical BSE cases, to increase knowledge on the pathogenesis and the transmission potential of Atypical BSE, to characterize and improve the ability of the tests used for the detection of Atypical BSE and to use the information gained through the previous activities as the basis for a TSE monitoring system in cattle.

Key words: BSE, Revision monitoring regime, human health, animal health

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BACKGROUND AS PROVIDED BY THE EUROPEAN COMMISSION

The TSE Roadmap adopted by the Commission in July 2005 and endorsed by both the European Parliament and the Council states that amendments of certain TSE measures could now be envisaged without endangering the health of the consumer and the policy of eradicating BSE, provided that the positive trend observed in the epidemiological situation continues and scientific conditions are in place. Among those possible amendments, a revision of BSE monitoring programmes for bovine animals is one of the topics of the Roadmap in the short and medium term period (2005-2009). Extensive epidemiological data on BSE have been collected via EU BSE surveillance over the last 7 years and have demonstrated that the control measures in place have been efficient and that the prevalence of the disease is clearly declining or is remaining consistently at a low level. Since 2001, more than 73 million tests have been carried out in the European Union[8].

According to the TSE Regulation (Regulation (EC) N° 999/2001), a Member State which can demonstrate the improvement of its epidemiologica1 situation may apply for a revision of its national BSE monitoring programme for both at risk (e.g. emergency slaughtered cattle, cattle with observations at ante mortem inspection and fallen stock) and healthy slaughtered cattle. The applying Member State shall demonstrate that there is a clearly declining or consistently low BSE prevalence in its territory, that it has implemented and enforced for at least 6 years a full BSE testing scheme and the Community legislation on a total feed ban for farmed animals.

Following a request from the Commission, the European Food Safety Authority (EFSA) published on 17 July 2008 an opinion related to the revision of the BSE monitoring regime in some Member States.

This opinion analyzed the data related to results of BSE surveillance in the 15 "old" Member States (EU15)[9] during the period 2001 – 2007 and developed a statistical model of the future trend of the BSE epidemic in those countries. Age options between 30 and 60 months for BSE testing of healthy slaughtered cattle and between 24 months to 60 months for testing of at risk cattle in EU 15 were considered and different scenarios were compared.

Slovenia and Cyprus have recently applied for a revision of their BSE monitoring systems but, as new Member States, their epidemiological data were not considered in EFSA's opinion published in July 2008, and there is therefore no indication of the level of additional risk that would exist if Slovenia and Cyprus implemented a revised BSE monitoring regime.

TERMS OF REFERENCE AS PROVIDED BY THE EUROPEAN COMMISSION

Assuming that Slovenia and Cyprus are in a position to comply with the legal criteria for having their BSE monitoring systems revised[10], and taking into account that the stringent preventive measures against BSE (SRM removal and total feed ban) will continue to apply in the future in Slovenia and Cyprus, EFSA is requested to provide an updated opinion on the risk for human and animal health related to the revision of the BSE monitoring regime in EU 15 Member States, Slovenia and Cyprus.

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8 Detailed epidemiological information on BSE monitoring can be found in TSE annual reports released by the Commission: (http://www.ec.europa.eu/food/food/biosafety/bse/annual_reps_en.htm)

9 Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, Sweden, United Kingdom.

10 Missions from the Food and Veterinary Office (FVO) in Slovenia and Cyprus were scheduled respectively on January and March 2009 to consider these aspects.

ACKNOWLEDGEMENTS

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ASSESSMENT

1. Introduction

The same general considerations and methodology applied in EFSA's Scientific Opinion on the "Risk for Human and Animal Health related to the revision of the BSE Monitoring regime in some Member States" (EFSA, 2008) are used in this assessment. Hence, the latter should be read together with the above-mentioned opinion in order to have a description of the methodology used and to fully appreciate the implications of setting different age limits for BSE monitoring in cattle.

In its approach the Panel first considered BSE epidemic trends in all the separate MS. All MS showed decreasing trends or low incidence rates[11]. For this reason the assessment was carried out collectively. For the purpose of this Opinion the whole of EU15 plus Slovenia and Cyprus is called EU17.

2. Analysis of the Active BSE monitoring programme per category and age during the period 2001 – 2008.

The information on the BSE cases detected in EU17 used in this analysis was received from the European Commission (EC) on 19th March 2009, while the data related to the number of tests performed in the framework of the BSE surveillance were extracted from the EC database on 23rd March 2009.

The small differences between the data provided in this Opinion and the related data provided in the previous EFSA Opinion (2008) are due to differences in the datasets received in 2008 and in 2009. However, these differences have a negligible impact on the assessment.

It is assumed that all countries considered for this mandate, including Cyprus and Slovenia, have implemented a BSE surveillance system and control measures as set out in the Regulation (EC) 999/2001 (EC, 2001) (as amended) for at least six years. If this assumption cannot be verified, the conclusions of this opinion will not apply to the respective country.

Extensive epidemiological data on BSE has been collected via the BSE Active Surveillance over the last 8 years and has demonstrated that the control measures in place against BSE have been efficient and that the prevalence of the disease is clearly declining or remained consistently at a low level: the BSE prevalence (ratio per 10,000 animals tested) in EU17 detected by the BSE Active Surveillance was 1.23 in 2001, 1.38 in 2002, 1.01 in 2003, 0.65 in 2004, 0.50 in 2005, 0.31 in 2006, 0.17 in 2007 and 0.12 in 2008.

From 2001 until the end of 2008 more than 73 million of tests have been carried out in the framework of BSE Active Surveillance in the EU17. Of these 5,116 animals were positive. These included 1,223 out of 64,067,599 healthy slaughtered cattle (19 per million), and 3,893 out of 9,930,277 at risk cattle (392 per million), while testing schemes differed between Member States[12]. For example: Germany tested younger healthy stock than most MS, and the

[11] Even if the incidence slightly increased in Portugal in 2008 compared to 2007 (19.3 compared to 15.7 per million animals above 24 months) it only consisted of animals born before the total feed ban (2001).

[12] Since 2004 in Slovenia about 177,500 tests have been carried out in the framework of BSE Active Surveillance. Of these 5 animals were positive. These included 2 out of 129,999 healthy slaughtered cattle (15 per million), and 3 out of 47,513 at risk cattle (63 per million). In the framework of BSE Passive Surveillance during that period 87 animals were tested and none of them resulted positive. In the same period in Cyprus 41,400 tests have been carried out in the in the framework of BSE Active Surveillance; 34,690 in healthy slaughtered cattle and 6,710 in at risk cattle. No positives animals were identified. No animals were tested in Cyprus in the context of BSE Passive Surveillance.

UK older healthy stock during its Over Thirty Months Scheme. In the framework of BSE Passive Surveillance in EU17 during the period 2001 – 2008 24,498 bovine animals were tested and 2,408 were positive.

In 2008, no BSE cases have been reported in EU17 in the framework of BSE Surveillance in: Austria, Belgium, Cyprus, Denmark, Finland, Greece, Italy, Luxemburg, Slovenia and Sweden. Moreover, also in 2007 no cases have been reported in these same countries, except 1 case respectively in Austria and Slovenia and 2 cases in Italy.

Detailed epidemiological information on BSE monitoring can be found in TSE annual reports released by the Commission: www.ec.europa.eu/food/food/biosafety/bse/annual_reps_en.htm

With respect to the number of BSE cases detected through the BSE Active Surveillance in EU17 since 2001 the data per target group are reported in Table 1.

Table 1. Number of BSE cases detected through the BSE Active Surveillance in EU17 during the period 2001 – 2008 per target group.

Target Group	N° of detected BSE cases per year								Total
	2001	2002	2003	2004	2005	2006	2007	2008	
Healthy Slaughtered	277	293	264	162	97	73	34	23	1,223
At risk animals									
Emergency slaughtered	323	508	317	169	123	31	7	5	1,483
Fallen stock	400	610	407	309	218	163	95	74	2,276
Presenting clinical signs at ante mortem inspection	36	24	32	11	16	9	4	2	134
Total	1,036	1,435	1,020	651	454	276	140	104	5,116

The total number of BSE cases detected through the BSE Surveillance (both Active and Passive) and the culling of animals in the framework of BSE eradication measures in EU17 during the period 2001 – 2008 per birth cohort and year of detection is reported in Table 2.

Table 2. Number of BSE cases detected through the BSE Surveillance (Active and Passive) and the culling of animals in the framework of BSE eradication measures in EU17 during the period 2001 – 2008 per birth cohort and year of detection.

Birth cohort	N° of detected BSE cases per year								
	2001	2002	2003	2004	2005	2006	2007	2008	Total
1980		1							1
1981	1								1
1982									
1983			1						1
1984	1	3				1			5
1985	1	2	2		1				6
1986	13	10	3	3	1				30
1987	21	30	9	6	6	1		1	74
1988	20	28	21	6		1		2	78
1989	25	37	21	17	5	5	1	1	112
1990	28	54	22	21	9	7	1	3	145
1991	66	78	47	27	22	8	1	1	250
1992	120	156	85	55	37	15	10	1	479
1993	330	245	179	94	56	27	17	9	957
1994	577	458	218	122	94	48	26	15	1,558
1995	669	616	303	136	67	37	23	9	1,860
1996	246	274	163	80	39	25	10	22	859
1997	43	91	153	86	35	23	6	14	451
1998	4	30	73	97	45	32	16	7	304
1999	1	6	25	51	60	37	16	9	205
2000			1	19	49	36	21	8	134
2001					8	8	2	4	22
2002					3	1	3	4	11
2003								4	4
Total	2,166	2,119	1,326	820	537	312	153	114	7,547*

* Please note the total number of BSE cases is lower than in Table 3 since the year of birth of 22 BSE cases is unknown and they are then not considered under this table.

The number of BSE cases detected through the BSE Surveillance (Active and Passive) and the culling of animals in the framework of BSE eradication measures during the period 2001 – 2008 per Member State, birth cohort and year of detection is provided in Appendix A.

When interpreting the significance of these data the following points should also be considered:

- The likely point in the incubation period at which PrP^{res} is detectable with the rapid BSE tests depends on the infective dose (Arnold *et al.*, 2007). While the range of doses of exposure of field cases of BSE is not known, an oral attack rate study has shown that the mean incubation period arising from doses in the range 0.1-1g fits with that estimated for field cases (Wells *et al.*, 2007). For a 1g dose, it was found that PrP^{res} was detectable at

97% of the incubation period (Arnold *et al.*, 2007). This degree of under-detection has to be taken into account when estimating infection prevalence from surveillance data.

- A constant decline (about 35% per year) in the total number of cases (coming from both BSE Active and Passive Surveillance) has been recorded and is likely due to a reduction in exposure to the BSE agent in EU 17: from 2,166 cases in 2001 to 115 cases in 2008, and the number of cattle infected with BSE is likely to continue to decline.
- Out of this, 37 cases were related to animals born after the start of the total feed ban in 2001.
- The Geographical BSE Risk (SSC, 2002) as well as the stage of the BSE epidemic can vary considerably between Member States.

2.1. Overall situation in the EU17

For the purpose of this assessment Methods 1 and 3 described under section 2.1. of EFSA's Scientific Opinion on the "Risk for Human and Animal Health related to the revision of the BSE Monitoring regime in some Member States" (EFSA, 2008) were used to analyse the trend of the BSE infection in the EU17.

2.1.1. Calculations based on Method 1

The number of BSE cases, the BSE incidence per million cattle over 24 months of age and the average age of cases per year of detection in the EU17 MS, considering both BSE Active and Passive Surveillance and the animals culled in the framework of BSE eradication measures, are shown in Table 3.

Table 3. Number of BSE cases, incidence per million cattle over 24 months and average age in years of cases during the period 2001 – 2008 per year of detection in the EU17 MS (the data consider both BSE Active and Passive Surveillance and the culling of animals in the framework of BSE eradication measures).

Member State		Year								Total
		2001	2002	2003	2004	2005	2006	2007	2008	
Austria	N° cases	1	0	0	0	2	2	1	0	6
	Incidence	1.0	0.0	0.0	0.0	2.1	2.1	1.1	0.0	
	Average age	5.0	NA	NA	NA	12.0	9.5	11.0	NA	
Belgium	N° cases	46	38	15	11	3	1	0	0	114
	Incidence	30.3	26.1	10.6	7.8	2.2	0.7	0.0	0*	
	Average age	6.0	6.7	7.4	7.5	10.0	12.0	NA	NA	
Cyprus	N° cases	0	0	0	0	0	0	0	0	0
	Incidence	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Average age	NA	NA	NA	NA	NA	NA	NA	NA	
Denmark	N° cases	6	3	2	1	1	0	0	0	13
	Incidence	6.7	3.5	2.4	1.3	1.3	0.0	0.0	0.0	
	Average age	5.0	5.3	6.5	14.0	9.0	NA	NA	NA	
Finland	N° cases	1	0	0	0	0	0	0	0	1
	Incidence	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Average age	6.0	NA	NA	NA	NA	NA	NA	NA	
France	N° cases	277	240	111	51	32	8	7	8	734
	Incidence	24.9	21.8	10.4	4.9	3.1	0.8	0.7	0.8	
	Average age	6.4	7.2	8.1	8.8	9.4	9.3	10.7	12.4	
Germany	N° cases	125	106	54	65	32	16	4	2	404
	Incidence	19.4	17.0	8.8	10.8	5.5	2.8	0.7	0.3	
	Average age	5.5	6.4	5.9	6.2	6.2	7.0	7.8	8.0	
Greece	N° cases	1	0	0	0	0	0	0	0	1
	Incidence	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Average age	5.0	NA	NA	NA	NA	NA	NA	NA	
Ireland	N° cases	242	334	183	126	77	38	29	22	1051
	Incidence	79.5	111.1	61.2	41.4	25.1	12.6	9.8	7.5	
	Average age	6.6	7.8	8.7	9.8	10.1	11.1	11.5	11.5	
Italy	N° cases	50	36	31	8	8	7	2	0	142
	Incidence	15.5	11.9	10.4	2.8	2.7	2.5	0.7	0.0	
	Average age	5.7	6.5	7.8	7.3	8.1	8.3	12.5	NA	
Luxemburg	N° cases	0	1	0	0	1	0	0	0	2
	Incidence	0.0	10.3	0.0	0.0	10.8	0.0	0.0	0*	
	Average age	NA	6.0	NA	NA	4.0	NA	NA	NA	
Netherlands	N° cases	20	24	18	6	3	2	2	1	76
	Incidence	11.2	13.5	10.1	3.5	1.8	1.2	1.2	0.6	
	Average age	6.3	6.2	6.7	8.3	4.7	8.5	7.5	8.0	
Portugal	N° cases	110	86	133	92	53	32	13	16	535
	Incidence	142.2	110.6	170.1	113.2	64.4	39.2	15.7	19.3	
	Average age	6.7	7.3	7.7	8.5	9.7	10.9	11.4	12.3	
Slovenia	N° cases	1	1	1	2	1	1	1	0	8
	Incidence	4.7	4.6	4.8	9.9	5.1	5.1	4.9	0.0	
	Average age	6.0	6.0	4.0	5.0	5.0	6.0	7.0	NA	
Spain	N° cases	83	127	167	137	103	77	33	24	751
	Incidence	24.1	35.8	46.6	38.2	29.7	24.1	9.8	7.1*	
	Average age	6.3	6.5	6.8	6.8	6.7	7.5	9.0	10.2	
Sweden	N° cases	0	0	0	0	0	1	0	0	1
	Incidence	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0*	
	Average age	NA	NA	NA	NA	NA	12.0	NA	NA	
United Kingdom	N° cases	1,203	1,123	612	330	226	129	65	42	3,730
	Incidence	243.7	228.3	125.1	67.1	46.1	26.5	13.6	9.0	
	Average age	7.6	8.9	9.6	10.7	11.2	11.8	11.9	12.6	
EU17	N° cases	2,166	2,119	1,327	829	542	314	157	115	7,569[§]
	Incidence	54.2	53.9	34.2	21.7	14.3	8.4	4.2	3.1*	
	Average age	7.0	8.1	8.6	9.1	9.5	10.1	10.9	11.7	

* To estimate this incidence the 2007 adult cattle population was used.

[§] The number of cases is higher than in Table 2 since the year of birth of 22 cases is unknown and they are not considered in that table.

The trend of the average age of BSE cases per year of detection in the EU17, considering both BSE Active and Passive Surveillance and the culling of animals in the framework of BSE eradication measures, is shown in Figure 1.

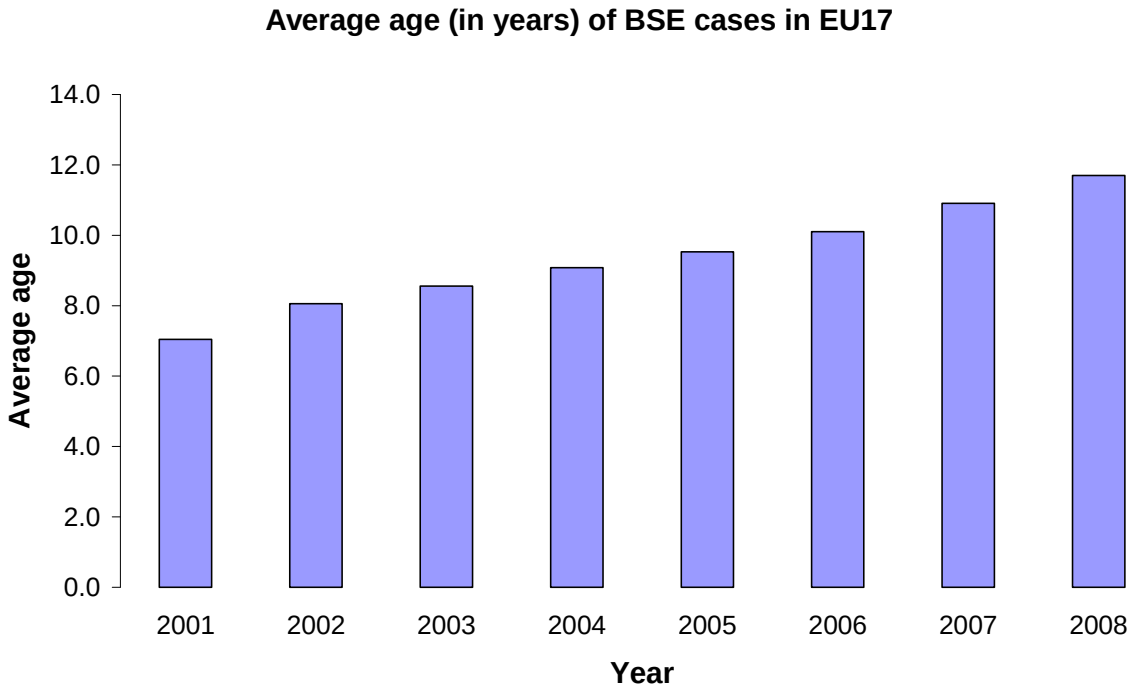

Figure 1. Average age (in years) of BSE cases per year of detection in the EU17, considering both BSE Active and Passive Surveillance and the culling of animals in the framework of BSE eradication measures.

2.1.1.1. Conclusion from calculations based on Method 1

From the analysis of the average age per year we can conclude that in each country within the EU17 where a sufficient number[13] of cases have been found since 2001, the average age of the detected BSE cases per test year has increased during the last 8 years and at present it is equal to or higher than 8 years in each of these countries.

The shape of the age distribution of BSE cases depends on two aspects: the age distribution of the cattle population and the level of BSE transmission in the past (de Koeijer *et al.*, 2002).

Assuming that the age distribution of cattle in the countries has not changed substantially, this indicates that the transmission of BSE has decreased as a consequence of the implementation of the control measures.

Consequently, in both the joint EU17 and in each of the individual EU17 countries in which sufficient data are available[14], the BSE epidemic has been declining[15] and is converging to the sensitivity limit of a surveillance system that uses currently approved rapid BSE tests.

[13] A minimum number of 50 cases was considered necessary to obtain statistically reliable estimates.

[14] In countries with less than 50 cases statistical methods are not able to reliably estimate the trend but the number of cases remains very low.

2.1.2. Calculations based on Method 3

For the purpose of this calculation two different scenarios were used:

Scenario I: assumes a constant incidence of BSE starting from the 2004 birth cohort (in practice the yearly estimate of the number of BSE cases per age group is the same from 2009 onwards);

Scenario II: can be considered more realistic as it is derived from the observed data and assumes a continue decay rate of the BSE epidemic for cohorts since 2004 based on the cohort incidence decline in previous cohorts calculated by log-linear regression (over the period 1994 to 2003).

Due to the restricted data available for recent cohorts and to the methodologies applied the approach only partially took into account the expected additional effect of the enhanced control measures taken in 2001 in the EU (see Appendix B). Moreover, the scenarios are based on upper 95% confidence limit of the calculated expected number of cases. Consequently they can be considered as worst case scenarios.

A spreadsheet with the calculations used when performing this method is provided as an Annex to this Opinion at http://www.efsa.europa.eu/EFSA/efsa_locale-1178620753812_1211902502788.htm.

For further extrapolation of these calculations into the future, specific assumptions on the efficacy of the control measures since 2009 are required.

2.1.2.1. Results from Scenario I

Since this scenario assumes constant incidence in birth cohort since 2004, these estimates will be the same for each year after 2009.

The expected total number of detected BSE cases (based on upper 95% confidence limit for birth cohorts since 2004) by calendar year and age category in this scenario is provided in Table 4.

Table 4. Expected total number of BSE cases (based on upper 95% confidence limit for birth cohorts since 2004) by calendar year and age category (in months) in Scenario I.

Year	Age category (months)			
	30 – 35	36 – 47	48 – 59	Total
2009	0.23	0.54	4.17	4.94
2010	0.23	0.54	4.17	4.94
2011	0.23	0.54	4.17	4.94
Total	0.69	1.62	12.51	14.82

The expected number of BSE cases detected in the healthy slaughter stream (based on upper 95% confidence limit for birth cohorts since 2004) by calendar year and age category in this scenario is provided in Table 5.

[15] Even if the incidence slightly increased in Portugal in 2008 compared to 2007 (19.3 compared to 15.7 per million animals above 24 months) it only consisted of animals born before the total feed ban (2001).

Table 5. Expected number of BSE cases detected in the healthy slaughter stream (based on upper 95% confidence limit for birth cohorts since 2004) by calendar year and age category (in months) in Scenario I.

Year	Age category (months)			Total
	30 – 35	36 – 47	48 – 59	
2009	0.08	0.10	1.44	1.62
2010	0.08	0.10	1.44	1.62
2011	0.08	0.10	1.44	1.62
Total	0.24	0.30	4.32	4.86

The expected number of BSE cases detected in the at risk stream (based on upper 95% confidence limit for birth cohorts since 2004) by calendar year and age category in this scenario is provided in Table 6.

Table 6. Expected number of BSE cases detected in the at risk stream (based on upper 95% confidence limit for birth cohorts since 2004) by calendar year and age category (in months) in Scenario I.

Year	Age category (months)				Total
	24 – 29	30 – 35	36 – 47	48 – 59	
2009	0.00	0.15	0.30	2.04	2.49
2010	0.00	0.15	0.30	2.04	2.49
2011	0.00	0.15	0.30	2.04	2.49
Total	0.00	0.45	0.90	6.12	7.47

2.1.2.2. Results from Scenario II

The expected total number of detected BSE cases (based on upper 95% confidence limit for constant trend of reduction by birth cohorts over the period 1994 to 2003) by calendar year and age category in this scenario is provided in Table 7.

Table 7. Expected total number of BSE cases (based on upper 95% confidence limit for birth over the period 1994 to 2003) by calendar year and age category (in months) in Scenario II.

Year	Age category (months)			Total
	30 – 35	36 – 47	48 – 59	
2009	0.05	0.17	2.17	2.39
2010	0.03	0.11	1.34	1.48
2011	0.02	0.08	0.83	0.93
Total	0.10	0.36	4.34	4.80

The expected number of BSE cases detected in the healthy slaughter stream (based on upper 95% confidence limit for constant trend of reduction by birth cohorts over the period 1994 to 2003) by calendar year and age category in this scenario is provided in Table 8.

Table 8. Expected number of BSE cases detected in the healthy slaughter stream (based on upper 95% confidence limit for constant trend of reduction by birth cohorts over the period 1994 to 2003) by calendar year and age category (in months) in Scenario II.

Year	Age category (months)			
	30 – 35	36 – 47	48 – 59	Total
2009	0.02	0.03	0.75	0.80
2010	0.01	0.02	0.46	0.49
2011	0.01	0.01	0.29	0.31
Total	0.04	0.06	1.50	1.60

The expected number of BSE cases detected in the at risk stream (based on upper 95% confidence limit for constant trend of reduction by birth cohorts over the period 1994 to 2003) by calendar year and age category in this scenario is provided in Table 9.

Table 9. Expected number of BSE cases detected in the at risk stream (based on upper 95% confidence limit for constant trend of reduction by birth cohorts over the period 1994 to 2003) by calendar year and age category (in months) in Scenario II.

Year	Age category (months)				
	24 – 29	30 – 35	36 – 47	48 – 59	Total
2009	0.00	0.03	0.10	1.06	1.19
2010	0.00	0.02	0.06	0.65	0.73
2011	0.00	0.02	0.04	0.41	0.47
Total	0.00	0.07	0.20	2.12	2.39

2.1.2.3. Conclusion from calculations based on Method 3

- According to these scenarios, in healthy slaughtered animals aged respectively up to 36, 48 or 60 months, less than one case for the first two age limits, and less than two cases for the third age limit, can be expected to be detected annually in EU17 by an active surveillance system using currently approved rapid BSE tests.
- According to these scenarios, in at risk animals aged respectively up to 30, 36, 48 or 60 months, less than one case for the first three age limits, and less than three cases for the fourth age limit, can be expected to be detected annually in EU17 by an active surveillance system using currently approved rapid BSE tests.
- Although the likelihood of detecting new cases in specific age groups is very low, there remains a small probability of detecting one or more cases in some of these groups.

3. Atypical BSE

The previous EFSA Scientific Opinion on the "Risk for Human and Animal Health related to the revision of the BSE Monitoring regime in some Member States" (EFSA, 2008) gave a description of Atypical BSE with regard to its distinction as H- and L- (or BASE) type BSE, its widespread detection in European as well as extra-European countries, its almost exclusive occurrence in animals over 8 years of age, its obscure and possibly spontaneous origin, its transmission to inbred mice and Tg mice expressing human, bovine and ovine prion protein (PrP), the limitations of presently available TSE rapid screening tests for its diagnosis, and the absence of information on distribution of its infectivity in peripheral tissues and body fluids.

Since its publication 4 additional Atypical BSE cases (2 in Poland and 1 respectively in Belgium and UK) have been reported in three posters presented during the congress Prion2008 held in Madrid from 8th to 10th October 2008 (Dobly *et al.*, 2008; Polak *et al.*, 2008; Stack *et al.*, 2008). It has however to be highlighted that the information related to these additional cases is still incomplete.

Moreover, results from a few studies became available that focus on the potential human risk from Atypical BSE.

Kong *et al.* (2008) investigated the infectivity and phenotype of L-type BSE or BASE by intracerebrally inoculating Tg mice expressing the human PrP (M129M) with brain homogenates from two BASE-affected cattle. Sixty percent of the inoculated Tg mice became infected after 20-22 months incubation, a transmission rate higher than those reported for Classical BSE. A quarter of BASE-infected Tg mice, but none of the Tg mice infected with sporadic CJD (sCJD), showed presence of PrP^{res} in the spleen, indicating that the BASE prion may be lymphotropic. The pathological prion protein isoforms in BASE-infected humanized Tg mouse brains were different from those of the original cattle BASE or sCJD. Minimal brain spongiosis and long incubation time were observed in the BASE-infected Tg mice. These results were interpreted to suggest that, in humans, BASE may be more virulent than classical BSE and may be lymphotropic.

A similar study was performed in Tg mice also expressing the human PrP (M129M) (Beringue *et al.*, 2008). In contrast with Classical BSE prions, L-type prions appeared to propagate in these mice with no obvious transmission barrier. H-type prions failed to infect the mice.

Another study evaluated the transmission of BASE to a non-human primate (Comoy *et al.*, 2008). Brain homogenates from cattle with Classical BSE and BASE were inoculated intracerebrally into cynomolgus monkeys (*Macacca fascicularis*). The single monkey infected with BASE had a shorter survival, and a different clinical evolution, histopathology, and prion protein (PrP^{res}) pattern than was observed for either Classical BSE or vCJD-inoculated animals. These results were interpreted to suggest a possibly higher degree of pathogenicity of BASE than Classical BSE in primates.

Taken together, these recent studies demonstrate that L-type BSE or BASE is easily transmissible to both humanized mice and primates, and may be more virulent to humans than Classical BSE. Moreover, BASE propagates with clinico-pathological features distinct from Classical BSE.

3.1. Conclusions on Atypical BSE

While the conclusions of the previous EFSA Opinion (EFSA, 2008) on Atypical BSE remain valid, recent studies suggest a potential human risk from Atypical BSE, in particular from L-Type or BASE. It is therefore important to increase knowledge on epidemiology of, improved diagnostic strategies and surveillance in, and pathogenesis and transmission potential of, Atypical BSE.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The grouping of the countries to be assessed using the methodology developed for this specific mandate is considered to be valid only when the epidemiological features[16] of each single country are in line with the features of the other countries to be considered in the group.

The additional recent data on BSE surveillance for 2008 confirm for both the joint EU17 and each of the individual EU17 countries in which sufficient case data are available[17], that the BSE epidemic has been declining[18] and is converging to the sensitivity limit of a surveillance system that uses currently approved rapid BSE tests.

Under the assumption that all countries in the EU17 (including Slovenia and Cyprus) have implemented a BSE surveillance system and control measures as set out in the Regulation (EC) 999/2001 (as amended) for at least six years it can be concluded for Classical BSE that:

- In healthy slaughtered animals aged respectively up to 36, 48 or 60 months, less than one case for the first two age limits, and less than two cases for the third age limit, can be expected to be detected annually in EU17 by an active surveillance system that uses currently approved rapid BSE tests.
- In at risk animals aged respectively up to 30, 36, 48 or 60 months, less than one case for the first three age limits, and less than three cases for the fourth age limit, can be expected to be detected annually in EU17 by an active surveillance system that uses currently approved rapid BSE tests.
- Although the likelihood of detecting new cases in specific age groups is very low, there remains a small probability of detecting one or more cases in some of these groups.

In the context of the continuous decline of the Classical BSE epidemic, the proportion of Atypical BSE cases among the total number of detected BSE cases can be expected to increase. Future risk assessments on BSE would benefit from separate reporting of Classical and Atypical BSE.

An age limit of 24 months in at risk animals would result in: (i) an increased sensitivity of surveillance in case of BSE re-emergence, and (ii) a possibly improved system for early detection of emerging new TSEs in cattle.

[16] In particular the age and birth cohort distribution of the BSE cases, the incidence rate and its evolution.
[17] A minimum number of 50 cases was considered necessary to obtain statistically reliable estimates.

RECOMMENDATIONS

It is recommended:

- to monitor and report separately Classical and Atypical BSE cases;
- to increase knowledge on the pathogenesis and the transmission potential of Atypical BSE;
- to characterize and improve the ability of the tests used for the detection of Atypical BSE;
- to use the information gained through the previous bullet points as the basis for a TSE monitoring system in cattle.

DOCUMENTATION PROVIDED TO EFSA

1. Letter (ref. n. SANCO E.2/MP/bo – D(2008) 520710 dated 03/10/2008) submitted by the European Commission with a request for an updated scientific opinion on the risk for human and animal health related to the revision of the BSE monitoring regime in some Member States.
2. Letter (ref. n. SANCO E.2/MP/bo – D(2008) 520784 dated 24/10/2008) submitted by the European Commission amending the terms of reference of the request mentioned in point 1.

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APPENDIX A

NUMBER OF BSE CASES DETECTED THROUGH THE BSE SURVEILLANCE (ACTIVE AND PASSIVE) AND THE ANIMALS CULLED IN THE FRAMEWORK OF BSE ERADICATION MEASURES SINCE 2001 PER MEMBER STATE, BIRTH COHORT AND YEAR OF DETECTION.

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Austria

Number of BSE cases detected through the BSE Surveillance (Active and Passive) and the animals culled in the framework of BSE eradication measures in Austria since 2001 per birth cohort and year of detection.

Birth cohort	N° of detected BSE cases per year								Total
	2001	2002	2003	2004	2005	2006	2007	2008	
1980	-	-	-	-	-	-	-	-	0
1981	-	-	-	-	-	-	-	-	0
1982	-	-	-	-	-	-	-	-	0
1983	-	-	-	-	-	-	-	-	0
1984	-	-	-	-	-	-	-	-	0
1985	-	-	-	-	-	-	-	-	0
1986	-	-	-	-	-	-	-	-	0
1987	-	-	-	-	-	-	-	-	0
1988	-	-	-	-	-	-	-	-	0
1989	-	-	-	-	-	-	-	-	0
1990	-	-	-	-	-	-	-	-	0
1991	-	-	-	-	-	-	-	-	0
1992	-	-	-	-	1	-	-	-	1
1993	-	-	-	-	-	1	-	-	1
1994	-	-	-	-	1	-	-	-	1
1995	-	-	-	-	-	-	-	-	0
1996	1	-	-	-	-	-	1	-	2
1997	-	-	-	-	-	-	-	-	0
1998	-	-	-	-	-	-	-	-	0
1999	-	-	-	-	-	-	-	-	0
2000	-	-	-	-	-	1	-	-	1
2001	-	-	-	-	-	-	-	-	0
2002	-	-	-	-	-	-	-	-	0
2003	-	-	-	-	-	-	-	-	0
Total	1	0	0	0	2	2	1	0	6

Belgium

Number of BSE cases detected through the BSE Surveillance (Active and Passive) and the animals culled in the framework of BSE eradication measure in Belgium since 2001 per birth cohort and year of detection.

Birth cohort	N° of detected BSE cases per year								Total
	2001	2002	2003	2004	2005	2006	2007	2008	
1980	-	-	-	-	-	-	-	-	0
1981	-	-	-	-	-	-	-	-	0
1982	-	-	-	-	-	-	-	-	0
1983	-	-	-	-	-	-	-	-	0
1984	-	-	-	-	-	-	-	-	0
1985	-	-	-	-	-	-	-	-	0
1986	-	-	-	-	-	-	-	-	0
1987	-	-	-	-	-	-	-	-	0
1988	-	-	-	-	-	-	-	-	0
1989	-	-	-	-	-	-	-	-	0
1990	-	-	-	-	-	-	-	-	0
1991	1	-	1	-	1	-	-	-	3
1992	1	3	-	-	-	-	-	-	4
1993	1	1	-	-	-	-	-	-	2
1994	7	5	2	1	-	1	-	-	16
1995	18	8	2	-	-	-	-	-	28
1996	18	13	6	4	-	-	-	-	41
1997	-	8	3	4	2	-	-	-	17
1998	-	-	1	2	-	-	-	-	3
1999	-	-	-	-	-	-	-	-	0
2000	-	-	-	-	-	-	-	-	0
2001	-	-	-	-	-	-	-	-	0
2002	-	-	-	-	-	-	-	-	0
2003	-	-	-	-	-	-	-	-	0
Total	46	38	15	11	3	1	0	0	114

Cyprus

Number of BSE cases detected through the BSE Surveillance (Active and Passive) and the animals culled in the framework of BSE eradication measure in Cyprus since 2001 per birth cohort and year of detection.

Birth cohort	N° of detected BSE cases per year								Total
	2001	2002	2003	2004	2005	2006	2007	2008	
1980	-	-	-	-	-	-	-	-	0
1981	-	-	-	-	-	-	-	-	0
1982	-	-	-	-	-	-	-	-	0
1983	-	-	-	-	-	-	-	-	0
1984	-	-	-	-	-	-	-	-	0
1985	-	-	-	-	-	-	-	-	0
1986	-	-	-	-	-	-	-	-	0
1987	-	-	-	-	-	-	-	-	0
1988	-	-	-	-	-	-	-	-	0
1989	-	-	-	-	-	-	-	-	0
1990	-	-	-	-	-	-	-	-	0
1991	-	-	-	-	-	-	-	-	0
1992	-	-	-	-	-	-	-	-	0
1993	-	-	-	-	-	-	-	-	0
1994	-	-	-	-	-	-	-	-	0
1995	-	-	-	-	-	-	-	-	0
1996	-	-	-	-	-	-	-	-	0
1997	-	-	-	-	-	-	-	-	0
1998	-	-	-	-	-	-	-	-	0
1999	-	-	-	-	-	-	-	-	0
2000	-	-	-	-	-	-	-	-	0
2001	-	-	-	-	-	-	-	-	0
2002	-	-	-	-	-	-	-	-	0
2003	-	-	-	-	-	-	-	-	0
Total	0	0	0	0	0	0	0	0	0

Denmark

Number of BSE cases detected through the BSE Surveillance (Active and Passive) and the animals culled in the framework of BSE eradication measure in Denmark since 2001 per birth cohort and year of detection.

Birth cohort	N° of detected BSE cases per year								Total
	2001	2002	2003	2004	2005	2006	2007	2008	
1980	-	-	-	-	-	-	-	-	0
1981	-	-	-	-	-	-	-	-	0
1982	-	-	-	-	-	-	-	-	0
1983	-	-	-	-	-	-	-	-	0
1984	-	-	-	-	-	-	-	-	0
1985	-	-	-	-	-	-	-	-	0
1986	-	-	-	-	-	-	-	-	0
1987	-	-	-	-	-	-	-	-	0
1988	-	-	-	-	-	-	-	-	0
1989	-	-	-	-	-	-	-	-	0
1990	-	-	-	1	-	-	-	-	1
1991	-	-	-	-	-	-	-	-	0
1992	-	-	-	-	-	-	-	-	0
1993	1	-	-	-	-	-	-	-	1
1994	-	-	-	-	-	-	-	-	0
1995	-	-	-	-	-	-	-	-	0
1996	3	2	1	-	1	-	-	-	7
1997	1	-	1	-	-	-	-	-	2
1998	1	1	-	-	-	-	-	-	2
1999	-	-	-	-	-	-	-	-	0
2000	-	-	-	-	-	-	-	-	0
2001	-	-	-	-	-	-	-	-	0
2002	-	-	-	-	-	-	-	-	0
2003	-	-	-	-	-	-	-	-	0
Total	6	3	2	1	1	0	0	0	13

Finland

Number of BSE cases detected through the BSE Surveillance (Active and Passive) and the animals culled in the framework of BSE eradication measures in Finland since 2001 per birth cohort and year of detection.

Birth cohort	N° of detected BSE cases per year								Total
	2001	2002	2003	2004	2005	2006	2007	2008	
1980	-	-	-	-	-	-	-	-	0
1981	-	-	-	-	-	-	-	-	0
1982	-	-	-	-	-	-	-	-	0
1983	-	-	-	-	-	-	-	-	0
1984	-	-	-	-	-	-	-	-	0
1985	-	-	-	-	-	-	-	-	0
1986	-	-	-	-	-	-	-	-	0
1987	-	-	-	-	-	-	-	-	0
1988	-	-	-	-	-	-	-	-	0
1989	-	-	-	-	-	-	-	-	0
1990	-	-	-	-	-	-	-	-	0
1991	-	-	-	-	-	-	-	-	0
1992	-	-	-	-	-	-	-	-	0
1993	-	-	-	-	-	-	-	-	0
1994	-	-	-	-	-	-	-	-	0
1995	1	-	-	-	-	-	-	-	1
1996	-	-	-	-	-	-	-	-	0
1997	-	-	-	-	-	-	-	-	0
1998	-	-	-	-	-	-	-	-	0
1999	-	-	-	-	-	-	-	-	0
2000	-	-	-	-	-	-	-	-	0
2001	-	-	-	-	-	-	-	-	0
2002	-	-	-	-	-	-	-	-	0
2003	-	-	-	-	-	-	-	-	0
Total	1	0	0	0	0	0	0	0	1

France

Number of BSE cases detected through the BSE Surveillance (Active and Passive) and the animals culled in the framework of BSE eradication measures in France since 2001 per birth cohort and year of detection.

Birth cohort	N° of detected BSE cases per year								Total
	2001	2002	2003	2004	2005	2006	2007	2008	
1980	-	-	-	-	-	-	-	-	0
1981	-	-	-	-	-	-	-	-	0
1982	-	-	-	-	-	-	-	-	0
1983	-	-	-	-	-	-	-	-	0
1984	-	-	-	-	-	-	-	-	0
1985	-	-	-	-	-	-	-	-	0
1986	-	-	-	1	-	-	-	-	1
1987	-	-	1	-	-	-	-	-	1
1988	-	1	-	-	-	-	-	-	1
1989	-	-	1	-	-	-	-	-	1
1990	-	1	1	-	1	-	-	1	4
1991	-	3	2	-	-	-	-	-	5
1992	1	5	2	2	2	-	-	-	12
1993	30	17	7	4	3	1	-	2	64
1994	87	56	23	12	6	2	-	-	186
1995	134	103	41	10	7	-	3	-	298
1996	21	40	13	10	2	-	1	2	89
1997	4	10	16	4	3	2	1	1	41
1998	-	4	4	6	-	-	2	-	16
1999	-	-	-	2	5	2	-	-	9
2000	-	-	-	-	3	-	-	2	5
2001	-	-	-	-	-	1	-	-	1
2002	-	-	-	-	-	-	-	-	0
2003	-	-	-	-	-	-	-	-	0
Total	277	240	111	51	32	8	7	8	734

Germany

Number of BSE cases detected through the BSE Surveillance (Active and Passive) and the animals culled in the framework of BSE eradication measures in Germany since 2001 per birth cohort and year of detection.

Birth cohort	N° of detected BSE cases per year								Total
	2001	2002	2003	2004	2005	2006	2007	2008	
1980	-	-	-	-	-	-	-	-	0
1981	-	-	-	-	-	-	-	-	0
1982	-	-	-	-	-	-	-	-	0
1983	-	-	-	-	-	-	-	-	0
1984	-	-	-	-	-	-	-	-	0
1985	-	-	-	-	-	-	-	-	0
1986	-	-	-	-	-	-	-	-	0
1987	-	1	-	-	-	-	-	-	1
1988	-	-	-	-	-	-	-	-	0
1989	-	-	-	-	-	-	-	-	0
1990	1	1	-	-	-	-	-	-	2
1991	1	-	-	1	-	-	-	-	2
1992	1	1	-	-	-	-	-	-	2
1993	-	3	-	-	-	-	-	-	3
1994	8	5	-	2	-	-	-	-	15
1995	40	32	8	2	1	1	-	-	84
1996	67	44	12	8	3	-	-	-	134
1997	5	11	13	14	1	-	-	-	44
1998	2	8	8	10	5	1	-	-	34
1999	-	-	13	18	11	9	3	-	54
2000	-	-	-	10	9	5	1	2	27
2001	-	-	-	-	2	-	-	-	2
2002	-	-	-	-	-	-	-	-	0
2003	-	-	-	-	-	-	-	-	0
Total	125	106	54	65	32	16	4	2	404

Greece

Number of BSE cases detected through the BSE Surveillance (Active and Passive) and the animals culled in the framework of BSE eradication measures in Greece since 2001 per birth cohort and year of detection.

Birth cohort	N° of detected BSE cases per year								Total
	2001	2002	2003	2004	2005	2006	2007	2008	
1980	-	-	-	-	-	-	-	-	0
1981	-	-	-	-	-	-	-	-	0
1982	-	-	-	-	-	-	-	-	0
1983	-	-	-	-	-	-	-	-	0
1984	-	-	-	-	-	-	-	-	0
1985	-	-	-	-	-	-	-	-	0
1986	-	-	-	-	-	-	-	-	0
1987	-	-	-	-	-	-	-	-	0
1988	-	-	-	-	-	-	-	-	0
1989	-	-	-	-	-	-	-	-	0
1990	-	-	-	-	-	-	-	-	0
1991	-	-	-	-	-	-	-	-	0
1992	-	-	-	-	-	-	-	-	0
1993	-	-	-	-	-	-	-	-	0
1994	-	-	-	-	-	-	-	-	0
1995	-	-	-	-	-	-	-	-	0
1996	1	-	-	-	-	-	-	-	1
1997	-	-	-	-	-	-	-	-	0
1998	-	-	-	-	-	-	-	-	0
1999	-	-	-	-	-	-	-	-	0
2000	-	-	-	-	-	-	-	-	0
2001	-	-	-	-	-	-	-	-	0
2002	-	-	-	-	-	-	-	-	0
2003	-	-	-	-	-	-	-	-	0
Total	1	0	0	0	0	0	0	0	1

Ireland

Number of BSE cases detected through the BSE Surveillance (Active and Passive) and the animals culled in the framework of BSE eradication measures in Ireland since 2001 per birth cohort and year of detection.

Birth cohort	N° of detected BSE cases per year								Total
	2001	2002	2003	2004	2005	2006	2007	2008	
1980	-	-	-	-	-	-	-	-	0
1981	-	-	-	-	-	-	-	-	0
1982	-	-	-	-	-	-	-	-	0
1983	-	-	-	-	-	-	-	-	0
1984	-	-	-	-	-	-	-	-	0
1985	-	-	-	-	-	-	-	-	0
1986	2	2	-	1	-	-	-	-	5
1987	-	2	-	-	-	-	-	-	2
1988	1	4	-	-	-	-	-	-	5
1989	2	1	4	3	-	1	-	-	11
1990	1	10	3	3	-	-	-	-	17
1991	6	10	6	3	1	2	1	-	29
1992	8	14	7	12	2	2	-	-	45
1993	21	40	25	16	11	1	2	-	116
1994	52	51	31	18	25	6	8	6	197
1995	110	133	74	43	20	11	7	2	400
1996	39	60	30	18	10	11	6	8	182
1997	-	5	3	3	-	2	-	2	15
1998	-	-	-	4	-	1	1	-	6
1999	-	2	-	2	3	-	-	1	8
2000	-	-	-	-	3	-	3	-	6
2001	-	-	-	-	2	1	-	1	4
2002	-	-	-	-	-	-	1	-	1
2003	-	-	-	-	-	-	-	2	2
Total	242	334	183	126	77	38	29	22	1,051

Italy

Number of BSE cases detected through the BSE Surveillance (Active and Passive) and the animals culled in the framework of BSE eradication measures in Italy since 2001 per birth cohort and year of detection.

Birth cohort	N° of detected BSE cases per year								Total
	2001	2002	2003	2004	2005	2006	2007	2008	
1980	-	-	-	-	-	-	-	-	0
1981	-	-	-	-	-	-	-	-	0
1982	-	-	-	-	-	-	-	-	0
1983	-	-	-	-	-	-	-	-	0
1984	-	-	-	-	-	-	-	-	0
1985	-	-	-	-	-	-	-	-	0
1986	-	-	-	-	-	-	-	-	0
1987	1	-	-	-	-	-	-	-	1
1988	-	-	2	-	-	-	-	-	2
1989	-	-	-	-	-	-	-	-	0
1990	-	-	-	-	-	-	-	-	0
1991	-	1	-	-	-	-	-	-	1
1992	-	-	1	-	1	1	1	-	4
1993	2	-	3	-	-	-	-	-	5
1994	8	5	1	-	-	-	-	-	14
1995	12	10	4	-	-	-	-	-	26
1996	20	14	10	4	3	1	-	-	52
1997	7	4	9	3	1	1	1	-	26
1998	-	2	1	-	-	-	-	-	3
1999	-	-	-	1	2	2	-	-	5
2000	-	-	-	-	1	1	-	-	2
2001	-	-	-	-	-	1	-	-	1
2002	-	-	-	-	-	-	-	-	0
2003	-	-	-	-	-	-	-	-	0
Total	50	36	31	8	8	7	2	0	142

Luxemburg

Number of BSE cases detected through the BSE Surveillance (Active and Passive) and the animals culled in the framework of BSE eradication measures in Luxemburg since 2001 per birth cohort and year of detection.

Birth cohort	N° of detected BSE cases per year								Total
	2001	2002	2003	2004	2005	2006	2007	2008	
1980	-	-	-	-	-	-	-	-	0
1981	-	-	-	-	-	-	-	-	0
1982	-	-	-	-	-	-	-	-	0
1983	-	-	-	-	-	-	-	-	0
1984	-	-	-	-	-	-	-	-	0
1985	-	-	-	-	-	-	-	-	0
1986	-	-	-	-	-	-	-	-	0
1987	-	-	-	-	-	-	-	-	0
1988	-	-	-	-	-	-	-	-	0
1989	-	-	-	-	-	-	-	-	0
1990	-	-	-	-	-	-	-	-	0
1991	-	-	-	-	-	-	-	-	0
1992	-	-	-	-	-	-	-	-	0
1993	-	-	-	-	-	-	-	-	0
1994	-	-	-	-	-	-	-	-	0
1995	-	-	-	-	-	-	-	-	0
1996	-	1	-	-	-	-	-	-	1
1997	-	-	-	-	-	-	-	-	0
1998	-	-	-	-	-	-	-	-	0
1999	-	-	-	-	-	-	-	-	0
2000	-	-	-	-	-	-	-	-	0
2001	-	-	-	-	1	-	-	-	1
2002	-	-	-	-	-	-	-	-	0
2003	-	-	-	-	-	-	-	-	0
Total	0	1	0	0	1	0	0	0	2

Netherlands

Number of BSE cases detected through the BSE Surveillance (Active and Passive) and the animals culled in the framework of BSE eradication measures in the Netherlands since 2001 per birth cohort and year of detection.

Birth cohort	N° of detected BSE cases per year								
	2001	2002	2003	2004	2005	2006	2007	2008	Total
1980	-	-	-	-	-	-	-	-	0
1981	-	-	-	-	-	-	-	-	0
1982	-	-	-	-	-	-	-	-	0
1983	-	-	-	-	-	-	-	-	0
1984	-	-	-	-	-	-	-	-	0
1985	-	-	-	-	-	-	-	-	0
1986	-	-	-	-	-	-	-	-	0
1987	-	-	-	-	-	-	-	-	0
1988	1	-	-	-	-	-	-	-	1
1989	-	-	-	-	-	-	-	-	0
1990	-	-	-	-	-	-	-	-	0
1991	-	-	1	1	-	-	-	-	2
1992	1	1	-	-	-	-	-	-	2
1993	2	1	-	-	-	-	-	-	3
1994	2	2	-	-	-	-	-	-	4
1995	4	3	-	-	-	-	-	-	7
1996	9	10	10	3	-	-	-	-	32
1997	1	4	5	1	-	1	-	-	12
1998	-	3	1	1	-	1	-	-	6
1999	-	-	1	-	-	-	1	-	2
2000	-	-	-	-	2	-	1	1	4
2001	-	-	-	-	1	-	-	-	1
2002	-	-	-	-	-	-	-	-	0
2003	-	-	-	-	-	-	-	-	0
Total	20	24	18	6	3	2	2	1	76

Portugal

Number of BSE cases detected through the BSE Surveillance (Active and Passive) and the animals culled in the framework of BSE eradication measures in Portugal since 2001 per birth cohort and year of detection.

Birth cohort	N° of detected BSE cases per year								Total
	2001	2002	2003	2004	2005	2006	2007	2008	
1980	-	-	-	-	-	-	-	-	0
1981	-	-	-	-	-	-	-	-	0
1982	-	-	-	-	-	-	-	-	0
1983	-	-	-	-	-	-	-	-	0
1984	-	1	-	-	-	-	-	-	1
1985	-	-	-	-	1	-	-	-	1
1986	-	-	-	-	-	-	-	-	0
1987	-	1	1	-	-	-	-	-	2
1988	-	-	-	-	-	1	-	-	1
1989	2	-	1	-	-	-	-	-	3
1990	1	-	1	3	2	3	-	-	10
1991	-	1	-	1	-	1	-	-	3
1992	3	1	4	3	2	-	1	-	14
1993	22	11	24	14	8	3	3	3	88
1994	38	22	19	13	7	7	2	2	110
1995	17	19	12	8	6	1	1	2	66
1996	22	19	23	9	7	2	1	2	85
1997	5	8	28	23	10	4	2	5	85
1998	-	1	18	13	7	8	-	1	48
1999	-	2	1	3	2	2	2	1	13
2000	-	-	-	1	-	-	-	-	1
2001	-	-	-	-	-	-	1	-	1
2002	-	-	-	-	1	-	-	-	1
2003	-	-	-	-	-	-	-	-	0
Total	110	86	132	91	53	32	13	16	533

Slovenia

Number of BSE cases detected through the BSE Surveillance (Active and Passive) and the animals culled in the framework of BSE eradication measures in Slovenia since 2001 per birth cohort and year of detection.

Birth cohort	N° of detected BSE cases per year								Total
	2001	2002	2003	2004	2005	2006	2007	2008	
1980	-	-	-	-	-	-	-	-	0
1981	-	-	-	-	-	-	-	-	0
1982	-	-	-	-	-	-	-	-	0
1983	-	-	-	-	-	-	-	-	0
1984	-	-	-	-	-	-	-	-	0
1985	-	-	-	-	-	-	-	-	0
1986	-	-	-	-	-	-	-	-	0
1987	-	-	-	-	-	-	-	-	0
1988	-	-	-	-	-	-	-	-	0
1989	-	-	-	-	-	-	-	-	0
1990	-	-	-	-	-	-	-	-	0
1991	-	-	-	-	-	-	-	-	0
1992	-	-	-	-	-	-	-	-	0
1993	-	-	-	-	-	-	-	-	0
1994	-	-	-	-	-	-	-	-	0
1995	1	-	-	-	-	-	-	-	1
1996	-	1	-	-	-	-	-	-	1
1997	-	-	-	-	-	-	-	-	0
1998	-	-	-	1	-	-	-	-	1
1999	-	-	1	-	-	-	-	-	1
2000	-	-	-	1	1	1	1	-	4
2001	-	-	-	-	-	-	-	-	0
2002	-	-	-	-	-	-	-	-	0
2003	-	-	-	-	-	-	-	-	0
Total	1	1	1	2	1	1	1	0	8

Spain

Number of BSE cases detected through the BSE Surveillance (Active and Passive) and the animals culled in the framework of BSE eradication measures in Spain since 2001 per birth cohort and year of detection.

Birth cohort	N° of detected BSE cases per year								Total
	2001	2002	2003	2004	2005	2006	2007	2008	
1980	-	-	-	-	-	-	-	-	0
1981	-	-	-	-	-	-	-	-	0
1982	-	-	-	-	-	-	-	-	0
1983	-	-	-	-	-	-	-	-	0
1984	-	-	-	-	-	-	-	-	0
1985	-	-	-	-	-	-	-	-	0
1986	1	-	-	-	-	-	-	-	1
1987	1	-	1	-	-	-	-	-	2
1988	1	1	1	-	-	-	-	-	3
1989	1	2	1	-	-	-	1	-	5
1990	1	-	1	1	-	-	-	1	4
1991	-	-	-	-	-	-	-	-	0
1992	1	1	2	1	-	-	1	1	7
1993	10	12	6	5	1	1	1	-	36
1994	13	9	9	4	3	1	-	1	40
1995	22	33	24	9	2	1	3	1	95
1996	20	33	34	14	7	4	1	2	115
1997	11	28	57	30	14	10	1	3	154
1998	-	7	26	49	24	18	6	4	134
1999	1	1	4	19	25	17	7	4	78
2000	-	-	1	5	26	24	12	3	71
2001	-	-	-	-	-	1	-	3	4
2002	-	-	-	-	1	-	-	1	2
2003	-	-	-	-	-	-	-	-	0
Total	83	127	167	137	103	77	33	24	751

Sweden

Number of BSE cases detected through the BSE Surveillance (Active and Passive) and the animals culled in the framework of BSE eradication measures in Sweden since 2001 per birth cohort and year of detection.

Birth cohort	N° of detected BSE cases per year								Total
	2001	2002	2003	2004	2005	2006	2007	2008	
1980	-	-	-	-	-	-	-	-	0
1981	-	-	-	-	-	-	-	-	0
1982	-	-	-	-	-	-	-	-	0
1983	-	-	-	-	-	-	-	-	0
1984	-	-	-	-	-	-	-	-	0
1985	-	-	-	-	-	-	-	-	0
1986	-	-	-	-	-	-	-	-	0
1987	-	-	-	-	-	-	-	-	0
1988	-	-	-	-	-	-	-	-	0
1989	-	-	-	-	-	-	-	-	0
1990	-	-	-	-	-	-	-	-	0
1991	-	-	-	-	-	-	-	-	0
1992	-	-	-	-	-	-	-	-	0
1993	-	-	-	-	-	-	-	-	0
1994	-	-	-	-	-	1	-	-	1
1995	-	-	-	-	-	-	-	-	0
1996	-	-	-	-	-	-	-	-	0
1997	-	-	-	-	-	-	-	-	0
1998	-	-	-	-	-	-	-	-	0
1999	-	-	-	-	-	-	-	-	0
2000	-	-	-	-	-	-	-	-	0
2001	-	-	-	-	-	-	-	-	0
2002	-	-	-	-	-	-	-	-	0
2003	-	-	-	-	-	-	-	-	0
Total	0	0	0	0	0	1	0	0	1

United Kingdom

Number of BSE cases detected through the BSE Surveillance (Active and Passive) and the animals culled in the framework of BSE eradication measures in United Kingdom since 2001 per birth cohort and year of detection.

Birth cohort	N° of detected BSE cases per year								
	2001	2002	2003	2004	2005	2006	2007	2008	Total
1980	-	1	-	-	-	-	-	-	1
1981	1	-	-	-	-	-	-	-	1
1982	-	-	-	-	-	-	-	-	0
1983	-	-	1	-	-	-	-	-	1
1984	1	2	-	-	-	1	-	-	4
1985	1	2	2	-	-	-	-	-	5
1986	10	8	3	1	1	-	-	-	23
1987	19	26	6	6	6	1	-	1	65
1988	17	22	18	6	-	-	-	2	65
1989	20	34	14	14	5	4	-	1	92
1990	24	42	16	13	6	4	1	1	107
1991	58	63	37	21	20	5	-	1	205
1992	104	130	69	37	29	12	7	-	388
1993	241	160	114	55	33	20	11	4	638
1994	362	303	133	72	52	30	16	6	974
1995	310	275	138	64	31	23	9	4	854
1996	25	37	24	10	6	7	-	8	117
1997	9	13	18	4	4	3	1	3	55
1998	1	4	14	11	9	3	7	2	51
1999	-	1	5	6	12	5	3	3	35
2000	-	-	-	2	4	4	3	-	13
2001	-	-	-	-	2	4	1	-	7
2002	-	-	-	-	1	1	2	3	7
2003	-	-	-	-	-	-	-	2	2
Total	1,203	1,123	612	322	221	127	61	41	3,710

APPENDIX B

METHODOLOGY USED WHEN PERFORMING THE CALCULATIONS WITH METHOD 3

INTRODUCTION

The BSE risk in various risk categories, age-groups and birth cohorts using a general method as described by de Koeijer (de Koeijer, 2007) was calculated and from that further calculation steps were performed to derive a risk assessment on the requested issues. A summary of the calculation steps is given here, and can be traced back in the Excel worksheet that is provided as an Annex to this Opinion at http://www.efsa.europa.eu/EFSA/efsa_locale-1178620753812_1211902502788.htm.

The case data for all EU17 are pooled together for the period of active surveillance (2001 through 2008). They are ordered by birth cohort and age (into year groups). All cases where the year of birth or age is unknown and all cases older than 155 months are also excluded because their exact age is often unclear from the statistics and their numbers are extremely low. In a later stage a correction was applied for the cases that are ignored in the modelling by adding a small fraction to the cohort estimates.

By organising the data in birth cohorts it is clear that a selection of ages have been fully tested, whereas other ages were not tested at all. A normalised age at onset distribution of BSE in a cohort (up to 155 months) is used to calculate the fraction of cases that is expected to be found in the part of the cohort that has been tested in the period 2001 through 2008. From that the expected number of cases in the full cohort was estimated, subsequently the maximum number of cases using 95% confidence in a binomial sample was calculated (using an add-on excel function downloadable from http://statpages.org/confint.html) (Clopper and Pearson, 1934) and lastly a finite population correction for large samples was applied (Burstein, 1975). Since annually the number of animals tested is of the order of 10 million animals, relatively small variations in this number make no significant difference to the width of the confidence interval, so the 10 million is applied for the number tested throughout the analysis.

Finally the available data was evaluated to determine the proportion of the cases by age group that are found in the healthy slaughter or at risk categories. This proportion is then applied to evaluate the effect of changing surveillance in the various risk categories.

Two scenarios were applied to calculate the future risk of BSE. All scenarios that are included here are based on worst case assumptions. Various other scenarios have been assessed for sensitivity analysis, but details on those scenarios are not included in the spreadsheet or in the Opinion.

Scenario I: Calculates the upper confidence limit of the incidence in the 2004 birth cohort and assumes all subsequent birth cohorts to have that same incidence. Since the incidence is decreasing significantly in each birth cohort since 1995 this is a worst case assumption.

Scenario II: Estimates the decay rate of the epidemic from the cohort case incidences of the last ten well evaluated birth cohorts (1994-2003) by log-linear regression. The incidence in the 2004 cohort and onwards is projected forward using the upper 95% confidence interval of the 2003 cohort incidence and the upper confidence limit of the decay rate.

UNDERLYING ASSUMPTIONS AND CALCULATION RULES

1) BSE infections occur mostly at a very young age.
2) The derived distribution for the age-at-onset is valid for the whole EU17, and will remain valid after 2008.
3) Uncertainty in the distribution of the age-at-onset is negligible
4) Local and regional variation in the age distribution of cattle population is not correlated with the local/regional BSE incidence.
5) The age distribution of cattle is sufficiently constant over the assessed period
6) All detectable BSE cases in the EU17 between 1 January 2001 and 31 December 2008 have been identified and are included in the applied dataset.
7) Animals from birth cohort of year x and age y will appear in the test years x+y and x+y+1. This depends on whether the test is performed before or after the birthday of the animal in a given year. It is assumed this is to be distributed in equal amounts.

AGE AT ONSET DISTRIBUTION

Using the age-at-infection and incubation period distributions from Arnold and Wilesmith (Arnold and Wilesmith, 2004) an age at onset distribution can be derived, which is based on reported case data from Great Britain (GB). A preliminary analysis showed that the age-at-onset distribution derived from the GB epidemic data had a lower mean age-at-onset than the observed data from the EU17, so an age-at-onset distribution from the available EU17 case data was derived. To do so, case data for the birth cohorts of 1994-1999 were used. Only the age categories which were fully tested by the end of 2007 were included. The relative risk of onset for each age category was calculated relative to the 7-year old age-group. Per age group, the average relative risks were determined and subsequently the newly derived age-at-onset distribution was normalized. Thus each of the included birth cohorts had equal weight in the final age-at-onset distribution.

The resulting distribution of the age at onset is given in lines 38 to 40 of each of the Excel worksheets.

SENSITIVITY ANALYSES

Since the age-at-onset distribution could vary between countries due to, for example, differences in the age distribution of the cattle population, a sensitivity analysis was conducted to compare the applied age-at-onset distribution with the GB age-at-onset distribution (Arnold and Wilesmith, 2004). This is considered to be an extreme distribution, which has a much younger age at onset than found anywhere else, probably as a result of the high exposure during the nineteen eighties. It was found that using the GB age-at-onset distribution leads to 56% increase in the expected case numbers in the younger age categories (<48 months). Obviously it then leads to lower predicted case numbers in the older age categories (6 years and older). The EU17 distribution which was derived from the active surveillance data was considered to be the most suitable one to analyse the EU BSE situation since it reflected the age-at-onset of recent EU cases. Calculating the epidemic decay rate from the number of cases in successive birth cohorts (Scenario II) makes little difference in

terms of the number of predicted cases in each birth cohort that each age at onset distribution produces for the next 5 birth cohorts. The Scenario II works with the birth cohort data.

It is assumed that prevalence in subsequent birth cohorts can display a wave over time which is a direct effect of a wave in past exposure. This wave blurs the effect of the extended control measures in 2001, since there are only three cohorts available with sufficient cohort data and the wavelength is a full generation long. Thus a time period of at least a full generation is needed in evaluating the growth rate of the epidemic. The applied log-linear regression overcomes the effect of the wave but necessarily uses so many past birth cohorts that the effect of the extra measures in 2001 averages away in the longer period of less pronounced decline.

It was also checked whether using only the healthy slaughter data in the analysis would lead to the same results as an analysis on the complete data, with the subsequent evaluation of the fraction which would appear in healthy slaughter. As can be expected, the calculations are not very sensitive to this assumption.

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