

VETERINARY ASSESSMENT OF THE RISK OF REPLACING THE CULLING OF COHORTS OF CATTLE AFFECTED WITH BOVINE SPONGIFORM ENCEPHALOPATHY AS SOON AS POSSIBLE, WITH THE PERMANENT RESTRICTION OF COHORTS

1. EXECUTIVE SUMMARY

Bovine spongiform encephalopathy (BSE) is a fatal neurological disease of cattle. Consumption of feed contaminated with BSE is believed to be the principal, if not the exclusive, route of infection with the BSE agent. Scientific studies have shown that cattle are more susceptible to infection with BSE during the first year of life. Cohorts are cattle which might have consumed the same feed as an animal affected with BSE when both were under a year of age.

In 1996, BSE was linked to a new form (variant) of the human transmissible spongiform encephalopathy, Creutzfeldt-Jakob Disease. As a result, the United Kingdom (UK) introduced the Over Thirty Month (OTM) rule which banned cattle aged over 30 months from entering the food chain. The UK also extended the ban on feeding of mammalian meat and bone meal, to all farmed animals. This reinforced feed ban is considered effective from 1 August 1996.

Between 2000 and 2004, the European Commission's Scientific Steering Committee and the European Food Safety Authority concluded that cattle which consumed the same feed as an animal affected with BSE were at greater risk of being infected with BSE than cattle in the normal healthy population and that the culling of cohorts was an effective method of preventing cattle infected with BSE from entering the food chain and of eliminating future cases of BSE. The results of the European Union's BSE monitoring programme between 2003 and 2005 continued to indicate that cohorts have a significantly higher level of BSE infection than normal healthy slaughtered cattle.

Since July 2001, Regulation (EC) No.999/2001 has required the culling of cohorts as soon as possible. However, since 19 January 2007, Regulation (EC) No.1923/2006 has provided for the European Commission and Member States to permit the use of BSE cohorts, until the end of their productive lives following such a request from a Member State. Permission is dependent upon a favourable risk assessment taking into account the control measures in that Member State.

The exclusion of cohorts from the food and feed chains is part of a package of BSE control measures intended to safeguard public and animal health and maintain consumer confidence. Minimising the number of cattle slaughtered for human consumption which test positive for BSE is important to maintain consumer confidence in UK beef and beef products.

In the UK, the culling of cohorts born after July 1996 started in March 2005 in preparation for the replacement of the OTM rule in November 2005. If infected

cattle within the cohort sub-population are culled before they develop detectable disease the future number of BSE cases may be reduced.

The eradication of BSE is paramount in terms of safeguarding public and animal health, reducing the economic burden of BSE controls and promoting trade in UK cattle and beef. Together with other BSE controls, the culling of cohorts as soon as possible, has the potential to support the achievement of the Government's Public Service Agreement target of eradicating BSE in Great Britain by 2010.

In view of the limitations of current control measures, allowing cohorts to be used until the end of their productive lives would require enhanced monitoring and enforcement measures and incur additional expense. The greater the number of cohorts alive, the greater the likelihood of a single cohort animal by-passing the official controls and entering the food chain. Such breaches have a negative effect on consumer confidence in UK beef.

On the basis of this risk assessment, veterinary advice is that culling cohorts as soon as possible provides a higher level of disease control than permanently restricting cohorts until the end of their productive lives. The risk assessment recommends that the UK continues to implement the policy of culling cohorts as soon as possible, but reviews this assessment in two years time, in the light of the predicted continuing decline in the BSE epidemic.

2. INTRODUCTION

The purpose of this veterinary risk assessment is to address the question:

Which of the following options provides the higher level of disease control:

- *Identification and restriction of the movement of cohorts of cattle affected with bovine spongiform encephalopathy (BSE) followed by culling and disposal as soon as possible, or*
- *Identification and restriction of the movement of cohorts of cattle affected with BSE followed by disposal at the end of their productive lives?*

3. BACKGROUND

1986

BSE was first detected in the United Kingdom (UK) in 1986. It is a progressive, fatal transmissible spongiform encephalopathy (TSE) which causes neurological disease in adult cattle.

1988

In 1988, Great Britain (GB) introduced a ruminant to ruminant feed ban and made BSE a notifiable disease (1989 in Northern Ireland (NI)). As a

consequence of the ruminant to ruminant feed ban, the UK BSE epidemic declined steadily following its peak of over 37000 cases in 1992.

1994

In 1994, the EU banned the feeding of mammalian meat and bone meal to ruminants.

1996

In 1996, BSE was linked to a new form (variant) of the human TSE, Creutzfeldt-Jakob Disease (vCJD) (Will R.G. *et al.* 1996). As a result, the UK introduced the Over Thirty Month (OTM) rule which banned cattle aged over 30 months from entering the food chain. The UK introduced the Over Thirty Month Scheme (OTMS) to destroy the carcasses of OTM cattle. The UK also extended the 1994 ban on the feeding of mammalian meat and bone meal, to all farmed animals. This reinforced feed ban is considered effective from 1 August 1996.

2000

In September 2000, the European Commission's Scientific Steering Committee (SSC) published an opinion on BSE-related culling in cattle (SSC 2000). The SSC considered data from the UK, several other European Union (EU) Member States and Switzerland. The SSC concluded that available data indicated that "herd culling¹" was effective in eliminating pre-clinical BSE cases and thus preventing future cases. Culling the "birth cohort²" was equally effective and more cost effective. The SSC recommended the application of "birth cohort" culling as a minimum, in response to indigenous BSE cases, irrespective of the prevailing epidemiological situation. However, the SSC acknowledged that the efficiency of such culling in terms of contributing to prevention of an epidemic was highest during its early phase.

¹ Culling applied to all cattle in either the current herd or in both the current and the natal herd of the animal affected with BSE.

² In this case, all cattle born or raised in the same herd within approximately 12 months before and after the date of birth of the animal affected with BSE.

2001

In 2001, the EU banned the feeding of processed animal protein to farmed animals with certain exemptions (e.g. feeding fish meal to non-ruminants).

In July 2001, Regulation (EC) No. 999/2001 laying down rules for the prevention, control and eradication of certain TSEs came into force. The amended TSE Regulation defines a “**cohort**” as a group of bovine animals which includes both:

(i) animals born in the same herd as the affected bovine animal, and within 12 months preceding or following the date of birth of the affected bovine animal; and

(ii) animals which at any time during the first year of their lives were reared together with the affected bovine animal during the first year of its life.

Member States must identify, restrict, cull and dispose of (as Category 1 animal by-product) the cohorts of a BSE case as soon as possible. There is an exemption from culling, for bulls kept continuously in artificial insemination centres and for live cattle kept for research purposes.

Subject to certain exemptions, Regulation (EC) No. 999/2001 requires the culling and disposal of cattle which are at increased risk of having consumed the same contaminated feed as an animal affected with BSE, during the period of greatest risk of infection.

2002

In January 2002, the SSC published a further opinion (SSC 2002) which concurred with both the 2000 SSC opinion and an Agence Française de Sécurité Sanitaire des Aliments (AFFSA) opinion that the cohorts of an animal affected with BSE are at a greater risk of being infected with BSE than the rest of the healthy cattle population. The SSC concluded that culling could prevent some potentially infected animals from entering food and feed chains and thus reduce the risk to public and animal health. The SSC also agreed that the level of protection achieved by the OTM rule and the OTMS in place in the UK at that time, together with other control measures (e.g. feed and specified risk material (SRM) controls) could not be improved by culling cohorts. However in the case of Germany, which also applied for a derogation from the culling of cohorts, the SSC concluded that the level of protection achieved by the total feed ban, SRM controls and testing healthy slaughtered cattle aged over 24 months for BSE, could be further improved by culling cohorts.

2004

In April 2004, the European Food Safety Authority (EFSA) published an opinion on BSE-related culling in cattle (EFSA 2004) which considered the

previous SSC opinions and the results of EU TSE surveillance in the period 2002-2003. On the latter basis, EFSA concluded that the prevalence of BSE in birth cohorts of affected cattle was about ten times higher than the prevalence of BSE in the overall healthy cattle population. In the light of the data available, EFSA concurred with the previous SSC opinions.

In September 2004, Regulation (EC) No. 1492/2004 came into force amending Regulation (EC) No. 999/2001. The amended TSE Regulation gives Member States discretion to exclude cattle from the cohort if there is evidence that they did not have access to the same feed as the animal affected with BSE.

Regulation (EC) No.1492/2004 provided for additional exclusions from the cohort cull at Member States' discretion. For example for cattle which left the natal herd as suckled calves without access to other feed, or cattle born on farms with batch calving and a clear break in feed usage.

2005

In preparation for the replacement of the OTM rule with a robust post-mortem BSE testing system in November 2005, the UK started culling BSE cohorts born on or after 1 August 1996 in March 2005³ and the "backlog" was effectively cleared by June 2005. Cattle born or reared in the UK before 1 August 1996 are permanently excluded from the food chain.

2007

On 19th January 2007, Regulation (EC) No. 1923/2006 came into force amending Regulation (EC) No. 999/2001. The amended TSE Regulation provides for the European Commission and Member States to permit the use of cohorts [and offspring] of cattle affected with BSE, until the end of their productive lives following such a request from a Member State. Permission is dependent upon a favourable risk assessment taking into account the control measures (i.e. controls to ensure that cohorts cannot enter the food chain and are ultimately destroyed – including cattle identification and traceability systems and abattoir checks) in that Member State. After death, cohorts must be destroyed as Category 1 animal by-product.

The European Commission's TSE Roadmap published in July 2005 (European Commission 2005) proposed deferring the destruction of cohorts until the end of their productive lives to allow for their use for breeding or milk production. This proposal was also identified in the European Commission's Work Programme published in November 2006 (European Commission 2006). It brought the EU controls on cohorts in line with the guidance in the

³ Prior to this, any cohorts born on or after 1 August 1996 and under thirty months old were also restricted and culled.

Terrestrial Code of the World Organisation for Animal Health (OIE) (World Organisation for Animal Health 2006).

4. SUMMARY OF ASSUMPTIONS

These are based on assumptions in the 2000 Scientific Steering Committee opinion on BSE-related culling in cattle:

- i. Consumption of feed contaminated with BSE is believed to be the principal, if not the exclusive, route of infection with the BSE agent (BSE Inquiry 2000)(Horn, G.B., *et al.* 2001)(Hill, W.G. 2005).
- ii. Infection with BSE normally takes place during the first twelve months of life. Cattle are most at risk⁴ of infection with BSE during the first 12 months of life (Arnold, M.E. & Wilesmith, J.W., 2004) (Supervie, V. & Costagliola, D. 2004). This may be due to the age-dependent development of lymphoid tissue in the intestine (St Rose, S.G. *et al.* 2006).
- iii. Experimental studies have shown that as little as 1 milligram of BSE-infected brain administered orally is sufficient to infect calves⁵ with BSE (Wells, G.A.H., *et al.* 2007).
- iv. The mean incubation period for BSE in cattle is approximately 60 months although the range is wide (Arnold, M.E. & Wilesmith, J.W., 2004).
- v. Detection of disease-associated abnormal prion protein (PrP^{Sc}) in the central nervous system, the basis for standard post mortem diagnostic tests, is only possible in the few months prior to, and during, the clinical stage of infection (SEAC 2006).
- vi. Although PrP^{Sc} is a surrogate for infectivity, failure to detect PrP^{Sc} does not guarantee the absence of infectivity in a tissue.
- vii. BSE is a rare event. With the exception of the UK between 1988 and 1996, the observed annual incidence in the EU remained below 0.1 % (1000 cases/million) of the adult (>24 months) cattle population.

5. DISCUSSION OF RISK FACTORS

5.1 Risk of BSE Infection in Cohorts

EU data from the testing of cohorts and offspring culled between 2003 and 2005 indicate that the prevalence of BSE in cohorts is significantly higher than in healthy slaughtered cattle (Tables 1 and 2).

⁴ Arnold and Wilesmith concluded that dairy cattle were most at risk of BSE infection, a combination of susceptibility and exposure, during the first 6 months of life. Supervie and Costagliola concluded that most BSE infections occur between 6 and 12 months of age.

⁵ Mean age at dosing = 4.7 months (range 4.1-5.6 months)

There are no ante-mortem BSE tests approved for use in cattle. Approved BSE post mortem tests do not detect 100% of animals infected with BSE. Recent unpublished data from Veterinary Laboratories Agency research, presented to SEAC, concluded that detection of PrP^{Sc} in the central nervous system, the basis for standard post mortem diagnostic tests, was only possible in the few months prior to, and during, the clinical stage of infection (SEAC 2006).

Table 1: Testing on bovine animals culled in the frame of BSE eradication in the EU15 from 2003 to 2005

Year	Cattle tested	BSE positive	Positive cases per 10000 cattle tested
2003	24966	10	4.00
2004	15163	5	3.30
2005	12045	13	10.79

Table 2: Testing on healthy bovine animals slaughtered in the EU15 from 2003 to 2005

Year	Cattle tested	BSE positive	Positive cases per 10000 cattle tested
2003	8716481	265	0.30
2004	8688653	151	0.17
2005	7723757	94	0.12

UK data from the culling of cohorts in 2005 indicated that the number of BSE-positive cases as a proportion of the total number of animals tested was significantly higher than for healthy slaughtered cattle (Tables 3 and 4). Prior to 2005, UK cohorts were disposed of via OTMS, and although many were tested, they were not specifically identified as cohorts.

Table 3: Testing on bovine animals culled in the frame of BSE eradication⁶ in the UK from 2003 to 2006

Year	Cattle tested	BSE positive	Positive cases per 10000 cattle tested
2003	555	0	0
2004	569	0	0
2005 ⁷	3969	8	20.16
2006 ⁸	881	0	0

⁶ No animals slaughtered in the offspring cull in the UK have tested positive for BSE

⁷ The UK commenced its proactive cohort cull in March 2005

⁸ Provisional Defra & DARD data as at 26 January 2007. 2003-2005 data from EU Reports.

Table 4: Testing on healthy bovine animals slaughtered in the UK from 2003 to 2006

Year	Cattle tested	BSE positive	Positive cases per 10000 cattle tested
2003	235490	19	0.80
2004	341916	10	0.29
2005	353257	7	0.20
2006 ⁹	469829	11	0.23

By February 2007, there were ten herds of origin which, together had produced 22 cases of BSE born on or after 1 August 1996 (Born After Reinforced feed Ban (BARB) cases). Of these 22 BARB cases, eleven of the twelve subsequent cases were cohorts of the additional cases on the holdings but only six of these cohorts were detected in the cohort cull (Annex 1).

The results of the BSE monitoring programme provide an indication of the relative prevalence of infection in the respective sub-populations. The observed incidence underestimates the *true* prevalence of infection. The true prevalence of infection in each sub-population could be estimated using an epidemiological back-calculation model.

The results of the EU BSE monitoring programme indicate that the prevalence of BSE in cohorts is significantly higher than in the healthy slaughtered population.

5.2 Public Health Risk

In 1996, BSE was linked to vCJD. Primary vCJD cases are believed to be due to the consumption of meat and meat products derived from cattle infected with the BSE agent in the late 1980s and early 1990s. A small number of secondary vCJD cases¹⁰ are believed to have been acquired by the receipt of blood from donors which subsequently developed clinical vCJD. By January 2007, there were 165 definite or probable vCJD cases in the UK of which 158 had died. Several other vCJD cases have been detected in other countries and many of these cases had a history of residence in the UK.

The specified bovine offal (SBO) ban in 1989 and the OTM rule in 1996 markedly reduced the level of BSE infection entering the food chain. The SBO ban has been modified in line with emerging scientific data and SRM controls have been estimated to remove over 99% of any BSE infectivity present in an animal which is incubating BSE at the time of slaughter.

⁹ Provisional Defra and DARD data as at 26 January 2007. 2003-2005 data from EU Reports.

¹⁰ As at March 2007, there were three clinical vCJD cases plus one pre-clinical vCJD case, associated with blood transfusion.

The entire carcase of any bovine which tests positive for BSE¹¹ is destroyed along with the carcase before and the two carcasses after on the slaughter line (one before/two after rule), to minimise the risk of cross contamination of carcasses with BSE infectivity inside the abattoir.

Consumer organisations have supported the measures to keep cohorts out of the food chain. The real or perceived risks associated with reported breaches of these controls (e.g. Which 2006, Which 2007¹ and Which 2007²) have a negative impact on consumer confidence in the safety of beef, particularly where product recall is considered necessary.

The exclusion of cohorts from the food and feed chains is part of a package of BSE control measures intended to safeguard public and animal health and maintain consumer confidence. Cohorts are cattle from a sub-population with a higher prevalence of BSE infection. Minimising the number of cattle slaughtered for human consumption which test positive for BSE is important to maintain consumer confidence in UK beef and beef products.

5.3 Animal Health Risk

The BSE epidemic in cattle has resulted in over 183 000 BSE cases in the UK. In addition there were 89 cases of feline spongiform encephalopathy (FSE) in domestic cats in GB between 1990 and 2001, and there have been 39 cases of TSE in zoo animals.

The BSE and animal by-products controls (e.g. feed and SRM controls) have dramatically reduced the animal health risk of BSE. Pet food may only be made from animal by-products that have been passed as fit for human consumption (see 5.3), although meat for zoo animals and dogs in recognised packs of hounds and registered kennels may be derived from fallen cattle under 24 months of age. SRM controls apply in all cases.

Assuming full compliance with the BSE controls currently in place, the animal health risk of cohorts is negligible. However, as the BSE epidemic declines and statutory controls (e.g. feed controls) are gradually relaxed, it will be important to maintain tight controls on the disposal of the sub-populations of cattle most likely to be infected with BSE i.e. cohorts and cattle born before August 1996.

¹¹ All cattle aged over 30 months and all emergency slaughtered cattle or cattle with abnormal observations at ante-mortem inspection aged over 24 months, slaughtered for human consumption, are tested for BSE.

5.4 Economic Risk

The BSE crisis had a devastating effect on the cattle industry (BSE Inquiry 2000). The BSE controls and the negative effects of BSE on trade are extremely expensive to the Government, the taxpayer and the industry.

From 1996 to 2006, the EU banned the export of cattle, beef and beef products from the UK (apart from a small amount of beef produced under the Date Based Export Scheme). In the twelve months prior to the imposition of the export ban in 1996 the UK exported £500 million pounds worth of beef.

The EU lifted the UK beef export ban in May 2006. In January 2007, preliminary figures from the Meat and Livestock Commission indicated that that the UK exported over 40000 tonnes of British beef, worth £90 million, in 2006 (MLC 2007).

Under the current OIE Terrestrial Animal Health Code, countries are classified according to BSE risk for the purposes of trade. To achieve the lowest BSE risk status (negligible), a country must wait for 11 years from the date of birth of the last indigenous BSE case.

It is in the UK's economic interest to eradicate BSE, reduce the BSE controls and increase international trade in UK cattle and beef as soon as possible. The Government has set itself a challenging Public Service Agreement (PSA) target of eradicating BSE in GB by 2010. Figure 1 provides details of the incidence of BSE in GB from 1988. Figure 2 provides details of BSE cases in GB by month of birth from 1995.

Cohorts are cattle from a sub-population with a higher prevalence of BSE infection. The eradication of BSE, a PSA target, is paramount in terms of reducing the economic burden of BSE controls and promoting trade in UK cattle and beef.

Figure 1 : Confirmed BSE cases in Great Britain from 1988: passive surveillance cases by year of restriction and active surveillance cases by year of death.

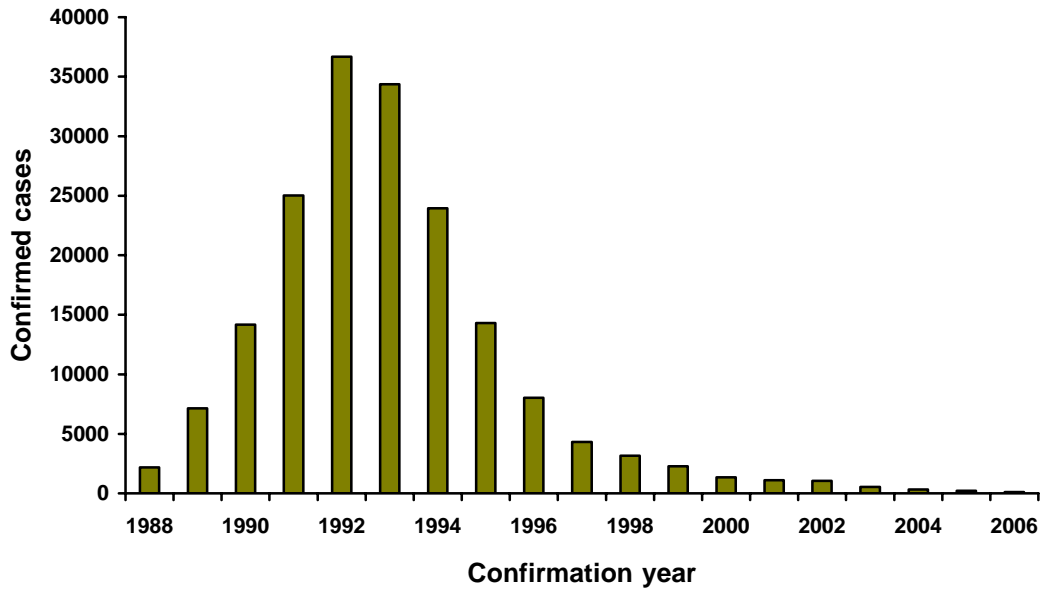
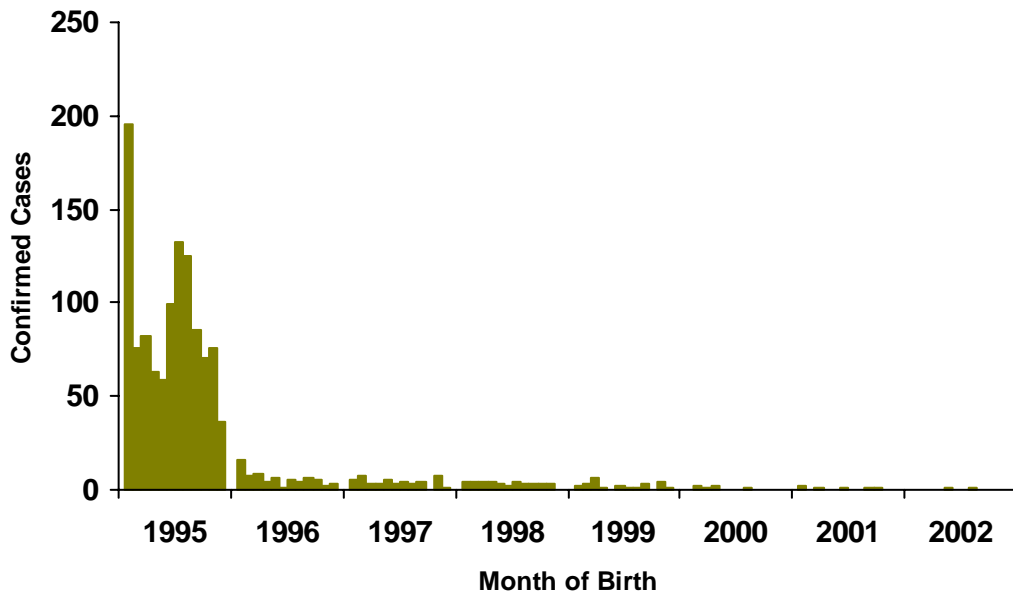


Figure 2 : Confirmed BSE cases in Great Britain by month of birth from 1995



6. SUMMARY OF RISK MANAGEMENT OPTIONS

➤ Option 1 (Current Option)

Identification, restriction of the movement, culling and destruction of cohorts as soon as possible.

➤ Option 2 (Potential Future Option)

Identification, restriction of the movement of cohorts as soon as possible but deferral of destruction until the end of the animals' productive lives.

6.1 Discussion of Risk Management Options

6.1.1 Current Controls on Cohorts (Option 1)

In GB, Animal Health¹² (AH) initially identified cohorts manually using farm records and data on the Cattle Tracing System (CTS). This involved identifying cohorts from BSE cases born on or after 1 August 1995.

In June 2005, AH launched an automatic cohort and offspring tracing (OCC) system linked directly to CTS. Cohorts identified on the OCC system are electronically "marked" on CTS. On suspicion of BSE in GB, (either a clinical suspect or positive result on post mortem screening test) AH identifies, restricts by notice, and seizes passports of cohorts as soon as possible. Where it is not possible to identify cohorts rapidly, AH restricts any herds suspected of containing cohorts.

Following confirmation of BSE, AH stamps the passports of cohorts "Not for human consumption" and culls the animals as soon as possible. Cohorts which are fit for transport are slaughtered in Older Cattle Disposal Scheme (OCDS) abattoirs from which all products are destroyed. Cohorts which are unfit for transport are killed on farm and collected for disposal by Rural Payments Agency (RPA) contractors. All BSE cohorts are tested for BSE post mortem. Their carcasses (including hides) are disposed of by incineration.

In order to enter the food chain cattle must be identified with at least one uniquely numbered official ear tag accompanied by passport bearing same unique identity. The controls in place are designed to preclude the entry of cohorts into the food chain but do have certain limitations (see Table 5).

In NI the controls are slightly different in that cattle do not have passports and each abattoir has access to the cattle tracing database, the Animal and Public Health Information System (APHIS). On suspicion of BSE, the Department for Agriculture and Rural Development (DARD) immediately identifies and electronically "restricts" the cohorts on APHIS and issues a movement

¹² Formerly the State Veterinary Service.

restriction notice. Official APHIS checks at abattoirs are designed to preclude the entry of cohorts into the food chain.

6.1.2 Effect of Controls on Cohorts (Option 1)

Three out of the six cohorts (50%) identified as BARB cases in GB in 2005 were “backlog” cohorts. The mean age of the three primary BARB cases was 54.6 months (range 40-71) while the mean age of their three BARB “backlog” cohorts was 72.6 months (range 52-85). (Annex 1)

For the five previous BARB cohort cases which were not detected by the cohort cull, the mean age of the five primary BARB cases was 56.2 months (range 40-67) while the mean age of their five BARB cohorts was 70 months (range 58-89). All but two (aged 58 and 89 months) of the five subsequent BARB cohorts were detected by active surveillance. On the basis of available evidence, which suggests that in most cases current post mortem BSE tests can only detect BSE from the later stages of the incubation period, shortly before clinical onset, these limited observations support the hypothesis that delaying the culling of cohorts has the potential to increase the number of BSE cases *detected* in the future, as it allows *infected* animals to progress further in their individual incubation periods.

Between 2004 and 2005, the number of BARB cases detected in the UK increased by 32% from 25 to 33. BARB cohorts contributed to, but were not wholly responsible for, this increase. Following the culling of the “backlog” of cohorts in 2005, the number of BARB cases decreased by 42% from 33 to 19 in 2006 (Figures 3 and 4).

Figure 3: Number of BARB cases confirmed in UK (subdivided by birth cohort)

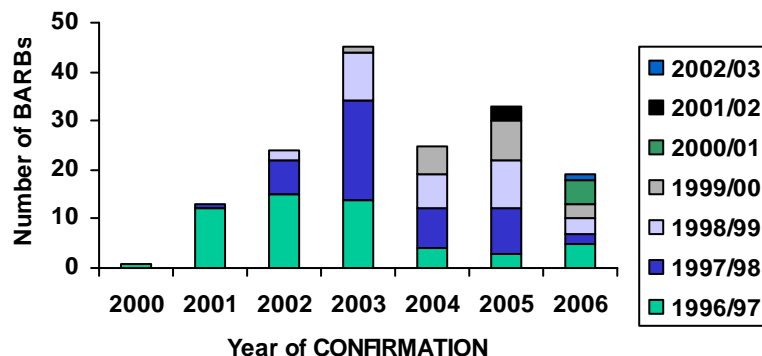
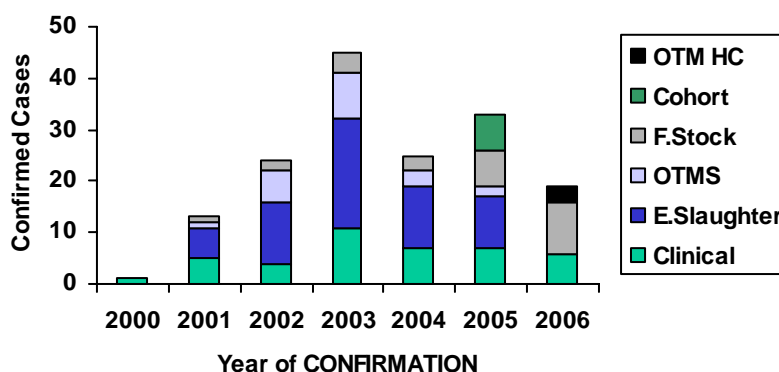
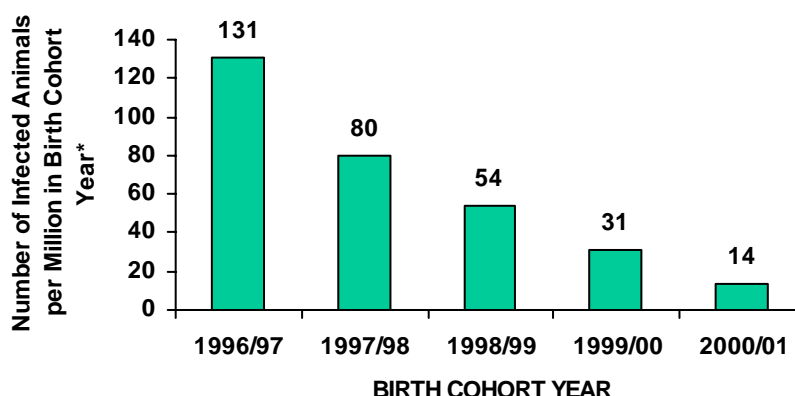


Figure 4: Number of BARB cases confirmed in UK (subdivided by surveillance category)¹³



The cull of the “backlog” of cohorts in 2005 is hypothetically at least partly responsible for the decrease in BARB incidence in 2006, as a result of removing additional infected animals before they could develop detectable disease. However, back-calculation data (Arnold, M.E. & Wilesmith, J.W. 2006) indicates that the prevalence of BSE infection in successive birth cohorts (all cattle in the population born in a 12-month period 1 August-31 July) is declining (Figure 5), and experts predict a natural decline in the number of BARB cases as infected cattle in older birth cohorts die before developing detectable disease.

Figure 5: Estimate of Infection Prevalence (infected animals/million) in successive birth cohorts in Great Britain 1996/97 to 2000/01 (September 2006)¹⁴



¹³ OTM HC = Cattle aged over 30 months slaughtered for human consumption; Cohort = BSE cohort; F. Stock = Fallen Stock; OTMS = Healthy cattle slaughtered under the Over Thirty Month Scheme; E.Slaughter = Cattle subject to emergency slaughter; Clinical = BSE suspects

¹⁴ The overlapping 95% confidence intervals are 96/97 (81-181); 97/98 (50-110); 98/99 (30-80; 99/00 (17-51); 00/01 (4-33).

Option 1, the culling of cohorts, reduces the number of cattle from a sub-population with a higher prevalence of BSE infection. If *infected* cattle within this sub-population are removed before they develop *detectable* disease the future number of BSE cases may be reduced.

6.1.3 Limitations of Current Controls (Option 1) on Cohorts

Table 5 examines potential scenarios in which the current controls in GB could fail with the result that an animal from the cohort of an animal affected with BSE enters the food chain.

As described above, the controls in NI are slightly different. Official APHIS checks at abattoirs are intended to preclude the entry of cohorts into the food chain. However, there remains a very low possibility of a breakdown of controls, particularly those subject to human error e.g. cattle identification or the application of the APHIS database (FSA 2006²). In January 2007, DARD reported a probable BARB case where the date of birth was unknown (Defra 2007).

Table 5: Analysis of the Likelihood of Failures of Current GB Controls (Option 1) Intended to Exclude Cohorts from the Food Chain

Problem	Has it occurred?	Frequency?	Likelihood of one or more animals from the cohort of a BSE case entering the food chain
Cohort not identified due to failure to comply with cattle identification regulations in relation to either the index case or the cohort	Yes: As at March 2007, there were two probable BARB cases in GB with date of birth unknown (Defra 2007). As at November 2006 there were also 170 ¹⁵ untraceable cohorts in GB although most if not all were presumed dead. Although, not a cohort, one animal born before 1996 also entered the food chain due to an identification error (FSA 2007)	Low	LOW
Due to timing or administrative delays in restricting cohort, animal is legally slaughtered for human consumption	No: No cohorts have entered the food chain between identification of the BSE case and restriction of the cohort	N/A	VERY LOW
Due to obstruction, timing or administrative delays in seizing passport of restricted cohort, animal is illegally slaughtered for human consumption	Yes: One potential cohort entered the food chain after restriction but before the passport was seized (FSA 2006 ¹). A small number of owners of potential cohorts have refused to surrender passports	Low	LOW
Cohort slaughtered for human consumption due to fraudulent use of ear tags or passports	Not Known: Fraudulent activity is believed to be very rare	Very Low	VERY LOW

6.1.4 External Audit of Current Controls (Option 1) on Cohorts

Following their 2006 assessment of BSE controls in the UK, inspectors from the European Commission's Food and Veterinary Office recommended that

¹⁵ Data provided by Defra to EU Food & Veterinary Office, November 2006

the UK *takes measures in slaughterhouses in Great Britain to prevent all cohorts and offspring born after 31 July 1996 from being slaughtered for human consumption in order to comply with provisions on BSE eradication set out in Regulation (EC) No.999/2001 (FVO 2007).* The measures are unspecified but could include an electronic control system similar to APHIS in NI. However, the need for additional expensive controls is reduced if the number of cohorts is kept to a minimum by prompt culling.

6.1.5 Managing the Limitations of Current Controls (Option 1) on Cohorts

The limitations of current controls identified above are managed as follows:

- The programme of cattle identification inspections with application of penalties for non-compliance.
- The application of herd restrictions where cattle identification or record keeping deficiencies hamper the identification of potential cohorts.
- The prompt identification, tracing and restriction of potential cohorts facilitated through the OCC system (or APHIS in NI).
- The prompt seizure of passports of potential cohorts in GB.
- Passport controls at abattoirs (or APHIS checks in NI).
- The electronic “marking” of potential cohorts on CTS to preclude the issue of replacement passports in GB.
- Slaughter and disposal of cohorts as soon as possible after confirmation to minimise the number of known cohorts at risk of entering the food chain.

6.1.6 Consideration of the Deferral of Destruction of Cohorts (Option 2)

Table 6 shows the progression of BSE cases in Great Britain on or after 1 August 1995. In 2006, there were 28 BSE cases in Great Britain born on or after 1 August 1995 which might have produced a cohort born after 31 July 1996. At 31 December 2006, AH recorded 88 cohort animals awaiting culling. During the period 1 January 2006 – 31 December 2006, the VLA recorded 681 cohorts culled and notified for testing. This equates to a mean cohort size of $769/28 = 27$. The actual size of an individual cohort will vary greatly depending upon a number of factors including the following:

- i. Age of index case;
- ii. Size and age profile of natal herd;
- iii. Number of rearing herds in first 12 months of life; and
- iv. Size and age profile of rearing herds in first 12 months of life.

Table 6: Progression of BSE Cases in Great Britain Born on or after 1 August 1995

Year of Detection	Number of BSE Cases Born on or after 1 August 1995	Percentage Change in Incidence
2000	71	
2001	124	+175 %
2002	146	+118 %
2003	95	-35 %
2004	47	-50 %
2005	47	0
2006	28	-40 %

Following a hypothetical cessation of cohort culling at the end of 2006 and assuming, as a **worst case**, a mean cohort size of 27 animals per BSE case, a linear reduction in BSE cases born on or after 1 August 1995 of **30%** per year and no mortality of the cohort cattle identified, the predicted number of cohort cattle accumulating in GB is as shown in Table 7.

Table 7: Accumulating Number of Cohort Cattle in Great Britain if Culling Ceased at the end of 2006 (Option 2)

Year	Number of BSE cases born after July 1995 in Great Britain (assumes 30% annual reduction)	Number of new cohort cattle (assumes 27 cattle per cohort)	Cumulative number of cohort cattle (assumes no culling or mortality)
2006	28	88 awaiting culling	88
2007	20	540	628
2008	14	378	1006
2009	10	270	1276
2010	7	189	1465

By 2010, there could be approximately 1000 cohort animals alive in GB if the culling of cohorts ended in 2007. The prospect of approximately 1000 cohort cattle alive on British holdings represents a significant control burden for the RPA (cattle identification), AH (farm level control), Local Authorities (farm level enforcement) and the Meat Hygiene Service (abattoir level control). Currently there is no effective method of continuously monitoring the fate of cohorts left alive on holdings.

In view of the limitations of current control measures, control Option 2 would require enhanced monitoring and enforcement measures and incur additional expense. The greater the number of cohorts alive, the greater the likelihood of a single cohort animal by-passing the official controls and entering the food chain. Such breaches have a negative effect on consumer confidence in UK beef.

7. SUMMARY OF VETERINARY ADVICE

The eradication of BSE is paramount in terms of safeguarding public and animal health, reducing the economic burden of BSE controls and promoting trade in cattle and beef.

The EU BSE monitoring programme indicates that cohorts have a higher prevalence of BSE infection than normal healthy slaughtered cattle. If *infected* cattle within the cohort sub-population are culled before they develop *detectable* disease the future number of BSE cases may be reduced.

Together with other BSE controls, the culling of cohorts as soon as possible, has the potential to support the achievement of the Government's target of eradicating BSE.

Replacing the cohort cull with permanent movement restrictions could increase the level of challenge on the controls intended to exclude cohorts from food and feed chains. Current controls intended to exclude cohorts from the food chain are not 100% effective. To reduce the increased likelihood of breaches of cohort controls, monitoring and enforcement measures would require enhancement, particularly in GB. This would incur additional expense. Any breaches would impact on consumer confidence. It is unlikely that future controls could be considered 100% effective.

Veterinary advice is that culling cohorts as soon as possible (control Option 1) provides a higher level of disease control than permanently restricting cohorts until the end of their productive lives (control Option 2).

8. CONCLUSIONS

This veterinary risk assessment concludes that control Option 1, the culling of cohorts as soon as possible, is the preferred option. The key benefits are as follows:

- i. The culling of cohorts potentially removes infected cattle before they develop detectable disease. This supports the Government's PSA target of eradicating BSE in GB by 2010, with all the associated benefits that this would bring.

- ii. Minimising the number of live cohorts, by prompt culling, reduces the likelihood of a breach of the controls intended to exclude cohorts from the food and feed chain. This promotes consumer confidence in UK beef.
- iii. Replacing the cohort cull with permanent movement restrictions would require expensive, additional control measures to monitor the restriction of cohorts and their disposal at the end of their productive lives.

The potential negative impacts of control Option 2, delaying the destruction of cohorts until the end of their productive lives, are largely dependent upon the number of cohorts alive.

9. RECOMMENDATIONS

This veterinary risk assessment recommends that the UK:

- i. continues to implement the policy of culling cohorts as soon as possible; and
- ii. reviews this assessment in two years time, in the light of the predicted continuing decline in the BSE epidemic and the number of cohorts generated.

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Annex 1

Original Multiple BARB BSE Cases in Great Britain

Passive/ Active	RBSE	Natal Herd Origin	DOB	DOD	Age Mths	Hmebrd/ Prchased
A	04/145	Wiltshire	14/11/1999	16/03/2004	40	H
A	04/521	"	12/11/1999	27/10/2004	59	P
A	02/1179	Dorset	17/09/1997	07/10/2002	60	H
A	03/416	"	14/09/1996	30/05/2003	80	P
A	02/1401	Cornwall	06/11/1998	22/11/2002	48	H
P	03/613	"	04/11/1998	11/09/2003	58	H
A	03/822	Shropshire	22/04/1998	16/12/2003	67	H
P	04/547	"	28/05/1997	24/11/2004	89	H
A	03/84	Ceredigion ¹	29/08/1997	06/01/2003	64	H
A	04/356	"	07/02/1998	08/07/2004	77	H
P	03/494	Ceredigion ²	23/04/1998	11/07/2003	62	H
A	03/775	"	14/04/1998	24/11/2003	67	H

Additional Multiple BARB BSE Cases in Great Britain detected by Cull of Cohorts born post 31 July 1996, which commenced March 2005

Index/ Cohort	Passive/ Active	RBSE	Natal Herd Origin	DOB	DOD	Age Mths	Hmebrd/ Prchased
I	A	04/145	Wiltshire	14/11/1999	16/03/2004	40	H
C	A	05/132	"	26/11/1999	22/04/2005	52	H
I	P	04/165	Ceredigion ³	06/05/1998	07/04/2004	71	H
C	A	05/133	"	06/03/1998	21/04/2005	85	H
I	P	03/238	Devon	05/10/1998	01/04/2003	53	P
C	A	05/156	"	06/07/1998	03/05/2005	81	H
I	A	05/24	Pembrokeshire	03/10/2001	17/01/2005	39	H
C	A	05/166	"	28/09/2001	12/05/2005	43	H
C	A	05/167	"	01/05/2002	12/05/2005	36	H
I	A	05/236	Orkney	25/03/1999	03/08/2005	76	H
C	A	05/337	"	30/03/1999	07/12/2005	80	H

Notes:

- i. RBSE is the BSE case reference number.
- ii. DOB and DOD are dates of birth and death.
- iii. Homebred or purchased indicates whether or not the BSE case remained in its natal herd.
- iv. The management of the Ceredigion¹ and Ceredigion² herds was linked.
- v. The two Dorset cases are not cohorts.