AUSVETPLAN is a series of technical response plans that describe the proposed Australian approach to an emergency animal disease incident. The documents provide guidance based on sound analysis, linking policy, strategies, implementation, coordination and emergency-management plans.

Standing Council on Primary Industries
This disease strategy forms part of:

AUSVETPLAN Edition 3

This strategy will be reviewed regularly. Suggestions and recommendations for amendments should be forwarded to:
AUSVETPLAN — Animal Health Australia
Manager, Veterinary Services
Suite 15, 26–28 Napier Close
Deakin ACT 2600
Tel: 02 6232 5522; Fax: 02 6232 5511
email: admin@animalhealthaustralia.com.au


Publication record:
Edition 1: BSE was not included in this edition
Edition 2:
   Version 2.0, 1996 (new manual)
   Version 2.1, 1998 (update to include new disease information from the United Kingdom, etc)
Edition 3:
   Version 3.0, January 2003 (major update of text and policy, and inclusion of new cost-sharing arrangements)
   Version 3.1, January 2005 (update)
   Version 3.2, February 2012 (update of scientific information on the disease, refinements to the control policy and inclusion of a movement controls matrix)

AUSVETPLAN is available on the internet at:
www.animalhealthaustralia.com.au

© Commonwealth of Australia and each of its states and territories, 2012
ISBN 0 642 24506 1 (printed version)
ISBN 1 876 714387 (electronic version)

This work is copyright and, apart from any use as permitted under the Copyright Act 1968, no part may be reproduced without written permission from the publishers; the Australian Government Department of Agriculture, Fisheries and Forestry; and Animal Health Australia, acting on behalf of the Standing Council on Primary Industries. Requests and inquiries concerning reproduction and rights should be addressed to AUSVETPLAN — Animal Health Australia (see above).

The publishers give no warranty that the information contained in AUSVETPLAN is correct or complete and shall not be liable for any loss howsoever caused, whether due to negligence or other circumstances, arising from use of or reliance on this code.

DISEASE WATCH HOTLINE

1800 675 888

The Disease Watch Hotline is a toll-free telephone number that connects callers to the relevant state or territory officer to report concerns about any potential emergency disease situation. Anyone suspecting an emergency disease outbreak should use this number to get immediate advice and assistance.
Preface

This disease strategy for the control and eradication of bovine spongiform encephalopathy (BSE) in bovine animals is an integral part of the Australian Veterinary Emergency Plan, or AUSVETPLAN (Edition 3). AUSVETPLAN structures and functions are described in the AUSVETPLAN Summary Document. This BSE strategy provides information about the disease (Section 1); the relevant risk factors and their treatment, and the options for the management of a disease outbreak, depending on the circumstances (Section 2); and the policy that will be adopted in the case of an outbreak (Sections 3 and 4). The key features of BSE are described in Appendix 1.

This manual has been produced in accordance with the procedures described in the AUSVETPLAN Summary Document and in consultation with Australian national, state and territory governments, and the livestock industries.

BSE is included on the World Organisation for Animal Health (OIE) list of notifiable diseases as a disease of bovine animals. One of the obligations this places on Australia is to notify the OIE within 24 hours of the first confirmed case of BSE. OIE-listed diseases are diseases with the potential for international spread, significant mortality or morbidity within the susceptible species, and/or potential for zoonotic spread to humans.1

The strategies in this document for the diagnosis and management of an outbreak of BSE in cattle are based on the recommendations in the OIE Terrestrial Animal Health Code2 and the OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals.3

In Australia, BSE is included as a Category 2 emergency animal disease in the Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Responses (EAD Response Agreement).4

In this manual, text placed in square brackets [xxx] indicates that that aspect of the manual remains contentious or is under development; such text is not part of the official manual. The issues will be worked on by experts and relevant text included at a future date.

Guidelines for the field implementation of AUSVETPLAN are contained in the disease strategies, operational procedures manuals, management manuals and wild animal manual. Industry-specific information is given in the relevant

---

1 These criteria are described in more detail in Chapter 1.2 of the OIE Terrestrial Animal Health Code: www.oie.int/index.php?id=169&L=0&htmfile=chapitre_1.2.1.htm
2 www.oie.int/index.php?id=169&L=0&htmfile=chapitre_1.11.5.htm
3 www.oie.int/fileadmin/Home/eng/Health_standards/tahm/204.06_BSE.pdf
enterprise manuals. The full list of AUSVETPLAN manuals that may need to be accessed in an emergency is shown below.

**AUSVETPLAN documents**

**Disease strategies**
- Individual strategies for each of 35 diseases
- Bee diseases and pests
- Response policy briefs (for diseases not covered by individual manuals)

**Operational procedures manuals**
- Decontamination
- Destruction of animals
- Disposal
- Livestock welfare and management
- Public relations
- Valuation and compensation

**Enterprise manuals**
- Artificial breeding centres
- Feedlots
- Meat processing
- Pig industry
- Poultry industry
- Saleyards and transport
- Zoos

**Management manuals**
- Control centres management (Parts 1 and 2)
- Laboratory preparedness

**Wild animal response strategy**

**Summary document**

**Nationally agreed standard operating procedures**

Nationally agreed standard operating procedures have been developed for use by jurisdictions during responses to emergency animal disease incidents and emergencies. These procedures underpin elements of AUSVETPLAN and describe in detail specific actions undertaken during a response to an incident.

---

Contents

Preface .....................................................................................................................................3

1 Nature of the disease ......................................................................................................7
  1.1 Aetiology ..............................................................................................................7
     1.1.1 BSE .......................................................................................................7
     1.1.2 Atypical BSE ......................................................................................7
  1.2 Susceptible species ..............................................................................................8
     1.2.1 BSE ....................................................................................................8
     1.2.2 Atypical BSE ....................................................................................10
  1.3 Worldwide distribution and occurrence in Australia ..................................10
  1.4 Diagnostic criteria .............................................................................................10
     1.4.1 Clinical signs .....................................................................................11
     1.4.2 Pathology ............................................................................................11
     1.4.3 Laboratory tests ...............................................................................12
     1.4.4 Differential diagnosis .......................................................................14
     1.4.5 Treatment of infected animals ...........................................................15
  1.5 Resistance and immunity ................................................................................16
     1.5.1 Innate and passive immunity ............................................................16
     1.5.2 Active immunity .................................................................................16
     1.5.3 Vaccination ...........................................................................................16
  1.6 Epidemiology ....................................................................................................16
     1.6.1 Incubation period ................................................................................16
     1.6.2 Persistence of agent .............................................................................17
     1.6.3 Modes of transmission .......................................................................19
     1.6.4 Factors influencing transmission ......................................................21
  1.7 Manner and risk of introduction to Australia ...............................................21
  1.8 Social and economic effects .............................................................................22
  1.9 Criteria for proof of freedom ...........................................................................22

2 Principles of control and eradication .........................................................................24
  2.1 Critical factors assessed in formulating response policy ............................24
     2.1.1 Features of the disease ......................................................................24
     2.1.2 Features of susceptible populations .................................................25
  2.2 Options for control or eradication ..................................................................25

3 Policy and rationale .......................................................................................................27
  3.1 Introduction .......................................................................................................27
  3.2 Control and eradication policy .......................................................................29
     3.2.1 Stamping out ........................................................................................29
     3.2.2 Quarantine and movement controls ..................................................31
     3.2.3 Tracing and surveillance ....................................................................31
3.2.4 Zoning and compartmentalisation ...................................................... 32
3.2.5 Vaccination ................................................................................................ 32
3.2.6 Treatment of animal products .......................................................... 32
3.2.7 Treatment of infected animals .......................................................... 32
3.2.8 Disposal of animals and animal products ....................................... 32
3.2.9 Decontamination ................................................................................ 33
3.2.10 Wild animal and vector control .................................................... 34
3.2.11 Public awareness and media .......................................................... 34
3.2.12 Public health implications ................................................................. 35
3.3 Other policies .......................................................................................... 36
3.4 Funding and compensation ..................................................................... 36

4 Recommended quarantine and movement controls ............................................... 38
4.1 Guidelines for classifying declared areas ..................................................... 38
4.1.1 Premises classifications ...................................................................... 38
4.1.2 Declared areas ..................................................................................... 39
4.2 Guidelines for issuing permits ................................................................. 39
4.3 Types of permit ................................................................................................. 40
4.3.1 General permit .................................................................................... 40
4.3.2 Special permits .................................................................................... 40
4.4 Recommended movement controls for BSE ................................................. 41

Appendix 1 Features of bovine spongiform encephalopathy ....................... 42

Glossary ............................................................................................................. 44

Abbreviations .................................................................................................... 52

References ......................................................................................................... 53
1 Nature of the disease

Three known strains of bovine spongiform encephalopathy (BSE) have been identified in cattle: classical BSE, low-type (L-type) BSE and high-type (H-type) BSE. L-type BSE and H-type BSE are also collectively called ‘atypical BSE’.

BSE is a progressive neurodegenerative disease of adult cattle. It was first recognised in the United Kingdom (UK) in 1986 (Wells et al 1987, Kimberlin 1992, OIE 1996) and became a serious epidemic in that country. Atypical BSE is a very rare disease that has been recognised in a number of countries for less than 10 years. All three strains of the disease are transmissible spongiform encephalopathies (TSEs) or ‘prion’ diseases. TSEs are characterised by long incubation periods, the accumulation in the central nervous system (CNS) of an abnormal isoform of a host-encoded prion protein (PrP), and a possible manifestation in sporadic, inherited or acquired forms (Prusiner 1998).

The BSE agent causes a disease in people similar to that in cattle. BSE is therefore of concern not only for the welfare of cattle, but also for food safety. An outbreak due to any of these agents will involve veterinary authorities, health authorities and food safety agencies.

1.1 Aetiology

A protease-resistant isoform (PrPSc) of a normal cellular prion protein (PrPc) has a pivotal role in the pathogenesis of TSEs and, according to the prion hypothesis, is the sole TSE transmissible agent (Prusiner 1998).

Other aetiological possibilities have largely been discounted. They include a robust virus, a virino (a nucleic acid protected by host protein), environmental factors and toxic chemicals.

A particular feature of the abnormal isoform of prion protein is resistance to inactivation by physical or chemical procedures, including freezing, desiccation, ultraviolet radiation, burial, common methods for chemical and heat disinfection, and degradation by certain proteolytic enzymes (Taylor DM 1996ab, Taylor K 1996).

1.1.1 BSE

The BSE epidemic in the UK resulted from feeding cattle meat-and-bone meal (MBM) contaminated with the BSE agent. However, the origin of the BSE agent itself is uncertain (Collee and Bradley 1997ab, Brown et al 2001). Hypotheses include a cross-species transmission of the prion responsible for scrapie in sheep, and a novel prion arising in cattle or another mammalian species (UK DEFRA 2001, Capobianco et al 2007).

1.1.2 Atypical BSE

Atypical BSE is characterised by either a lower (L-type) or higher (H-type) molecular mass of the unglycosylated abnormal form of prion protein, determined
using western blot analyses. These strains have been detected in a number of countries during large-scale surveillance for BSE in cattle. The origin of these rare conditions is not yet known, but a spontaneous, noncontagious origin cannot be excluded. One case of H-type BSE identified in the United States was attributed to a heritable polymorphism in the prion gene (Nicholson et al 2008).

### 1.2 Susceptible species

#### 1.2.1 BSE

Species that have been experimentally infected with the BSE agent, both parenterally (by injection) and orally, include mice, cattle, sheep, goats, nonhuman primates and mink.

**Domestic cattle**

BSE is primarily a disease of domestic cattle (genus *Bos*), but it also affects other bovine animals, including buffalo (genus *Bubalus*). In this manual, any references to cattle may also refer to buffalo.

**Wild bovids and cats**

During the BSE epidemic in cattle in the UK, a spongiform encephalopathy was also identified in various zoo species — including antelopes and cattle (Bovidae) and cats (Felidae) — as well as in domestic cats. Affected exotic species included ankole cattle, Arabian oryx, eland, gemsbok, kudu, nyala, scimitar-horned oryx, bison, cheetah, puma, ocelot and lion. In several of these cases, bioassay studies in mice produced a characteristic incubation period and profile of neuropathological changes, indicating that the aetiological agent was the BSE agent. Affected bovid species had received MBM as a dietary supplement, and the exotic felid species were fed bovine carcases, including spinal cord.

**Small ruminants**

Sheep have been experimentally infected with the BSE agent, and the disease agent had a tissue distribution that also involved the lymphoreticular system, similar to that seen with classical scrapie; BSE was naturally transmitted between sheep in an experimental flock (Bellworthy et al 2005ab). BSE challenge of sheep that have a PrP genotype resistant to classical scrapie has resulted in subclinical infection (Bencsik and Baron 2007). The question of BSE in sheep arises because sheep in the UK were fed the same contaminated MBM that drove the BSE epidemic in cattle.

The European Union has had an extensive surveillance program in place for some years in an attempt to identify whether BSE exists in small ruminants. Despite many hundreds of thousands of tests on brains from sheep and goats, the only cases of BSE confirmed (retrospectively) in naturally infected small ruminants have been in a goat that died in 2002 (France) and in a goat that died in 1990 (UK). Risk assessments have concluded that the prevalence of BSE in the UK sheep flock was zero or very low, if it was present at all (SEAC 2006).
**Pigs**

Pigs are susceptible to BSE infection, and developed a TSE disease following multiple injections with BSE brain homogenate, but have not been shown to be susceptible to oral challenge.

**Chickens**

Chickens have not developed BSE following either injection or oral exposure.

**Dogs and horses**

No cases have been reported in dogs or horses.

**Primates**

Various nonhuman primate species are susceptible to BSE, both naturally and in experiments.

**Humans**

Creutzfeldt-Jakob disease (CJD) is a TSE that affects humans. Most cases arise spontaneously with no known cause (sporadic CJD) — the annual incidence in countries worldwide is approximately one case per million people. Some cases of CJD have also occurred because of health-care related procedures in which the infection has been transmitted from an infected individual to another individual through infected biological products or instruments (iatrogenic CJD). Some families also have a predisposition to the disease (familial CJD).

In addition to these known forms of the disease (sporadic, iatrogenic and familial), in March 1996, the UK reported 10 cases of a new clinicopathological variant of CJD (variant CJD or vCJD) in adolescents and adults under the age of 40 years with unusual neuropathological findings (Will et al 1996).

Like BSE, vCJD is a degenerative disease affecting the CNS and is always fatal. Primary cases are caused by the consumption of foods containing specified risk materials (SRMs) — such as brain and spinal cord — from BSE-affected cattle. In laboratory studies, the pathological agents isolated from BSE-affected cattle and human cases of vCJD have shown similar distinctive biological and molecular-biological features (Collinge et al 1996, Lasmezas et al 1996, Bruce et al 1997, Hill et al 1997).

Since vCJD was first identified in the UK, further cases have occurred there and in mainland Europe. There have been a few cases in some non-European countries, in individuals who lived in the UK or may have consumed foods from the UK that contained SRMs. A small number of secondary vCJD cases has been reported in the UK, due to blood transfusion from asymptomatic, infected donors. This initially led to concerns about an impending epidemic of the disease. However, it appears likely that the number of cases will be much smaller than originally predicted (Clarke and Ghani 2005). Up-to-date information on the incidence of vCJD can be
obtained from the website of the United Kingdom CJD Research and Surveillance Unit.7

1.2.2 Atypical BSE

Natural cases of atypical BSE have only been found in cattle. Cattle have been experimentally infected with both strains (L-type and H-type) by intracerebral injection, and the same route has been used to infect nonhuman primates with the L-type BSE agent (Comoy et al 2008, Kong et al 2008, Lombardi et al 2008). Oral challenge studies in cattle and nonhuman primates will further assess the potential for intraspecies and interspecies transmission of these strains and their zoonotic risk. The known epidemiology of these strains indicates that it is highly unlikely that they are spread horizontally or vertically from cattle.

1.3 Worldwide distribution and occurrence in Australia

No strain of BSE has been identified in cattle in Australia to date.

BSE was first diagnosed in the UK in 1986, and its annual case incidence there peaked in 1992. Although the great majority of cases have occurred in cattle in the UK, smaller scale epidemics, linked to the export of live cattle and MBM from the UK and subsequently from other BSE-affected countries, have occurred in mainland Europe, Canada, Japan and Israel.

Up-to-date information on the global BSE situation can be found on the website of the World Organisation for Animal Health (OIE).8

Around 50 cases of atypical BSE had been identified in cattle by 2009 from the UK, mainland Europe, Canada, the United States and Japan. Several countries have reported these atypical strains in the absence of BSE cases in indigenous cattle.

Two cases of feline TSE have been diagnosed in imported animals in Australian zoos. In 1992, a case was seen in a cheetah imported from the UK to a zoo in Western Australia, and the agent was subsequently typed as the classical BSE strain (Peet and Curran 1992). This animal and two littermates imported at the same time were destroyed and incinerated. The source of infection was traced to a zoo in the UK. In July 2002, a second case was diagnosed in an Asiatic golden cat imported from the Netherlands (Young and Slocombe 2003). The cat, which was born in Germany, died suddenly of a pancreatic condition, and the TSE was detected as an incidental finding on routine histopathology of the brain.

1.4 Diagnostic criteria

There is no validated diagnostic test currently available for the BSE agent in live animals. Laboratory tests on brain and spinal cord tissue obtained at postmortem examination are therefore required for confirmation of this disease.

---

7 www.cjd.ed.ac.uk
8 www.oie.int/animal-health-in-the-world/bse-portal
The *Australian and New Zealand Standard Diagnostic Protocols for TSEs* (SCAHLS 2010) is the authoritative guide to laboratory diagnosis. Its methods are consistent with the current edition of the OIE *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals* (OIE Terrestrial Manual). Submission of samples to an international reference laboratory may also be required.

### 1.4.1 Clinical signs

Due to the long incubation period of BSE, signs in cattle that were exposed as calves usually appear when the animals are between 3 and 7 years of age. BSE usually has an insidious onset and a slowly progressive clinical course extending over weeks to months. The following three signs are most frequently seen in affected animals:

- apprehension (mental status)
- hyperaesthesia (sensation)
- ataxia (posture and movement).

At least one of these signs is present in most BSE cases.

Changes in mental status affect behaviour and temperament; the first sign of BSE may be when a normally placid animal becomes aggressive and kicks in the milking shed. Hypersensitivity can be to touch, sound and light. Ataxia affects mainly the hind limbs. Other posture and movement abnormalities include falling, tremor and abnormal head carriage. In advanced cases, generalised weakness and loss of condition can cause recumbency, and signs of altered mental status and hyperaesthesia may no longer be obvious. The clinical history of any recumbent or chronically wasted animal should be sought, especially in an abattoir situation. Loss of bodyweight and reduced milk yield often accompany the nervous signs as the disease progresses.

In Europe, BSE is also considered in the differential diagnosis of ‘sudden’ death or cases of purported misadventure. A higher incidence of BSE has been found in Europe in emergency slaughter cattle than in cattle passing preslaughter inspection; when BSE has been diagnosed in either circumstance, there is often a history of overlooked subtle, early clinical signs of BSE.

All natural cases of atypical BSE, except one in Japan, have been reported in cattle that are at least 8 years of age (Dobly et al 2010). Clinical signs of atypical BSE (when present) can be similar to those of classical BSE; experimentally, they have included mental dullness and amyotrophy (Lombardi et al 2008).

### 1.4.2 Pathology

**Gross lesions**

There are no gross lesions with any strain of BSE.

**Microscopic lesions (histopathology)**

In clinical TSE cases, the characteristic histological changes in the CNS are vacuolation of grey matter neuropil (spongiform change), and/or vacuolation of neurons, astrocytosis and neuronal degeneration. In cattle with BSE, these changes are more common in certain neuroanatomical nuclei, particularly within the
brainstem, and are bilateral and usually symmetrical. The characteristic lesion profile in cattle is the basis for routine histological screening for BSE. Accumulation of PrP can be demonstrated within these lesions. The Australian and New Zealand Standard Diagnostic Protocols for TSEs (SCAHLS 2010) and the OIE Terrestrial Manual contain further details.

In preclinical TSE cases, the characteristic histological changes may be absent.

1.4.3 Laboratory tests

The range of samples and the methods of sample collection, preservation and submission are described in the National Guidelines for Field Operations, first published in 2000 and updated in 2008. The preferred specimen is the whole brain with the brainstem intact, removed from the skull immediately after the animal is killed by intravenous barbiturate injection. A 3-10 g sample (1-2 cm) of unfixed cervical spinal cord and/or medulla from the back of the head (obex) should be collected and stored frozen, preferably at -80 °C. This specimen is suitable for detection of PrPSc by western blotting and rapid immunodiagnostic methods (see Table 1.1). After appropriate microbiological sampling, the brain should be fixed, without longitudinal sectioning or distortion, in 10% neutral buffered formalin for histological and possible immunohistological examination.

If mechanical injury to the brain has occurred — for example, following euthanasia by captive bolt, an attempt should still be made to submit samples as described above, as it may be possible to salvage diagnostically useful material from less than ideal specimens. However, in the case of strong clinical suspicion of BSE, every effort should be made to collect undamaged brain and cord samples. The National Transmissible Spongiform Encephalopathies Surveillance Program (NTSESP) Training Guide shows how to remove the appropriate specimens (see Training resources in References for details).

Anticoagulated blood samples (lithium heparin) and fresh and fixed tissues should be collected and stored for genetic predisposition studies and parentage typing, which may be required for legal or epidemiological reasons at a later stage.

Transport of specimens

Specimens must be packed according to transportation regulations, and the laboratory advised well in advance of specimen arrival times and conditions. Unfixed samples of cervical spinal cord and/or medulla caudal to the obex can be transferred chilled (packed with sufficient cooler bricks) to the state or territory diagnostic laboratory, where they will be held frozen (preferably at -80 °C) pending forwarding to the CSIRO Australian Animal Health Laboratory (CSIRO-AAHL) in Geelong. Formalin-fixed tissues, including brain, should be securely packed in leak-proof containers.

Specimens should initially be sent to the state or territory diagnostic laboratory, from where they will be forwarded to CSIRO-AAHL for emergency disease testing.

---

after the necessary clearance has been obtained from the chief veterinary officer (CVO) of the state or territory of the disease outbreak and the CVO of Victoria has been informed about the transport of the specimens to Geelong.

**Laboratory diagnosis**

Laboratory examination of brain is necessary to confirm a diagnosis of BSE. Test methods are discussed in greater detail in the *Australian and New Zealand Standard Diagnostic Procedure for Transmissible Spongiform Encephalopathies* (SCAHLS 2010).

Histological examination to detect the characteristic changes in the CNS mentioned in Section 1.4.2 is the first step because it may also provide an alternative diagnosis and thus conclude an investigation. Appropriately targeted histopathological examination of the brain in clinically affected animals can detect characteristic lesions with high sensitivity and specificity (Wells et al 1989, OIE 2011).

Tests for detecting accumulated PrPsc in CNS tissue provide a more definitive diagnosis of BSE. Three sets of methods are available:

- Immunohistochemistry on formalin-fixed sections of CNS. This uses specific antibodies to detect accumulated PrPsc in situ, and has similar sensitivity to immunoochemical methods.

- Immunoochemical detection of PrPsc in homogenates of unfixed CNS tissue. Various tests are available. Western blotting, also known as immunoblotting, is available in Australia. Tissue homogenates are processed through a variety of digestion and concentration steps before specific antibody is used to detect PrPsc. Western blotting is based on electrophoresis and has the capacity to distinguish the molecular weight and the pattern of glycosylation of PrPsc. A number of enzyme-linked immunosorbent assay (ELISA) and rapid western blot techniques are also available and are generally used as screening tests in surveillance programs.

- Detection of scrapie-associated fibrils (SAFs) by electron microscopy. This assay detects disease-specific ultrastructural elements by negative staining electron microscopy. SAF detection is less sensitive than immunodetection, but can be used on autolysed tissue (OIE 2011).

Confirmation of a clinical diagnosis of BSE in cattle is based on recognition of distinctive histopathological changes in the CNS, with confirmation by immunohistochemistry on the fixed tissues, by immunoochemistry (western blot, ELISA) on unfixed CNS tissue, or by detection of SAFs. There are no serological assays for BSE, as no specific immune response is recognised as part of the disease process. Table 1.1 shows the tests for BSE that are currently used for diagnosis in Australia.
Table 1.1 Laboratory tests currently available at CSIRO–AAHL for the diagnosis of BSE

<table>
<thead>
<tr>
<th>Test</th>
<th>Specimen required</th>
<th>Test detects</th>
<th>Time taken to obtain result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histopathology</td>
<td>Formalin-fixed brain</td>
<td>Characteristic lesions</td>
<td>2 days</td>
</tr>
<tr>
<td>Immunohistochemistry</td>
<td>Formalin-fixed brain</td>
<td>Accumulation of PrP&lt;sup&gt;Sc&lt;/sup&gt;</td>
<td>3 days</td>
</tr>
<tr>
<td>Western blot</td>
<td>Unfixed brain tissue or cervical spinal cord</td>
<td>PrP&lt;sup&gt;Sc&lt;/sup&gt;</td>
<td>1 day</td>
</tr>
<tr>
<td>ELISA</td>
<td>Unfixed brain tissue or cervical spinal cord</td>
<td>PrP&lt;sup&gt;Sc&lt;/sup&gt;</td>
<td>1 day</td>
</tr>
<tr>
<td>Electron microscopy</td>
<td>Unfixed brain tissue or cervical spinal cord</td>
<td>Scrapie-associated fibrils (SAFs)</td>
<td>2 days</td>
</tr>
</tbody>
</table>

ELISA = enzyme-linked immunosorbtent assay
Source: Information provided by CSIRO-AAHL, 2011 (refer to CSIRO-AAHL for most up-to-date information).

Other tests are also available, but are not in routine use and are essentially research tools. These include bioassays, most often mouse transmission tests, which involve intracerebral inoculation and take a year or more to complete. They identify patterns of distribution of brain lesions that are distinctive for different prion strains. However, the long incubation period precludes the routine use of this type of assay (SCAHLS 2010). Serial protein misfolding cyclic amplification (sPMCA) is a test under development that has potential for screening tissues and secretions, including milk and urine (Maddison et al 2009), as well as environmental samples (Nichols et al 2009).

1.4.4 Differential diagnosis

BSE is a progressive disease of the nervous system and should be considered in the differential diagnosis of locomotory and neurological disorders in cattle over 30 months of age. The following disorders of the nervous and locomotory systems are known to occur in Australia and provide a background guide for the differential diagnosis of BSE:

- trauma
  - brain and spinal cord
- musculoskeletal diseases
- nutritional myopathy (vitamin E or selenium deficiency)
- metabolic diseases
  - hypomagnesaemia or hypocalcaemia
  - nervous acetonaemia
  - polioencephalomalacia
  - hepatic and renal encephalopathy
  - heat stress
- infectious diseases
  - brain or spinal abscess (including cranial or vertebral osteomyelitis)
  - listeriosis
– thromboembolic meningoencephalomyelitis
– cerebral babesiosis
– bovine herpesvirus encephalitis (type 1.3 — BHV1.3)
– sporadic bovine encephalomyelitis
– bovine malignant catarrhal fever
– bovine ephemeral fever
– focal symmetrical encephalomalacia (Clostridium perfringens)

• toxicoses
– lead toxicosis
– plant toxicoses
  - perennial ryegrass staggers (Acremonium lolii, endophyte on Lolium perenne)
  - annual ryegrass staggers, blown grass staggers/floodplain staggers (Clavibacter toxicus on seedheads)
  - paspalum staggers (ergotism: Claviceps paspali on Paspalum dilatatum)
  - phalaris staggers
  - Swainsona toxicosis
  - Xanthorrhoea toxicity
  - pyrrolizidine alkaloidosis
– botulism
– urea toxicosis
– snakebite

• genetic diseases
– cerebellar hypoplasia (Shorthorn, Brahman cattle)
– cerebellar abiotrophy (Angus cattle)
– progressive ataxia (Charolais cattle)
– progressive spinal myelinopathy (Murray Grey cattle)
– neuronal ceroid-lipofuscinosis (Devon cattle)
– tomaculous-like neuropathy (Santa Gertrudis cattle)

• neoplasia.

BSE should also be differentiated from other diseases exotic to Australia, including rabies.

1.4.5 Treatment of infected animals

There is no treatment for an animal with a TSE.
1.5 Resistance and immunity

1.5.1 Innate and passive immunity

There is no evidence for passive immunity playing any part in resistance to TSEs. In both scrapie in sheep (Hunter et al 1997) and vCJD in humans (Brown et al 2001), susceptibility or resistance to disease is associated with polymorphisms within the PrP gene. In cattle, some genetic risk factors affecting susceptibility to BSE have been identified (Murdoch et al 2010).

1.5.2 Active immunity

The disease is fatal in all cases, and no protective immunological response has been detected.

1.5.3 Vaccination

There is no vaccine for any TSE.

1.6 Epidemiology

The epidemiology of atypical BSE is not well understood. Millions of cattle worldwide have been screened for BSE strains, but, from 1986 to 2009, only around 50 cases of these rare diseases had been diagnosed in Europe, Canada, the United States and Japan. All cases, except one in Japan, have been reported in cattle 8 years of age or older (Dobly et al 2010). They may have a spontaneous, noncontagious origin (Biacabe et al 2008). A heritable polymorphism in the PrP gene responsible for one case of H-type BSE in the United States is rare (Heaton et al 2008). Based on this information, the likelihood of these rare conditions arising in the indigenous cattle population is extremely low.

The rest of this section concerns the epidemiology of classical BSE in cattle, which is determined principally by its long incubation period and its mode of transmission — in the natural setting, ingestion mainly by young animals of feeds containing BSE-contaminated MBM (Collee and Bradley 1997ab, Wilesmith 1998, Brown et al 2001). All BSE cases in countries other than the UK have origins in the importation and feeding to young cattle of MBM, or the importation from the UK of live cattle that entered the animal feed chain.

The OIE has assessed that there is a negligible risk that BSE is present in Australia or that it has been introduced to cattle in Australia through the importation of commodities potentially contaminated with the disease agent.

1.6.1 Incubation period

The age-specific incidence of BSE in the UK has provided insight into the incubation period of the disease and its distribution (Wilesmith 1998). Most cattle became infected in the first 6 months of life, and the incubation period is long (the average is cited as 5 years). In the UK dataset from 1987 to 1997, 90% of cases occurred in cattle from 3 to 8 years of age, and 10% occurred in cattle aged 9 years and over. The age profile of infected cattle has steadily increased in European countries as strict controls on animal feeds have minimised the number of cattle
being infected – 125 cases were reported in the European Union in 2008, compared with 2167 in 2001 (EC 2009).

1.6.2 Persistence of agent

General properties
Residues of contaminated MBM stored on farm and fed to cattle after 1996 may be responsible for the continuing trickle of BSE cases in cattle born after the feed ban in some countries. Because of their peculiar protein structure, prions are resistant to freezing, desiccation, ultraviolet radiation, most disinfectants and burial. The CJD agent can remain infectious for 28 months at room temperature after the infected person’s death. On the other hand, pH extremes and some organic acids can inactivate prions.

Live animals
After ingestion in contaminated feed, the BSE agent spreads in an infected animal via the neural route to the CNS. Experimental data point to simultaneous spread of infection via the vagus nerve and splanchnic nerves to the spinal cord, from where infection ascends to the brain (EFSA 2007).

Attack rate studies in the UK have demonstrated that high doses can decrease the incubation period, but very low doses have more influence on lowering attack rates than on increasing the incubation period. Epidemiological and experimental data suggest that most natural BSE cases were exposed to low doses. The oral ID$_{50}$ (that is, the dose needed to orally infect 50% of exposed cattle) for clinical BSE cases is around 0.2 g of BSE brain tissue (Wells et al 2007), and one of 15 orally challenged calves became infected at a dose of 0.001 g of BSE brain tissue (SEAC 2003). When cattle are orally challenged with 1 g of BSE brain tissue, the shortest incubation period seen is 45 months. Experimental data also show that BSE infectivity in the CNS is below detectable levels or absent until 75% of the average incubation period has passed (EFSA 2007, Wells et al 2007). End-point titration of the pool of brainstem homogenate used in these studies in RIII mice gave a titre of $10^{3.5}$ mouse parenteral ID$_{50}$/g.

Several publications have reviewed the infected tissue distribution of BSE-affected cattle. Table 1.2 shows estimates of the levels of infectivity of each tissue (expressed as ID$_{50}$ units) at the height of infectivity for that tissue.
Table 1.2 Estimate of cattle oral ID$\text{so}$ with each tissue at the height of infectivity for that tissue type

<table>
<thead>
<tr>
<th>Tissue</th>
<th>Weight of tissue (g/animal)</th>
<th>Infectivity ID$\text{so}$/g</th>
<th>Infectivity ID$\text{so}$/animal</th>
<th>% of total infectivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain</td>
<td>500</td>
<td>50</td>
<td>25 000</td>
<td>60.2</td>
</tr>
<tr>
<td>Spinal cord</td>
<td>200</td>
<td>50</td>
<td>10 000</td>
<td>24.1</td>
</tr>
<tr>
<td>Distal ileum</td>
<td>800</td>
<td>5</td>
<td>4 000</td>
<td>9.6</td>
</tr>
<tr>
<td>Dorsal root ganglia</td>
<td>30</td>
<td>50</td>
<td>1 500</td>
<td>3.6</td>
</tr>
<tr>
<td>Trigeminal ganglia</td>
<td>20</td>
<td>50</td>
<td>1 000</td>
<td>2.4</td>
</tr>
<tr>
<td>Tonsil</td>
<td>50</td>
<td>0.005</td>
<td>0.25</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1 600</strong></td>
<td><strong>41 500</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Comer and Huntly (2003)

BSE in cattle differs from some other TSEs in that infectivity in the lymphoreticular system is slight, and located in Peyers patches and tonsils. Infectivity appears in the Peyers patches in the distal ileum between 6 and 18 months after exposure, and reappears between 36 and 40 months after exposure.

Up-to-date information on this and other BSE research can be obtained from the websites of the UK Department of Environment, Food and Rural Affairs, the Advisory Committee on Dangerous Pathogens and the European Food Safety Authority.

Animal products and byproducts

TSE agents survive for long periods in carcases and withstand many of the procedures currently used to process products. The OIE has made recommendations regarding the destruction of the BSE agent in Chapter 11.5 of the OIE Terrestrial Code.

Decontamination is discussed in Section 3.2.9.

Veterinary instruments

As an aberrant protein, TSE agents are very resistant to the physicochemical conditions that inactivate conventional viruses and bacteria. Prions may persist on veterinary instruments that have been steam sterilised at 121 °C or decontaminated by most commonly applied chemical procedures.

---

11 www.dh.gov.uk/ab/ACDP/index.htm
13 www.oie.int/index.php?id=169&L=0&htmfile=chapitre_1.11.5.htm
1.6.3 Modes of transmission

Live animals

BSE is not a contagious disease of cattle in the usual sense, and there is no evidence for horizontal or vertical spread of BSE between animals. This is consistent with the restriction of its infectivity largely to CNS tissue, and is supported by the fact that very few cases of BSE have been reported in cattle in the UK born after the introduction of the comprehensive feed ban on 1 August 1996 (referred to as ‘born after the real feed ban’, or BARB, cattle). The continuing appearance of BSE in BARB cattle in the UK can be attributed to residues of contaminated MBM on farms (Hill 2005).

Most cattle become infected with BSE when they are calves (Donnelly and Ferguson 2000). Using a computer simulation model, Wilesmith et al (1988) demonstrated that the risk of exposure was 30 times greater for calves than for adult cattle. The most compelling evidence for infection occurring mainly during calfhood is the peak age incidence of BSE and the feeding patterns of the dairy industry in the UK (Wilesmith 1998). Cattle usually present with the disease at about 5–7 years old, and the peak in 1995–96 seen in the UK after the 1988 feed ban is consistent with a 5-year incubation period. Wilesmith et al (1988) also demonstrated that most cattle were infected in the first 6 months of life.

The movement of clinically normal but infected cattle is a risk factor for the introduction of BSE into new countries if rendered material from such cattle enters the cattle feed supply. This risk applies during the period of infectivity of tissues from such cattle, which begins shortly before the appearance of clinical signs (Wells et al 1998, Wells et al 2007).

Animal products and byproducts

Data from studies on the infectivity of cattle tissues have enabled international standards to be established for tissues that transmit BSE and tissues that can be safely traded. Irrespective of the BSE risk status of a country, the following commodities are recognised by the OIE as not representing a risk of transmitting BSE:14

- milk and milk products
- semen and in vivo–derived cattle embryos collected and handled in accordance with the recommendations of the International Embryo Transfer Society15
- hides and skins
- gelatine and collagen prepared exclusively from hides and skins
- tallow with maximum level of insoluble impurities of 0.15% in weight, and derivatives made from this tallow

---

14  www.oie.int/index.php?id=169&L=0&htmlfile=chapitre_1.11.5.htm
15  Based on available research and field information, the Research Subcommittee of the Health and Safety Advisory Committee of the International Embryo Transfer Society has categorised some diseases based on their relative risk of dissemination by properly processed and handled in vivo–derived embryos.
• dicalcium phosphate (with no trace of protein or fat)
• deboned skeletal muscle meat (excluding mechanically separated meat) from cattle that were not subjected to a stunning process before slaughter, with a device injecting compressed air or gas into the cranial cavity, or to a pithing process, and that passed antemortem and postmortem inspections and was prepared in a manner to avoid contamination with SRMs (see below)
• blood and blood byproducts from cattle that were not subjected to a stunning process before slaughter, with a device injecting compressed air or gas into the cranial cavity, or to a pithing process.

In an extensive study by Wrathall et al (2002), embryos from cattle clinically affected with BSE were implanted into New Zealand-born, BSE-free cattle. The embryos did not transmit BSE to the recipient cattle. In addition, when more than 1000 nonviable embryos were inoculated intracerebrally into susceptible mice, no lesions were demonstrated after 2 years. It is important to note, however, that the embryos were washed according to internationally accepted standards.

The OIE recognises that:
• tonsils and distal ileum from cattle of any age represent a BSE risk for controlled and undetermined BSE risk countries (see Section 1.9 for further information on these OIE country categories)
• brain, eyes, spinal cord, skull and vertebral column represent a BSE risk if they are derived from cattle over 30 months of age in a controlled BSE risk country, or over 12 months of age in an undetermined BSE risk country
• cattle tissues from a negligible BSE risk country (the status given to Australia) do not represent a BSE risk.

Biological products
TSEs can be spread iatrogenically. For example, CJD has been transmitted between people through extracts of human pituitary gland that were contaminated with the disease agent. Biological products derived from the tissues of cattle affected with BSE therefore provide a possible route of transmission of the disease and must be considered during disease investigations.

Although TSEs must be considered in risk assessments for biological products, there is no epidemiological evidence that such products have been a source of BSE cases in the UK or elsewhere. Quarantine controls are in place in Australia for the importation of biological products such as veterinary vaccines.

Veterinary instruments
Surgical and veterinary instruments are not recognised as a route of BSE spread to cattle. The potential for transmission of BSE by fomites is limited, because contamination requires exposure to CNS tissue from affected cattle. However, care is required in the disposal or decontamination of equipment used for the postmortem removal of brain tissue from suspected BSE cases. Surgical instruments used for procedures with CNS exposure (eg eye ablation) may also be contaminated if the animal is incubating BSE, but such procedures are rare. This form of transmission is therefore extremely unlikely.
Other equipment and materials

Other equipment, vectors and materials do not have a role in spreading BSE.

Vectors

There is no evidence for the transmission of BSE by arthropod vectors.

1.6.4 Factors influencing transmission

The most significant risk factor for the transmission of BSE to cattle is the feeding of MBM contaminated with the BSE agent. Global eradication of BSE is expected, following the implementation since 1996 of measures to prevent the feeding of ruminant-derived MBM to cattle.

1.7 Manner and risk of introduction to Australia

Key factors in the epidemiology of BSE are well established. They point to three pathways for the introduction of BSE into Australia:

- Importation of cattle from BSE-affected countries.
  Importation of cattle into Australia from the UK ceased in 1988, and importation from continental Europe ceased in 1991. Live cattle cannot now be imported into Australia from any BSE-affected country. The small number of cattle still alive that had been imported from Europe, Japan, Canada (1996 onwards) and the United States (1996 onwards) have been permanently identified under the National Livestock Identification System. They are also in official ‘lifetime quarantine’ and will never enter the human food, or animal feed, chains. Risk assessments have shown that there is a negligible risk that BSE has been introduced into Australia by importation of these cattle.

- Importation of contaminated feedstuff originating from BSE-affected countries.
  Importation into Australia of animal-derived MBM (except for fishmeal) from all countries except New Zealand was banned in 1966 as a measure against the importation of anthrax spores. Risk-based import controls minimise the chance that other imported stockfeeds or stockfeed ingredients have been contaminated with MBM. Risk assessments have shown that there is a negligible risk of introduction of BSE into Australia by importation of these commodities.

- Importation of biologicals contaminated with the BSE agent.
  Vaccines and other biologicals that involve bovine products in their manufacture have been subjected to quarantine risk assessments. Restrictions on the importation of these products have been extended, in line with emerging knowledge of the BSE status of countries throughout the world. The risk of introduction of BSE into Australia in such products is considered to be negligible.

  Stringent controls are in place to prevent the introduction of BSE through these three pathways. In the unlikely event that the BSE agent is introduced, the legislated bans in Australia on feeding ruminant animals MBM derived from
mammals, birds or fish (ie restricted animal material) would prevent BSE being propagated and amplified. It has been illegal to feed ruminant MBM to ruminants in all Australian states and territories since 1997. The ban is enforced by state and territory authorities, with support from quality assurance programs in the farming, feedlot, rendering and stockfeed manufacturing industries.

1.8 Social and economic effects

The economic effects of a temporary loss of market access as a result of a case of BSE in cattle in Australia have been modelled for three hypothetical scenarios, involving a midrange, low-end and high-end reduction in exports, with the high-end scenario also including a reduction in domestic consumption (Yainshet et al 2006). The study found that:

A case of [any strain of] BSE in Australia is likely to impose significant costs, not just to the beef industry but across the broader economy. The results indicate that these impacts may be greater than that observed in countries such as the United States, Canada and Japan that have already experienced isolated cases of BSE. This reflects the highly export oriented nature of the Australian beef industry and the concentration of beef exports in a few key markets that are highly sensitive to BSE. The three scenarios highlight the importance of quickly regaining export markets, with costs escalating rapidly as the closure period lengthens. The high end scenario also highlights the importance of managing consumer reactions in Australia to limit the impact a BSE case could have on the domestic market for beef.

1.9 Criteria for proof of freedom

The OIE categorises countries into three risk levels associated with BSE: negligible, controlled and undetermined.16 Beef importing countries, including Australia, either adopt the OIE’s categorisations or conduct their own using similar criteria. Australia is classified by the OIE as negligible BSE risk. Negligible BSE-risk countries that subsequently report a case of any strain of BSE in indigenous cattle will be reclassified by the OIE as controlled risk, unless all cases were born more than 11 years ago.

The OIE risk classification system requires that the BSE risk status of the cattle population of a country, zone or compartment be determined on the basis of the following criteria:

- the outcome of a risk (release and exposure) assessment that identifies all potential factors for BSE occurrence and their historic perspective
- an ongoing awareness program for veterinarians, farmers and workers involved in transportation, marketing and slaughter of cattle, to encourage reporting of all cases showing clinical signs consistent with BSE
- compulsory notification and investigation of all cattle showing clinical signs consistent with BSE

16 www.oie.int/index.php?id=169&L=0&htmfile=chapitre_1.11.5.htm
• examinations of brain or other tissues collected within the framework of a surveillance and monitoring system.

Commodities from the cattle population of a country, zone or compartment may pose a negligible risk or a controlled risk of transmitting the BSE agent, depending on the extent to which the country meets conditions listed by the OIE. The cattle population of a country, zone or compartment is considered to pose an undetermined BSE risk if it cannot be demonstrated that it meets the requirements of another category.

Proof of freedom is difficult because of the long incubation period for BSE and the possible sporadic nature of atypical BSE. The ultimate aim of an emergency response is to verify either that Australian cattle and their products represent a negligible risk of transmitting the BSE agent, or that Australia has controlled this risk through appropriate risk reduction measures. How this aim is achieved will depend on:

• the age of the index case and any subsequent cases
• the strain of BSE
• the putative source of the BSE agent
• the extent of the outbreak
• the results of tracings of cohort cattle and their products.

If a BSE strain is detected in Australian cattle less than 11 years of age, it will be necessary to demonstrate that Australia has minimised the likelihood of BSE risk materials entering the human food, and animal feed, chains. This will require increased auditing of existing arrangements and completion of the risk analyses specified in the BSE chapter in the OIE Terrestrial Code.

Food safety authorities will have a lead role in the protection of the human food supply — for example, removal of SRMs from the human food chain if this is indicated by the risk assessment.

Australia’s BSE surveillance program is structured to comply with the OIE requirements, which will allow the detection of BSE around a design prevalence of at least one case per 100 000 adult cattle at a confidence level of 95%.

In the event of an outbreak, the National TSE Surveillance Program — within the TSE Freedom Assurance Program17 managed by Animal Health Australia — would be used as the basis for an improved surveillance program. This will comprise the examination of native-born cattle over 30 months of age that either display clinical signs consistent with a differential diagnosis that includes BSE, or are in other OIE at-risk subpopulations — such as downer, emergency slaughter and fallen cattle. The age, target subpopulations and number of cattle to be examined will be determined at the time, based on the results of investigation and the need to support domestic and export markets for Australian cattle and their products.

2 Principles of control and eradication

2.1 Critical factors assessed in formulating response policy

2.1.1 Features of the disease

- Classical bovine spongiform encephalopathy (BSE) is primarily a disease of domestic cattle (genus *Bos*) but also affects other bovine animals, including buffalo (genus *Bubalus*).

- BSE has an insidious onset and a slowly progressive clinical course.

- BSE results from the ingestion, primarily by young animals, of feed containing meat-and-bone meal (MBM) contaminated with the BSE agent.

- BSE arose in the United Kingdom and was propagated through the recycling of bovine tissues into animal feed. Later, the export of infected cattle and contaminated feed spread the BSE agent to other countries, where it was again recycled and propagated through the feed chain.

- The ID$_{50}$ of BSE brain material that causes clinical disease in cattle is less than 1 g, and the average incubation period is 5 years. The distribution of tissue infectivity in BSE cases is well known. Very small oral doses result in low attack rates of clinical disease.

- The agent for the three known strains of BSE, like all transmissible spongiform encephalopathy agents, is extremely resistant to the usual physical and chemical methods of disinfection. However, it is not absolutely resistant, and appropriate methods may be available for decontamination.

- There is no validated diagnostic test for the BSE agent in live animals.

- BSE is not a contagious disease in the usual sense, and there is no evidence of horizontal or vertical transmission of BSE between cattle. Bovine embryos and semen, dairy products, beef and some other bovine products do not appear to transmit BSE.

- BSE can be spread iatrogenically.

- Atypical BSE (L-type and H-type BSE) is an extremely rare disease of cattle over 8 years of age. It may have a sporadic aetiology and theoretically could rarely arise in Australian cattle. The tissue distribution of infectivity of these agents outside the central nervous system is not known. They are highly unlikely to spread horizontally or vertically, and their ability to infect cattle through feeding of MBM is not yet known.

- A variant form of Creutzfeldt-Jakob disease (vCJD) in humans is caused by the consumption of foods containing specified risk materials (such as brain and spinal cord) from BSE-affected cattle.
2.1.2 Features of susceptible populations

- Australia does not import live cattle from BSE-affected countries, nor animal-derived MBM (except for fishmeal) from any country except New Zealand.
- Australia suspended the importation of cattle from the United Kingdom in 1988, from other European countries in 1991, and from other BSE-affected countries from the date the disease was first reported.
- Cattle imported from countries that have subsequently reported BSE cases were traced, and those still alive at the time were placed under official, permanent quarantine. Measures in place allow the normal commercial management of these animals, but prohibit their use for the production of human or animal food.
- There is a negligible risk that Australian cattle have been, or will be, infected with the BSE agent.
- In 1997, Australia banned feeding of ruminant MBM to ruminants.
- In 2008–09, Australia had approximately 27 million cattle and buffalo; of these, about 2.5 million were dairy cattle and 700,000 were in feedlots. Around 7 million animals are estimated to have been less than 1 year of age. No definitive data are available on the number of cattle that are over 8 years of age (the theoretical risk group for atypical BSE) at a particular time.
- Fear of repercussions may deter producers from reporting disease.
- The expected severe market disruption associated with an outbreak will reduce the value of all related industries.

2.2 Options for control or eradication

Based on an assessment of the above factors, managing an emergency response to a finding of BSE in Australian cattle may require the use of some or all of the following strategies:

- registration of all commercial and noncommercial livestock holdings; compulsory biosecurity programs; awareness and rapid resolution of ownership of animals and animal products on farms
- epidemiological investigations of the case(s) and cohorts
- swift declaration and effective policing of movement controls on live cattle and certain animal products
- modified stamping out
- increased targeted active surveillance
- strengthening of current BSE risk reduction measures
- close liaison with affected industries and public health agencies
- a public awareness campaign to improve early detection, support consumer confidence in beef, and maintain access to export markets for Australian cattle and their products
- individual animal identification; and tracing of animals, and products and byproducts from the case(s) and cohorts.
The policy options for management of a case of any strain of BSE in Australian cattle, based on consultation and cooperation between government and the livestock industries, are:

- investigation and communication of findings only
- containment, with a view to eventual eradication
- eradication.

The policy to be implemented is described in Section 3.
3 Policy and rationale

3.1 Introduction

Summary of policy

Bovine spongiform encephalopathy (BSE) is a World Organisation for Animal Health (OIE)-listed disease that is significant in the international trade of cattle and cattle products. Classical BSE is also a foodborne zoonosis. A confirmed case of any strain of BSE in Australia could result in serious economic loss within the livestock industries, due to loss of export markets and disruption to business continuity from falls in domestic consumption of beef.

The default policy is to eradicate any strain of BSE as quickly as possible using modified stamping out, supported by a combination of strategies including:

- early recognition and laboratory confirmation of a case(s)
- initial quarantine of infected and dangerous contact premises
- quarantine and movement controls over animals and animal products
- improved risk reduction measures, such as revisions to the ruminant feeding ban
- tracing and increased surveillance (based on epidemiological assessment) to identify cohort cattle and the source and extent of infection, and subsequently to establish proof of freedom from the disease
- zoning/compartmentalisation (if applicable) to define infected and disease-free premises and industry sectors
- disposal of confirmed case(s)
- destruction and disposal of all cohort cattle, depending on the findings of veterinary investigations
- recall of animal products likely to be contaminated
- a public awareness campaign that describes measures taken to protect human and animal health.

BSE (any strain) is included as a Category 2 emergency animal disease in the Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Responses (EAD Response Agreement). Category 2 diseases are those for which costs will be shared 80% by government and 20% by industry.
Table 3.1 provides the case definitions for BSE.

Table 3.1  Case definitions for BSE

<table>
<thead>
<tr>
<th>Case type</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspect BSE case</td>
<td>An animal of the genus <em>Bos</em> (cattle) or <em>Bubalus</em> (buffalo) with history, clinical signs and histological changes consistent with BSE (as described in Section 1.4), until BSE is confirmed or excluded OR An animal with a positive result from a sensitive and specific screening test such as an ELISA for TSEs (see Section 1.4), until BSE is confirmed or excluded</td>
</tr>
<tr>
<td>Confirmed BSE case</td>
<td>A suspect case with positive results from a TSE-specific immunohistochemistry, immunochemistry or other validated confirmatory test</td>
</tr>
<tr>
<td>Cohorts to a BSE case</td>
<td>Cattle which, during their first year of life, were reared with the BSE cases during their first year of life, and which investigation showed consumed the same potentially contaminated feed during that period OR If the results of the investigation are inconclusive, all cattle born in the same herd as, and within 12 months of the birth of, the BSE cases</td>
</tr>
</tbody>
</table>

BSE = bovine spongiform encephalopathy; ELISA = enzyme-linked immunosorbent assay; TSE = transmissible spongiform encephalopathy

In this response strategy, references to cattle also apply to buffalo.

This response strategy does not cover the response to BSE agents causing disease in small ruminants, domestic cats or zoo felids. The experience overseas is that these cases only arise as spillover events from a significant BSE epidemic in indigenous cattle.

This response strategy does not cover a BSE outbreak caused by veterinary vaccines or other veterinary therapeutics. Although it is important that BSE is considered in risk assessments for biological products, there is no evidence to suggest that they have been a source of BSE cases overseas.

The chief veterinary officer (CVO) in the state or territory in which the outbreak occurs will be responsible for developing an Emergency Animal Disease (EAD) Response Plan for the particular outbreak.

The Consultative Committee on Emergency Animal Diseases (CCEAD), convened for the incident, assesses the response plan drawn up by the affected jurisdiction’s CVO for technical soundness and consistency with AUSVETPLAN, and endorses it or seeks modifications to it. Overall operational management of the incident rests with the CVO of the affected jurisdiction, with oversight by the CCEAD.

The National EAD Management Group (NMG), also convened for the specific incident, decides on whether cost sharing will be invoked (following advice from the CCEAD), and manages the national policy and resourcing needs.

---

18 [www.oie.int/index.php?id=169&L=0&htmfile=chapitre_1.11.5.htm](www.oie.int/index.php?id=169&L=0&htmfile=chapitre_1.11.5.htm)
For further details, refer to the Summary Document.

CVOs will implement disease control measures as agreed in the EAD Response Plan and in accordance with relevant legislation. They will make ongoing decisions on follow-up disease control measures in consultation with the CCEAD and the NMG, based on epidemiological information about the outbreak.

For information on the responsibilities of the state or territory disease control headquarters and local disease control centres, see the Control Centres Management Manual.

3.2 Control and eradication policy

This policy will apply once a confirmed case of any strain of BSE is diagnosed in cattle in Australia.

Details of the policy will depend on the type of incident that initiates an emergency response (e.g., imported or indigenous case; age of animal; strain involved, if indigenous) and the results of the epidemiological investigation. Table 3.2 shows the actions that may be required.

Australia will continue to meet the OIE’s conditions for a negligible BSE-risk country if a case is in imported cattle or if the case is in indigenous cattle aged 11 years or older, and the assessed BSE risk of Australia’s imports has not changed. The occurrence of BSE in indigenous cattle will indicate a cycle of transmission in Australia. A case of atypical BSE in indigenous cattle will probably be a sporadic event. The distinction between these situations is important because different response measures will be indicated. An improved surveillance and monitoring program may be required, to an extent and intensity determined by the epidemiological and other veterinary investigations.

3.2.1 Stamping out

Modified stamping out will be undertaken, as defined in the OIE Terrestrial Code. BSE is a notifiable disease in all Australian states and territories, and suspect cases must be notified to a government veterinarian or animal health officer.

The premises with the index case will be declared an infected premises (IP), and part or all of the premises will be placed under quarantine. Movement controls will be imposed on all cattle on the premises until the full results of epidemiological investigations are known.

Subsequent strategies will depend on the outcome of veterinary investigations to identify the risk status of cohort cattle and relevant materials associated with a confirmed case (see Table 3.2). The investigation will begin with a complete history of feeding practices and identification of all premises where the confirmed case had resided from birth to diagnosis. Subsequently, any cohort cattle, potentially contaminated products from the case or cohort cattle, and potentially contaminated feedstuffs and biological materials will be traced.

In response to a BSE case, investigations will include assessment of the risk posed by cohort ruminants other than cattle. However, based on overseas experience, measures would be required for these animals only in exceptional circumstances.
### Table 3.2 Potential actions required for categories of infected or potentially infected cattle

<table>
<thead>
<tr>
<th>Animal category</th>
<th>Actions</th>
<th>Other measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imported cattle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Confirmed case</td>
<td>Review animal identification to confirm that the case was imported</td>
<td>Quarantine IPs, DCPs and TPs until epidemiological studies and identification of cohort cattle have been completed</td>
</tr>
<tr>
<td>• Cohort cattle residing in Australia</td>
<td>Dispose of carcase appropriately</td>
<td>Trace and isolate potentially contaminated products (edible and inedible) derived from the case and cohort cattle if they were not in lifetime quarantine</td>
</tr>
<tr>
<td></td>
<td>Assess potential for feedborne exposure in Australia</td>
<td>Advise source country</td>
</tr>
<tr>
<td></td>
<td>Trace cohort cattle to establish their fate and, if they are alive, place them in lifetime quarantine (if not already in lifetime quarantine)</td>
<td>Introduce, in conjunction with health authorities, a public awareness program that describes measures taken to protect human and animal health</td>
</tr>
<tr>
<td></td>
<td>Quarantine IPs, DCPs and TPs until epidemiological studies and identification of cohort cattle have been completed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trace and isolate potentially contaminated products (edible and inedible) derived from the case and cohort cattle</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Advise source country</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Introduce, in conjunction with health authorities, a public awareness program that describes measures taken to protect human and animal health</td>
<td></td>
</tr>
<tr>
<td>Indigenous cattle</td>
<td>Review case diagnosis, strain of BSE, confirmatory testing, parallel testing at CSIRO-AAHL and the world reference laboratory (Veterinary Laboratory Agency, Weybridge)</td>
<td>Quarantine IPs, DCPs and TPs until epidemiological studies and identification of cohort cattle have been completed</td>
</tr>
<tr>
<td>• Confirmed case</td>
<td></td>
<td>Trace and isolate potentially contaminated products (edible and inedible) derived from the case and cohort cattle</td>
</tr>
<tr>
<td>• Cohort cattle</td>
<td></td>
<td>Introduce, in conjunction with health authorities, a public awareness program that describes measures taken to protect human and animal health</td>
</tr>
<tr>
<td></td>
<td>Review animal identification to confirm that the case is of Australian origin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trace the case to property of birth and other properties where it has resided</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Depending on epidemiology findings and risk assessment:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• kill and test cattle on declared premises, and dispose of carcases appropriately</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• quarantine premises or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• take no action</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(decision based on assessment of potential exposure to the BSE agent)</td>
<td></td>
</tr>
<tr>
<td>• Other indigenous cattle</td>
<td>Depending on epidemiology findings and risk assessment, consider implementing:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• an increased BSE surveillance program</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• a protocol for removal and disposal of SRMs from human food and animal feed</td>
<td></td>
</tr>
</tbody>
</table>

BSE = bovine spongiform encephalopathy; CSIRO-AAHL = Australian Animal Health Laboratory of the Commonwealth Scientific and Industrial Research Organisation; DCP = dangerous contact premises; IP = infected premises; SRM = specified risk material; TP = trace premises
3.2.2 Quarantine and movement controls

Quarantine will be imposed on IPs and dangerous contact premises (DCPs). After investigation, it may be possible to reduce quarantine restrictions on cohort cattle or their potentially contaminated products. Further decisions can then be made based on data from veterinary investigations (see Table 3.2, above).

Declaration of restricted and control areas for BSE will not be required, due to the nature of the disease.

3.2.3 Tracing and surveillance

Tracing will be undertaken to:

- identify, as accurately as possible, the age of the case(s)
- assist in establishing the source of infection
- determine the presence of other potentially infected herds
- find risk materials that might enter the human food, or animal feed, chains.

Once BSE has been confirmed, cohort cattle and their potentially contaminated products will be traced.

If possible, feedstuffs that a confirmed BSE case consumed during its first year of life will also be traced. This will be very difficult, given that the average age of BSE cases is 5 years.

The current manager of the cattle and the manager responsible during the year of birth of the case and cohort cattle will be interviewed. Any private veterinary practitioner who has serviced the premises involved or the property of origin of the confirmed cases should also be interviewed to discuss the range of clinical presentations observed in cattle at those properties during at least the previous 9 years.

Trace-forward of cohort cattle and products will be used to declare DCPs and trace premises (TPs). The cattle will be examined periodically until death to detect any development of characteristic clinical signs. All such cattle will be identified by National Livestock Identification System microchip devices and will be tested for BSE at death, if possible. In response to a BSE case, investigations will attempt to include the tracing of cohort ruminants other than cattle. However, based on overseas experience, measures would usually not be required for these animals.

Trace-back for BSE cases will attempt to determine, as accurately as possible, the age of the case(s) and to locate the possible source of exposure. In the case of BSE in an imported animal, although exposure will almost certainly have occurred overseas, the possibility that exposure was via feed in Australia still needs to be assessed.

A systematic program of testing of cohort and other risk subpopulations of cattle will be required to determine the extent of BSE cases in Australia, and to help provide proof that Australia’s negligible BSE risk status can be retained or that the disease has been controlled. In response to a BSE case(s), the program might need to be maintained for a prolonged period.
Information on specimen collection and diagnosis is given in Section 1.4.3 and the *NTSESP National Guidelines for Field Operations*.19

3.2.4 Zoning and compartmentalisation

Because of the nature of BSE, zoning has not been appropriate overseas, and the same would probably apply in Australia. However, in exceptional circumstances, certain classes of cattle may be able to be compartmentalised and made exempt from some BSE controls. In the United Kingdom (UK), for example, cattle from specialist beef herds at very low risk of BSE and registered under the UK’s beef assurance scheme were allowed to be slaughtered for sale for human consumption up to 42 months of age.

3.2.5 Vaccination

Vaccination is not applicable.

3.2.6 Treatment of animal products

No treatment for animal products is guaranteed to be effective in inactivating the BSE agent under normal commercial operations. Meat and animal products from confirmed cases of BSE and from cohort cattle will not be rendered for meat-and-bone meal or for other products, but will be disposed of by incineration or another acceptable method.

Depending on the outcome of epidemiological investigations and risk assessment, risk reduction measures could be strengthened — for example, through revisions to ruminant feeding restrictions. Specified risk materials may need to be removed from human food and animal feed, and then disposed of. Cattle tissues and organs recognised as specified risk materials are described in Section 1.6.3.

3.2.7 Treatment of infected animals

There is no effective treatment.

3.2.8 Disposal of animals and animal products

The carcases of all animals that are killed to eradicate BSE will be completely destroyed in accordance with procedures described below.

Destruction and testing of cattle on farm is preferred to transporting them for slaughter at another site. Killing on farm reduces the risk of spread of the BSE agent from a knackery or abattoir, and focuses control measures in one place.

Care is required in collecting postmortem samples of brain (which is required for diagnosis), using methods described in the *NTSESP National Guidelines for Field Operations*.

---

The following points are relevant to carcass disposal (see the Disposal Manual for detailed information):

- Wherever possible, carcasses will be burned or incinerated.
- Burning or incineration of carcasses will be supervised by disease control authorities to ensure that appropriate methods are used and that all contaminated material is completely burned.
- The ash will be collected, mixed with agricultural lime to create alkaline conditions, and buried deeply at a suitable site.
- Where burning is not practical, carcasses and other materials that cannot be adequately decontaminated will be mixed with caustic materials that will create an alkaline environment and buried deeply at a suitable site.
- Consideration will be given to the future use of the burial site, and to any associated water sources, as the agent may remain in a transmissible state in the soil for long periods (however, environmental sources have not been definitively implicated in BSE transmission).
- Dogs, cats and other potential scavengers should be kept away from destruction and disposal sites.
- Other methods of destruction of carcasses and contaminated material, as specified by the OIE for transmissible spongiform encephalopathies (TSEs), can be considered (ie alkaline hydrolysis).
- The location of burial sites for carcasses, products or ash will be recorded and marked.

Rendering will not be used to dispose of confirmed cases or cohort cattle, because the temperatures and pressures currently used would not be high enough to guarantee complete inactivation of the disease agent.

3.2.9 Decontamination

Areas, fixtures and fittings that might have been contaminated with the tissues from confirmed cases during a postmortem examination will be decontaminated. The decontamination measures used will be in proportion to risk. Decontamination may be required for premises with the potential for heavy contamination, such as field necropsy sites and laboratory postmortem rooms, but decontamination of a property with confirmed or suspected cases is not necessary except as outlined above.

The Decontamination Manual contains general information on decontamination procedures. Because many of the standard methods of decontamination cannot ensure complete inactivation of the BSE agent, the emphasis will be on removal of the agent by thorough cleaning, followed by an appropriate steam sterilisation or liquid chemical treatment, as described below.

Most common disinfectants, including ethanol, formalin, hydrogen peroxide, iodophors and phenolics, and gases such as ethylene oxide and formaldehyde, are not effective against the agent. One of the following methods of chemical decontamination for TSE agents will be used:
• Sodium hypochlorite solution containing 2% (20 000 ppm) available chlorine for more than 1 hour at 20 °C. For the BSE agent, the OIE Terrestrial Manual recommends overnight chemical disinfection of equipment.

• 2 M (80 g/L) sodium hydroxide for more than 1 hour at 20 °C. This method is not completely effective unless the alkali-to-tissue ratio is high enough.

• For histological samples only, 96% formic acid for 1 hour. However, formalin fixation of infected tissues stabilises the scrapie agent so that it cannot then be inactivated by steam sterilisation. Residues of formalin-fixed tissues should therefore be disposed of by incineration.

The risk of horizontal transmission of BSE through environmental contamination with infected tissues is theoretical only and is not supported by overseas experience with the disease. However, entry of ruminants to necropsy sites on IPs will be prevented until decontamination is complete. It is not necessary to impose ongoing farm-gate disinfection at IPs.

Instruments used for postmortem removal of brain or other potentially infected tissue from suspect cases, confirmed cases and cohort cattle will either be discarded after a single use, or decontaminated using one of the methods described above before they are reused on live ruminants. If BSE is confirmed in indigenous cattle, equivalent controls on instruments used on cattle that are not considered at risk (eg for eye ablation or routine postmortem) are not warranted.

3.2.10 Wild animal and vector control

Carcasses will be disposed of in such a way that ingestion by wild and stray animals, including dogs, pigs, cattle and sheep, is prevented. Vector control is not applicable.

See the Wild Animal Response Strategy for further information.

3.2.11 Public awareness and media

One of the most important elements of a public health response will be the communication strategy. Unsubstantiated reports of BSE could have serious ramifications for the livestock industry, its communities, the Australian economy and international relations. The public, especially those in the livestock industries, need to be provided with accurate information to support domestic beef consumption after any strain of BSE is confirmed. There should be clear coordination of information among the relevant organisations, including human health authorities, industry organisations, food safety authorities and the Transmissible Spongiform Encephalopathies Advisory Committee of the National Health and Medical Research Council (NHMRC). Communications with countries that import Australian cattle and their products will be critical to maintaining or regaining market access.

Information provided to the public after confirmation of a case of BSE should cover:

• the circumstances of the outbreak, and exactly what is known and not known
• facts about the disease (including fact sheets)
• the planned response to the outbreak, with regular updates
• issues related to the consumption of meat, with a clear explanation of how the food chain is being protected
• arrangements to prevent spread of the disease, such as the pre-existing bans on feeding vertebrate protein to ruminants and longstanding restrictions on imports from countries with BSE
• trade implications
• comparison with the UK epidemic and the situation in other countries.

See the Public Relations Manual for further information on provision of public information about emergency animal diseases.

3.2.12 Public health implications

As described in Section 1.2, variant Creutzfeldt-Jakob disease (vCJD) was identified in the UK in the mid-1990s and found to be associated with consumption of beef products contaminated with certain tissues from BSE-affected cattle. The zoonotic potential of atypical BSE is not yet fully understood.

An Australian National CJD Registry has been maintained in the Department of Pathology, University of Melbourne, since 1993, and cases of possible CJD are investigated by medical neurologists. No case of vCJD has yet been reported in Australia. However, cases could conceivably occur in the future (eg in people who lived in the UK before BSE-contaminated beef products were removed from the human food chain).

In 2000, Australia’s peak public health advisory and medical research body, the NHMRC, established a Special Expert Committee on TSEs, which is now the Transmissible Spongiform Encephalopathies Advisory Committee. The committee’s purpose is to provide expert and timely advice to Australian governments on all matters necessary to prevent the occurrence and spread of vCJD and other TSEs in Australia.

Australian health regulatory agencies, such as the Therapeutic Goods Administration and Food Standards Australia New Zealand, have extensively reviewed all products under their control to identify constituents of bovine origin and have taken measures to prevent exposure of the Australian population. Blood-donor deferral procedures, among other safeguards, have been put in place to protect the safety of the Australian blood supply.

The Department of Health and Ageing has prepared a response plan for vCJD as part of Australia’s preparedness to address the potential impacts of the disease, including public health, medico-legal, social, community, political, trade and international relations impacts.²⁰ The plan is based on a risk management approach for biological emergencies. It recognises that such an event will occur very infrequently, the evidence base for decision making may be limited and evolving, and the community reaction could be disproportionate to the level of physical risk.

There is no risk of human or animal exposure to the BSE agent from live cattle. However, people handling potentially infected material (e.g., central nervous system tissue from suspected BSE cases) must take adequate precautions to avoid exposure to these agents. Veterinarians, laboratory workers and slaughterhouse workers need to wear appropriate face and eye protection, and gloves when handling tissues suspected of containing high levels of the agent. Care should be taken to minimise environmental contamination during necropsy procedures and to decontaminate, as described above.

### 3.3 Other policies

Apart from eradication (the policy described above), other policy options are:

- investigation and communication of findings only — for example, if a sporadic atypical case were found in an older animal
- containment, with a view to eventual eradication — for example, if spread of the disease were to occur due to iatrogenic transmission through a contaminated biological product, a program with a high level of industry cooperation would be required to achieve eradication. The eradication program would comprise
  - extensive surveillance using rapid diagnostic tests on nervous tissue obtained postmortem at abattoirs (supported by confirmatory testing of positives)
  - trace-back and other veterinary investigations
  - interim quarantine, where required
  - eradication programs for identified infected herds, as determined by veterinary investigations.

### 3.4 Funding and compensation

BSE is classified as a Category 2 disease under the EAD Response Agreement between the governments of Australia and the livestock industries.

Category 2 diseases are EADs that have the potential to cause major national socioeconomic consequences through very serious international trade losses, national market disruptions and very severe production losses in the livestock industries that are involved. Category 2 also includes diseases that may have slightly lower national socioeconomic consequences, but also have significant public health and/or environmental consequences. For this category, the costs will be shared 80% by governments and 20% by the relevant industries (refer to the EAD Response Agreement for details).\(^\text{21}\)

\(^{21}\) Information on the EAD Response Agreement can be found at:  
Information on the valuation and compensation arrangements for livestock or property that are destroyed for the purpose of eradication or prevention of the spread of the EAD, and livestock that have died of the EAD, can be found in the AUSVETPLAN *Valuation and Compensation Manual*. 
4 Recommended quarantine and movement controls

4.1 Guidelines for classifying declared areas

4.1.1 Premises classifications

The status of individual premises will be declared after an epidemiological risk assessment has been completed (including the use of Biosecurity, Surveillance, Incident Response and Tracing [BioSIRT] surveillance forms or equivalent documentation).

Infected premises

An infected premises (IP) is a premises (which may be a paddock or part of a property) on which a case of bovine spongiform encephalopathy (BSE) has been confirmed or is suspected, and/or that potentially contains contaminated animal products or byproducts from a confirmed case.

Dangerous contact premises

Premises classified as dangerous contact premises (DCPs) will be premises containing cohort cattle that will need to undergo further examination.

Since a DCP presents an unacceptable risk to the response if the risk is not addressed, such premises are a high priority for investigation and action. An investigation of a DCP may produce the following outcomes:

- If the presence of a case of BSE is confirmed or suspected, the premises would be designated as an IP.
- If its presence is not confirmed, the premises would receive the qualifier assessed negative (AN).

Trace premises

Trace premises (TP) is a temporary designation applied to premises that contain a susceptible animal(s) that tracing indicates may have been exposed to contaminated animal products, and that requires investigation. The investigation may produce the following outcomes:

- If the presence of a case of BSE is confirmed or suspected, the premises would be designated as an IP.
- If its presence is not confirmed, the premises would receive the qualifier AN.

Resolved premises

A resolved premises (RP) is either an IP or a DCP that has completed the required control measures.
4.1.2 Declared areas

Restricted areas and control areas

Declaration of restricted areas or control areas will not be required during a BSE outbreak. In exceptional circumstances, compartments may be created to address different risks presented by different sectors of the cattle industry.

4.2 Guidelines for issuing permits

When assessing risk for the purposes of issuing a permit, the elements to consider include:

- sources of risk
  - species of animal
  - level of disease on both the originating and destination premises
  - organisation and management issues (ie confidence in animal tracing and surveillance)
  - proposed use of the animals
  - proposed transport route
  - security of transport
  - security and monitoring at the destination
  - environment and natural events
  - community and human behaviour
  - risk of sabotage
  - technology
  - regulations and standards

- areas of impact
  - livestock health (health of affected species, including animal welfare)
  - human health (including occupational health and safety)
  - trade and economic impacts (including commercial and legal impacts)
  - environmental impacts
  - organisational capacity
  - political impacts
  - reputation and image

- proposed risk treatment measures
  - security
  - communication.
4.3 Types of permit

Permits are either general or special. General permits are used for lower risk movements, and are used to provide a record of each movement. Special permits are used for higher risk movements, and therefore require official written permission.

All permit conditions must be met for every permit. General permits may not be available until the relevant chief veterinary officer gives approval for general movements. Special permits include specific permits, emergency permits and transit permits. These may be in addition to documents required for routine movements between jurisdictions (eg health certificates, waybills, consignment notes, National Vendor Declarations).

4.3.1 General permit

A general permit is a legal document that describes the requirements for movement of an animal (or group of animals), commodity or thing, for which permission may be granted without the need for direct interaction between the person moving the animal(s), commodity or thing and a government veterinarian or gazetted inspector of stock. The permit may be completed via a webpage or in an approved place (such as a government office or commercial premises). A printed version of the permit must accompany the movement. The permit may impose preconditions and/or restrictions on movements. It may not be available in the early stages of a response.

4.3.2 Special permits

Specific permit

A specific permit is a legal document that describes the requirements for movement of an animal (or group of animals), commodity or thing, for which the person moving the animal(s), commodity or thing must obtain prior written permission from the relevant government veterinarian or gazetted inspector of stock. A printed version of the permit must accompany the movement. The permit may impose preconditions and/or restrictions on movements.

Emergency permit

An emergency permit is a special permit that describes strict legal requirements for movement of an animal to enable emergency veterinary treatment to be delivered, or to enable animals to be moved for animal welfare reasons, or to enable any other emergency movement, for which the person moving the animal(s) must obtain prior permission from the relevant government veterinarian or gazetted inspector of stock. Each movement should be assessed on a case-by-case basis.

Transit permit

A transit permit is a special permit that describes strict legal requirements to allow movement through a declared area or areas of different status without stopping, for which the person moving the animal(s), commodity or thing must obtain prior permission from the relevant government veterinarian or gazetted inspector of stock.
4.4 Recommended movement controls for BSE

Table 4.1 shows the recommended movement controls that will apply to IPs, DCPs and TPs in the initial stages of a BSE incident. Subsequently, movement restrictions may be amended to apply, for example, to only part of a premises or to cohort cattle only until they can be destroyed and tested.

Table 4.1 Recommended movement controls for declared premises

<table>
<thead>
<tr>
<th>From</th>
<th>To Nondeclared premises</th>
<th>IP/DCP/TP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cattle/buffalo</td>
</tr>
<tr>
<td>Cattle/buffalo</td>
<td>Prohibited except under SpP1</td>
<td>Prohibited except under SpP2</td>
</tr>
<tr>
<td>Other ruminants</td>
<td>No restrictions</td>
<td>No restrictions</td>
</tr>
<tr>
<td>Other animals</td>
<td>Specified products⁴</td>
<td>Equipment</td>
</tr>
<tr>
<td>Specified products</td>
<td>Equipment</td>
<td>Cattle/buffalo</td>
</tr>
<tr>
<td>ipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cattle/buffalo</td>
<td>Prohibited except under SpP1</td>
<td>Prohibited except under SpP2</td>
</tr>
<tr>
<td>Other ruminants</td>
<td>No restrictions</td>
<td>No restrictions</td>
</tr>
<tr>
<td>Other animals</td>
<td>Prohibited except under SpP1</td>
<td>Prohibited except under SpP2</td>
</tr>
<tr>
<td>Specified products</td>
<td>No restrictions</td>
<td>No restrictions</td>
</tr>
<tr>
<td>Nondeclared premises</td>
<td>No restrictions</td>
<td>No restrictions</td>
</tr>
</tbody>
</table>

⁴ For example, cattle carcases, ruminant meat and bone meal

DCP = dangerous contact premises; IP = infected premises; TP = trace premises

Notes:
SpP1 (specific permit 1): for destruction and disposal only
SpP2 (specific permit 2): for animal identification
GP1 (general permit 1): decontamination of the IP/DCP/TP is required before introduction of animals
Appendix 1 Features of bovine spongiform encephalopathy

Disease and cause

Three known strains of bovine spongiform encephalopathy (BSE) have been identified in cattle: classical BSE and two strains of ‘atypical’ BSE. As the BSE agent causes a similar disease in humans, BSE is important not only for the welfare of cattle, but also as a food safety issue.

BSE is one of the transmissible spongiform encephalopathies (TSEs) or ‘prion’ diseases, and causes progressive neurodegenerative disease. TSEs are characterised by long incubation periods and the accumulation in the central nervous system of an abnormal form of a prion protein.

Distribution

BSE was first recognised in the United Kingdom (UK) in 1986 and became a serious epidemic in that country. Atypical BSE is a very rare disease in older cattle that has been recognised for less than 10 years; the origin of atypical BSE is not yet known, but a spontaneous, noncontagious origin cannot be excluded.

BSE aetiology involves feeding cattle (particularly young cattle) meat-and-bone meal (MBM) contaminated with the BSE agent. All BSE cases in countries other than the UK have origins in the importation and feeding of MBM to young cattle, or the importation from the UK of live cattle that entered the animal feed chain.

The assessment of the World Organisation for Animal Health (OIE) is that there is a negligible risk that BSE is present in Australia or that it has been introduced to cattle in Australia through the importation of commodities potentially contaminated with the BSE agent.

Species affected

BSE is primarily a disease of domestic cattle (genus Bos), but also affects other bovine animals, including buffalo (genus Bubalus).

Creutzfeldt-Jakob disease (CJD) is a TSE that affects humans. In March 1996, the UK reported 10 cases of a new clinicopathological variant of CJD (variant CJD or vCJD). Primary cases of vCJD are caused by the consumption of foods containing specified risk materials (such as brain and spinal cord) from BSE-affected cattle.

Clinical signs

Due to the long incubation period of BSE after exposure of calves, signs usually appear when cattle are between 3 and 7 years of age. BSE usually has an insidious onset and a slowly progressive clinical course, extending over weeks to months. Apprehension, hyperaesthesia and ataxia are the main signs, and at least one of these signs is present in most BSE cases; these three signs are the most frequent changes in mental status, sensation, and posture and movement, respectively.
Changes in mental status affect behaviour and temperament; the first sign of BSE may be when a normally placid animal becomes aggressive and kicks in the milking shed. Hypersensitivity can be to touch, sound and light. Ataxia affects mainly the hind limbs. Other abnormalities of posture and movement include falling, tremor and abnormal head carriage.

**Diagnosis**

There is currently no validated diagnostic test for the BSE agent in live animals. Laboratory tests on brain and spinal cord tissue obtained at postmortem examination are therefore required to confirm this disease.

**Persistence of the agent**

A particular feature of TSE agents, including BSE, is resistance to inactivation by physical or chemical procedures such as freezing, desiccation, ultraviolet radiation, and the usual methods of chemical and heat disinfection. TSE agents survive for long periods in carcasses and withstand many of the procedures currently used in the commercial processing of bovine products.

Irrespective of the BSE risk status of a country, the following commodities are recognised by the OIE as not representing a risk of transmitting BSE: milk and milk products, semen and in vivo-derived cattle embryos that are collected and handled correctly, hides and skins, and deboned skeletal muscle meat.
## Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal byproducts</td>
<td>Products of animal origin that are not for consumption but are destined for industrial use (eg hides and skins, fur, wool, hair, feathers, hooves, bones, fertiliser).</td>
</tr>
<tr>
<td>Animal Health Committee</td>
<td>A committee comprising the CVOs of Australia and New Zealand, Australian state and territory CVOs, Animal Health Australia, and a CSIRO representative. The committee provides advice to the Standing Council on Primary Industries on animal health matters, focusing on technical issues and regulatory policy (formerly called the Veterinary Committee). <em>See also</em> Chief veterinary officer (CVO), Standing Council on Primary Industries</td>
</tr>
<tr>
<td>Animal products</td>
<td>Meat, meat products and other products of animal origin (eg eggs, milk) for human consumption or for use in animal feedstuff.</td>
</tr>
<tr>
<td>Australian Chief Veterinary Officer</td>
<td>The nominated senior Australian government veterinarian in the Department of Agriculture, Fisheries and Forestry who manages international animal health commitments and the Australian Government’s response to an animal disease outbreak. <em>See also</em> Chief veterinary officer (CVO)</td>
</tr>
<tr>
<td>AUSVETPLAN</td>
<td><em>Australian Veterinary Emergency Plan.</em> A series of technical response plans that describe the proposed Australian approach to an emergency animal disease incident. The documents provide guidance based on sound analysis, linking policy, strategies, implementation, coordination and emergency-management plans.</td>
</tr>
<tr>
<td>Biological products</td>
<td>Agents of biological origin (eg sera, hormones) for therapeutic use in the diagnosis or treatment of certain diseases.</td>
</tr>
<tr>
<td>Bonemeal</td>
<td><em>See</em> Meatmeal/bonemeal</td>
</tr>
<tr>
<td>Chief veterinary officer (CVO)</td>
<td>The senior veterinarian of the animal health authority in each jurisdiction (national, state or territory) who has responsibility for animal disease control in that jurisdiction. <em>See also</em> Australian Chief Veterinary Officer</td>
</tr>
<tr>
<td>Cohort cattle</td>
<td>Cattle which, during their first year of life, were reared with a BSE case during their first year of life, and which investigation showed consumed the same potentially contaminated feed during that period or If the results of the investigation are inconclusive, all cattle born in the same herd as, and within 12 months of the birth of, a BSE case.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Compensation</td>
<td>The sum of money paid by government to an owner for livestock or property that are destroyed for the purpose of eradication or prevention of the spread of an emergency animal disease, and livestock that have died of the emergency animal disease.</td>
</tr>
<tr>
<td>Confirmed case</td>
<td>A suspect case with positive results from a TSE-specific immunohistochemistry, immunochemistry or other confirmatory test.</td>
</tr>
<tr>
<td>Consultative Committee on Emergency Animal Diseases (CCEAD)</td>
<td>A committee of state and territory CVOs, representatives of CSIRO Livestock Industries and the relevant industries, and chaired by the Australian CVO. The CCEAD convenes and consults when there is an animal disease emergency due to the introduction of an emergency animal disease of livestock, or other serious epizootic of Australian origin.</td>
</tr>
<tr>
<td>Control area</td>
<td>A declared area in which the conditions applying are of lesser intensity than those in a restricted area (the limits of a control area and the conditions applying to it can be varied during an outbreak according to need).</td>
</tr>
<tr>
<td>Dangerous contact animal</td>
<td>Susceptible animals that have been designated as being exposed to other infected animals or potentially infectious products following tracing and epidemiological investigation.</td>
</tr>
<tr>
<td>Dangerous contact premises</td>
<td>A premises that may or may not contain a susceptible animal(s), including those not showing clinical signs, but that, following a risk assessment, is considered highly likely to contain an infected animal(s) or contaminated animal products, wastes or things, which present an unacceptable risk to the response if the risk is not addressed. See Section 4.1 for further details</td>
</tr>
<tr>
<td>Declared area</td>
<td>A defined tract of land that is subjected to disease control restrictions under emergency animal disease legislation. Types of declared areas include restricted area, control area, infected premises, dangerous contact premises and suspect premises. See Section 4.1 for further details</td>
</tr>
<tr>
<td>Decontamination</td>
<td>Includes all stages of cleaning and disinfection.</td>
</tr>
<tr>
<td>Destroy (animals)</td>
<td>To slaughter animals humanely.</td>
</tr>
<tr>
<td>Disease agent</td>
<td>A general term for a transmissible organism or other factor that causes an infectious disease.</td>
</tr>
<tr>
<td>Disease Watch Hotline</td>
<td>24-hour freecall service for reporting suspected incidences of emergency diseases — 1800 675 888</td>
</tr>
<tr>
<td>Disinfectant</td>
<td>A chemical used to destroy disease agents outside a living animal.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Disinfection</td>
<td>The application, after thorough cleansing, of procedures intended to destroy the infectious or parasitic agents of animal diseases, including zoonoses; applies to premises, vehicles and different objects that may have been directly or indirectly contaminated.</td>
</tr>
<tr>
<td>Disposal</td>
<td>Sanitary removal of animal carcasses, animal products, materials and wastes by burial, burning or some other process so as to prevent the spread of disease.</td>
</tr>
<tr>
<td>Emergency animal disease</td>
<td>A disease that is (a) exotic to Australia or (b) a variant of an endemic disease or (c) a serious infectious disease of unknown or uncertain cause or (d) a severe outbreak of a known endemic disease, and that is considered to be of national significance with serious social or trade implications.</td>
</tr>
<tr>
<td></td>
<td>See also Endemic animal disease, Exotic animal disease</td>
</tr>
<tr>
<td>Emergency Animal Disease (EAD)</td>
<td>Agreement between the Australian and state/territory governments and livestock industries on the management of emergency animal disease responses. Provisions include funding mechanisms, the use of appropriately trained personnel and existing standards such as AUSVETPLAN.</td>
</tr>
<tr>
<td>EAD Response Agreement</td>
<td></td>
</tr>
<tr>
<td>Endemic animal disease</td>
<td>A disease affecting animals (which may include humans) that is known to occur in Australia.</td>
</tr>
<tr>
<td></td>
<td>See also Emergency animal disease, Exotic animal disease</td>
</tr>
<tr>
<td>Enterprise</td>
<td>See Risk enterprise</td>
</tr>
<tr>
<td>Epidemiology</td>
<td>The study of disease in populations and of factors that determine its occurrence.</td>
</tr>
<tr>
<td>Epidemiological investigation</td>
<td>An investigation to identify and qualify the risk factors associated with the disease.</td>
</tr>
<tr>
<td></td>
<td>See also Veterinary investigation</td>
</tr>
<tr>
<td>Exotic animal disease</td>
<td>A disease affecting animals (which may include humans) that does not normally occur in Australia.</td>
</tr>
<tr>
<td></td>
<td>See also Emergency animal disease, Endemic animal disease</td>
</tr>
<tr>
<td>Exotic fauna/feral animals</td>
<td>See Wild animals</td>
</tr>
<tr>
<td>Fomites</td>
<td>Inanimate objects (eg boots, clothing, equipment, instruments, vehicles, crates, packaging) that can carry an infectious disease agent and may spread the disease through mechanical transmission.</td>
</tr>
<tr>
<td>General permit (GP)</td>
<td>A permit completed either online or through some other remote means by the premises owner/farmer or their agent, a printed version of which accompanies the relevant commodity movements. It may impose preconditions or restrictions on movements. Jurisdictions may assign an appropriate term to GP to suit their legislative system.</td>
</tr>
<tr>
<td></td>
<td>See also Specific permit</td>
</tr>
</tbody>
</table>
Iatrogenic disease  A case of disease caused by medical or veterinary procedures (eg an infection spread by surgical procedures).

Immunoochemistry  The branch of immunology, or a diagnostic test, concerned with chemical substances and reactions of the immune system, specifically antigens and antibodies and their interactions with one another.

Immunohistochemistry  Immunoochemistry applied to the study, or testing, of cells and tissues.

Incubation period  The period between the introduction of the pathogen into the animal and the first clinical signs of the disease.

Index case  The first case of the disease to be diagnosed in a disease outbreak.  
See also  Index herd, Index property

Index herd  The first herd in which a case of the disease has been diagnosed.  
See also  Index case, Index property

Index property  The property on which the index case is diagnosed.

Infected premises  A defined area (which may be all or part of a property) in which an emergency disease meeting the case definition exists or is believed to exist, or in which the causative agent of that emergency disease exists or is believed to exist.  
See Section 4.1 for further details

Local disease control centre (LDCC)  An emergency operations centre responsible for the command and control of field operations in a defined area.

Meatmeal/bonemeal  The solid protein products obtained when animal tissues are rendered.  
See also  Rendering (of carcasses)

Monitoring  Routine collection of data for assessing the health status of a population.  
See also  Surveillance

Movement control  Restrictions placed on the movement of animals, people and other things to prevent the spread of disease.


<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational procedures</td>
<td>Detailed instructions for carrying out specific disease control activities, such as disposal, destruction, decontamination and valuation.</td>
</tr>
<tr>
<td>Owner</td>
<td>Person responsible for a premises (includes an agent of the owner, such as a manager or other controlling officer).</td>
</tr>
<tr>
<td>Premises</td>
<td>A tract of land, including its buildings, or a separate farm or facility that is maintained by a single set of services and personnel.</td>
</tr>
<tr>
<td>Prevalence</td>
<td>Proportion (or percentage) of animals in a particular population affected by a particular disease (or infection or positive antibody titre) at a given point in time.</td>
</tr>
</tbody>
</table>
| Prion                        | Word coined in the 1980s for ‘proteinaceous infectious particle’. Prion protein (PrPsc) is an abnormal form of a common cellular membrane protein (PrPc). PrPsc is more resistant to protein-digesting enzymes (proteases) than PrPc and is the major constituent of scrapie-associated fibrils. Prion proteins are thought to be involved in the transmission of TSEs and to be the sole disease agent for BSE. 
See also Scrapie-associated fibrils |
<p>| Quarantine                   | Legal restrictions imposed on a place or a tract of land by the serving of a notice limiting access or egress of specified animals, persons or things.                                                        |
| Rendering (of carcasses)     | Processing by heat to inactivate infective agents. Rendered material may be used in various products according to particular disease circumstances.                                                              |
| Restricted area              | A relatively small declared area (compared with a control area) around an infected premises, which is subject to intense surveillance and movement controls. Not applicable to BSE.                                      |
| Risk enterprise              | A defined livestock or related enterprise, which is potentially a major source of infection for many other premises. Includes intensive piggeries, feedlots, abattoirs, knackeries, saleyards, calf scales, milk factories, tanneries, skin sheds, game meat establishments, cold stores, artificial insemination centres, veterinary laboratories and hospitals, road and rail freight depots, showgrounds, field days, weighbridges, garbage depots. |
| Ruminant                     | Any of various cud-chewing, cloven-hoofed quadrupeds, such as cattle, deer or camels, that usually have a stomach divided into three or four compartments.                                                   |
| Scrapie                      | A TSE found in sheep and goats. Scrapie is endemic in the United Kingdom and many other parts of the world (but not in Australia). It can be transmitted naturally or experimentally to other animal species, including mice, and has been the experimental model for much TSE research. |</p>
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrapie-associated fibrils</td>
<td>Abnormal fibrils caused by an accumulation of protease-resistant prion protein (PrP\textsuperscript{Sc}) and identified by electron microscopy. First identified in scrapie-infected mice but now recognised as a characteristic of all TSEs. See also Prion</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>The proportion of truly positive units that are correctly identified as positive by a test. See also Specificity</td>
</tr>
<tr>
<td>Specific permit (SpP)</td>
<td>A movement permit jointly completed by the premises owner or farmer, and the relevant government veterinarian or inspector. A printed version must accompany the movement of the relevant animal(s). It may impose preconditions or restrictions on movements.</td>
</tr>
<tr>
<td>Specificity</td>
<td>The proportion of truly negative units that are correctly identified as negative by a test. See also Sensitivity</td>
</tr>
<tr>
<td>Specified risk materials (SRM)</td>
<td>Those parts of infected cattle considered likely to contain the BSE agent and therefore prevented by regulations from entering the human food or animal feed chains. Definitions vary between countries in terms of both cattle age and anatomy.</td>
</tr>
<tr>
<td>Stamping out</td>
<td>The strategy of eliminating infection from premises through the destruction of animals in accordance with the particular AUSVETPLAN manual, and in a manner that permits appropriate disposal of carcasses and decontamination of the site.</td>
</tr>
<tr>
<td>Standing Council on Primary Industries</td>
<td>The council of Australian national, state and territory and New Zealand ministers of agriculture that sets Australian and New Zealand agricultural policy (formerly the Primary Industries Ministerial Council). See also Animal Health Committee</td>
</tr>
<tr>
<td>State or territory disease control headquarters</td>
<td>The emergency operations centre that directs the disease control operations to be undertaken in a particular state or territory.</td>
</tr>
<tr>
<td>Surveillance</td>
<td>A systematic program of investigation designed to establish the presence, extent or absence of a disease, or of infection or contamination with the causative organism. Includes the examination of animals for clinical signs, antibodies or the causative organism.</td>
</tr>
<tr>
<td>Susceptible animals</td>
<td>Animals that can be infected with a particular disease (for BSE — mainly cattle). See Section 1.2 for further details</td>
</tr>
</tbody>
</table>
Suspect animal (general)  An animal that may have been exposed to an emergency disease such that its quarantine and intensive surveillance, but not pre-emptive slaughter, is warranted. 
See also Suspect case (BSE)

Suspect case (BSE)  An animal of the genus *Bos* (cattle) or *Bubalus* (buffalo) with history, clinical signs and histological changes consistent with BSE, until BSE is confirmed or excluded 
or
An animal with a positive result from a sensitive and specific screening test such as an ELISA for transmissible spongiform encephalopathies, until BSE is confirmed or excluded. 
See Section 1.4 for further details

Suspect premises  Temporary classification of a premises that contains a susceptible animal(s) not known to have been exposed to the disease agent but showing clinical signs that require investigation. After rapid resolution of the status of the suspect animals contained on it (for BSE, this is cohorts), a suspect premises is reclassified either as an infected premises (and appropriate disease-control measures taken) or as free from disease.

Tracing  The process of locating animals, persons or other items that may be implicated in the spread of disease, so that appropriate action can be taken.

Transmissible spongiform encephalopathies (TSEs)  A group of diseases, affecting various animal species, that involve noninflammatory vacuolated (spongiform) degeneration of the grey matter areas of the brain and spinal cord.

Vaccination  Inoculation of healthy individuals with weakened or attenuated strains of disease-causing agents to provide protection from disease.

Vaccine  Modified strains of disease-causing agents that, when inoculated into an animal, stimulate an immune response and provide a reasonable level of protection against disease or infection.

Vector  A living organism (frequently an arthropod) that transmits an infectious agent from one host to another. A *biological* vector is one in which the infectious agent must develop or multiply before becoming infective to a recipient host. A *mechanical* vector is one that transmits an infectious agent from one host to another but is not essential to the lifecycle of the agent.

Veterinary investigation  An investigation of the diagnosis, pathology and epidemiology of the disease.
See also Epidemiological investigation
Wild animals

- native wildlife       Animals that are indigenous to Australia (eg bats, dingoes and marsupials) and may be susceptible to emergency animal diseases.

- feral animals        Domestic animals that have become wild (eg cats, horses, pigs).

- exotic fauna         Nondomestic animal species that are not indigenous to Australia (eg foxes).

Zoning                  The process of defining disease-free and infected areas in accordance with OIE guidelines, based on geopolitical boundaries and surveillance, in order to facilitate trade.

Zoonosis              A disease that can be transmitted between animals and humans.
# Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAHL</td>
<td>Australian Animal Health Laboratory</td>
</tr>
<tr>
<td>AUSVETPLAN</td>
<td>Australian Veterinary Emergency Plan</td>
</tr>
<tr>
<td>BSE</td>
<td>bovine spongiform encephalopathy</td>
</tr>
<tr>
<td>CCEAD</td>
<td>Consultative Committee on Emergency Animal Diseases</td>
</tr>
<tr>
<td>CJD</td>
<td>Creutzfeldt-Jakob disease</td>
</tr>
<tr>
<td>CNS</td>
<td>central nervous system</td>
</tr>
<tr>
<td>CSIRO</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
</tr>
<tr>
<td>CVO</td>
<td>chief veterinary officer</td>
</tr>
<tr>
<td>DCP</td>
<td>dangerous contact premises</td>
</tr>
<tr>
<td>EAD</td>
<td>emergency animal disease</td>
</tr>
<tr>
<td>ELISA</td>
<td>enzyme-linked immunosorbent assay</td>
</tr>
<tr>
<td>IP</td>
<td>infected premises</td>
</tr>
<tr>
<td>MBM</td>
<td>meat-and-bone meal</td>
</tr>
<tr>
<td>NHMRC</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>NMG</td>
<td>National Management Group</td>
</tr>
<tr>
<td>NTSESP</td>
<td>National TSE Surveillance Program</td>
</tr>
<tr>
<td>OIE</td>
<td>World Organisation for Animal Health</td>
</tr>
<tr>
<td>PrP</td>
<td>prion protein</td>
</tr>
<tr>
<td>PrP&lt;sub&gt;Sc&lt;/sub&gt;</td>
<td>abnormal, protease-resistant isoform of prion protein</td>
</tr>
<tr>
<td>SRM</td>
<td>specified risk material</td>
</tr>
<tr>
<td>TP</td>
<td>trace premises</td>
</tr>
<tr>
<td>TSE</td>
<td>transmissible spongiform encephalopathy</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>vCJD</td>
<td>variant Creutzfeldt-Jakob disease</td>
</tr>
</tbody>
</table>
References


Comer PJ and Huntly J (2003). Exposure of the human population to BSE infectivity over the course of the BSE epidemic in Great Britain and the impact
of changes to the Over Thirty Month Rule.
www.food.gov.uk/multimedia/pdfs/otmcomer.pdf


**Further reading and internet links**


http://ec.europa.eu/food/fs/sc/ssc/outcome_en.html

http://ec.europa.eu/food/fs/sc/ssc/outcome_en.html

http://ec.europa.eu/food/fs/sc/ssc/outcome_en.html

SSC (Scientific Steering Committee of the European Commission) (2000). Final opinion on the geographical risk of bovine spongiform encephalopathy (GBR), adopted by the Scientific Steering Committee on 6 July 2000. European
http://ec.europa.eu/food/fs/sc/ssc/outcome_en.html

http://ec.europa.eu/food/fs/sc/ssc/outcome_en.html


http://ec.europa.eu/food/fs/sc/ssc/outcome_en.html

SSC (Scientific Steering Committee of the European Commission) (2003a). Updated opinion and report on the safety of dicalcium phosphate and tricalcium phosphate from bovine bones, used as animal feed additive or as fertilizer, adopted by the Scientific Steering Committee at its meeting of 6–7 March 2003.
http://ec.europa.eu/food/fs/sc/ssc/outcome_en.html

SSC (Scientific Steering Committee of the European Commission) (2003b). Updated opinion on the safety with regard to BSE risk of gelatine derived from ruminant bones or hides. Adopted by the Scientific Steering Committee at its meeting of 6–7 March 2003.
http://ec.europa.eu/food/fs/sc/ssc/outcome_en.html

http://ec.europa.eu/food/fs/sc/ssc/outcome_en.html

http://ec.europa.eu/food/fs/sc/ssc/outcome_en.html


Numbers of BSE cases (worldwide) www.oie.int/animal-health-in-the-world/bse-portal


European Scientific Steering Committee scientific opinions (pre-May 2003) http://ec.europa.eu/food/food/biosafety/tse_bse/scientific_advises_en.htm

UK Advisory Committee on Dangerous Pathogens www.dh.gov.uk/ab/ACDP/index.htm

UK Creutzfeldt–Jakob Disease Surveillance Unit — vCJD cases worldwide www.cjd.ed.ac.uk/vcjdworld.htm
UK Department for Environment, Food and Rural Affairs (DEFRA)

World Health Organization (WHO)
www.who.int/csr/disease/bse/en/

World Organisation for Animal Health (OIE) BSE risk status of member countries
www.oie.int/eng/Status/BSE/en_BSE_free.htm

Training resources


Available via:
- compact disc prepared and distributed by Animal Health Australia, June 2008