Eläinlääkintä- ja elintarviketutkimuslaitos
National Veterinary and Food Research Institute, Finland

JULKAISU 08/2004 • PUBLICATION 08/2004



THE BSE-RISK ASSOCIATED WITH IMPORT OF LIVE CATTLE AND MEAT AND BONE MEAL TO FINLAND

– a Qualitative Risk Assessment

BSE-RISKI NAUTOJEN JA LIHALUUJAUHON TUONNISTA SUOMEEN

– kuvaileva riskinarviointi

EELA

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EELA

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Acknowledgements

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Julkaisija	**Eläinlääkintä ja elintarviketutkimuslaitos, EELA**
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Julkaisun nimi	**BSE-riski nautojen ja lihaluujauhon tuonnista Suomeen - kuvaileva riskinarviointi**

Tiivistelmä

Vuonna 2002 käynnistettiin maa- ja metsätalousministeriön pyynnöstä riskinarviointi BSE- riskin arvioimiseksi suomalaisessa nautakarjassa. Projektin ensimmäinen osa, kuvaileva riskinarviointi BSEn maahan leviämisestä elävien nautojen sekä lihaluujauhon tuontien välityksellä on tehty Eläinlääkintä- ja elintarviketutkimuslaitoksen (EELA) ja Kasvintuotannon tarkastuskeskuksen (KTTK) yhteistyönä. Projektin toisen vaiheen aikana tullaan laskennallisesti arvioimaan BSE-taudinaiheuttajan leviämistä Suomessa.

Tässä raportissa esitellään tietoja Suomeen tuotujen nautojen määrästä, alkuperämaasta, syntymä-, tuonti- sekä hävittämisajankohdasta, BSEn varalta testaamisesta sekä niiden mahdollisesta joutumisesta rehuketjuun. Lisäksi on kerätty tietoja lihaluujauhon maahantuonnista ja arvioitu sen käyttöä nautakarjalle. Myös tietoja maahantuodusta juottorehusta, rasvasta sekä teurasjätteestä on kerätty samassa yhteydessä, vaikka niiden aiheuttamaa BSE-riskiä ei olekaan arvioitu tässä työssä. BSEtä koskeva lainsäädäntö kyseisen ajanjakson osalta esitetään raportin liitteessä.

Vuosina 1980 – 2002 Suomeen tuotujen nautojen arvioitiin tuontimaasta riippuen aiheuttaneen olemattoman-kohtalaisen riskin suomalaiselle nautaeläinpopulaatiolle sen jälkeen, kun ensimmäisiä tuotuja nautoja päätyi rehuketjuun 1980-luvun loppupuolella. Suurimman riskin arvioitiin liittyneen Iso-Britanniasta tuotuihin nautoihin, joiden joukossa Suomeen olisi tuotu tämän arvion mukaan ainakin 0,3 – 2,8 BSE-tartuntaa kantavaa nautaa. Näistä 0,2 – 1,9 arvioidaan päätyneen Suomessa elintarvike ja/tai rehuketjuun. Vaikka Iso-Britanniasta tuodut naudat ovat aiheuttaneet suurimman elävien eläinten tuontiin liittyvän BSE-riskin, myös Tanskasta tuoduilla naudoilla on ollut merkitystä.

Tämän arvion mukaan ulkomailta tuotu lihaluujauho on aiheuttanut suuremman riskin BSE-taudinaiheuttajan leviämiselle Suomeen kuin elävien nautojen tuonti samana ajanjaksona. Arvion mukaan tuontilihaluujauhon aiheuttama riski BSEn leviämiselle on tuontimaasta riippuen vaihdellut kohtalaisen ja erittäin korkean välillä. Suurin riski on arvion mukaan liittynyt lihaluujauhon tuontiin Hollannista, Tanskasta ja Saksasta. Tuontilihaluujauhon käyttö märehtijöiden ruokinnassa kiellettiin

vuonna 1990. Sitä ennen lihaluujauhoa tuotiin Suomeen yhteensä 305 647 tonnia, josta 172 006 tonnia oli peräisin BSE-riskimaista. Koska vain harvat 1980-luvulta peräisin olevat asiakirjat ovat saatavilla, oli vaikeaa selvittää tuontilihaluujauhon osuutta Suomessa käytetystä lihaluujauhosta. Tämän vuoksi tässä arviossa laskettiin tuontilihaluujauhon käyttöä naudoille useammalla eri skenaariolla. Näiden mukaan 1980-luvulla olisi voitu naudoille käyttää 7 032 - 90 755 tonnia BSE-riskimaista peräisin oleva tuontilihaluujauhoa. Todennäköisimmin näiden vuosien tuontilihaluujauhon käyttö nautakarjan rehuissa on ollut näiden arvojen välissä, noin 16 000 - 31 000 tonnia. Vuosina 1991 – 2002 tuotiin Suomen lihaluujauhoa BSE-riskimaista yhteensä 76 013 tonnia. Tämä käytettiin yksimahaisten eläinten ruokintaan, mutta naudat saattoivat silti altistua tuontilihaluujauholle rehujen ristikontaminaation kautta. Vuoden 2001 aikana tämä ei ole ollut enää todennäköistä koska lihaluujauhon käyttö kiellettiin kaikille elintarviketuotannossa käytettäville eläimille ja lihaluujauhoa sisätävien rehujen valmistus, varastointi ja kuljetus erotettiin toisistaan. Vuonna 2002 ei Suomeen tuotu ollenkaan lihaluujauhoa.

Vuosina 1980 – 2002 Suomeen on tuotu BSE-riskimaista myös rasvaa (16 559 tonnia), juottorehuja (9 298 tonnia) ja teurasjätteitä (110 220 tonnia). Näiden tuontien merkitystä nautakarjan BSE-riskille on nykytiedon valossa vaikea arvioida.

Tämä arvio perustuu tilanteeseen 31.10.2004 saakka. Jos jonkin maan, josta on tuotu Suomeen eläviä nautoja tai lihaluujauhoa, BSE tilanne muuttuu, myös tämän riskinarvioinnin tulokset saattavat muuttua. Tämä koskee erityisesti Ruotsia koska sekä nautojen ja lihaluujauhon tuontimäärät sieltä ovat olleet suuria.

Avainsanat	Riskinarviointi, tuonti, BSE, nauta, rehu, lihaluujauho
Julkaisusarjan nimi ja numero	EELAn julkaisuja ISSN 1458-6878
Sivuja	160
Kieli	Raportin kuvailulehti: suomi, ruotsi ja englanti Riskinarvioinnin yhteenveto ja johtopäätökset: englanti ja suomi, Riskinarviointi: englanti Taustatiedot: englanti
Luottamuksellisuus	Julkinen
Julkaisun jakaja	Eläinlääkintä ja Elintarviketutkimuslaitos, EELA puh. (09) 3931 01, faksi, (09) 3931 740, tiedotus@eela.fi
Kirjapaino ja aika	EDITA, Helsinki, 2004
Muut tiedot	

Beskrivning

Utgivare	**Forskningsanstalten för veterinärmedicin och livsmedel, EELA**
Författare	**Alem Tesfa, Outi Tyni, Heidi Rosengren, Riitta Maijala**
Titel	**BSE risken vid import av kött- och benmjöl till Finland – En kvalitativ riskvärdering**

Referat

Jord och skogsbruksministeriet beställde år 2002 en värdering av risken för BSE hos Finländska nötkreatur. Den första delen av projektet, en kvalitativ värdering av risken för introduktion av BSE till Finland via import av nötkreatur och kött- och benmjöl utfördes som ett samarbetsprojekt mellan Forsknings anstalten för veterinärmedicin och livsmedel (EELA) och Kontrollcentralen för växtproduktion (KTTK). Resultaten från denna riskvärdering kommer att användas i den andra delen av projektet, då risken för BSE hos Finländska nötkreatur värderas kvantitativt.

I denna rapport presenteras data om mängden, ursprungsland, födelse, import och destruerings tidpunkt och eventuell testning av nötkreatur. Dessutom har möjligheten att importerade nötkreatur har hamnat i foderkedjan utretts. Data gällande import av kött- och benmjöl har också sammanställts. Användningen av importerat kött- och benmjöl i utfodringen av nötkreatur har estimerats. Den risk, som importerad mjölk ersättning, djurfett eller användning av kött- och benmjöl som gödsling har utgjort har inte värderats. Information om dessa har dock samlats in och presenteras i denna rapport. Utöver detta presenteras lagstiftningen gällande BSE riskhantering i en bilaga till rapporten.

Enligt denna riskvärdering varierade risken för exponering av Finska nöt för BSE via import av nötkreatur till Finland, under åren 1980 – 2002 från obefintlig till moderat, från och med att de första importerade djuren destruerades i slutet av 1980 talet. Import av nötkreatur från Stor Britannien (UK) bedömdes ha utgjort den största risken. Minst 0,3-2,8 BSE infekterade nötkreatur beräknas ha blivit importerade från UK till Finland under 1980-talet och minst 0,2-1,9 av dessa beräknas ha hamnat i livsmedels och/eller foderkedjan. Nötkreatur importerade från Danmark utgjorde enligt värderingen också en risk, vilken dock bedömdes vara mindre än den som importerna från UK utgjorde.

Import av kött- och benmjöl har, enligt denna riskvärdering, utgjort en större risk för spridning av BSE till den Finländska nötkreatur populationen än importen av nötkreatur under samma tid. Risken ansågs ha varierat från moderat till extremt hög beroende på ursprungslandet. Den största risken utgjorde kött- och benmjöl, som importerades från Nederländerna, Danmark och Tyskland. Användningen av

importerat kött- och benmjöl i utfodringen av idisslare i Finland förbjöds 1990. Före 1990 importerades totalt 305 647 ton kött- och benmjöl, varav 172 006 ton kom från BSE-riskländer. Andelen importerat kött- och benmjöl av den totala mängden kött- och benmjöl som använts i Finland, är svår att bedöma, då bara en del av dokumenten gällande foderproduktion på 1980 talet står att finna idag. På grund av detta beräknades användningen av importerat kött och benmjöl för utfodring av nötkreatur med hjälp av olika scenarier. Enligt dessa scenarier kan 7 032 - 90 755 ton kött- och benmjöl importerat från BSE-riskländer ha använts för utfodring av nötkreatur I Finland 1983-1990. Mängden av kött- och benmjöl, som användes under dessa år var dock sannolikt mellan dessa värden, i storleksklassen 16 000 - 31 000 ton. Under åren 1991-2002 importerades 76 013 ton kött- och benmjöl från BSE-riskländer. Detta användes för utfodring av enkelmagade djur. Nötkreatur kan ha exponerats för detta via foder kontaminerat med råmaterial för enkelmagade djur. Detta har dock sannolikt inte mera skett under år 2001 då användningen av kött- och benmjöl förbjöds för alla livsmedels produktionsdjur. Dessutom separerades foderproduktionslinjerna, lagren och transporten av foder innehållande kött- och benmjöl från nötkreatur foderlinjen. År 2002 importerades inget kött- och benmjöl till Finland.

Under åren 1980 – 2002 importerades 16 559 ton fett, 9 298 ton mjölk ersättning och 110 220 ton slakteriavfall från BSE riskländer. Risken med dessa värderades dock inte i denna rapport.

Denna värdering baserar sig på situationen den 31.10. 2004. I fall BSE situationen ändras i något av de land varifrån Finland har importerat nötkreatur eller kött och benmjöl, kan även resultaten av denna riskvärdering ändras. Detta gäller speciellt Sverige, då nötkreatur, kött- och benmjöls och slaktavfalls importens volym har varit stor.

Sökord	Riskvärdering, import, BSE, nötkreatur, foder, kött- och benmjöl
Publikationsseriens namn och nummer	EELA publikationsserie, ISSN 1458-6878
Antal sidor	160
Språk	Presentations blad: finska, svenska och engelska Riskvärderingens sammanfattning och konklusion: engelska och finska Riskvärderingen: engelska Bakgrunds information: engelska
Offentlighet	Offentlig handling
Distributör	Forskningsanstalten för veterinärmedicin och livsmedel, EELA, tfn. (09) 39 31 01, fax (09) 39 31 740, tiedotus@eela.fi
Tryckeri och publicerings tidpunkt	EDITA, Helsingfors, 2004
Övriga uppgifter	

Description

Publisher National Veterinary and Food Research Institute EELA

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Title The BSE-risk associated with the import of live cattle and meat and bone meal into Finland – a Qualitative Risk Assessment

Abstract

A risk assessment on the risk of BSE in the Finnish cattle population was initiated in 2002, at the request of the Ministry of Agriculture and Forestry. The first part of the project, a qualitative assessment on the risk of the release of BSE into Finland through live cattle and meat and bone meal (MBM) imports during 1980-2002, was conducted as a joint project of the National Veterinary and Food Research Institute (EELA) and the Plant Production Inspection Centre (KTTK). The result of this risk assessment will be used in the second part of this project, where the risk of BSE within the Finnish cattle population will be assessed quantitatively.

Data on the time of birth, import, the country of origin, the time and method of disposal and the results of possible testing of imported cattle has been gathered and is presented in this report. Data on the amount of MBM imported has been collected and its use in cattle feeding has been estimated. The risks caused by milk replacers, animal fat or by the use of MBM as a fertiliser were not assessed in this project, although data was collected and is included in this report. Furthermore, legislation concerning the management of BSE during the relevant time period is presented in an Annex.

During 1980 – 2002, the risk of the BSE to the Finnish cattle population via imports of cattle was assessed to have varied from negligible to moderate since the first imported cattle were disposed of in the late 1980s. The highest risk was assessed to be associated with imports of live cattle from the United Kingdom (UK). It is estimated that at least 0.3-2.8 BSE infected cattle were imported from the UK to Finland during the 1980s and that at least 0.2-1.9 of these ended up in the food- and/or feedchain. A risk, although smaller, was also associated with cattle imported from Denmark.

The import of MBM was assessed to have posed a greater risk for the introduction of BSE into the Finnish cattle population compared to the import of live cattle. According to this assessment, the risk varied from moderate to extremely high between 1983 – 1990, with the highest risk being associated with MBM imported from the Netherlands, Denmark and Germany. The use of imported MBM in feed for cattle was prohibited in 1990. Of the 305,647 tons of MBM imported to Finland before 1990, 172,006 tons were imported from BSE-risk countries. Since only few

records on the production and the use of feeds were available from the 1980s, the use of MBM in cattle feed was estimated using several scenarios. Based on these scenarios, the estimated use of MBM imported from BSE-risk countries in cattle feeding varied between 7,032 and 90,755 tons between 1980 and 1990. The most likely volume of MBM used in cattle feed was between these values, approximately 16,000 - 31,000 tons. Between 1991 and 2001, Finland imported a total of 76,013 tons of MBM from BSE-risk countries, of this 20,498 tons was used for feeding fur and pet animals. However, domestic cattle could have been exposed to this feed via cross-contamination in feed-mills and during transportation, storage or handling on the farms. Contamination of cattle feed with MBM during 2001 was unlikely due to the total feed ban and separation of the processing, transportation, and storage facilities of feed containing MBM. No MBM was imported to Finland in 2002.

Finland imported also animal fat (16,559 tons), milk replacers (9,298 tons) and slaughter offal (110,220 tons) from BSE-risk countries between 1980 and 2001. BSE-risk associate with these products was not assessed.

This assessment is based on the knowledge of the BSE-situation in exporting countries up to 31.10. 2004. However, if the situation changes, i.e. BSE cases are detected in these countries or if it assessed that it is probable that BSE is present in these countries, the results of this risk assessment will be altered. This is especially the case concerning the imports from Sweden, as the import volumes of live animals, MBM and slaughter offal was large.

Key words	Risk assessment, import, BSE, cattle, feed, meat and bone meal
Name and number of publication	National Veterinary and Food Research Institute Publications ISSN 1458-6878
Pages	160
Language	Description: Finnish, Swedish and English Summary of the risk assessment and conclusions: English and Finnish Risk assessment: English Background information: English
Confidentiality	Public
Distributor	National Veterinary and Food Research Institute, EELA, EELA, tel. +358 9 393101, Fax +358 9 3931740, tiedotus@eela.fi
Printing press and time	EDITA, Helsinki, 2004
Other information	

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1. Definitions and Abbreviations

Definitions

Beef cattle Adult cattle or calves of any breed intended for meat production.

Beef herd A cattle herd producing calves (any breed) and/or rearing them for beef production until slaughter.

BSE/cattle system A simplified qualitative model used by SSC in the GBR assessments to illustrate the system of circulation of the BSE-agent within the cattle population and the feed chain in a country (SSC 2000a).

BSE-risk countries Refers to countries where domestic BSE-case have been reported and categorised according to the Geographical Risk of Bovine Spongiform Encephalopathy by the Scientific Steering Committee (SSC 2000a).

Bought in calves Calves under the age of 3 months bought to be reared for beef production.

Cattle In this report: bovine animals (bos bovis), including bisons.

Calf starter Concentrate feed for pre-ruminant calf.

Cohort A group of cattle, born within a given time, in a given population. In EC legislation on BSE: A group of bovine animals which were either born in the same herd as, and within 12 months preceding or following the birth of, the affected cattle or reared together with the affected animal at any time during the first year of their lives and which may have consumed the same feed as that which the affected animal consumed during the first year of its life (Regulation (EC) No 999/2001).

Exposure assessment Description of the biological pathways necessary for exposure of the population at risk to BSE, released from a given source, and a quantitative or a qualitative estimate on the probability of the exposure occurring (OIE 2001).

External challenge Likelihood and amount of the BSE-agent entering into a defined geographical area in a given time period through infected cattle or MBM (SSC 2000a).

EU-15 Member states The Member States of the European Union (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, Sweden, The United Kingdom) before the accession of the New EU Member States (Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia and Chez Republic 1.5.2004).

Fallen stock Cattle which have died or that are killed on the farm or during transport, which are not intended for human consumption.

Feeds A diet containing materials such as grain, forage, agro-industrial by-products, minerals and vitamins prepared for livestock feeding.

Flat rate feeding A system where dairy cows are fed constant amount of feed irrespective of its milk yield.

French cattle Cattle imported from France or cattle of French origin that have been imported via another country.

Hazard Any pathogenic agent that could produce adverse consequences on the importation of a commodity.

Import In this report: animal, feed raw material or feed entering Finland from other Member States of the EU or from third countries.

Internal challenge Likelihood and amount of the BSE-agent being present and circulating in a specific geographical area in a given time (SSC 2000a).

Intracommunity trade Trade between EU Member States.

Meat and bone meal In this report: A product of rendering of animal by products including, meat meal and meat and bone meal.

OIE list B diseases Transmissible animal diseases that are considered to be of socio-economic and/or public health importance within countries and that are significant in the international trade of animals and animal products.

Overall challenge Combination of the external and internal challenges being present in a BSE / cattle system at a given time (SSC 2000a).

Own-control Control system used by operators and establishments.

Processed animal protein animal proteins derived entirely from Category 3 material, which have been treated in accordance with Chapter II of Annex V (Regulation (EC) No 1774/2002) so as to render them suitable for direct use as feed material or other use in feedingstuffs, including pet food, or use in organic fertilisers or soil improvers; however, it does not include blood products, milk, milk-based products, colostrum, gelatine, hydrolysed proteins and dicalcium phosphate, eggs and egg-products, tricalcium phosphate and collagen.

Release assessment Description of the biological pathways necessary for an importation activity to release (introduce) pathogenic agents into a particular environment and an estimate on probability of that complete process occurring (OIE 2001).

Risk The likelihood of the occurrence and the probable magnitude of the consequences of an adverse event to animal or human health in the importing country during a specific time period (OIE 2001).

Risk assessment Evaluation of the likelihood and the biological and economic consequences of entry, establishment, or spread of a pathogenic agent within the territory of an importing country (OIE 2001).

Risk management The process of identifying, selecting and implementing measures that can be applied to reduce the level of risk (OIE 2001).

Specified risk material In Finland: tissues including the skull excluding the mandible and including the brain and eyes, the vertebral column excluding the vertebrae of the tail, the spinous and transverse processes of the cervical thoracic and lumbar vertebrae and the median sacral crest and wings of the sacrum, but including the dorsal root ganglia, and the spinal cord of bovine animals aged over 12 months, and the tonsils, the intestines from the duodenum to the rectum and the mesentery of bovine animals of all ages.(Annex XI, A. Regulation (EC) 999/2001 as amended by 1492/2004).

Stability Ability of a BSE/cattle system in a given country to prevent the introduction and to reduce the spread of the BSE-agent within its borders (SSC 2000a).

Suckler cow A cow kept for production of calves intended for meat production. The calf is kept with the dam and is allowed to suckle the dam until weaning.

Suckler cow herd A cattle herd kept for beef production where the calves are allowed to suckle the dam freely and are kept with the dam at least until weaning.

Three stage weaning A practice where calves are reared on three different farms during stage of growth (1 -3 weeks of life mainly on their birth farm; 3 weeks to 6 months of age on the second rearing farm; and from 6 months until the animal achieves the desired slaughter weight on farms specialised in final stage of rearing).

Abbreviations

ADPC	Agricultural Data Processing Centre
APHIS	Animal and Plant Health inspection Service (USA)
BM	Blood meal
BSE	Bovine Spongiform Encephalopathy
CBD	Central bovine database
CD	Commission Decision
CJD	Creutzfeldt-Jakob Disease
vCJD	Variant Creutzfeldt-Jakob Disease
CNS	Central nervous system
CWD	Chronic wasting disease
DEFRA	Department for Environment, Food and Rural Affairs (successor to MAFF as the competent authority responsible for food safety and veterinary issues in the United Kingdom)
GBR	Geographical BSE-risk
EC	European Community
EELA	National Food and Veterinary Research Institute. Formerly: State Veterinary Institute (VELL)
EFSA	European Food Safety Authority
ELISA	Enzyme-linked immunosorbent assay
ETT	Association for animal disease prevention in Finland
EU	European Union
FABA	Finnish Animal Breeding Association
FSE	Feline Spongiform Encephalopathy
IACS	Integrated administration and control system
KTTK	Plant Production Inspection Centre
MAFF	Ministry of Agriculture, Fisheries and Food (former competent authority responsible for food safety and veterinary issues in the United Kingdom)
MBM	In this report: Meat and bone meal and meat meal
MMM	Ministry of Agriculture and Forestry. In this report, MMM also refers to the department of the ministry responsible for veterinary issues (Department of food and health since 2001, former Veterinary department; Veterinary and food department)
OIE	Office International des Epizooties (World Organisation for Animal Health)
OTM	Healthy bovine animals over thirty months of age
PAP	Processed animal protein
PrP^{Sc}	Modified prion protein
RAC	Rural Advisory Centre

SRM	Specified risk material
SSC	Scientific Steering Committee of the European Commission
TIKE	Information centre of the Ministry of agriculture and forestry
TME	Transmissible mink encephalopathy
TMR	Total mixed ration
TSE	Transmissible spongiform encephalopathy
UK	The United Kingdom
USA	The United States of America
USSR	Soviet Union
VELL	State Veterinary Institute (Predecessor of the National Food and Veterinary Research Institute)
WHO	World Health Organisation

2. Summary and conclusions

In 2002, at the request of the Ministry of Agriculture and Forestry, the National Veterinary and Food Research Institute (EELA) and the Plant Production Inspection Centre (KTTK) began a joint assessment of the risk of Bovine Spongiform encephalopathy (BSE) in the Finnish cattle population. This report presents the results of the first phase, a qualitative import risk assessment of BSE, focusing on the risk to the Finnish cattle population in 1980-2002 from imported meat and bone meal (MBM) and live cattle. This risk assessment focuses on actual imports, and also takes into consideration the purpose for which a product was imported. Different exporting countries and products are thus only compared in terms of imports to Finland, and therefore the results of this risk assessment cannot be directly compared to the risk assessments of other countries.

In conjunction with the Geographical BSE Risk assessments of the Scientific Steering Committee (SSC) of the European Commission, information relevant to BSE had already been collected in Finland earlier. In this report, that information has been further refined to produce a wider and more reliable picture of the number of cattle imported, time of birth and of import, the country of origin, the time and means of disposal and the results of possible testing of imported cattle. In addition, we have collected information on the importation of meat and bone meal as well as on the composition of feed ingredients. Furthermore, information on imported milk replacers, animal fat, slaughter offal, liver, blood and feather meal has been collected. We have also gathered information on Finnish risk management procedures as well as on other factors which may have affected the spread of BSE agents in Finland.

The results of this qualitative import risk assessment will be refined and used in the second phase of the project, in which a quantitative model of the further spread of the BSE agent in Finland will be developed. The results of the second phase will be published later in a separate report.

Import of live cattle

Data

Many problems were associated with the collection of historical information on the importation of live cattle. Information was gathered from several different statistics, which were difficult to compare. The most complete information on the number of and the country of origin cattle imported prior to 1995 was found in the records of the National Board of Customs (Customs) in Finland, despite a few inaccuracies. Even at present there is no single register in Finland for BSE test results for imported cat-

tle, although it would be possible to create such a register by combining and updating current registers.

Release and exposure

According to this assessment it is possible that BSE could have been released into Finland and that the Finnish cattle population could have been exposed to the agent through the importation of live cattle. In 1980-2002, a total of 1,974 cattle were imported to Finland. In the 1980s, cattle were imported only from the United Kingdom (UK), Sweden, Denmark and Norway. Not until the end of the 1990s did imports come from other countries. The Finnish cattle population could have been exposed to the BSE-agent due to BSE-infected imported cattle ending up in the feed chain only after the first imported cattle had been disposed of in the end of the 1980s.

Risk estimate

The most significant risk for the Finnish cattle population was assessed to be linked to cattle imported from the UK between 1983 and 1988. During that period, a total of 115 cattle were imported to Finland from the UK; one individual was returned soon after importation. It was estimated that of these cattle, by 1996, eighty-five probably ended up in the food- and/or feed chain in Finland without having undergone BSE testing. By utilizing information on the cumulative incidence of BSE in different birth cohorts in the UK in 1987-1996 it was estimated that at least 0.3-2.8 BSE-infected cattle were imported to Finland from the UK until the end of 2002. At least 0.2-1.9 of these would have ended up in the Finnish food- and/or feed chain by 1996 at the latest. In reality, the number of BSE-infected cattle may have been higher than this estimate, since the reported prevalence of detected BSE cases in the UK does not take into account undetected cases.

The risk of the BSE agent spreading to Finland via the import of live cattle is probably decreased by the fact that nearly all cattle imported to Finland from BSE countries have been of beef breeds. In the UK, there has been significantly less BSE in beef cattle than in dairy cattle. However, it has also been demonstrated that in the UK the risk of BSE is greater in cattle grown for export, as opposed to cattle sold at the domestic market. It is believed that this is because breeding animals intended to be sold abroad have more often been fed processed animal protein even though animal protein has not been fed to other cattle at the same farm.

Although cattle imported from the UK were assessed to have caused the greatest BSE risk connected with the import of live cattle, cattle imported from Denmark were also assessed to have represented a risk, although low. Over half of the cattle imported to Finland in 1980-2002 were of Danish origin. In addition, a relatively large proportion of cattle imported from Denmark ended up in the food- and/or feed chain in Finland before 1996, when the risk management measures in use in Finland were insufficient to prevent BSE from circulating and multiplying in the feed chain in Finland. Cattle from other countries with domestic BSE cases were not imported to Finland prior to 1998. These animals did not enter the food- and/or feed chain in Finland before the current risk management measures to reduce the risk of the BSE agent spreading to cattle were initiated.

General observations

The GBR assessments of the SSC have been used to assess the risks associated with imports from specific countries. This assessment is based on knowledge of the BSE-situation in exporting countries up to 31.10. 2004. However, if the situation changes, i.e. BSE cases are detected in these countries or if it assessed that it is

probable that BSE is present in these countries, the results of this risk assessment will be altered. This is especially the case concerning the imports from Sweden, since these have accounted for over a large part of the total number of imported animals into Finland.

Other observations

On the basis of the available information, it appears that at least seven of the imported cattle removed from production in 2001 were not tested for BSE at disposal, even though Finnish legislation in effect at the time would have mandated such testing. However, since testing is able to detect BSE-infection only during the last 3 months before clinical signs of the disease appears and since more stringent risk management measures were in force since 2001 (such as removing specified risk material and the MBM ban) the effect of these untested cattle is not significant in the possible release of BSE agent into Finland.

Imported feed

Source of data

Data from different sources on imported processed animal protein (PAP) was compiled and compared regarding the volume of import and the countries of origin. Annual statistics has been gathered by the KTTK, the National board of Customs (Customs), the government archives and the board of agriculture. In this assessment, the PAP imported and used in cattle feed formulation is abbreviated as MBM and it includes both meat meal and meat and bone meal.

1. Documents from the Customs provide information on annually imported meals and flours of meat, animal offal (including marine animals) and greaves as one category of PAP (coded as CCCN 2301 10000) without division into different groups. Bone and horn-cores are categorised as a separate group and coded as CCCN 050 80000. The Customs statistics do not provide information on the usage of PAP by feed mills or by fur animal producers.
2. Data from the National archives provides information on the applications for import of PAP, the requirements of the import permit, applicant's profession or occupation, granted permits and product imported. Information on the use of the intended imports is not available in the National archives.
3. The statistics available in the Publication of the Board of Agriculture provides general information on annually imported feed proteins including MBM to Finland until 1986. However, it does not provide information on all types of PAP or where it was imported from or the use of these imports for feeding different species of animals.
4. KTTK keeps records on imported meals produced from meat, bone, liver, blood and feather as separate categories. It also keeps records on other imported feed raw materials and compounded miscellaneous feeds. However, information is not available on the animal species for which these imports were used, except in fur animals. KTTK also provides a database (Focus) for the production years 1989 and 1990 and other documents on the use of MBM in cattle feeding, but it does not give the share of imported MBM in feed formulation.

Practical difficulty in interpreting the available statistics was caused by differences between KTTK and the Custom's statistics. KTTK's annual statistics give higher amounts for imported PAP than the Custom's statistics and they are more specific

by the type of products imported. Therefore, for the present assessment, KTTK's statistics were chosen as reference statistics for imports of MBM into Finland. Furthermore, every feed mill was obliged to report bi-annually to KTTK the amount of raw material used and the total feed amount produced.

Generally, reliable documents were lacking for the relative proportions or market shares of domestic and imported MBM used for cattle feed formulation as well as for the amount of feed produced with MBM annually. Furthermore, detailed information on the amount of feed produced per feed ingredient certificate issued by each individual feed mill and therefore the total annual amount of MBM used in cattle feed is no longer available prior to 1990. Similarly, it was not possible to identify which feed mills used imported MBM from a particular exporting county.

Release

Records on the importing of protein feed (oil seed cakes and meals, fishmeal and MBM) to Finland show that MBM has been imported to Finland as one of the protein feed for several decades, starting as early as in 1940. According to KTTK, between 1980 and 2002 a total of 369,967 tons of PAP was imported to Finland. Of this, 305,647 tons was MBM. The rest, 64,320 tons, was meals produced from blood, liver and feathers, which have not been used for cattle feed in Finland. The largest proportion of the total imported MBM was imported from BSE-risk countries.

Of the total MBM imported from BSE-risk countries to Finland, 95,993 tons was prior to the ban of the use of imported MBM for ruminant feeding in 1990. Before this ban, the annual import of MBM from these countries was at its maximum in 1988 and 1989 (Table 10). A total of 5,238 tons of MBM imported from BSE-risk countries was used for feeding of fur and pet animals between 1980 and 1990. After the ban in 1990, 76,013 tons of MBM was imported from BSE-risk countries of which 20,498 tons was used for feeding fur and pet animals. The greatest import of MBM was in 1994. According to KTTK, this imported MBM was entirely used in the formulation of feed for mono-gastric animals such as pigs, poultry, pets and fur animals. The domestic cattle population could have been exposed to the MBM imported after 1990 via cross-contamination at feed-mills and during storage, transportation or handling of feeds for cattle and mono-gastric animals at the farms. According to KTTK, no MBM or MBM containing feed for cattle feeding was imported from the UK. Pet food and some aromatic substances containing PAP were imported for feeding non-food producing animals.

Use of MBM

On the basis of the ingredient certificates, the percentage of MBM in feed produced by the feed mills using MBM in cattle feed varied in complete, semi-protein and protein feeds in the ranges 1.0 % – 4.0 %, 4.0 % – 7.0 %, and 5.0 % – 65.0 %, respectively. The highest percentage of MBM in dairy cattle feed was 10 %, whereas the protein feed intended for young stock feeding contained up to 65 % MBM-molasses (particularly in 1986 and 1987). The use of imported MBM in cattle feeding was banned in 1990, and the use of domestic MBM in cattle feeding was banned in 1995.

Method of estimation and results

Since no data was available on the use of imported vs. domestic MBM in cattle feed, different scenarios (A - E) were used to assess the possible exposure of the Finnish cattle population to imported MBM. In addition to the scenarios, four time periods based on the direct / indirect use of MBM for cattle were defined. Indirect use in-

dicates that imported MBM was not intentionally added to cattle feed but could be there due to cross-contamination at feed mills, during transport or storage on farms. The four time periods are:

- Period I: Between 1980 and 1982: No imported or domestic MBM was used for cattle feeding and only indirect exposure through feed contamination was possible.
- Period II: Between 1983 and 1990: The use of imported or domestic MBM was legally possible for cattle feeding, resulting in direct exposure.
- Period III: Between 1991 and 1995: The use of imported MBM in cattle feeding was banned but contamination was still possible since a) domestic MBM was used for cattle feeding b) imported MBM was used for mono-gastric animals feeding and c) the feed raw material inlet and the processing line was not separated therefore indirect exposure through feed contamination was possible.
- Period IV: Between 1996 and 2001: The use of domestic MBM was banned in cattle feeding but still allowed for feeding mono-gastric animals and the feed raw material inlet and the processing line was not separated resulting in indirect exposure through feed contamination. However, the level of cross-contamination was probably lower than that during Period III.

The scenarios A – E are as follows:

Scenario A is a “worst case scenario” because it assumes that all imported MBM (1980 – 2002) was fed to cattle, except when documentation was provided that it was directly used for feeding fur and pet animals. In scenario A, the amount of annual imports and the countries of origin were known.

Since the results from scenario A showed highly overestimated values which would have been physiologically beyond the threshold of the animal, several other scenarios were constructed.

Scenario B is based on the Focus-database (KTTK 2004). It provides the proportion of cattle feed containing MBM and the concentration of MBM in those feedstuffs in 1989 and 1990 based on production volumes and certificates of feeds for every group of production animals. This data was used to extrapolate the years 1983 - 1995. Focus feed database (Focus-database) was available only for the production years 1989 and 1990 and the programme is out of date. The data for 1989 and 1990 showed that some of the feed ingredients were not entered to the database according to the identification code given to these feed ingredients. The data was cross-checked with the information on the feed ingredient certificates and corrected. Even after re-checking and correcting the code, the available data gives a rather biased result because a) the years 1989 and 1990 are not the most representative years for the MBM proportion of cattle feed as the use of imported MBM in cattle feed was banned in mid- 1990, b) it assumes that the volume and composition of feed remains constant, and c) the proportion of imported MBM is not known. Therefore, due to the lack of documentation on the share of foreign origin MBM out of the total use, it was assumed that all MBM was imported from BSE-risk countries. Scenario B_1 assumes that all MBM used for cattle was imported from BSE-risk countries whereas scenario B_2 assumes that all MBM used for cattle was imported both from BSE-risk and other countries.

Scenario C also is based on the share of feed ingredient certificates containing MBM. This estimation is based on the total number of annually issued (whenever available) feed ingredient certificates. Furthermore it considers the proportion of certificate issued for feeds containing MBM in relation to the total feed produced for the period between 1983 and 1990. The weaknesses of this scenario are that not

all the issued certificates were available, and no documents were available on the volume of feed produced per issued certificate. As the proportion of imported MBM is not known it was assumed that all of the used MBM was imported from BSE-risk countries. Scenario C_1 also assumes that all MBM used for cattle was imported from BSE-risk countries whereas scenario C_2 assumes that all MBM used for cattle was imported both from BSE-risk and other countries.

Scenario D is the share of MBM imported from BSE-risk countries ending up in the cattle feed chain through cross-contamination. It is based on the result of microscopic detection of MBM in cattle feed between 1997 and 2001 (Period IV). The average level of MBM detected in cattle feed in 1997 and 1998 was used to estimate the most probable contamination level for the year 1996.

Scenario E is based on the calculated share of MBM imported from BSE-risk counties of the total available (all domestic and imported) MBM for the feeding of livestock in Finland during the time period 1983 -1995.

Period I (1980 – 1982)

According to the available documents, no feed mills used MBM in cattle feeding during the period 1980 – 1982. However, since MBM (domestic and imported) has been used as feed for mono-gastric animals, the risk of contamination of cattle feed on the production line as well as during post-production handling of the feed was inevitable during these years. However, quantification of the extent of contamination of cattle feed with MBM during this period was not possible since the use of MBM in cattle feed was legally possible and the method of detection of the presence of MBM in cattle feed was not available in those years.

Period II (1983 – 1990)

In period II, the direct use of the total (domestic and imported) MBM in cattle feed was estimated in different scenarios (A, B_1, B_2, C_1, C_2, and E).

Based on the assumptions in Scenario A it was estimated that a total of 90,755 tons of MBM imported from BSE-risk countries was fed to cattle between 1983 and 1990 (Table 26), which however seems unlikely because the imported MBM volume exceeds the feed palatability level and animals physiological threshold.

On the basis of the assumptions used in the scenarios B_1, and B_2, the estimated average annual use of MBM imported from BSE-risk countries in cattle feed in B_1 varied from 0,035 to 3,937 tons / a whereas the estimated average annual use of MBM in cattle feed varied from 0 to 3,058 tons / a in scenario B_2. The overall total use of MBM was estimated to vary from 16,405 (B_2) to 18,162 (B_1) tons between 1983 and 1990 (Table 26).

Based on the assumptions used in the scenarios C_1 and C_2, the estimated average annual use of MBM imported from BSE-risk countries in cattle feed varied in C_1 from 0,035 to 7,659 tons / a whereas the estimated average annual use of MBM in cattle feed varied from 0 to 6,193 tons / a in scenario C_2. The overall total use of MBM was estimated to vary from 26,738 (C_2) to 30,858 (C_1) tons between 1983 and 1990 (Table 26).

Based on the assumptions used in scenario E, the estimated average annual use of MBM imported from BSE-risk countries in cattle feed varied from 0, to 2,448 tons / a.The overall total use of MBM imported from BSE-risk countries in cattle feed was 7,032 tons/a (Table 26) in scenario E between 1983 and 1990.

Period III (1991 – 1995)

This is the period when the use of imported MBM in cattle feeding was not legally

possible following the ban in 1990 but was possible for feeding mono-gastric animals. Furthermore, cattle feed produced before enforcement of the legislation were not withdrawn from the market and were still used during 1990. Feeding of domestic MBM to cattle was permitted until 1995. During this time, the feed raw material inlet, processing line, warehouse and transportation facilities were not separated. Post-production contamination control was also not effective. During this period, the use of MBM imported from BSE-risk countries was estimated with scenarios A, B_1, B_2 and E. The estimated use of MBM for cattle feeding during period III was 44,996, 15,396, 13,937 and 1,961 in scenarios A, B_1, B_2 and E, respectively.

The external challenge to the Finnish cattle population through feed contamination by imported MBM from BSE-risk countries was assessed to be very high during these years.

Period IV (1996 – 2001)

During period IV the use of domestic MBM for feeding cattle was also banned, but MBM (domestic and imported) was permitted in mono-gastric feeding. The method for detection of MBM in cattle feed was not in use before 1997. A complete ban on the use of MBM for feeding of production animals came into force 1.1. 2001. The feed processing lines for feeds containing fishmeal was also separated in 2001. Feed containing MBM was removed from feed mills, farms and warehouses and destroyed in 2001. Based on the microscopic detection of MBM in feed, the total cross-contamination of cattle feed with MBM varied from 0,065 – 0,353 tons/a (Table 31). According to the estimation in scenario D, the share of MBM imported from BSE-risk countries varied from 0,032 to 0,089 tons/a between 1996 and 2000. The overall total cross–contamination level of cattle feed with MBM imported from BSE-risk- countries was estimated to have been 0,301 tons (Table 26).

The external challenge to the Finnish cattle population through feed contamination with MBM imported from BSE-risk countries during 1996 – 2001 was assessed to be high but decreased towards the end of the period.

Risk estimate

According to this assessment, the total risk to the Finnish cattle population resulting from all MBM imported to Finland between1980 and 2002 was moderate to extremely high depending on the country of origin. The risk of exposure of the Finnish cattle population to BSE via imported MBM from the Netherlands was assessed to be high to very high. The assessment was based on the risk associated to the MBM imported from the Netherlands and the BSE situation in the Netherlands during the time period assessed. The risk of exposure of the Finnish cattle population to BSE through imported MBM from Denmark and Germany was assessed to vary from moderate to high due to the amount of imported MBM, time of import and the probable BSE situation in these countries at the time of MBM export.

The risk of exposure of the Finnish cattle population to BSE via imported MBM from Ireland, France and Austria was assessed to vary from negligible to low based on the amount of MBM imported and the time of import. The risk of exposure of the Finnish cattle population to BSE via imported MBM from Australia, Sweden, Norway and New Zealand was assessed to be negligible because of the BSE situation in these countries at the time of import of MBM to Finland.

General observations

This assessment is based on the knowledge of the BSE-situation in these exporting countries up to 31.10 2004. However, if the situation changes, i.e. BSE cases are

detected in these countries or if it assessed that it is probable that BSE is present in these countries, the results of this risk assessment will be altered. This is especially the case concerning the imports from Sweden, as the import volumes of MBM from this country were high

Other possible sources

The current understanding of the epidemiology is that the BSE agent has entered cattle feed especially via MBM. In recent years, however, there has also been speculation on whether it is safe to use milk replacers containing animal fat possibly including ruminant-origin fat in cattle feed. Although this risk assessment does not include milk replacers and animal fat, data was compiled for possible future analysis should the need arise.

During 1980 – 2002, milk replacers for calves, animal fat and slaughter offal were imported both from BSE-risk and other countries to Finland. The milk replacers imported from Denmark and Germany contained mixed animal fat (cattle and pigs) until 2000, but milk replacers imported from the Netherlands and Sweden contained plant/vegetable oil. Milk replacers have probably been used directly for feeding of calves in Finland.

Imported animal fat has been used in feed for pigs, poultry, fur animals and pets. Animal fat has also been utilised in cattle feed, but investigation of whether this has been imported or produced by domestic rendering plants was out of the scope of this project and will be dealt with in the second part of the risk assessment.

Imported offal is assumed to have contained cattle and pig slaughter waste, since the statistics do not contain an exact breakdown by livestock species.

In this assessment, the exposure of Finnish cattle to BSE-risk through imported milk replacers, animal fat and slaughter offal was not assessed. Risk assessment of these products may change the overall conclusion made in this assessment, particularly in the case of slaughter offal, if the assessment of the stability and challenge over time in individual countries change in the light of new historical data.

Conclusions

1. During 1980 – 2002, there was, depending on the country of origin, a negligible to moderate risk that imported animals carried BSE ended up in the cattle feed chain and exposed the Finnish cattle population to BSE. The largest risk has been cattle imported from the UK and Denmark which were removed from production before 1996.
2. The challenge of the Finnish cattle population resulting from the disposal of imported cattle and rendering of materials into MBM started earliest in the late 1980s.
3. The external challenge from imported cattle is assessed to be lower than in the Geographical BSE-risk (GBR) assessment of the SSC (SSC 2002b) as this assessment takes into account cattle that were excluded from the feedchain. It is also a more accurate assessment as the point of reference for the BSE-risk of individual cattle is the time of birth and of disposal of the animal not the time of import.
4. Between 1980 and 2002, imported MBM was assessed to present a higher risk of exposure to BSE-agents of the Finnish cattle population than the import of

live animals during the same period. According to our assessment, imported MBM would have presented a moderate to extremely high risk, depending on the country of origin and time of import. The highest risks were associated with the import of MBM from the Netherlands, Denmark and Germany.

5. Between 1980 and 2002, Finland imported a total of 305,647 tons of MBM. Of this, 144,082 tons of MBM was imported to Finland prior to the ban of the use of imported MBM for ruminant feeding in 1990. A large proportion of the total imported MBM was from BSE-risk countries.
6. Due to the lack of documentation, it was not possible to make accurate estimation on the use of imported MBM from BSE-risk countries to Finland during 1980 and 1990. However, based on several scenarios used in this assessment, the probable use of MBM in cattle feed varied from 7, 000 tons to 91, 000 tons during 1983 – 1990. While these values are assumed to be the extremes, the most likely volume of MBM used in cattle feed was between these values, approximately 16, 000 – 31,000 tons.
7. If in the future milk replacers or animal fat are implicated in the spread of the BSE agent, it is possible that Finnish cattle could have been infected by this route until 2000. Imported slaughter offal used in the production of MBM might also prove significant.
8. The external challenge from imported MBM is assessed to be lower than in the Geographical BSE risk (GBR) assessment of the SSC (SSC 2002b). The imports of MBM used in the GBR assessment do not take into account the proportion of the imported MBM that went to the production of feed for monogastric animals. However, the exact proportion of imported MBM that went into the cattle feed chain cannot be estimated and therefore several scenarios are used to estimate the probable use of imported MBM. On the basis of the estimation (scenario A), the total volume of MBM imported 1980 – 2002, except the proportion that was used for feeding fur and pet animals, is extremely high to feed to cattle.
9. In order to be able to use the information efficiently in different official registers for surveillance, decision-making and risk assessment, it would be important to further develop and combine the different registers.
10. This assessment is based on the knowledge of the BSE-situation in the exporting countries up to 31.10.2004. However, if the situation changes, i.e. BSE cases are detected in these countries or if it assessed that it is probable that BSE is present in these countries, the results of this risk assessment will be altered. This is particularly relevant in the case of imports from Sweden, as the import volumes of live cattle and MBM and slaughter offal were high.

3. Yhteenveto ja johtopäätökset

Vuonna 2002 käynnistettiin maa- ja metsätalousministeriön (MMM) pyynnöstä Eläinlääkintä- ja elintarvike-tutkimuslaitoksen (EELA) ja Kasvintuotannon tarkastuskeskuksen (KTTK) yhteistyönä riskinarviointi BSE-riskin arvioimiseksi Suomalaisessa nautakarja populaatiossa. Tässä raportissa esitellään tämän työn ensimmäisen eli Suomeen leviämisen arviointia koskevan vaiheen tulokset. Raportissa on arvioitu Suomeen vuosina 1980 – 2002 tuodun lihaluujauhon sekä nautojen aiheuttamaa riskiä nautapopulaatiolle. Tässä riskinarvioinnissa on tarkasteltu maahantuontiriskiä Suomeen toteutuneiden tuontien sekä niiden käyttötarkoitusten kannalta. Eri tuontimaita ja tuotteita on verrattu vain näiden tuontien sisällä, eikä riskinarvioinnin tuloksia voida siksi suoraan verrata muita maita koskeviin riskinarviointeihin.

EUn komission tieteellisellä ohjauskomitealla (SSC) teettämää maantieteellistä BSE-riskinarviointia varten on Suomessa kerätty tietoja jo aiemmin. Tässä raportissa on näitä tietoja tarkennettu ja pyritty mahdollisimman kattavasti ja luotettavasti saamaan kuva Suomeen tuotujen nautojen määrästä, alkuperämaasta, nautojen syntymä-, tuonti- ja hävittämisajankohdista, BSEn varalta testaamisesta sekä tuontinautojen mahdollisesta joutumisesta rehuketjuun. Lisäksi on kerätty tietoja lihaluujauhon maahantuonnista ja arvioitu sen käyttöä nautakarjalle. Myös tietoja maahantuodusta maksa- höyhen- ja verijauhosta sekä juottorehusta, rasvasta sekä teurasjätteestä on selvitetty samassa yhteydessä. Ensimmäisen vaiheen aikana on myös kerätty kyseisen ajanjakson osalta tietoja Suomen riskinhallintatoimista sekä joistakin muista sellaisista tekijöistä, joilla on voinut olla vaikutusta BSE-taudinaiheuttajan leviämiseen Suomessa.

Tämän kuvailevan riskinarvioinnin tuloksia on tarkoitus hyödyntää projektin toisessa vaiheessa ja tuottaa myös laskennallinen malli BSE-riskistä Suomessa. Tulokset tullaan julkaisemaan myöhemmin erillisessä raportissa. Projektin toisen vaiheen aikana tullaan arvioimaan BSEn taudinaiheuttajan leviämistä Suomen sisällä.

Elävien nautojen tuonti

Aineistot

Elävien nautojen historiallisten tuontitietojen keräämiseen liittyi useita ongelmia. Tuontitietoja on kertynyt useisiin eri tilastoihin, joiden keskinäinen vertailu oli vaikeaa. Todennäköisesti täydellisimmät tiedot ennen vuotta 1995 maahantuotujen nautojen määristä ja alkuperämaista ovat Suomen tullin tilastoissa, pieniä epätarkkuuksia lukuun ottamatta. Tälläkään hetkellä tuotujen nautojen testaustulokset eivät ole helposti saatavissa yhdestä rekisteristä. Se olisi kuitenkin mahdollista toteuttaa yhdistämällä nykyisiä rekistereitä ajantasaisesti.

Leviäminen ja altistus

Tämän arvioinnin perusteella näyttäisi olevan mahdollista, että BSE-taudinaiheuttaja on voinut levitä Suomeen elävien nautojen tuonnin välityksellä ja altistaa Suomalaisen nautapopulaation taudinaiheuttajalle. Vuosina 1980 – 2002 on Suomeen tuotu yhteensä 1974 nautaa. 1980-luvulla nautoja tuotiin vain Yhdistyneestä Kuningaskunnasta (UK), Ruotsista, Tanskasta ja Norjasta. Vasta 1990-luvun loppupuolelta lähtien on tuontia ollut myös muista maista. Suomalainen nautapopulaatio on saattanut altistua infektoituneesta tuontieläimestä peräisin olevalle lihaluujauholle vasta ensimmäisten tuontinautojen päädyttyä rehuketjuun 1980-luvun loppupuolella.

Riskin kokonaisarviointi

Tuontinaudoista merkittävimmän riskin arvioitiin liittyneen UKsta vuosien 1983 – 1988 välisenä aikana tuotuihin nautoihin. UKsta tuotiin tuona aikana Suomeen yhteensä 115 nautaa, joista yksi palautettiin pian tuonnin jälkeen. Suomessa UKsta tuoduista naudoista 85 on todennäköisesti päätynyt rehuketjuun viimeistään vuonna 1996 ilman BSEn varalta tehtyä tutkimusta. UKssa nautojen eri syntymäkohorteissa vuosina 1987 – 1996 todettujen BSE-tapausten ilmaantuvuustietojen avulla arviointiin, että Suomeen olisi tuotu UK:sta ainakin 0,3 – 2,8 BSE-tartunnan saanutta nautaa vuoden 2002 loppuun mennessä. Näistä ainakin 0,2 – 1,9 arvioidaan päätyneen Suomessa rehuketjuun viimeistään vuonna 1996. Todellisuudessa BSE-tartunnan saaneiden nautojen lukumäärä on voinut olla tätä korkeampi, sillä UKssa todettujen tapausten raportoitu ilmaantuvuustieto ei ota huomioon diagnosoimatta jääneitä tapauksia.

Riskiä BSE-taudinaiheuttajan leviämisestä Suomeen tuontieläinten välityksellä todennäköisesti vähentää se seikka, että lähes kaikki Suomeen BSE-maista tuodut naudat ovat olleet liharotuisia, sillä UKssa BSEtä on todettu huomattavasti vähemmän liha- kuin lypsykarjoissa. UKsta vietyjen liharotuisten nautojen osalta on kuitenkin todettu, että niihin liittyy suurempi BSE-riski kuin vastaaviin UKssa kasvatettuihin nautoihin, joita ei ole myyty tilalta. Tämän uskotaan johtuvan siitä, että tilalta myytäväksi aiottujen siitoseläinten ruokintaan on usein käytetty eläinperäistä proteiinia, vaikka sitä ei muulle lihakarjalle näillä tiloilla olisi käytettykään.

Vaikka UKsta tuotujen nautojen on arvioitu aiheuttaneen suurimman elävien eläinten tuontiin liittyvän BSE-riskin, myös Tanskasta tuoduilla naudoilla on ollut merkitystä. Yli puolet vuosien 1980 – 2002 välisenä aikana Suomeen tuoduista naudoista on tuotu Tanskasta. Lisäksi Tanskasta tuoduista naudoista suhteellisen suuri osuus on päätynyt Suomessa rehuketjuun ennen vuotta 1996, jolloin mikään Suomessa käytössä ollut riskinhallintatoimi ei todennäköisesti olisi estänyt niissä mahdollisesti olleen BSE-taudinaiheuttajan kiertoa ja lisääntymistä suomalaisessa rehuketjussa. Muista sellaisista maista, joissa on todettu kotoperäisiä BSE-tapauksia, on tuotu Suomeen nautoja vasta vuodesta 1998 alkaen. Kyseiset eläimet eivät ole joutuneet Suomessa rehuketjuun ennen kuin Suomessa voimassa olleet riskinhallintatoimet ovat vähentäneet riskiä BSE-taudinaiheuttajan leviämisestä nautakarjaan niiden välityksellä.

Yleiset havainnot

Tämä arvio perustuu tilanteeseen 31.10.2004 saakka. Jos jonkin maan, josta on tuotu Suomeen eläviä nautoja, BSE tilanne muuttuu, eli BSE tapauksia löytyy maasta tai riskinarvioinnin perusteella niitä todennäköisesti esiintyisi siellä, myös tämän riskinarvioinnin tulokset saattavat muuttua. Tämä koskee erityisesti Ruotsia koska nautojen tuontimäärät ovat olleet suuria.

Muut havainnot

Käytettävissä olleiden tietojen perusteella näyttää siltä, että seitsemän tuotannosta poistettua tuontinautaa on jäänyt vuonna 2001 testaamatta BSEn varalta vaikka ne tuona aikana voimassa olleen suomalaisen lainsäädännön vaatimusten perusteella olisi pitänyt testata. Tällä ei kuitenkaan ole ollut vaikutusta nautakarjan BSE-riskiin, sillä riski BSE-taudinaiheuttajan joutumiselle rehuketjuun on vuodesta 2001 käytössä olleiden riskinhallintatoimien johdosta ollut kuitenkin selvästi aikaisempia vuosia matalampi. Lisäksi BSE-testauksen riskiä vähentävä vaikutus on vähäinen sillä sen avulla ei voi todeta BSE- tapausta kuin vasta joitakin kuukausia ennen kliinisten oireiden alkamista.

Rehujen tuonti

Aineistot

Tässä työssä kerättiin ja verrattiin eri tilastolähteistä saatavilla olevia tietoja eläimistä peräisin olevien rehujen tuontimääristä ja alkuperämaista. Tietoja maahantuoduista lihaluujauhoista on tilastoitu vuosittain KTTKn, Tullihallituksen, Valtionarkiston ja Maatilahallituksen vuositilastoihin. Tilastojen välinen ero aiheutti ongelmia tietojen tulkinnassa. Tässä raportissa käytetty lyhenne lihaluujauho (LLJ) sisältää sekä lihajauhon että lihaluujauhon.

1. Tullihallituksen tilastossa lihaluujauhon tuonti on merkitty luokkaan CCCN 230 11000. Se sisältää eläinvalkuaisia kuten lihasta tai muista eläimen osista sekä muista eläimistä kuten kalasta, meriäyriäisistä ja muista vedessä elävistä selkärangattomista sekä eläinrasvan sulatusjätteestä valmistetut jauhot, jotka on tarkoitettu eläinten ruokintaan. Lihaluujauhoa ei ole eritelty erikseen. Luujauho on merkitty tullin tilastossa luokkaan luut ja sarvitohlot (CCCN 050 8000). Tullin tilastossa ei ole tietoja tuontilihaluujauhon käyttöosuudesta kotieläinten rehunvalmistuksessa.
2. Valtionarkistossa olevissa dokumenteissa on tietoja maahantuontilupahakemuksista, tuontiluvan saannista ja tuontilupaehdoista, hakijoiden ammateista ja tuontirehun laadusta muttei tuontimäärästä eikä siitä, minkä eläinlajin rehuksi (lukuun ottamatta turkiseläinten rehua), tuontilihaluujauhoa suunniteltiin käytettäväksi tai käytettiin.
3. Maatilahallituksen vuositilastoissa on tietoja valkuaisrehun tuonnista vuoteen 1986 asti, mm. tiedot lihaluujauhon tuonnista 1940-luvulta saakka. Tietoja lihaluujauhon alkuperämaasta ja käytöstä nautakarjanrehussa ei ole.
4. KTTKlla on eritellysti tietoja maahantuoduista lihaluu-, maksa-, veri- ja höyhenjauhoista sekä muista tuontirehuraaka-aineista ja valmisrehuista. Toiminnanharjoittajakohtaiset tiedot rehujen valmistusmääristä/vakuustodistus ennen vuotta 1990 eivät ole kuitenkaan ole enää saatavilla. KTTKlla on myös rehujen valmistus- ja koostumustietokanta (Focus) vuodella 1989 ja 1990. Tietoa tuontilihaluujauhon osuudesta kaikesta kotieläinten rehuissa käytetystä lihaluujauhosta ei ole saatavissa.

KTTKn ja tullin tilaston eroavuudet aiheuttivat ongelmia arvioinnissa. KTTKn vuositilastojen mukaan lihaluujauhoa tuotiin enemmän kuin tullin tilastojen mukaan ja tuotteet ovat jaoteltu omiin ryhmiinsä. Huolimatta siitä, että kaikkia dokumentteja ei ollut saatavilla, KTTKn tilastot valittiin tämän arvioinnin perustaksi, sillä tuontilihaluujauhon määrät, teollisen rehun vuosivalmistusmäärät sekä rehujen koostumustiedot olivat KTTKn tilastoista hyvin saatavissa. Lisäksi rehutehtaiden piti raportoida

KTTKlle rehujen raaka-aine- sekä valmistusmäärät kaksi kertaa vuodessa.

Nautakarjan rehuseoksissa käytetyistä eläinvalkuaisrehuista ei ole dokumentteja, joista selviäisivät maahantuodun lihaluujauhon ja kotimaisen lihaluujauhon suhteelliset käyttöosuudet. Myöskään tietoja tuotetuista rehumääristä jokaista vakuustodistusta kohti ja lihajauhoa sisältävän rehun tuotantomäärästä ei ole saatavissa ajalta ennen 1990. Ei myöskään ollut mahdollista selvittää mitkä rehualan yritykset käyttivät tuontilihaluujauhoa.

Lihaluujauhon tuonti

Proteiinirehujen (öljykasvien rouheet tai kakut ja kala- ja lihaluujauhoa) tuontitilastojen mukaan lihaluujauhoa on tuotu Suomeen vuodesta 1940. KTTKn tilastojen mukaan vuosien 1980 – 2002 välisenä aikana on Suomeen tuotu 369 967 tonnia prosessoitua eläimistä tuotettua valkuaisrehua muista maista kuin UKsta. Tästä määrästä lihaluujauhon osuus on ollut 305 647 tonnia. Loput (64 320 tonnia) oli veri-, maksa- ja höyhenjauhoa, joita ei Suomessa ole käytetty nautakarjan ruokinnassa. Tuontilihaluujauhosta valtaosa on tuotu maista, joissa on todettu BSE-tapauksia nautakarjassa.

BSE-riskimaiden lihaluujauhon tuonnista 95 993 tonnia on tapahtunut ennen vuonna 1990 asetettua tuontilihaluujauhon käyttökieltoa märehtijöiden rehussa. Lihaluujauhon tuonti näistä maista oli suurimmillaan vuosina 1988 ja1989 (Taulukko 10). Tämän kiellon jälkeen BSE-riskimaista on tuotu Suomeen 76 013 tonnia lihaluujauhoa, josta 20 498 tonnia on käytetty turkis- ja lemmikkielinten rehuksi. Kiellon jälkeinen huippuvuosi tuonnin suhteen BSE-riskimaista Suomeen oli vuonna 1994. KTTKn mukaan kiellon jälkeen tuotulihaluujauhoa on yksinomaan käytetty yksimahaisten eläinten, kuten sikojen, siipikarjan, lemmikki- ja turkiseläinten rehun valmistukseen. Vuoden 1990 jälkeen Suomen nautakarjapopulaatio on voinut altistua tuontilihaluujauhon sisältämälle BSE-taudin aiheuttajalle rehutehtaissa ja varastoinnin sekä kuljetuksen aikana tapahtuneen ristikontaminaation kautta.

KTTKn mukaan nautakarjan rehuksi tarkoitettua lihaluujauhoa, lihaluujauhoa sisältävää rehua tai rehujen raaka-aineita ei ole tuotu Suomeen Iso-Britanniasta. Prosessoitua eläinvalkuaista sisältävää lemmikkieläinrehua sekä aromiaineita on kuitenkin tuotu rehuksi muille eläinlajeille kuin elintarviketuotannossa käytettäville eläimille.

Lihaluujauhon käyttö nautakarjan rehussa

Rehujen tuoteselosteiden tai vakuustodistusten perustella lihaluujauhon osuus on ollut täysrehuissa 1 – 4 %, puoli-tiivisteissä 4 – 7 % ja tiivisteissä. 5 – 65 %. Korkeimmillaan lihaluujauhon osuus yksittäisessä lypsykarjanrehussa oli 10 %. Nuorkarjan rehu on voinut sisältää jopa 65 % melassoitu lihaluujauhoa vuosina 1986 ja 1987. Tuontilihaluujauhon käyttö märehtijöiden rehussa kiellettiin vuonna 1990 ja kotimaisen lihaluujauhon käyttö naudan rehussa kiellettiin maaliskuussa 1995.

Arviointimenetelmät ja arvioitu tuontilihaluujauhon käyttö naudoille

Koska vain harvat 1980-luvulta peräisin olevat rehutuotantoa ja käyttöä kuvaavat asiakirjat olivat saatavilla, oli vaikeaa selvittää tuontilihaluujauhon osuutta käytetystä lihaluujauhosta. Tämän vuoksi tässä arvioinnissa laskettiin lihaluujauhon käyttöä nautakarjan rehussa useammalla eri skenaariolla (A- E). Lisäksi lihaluujauhon käyttöajankohdat jaettiin neljään ajanjaksoon sen mukaan, onko lihaluujauhoa suoraan käytetty naudan rehussa tai rehu on voinut kontaminoituja muiden eläinlajien rehuista. Nämä neljä ajanjaksoa ovat:

Jakso I: Vuodet 1980 – 1982, jolloin lihaluujauhoa ei käytetty naudoille mutta ristikontaminaatio on ollut mahdollista.

Jakso II: Vuodet 1983 – 1990, jolloin kotimaisen ja tuontilihaluujauhon käyttö naudanrehussa oli sallittu ja naudat ovat voineet altistua suoraan rehussa olevalle lihaluujauholle.

Jakso III: Vuodet 1991 – 1995, jolloin tuontilihaluujauhon käyttö naudanrehussa oli kielletty, mutta se oli sallittua yksimahaisten eläinten rehussa. Tällöin naudan rehu on voinut sisältää tuontilihaluujauhoa ristikontaminaation seurauksena ja se on sisältänyt kotimaista lihaluujauhoa. .

Jakso IV: Vuodet 1996 – 2001, jolloin sekä tuonti- että kotimaisen lihaluujauhon käyttö naudanrehussa oli kielletty, mutta se oli sallittua yksimahaisten eläinten rehussa. Ristikontaminaatio oli siten mahdollista, mutta se oli todennäköisesti alhaisemmalla tasolla kuin jaksolla III.

Skenaario A on nk. pahin mahdollinen skenaario (”worst case scenario”). Siinä oletetaan, että kaikki vuosina 1980 – 2002 maahantuotu lihaluujauho on käytetty naudoille lukuun ottamatta niitä tuonteja, jotka on dokumentoidusti tuotu turkiseläinten rehuntuotantoon. Skenaariossa A lihaluujauhon tuontimäärät ja -maat ovat tiedossa. Koska skenaariossa A oletettu lihaluujauhon käyttömäärä naudoille on fysiologisesti mahdotonta, tutkittiin myös muita skenaarioita.

Skenaario B perustuu tietoihin joita on syötetty Fokus-tietokantaan (KTTK 2004). Tietokannasta löytyvät vuosien 1989 ja 1990 rehujen valmistusmäärät ja niiden lihaluujauhopitoisuustietoja. Näiden vuosien tilastot ovat ekstrapoloitu vuosien 1983 – 1995 väliselle ajalle lihaluujauhon käyttömäärän arvioimiseksi. Tietojärjestelmässä oli joukko vääriä tallennuksia, jotka on jäljitetty ja korjattu vakuustodistusdokumentteihin rekisteröintipäiväysten perusteella. Korjaustenkin jälkeen tietokannan tietojärjestelmän perustuvat tulokset olivat ekstrapoloinnin kannalta epäluotettavia koska a) kielto tuontilihaluujauhon käytöstä naudan rehussa tuli voiman 1990, joten vuodet 1989 ja 1990 eivät olleet lihaluujauhon käyttöön kannalta edustavimmat vuodet. b) skenaariossa B oletetaan, että rehujen valmistusmäärät ja koostumus ovat pysyneet vakiona ja c) tuontilihaluujauhon osuus kaikesta käytetystä lihaluujauhosta ei ole tiedossa. Koska ei ole olemassa dokumentteja jotka osoittaisivat mikä on tuontilihaluujauhon osuus naudoille käytetyistä lihaluujauhoista, on skenaariossa oletettu että kaikki nautakarjan rehussa käytetty lihalujauho on lähtöisin BSE-riskimaista (skenaario B_1), tai lähtöisin sekä BSE-riski maista ja muista tuontimaista (B_2).

Skenaario C perustuu lihaluujauhoa sisältävien rehujen vakuustodistusten osuuteen kaikista vuosina 1983 – 1990 KTTKlle ilmoitetuista vakuustodistuksista. Skenaario Cn heikkoutena on, että kaikki vakuustodistukset eivät olleet saatavissa eikä rehujen valmistusmäärä per vakuustodistus ole tiedossa. Koska dokumentteja tuontilihaluujauhon osuudesta naudoille käytetyistä kokonaislihaluujauhomäärästä ei ole olemassa, on skenaariossa oletettu, että nautakarjanrehussa käytetty lihaluujauho on lähtöisin BSE-riskimaista (skenaario C_1) tai BSE-riskimaista ja muista tuontimaista (C_2).

Skenaario D perustuu laboratorioanalyysien (mikroskopointi) perusteella saatuihin tietoihin nautakarjarehujen sisältämästä lihaluujauhosta vuosina 1997 – 2001 (jakso IV). Vuosien 1997 ja 1998 havaintojen keskiarvoa on käytetty arvioimaan nautakarjarehujen mahdollisen ristikontaminaation tasoa vuoden 1996 aikana.

Skenaario E perustuu BSE-riskimaista tuodun lihaluujauhon laskennalliseen osuuteen kaikesta Suomessa käytössä olleesta (kotimainen sekä tuonti) lihaluujauhosta 1983 -1995 välisenä aikana.

Jakso I (1980 – 1982)

Saatavissa olevien dokumenttien perusteella kotimaista tai tuontilihaluujauhoa ei ole käytetty naudoille 1980 – 1982 välisenä aikana. Sekä tuotua että kotimaista lihaluu-

jauhoa kuitenkin käytettiin yksimahaisten eläinten rehuissa. Siten nautakarjanrehun ristikontaminaatio on ollut mahdollista rehujen valmistuslinjalla sekä varastoinnin ja kuljetuksen aikana. Lihaluujauhon kontaminaatiotasoa nautakarjanrehussa oli kuitenkin mahdoton arvioida, koska lihaluujauhon käyttö on tuolloin ollut laillista ja siitä syystä sen esiintymistä nautojen rehuissa ei seurattu.

Jakso II (1983 – 1990)

Jakso II kuvaa lihaluujauhon (tuonti ja kotimainen) todellista käyttöä naudanrehussa eri skenaarioissa (A, B_1, B_2, C_1,C_2, D ja E) (Taulukko 26).

Skenaarion A tuloksena on, että 90 755 tonnia tuontilihaluujauhoa on käytetty naudoille vuosina 1983 – 1990. Käytännössä on kuitenkin niin, että tämä lihaluujauhomäärä nautojen ruokinnassa, olisi todennäköisesti ylittänyt nautojen fysiologisen kynnyksen sekä rehujen maittavuuden osalta hyväksyttävän tason.

Skenaario B_1ssa käytettyjen olettamusten perusteella arvioitiin, että BSE-riskimaista peräisin olevan lihaluujauhon keskimääräinen vuosittainen käyttö oli 0.035 – 3 937 tonnia/vuosi. Skenaario B_2ssä käytettyjen olettamusten perusteella arvioitiin, että BSE-riskimaista ja ei-BSE-riskimaista peräisin olevan lihaluujauhon keskimääräinen vuosittainen käyttömäärä on ollut 0 – 3 058 tonnia/vuosi. Kaikkiaan tuontilihaluujauhoa olisi tämän skenaarion mukaan käytetty vuosina 1983 – 1990 yhteensä 16 405 (B_2) – 18 162 (B_1) tonnia.

Skenaario C_1ssa käytettyjen olettamusten perusteella arvioitiin, että BSE-riskimaista peräisin olevan lihaluujauhon keskimääräinen vuosittainen käyttömäärä oli 0.035 – 7 659 tonnia/vuosi. Skenaario C_2ssä käytettyjen olettamusten perusteella arvioitiin, että BSE-riskimaista ja ei-BSE-riskimaista peräisin olevan lihaluujauhon keskimääräinen vuosittainen käyttömäärä on ollut 0 – 6 193 tonnia/vuosi. Kaikkiaan tuontilihaluujauhoa olisi tämän skenaarion mukaan käytetty vuosina 1983 – 1990 yhteensä 26 738 (C_2) – 30 858 (C_1) tonnia.

Skenaario Essä käytettyjen olettamusten perusteella arvioitiin, että BSE-riskimaista peräisin olevan lihaluujauhon keskimääräinen vuosittainen käyttömäärä on ollut 0 – 2,448 tonnia/vuosi. Kaikkiaan tuontilihaluujauhoa olisi tämän skenaarion mukaan käytetty vuosina 1983 – 1990 yhteensä 7 032 tonnia.

Jakso III (1991 – 1995)

Jakso III kuvaa aikaa, jolloin tuontilihaluujauhon käyttö naudanrehussa oli kielletty mutta sallittu yksimahaisten rehuissa. Ennen kiellon voimaantuloa valmistettuja nautakarjanrehuja ei vedetty käytöstä ja ne olivat käytössä 1990. Kotimaisen lihaluujauhon käyttö naudoilla oli sallittu vuoteen 1995 asti. Jakson IIIn aikana nautakarjan ja yksimahaisten eläinten rehujen raaka-aineen vastaanotto, valmistuslinjat ja varastointi sekä kuljetusvälineet eivät olleet erillisiä. Rehuvalmistuksen jälkeisen ristikontaminaatiovaaran valvonta ei ole ollut myöskään tehokasta. Lihaluujauhon käyttö on estimoitu eri skenaarioilla (A, B_1, B_2 ja E) jaksolla III, ja näissä skenaarioissa käytettyjen olettamusten perusteella arvioitiin lihaluujauhon kokonaiskäytön olleen vuosien 1990 – 1995 aikana 44 996 (A), 15 396 (B_1), 13 937 (B_2) ja 1 961 (E) tonnia (Taulukko 26).

Jakso IV (1996 – 2001)

Jaksolla IV sekä tuonti että kotimaisen lihaluujauhon käyttö naudanrehussa oli kielletty. Käyttö oli kuitenkin sallittu yksimahaisten eläinten rehussa. Rehujen sisältämä lihaluujauhon havaitsemismenetelmä otettiin käytön vuonna 1997. Lihaluujauhon käyttö kielto tuli voiman kaikille tuotantoeläinten rehuissa 1.1 2001 ja lihaluujauhoa sisältävä rehu vedettiin pois markkinoilta, varastoista ja tuotantotiloilta. Samana

vuonna kalajauhoa sisältävän rehun valmistuslinja eriytettiin muista tuotantoeläinten rehujen tuotantolinjoista. Laboratorioanalyysien (mikroskopointi) tulosten perusteella arviotiin, että nautakarjanrehuun päätyi risti-kontaminaation kautta lihaluujauhoa kaikkiaan 0.065 – 0.353 tonnia/vuosi (Taulukko 31). D skenaariossa käytettyjen olettamusten perusteella BSE-riski maista tuotujen lihaluujauhon osuus oli 0.032 – 0.089 tonnia/vuosi 1996 – 2000 välisenä aikana. Kaikkiaan tuontilihaluujauhoa olisi tämän skenaarion mukaan joutunut rehuun ristikontaminaationa yhteensä 0.301 tonnia (Taulukko 26).

Riskin kokonaisarviointi

Tämä arvioinnin perustella, riski siitä, että tuontilihaluujauho (1980 – 2002) on altistanut suomalaisen nautakarjapopulaation BSE-taudinaiheuttajalle arvioittuu kohtalaisesta erittäin korkeaksi riippuen tuonti ajanjaksosta ja tuontimaiden BSE-tautitilanneesta.

Hollannista tuotuun lihaluujauhoon arvioitiin liittyvän suurin riski BSE-taudinaiheuttajan leviämisestä Suomen nautakarjapopulaatioon tuontirehujen välityksellä (korkea – hyvin korkea). Myös Tanskasta ja Saksasta tuotuun lihaluujauhoon liittyi merkittävä riski (kohtalainen – korkea). Riski BSE-taudinaiheuttajan leviämisestä Suomen nautakarjapopulaatioon Ranskan, Irlannin ja Itä-vallan tuontilihaluujauhon välityksellä on mitättömän ja hyvin matalan välillä, koska tuonti on ollut hyvin vähäistä ja tuonti on tapahtunut vasta käyttökiellon jälkeen. Riski BSE-taudinaiheuttajan leviämisestä Suomen nautakarjapopulaatioon Ruotsin, Uuden Seelannin, Norjan ja Australian tuontilihaluujauhon välityksellä on arvioitu mitättömäksi näiden maiden BSE-tilanteen takia (30.10.2004 asti).

Yleiset havainnot

Tämä arvio perustuu tilanteeseen 31.10.2004 saakka. Jos jonkun maan, josta on tuotu Suomeen lihaluujauhoa, BSE tilanne muuttuu, eli BSE tapauksia löytyy maasta myös tämän riskinarvioinnin tulokset saattavat muuttua. Tämä koskee erityisesti Ruotsia koska lihaluujauhon tuontimäärät ovat olleet suuria

Muita mahdollisia lähteitä

Suomeen on tuotu vuosina 1980 – 2002 vasikoiden juottorehua ja eläinrasvaa sekä BSE riski maista että muista maista. Tanskasta ja Saksasta tuoduissa vasikoiden juottorehuissa on käytetty eläinrasvaa (nauta ja sika) aina vuoteen 2000 asti, mutta Hollannista ja Ruotsista tuodut juottorehut sisälsivät kasvirasvaa. Vasikoiden juottorehut on todennäköisimmin käytetty suoraan vasikoiden ruokintaan.

Tuontirehurasvoja on käytetty ainakin sikojen, siipikarjan, turkis- ja lemmikkieläinten rehussa. Eläinrasvaa on myös käytetty nautakarjanrehussa, mutta kysymys siitä onko se ollut tuonti- vai kotimaisen eläinjätteenkäsittelylaitoksen valmistamaa eläinrasvaa ei kuulunut tämän projektin toimeksiantoon. Tätä kysymystä selvitetään projektin seuraavassa vaiheessa.

Näiden tuontien lisäksi Suomeen on tuotu teurasjätettä vuosina 1980 -2002. Tuonti teurasjätteiden koostumus on oletettu koostuvan naudan ja sian teurasjätteistä.

Johtopäätökset

1. Riski, että tuontieläimet ovat altistaneet suomalaisen nautapopulaation BSE taudinaiheuttajalle joutuessaan Suomessa rehuketjuun, arvioitiin Suomen tuontia arvioitaessa mitättömästä - kohtalaiseksi vuosina 1980 – 2002 tuontimaasta riip-

puen. Suurin riski on liittynyt UKsta tuotuihin nautoihin, jotka on poistettu ennen vuotta 1996 sekä Tanskasta tuotuihin eläimiin.

2. Tuontinatojen hävityksestä ja renderöinnistä aiheutuva suomalaisten nautojen mahdollinen altistuminen BSElle alkoi aikaisintaan 1980-luvun lopussa kun ensimmäiset tuontinaudat päätyivät rehuketjuun.
3. Suomalaisen nautapopulaation riski altistua BSElle tuontinautojen hävityksen ja renderöinnin välityksellä on arvioitu tässä työssä alhaisemmaksi kuin mitä Euroopan tieteellisen ohajuskomitean (SSC) tekemässä maantieteellisessä BSE riskinarvioinnissa (SSC 200a) arvioitiin. Tämä johtui siitä että tässä arvioinnissa on huomioitu niitä tuontinaudat jotka eivät joutuneet rehuketjuun. Arvio on myös tarkempi kuin SSC tekemä arvio, koska yksittäisten nautojen BSE riskin arvioinnissa on käytetty hyväksi niiden syntymä- sekä hävittämisajankohdan.
4. Tuontilihaluujauho on vuosien 1980 – 2002 välisenä aikana todennäköisesti aiheuttanut suuremman riskin BSE-taudinaiheuttajan leviämiselle Suomeen kuin elävien nautojen tuonti samana ajanjaksona. Tuonti lihaluujauho on aiheuttanut BSEn leviämiselle Suomen tuontia arvioitaessa kohtalaisen – erittäin korkean riskin vuosina 1983 -1998 tuontimaasta riippuen. Suurin riski on liittynyt lihaluujauhon tuontiin Hollannista, Tanskasta ja Saksasta.
5. Vuosina 1980 – 2002, Suomeen on tuotu 305 647 tonnia lihaluujauhoa joista 144,082 tonnia oli tuotu ennen tuontilihaluujauhon käyttökielto naudanrehussa vuonna 1990. Suurin osa kokonais tuonnista oli lähtöisin BSE-riskimaista.
6. Suomalaisen nautakarjan rehuissa käytetyn tuontilihaluujauhon määrää vuosina 1983 -1990 on dokumenttien puutteellisuuden takia mahdotonta arvioida tarkasti. Käytettyjen skenaarioiden perusteella voidaan kuitenkin arvioida että käyttömäärä vuosina 1983 -1990 on ollut vähintään 7 000 tonnia ja enintään 91 000 tonnia. Nämä ovat arvion mukaan todennäköisimmät ala- ja ylärajat. Todennäköisimmin näiden vuosien tuontilihaluujauhon käyttö nautakarjan rehuissa on ollut näiden arvojen välissä, noin 16 000 – 31 000 tonnia.
7. Mikäli tulevaisuudessa juottorehulla tai rehurasvalla osoitetaan olevan merkitystä BSE-taudinaiheuttajan leviämisessä, suomalainen nautakarja on voinut altistua myös näiden välityksellä aina vuoteen 2000 asti. Myös lihaluujauhon valmistukseen käytetyllä tuontiteurasjätteellä saattaa olla merkitystä.
8. Suomalaisen nautapopulaation riski altistua BSElle tuontilihaluujauhon välityksellä on arvioitu tässä työssä alhaisemmaksi kuin mitä Euroopan tieteellisen ohajuskomitean (SSC) tekemässä maantieteellisessä BSE riskinarvioinnissa (SSC 2000a) arvioitiin. Koska ei voinut tarkkaan arvioida, mikä on tuontilihaluujauhon osuus naudoille käytetyistä lihaluujauhoista, työssä käytettiin useampia skenaarioita. Tulosten perustella vuosina 1980 – 2002 maahantuotu lihaluujauhomäärä lukuun ottamatta niitä tuonteja, jotka on käytetty turkis- ja lemmikkieläinten rehuntuotantoon on liian suuri (skenaario A) syötettäväksi naudoille.
9. Erilaisten viranomaisrekistereiden kehittäminen olisi mahdollista, mikäli jatkossa halutaan paremmin hyödyntää ja yhdistää rekistereiden sisältämää tietoa seurannassa, päätöksenteossa ja riskinarvioinnissa.
10. Tämä arvio perustuu tilanteeseen 31.10.2004 saakka. Jos jonkun maan, joista on tuotu eläviä nautoja tai lihaluujauhoa Suomeen BSE riskitaso muuttuu uusien historiallisten tietojen valossa, niin myös tämän riskinarvioinnin tulokset saattavat muuttua.

4. Introduction

4.1 History

BSE was diagnosed for the first time in the UK in November 1986 (Wilesmith 1988). The possibility of its causal link to a new variant of a fatal neurological disease in humans, the variant Creutzfeldt-Jakob disease (vCJD), was announced in 1996. Currently BSE has considerable effects on several sectors of farm animal production, including trade of cattle and certain products, feeding of farm animals, slaughtering of ruminants and disposal of animal waste.

The first case of BSE in Finland was diagnosed in December 2001. The infected animal was tested for BSE because of its neurological symptoms compatible with BSE at the ante mortem inspection in a slaughterhouse. It was a 5-year-old dairy cow born in Finland in 1995. It had been kept on the same farm since birth, where, according to the owner of the animal, no MBM had been used for feeding of cattle for 20 years. In accordance with EC legislation, 31 cattle of the farm and contact farms were examined for BSE after their culling as a result of the case. None of them were found to be infected.

Up to 31.12.2003, a total of 297,031 cattle have been examined for BSE in Finland (including 433 cattle with symptoms from the central nervous system (CNS) examined before 2001), with only one positive result for BSE (Table 1, Table 2).

Table 1.
Number of animals with CNS-symptoms examined for BSE (histopathology). (EELA 2003a)

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total
Number	7*	6**	17	23	14	5	12	11	13	57	94	91	93	433

Note: * 3 < 24 months
** 1 < 24 months

Table 2.
Number of bovine animals examined for BSE in Finland in 2001-2003. (EELA 2003b)

Year	Fallen stocks	Emergency laughter	Clinical signs at ante mortem	Healthy slaughtered	BSE-eradication	BSE-suspects	Total
2001	3,880	8,140	5,940	9,882	31	3	27,876
2002	7,549	9,241	5,843	114,678	0	6	137,317
2003	10,899	8,087	4,216	108,198	0	5	131,405
Total*	22,328	25,468	15,999	232,758	31	14	296,598

Note: *Total 1980-2002 297,031

In 2000, the Scientific Steering Committee of the European Commission (SSC) classified Finland on level II for its geographical risk of BSE in the cattle population (see section 5.3.1 and Annex 4). A precondition for classification of a country on this level is that no cases of BSE have been detected. As a consequence, after the first BSE-case had been detected in Finland, the GBR-classification had to be reassessed (SSC 2002b). Another consequence of the confirmed presence of the BSE-agent in the cattle population was that Finland had to start testing all healthy cattle over 30 months of age slaughtered for human consumption (OTMs), an EC requirement from which Finland, had until then, had the right to derogate.

4.2. Objectives

The project on risk assessment of BSE in the cattle population in Finland was requested by the Ministry of agriculture and forestry (MMM) in October 2002. It is carried out by EELA in collaboration with the KTTK. The aim of the whole project is to assess the true prevalence of the BSE-agent in the Finnish cattle population during two decades and to estimate the probability of the presence of the infectious agent in Finland in the near future.

This report describes the results of the first part of the project. The assessment is based on data concerning the years 1980 – 2002. In terms of the World Organisation on Animal Health (OIE 2001), it consists of the assessment of the risk of introduction of the infectious agent to the country through import ("release and exposure assessment"). An assessment of the propagation of the BSE-agent assumed to be already present in Finland ("consequence assessment") will be made during the second part of the project and its results will be published in a separate report.

The objectives of this first part of the project were:

- to perform a qualitative assessment according to the code of OIE on the release of the BSE-agent and the exposure of the Finnish cattle population resulting from import of live cattle and MBM to Finland in 1980 – 2002; and
- to complete the data set on imported cattle and feed that has been collected previously within more restricted timetables.

This assessment is limited to the assumption that BSE is transmitted through MBM only and cattle is the only species of animals that could be infected by BSE and can transmit the infection to other cattle. Other possible sources of infection than MBM, as well as data concerning sheep and goats, have therefore been left out of the scope of this work. However, data on milk replacers, fat and slaughter offal's were collected during this work and they are also presented in this report.

5. Hazard identification

5.1.BSE-agent

5.1.1. Characterisation of the infectious agent

The precise nature of the causative agent of BSE is still uncertain. According to the present dominant view, the disease is caused by a small self-replicating protein, PrP^{Sc}. This is a modified, filamentous isoform of a normal membrane protein that is found in the CNS of healthy cattle. Compared to the normal prion protein, the PrP^{Sc} is remarkably resistant to physical and chemical actions such as temperature, pressure, disinfectants and variations of pH.

5.1.1.1. Clinical disease and pathology

Clinical BSE in cattle is characterised by slowly progressing neurological symptoms, although in some cases the clinical symptoms may develop very rapidly. The intensity of the symptoms may vary daily and they are often exacerbated when the animal is stressed. The most typical clinical symptoms of BSE are related to alteration of mental status (apprehension, changes of temperament, abnormal behaviour), changes in sensation (hyperaesthesia to touch and sound) and changes in posture and movement (ataxia, tremors). Loss of body condition and weight and reduction of milk yield are usually recorded (Wilesmith et al 1992a).

The infection process of BSE is slow. Most clinical cases occur at the age of 4 – 5 years. The youngest detected cases have been a little less than 2 years old, the oldest well over 15 years (DEFRA 2003). The time from the onset of clinical symptoms until the death of the animal varies from one week to 14 months. The disease is always fatal (OIE 2000a).

BSE-infectivity has been demonstrated in the central nervous tissues and in lymphoreticular tissues of cattle (Terry et al 2003). No serological changes caused by the disease have been detected (OIE 2000a).

Morphological changes detected in the post mortem examination of the brain are neurodegenerative. They consist of spongiform change in the grey matter and a neuronal vacuolation in certain nuclei of the brainstem. The changes are usually symmetrically bilateral (OIE 2000a).

5.1.1.2. The relation of BSE to other prion diseases

BSE belongs to a group of disorders called the TSEs. The name of the group refers to the ability of the diseases to be transmitted and to a spongy degeneration in the central nervous system that result from the infection (WHO 2002). Other TSE-diseases include Creutzfeld Jacob Disease (CJD), Gerstman-Sträussler-Scheinker –syndrome and kuru in humans, scrapie in sheep and goats, transmissible mink

encephalopathy (TME) in minks, feline spongiform encephalopathy (FSE) in cats and chronic wasting disease (CWD) in deer and elk. BSE is the only form of animal TSEs that is assumed to be transmitted to humans. Already in the earliest studies on BSE it was noted that there are strong resemblance between BSE and other unconventional encephalopathies (Wells et al 1987).

BSE is believed to be linked to a severe neurodegenerative disease in humans, the (vCJD). This disease is characterised by slowly progressing neurological symptoms, and it is always fatal. This new variant was described for the first time in March 1996. There are three forms of the traditional CJD: sporadic form (85 – 90 % of cases), familiar form (5 – 10 % of cases) and iatrogenic form (less than 5 % of cases) (WHO 2002).

Exposure to food containing infected bovine material is believed to be the source of infection of vCJD, but the infective dose for humans is unknown. Compared to the traditional form of CJD, the duration of the symptoms in the variant is longer (median 14 months compared to 4,5 months for traditional CJD) and it affects younger people (average age 29 years compared to 65 years for traditional CJD) (WHO 2002). The number of cases of vCJD worldwide reported to WHO up to 31.12. 2003 is presented in Table 3.

Scrapie is a neurodegenerative disease of sheep and goats that has been known for over two and a half centuries. The main mode of transmission is from ewe to offspring immideately after birth. Unlike BSE, scrapie may also be transmitted horizontally. The source of infection is thought to be foetal membranes (OIE 2000b). There is some pathological evidence that the aetiology of BSE is related to that of scrapie (Wilesmith et al 1988). According to one hypothesis, the scrapie agent could be the origin of the BSE-agent. This theory is supported by the fact that in the UK there is a relatively large sheep population, where scrapie is endemic. A relatively large amount of scrapie agent could therefore have entered the cattle feed chain through rendering under conditions that would not have destroyed it. The first cases of scrapie in Finland were detected in 2002 in four goats on two different farms (EELA 2003b).

Transmissible mink encephalopathy (TME) is a rare TSE-disease that affects farmed mink. It was detected for the first time in the United States in 1947. The average incubation period of TME is over 7 months, and the clinical signs can last 3-6 weeks. The earliest signs include increased soiling of nest and difficulty in eating. As the disease progresses, the neurological signs become more apparent. Epidemiological studies suggest that the infection is transmitted by an external exposure, such as contaminated feed (Marsh et al 1991). TME has been diagnosed in Finland once in 1966 (EELA 2003a).

Table 3.
Number of cases of vCJD worldwide reported to WHO between October 1996 and November 2003 (WHO 2002)

Country	Number of cases
UK	129
France	6
Canada	1
USA	1
Ireland	1
Italy	1

5.2. Epidemiology

Despite the lack of certainty concerning the nature of the causative agent of BSE, it is generally accepted that the most important vehicle of infection is feed containing infected bovine tissue. The epidemiological pattern of BSE is considered typical of a so-called extended common source epidemic (Wilesmith 1988).

There has been no evidence of horizontal transmission of BSE from one animal to another. Maternal transmission of BSE from dam to calf is considered to be a possible route of infection, but is not believed to be able to sustain the epidemic alone (Anderson et al 1996). It has been demonstrated that the risk of developing the disease for the offspring of clinical cases of BSE is higher than average, but it has not been established whether this is due to true maternal transmission (OIE 2000a). There is no evidence of transmission of BSE via embryos, semen or milk. (OIE 2000a).

PrP^{Sc} accumulates in the brain and in the lymphoreticular tissue of the host. Accumulation in the tissue induces conversion of the normal prion protein molecules of the host to the modified form.

In UK, BSE has been diagnosed in dairy herds more commonly than in suckler herds (Wilesmith et al 1992b). For example, in June 2003 the confirmed dairy herd incidence in the UK was 61.9 % and the confirmed suckler herd incidence 17.3 %. Among all confirmed cases in Great Britain, 80.8 % were dairy cattle (DEFRA 2003).

5.2.1. Cattle as a route of infection

BSE-infection may be transmitted to the cattle population of the importing country through import of live cattle under two conditions.

First, the animal must be infected with BSE. The likelihood for imported cattle to be infected by BSE-agent depends mainly on the prevalence of the BSE-agent in the country of origin, the feeding practices and the relevant control measures applied in the country between the time of birth and export of the animal.

Secondly, after the disposal of the animal, infected material from its carcass must end up in the feed chain of cattle in the importing country. The likelihood for this depends mainly on risk management measures and practices related to feeding and to processing of risk material, on the efficiency of the BSE-surveillance applied in the importing country at the time of culling as well as on the way of disposal of the animal.

5.2.2. Feed as a route of infection

Bovine Spongiform Encephalopathy (BSE) is believed to be linked to the practice of re-cycling ruminant (cattle, sheep) carcasses to recover protein in the form of MBM, which has not been sufficiently processed to inactivate the infectious agent, and feeding the protein to ruminants. Hitherto, compounded cattle feed containing MBM has been the only common factor detected amongst all BSE cases in epidemiolocal studies (DEFRA 2001). The main factor influencing the spread of BSE among cattle has been referred / believed to be the intake of infective prion with MBM.

Before the removal of SRM from processed animal protein became obligatory, rendering plants used SRM materials including skull, brain and eyes for the extraction of animal fat and MBM. However, animal fat as a risk material is not yet clearly defined. The World Health Organisation (WHO) has concluded that because of the proteinaceous nature of TSE agents, they will tend to remain intact within the cellular residues of MBM during the extraction process, rather than being extracted with the

lipids of tallow (WHO 2001). Although rendering studies showed that tallow can be considered as less infective (MAFF 2001), the possibility cannot be excluded that small amount of proteinaceous residues can enter the tallow during processing and subsequently result in infection.

According to the review by DEFRA (2000) on the origin of BSE, in high producing dairy herds of the UK, calves were removed from the dam shortly after birth and reared artificially on “least cost” calf starter rations containing MBM in 1970 – 1988. This method of rearing young calves led to BSE exposure when animals were most susceptible to the disease. On the other hand, calves in suckler herds were allowed to suckle the dam freely and thus their exposure to BSE-risk agent was minimal. This assumption has also been substantiated in a computer simulation model, which indicated that the risk of exposure for calves was 30 times that of adults (Wilesmith et al 1988).

According to DEFRA (2001), the dose response or the threshold value of MBM agent to cause infection is not well known. However, it has been speculated that as low as 0.1 g of infected brain tissue containing the prion is sufficient to cause infection. Thus, even if the daily intake is low accumulative intake over time can trigger the disease just as well as a single dose.

5.3. Geographical distribution of BSE

The first cases of BSE were recognised in the UK in November 1986 (Wilesmith 1988). BSE was diagnosed for the first time in animals born outside the UK in Ireland (10 domestic cases in 1989 and 13 in 1990) and Switzerland (2 domestic cases in 1990). Since then, domestic cases of BSE have been recorded in all Member States of the European Union (EU) except Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta and Sweden. Outside the EU, domestic cases of BSE have been detected in Switzerland, Israel, Japan, and Canada (OIE 2004a).

Although cases of BSE have later been diagnosed in several other countries, the vast majority of all cases (98 % of BSE-cases until 31.12.2002) have been reported in the UK (OIE 2004a, OIE 2004b)

Since 2001, the number of detected cases of BSE has increased in most of the countries that were members of the EU before 1.5.2004 (EU-15 Member States) other than the UK. This coincides with the intensified monitoring for BSE required in the EU legislation since 2001.

5.3.1. Assessment of the GBR of Finland

The first assessment of the GBR of Finland was published by SSC in July 2000 (SSC 2000b). Finland was assessed on GBR level II, indicating that the presence of cattle being infected with the BSE-agent was unlikely but not excluded. After BSE was diagnosed in Finland in one indigenous animal in December 2001, the GBR of Finland was reassessed in 2002 (SSC 2002b). In this assessment Finland was placed on GBR level III, indicating that it has been confirmed that domestic cattle in Finland are (clinically or pre-clinically) infected with the BSE-agent at a lower level.

The updated assessment of GBR of Finland of the external challenge experienced by Finland concerned the years 1980 -2000; the year’s 2000 – 2001 was not assessed due to lack of data for these years. The outcome of the assessment is presented in Table 4.

The overall external challenge was considered to have been moderate in 1980 – 1985 and very high in 1986 – 2000. The overall assessment of the external chal-

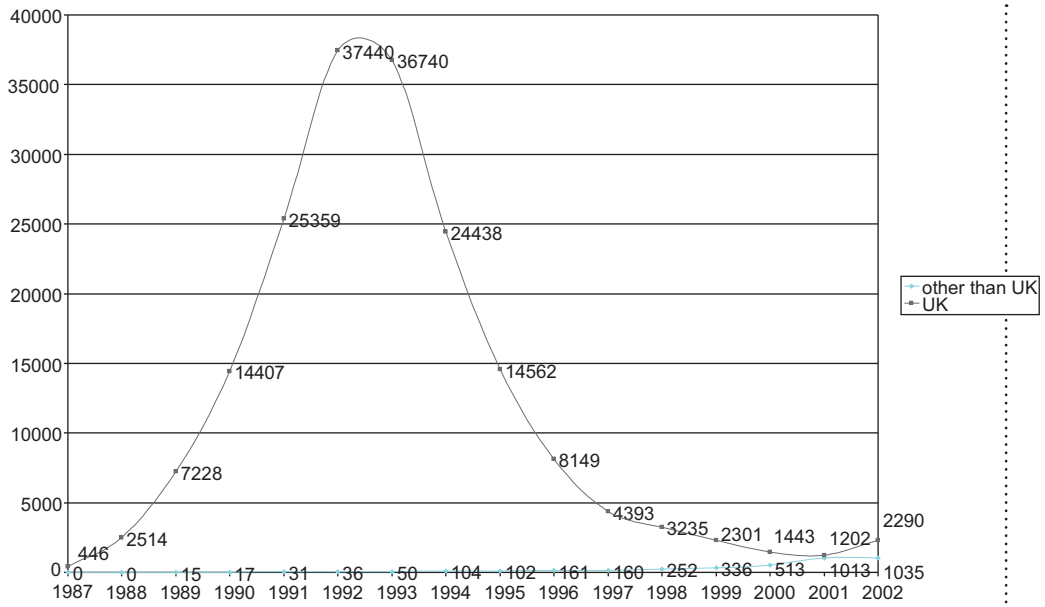

Figure 1.
Cases of BSE reported in the UK (183,191) and in other countries (3,825) until 1987 – 2003 (OIE 2004a, OIE 2004b)

lenge is mainly the result of import of MBM from BSE-risk countries. External challenge resulting from imports of cattle was considered either very low or negligible for most of the time covered. Only between 1986 and 1990 it was considered moderate, due to cattle imported from the UK in 1988 (SSC 2002b).

The outcome of the assessment of the stability of the BSE/cattle system in Finland over time according to the updated assessment of the GBR of Finland in 2002 is shown in Table 5.

5.3.2. BSE in countries relevant for release of BSE-agent into Finland

During 1980 -2002 there were imports of live cattle and/or MBM from 8 BSE-risk countries. The number of BSE-cases reported in the countries from which there has been import of cattle and / or feed in Finland between 1980 and 2003, as well as in the countries of origin of cattle and / or feed imported to Finland via these countries, is presented in Table 6.

According to SSC, only those exports that have taken place after the first internal challenge could possibly have been present in the exporting country shall be regarded as an external challenge to the importing country (Table 30, Annex 4). Fore a more detailed description of the GBR of countries from which cattle and/or feed were imported to Finland between 1980 and 2002 see Annex 4.

Table 4.
External challenge experienced by Finland according to the Scientific Steering Committee (SSC 2002b)

External challenge		Reason for this external challenge	
Period	Level	Cattle imports	MBM imports
1980-1985	Moderate	Very low	Moderate
1986-1990	Very high	Moderate	Very high
1991-1995		Very low	
1996-2000		Negligible	

Table 5.
Stability of the Finnish BSE/cattle system according to the updated assessment of the Geographical BSE Risk of Finland by the Scientific Steering Committee (SSC 2002b)

Period of time	Level of stability	Justification
1980 – 1995	Very unstable	According to SSC, there were no risk managment measure in force that would have significantly reduced the likelihood of risk material from infected animals to end up in feed chain and to be fed to cattle
1996 – 1997	Unstable	1996: Feeding reasonably OK. Ban on use of processed ruminant protein for feeding of ruminants came in force. Cross contamination still possible.
		1997: Surveillance of animals that showed CNS-symptoms at ante mortem inspection at slaughterhouses was started
1998 – 2000	Neutrally stable	1998: Rendering OK. All rendering plants applied 133°C / 20 min / 3 bar standard for processing animal waste
2001	Optimally stable	BSE surveillance: Large scale monitoring of risk animals and of cattle imported from countries with BSE cases since 1st January; also testing of normally slaughtered cattle over 30 months of age since 7.12.2001.
		SRM removal OK
		Feeding OK

Table 6.
Number of BSE cases reported up to 31.12.2003 in countries from which cattle and / or feed were imported to Finland between 1980 and 2002 (OIE 2004a, OIE 2004b).

Country	Before 1988	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Total
Australia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Belgium	0	0	0	0	0	0	0	0	0	0	1	6	3	9	46	38	15	118
Denmark	0	0	0	0	0	1[a]	0	0	0	0	0	0	0	1	6	3	2	13
France	0	0	0	0	5	0	1	4	3	12	6	18	31	161	274	239	137	891
Germany	0	0	0	0	0	1	0	3	0	0	2	0	0	7	125	106	54	298
Ireland	0	0	15[b]	14[b]	17[b]	18[b]	16	19[b]	16[b]	73	80	83	91	149	246	333	183	1353
Netherlands	0	0	0	0	0	0	0	0	0	0	2	2	2	2	20	24	19	71
New Zealand	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United Kingdom[c]	446	2514	7228	14407	25359	37280	35090	24438	14562	8149	4393	3235	2301	1443	1202	1144	612	183803

[a] Imported case
[b] includes imported cases (5 in 1989, 1 in 1990, 2 in 1991, 2 in 1992, 1 in 1994 and 1 in 1995)
[c] including cases from Alderney, Great Britain, Guernsey, Isle of man, Jersey and Northern Ireland

6. Risk assessment

The focus of this risk assessment has been the risk posed by factual imports of live cattle and MBM into Finland and their use. Different exporting countries and different commodities have been scrutinised only regarding imports into Finland and can therefore not be compared to risk assessments concerning the other countries.

The risk of BSE to the Finnish BSE/cattle system is a combination of the situation as regards to BSE in the exporting country and the stability of the BSE/cattle system in the country between the time of birth of the exported animal and the time of export. Furthermore the risk management in Finland at the time of disposal of the imported cattle or the use of imported MBM is also important (Figure 2, Figure 3).

A basic assumption used in this assessment is that the imported animals have been a risk at the time they have possibly ended up in the feed chain, which is the year of disposal of the animal, not the year of import. We assume that the imported MBM has been used and posed a risk, in the year of import (Figure 4).

6.1. Available data

6.1.1. Data on imported cattle

There are several sources of information for statistics and individual data on cattle imported to Finland in 1980 – 2002. The type of data from different sources varies somewhat according to the purpose for which it has been collected.

6.1.1.1. Statistics of the Ministry of Agriculture and Forestry

The statistics on import of cattle of MMM in 1980 – 1994 are based on the import licences granted during this period. MMM did not keep records of the actual imports that took place at that time. All licenses were not necessarily used (FABA 2003), and in several cases less animals were imported than the import licence would have allowed, which can be confirmed by comparing the import licences granted by MMM with the number of cattle that were actually imported. The licenses were normally valid for three months. If the license was granted close to the end of the year, the import could have taken place during the next calendar year.

Import of cattle from other Member States has been allowed without an import license since Finland joined the EU in 1995. Since then, the statistics of MMM on internal trade of live cattle have been based on records of the importers and their statements of imports to MMM.

6.1.1.2. National board of Customs

Statistics of the National board of Customs (Customs) are used in this assessment

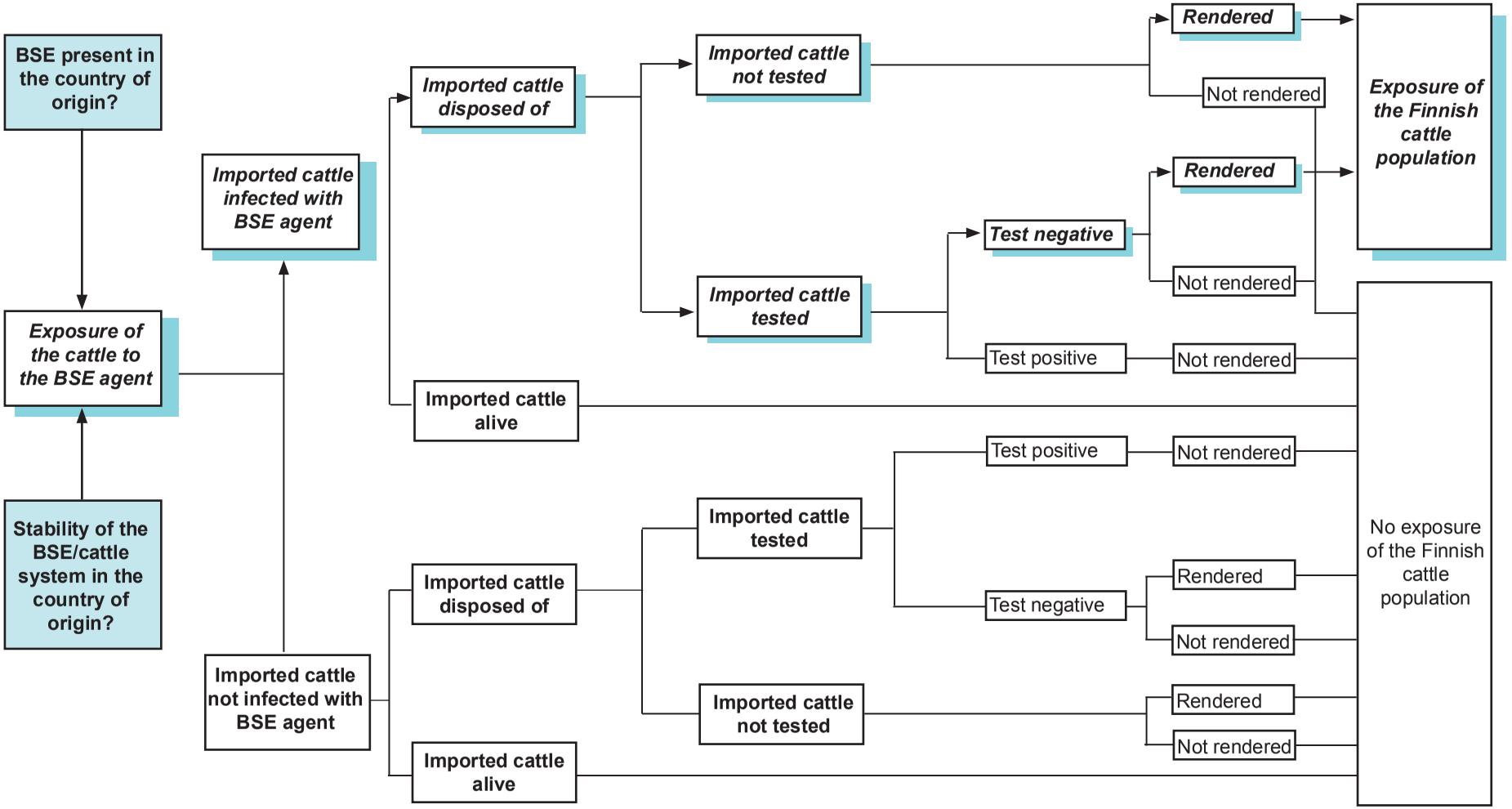

Figure 2.
A scenario tree for the exposure of the Finnish cattle population with BSE via imports of live animals.

Note: Arrowhead — path leading to exposure
Shadowed rectangle — event necessary for exposure
Shaded rectangle — BSE situation and stability in the country of origin
Rendered whole carcass or slaughter by products potentially used for production of MBM.
Not rendered whole carcass or slaughter by-products was not used for procuction of MBM.

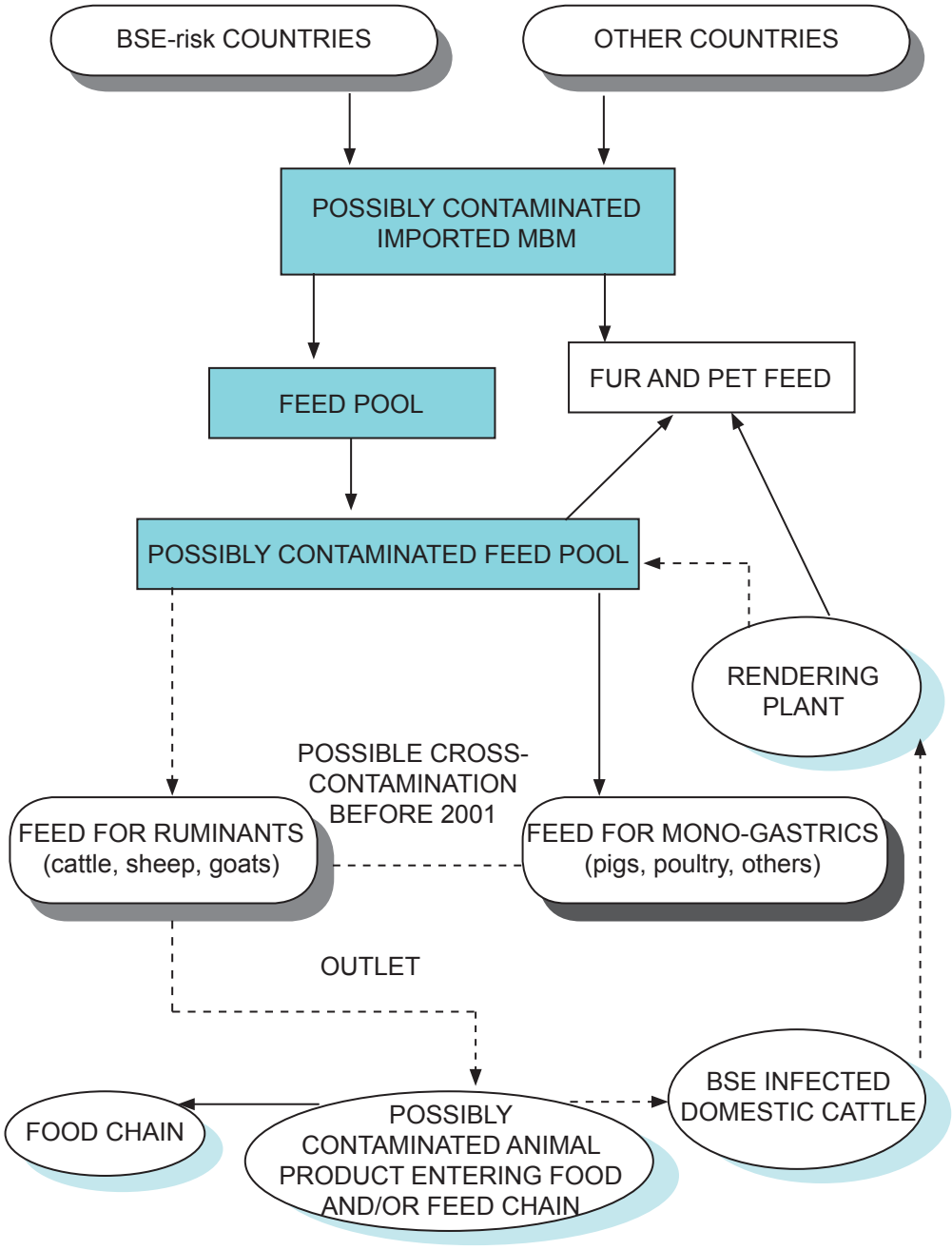

Figure 3.
Schematic presentation of recycling of imported MBM in animal feed chain.

Note: Broken lines indicate ruminant feed-chain

as a reference for the numbers and countries of origin of cattle imported in 1980 – 1994. During these years, practically all data concerning numbers, value and weight of live cattle imported to Finland was gathered in these statistics. This data was published each year in a yearbook. If the value of import of cattle from a certain country did not exceed the threshold value for publication for that year (20,000 FIM in 1980 – 1987, 50,000 FIM in 1988 – 1994), the exporting country was not specified in the publication. Even in this case the information was maintained by the Customs.

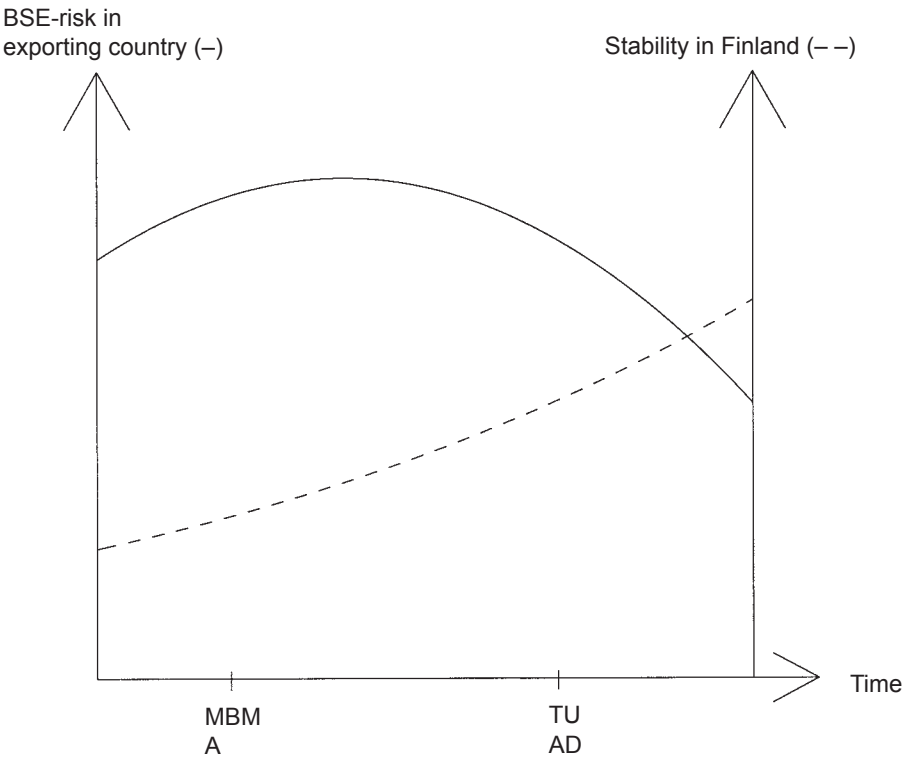

Figure 4.
The assessed risk is a combination of the situation as regards to BSE in the exporting country between the time of birth and export and the situation in Finland at the time of disposal of the imported cattle or the use of imported MBM.

Note:	Solid line	BSE risk in exporting country between the time of birth and the time of export of the animal
	Dotted line	Stability of the Finnish BSE/cattle system at the time of use of MBM and cattle disposal
	MBM	Time of import of meat and bone meal I
	A	Time of import of live cattle
	AD	Time of disposal of the imported cattle
	TU	Time of use of imported MBM in cattle feed

Since 1995, very little data on import of cattle has been gathered in the statistics of the Customs, since cattle from other Member States are no longer considered as import but as intra-community trade. There has been no import of cattle from countries outside the EU.

6.1.1.3. Central bovine database

In Finland, a system for registration and identification of individual bovine animals, the Central bovine database (CBD), has been in use since 1995. It has been approved by the Commission as fully operational according to the Council Regulation (EC) No 820/97 since 1 May 1999 (Commission Decision 1999/317/EC). The maintenance of CBD has been delegated by the MMM to the Agricultural Data Processing Centre (ADPC), a private company run by several farmer associations. All information on birth, death or slaughtering and movements of each individual bovine animal must be notified to the database by the holdings, dealers and slaughterhouses.

CBD contains specific data on individual imported bovine animals, e.g. information on origin, breed and time of birth, import and disposal. In certain cases, however, information is limited. In 1995, when the database was founded, information on animals was collected retrospectively for cattle that were alive at that time. For these animals, the exact time of import was only seldom available, and even the information on the event of import itself was not always entered into the database. These animals have been determined as imported because their herd of origin is in another country. The names of animals are also indicative of a foreign origin. The information on country of origin of imported animals has been mandatory for cattle imported since 1998. Very little information is available in the CBD on any individual cattle that were disposed of before its foundation in 1995.

Before the reorganisation of CBD, the information on individual animals was kept in the active database of CBD for three years plus the ongoing year after culling of the animal. After that, the information was removed from the active database to the archives of CBD where it can still be obtained by the ADPC. Unfortunately, there were practical limitations to access to the archives of CBD in the framework of this project, since a large-scale reorganisation of CBD was in progress at the same time as information for this assessment was collected.

6.1.1.4. Finnish Animal Breeding Association

The Finnish Animal Breeding Association (FABA) has kept a herd book on breeding animals of beef breeds since 1974. Since practically all cattle imported to Finland before 1995 have been valuable breeding animals of beef breeds; almost all of them have also been registered in the herd book in Finland. The main purpose of the herd book is to maintain the information on the pedigree of the breeding animals and the time of birth is always registered, but in many cases it also contains at least approximate information on time of import and disposal of the animals, which have been used for this risk assessment.

The data kept by FABA has been especially valuable for providing detailed individual information on cattle imported from the UK and tracing their herds of origin.

6.1.1.5. National Food and Veterinary Research Institute

Before Finland joined the EU in 1995, import of cattle was subject to national requirements. One of these requirements was that cattle had to be kept in quarantine in Finland for a given period of time after their import. During the quarantine, serological and faecal samples were taken from the animals for examination for infectious diseases, according to the conditions laid down in the import license granted by MMM. Most of the samples were examined by the State Veterinary Institute (VELL), which was the predecessor of the National Food and Veterinary Research Institute (EELA).

Copies of the results and other documents related to the BSE examinations covering the period 1980 -2002 have been kept in the archives of EELA. These documents have been used for completing and revising the data (e.g. dates of import and number of heads) concerning cattle imported to Finland before 1995.

Information on BSE-testing of the individual animals has been provided by the Department of Pathology (for years before 2001) and the Department of Virology (since 2001) of EELA.

6.1.1.6. Association for animal disease prevention in Finland

The Association for animal disease prevention in Finland (ETT) was founded in July 1994 in order to maintain the good situation regarding contagious diseases of farm

animals that was challenged by the common market of the EU. ETT is a voluntary association, which includes most of the Finnish beef, dairy and feed industries and farmer unions as its members. One of its main activities consists of giving advice and setting requirements on import of farm animals. The members of the association make agreements with their producers to comply with the rules of ETT. Since ETT involves most of the farm animal sector in Finland, practically all cattle imports to the country since 1995 have taken place according to its requirements.

ETT keeps its own records on import of farm animals, feed, semen and embryos that have taken place in the framework of its requirements. The records of ETT have been used in this assessment to verify details of imports of cattle that have taken place since 1995.

6.1.1.7. Ministry of Agriculture, Fisheries and Food (UK)

The Ministry of Agriculture, Fisheries and Food (MAFF) was the former competent authority responsible for food safety and veterinary issues in the UK. On a request from MMM, MAFF has provided information on individual cattle imported from the UK, especially on the BSE status of their herds of origin and the birth cohorts. The Department for Environment, Food and Rural Affairs (DEFRA), the successor of MAFF, has also provided data on the confirmed cumulative incidences of BSE in different birth cohorts in beef herds in the UK, which has been helpful in the estimation of risk related to import of cattle from the UK.

6.1.1.8. Owners of imported cattle

For cattle imported from the UK, supplementary information on the time and method of disposal of the animals has been provided by their importers and owners. Most of this data has been gathered by MMM directly from the owners between 1996 and 1999. In this report, it has been used to complete the data from other sources.

6.1.2. Data on imported feed

Information on the imported PAP into Finland between 1980 and 2002 was compiled from various statistical sources and compared. However, there are distinct differences between the import amounts of PAP recorded by the different institutions and also in the use of different types of PAP in feed formulation.

6.1.2.1. National Board of Customs

The document from the Customs provides information on annual import of PAP that includes by-products of both land and marine animals. These products were meals and flours of meat, offal (including marine animals), and greaves as one category of PAP and were coded as CCCN 23011000. The data did not include separate values for individual items but instead subsumed them in the category of flours and meals of meat, greaves, fish and other marine animal offal unfit for human consumption. Bone and horn-cores were put into a different group of the same category and were coded as CCCN 0508000. This record gives a total import amount including large proportions of animal tissue by-product also used in fertiliser production. Customs documents do not provide information on how imported MBM was utilised by the feed mills or fur animal producers. Therefore, it was not considered as representative data to be used for this assessment.

6.1.2.2. National Archive Service

The information available at the National Archive Service reveals permits granted by the MMM for importing PAP. The permits granted show the occupations of the

applicants, the country of import, rendering plant and the type of PAP. In the import permits, the use of the MBM was described as" for animal feeding" without specifying the species of the animal except when it was imported for feeding fur animals. The permit does not always specify the amount of MBM to be imported, the processing temperature, the origin of the processed raw material or from which animal species' offal it was processed. Thus, the information available at the national Archives was not considered sufficient for the assessment of BSE-risk related to MBM import.

6.1.2.3. Board of Agriculture

The information available in the Publication of the Board of Agriculture provides figures on imported MBM for animal feeding until 1986, as one of the feed proteins imported to Finland (Publication of Board of Agriculture No: 403). It does not include other PAP or provide information concerning either exporting countries or the type of animal it would be used. Nevertheless, since the publication was a source of annual statistics concerning milk-recording herds, based on the information available, it could be expected that the MBM imported until 1986 was used in feed for milking cows or young stock. Since there is no information on the import data for the period between 1987 and1990 or on the use of imported MBM in animal feed formulation, the data source was not used for this assessment.

6.1.2.4. KTTK

The information available at KTTK provides data on annual import of PAP and total amount of feed produced per year for the period of 1980 – 2002. The data also partially provides the raw material that has been available to the various feed mills for cattle feed formulation. All feed importer/brokers and feed mills are required to report bi-annually to KTTK the amount of imported feed material, raw materials used in feed formulation as well as the amount of feed produced. However, documents concerning the annual production amount of individual feed mills, the feed produced per feed ingredient certificate issued each year and the exact proportion of imported MBM used in cattle feed for the period between 1980 and 1990 was not available. Particularly a database (Focus) for the production years 1989 and 1990 was used in scenario B_1 to extrapolate for 1983 – 1988 and 1991 and 1995 (see section 6.3.2). Nevertheless, KTTK's data was selected for this assessment because of its wider information on imported MBM, including amounts of cattle feed produced and their MBM contents.

6.2. Release assessment

6.2.1. Import of cattle

Import of live cattle to Finland to 1980 – 1994 was characterised especially by two features: rigorous control of import by the central competent authority and import of breeding animals of beef breeds.

Between 1980 and1994, before Finland joined the EU, the only countries from which live cattle were imported to Finland were Denmark, Sweden, UK and Norway (Table 7). In order to protect the animal health situation in Finland, import of live farm animals was strictly controlled (see Annex 3). Imports of live cattle were subject to an import licence by MMM, and preventive vaccination against foot and mouth disease alone restricted imports of cattle from most of the EU Member States. The number of breeds that were granted import licences before 1995 were restricted to only a few breeds (MMM 2003).

Reasons related to breeding of cattle had an effect on the countries from which animals could be imported: not only did these countries have to fulfil the veterinary requirements of MMM but they also had to have high quality breeding cattle available for export. Import licences were not granted for cattle, which were considered to be of low breeding value. For the same reason, cattle were in general imported at the age of 1 – 2 years, the age that was considered optimal with regard to their breeding value (Puonti 2002). The number of breeds was limited and import of new breeds to Finland was not encouraged (MMM 2003).

Imported cattle were relatively expensive. For example in 1987, the average value of cattle imported from UK to Finland in 1987 per animal (transport expenses excluded) was 32,786 FIM (Customs 2002), which corresponds to a value of 8,194 € in 2002 (Statistics Finland 2003). In the meantime, even 23,500 FIM that was paid for a Hereford bull in an auction in Finland in the same year was considered to be a very high price (Vehmaan-Kreula 1987). The price of the animals has probably been a limiting factor for import of live cattle to Finland.

Since 1995, cattle have been imported from other countries as well, but Sweden and Denmark have remained the most significant countries or origin of cattle imported to Finland. No cattle have been imported from third countries (Table 7).

A characteristic feature of import of cattle since 1995 has been the introduction of new breeds. Over a half of all cattle imported in 1995 – 2002 have been of the Highland breed (ETT 2003). Other breeds that were introduced in Finland only after 1994 include Jersey, Dexter and Blonde d'Aquitane. Bisons have been imported to Finland since 1998, but the number of bisons imported to Finland annually has been declining and the total number of bisons imported to Finland by 31.12.2002 was less than one hundred animals (MMM 2003).

With few exceptions, all cattle imported between 1980 and 2002 were breeding animals of beef breeds. Since 1993, dairy cattle were also imported, especially from Sweden, but their proportion and numbers have remained low compared to beef breeds.

Estimates of the likelihood that imported cattle could be infected by BSE are based on the GBR-assessments by the SSC on each of the countries of export. These assessments are briefly described in Annex 4.

Due to the differences between the data on the number of imported cattle provided by different sources, one source had to be chosen for point of reference for each year. For the reasons described in section 6.1.2, the statistics of the Customs were chosen as a reference for the number of cattle imported between 1980 and 1994 and the statistics of MMM between 1995 and 2002.

For cattle imported before 1998 for which the information on the country of origin is not available in the CBD, the country of origin has been estimated on the basis of their names and other data. These cattle include 225 animals imported from Denmark and 23 imported from Sweden. For one animal the country of origin could not be assessed on the basis of the available information. The individual data concerning this animal has not been used as material for this work, even though its date of birth and date of disposal are known.

It is assumed that cattle imported to Finland were born and kept solely in the country of origin before their import, 16 cattle imported to Finland in 1980 – 2002 are known to have been born in a different country than that from which they were exported to Finland. These include 10 animals of French origin (4 Limousine cattle imported from Denmark, 6 bisons from Belgium), 4 of Austrian origin (4 Simmental imported from Denmark) and 2 of Canadian origin (1 Hereford imported from Sweden and 1 Aberdeen Angus from Denmark). It is estimated that the BSE-risk related

to import from France is more significant than the risk of the imports from Denmark or Belgium and the cattle of French origin are therefore considered as French and dealt with in chapter 7.1.6. The cattle of Austrian and Canadian origin are dealt with in the chapters concerning import from Denmark and Sweden.

The year of import has been estimated for several cattle imported before 1995 for which the exact time of import is not available in CBD. The estimations are based on other data on these animals, such as date of birth and data on their breed and owner compared to the import licences granted by MMM during the period in question.

The basic principles used in estimation of the time of import and country of origin in cases where the exact data is not available in the CBD are presented in Annex 6.

6.2.1.1. Import of cattle from Belgium

Between 1980 and 2002, 51 bisons were imported to Finland from Belgium (Table 7). No cattle other than bisons have been imported to Finland from Belgium. The first import took place in 1998 (MMM 2003, ETT 2003). They were all imported during a period when it was considered probable that import of cattle from Belgium could have presented an external challenge to the importing country (SSC 2002a).

CBD contains individual data on the identity and fate of all 51 bisons imported from Belgium to Finland. 6 of the bisons imported in 1999 are known to be of French origin (CBD 2003) and are therefore dealt with in the section concerning France.

6.2.1.2. Import of cattle from Denmark

Between 1980 and 2002, a total of 1002 cattle were imported to Finland from Denmark (Table 7) (Customs 2002, MMM 2003). 109 of them were imported during a period when it was considered possible that import of cattle from Denmark could have represented an external challenge to the importing country and 882 when it was considered to be likely (SSC 2002a). 11 of the animals imported from Denmark were bisons, all others apparently breeding animals of beef breeds. A licence for import of dairy cattle from Denmark was granted in 1994, but was apparently never used (Johansson 2003). Over 80 % of cattle imported from Denmark between 1995 and 2002 were of the Highland breed (ETT 2003).

Cattle imported from Denmark represent over half of all cattle imported to Finland between 1980 and 2002. Before 1994, Denmark was the most important country for import of live cattle to Finland: between 1980 and 1994 74 % (728 out of 989) of imported cattle came from Denmark (Customs 2002). After 1994 the import of cattle from Denmark has declined both absolutely and proportionally: in 1995 – 2002 it accounted for less than 30 % (279 out of 984) of cattle imported to Finland (MMM 2003).

Among the cattle imported from Denmark between 1980 and 2002, 4 are known to be of French origin. They are excluded from this chapter and dealt with in the section concerning France.

Since most of the cattle imported from Denmark between 1980 and 2002 were imported before 1995, there is lack of data on individual cattle in the CBD. Individual data is available for 566 cattle, covering at least the identity (Cattle identification number), breed and sex of the animals. The date of birth is known for 549 cattle. Of these, 339 are reported in the CBD to be of Danish origin, and 228 cattle are recognised as being imported from Denmark on the basis of their name or other information. The date of disposal is known for 282 cattle and estimated for 10 cattle (for the principles used in the estimation, see Annex 6). 267 cattle imported from Denmark were alive on 31.12.2002.

The year of import is known for all cattle imported since 1995 for which there is

Table 7.
Import of cattle to Finland in 1980 – 2002. (Data for 1980 – 1994 provided by Customs, for 1995 – 2002 by MMM)

Country of origin	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
Belgium																			12	19	13	7		51
Denmark		11						3	8	98	210	209	144	23	22	6	17	28	59	60	14	12	78	1,002
France																							3	3
Germany																			23	33	27		14	97
Netherlands																				20			4	24
Norway						1									8									9
Sweden				37	33						40	12	1	6	7	79	21	38	66	36	42	64	190	672
Switzerland															1*									0
UK				2	22	37	8	14	32															115
Total	0	11	0	39	55	38	8	17	40	98	250	221	145	29	37	85	38	66	160	168	96	83	289	1,974

Note:
* This animal would have belonged to the category “other than purebred animals” in the harmonised nomenclature used by the Customs. No other document has been found that would support the information that any cattle would have been imported to Finland from Switzerland.

data in CBD (269 animals). For cattle imported earlier (289 animals in CBD), the exact year of import is not always available in the CBD. In these cases, the time of import has been estimated based on other data, such as the time of birth (imported cattle most often 1 – 2 years old) (Puonti 2002) and the breed e.g. Simmentals were not imported before 1990 (MMM 2003) of the animal. In some cases the time of birth has been estimated on the basis of a known owner and the import licence granted by MMM.

Cattle imported from Denmark in 1980 – 1984

According to SSC, the internal challenge with regards to BSE in Denmark probably started in 1985 (SSC 2002a). It is therefore unlikely that import of cattle from Denmark before 1985 presented a risk of release of the BSE-agent to the Finnish cattle population.

Between 1980 and 1984, a total of 11 cattle were imported to Finland from Denmark, all in 1981 (Customs 2002). Import of cattle from Denmark was interrupted in 1982 because of an epidemic of foot and mouth disease (Heinonen 2003). The imports did not start again until 1987 (Customs 2002).

Cattle imported from Denmark in 1985 – 1989

According to SSC, it is possible that export of cattle from Denmark in 1985 – 1989 presented an external challenge with regards to BSE to the importing country (SSC 2002a).

Between 1985 and 1989, 109 cattle were imported from Denmark to Finland (Customs 2002). There was no import of cattle from Denmark in 1985 or 1986.

Cattle imported from Denmark in 1990 – 2002

According to SSC, it is probable that export of cattle from Denmark since 1990 could have represented an external challenge with regards to BSE to the importing country (SSC 2000a).

Between 1990 and 2002, 882 cattle were imported from Denmark to Finland (Customs 2002, MMM 2003). Among the cattle imported from Denmark between these years, 4 were of French origin, 4 of Austrian origin and one of Canadian origin. For the cattle of French origin, see the following section.

6.2.1.3. Import of French cattle

The total number of French cattle imported to Finland between 1980 and 2002 was 13 (Table 7). They were all imported during a period when it is considered probable that import of cattle from France could have presented an external challenge to the importing country (SSC 2002a).

Before 2002 there was no import of cattle to Finland directly from France. In 2002, the first 3 cattle were imported to Finland directly from France. They are of dairy breed and one of them is of Danish origin. Some cattle that are known to be of French origin were imported to Finland from other countries before 2002. These animals include 3 Limousin bulls (2 imported in 1991 and 1 in 1995) and 1 Charolais bull imported in 1997 from Denmark, and 6 bisons imported from Belgium in 1999 (Customs 2002, MMM 2003).

6.2.1.4. Import of cattle from Germany

Between 1980 and 2002, 97 cattle were imported to Finland from Germany (Table 7). All cattle imported to Finland from Germany until 31.12. 2002 were of the Highland breed (ETT 2003). The first import of live cattle from Germany to Finland took place

in 1998 (MMM 2003). They were all imported during a period when it is considered to have been probable that import of cattle from Germany could have presented an external challenge to the importing country (SSC 2002a).

6.2.1.5. Import of cattle from Netherlands

Between 1980 and 2002, 24 cattle were imported from the Netherlands to Finland (Table 7). The first import of live cattle from the Netherlands to Finland took place in 1999, when 20 dairy cattle were imported as experimental animals. In 2002, 4 Highland cattle were imported from the Netherlands (MMM 2003). They were all imported during a period when it is considered to have been probable that import of cattle from the Netherlands could have presented an external challenge to the importing country (SSC 2002a).

6.2.1.6. Import of cattle from Norway

Between 1980 and 2002, 9 cattle were imported to Finland from Norway: 1 in 1985 and 8 in 1994

6.2.1.7. Import of cattle from Sweden

Between 1980 and 2002, 672 cattle were imported from Sweden to Finland (136 in 1980 – 1994 (Customs 2002) and 536 in 1995 – 2002 (MMM 2003) (Table 7). Between 1985 and 1989 there was no import of cattle from Sweden, mainly because of the risk of a Parafilaria bovicola –infection (Heinonen 2003). Since 1995, the average number of cattle imported each year from Sweden has increased, and the share of cattle imported from Sweden in 1995 – 2002 was 54.7 % of all imports of cattle in Finland during that period. The vast majority of cattle imported from Sweden are breeding animals of beef breeds, although approximately 20 % of cattle imported after 1994 have been of dairy breeds. A relatively large number of Highland cattle have been imported from Sweden: the proportion of Highland cattle of all cattle imported from Sweden in 1995 – 2002 in CBD is over 40 % (MMM 2003).

6.2.1.8. Import of cattle from Switzerland

According to the Customs, one bovine animal was imported from Switzerland in Finland in 1994 (Table 7). This animal would have belonged to the group of “other than pure bred breeding animals” in the harmonised nomenclature used by the Customs. No other document has been found that would support the information that any cattle would have been imported to Finland from Switzerland and therefore it is excluded from this assessment.

6.2.1.9. Import of cattle from the United Kingdom

Between 1980 and 2002, 115 live cattle were imported from the UK to Finland (Customs 2002, EELA 2003b). The imports took place between 1983 and 1988. One of the imported animals was re-exported to the UK soon after its import by an order from MMM (MMM 2003; personal communication from the importer). All imported cattle were breeding animals of beef breeds (MMM 2003).

In order to prevent the spread of BSE into Finland, MMM stopped granting licences for import of cattle from the UK in October 1988 (MMM 2003). The last import of 13 live cattle from the UK in Finland took place on 30 November 1988 (EELA 2003b)

Available data on cattle imported from the UK

The following information is available for all of the 115 cattle imported to Finland from the UK between 1980 and 2002: year of import, breed, importer, time and results

of examinations made during quarantine in Finland. The identity of 109 animals is known. Data on these 109 known cattle include information on name and the date of birth. Although the identity of 6 cattle is unknown, their importer, breed (all Hereford) and year of import (4 imported in 1984 and 2 in 1985) are known from the documents related to the import licenses. Copies of the pedigrees of cattle that were chosen for import are enclosed in the applications for the licences and kept by MMM. It is probable that the cattle that were actually imported are among these cattle. Information on the BSE-status of the herd of origin in the UK is available for 89 cattle (MAFF 2000)

The figures of EUROSTAT on cattle imported from the UK to Finland are the same as the figures of the Customs except for 1988, when according to EUROSTAT 45 cattle were imported, compared to 32 according to the Finnish Customs, EELA and to the information from the importers gathered by MMM. A licence for transit of 25 cattle from the UK to the Soviet Union through Finland was granted by MMM late in 1989. Even this is not likely to be the explanation, since the difference between the figures on import of EUROSTAT and the Finnish Customs concerns the previous year. No evidence has been found that would support the figure of EUROSTAT for import of cattle to Finland in 1988. Had the import of these 13 cattle missing from the statistics of the Finnish Customs taken place, it would have occurred without the knowledge of the Finnish Customs and without a licence from MMM. This is not very likely.

Time of import

According to the SSC, the risk of release of the BSE-agent through import from the UK was highest between 1988 and 1993, which corresponds to the peak of the BSE-epidemic in the UK (SSC 2000e). In practice the increase of the prevalence of BSE in the UK was gradual. Since the year of import of each of the 115 cattle imported to Finland from the UK is known, it is possible to regroup the data separately for each year of import.

Breed

The data on the breeds of cattle imported from the UK is based on a combination of data related to applications for licences of import (MMM 2003), and on the number of cattle imported in each consignment that can be found in the documents related to examinations of the cattle in the archives of the department of Virology of EELA (EELA 2003b). All cattle imported from the UK during 1980 – 2002 were of beef breeds: Hereford, Charolais and Limousine (Table 8).

The BSE-status of the herd of origin and the time of birth of possible confirmed case(s) detected and / or born in the herd of origin are known for 89 of the cattle imported to Finland from the UK. This data was provided to the MMM by MAFF in June 1999. Although the value of this information is only indicative, it can be used in estimating the probability of individual imported cattle to have been exposed to the BSE-agent in their herd of origin. The imported cattle can be divided into different groups according to the data on the BSE-status of their herd of origin and their 12 month birth cohort with relation to any possible BSE-case confirmed in another animal in the herd (Table 9). BSE-status of the herd of origin indicates whether any BSE cases have been confirmed in cattle born within the herd or in cattle purchased to the herd from another herd. Data on the birth cohort indicates whether the animal was born within 12 months (before or after) of the birth of a confirmed BSE-case.

Age at import

All cattle for which the time of birth is known (109) were imported before 3 years of age, the youngest just prior to 8 months of age. It seems probable that the unknown 6 cattle were imported within this same age span.

Table 8.
Cattle imported from the UK: different breeds (MMM 2003, EELA 2003b)

Year of import	Breed		
	Hereford	Charolais	Limousine
1983	2		
1984	22		
1985	25	5	7
1986		8	
1987		11	3
1988		10	22
Total	49	34	32

Table 9.
BSE-status of the herd of origin and birth cohort of cattle imported from the UK (MAFF 2000, MMM 2003).

BSE status of the herd of origin, birth cohort	Number of cattle
Homebred BSE case	
BSE case born within the 12 month cohort	17
BSE case born outside the cohort	27
Purchased BSE case	
BSE case in a purchased animal	
born within the 12 month cohort	4
born outside the cohort	4
no data on cohort	
other *	
born within the 12 month cohort	
born outside the cohort	4
no data on cohort	4
No BSE case connected to the holding of origin	27
No data available	28
Total	115

Note * owner and type of production of the holding has been changed after export of the animal

6.2.2. Import of feed

6.2.2.1. Import of processed animal protein

Imports of PAP and other feeds containing these products required an import permit from the MMM before Finland joined the EU in 1995 (see Annex 3). Import permits were granted for imports of MBM from certain rendering plants in Sweden, Denmark, the Netherlands, Germany and New Zealand. Permits were also granted for import of PAP from France, but only for use as an ingredient in pet food. Import permits have not been granted to rendering plants or for imports of feed containing PAP from the UK since 1980, except for pet food containing PAP as an ingredient. Agencies importing PAP for animal feed and also for fertiliser production, as well as feed mills using it, are required to report the import and its use to KTTK.

Records of the import of protein feed (oil seed cakes and meals, fishmeal and MBM) to Finland show that MBM has been imported as one of the protein feeds imported to Finland for several decades, starting as early as in 1940 (Publication of Board of Agriculture No: 403).

The total import of PAP between 1980 and 2002 was 369,904 tons (KTTK 1980 – 2002). The import of MBM is shown in Table 10 and that of liver, blood and feather meal in Table 11. In Finland, products such as blood, liver and feather meal have not been used in the formulation of feed for cattle and therefore these products are omitted from this assessment.

Table 10.
MBM (tons/a) imported to Finland between 1980 and 2002 by exporting countries (KTTK year book and annual reports 1980 – 2002). The amount of MBM used in feed for fur and pet animals was as reported by KTTK and feed mills.

Exporting countries	Year of import										
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
The Netherlands											
Total MBM	2,312	5,041	3,951	7,183	3,590	3,439	6,980	5,406	9,110	13,884	9,888
MBM Fur and pet*										0,16	3,105
MBM Fur**S											
Austria											
Total MBM	0,017										
Denmark											
Total MBM	1,022	1,288	0,022	0,311	1,796	4,344	4,079	10,688	13,248	9,746	4,045
MBM Fur and pet					0,509	0,712	0,114	0,620		0,030	0,497
Sweden											
Total MBM	0,276	0,583	0,207	0,042	1,025	0,315	2,052	4,857	2,215	3,309	4,096
MBM Fur and pet				0,040			0,602	1,295	0,292	1,332	
Germany											
Total MBM					0,035				1,100	0,001	
New Zealand											
Total MBM	0,232	0,503	0,357	0,346	0,416	0,472	0,0277	0,100	0,037	0,061	
Norway											
Total MBM							0,027				
France											
Total MBM											
Ireland											
Total MBM											
Australia											
Total MBM											
Unspecified §											
MBM Fur and pet*											1,717
MBM imported	3,859	7,415	4,537	7,882	6,862	8,570	13,166	21,051	25,710	27,001	18,029
Total MBM for Fur and pet				0,040	0,509	0,712	0,716	1,915	0,292	1,522	5,319

Note: No MBM was imported in 2002; MBM = includes meat meal and meat and bone meal; §1,643 tons of MBM was imported from unspecified country in 1997.

Sources: Fur and pet = MBM imported for fur and pet feed production (KTTK laboratory results 1980-2002), Fur and pet* = MBM used for fur and pet feeding reported by feed mills and feed mixers (KTTK archives 1980-2002), Fur**S = sheep MBM imported from the Netherlands used for fur animal feeding (KTTK archives 1980 – 2002)

6.2.2.2. Import of MBM

The largest proportion of MBM import to Finland was from BSE-risk countries. Of the total import of MBM between 1980 and 2002, 47 % was imported prior to the ban of the use of imported MBM in ruminant feed in 1990 and the rest, 53 %, was imported after 1990. The latter was used directly for the formulation of feed for mono-gastric animals until 12.12.2000. According to KTTK, no MBM was imported to Finland in 2002.

Year of import												Total import per country
1991	1992	1993	1994	1995	1996	1997*	1998	1999	2000	2001	2002	
1,903	5,615	7,847	8,432	6,820	1,124	0,080	1,811	1,389				105,805
0,025	4,751	3,487	5,153		0,403	0,703	0,102					17,889
			0,021									0,021
												0,017
6,014	7,994	6,551	10,140	0,317	0,248	2,927	2,372	0,244	0,972			88,368
0,650	1,376	0,898	0,476		0,031	0,875	1,568					8,356
3,511	3,242	5,589	11,644	9,701	9,884	8,868	7,993	12,432	8,592	0,168		100,601
0,501	3,320	0,033	0,388		0,654	0,83	0,027					9,314
	0,034	0,066	0,047		0,050	0,072	0,144					1,549
									2,493	0,707		5,752
							0,327					0,354
			0,011			0,085	0,015	1,000				1,111
					0,025							0,025
				0,025			0,397					0,422
						1,643						1,643
1,966	4,207				0,317			0,219				8,426
11,428	16,885	20,053	30,274	16,863	11,331	13,675	13,059	15,065	12,057	0,875		305,647
3,142	13,654	4,418	6,038		1,405	2,408	1,697	0,219				44,006

Table 11.
Imports of meals produced from liver, blood and feather (tons/a) to Finland between 1980 and 2002 by exporting countries (KTTK year book and annual reports 1980 – 2002).

Exporting countries	Year of import										
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
The Netherlands											
Blood meal	0,195	0,442	0,975	1,002		0,845	0,600		0,181	0,065	0,025
Liver meal		0,185					0,017				
Feather meal			2,453	1,382	1,727	1,382	1,120	1,581	0,850	1,108	0,598
Austria											
Blood meal											
Denmark											
Blood meal	1,909	1,303	1,033	0,746	0,627	1,101	1,078	0,912	0,845	0,717	0,434
Liver meal		0,060									
Feather meal	0,140	0,025	0,004							0,091	
Sweden											
Blood meal			0,573	0,813	0,572	0,634	0,419	0,377	0,080		
Feather meal									0,024		
Germany											
Blood meal			0,182		0,362			0,023			
Liver meal	0,262	0,016		0,222							
Feather meal					0,350	0,054					
New Zealand											
Blood meal					0,420			0,053			
Liver meal	0,498	0,911	0,841	0,842	1,017	0,663	0,330	0,212	0,302	0,185	0,033
Feather meal				0,054					0,850		
Norway											
Blood meal											
France											
Liver meal											
Ireland											
Blood meal											
Feather meal	0,039										
Australia											
Liver meal											
The United Kingdom											
Liver meal							0,018				
Feather meal											
Total blood meal	2,104	1,745	2,763	2,561	1,981	2,580	2,097	1,365	1,106	0,782	0,459
Total liver meal	0,76	1,172	0,841	1,064	1,017	0,663	0,365	0,212	0,302	0,185	0,033
Total feather meal	0,179	0,025	2,457	1,436	2,077	1,436	1,120	1,581	1,724	1,199	0,598
Total	3,043	2,942	6,061	5,061	5,075	4,679	3,582	3,158	3,132	2,166	1,090

Import from BSE-risk countries

The Netherlands was on of the main country exporting MBM to Finland. Of the total import of MBM coming from the Netherlands, 69 % was prior to 1990. The second largest exporting BSE-risk country was Denmark (Table 10). More than half of the total import of MBM from Denmark was prior to 1990.

Besides these two countries, Germany, France, Ireland, and Austria were BSE-risk

1991	1992	1993	1994	1995	1996	1997*	1998	1999	2000	2001	2002	Total import per country
	0,041		0,105	1,218	0,668	0,027	0,732	0,795	0,943			8,859
												0,202
0,170						0,237						12,608
					0,020							0,020
0,509	1,224	1,617	1,466	0,004	0,200	1,094	1,000	0,40	0,381			18,604
												0,060
												0,260
	0,933	0,782	0,757	0,589	1,296	0,837	0,879		0,040	0,182		9,763
												0,024
						0,175						0,742
	0,021	0,056	0,244	0,071	0,218		0,075					1,185
			0,005							2,493		2,902
												0,473
0,034												5,868
												0,904
								0,208	1,078			1,286
								0,014				0,014
					0,390							0,390
												0,039
					0,025		0,025					0,050
												0,018
											0,049	0,049
0,509	2,198	2,399	2,328	1,811	2,574	2,133	2,611	1,407	2,442	0,182	0,049	40,186
0,034	0,021	0,056	0,244	0,071	0,243	0	0,100	0	0	0		7,383
0,170	0	0	0,005	0	0	0,237		0		2,493		16,737
0,713	2,219	2,455	2,577	1,882	2,817	2,370	2,711	1,407	2,442	2,675	0,049	64,320

countries that exported MBM to Finland. The import of MBM from France and Ireland occurred after the ban of the use of imported MBM in cattle feeding and that from Austria was in 1980, when MBM was not used in cattle feeding.

According to KTTK, no MBM or MBM-containing feed was imported from the UK for cattle feeding. Pet food and some aromatic substances containing PAP were however imported for feeding non-food producing animals.

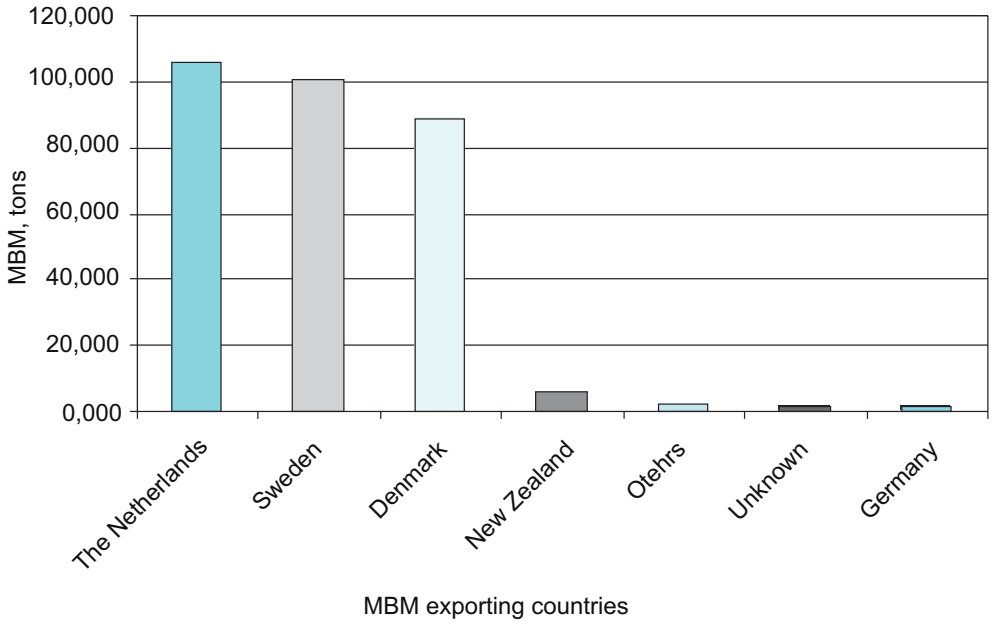

Figure 5.
Major MBM exporting countries to Finland between 1980 and 2002. Unknown represents an import of 1,643 tons of MBM in 1997 for which no specifics were given (KTTK year book and annual reports 1980 – 2002).

Other countries
Between1980 and 2002, MBM was also imported to Finland from other countries such as Sweden, New Zealand, Australia and Norway (Table 10).

6.2.2.3. Import of milk replacers

Between 1980 and 2002, milk replacers were imported to Finland from Denmark, Germany, the Netherlands and Sweden (Table 12). Milk replacers were not imported to Finland between 1984 and 1994. About 99 % of the total import occurred after 1997. The largest annual import of milk replacers occurred in 1999 and in 2002. Denmark and the Netherlands were the largest exporting countries of milk replacers to Finland (KTTK 1980 – 2002).

Milk replacers imported from the Netherlands and Sweden contained fat of plant origin, mainly vegetable oils, whereas the milk replacers imported from Germany contained mixed fat (fat from ruminants and swine). The milk replacers imported from Denmark contained mixed fat until the year 2000, after which plant/vegetable oil was used (KTTK 1980 – 2002).

6.2.2.4. Import of animal fat

Denmark was the major exporting country of animal fat to Finland, followed by Sweden and Germany. Other exporting countries were the Netherlands, France, and USSR. There were also some imports of animal fat from unspecified countries in 1992 and in 1996. A total of 0,446 tons of animal fat was also imported from the UK in 1985 (Table 13). The composition of the imported fat was not specified but it is assumed to be a mixture of cattle, sheep and swine fat (KTTK 1980 – 2002).

6.2.2.5. Import of slaughter offal

According to the yearbook of KTTK (1980 – 2002), the largest import of slaughter

Table 12.
Milk replacers (tons/a) imported to Finland between 1980 and 2002 (KTTK year book and annual reports 1980 – 2002).

Year of import	Exporting countries			
	Sweden	Germany	Denmark	The Netherlands
1980		0,005	0,001	
1982		0,001		
1983		0,003		
1995			0,002	
1996	0,095			
1997			0,005	0,151
1998			0,095	0,452
1999			0,246	1,095
2000			0,148	0,055
2001	0,148		0,344	
2002	0,406		6,696	
Total	0,649	0,009	7,537	1,753

Note:
Milk replacer imported from Germany contained both ruminant and swine fat (mixed fat).
Milk replacer imported from the Netherlands and Sweden contained plant origin oil.
Milk replacer imported from Denmark contained mixed fat before the year 2000 and plant oil thereafter.

offal took place between 1980 and 1988 (Table 14). The main exporting countries were the Nordic countries - Sweden, Denmark and Norway. Before 1989, slaughter offal was also imported from New Zealand, the UK, the Netherlands, Belgium, Germany, Ireland, the USSR and unspecified countries. The imported slaughter offal was assumed to be a mixture of cattle, sheep and swine slaughter waste. Since 1992, slaughter offal was only imported from Sweden. In the reports of KTTK (1985, 86, 87, 88), it was stated that “the figures for the import of slaughter offal express the amount of import, which is proportional to the number of samples analysed by the State Institute of Agricultural Chemistry, not the whole import”. Therefore, the figures given in Table 14 for the import of slaughter offal may or may not represent the total import.

6.2.2.6. Import of miscellaneous feeds

According to KTTK, all compounded feed for cattle was formulated and manufactured domestically. However, Finland imported 0,360 tons of dairy concentrate from Estonia between 1986 and 2002. Dairy concentrates imported prior to the adoption of the microscopic testing method for the detection of MBM in feed and feed materials in 1997 were not tested for MBM. According to the documents accompanying the import issued by the exporting country, the dairy concentrates did not contain MBM. According to KTTK, dairy concentrates imported after 1997 were sampled during the quarantine period before permits were granted for their use. The samples from the dairy concentrate were microscopically examined for MBM and were found to be negative.

Other compounded feed / products imported to Finland were used for horses, fish and pets.

Table 13.
Animal fat (tons/a) imported to Finland between 1980 and 2002 (KTTK year book and annual reports 1980 – 2002).

Year	Exporting countries							
	The Netherlands	Denmark	Sweden	Germany	The United Kingdom	USSR	France	Unidentified
1980			0,484	0,023				
1981								
1982								
1983								
1984			0,095					
1985		0,127	0,122		0,446			
1986			0,368	0,407		0,227		
1987			0,029	0,132				
1988								
1989	0,008	0,120	0,030	0,004				
1990				0,132				
1991								
1992	0,060							0,059
1993								
1994								
1995								0,017
1996	0,800	5,040		0,276			0,004	
1997		5,410						
1998								
1999		0,921	0,027					
2000		0,752	0,285					
2001			2,701	1,594				
2002								
Total	0,868	12,370	3,657	2,568	0,446	0,227	0,004	0,076

Note: USSR = Soviet Union

6.2.2.7. Traceability problems associated with imported processed animal protein

The import permits issued by the MMM before Finland joined EU in 1995 required the imports of MBM to originate from a specified rendering facility in the country of origin (MMM 2004). Thus, this assessment is based on the assumption that the MBM imported from a certain country also originated from that country. However, the import permits issued by the MMM or the documents accompanying the imports had no requirements concerning the origin of the animals that constituted the raw material for the imported MBM.

Import permits for mammalian origin PAP and feed containing these products originating from the UK have not been issued since 1980, except for hydrolysed feather meal used in pet food. In addition, since the adoption of the Commission Decision 96/239/EC on 27 March 1996, it has been illegal to export processed mammalian protein from the UK. Customs statistics however show documentation for the imports of MBM from the UK to Finland in 1984, 1985, 1998 and 2002 (Table 34). Other sta-

Table 14.
Slaughter offal (tons/a) imported to Finland between 1980 and 2002 (KTTK year book and annual reports 1980 – 2002).

Year of import	Exporting countries											
	Norway	Sweden	Germany	Denmark	The Netherlands	Belgium	Ireland	Austria	The United Kingdom	USA	New Zealand	USSR
1980	2,795	18,605	1,479	17,478		0,025			0,032			
1981	5,703	19,611	1,120	16,475	0,278							
1982	5,065	33,901	0,517	16,112				0,046	0,107	0,054	0,222	5,065
1983	4,036	52,120	0,049	5,427								
1984	4,540	24,040	0,049	5,592	0,001				0,285			
1985	4,340	26,357		16,825					0,040		0,651	
1986	4,266	26,708		7,600	0,455						0,206	
1987	5,224	22,981		13,039	0,510		0,039		2,140		0,062	
1988	3,612	17,910		3,816	0,132							0,026
1989	1,452	4,467		0,673								
1990		1,385		0,022								
1991		1,499		0,026								
1992		1,927										
1993		1,449										
1994		1,213										
1995		4,218										
1996		2,252										
1997		3,225										
1998		0,983										
1999		0,448										
2000		2,397										
2001		2,996										
2002												
Total	41,033	243,692	3,116	103,085	1,376	0,025	0,039	0,046	2,604	0,054	1,141	5,091

Note: USA = United States of America; USSR = Soviet Union; “the figures for the import of slaughter offal express the volume of import, which is proportional to the number of samples analysed by the State Institute of Agricultural Chemistry, not the whole import”.

tistical sources also show MBM import from the UK to Finland in 1984, 1992, 1993, 1994 and 1996 (Table 32). According to KTTK, the import of 0, 49 tons PAP in the year 2002 was later clarified as feather meal, whereas the imports in 1984 and 1985 were not identified.

6.3. Exposure assessment

6.3.1. Disposal of imported cattle

The likelihood that an imported animal infected with BSE could transmit the infection to the Finnish cattle population depends mainly on the risk management measures in force in Finland at the time of its disposal. If the time of disposal of an individual animal is known, the possibility of the release of the BSE-agent to the Finnish cattle population via this animal can be estimated on the basis of the assessment of the stability of the Finnish BSE/cattle system at that time by SSC (see section 5.3.1. and 5.3.2.). A simplification of the relation of the time of disposal of the animal to the risk of release of the BSE-agent from it is presented in Table 15. The Table is based on the assessment of the stability of the BSE/cattle system in Finland by SSC (SSC 2002b).

Because of a change in the risk management measures for cattle imported from the UK in 1996 (MMM 1996), this estimation is applicable to them only if they have been disposed of at the latest in 1996. For estimation of the BSE-risk related to cattle imported from the UK, see the section concerning the fate of cattle imported from the UK.

The basic principles used in the estimation of the time of disposal of cattle for which the relevant data is not available are presented in Annex 5.

Table 15.
Relationship between the time of culling of the imported animal to the risk of transmission of the BSE-agent to the Finnish cattle population

<table>
<tr><th rowspan="2">Time of culling of the animal</th><th colspan="3">Risk management measures in force in Finland with the aim to prevent the release and propagation of BSE in the Finnish cattle population</th></tr>
<tr><th>Feeding</th><th>Surveillance</th><th>Removal of specified risk material</th></tr>
<tr><td>Before 1996</td><td>None</td><td rowspan="2">Passive surveillance</td><td rowspan="4">None</td></tr>
<tr><td>1996</td><td rowspan="3">Ban on use of processed ruminant protein for feeding of ruminants</td></tr>
<tr><td>1997</td><td rowspan="2">Targeted surveillance of cattle with neurological symptoms at ante mortem inspection at slaughterhouses. Testing for BSE of all cattle imported from the UK; prevention of their entering the feed chain</td></tr>
<tr><td>1998 – 2000</td></tr>
<tr><td>2001 – 2002 or alive in 31.12.2002</td><td>Ban on feeding of processed animal protein for farm animals kept for the production of food</td><td>Testing of cattle over 20 months imported from BSE-risk countries at the time of culling; testing of cattle belonging to risk groups</td><td>Removal and destruction of specified risk material</td></tr>
</table>

In Finland, cattle that have died or been killed on the farm have traditionally been buried on the farm, because distances between farms and the few rendering plants are long and there was no organised collecting system for fallen stock before 2001. It is therefore assumed that risk material from fallen stock on farms has been much less likely to end up in the feed chain than risk material produced at slaughterhouses. There is little data available on the way of disposal of individual imported cattle. Unless there is data indicating that the animal died on the farm, it is assumed that it was slaughtered for human consumption. Emergency slaughtered animals are assumed to be as likely to end up in the feed chain as the animals send to normal slaughter.

The age at which cattle imported to Finland were disposed of (as of 31.12 2002) varied from 1 - 20 years with two peaks at 4 - 5 years and 9 - 10 years of age (Figure 6).

6.3.1.1. Fate of cattle imported from Belgium

None of the bisons of Belgian origin are thought to have entered the feed chain in Finland. 13 were disposed of before 31.12.2002 (9 in 2001 and 4 in 2002); all were tested for BSE with negative results. 32 were reported to be alive on 31.12.2002 (CBD 2003).

Rendering	**Effect of the risk management measures on the probability of an imported animal to transmit the BSE-agent to the Finnish cattle population**
None	None; all risk material could have been processed to MBM and fed to cattle
	Probability of bovine MBM to be fed to cattle is reduced but still possible through cross contamination
	Likelihood that clinical cases of BSE would be detected at slaughterhouses is improved
Application of 133°C / 20 min /3 bar standard for processing animal waste by all rendering plants	Probability of processed bovine MBM to contain infectious BSE-agent is reduced. Risk of infection in case of a cross contamination is reduced
	Probability of detecting BSE-cases is considerably improved, risk of transmission of infection in feed reduced to minimal. Even if the animal was infected by BSE, the possibility that it could transmit the infection to the Finnish cattle population is minimal

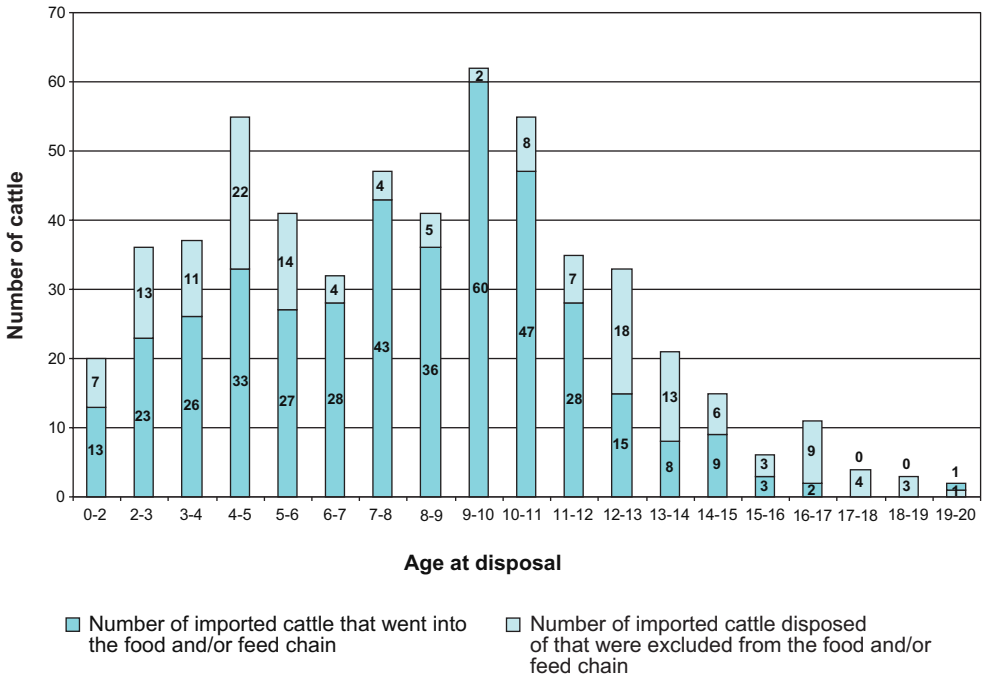

Figure 6.
The age at disposal for imported cattle for which the time of birth and time of disposal is known (CBD 2003).

6.3.1.2. Fate of cattle imported from Denmark

Cattle imported during 1980 – 1984
The time of disposal of the 11 animals imported in 1981 is unknown, but it is probable that they all went into the food- and/or feed chain in Finland before 1995.

Cattle imported during 1985-1989
The cattle imported between 1985-1989 of which there is data on the fate and time of disposal in the CBC went into the food and/or feed chain starting in 1991, five prior to 1996 when feeding of domestic MBM was banned (Table 16). Table 18 is based on the assumption that the other 91 cattle were slaughtered for human consumption and went into the food and/or feed chain between their time of import and 1995. For the principles used in the estimation, see Annex 5.

Cattle imported during 1990-2002
Among the 882 cattle for which there is data in the CBD, 266 were alive, 25 had died and 250 had been slaughtered (31.12. 2002). The date of disposal of 265 cattle is known and they went into the food and/or feed chain starting in 1993, a part of them prior to 1996 when feeding of domestic MBM was banned. 53 cattle were tested for BSE, with negative results (Table 17). The cattle imported from Denmark between 1990 and 2002 for which there is no data in CBD are assumed to have been slaughtered starting in the year when they were imported and before 1995 when the CBC was founded (Table 18). For the principles used in the estimation, see Annex 5.

6.3.1.3. Fate of French cattle
Among the 13 French cattle imported to Finland, 10 were alive in 31.12.2002, including all 6 bisons, all 3 cattle imported in 2002 and the Charolais bull imported in

Table 16.
Fate of cattle imported from Denmark between 1985 and 1989 (no cattle was imported from Denmark in 1985 and 1986) (CBD 2003).

Year of import	1987	1988	1989		Total
Imported	**3**	**8**	**98**		**109**
	No data available	**No data available**	**Data available**	**No data available**	
Data available	3	8	18	80	18
Alive*	-	-	1	-	1
Died*	-	-	2	-	2
1987	-	-	-	-	-
1988	-	-	-	-	-
1989	-	-	-	-	-
1990	-	-	-	-	-
1991	-	-	-	-	-
1992	-	-	-	-	-
1993	-	-	-	-	-
1994	-	-	-	-	-
1995	-	-	-	-	-
1996	-	-	-	-	-
1997	-	-	1	-	1
1998	-	-	-	-	-
1999	-	-	1	-	1
2000	-	-	-	-	-
2001	-	-	-	-	-
2002	-	-	-	-	-
Slaughtered*	3	8	15	80	106
1987		-	-	-	
1988			-	-	
1989			-		
1990			-		
1991			1		
1992					
1993			2		
1994	3	8	2	80	96
1995	-	-	-	-	-
1996	-	-	-	-	-
1997	-	-	-	-	-
1998	-	-	2	-	2
1999	-	-	3	-	3
2000	-	-	4	-	4
2001	-	-	1	-	1
2002	-	-	-	-	-

Note *31.12. 2002

Table 17.
Fate of cattle imported from Denmark between 1990 and 2002 (CBD 2003).

Year of import	1990	1991	1992	1993	1994	1995
Imported	**210**	**209**	**144**	**23**	**22**	**6**
Data available	69	126*	57	22	8	6**
Alive*	5	23	11	5	1	1
Died*	5	5	2	1	0	1
1990	-	-	-	-	-	-
1991	-	-	-	-	-	-
1992	-	-	-	-	-	-
1993	-	-	-	-	-	-
1994	-	-	-	-	-	-
1995	-	-	-	-	-	-
1996	-	-	-	-	-	1
1997	-	-	-	-	-	-
1998	1	2	-	-	-	-
1999	2	3	1	-	-	-
2000 / tested	1 / 0	-		1 / 0	-	-
2001 / tested	1 / 0	-	1 / 0	-	-	-
2002 / tested	-	-	-	-	-	-
Slaughtered*	59	96	44	16	7	2
1990	-	-	-	-	-	-
1991	-	-	-	-	-	-
1992	-	-	-	-	-	-
1993	-	-	1	-	-	-
1994	-	-	1	-	1	-
1995	7	3	5	2	1	-
1996	3	10	4	6	1	1
1997	3	6	4	2	1	-
1998	6	10	3	-	-	-
1999	11	29	11	2	1	-
2000 / tested	7 / 0	18 / 0	3 / 1	2 / 0	1 / 0	-
2001 / tested	12 / 7	6 / 4	6 / 3	-	-	1 / 1
2002 / tested	8 / 5	10 / 8	3 / 3	2 / 1	-	-
Earliest in						
1994	-	1	2	-	-	-
1995	-	-	1	-	1	-
1996	2	2	-	-		-
1997	-	1	-	-	-	-
French origin**	-	2	-	-	-	1

Note *31.12. 2002
** These animals (also included in the total figures) were originally from France but were imported to Finland via Denmark

1996	1997	1998	1999	2000	2001	2002	Total
17	**28**	**59**	**60**	**14**	**12**	**78**	**882**
15	28**	52	60	14	12	78	545
11	20	31	55	14	11	78	266
2	2	4	2	0	1	0	25
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	1
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	3
-	1	2	-	-	-	-	9
1 / 0	-	1 / 0	2 / 0	-	-	-	6/0
1 / 1	1/ 1	1 / 1	-	-	1 / 0	-	6/3
-	-	-	-	-	-	-	-
2	4	17	3	0	0	0	250
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	1
-	-	-	-	-	-	-	2
-	-	-	-	-	-	-	18
-	-	-	-	-	-	-	25
-	-	-	-	-	-	-	16
1	-	-	-	-	-	-	20
	2	-	-	-	-	-	56
1 / 0	2 / 0	3 / 0	-	-	-	-	37/1
-	-	5 / 5	-	-	-	-	30/13
-	-	9 / 9	3 / 3	-	-	-	35/29
-	-	-	-	-	-	-	3
-	-	-	-	-	-	-	2
-	-	-	-	-	-	-	4
-	-	-	-	-	-	-	1
-	1	-	-	-	-	-	4

1997. The 2 Limousin bulls imported in 1991 were slaughtered in 1999 and 2000, and were not tested for BSE. The Limousin bull imported in 1995 was slaughtered in 2001 and tested for BSE with negative results.

6.3.1.4. Fate of cattle imported from Germany

There is information on all 97 cattle of German origin in the CBD. It is assumed that 90 of them did not enter the food and/or feed chain in Finland by 31.12.2002, 2 were re-exported to Germany, 85 were still alive in 31.12.2002 and 3 had died (Table 19). Of the 7 cattle that are known (6 cattle) or assumed (1 animal) to have been slaughtered, 5 were tested for BSE with negative results. The two animals that had been slaughtered without being tested for BSE were born in 1997 and 1998, when the level of stability of the BSE/cattle system in Germany was according to SSC already neutral (SSC 2000c).

6.3.1.5. Fate of cattle imported from the Netherlands

Cattle imported from the Netherlands in 1999 were disposed of between 1999 and 2002 (Table 20). 2 of the cattle died, 8 were slaughtered and 10 were killed and incinerated, according to the requirements related to their status as experimental animals. The cattle imported in 2002 were alive on 31.12.2002.

6.3.1.6.Fate of cattle imported from Norway

The animal imported in 1985 (a Charolais bull) was slaughtered in 1991. There is no individual data in the CBD on the 8 cattle imported in 1994, but they were dairy cattle and they were all disposed of within a few of years after the import (information provided by the municipal veterinarian in charge of the herd).

Table 18.
Estimation on the fate of cattle imported from Denmark during 1990 – 2002 for which there is no data in CBD.

Year of import	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total
Imported	210	209	144	23	22	6	17	28	59	718
Slaughtered*	142	83	87	1	14	1	2	1	7	338
1990		-	-	-	-	-	-	-	-	
1991			-	-	-	-	-	-	-	
1992				-	-	-	-	-	-	
1993						-	-	-	-	
1994	142	83	87	1	14	-	-	-	-	327
1995	-	-	-	-	-	1	-	-	-	1
1996	-	-	-	-	-	-	2		-	2
1997	-	-	-	-	-	-	-	1	-	1
1998	-	-	-	-	-	-	-	-	7	7
1999	-	-	-	-	-	-	-	-	-	-
2000	-	-	-	-	-	-	-	-	-	-
2001	-	-	-	-	-	-	-	-	-	-
2002	-	-	-	-	-	-	-	-	-	-

Note *31.12. 2002

Table 19.
Fate of cattle imported from Germany (CBD 2003)

Year of Import	1998	1999	2000	2001	2002	Total
Imported	23	33	27	-	14	97
Alive*	19	28	25	-	13	85
Died*	1	1			1	3
1998	-	-	-	-	-	-
1999	1	1	-	-	-	2
2000	-	-	-	-	-	-
2001	-	-	-	-	-	-
2001/tested	-	-	-	-	-	-
2002/tested	-	-	-	-	1	1/0
Slaughtered*	1	3	2			6
1998	-	-	-	-	-	-
1999	-	-	-	-	-	-
2000	1	-	-	-	-	1
2001	-	-	-	-	-	-
2001/tested	-	-	-	-	-	-
2002/tested	-	3	2	-	-	5/5
Re-exported	2	-	-	-	-	2
**Unclear ** **	-	1	-	-	-	1

Note *31.12. 2002
** Assumed to have been slaughtered in 1999

Table 20.
Fate of cattle imported from the Netherlands (CBD 2003)

Year of Import	1999	2002	Total
Imported	20	4	24
Alive*	-	4	4
Died*	2	-	2
1999	1	-	1
2002/tested	1	-	1/1
Slaughtered*	-	-	8
1999	7	-	7
2000	1	-	1
2002; Other**	10	-	10

Note *31.12. 2002
** Killed, incinerated in 2002. Tested for BSE with negative results.

6.3.1.7. Fate of cattle imported from Sweden

The fate of 564 cattle imported from Sweden between 1980 and 2002 is known (Table 21). These went into the food and/or feed chain starting in 1996, when feeding of domestic MBM was already banned. Of the animals for which there is no data in the CBC, 117 are assumed to have gone into the food- and/or feedchain prior to 1996 when feeding of domestic MBM to ruminants was banned (Table 22). For the principles used in the estimation, see Annex 5.

Table 21.
Fate of cattle imported from Sweden between 1980 and 2002. Cattle for which there is data in CBD (CBD 2003).

Year of Import	1980 – 1989	1990 – 1999	2000 – 2002	Total
Imported	70	306	296	672
Data available	8	262	294	564
Alive*	0	146	293	439
Died*	1	10	2	13
1990	-	-	-	-
1991	-	-	-	-
1992	-	-	-	-
1993	-	-	-	-
1994	-	-	-	-
1995	-	-	-	-
1996	1	-	-	1
1997	-	1	-	1
1998	-	-	-	-
1999	-	4	-	4
2000 / tested	-	3 / 0	-	-
2001 / tested	-	2 / 1	1 / 1	3 / 2
2002 / tested	-	-	-	-
Tested, all	-	6	1	7
Slaughtered*	7	106	0	113
1990	-	-	-	-
1991	-	-	-	-
1992	-	-	-	-
1993	-	-	-	-
1994	-	-	-	-
1995	-	3	-	3
1996	1	14	-	15
1997	1	4	-	5
1998	-	10	-	10
1999	4	18	-	22
2000 / tested	1	17 / 2	-	1
2001 / tested	-	21 / 10	-	-
2002 / tested	-	19 / 17	-	-
Tested, all	0	29	0	29

Note *31.12. 2002

6.3.1.8. Fate of cattle imported from the UK

In 1996, MMM traced all cattle imported from the UK that were then still alive in Finland and ordered them to be examined for BSE at the time of their disposal and their carcasses and by-products to be destroyed and excluded from the food- and/or feed chain. The owners were entitled to a compensation from the government, covering the slaughter value of the animal (MMM 1998). They were also ordered to contact MMM in case these animals showed any signs compatible with BSE before their cull-

Table 22.
Estimation of the fate of cattle imported from Sweden between 1980 and 2002 for which there is no data in CBD.

Time of import	1980 – 1989	1990 – 1999	2000 – 2002	Total
Imported	70	306	296	672
No data available	62	44	2	108
Slaughtered*	62	44	2	108
1980		-	-	
1981		-	-	
1982		-	-	
1983		-	-	
1984		-	-	
1985		-	-	
1986		-	-	
1987		-	-	
1988		-	-	
1989		-	-	
1990			-	
1991			-	
1992			-	
1993			-	
1994	62	44	-	106
1995	-	-	-	-
1996	-	-	-	-
1997	-	-	-	-
1998	-	-	-	-
1999	-	-	-	-
2000	-	-	-	-
2001	-	-	-	-
2002	-	-	2	2

Note *31.12. 2002

ing. There was no indication reported to MMM of such cases, either by the owners or the veterinarians. No indication was provided to the MMM of earlier cases where symptoms of cattle imported from the UK, disposed of before 1996, would have caused a suspicion of BSE (Heinonen 2003).

Time and method of disposal

The time of disposal is known for 102 cattle imported from the UK, including one animal re-exported to the UK in 1985 (data provided by the importers, FABA and ADPC) It is assumed that the 13 cattle, for which the time of disposal is not known, had already been disposed of between the year of their import and the summer of 1996, when MMM started to trace back all cattle imported from the UK. The first four animals for which the time of disposal is known were culled and disposed of in 1987. In 1992, the peak year for culling and disposing of cattle imported from the UK, 16 animals went into the food and/or feed chain. Four of these are known to originate

from a herd and a birth cohort possibly exposed to BSE in the herd of origin. A total of 85 animals were disposed of prior to 1996 before the feeding of domestic MBM to ruminants was banned. The last imported animal to be culled was disposed of in 2002 at an age of 16 years. The animal was excluded from the food and feed chain and tested for BSE at disposal.

The number of cattle imported from the UK that were examined for the presence of BSE at the time of their culling and destroyed by order of MMM is 26. All of these animals were culled and destroyed between 1996 and 2002.

The following assumptions are made, related to the method of disposal of cattle imported from the UK:

- Cattle that were disposed of before 1996 were slaughtered and their risk material went into the food and/or feed chain, unless there is evidence of another method of disposal
- Cattle that died or were killed on the farm were buried on the farm and did not end up in the food and/or feed chain.

Age at disposal

Since all cattle imported from the UK were breeding cattle of beef breeds, they lived to be relatively old, compared to the average age of dairy cattle. The age at disposal of 101 cattle imported from the UK is known. The average age of disposal among these animals was 8.5 years. Over half of all cattle imported from the UK (60 cattle) are known to have lived to an age of at least 8 years, and over 20 % (24 cattle) to at least 12 years (Figure 7). A Hereford bull imported in 1984 was re-exported to the UK and not disposed of in Finland. Therefore it was excluded from these figures.

The fate and time of disposal of 106 animals imported from the UK is known (Table 23) and for the rest an estimation on the age of disposal was performed (Annex 6).

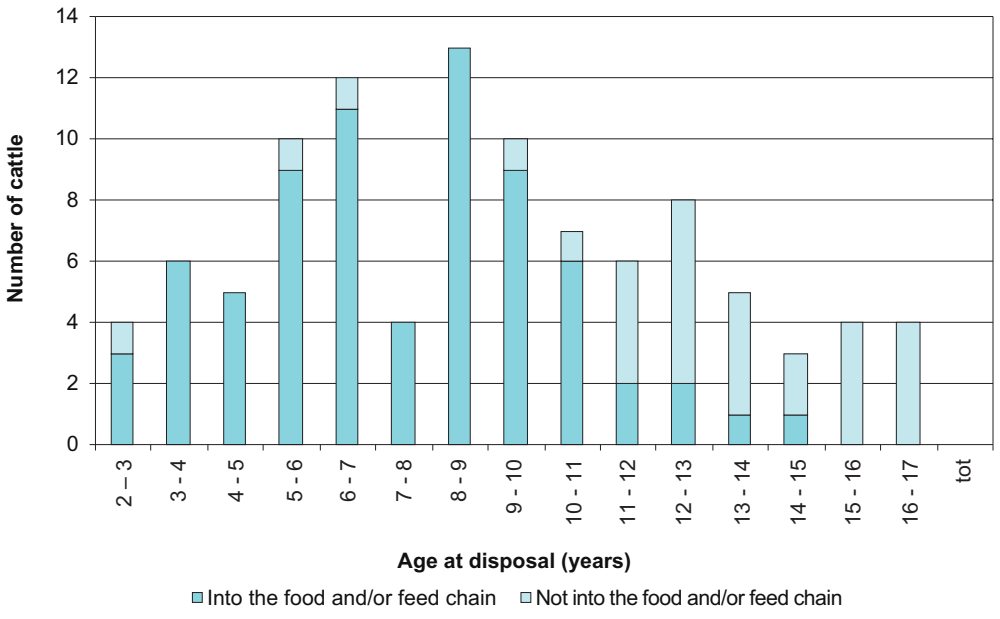

Figure 7.
Age at disposal of cattle imported from the UK (CBD 2003)

Table 23.
Fate of animals imported from the UK for which the fate is known. (CBC 2003, MMM 1997, EELA 2003b, importers).

Year of import	1983	1984	1985	1986	1987	1988	Total
Number	**2**	**22**	**37**	**8**	**14**	**32**	**115**
Data available	0	16	32	8	14	30	100
Alive[A]		-	-	-	-	-	-
Died[A]		3	8	0	6	12	29
1987	-	-	-	-	-	-	-
1988	-	-	-	-	-	-	-
1989	-	-	-	-	-	1[C]	1
1990	-	-	-	-	-	-	-
1991	-	-	-	-	1[C]	-	1
1992	-	-	-	-	-	1[D]	-
1993	-	-	-	-	-	-	-
1994	-	-	-	-	-	-	-
1995	-	-	-	-	-	-	-
1996	-	-	-	-	-	-	-
1997	-	1[B]	2[B]	-	2[B]	1[B]	5
1998	-	1[B]	1[B]	-	2[B]	5[B]	4
1999	-	1[B]	2[B]	-	1[B]	1[B]	-
2000	-	-	3[B]	-	-	1[B]	-
2001	-	-	-	-	-	-	-
2002	-	-	-	-	-	2[B]	-
Slaughtered[A]	2	12	24	8	8	18	72[E]
1987	-	1	2	1	-	-	4
1988	-	-	3	-	1	-	4
1989	-	-	1	1	-	-	2
1990	-	3	4	-	1	2	10
1991	1	1	3	1	4	1	11
1992	1	2	4	-	-	5	12
1993	-	1	5	2	-	2	10
1994	-	2	1	-	1	4	8
1995	-	-	-	3	-	4	7
1996	-	1	1	-	-	-	2
1997	-	1	-	-	-	-	1
1998	-	-	-	-	-	-	-
1999	-	-	-	-	-	-	-
2000	-	-	-	-	-	-	-
2001	-	-	-	-	-	-	-
2002	-	-	-	-	-	-	-
Reexported	-	1	-	-	-	-	1

Note [A] 31.12. 2002
[B] Excluded from the feed and food chain by order of MMM. Tested for BSE with negative results.
[C] Dead and buried on farm without being tested for BSE
[D] Autopsied at the department of pathology of EELA, destroyed
[E] Of which at least 8 animals originated from a herd with a BSE case in the same birth cohort as the imported cattle

Table 24.
Fate of animals imported from the UK for which the fate is not known.

Year of import	1984	1985	1988	Total
Number	**22**	**37**	**32**	**115**
No data available	6	5	2	13
Alive*	-	-	-	-
Slaughtered*	6	5	2	13
1983	-	-		
1984		-		
1985				
1986				
1987				
1988				
1989				
1990				
1991				
1992				
1993				
1994	6	5	2	13

Note *31.12. 2002

Table 25.
Age of disposal of cattle imported from the UK, estimated

Age	Total*
2 - 6	1
2 - 10	2
2 - 13	3
2 - 14	6
3 - 12	1
Total	13

Note *all probably ended up in the food and/feed chain

6.3.2. Use of imported MBM

Although some documents have indicated that MBM has been used in one particular dairy feed in 1974 and 1977, it was not customary to use MBM in cattle feeding in Finland before 1983. According to KTTK, the major proportion of the MBM used in cattle feed between 1983 and 1990 was domestic MBM and the imported MBM was used for feeding mono-gastric animals. However, this claim cannot be verified because of the lack of documentation showing the direct use of imported MBM for mono-gastric animals. Even if the used product was domestic MBM, it is possible that this product might have contained imported slaughter by-product or offal from possibly infected imported cattle. Because of the lack of distinctly recorded documentation on the precise proportion of domestic and imported MBM used in cattle

feed, it has been difficult to assess the role of imported MBM in cattle feed formulation.

Before 1995, every feed mill in Finland was required to attach an accompanying certificate (product declaration certificate) to industrially formulated feed bags or containers indicating their ingredient percentage composition. These certificates were numbered with a serial number to ensure that a) the changes made by nutritionists in the feed mills office were followed by individuals working on the feed processing line and also b) to control the amount of the feed produced per issued certificate. Whenever the ingredient/s changed, feed mills were required to submit to KTTK a new certificate showing the list of the feed raw materials. KTTK was responsible for the control of the feed value of the product/s.

Based on the ingredient certificates, the percentage of MBM in feed produced by the feed mills using MBM in cattle feed varied in complete, semi-protein and protein feeds in the range 1.0 % – 4.0 %, 4.0 % – 7.0 %, and 5.0 % – 65.0 %, respectively. The highest percentage of MBM in dairy cattle feed was 10 %, whereas the protein feed intended for young stock feeding contained up to 65 % MBM-molasses (particularly in 1986 and 1987). The use of imported MBM in cattle feeding was banned in 1990, and the use of domestic MBM in cattle feeding was banned in 1995. The feed containing MBM produced in 1995 was however permitted to be used until March 1996.

Partly due to the documentation system used when the feeding of imported MBM to cattle was legal (until 1990), the available documents concerning several relevant data were inconsistent and incomplete. There have been considerable difficulties in obtaining reliable documents on:

a) The total number of feed ingredient certificate issued each year by individual feed mills (because the available document on ingredient certificate at KTTK is inconsistent with the serial numbers issued by some feed mills each year, Scenarios B and C).
b) The exact amount of feed produced by individual feed mills per feed ingredient certificate issued per year (Scenario C).
c) The exact total amount of feed containing MBM produced each year (Scenarios B and C).
d) The share of imported MBM in cattle feed production each year (Scenarios B and C).
e) The feed mills that used imported MBM and for what species of animal feed formulation the feed was used.

6.3.2.1. Estimation of the use of MBM imported from BSE-risk countries in cattle feed

Since no data was available on the use of imported vs. domestic MBM in cattle feed, five different scenarios (A-E) were used to assess the possible exposure of the Finnish cattle population to imported MBM (Table 26).

Scenario A is a “worst case scenario” because it assumes that all imported MBM (1980 – 2002) was fed to cattle, except when documentation was provided that it was directly used for feeding of fur and pet animals (Table 35, Annex 6). In scenario A, the amount of annual imports and the countries of import were known (Table 26).

Scenario B is based on the Focus feed-database (KTTK 2004). The database provides the proportion of cattle feed containing MBM and the concentration of MBM in these feedstuffs in 1989 and 1990 based on production volumes and certificates of feed for each group of production animals. This data was used to extrapolate the years 1983 – 1995. The Focus database was available only for the production

years 1989 and 1990. The data for 1989 and 1990 showed that some of the feed ingredients were not entered to the database according to the identification code given to these feed ingredients. The data was cross-checked with the information on the feed ingredient certificates and corrected. Even after re-checking and correcting the code, the available data gives a rather biased result because a) the years 1989 and 1990 are not the most representative years for MBM proportion in cattle feed as the use of imported MBM in cattle feed was banned in mid- 1990, b) it assumes that the volume and composition of feed remained constant, and c) the proportion of imported MBM is not known. Therefore, due to the lack of documentation on the share of foreign origin MBM of the total use, it was assumed that all the foreign MBM was imported from BSE-risk countries (Scenario B_1) or from both BSE-risk countries and others (Scenario B_2) (Table 26).

Scenario C is based on the share of feed ingredient certificates containing MBM. This estimate is based on the total number of annually issued (whenever available) feed ingredient certificates and the proportion of certificates issued for feeds containing MBM in relation to the total feed produced for the period between 1983 and 1990. The weakness of this scenario is that not all the issued certificates or the documents on the volume of feed produced per issued certificate were available. As the proportion of imported MBM is not known it was assumed that all of the used MBM was imported from BSE-risk countries (Scenario C_1) or from both BSE-risk countries and others (Scenario C_2) (Table 26).

Scenario D is the share of MBM imported from BSE-risk countries ending up in the cattle feed chain through cross-contamination. It is based on the result of microscopic detection of MBM in cattle feed between 1997 and 2001 (Period IV), and the average level of MBM detected in cattle feed in 1997 and 1998 was used to estimate the most probable contamination level for the year 1996 (Table 31, Annex 4).

Scenario E is based on the share of MBM imported from BSE-risk counties out of the total available (all domestic and imported) MBM and covers periods II and III (Table 35, Annex 7).

The level of exposure of the Finnish cattle population to imported MBM was divided into four time periods based on the direct use of MBM for cattle and on the possibility of indirect exposure due to cross-contamination at feed mills, during transport or storage on farms (for details on the possibility for cross contamination see Annex 5)

- **Period I**: Between 1980 and 1982, no MBM was used for domestic cattle feeding and only indirect exposure through feed cross-contamination was possible (Table 26).
- **Period II**: Between 1983 and 1990 the use of MBM was legally possible for cattle feeding, resulting in direct exposure (Table 26).
- **Period III**: Between 1991 and 1995, the use of imported MBM in cattle feed was banned but legally possible for feeding mono-gastric animals. Furthermore cattle were fed feeds containing domestic MBM and the feed raw material inlet and the processing line was not separated. Therefore, since these feeds were processed on same processing lines, indirect exposure through feed cross-contamination was possible (Table 26).
- **Period IV**: Between 1996 and 2001, the use of domestic MBM in cattle feeding was banned but both domestic and imported MBM was allowed for feeding mono-gastric animals, resulting in the possibility of indirect exposure through feed cross-contamination. However, the level of cross-contamination was probably lower than during Period III (Table 26).

Table 26.
The use of MBM imported from BSE-risk countries for cattle feeding according to different scenarios (A - E) during different periods (I- IV). For the detailed estimates see Table 35, Annex 6.

Scenario	Explanation	Formulae	Volume Period 1	Volume Period 2	Volume Period 3	Volume Period 4
A	Scenario A: all imported MBM from BSE risk countries, which was not used for fur animals or pets, was used for cattle	TOTCAT	0	90,755	44,996	10,974
B_1	Scenario B_1: all MBM used for cattle was imported from BSE risk countries	B_1 = (PROP/TOTCAT) * Focus	0	18,162	15,396	-
B_2	Scenario B_2: all MBM used for cattle was imported (both form BSE risk countries and other countries)	B_2 = (PROP/CAT) * Focus	0	16,405	13,937	-
C_1	Scenario C_1: all MBM used for cattle was imported from BSE risk countries	C_1 = (PROP/TOTCAT) * Certificate	0	30,858	-	-
C_2	Scenario C_2: all MBM used for cattle was imported (both form BSE risk countries and other countries)	C_2 = (PROP/CAT) * Certificate	0	26,738	-	-
D	Scenario D: all cross contamination detected in laboratory analyses was due to imported MBM	D = FMBMC * (TOTCAT/CAT)	-	-	-	0,301
E	Scenario E: The share of MBM imported from BSE-risk countries and used for cattle feeding is the same as the share of imported MBM out of total available MBM in that year	E = (TOTCAT / DOM + TOT) * Focus	-	7,032	1,961	-

Note: TOT = All MBM imported into Finland (KTTK 1980 – 2002)
CAT = All MBM imported into Finland which did not go to fur and pet feeding
TOTBSE = Total MBM imported from BSE-risk countries
BSEFURPETS = MBM imported from BSE-countries which was used in fur and pet feeding
TOTCAT = (TOTBSE - BSEFURPETS) = All MBM imported into Finland from BSE-risk countries, which did not go to fur and pet feeding (-> possibly to cattle)
PROP = Proportion of MBM imported from BSE-risk country
Focus = MBM used for cattle in 1989 and 1990 based on Focus (%) (KTTK 2004)
Certificate = MBM used for cattle based on feed ingredients certificates
PROD = Production volume of cattle feed (KTTK 1980 – 2002)
CC = Cross-contamination detected (KTTK 2002)
FMBMC = (CC*PROD) assumed amount of MBM in cattle feed due to cross-contamination
DOM = Domestic production of MBM (KTTK 1980 – 2002)

6.3.2.2. The use of other imported PAP

The use of imported milk replacers for feeding of pre-weaning calves

According to the feed ingredient certificates, domestic milk replacers for feeding pre-weaning calves did not contain MBM (KTTK 2001). Furthermore, according to the exporting countries, milk replacers for pre-weaning calves imported to Finland between 1980 and 2002 did not contain MBM. Annually imported milk replacers were used directly for feeding pre-weaning calves.

The use of imported animal fat in cattle feed

There is no recorded documentation on the proportion of imported animal fat that has been used for the formulation of feed for adult cattle and milk replacers for calves. The feed ingredient certificates of cattle and mono-gastric animals show that animal fat had been used as one of the energy sources of feed raw material.

The use of imported offal

During the 1980s, there was a shortage of domestic slaughter offal supply to the rendering plants for the production of MBM because nearly all slaughter by-products went directly for fur animal feeding. Since 1992, offal was imported only from Sweden. A large proportion of the offal imported after 1992 was either directly used for fur animal feeding or rendered to MBM for fur animal feeding. A minor proportion was also used in pet feed production. According to rendering plants, approximately 61,462 tons of slaughter offal imported from Sweden was processed to domestic MBM during the period 1983 – 2002 (Table 27).

Table 27.
The use of imported slaughter offal (tons/a) by the Finnish rendering plants (Source: Rendering plants).

Year of MBM production	Volume, tons
1983-84	3,183
1984-85	2,470
1985-86	2,517
1986-87	2,061
1987-88	1,497
1989	6,727
1996	2,609
1997	3,645
1998	4,365
1999	5,802
2000	5,225
2001	6,932
2002	14,429
Total	61,462

6.4. Discussion and conclusion on the risk of the BSE-agent to the Finnish cattle popoulation

6.4.1. Imported cattle

With regard to the risk of transmission of BSE-infection to cattle imported to Finland between 1980 and 2002, the most important group of animals has been those imported from the UK. This is due to the fact that the risk associated with cattle imported from the UK is considered to be much higher than that with cattle imported from any other country. Using the method of SSC for the assessment of the level of external challenge associated with cattle imported from other countries than the UK (SSC 2002a), the external challenge associated with import of live cattle to Finland between 1980 and 2002 from all other countries than the UK would have been comparable to an external challenge resulting from the import of only approximately 11 cattle from the UK during the peak of the BSE-epidemic between 1988 and 1993. According to SSC, this would have resulted in a low external challenge, divided

over the whole period of 1980 – 2002. According to SSC, the level of the external challenge resulting from import of live cattle experienced by Finland was the highest during the five year period 1986 – 1990 when it was considered as moderate see section 5.3.1 (SSC 2002b). The external challenge during that period results almost entirely from the cattle imported from the UK during 1980 – 1988.

6.4.1.1. Cattle imported from the UK

The main variables that can be used to assess the risk of release of BSE-agent to the Finnish cattle population through cattle imported from the UK are the following: time of import, BSE status of herd of origin and the possible location within a birth cohort of a confirmed BSE-case as well as their time and method of disposal, and the 12-month birth cohort of each animal (July to June inclusive). The latter can be used to compare the data with cumulative incidences of confirmed cases of BSE in different birth cohorts in the UK, detected until 1996.

The imported cattle from the UK were a risk at the time of culling when they went into the food and/or feed chain in Finland. The first imported cattle are known to have entered the food and/or feed chain in 1987.

All cattle imported from the UK and almost all cattle imported from other countries to Finland between 1980 and 2002 were breeding cattle of beef breeds. It might seem obvious that the risk of release of the BSE-agent associated with imported beef cattle is significantly lower than the risk associated with imported dairy cattle, since the confirmed incidence of BSE in suckler herds is lower than in dairy herds in Great Britain (Weybridge 2003). However, the risk of BSE related to beef cattle exported from the UK is higher than the risk related to beef cattle that remained in the UK. This is due to the fact that pedigree animals that were going to be exported were often fed with concentrates even in suckler herds (Schreuder et al 1997). The importance of the difference of the risk of BSE related to dairy and beef cattle has also been questioned in other contexts, such as in the analysis of the results of a pilot study set up in France in 2000, in which no significant differences of incidence between dairy, suckler and mixed herds were observed (Morignat et al 2002).

A quantitative assessment of the risk of BSE from the import of cattle from the UK into other EU-15 Member States was published in 1997 (Schreuder et al 1997). The study was based on the cumulative incidence of BSE in each 12-month birth cohort detected in the UK up to 1996. The probable number of BSE cases exported from the UK to each EU-15 Member States before 1995 was estimated, assuming that the incidence of BSE and the culling rate of cattle would have been the same in cattle that were exported from the UK as in cattle that were raised in the country. Three separate series of cumulative incidences were used: incidences in all herds on average and separate incidences in beef herds only and in dairy herds only. Using the method described and the average cumulative incidence for each birth cohort published in the article and the available data on cattle imported to Finland from the UK, it was estimated that the expected number of BSE-cases imported from the UK to Finland was 2.8, and the expected number of BSE-cases among the cattle imported from the UK that probably entered the food and/or feed chain in Finland was 1.9. Using the cumulative incidences for suckler cattle, the estimated expected number of BSE-cases imported from the UK and the estimated expected number that entered the food and/or feed chain in Finland would have been 0.3 and around 0.2, respectively.

In 1990 and again in 1996 the Finnish animal owners and the veterinarians of the cattle imported from the UK were asked by the MMM to report all possible cases in which symptoms would have raised suspicion of BSE (the MMM 1990, the

MMM1996). This included also cattle that had already been disposed of. No such cases were reported to MMM. When drawing conclusions based on the confirmed incidence of BSE in the UK, it must be born in mind that many cases of BSE may have been left undiagnosed even in the UK. Furthermore, before 1996, the ability of animal owners and veterinarians in Finland to recognise clinical cases of BSE would probably not have been as high as in the UK at that time.

Conclusion

The risk of transmission of BSE-agent to the feed chain in Finland through cattle imported from the UK is considered moderate. Among the 115 cattle imported to Finland from the UK, 85 probably entered the food and/or feed chain before 1996. The first cattle for which the time of disposal is known are assumed to have entered the food and/or feed chain in 1987. Among the 32 cattle that were imported to Finland from the UK in 1988 (when the risk associated with import from the UK is considered to have been highest), 14 originated in herds in which at least one BSE-case has been detected in cattle born within the same birth cohort. Eight of these cattle probably entered the food and/or feed chain in Finland between 1990 and 1995 when the Finnish BSE/cattle system was still unstable and would not have prevented the propagation of the BSE-agent if it had entered the system. The highest number of animals imported from the UK went into the food and/or feedchain in 1992 when 16 cattle from the UK were culled, four of these originating in herds in which at least one BSE-case has been detected in cattle born within the same birth cohort.

Using the data on cumulative incidences of BSE in different birth cohorts in Great Britain (Schreuder et al 1997, Weybridge 2003), it was estimated that among these 85 cattle there were 1.9 or 0.2 cases of BSE, depending on wether the cumulative incidence used in the calculation was for the whole population (Schreuder et al 1997) or for beef breeds (Weybridge 2003).

6.4.1.2. Cattle imported from Denmark

It is possible that BSE-agent could have been released into the food and/or feed chain to Finland through cattle imported from Denmark. Using the method of SSC for assessing the level of external challenge represented by import of cattle from other countries than UK (SSC 2002a), the external challenge resulting from import of live cattle from Denmark to Finland between 1980 and 2002 would have been comparable to the import of approximately 9 cattle from the UK during the peak of the epidemic in 1988 – 1993. According to SSC, this would have resulted in a very low external challenge, divided over the whole period of 1980 – 2002.

Using the method of SSC, it can be estimated that import of cattle from Denmark was responsible for approximately 80 % of the external challenge experienced by Finland between 1980 and 2002 resulting from import of cattle from all other countries than the UK. In practice, the significance of cattle imported from Denmark as regards to risk of release of the BSE-agent is even higher compared to the other countries of origin, excluding UK. A considerable proportion of cattle imported from Denmark were disposed of before 1996, whereas almost all cattle originating from other BSE-risk countries have been imported in Finland only since 1998 and have therefore not entered the feed chain in Finland before the Finnish BSE/cattle system was already neutrally stable (see section 5.3.1.)

The most significant risk among cattle imported from Denmark is associated with those that were imported since 1990 and entered the feed chain in Finland before 1996. According to our estimation, there were 354 of these cattle. None of these were tested for BSE.

Conclusion

The risk of transmission of BSE-agent to the feed chain in Finland through cattle imported from Denmark is considered low. The significance of Denmark is underlined by the fact that before 1995 it was the most important country of origin of live cattle imported to Finland. The number of cattle imported from Denmark and disposed of in Finland before 1996 was 354. The first cattle for which the time of disposal is known are assumed to have entered the food and/or feed chain in 1987. At that time the Finnish BSE/cattle system was still unstable and would not have prevented the propagation of the BSE-agent if it had entered the system.

6.4.1.3. Cattle imported from other BSE-risk countries

Cattle imported from other BSE-risk countries (Belgium, France, Germany, and the Netherlands) have been disposed of since 1999, when feeding of domestic MBM to ruminants had already ceased three years ago. Both the age and number of animals disposed of before 31.12.2002 was low. The Belgian animals disposed of were all bisons that did not go into the feedchain.

Conclusion

France

The risk of transmission of BSE-agent to the feed chain in Finland through French cattle is considered very low. Among the countries from which cattle were imported in Finland between 1980 and 2002, the risk related to France is in general considered to be the most significant after the UK. However, in practice it can be considered less significant than the risk related to Denmark, since only 3 of the French cattle imported between 1980 and 2002 were estimated to have entered into the food and/or feed chain in Finland. One of them, born in 1994, was slaughtered in 2001 and tested for BSE. The two others were slaughtered for human consumption in 1999 and 2000 and they were not tested for BSE. These animals were born in 1989 when the BSE/cattle system of France was according to SSC extremely unstable. At the time of their disposal in Finland, the possibility of transmission of the BSE-agent by cross contamination of feed cannot be excluded.

The Netherlands

The risk of transmission of BSE-agent to the feed chain in Finland through cattle imported from the Netherlands is considered very low. Eight of the 24 cattle imported from the Netherlands may have entered the food and/or feed chain in Finland without being tested for BSE. All of them were born in 1996 or 1997, when the Dutch system was already considered to have been stable (SSC 2000d). These cattle were disposed of in Finland in 1999 – 2000, when the Finnish BSE/cattle system was neutrally stable.

Belgium

The BSE-risk to the Finnish cattle population resulting from cattle of Belgian origin imported to Finland between 1998 and 2002 is considered negligible. Among the 45 bisons of Belgian origin, 13 had been slaughtered before 1.1.2003, and the other 32 were still alive. All the 13 bisons that were disposed of were tested for BSE with negative results.

Germany

The BSE-risk to the Finnish cattle population resulting from import of cattle from Germany is considered negligible. Only two of the 97 cattle imported were slaughtered

before 31.12.2002 without being tested for BSE. These cattle were born in 1997 and 1998, when the level of stability of the BSE/cattle system in Germany was according to SSC already neutral.

6.4.1.4. Cattle imported from Sweden and Norway

Between 1980 and 2002, a total of 672 cattle were imported from Sweden and 9 from Norway.

No cases of BSE have been recorded in Sweden and Norway. The number of animals imported from Norway is very small (9).

According to the GBR assessment of the Biological Hazards panel of the EFSA (EFSA 2004) BSE cases in Sweden are unlikely, but not excluded. The proportion of imported cattle originating from Sweden is over 30%. Furthermore, over 20% of the cattle imported from Sweden were dairy cows which, at least in the UK a higher risk of carrying BSE. Furthermore, of the animals imported before 1996, when the stability of the Finnish cattle/feed system would not have been sufficient to prevent the circulation of the agent, at least 117 went into the food- and/or feedchain without being tested for BSE. However, over 40% of the imported animals have been Highlander cattle, which have a reduced significance regarding the BSE risk, due to difference in feeding patterns of this breed. The likelihood Highlander cattle to end up in the food- and/or feed chain are probably also lower than any for any other beef breed.

Conclusion

In the light of the available information on the GBR-status of Sweden and Norway, the risk related to import of live cattle from these countries between 1980 and 2002 is considered negligible.

This assessment is based on the knowledge of the BSE-situation in exporting countries up to 31.10.2004 However, if the situation changes, i.e. BSE cases are detected in these countries or if it assessed that it is probable that BSE is present in these countries, the results of this risk assessment will be altered. This is especially the case concerning the imports from Sweden, as the number of imported live cattle was more than 30% of the total number of cattle imported into Finland, the imported breed includes dairy cows and only a few of the animals already disposed of have been tested for BSE. In the case of changes in the information concerning Norway the situation is different, since the number of animals imported is small and therefore the risk associated to them could in no case be more than very low. The time of disposal of one of the animals is 1991. The time of disposal for the remaining 8 is not known.

6.4.2. Imported feed

6.4.2.1. Scenario A - E

It should be noted that several relevant documents that would have facilitated the exposure assessment are either missing or inconsistent. Based on scenarios A – E, it is however assumed that, despite all the shortcomings, this assessment would allow an approximate estimation of how much of the MBM imported during 1980 – 2002 would have ended up in cattle feed chain.

It is known that much of the imported MBM was used for pigs and poultry, although exact figures are not known. Furthermore, domestic MBM was also fed to cattle during these years. It is also very unlikely that the Finnish cattle population would have consumed the amount of MBM estimated based on scenario A, since feeding a high level of MBM in the diet causes palatability problems of the feed, which might lead

to loss of appetite.

Cattle feed accounts for about 46 % of the total feed annually produced in Finland and the MBM percentage of cattle feed in 1989 and 1990 varied from 1.0 to 10 %. If the total (53,424 and 47,520 tons) MBM available during 1989 – 1990 would have been divided proportionally among different species, the maximum amount of MBM imported from BSE-risk countries that would have gone directly to cattle feed in 1989 and 1990 would have been 10,790 and 4,752 tons in scenario A instead of 23,441 and 10,331 tons. This indicates that scenario A overestimates the values for MBM imported from BSE-risk countries and used in cattle feeding at least by 54%.

Although the extrapolation used in scenarios B and C may not be true for other years and no data is available to verify it, these scenarios provide an idea on the magnitude of the overestimation in scenario A. In 1989 and 1990, the domestic production of MBM was 26,423 and 29,491 tons whereas the total available MBM was 53,424 and 47,520 tons. The share of MBM imported from BSE-risk countries was 23,441 and 10,331 tons (excluding the imports used for fur animal and pet feed). During these years, the estimated amount of MBM imported from BSE-risk countries to Finland that would have entered the cattle feed chain was 19,504 and 7,375 tons more in scenario A than in scenario B_1 and 18,241 and 5,347 tons more than in scenario C_1. This would imply that 22 – 43 % of the total MBM available for livestock feed production (including cattle and mono-gastric animals) in these years was from BSE-risk countries.

Since 1989 and 1990 were not the years with the highest use of MBM in cattle feed and the average value for these years was used to estimate years 1983 -1988, scenario B probably underestimates the use of total MBM. It is also biased, since not all MBM used in cattle feed was of foreign origin (Table 35, Annex 6). The estimate in Scenario B assumes that neither the share of MBM-containing feed nor the concentration in such feeds changed during 1983 – 1990, although it is obvious that the feed ingredient composition and produced feed volumes did in fact fluctuate. Despite its weaknesses, this estimate provides an overview of the possible feeding of imported MBM imported from BSE-risk countries to cattle until 1990.

The result in scenario C is also biased due to the missing certificates and the lack of the volumes produced per each certificate. However, at least the estimates for 1986-1989 showed a tendency of parallel increase of the total MBM used in cattle feeding with an increase in MBM import from BSE-risk countries. During these years, the import of MBM from BSE-risk countries varied between 84% and 91% of the total MBM import. An additional bias in Scenario C is that it assumes that all MBM used in cattle feed was of foreign origin.

Had all the issued feed certificates and the volumes of feeds produced with each of them been available for use, scenario C would have provided the most accurate information on the total use of MBM in cattle feed but the share of MBM imported from BSE-risk countries would still remain unsolved.

Scenario D shows that cross-contamination of cattle feed with MBM was frequent between 1996 and 2000 but declined towards the beginning of 2001 and was not detected in 2002 (Table 31, Annex 4) due to the total ban of MBM in the feed for food-producing animals.

Scenario E gave lower values compared to scenarios A – C. For example in Period II, scenario E was only 8%, 39 % and 23% of scenarios A, B_1 and C_1, respectively. The annual use of MBM estimated in Scenario E was very low compared to scenarios B and C but this value could also be seen as close to the value that could have possibly been used for cattle feeding during those years. It might also justify the claim that most of the imported MBM was used mainly for monogastric animals.

6.4.2.2. Time periods

Possibility for cross-contamination during different time periods

Period I (1980 – 1982)

Although it was not legally approved to feed cattle with MBM, cross-contamination of cattle feed with MBM might have occurred in Period I during raw material transportation, feed manufacturing, post production storage and transportation of ready feed, and storage and handling of the feed on the farms. Therefore, we consider that some degree of cross-contamination was unavoidable in Period I. However, the intensity of the cross-contamination could not be estimated as the method for detecting MBM in cattle feed was not in use in this time.

Period II (1983 – 1990)

Feeding of cattle with MBM was legal. MBM was used in cattle feeds.

Period III (1991 –1995)

The implementations of the bans on the use of imported MBM in 1990 and of domestic MBM in 1995 were not totally effective because of the use of both imported and domestic MBM in mono-gastric feed. Furthermore, cattle feed formulated with MBM in 1995 was permitted to be used until March 1996, resulting in a one year transition period after the ban of domestic MBM. Feed for cattle and mono-gastric animal was produced on the same line, feed and feed raw materials were stored under the same premises at the feed mills and the same vehicle was used for transporting feed for mono-gastric animals and cattle. As long as the feeding of mono-gastric animals with MBM remained possible and the processing and post processing handling facilities were not separated, there was a potential for cross-contamination.

Thus, the risk of exposure of the Finnish cattle population to BSE-risk via cross-contamination of cattle feed at the feed mills with MBM imported from BSE-risk countries and used for mono-gastric animals was frequent and significant prior to March 1996. Furthermore, the domestic MBM produced form both imported and domestic cattle may have contained BSE-infectivity. Therefore, the risk of exposure of the Finnish cattle population to BSE via cross-contamination of cattle feed with mono-gastric animal feed containing imported MBM was very high until March 1996. The evaluation how probable this contamination was will be made in the next phase of the BSE-risk assessment project.

Period IV (1996 – 2001)

The risk of exposure of the Finnish cattle population to BSE-risk via cross-contamination of cattle feed with mono-gastric animal feed containing MBM imported from BSE-risk countries was assessed to be very high to moderate on the basis of the detection of MBM in cattle feed between March 1996 and January 2001 (Scenario D).

Conclusion on the possibility for cross-contamination

According to the available documents, no feed mill used MBM in cattle feeding in 1980 – 1982 (Period I). However, many of the feed handling processes were not strictly separate, both in feed mills and on the farms and cross-contamination of cattle feed with MBM (domestic and imported) was therefore inevitable in period I.

The risk of cross-contamination of cattle feed produced in Periods III and IV (1991 – 2001) was very high since:

- The implementation of the ban on MBM from cattle feed was not totally effective (see Table 31 Annex 5).

- The method for detection of MBM (Commission Directive 98/88/EC) in cattle feed was not in use in Finland before 1997 (Annex 3).
- The feed processing lines for cattle and mono-gastric animals were not separated except for pig feeds containing fish meal that was processed on separate line since 2001.
- Feed containing MBM was stored under the same premises in the feed mills, farms and warehouses until January 2001 (MMM 2001).
- The same transportation facility was used for transporting feeds that did not contain MBM for cattle and feeds containing PAP for mono-gastric animals until January 2001 (MMM 2001).

6.4.2.3. Conclusion on the risk of imported MBM

BSE-risk countries

The annual share of the MBM imported from BSE-risk countries was estimated using various scenarios. Due to the lack of documents, all MBM used for cattle feeding during the assessment period was assumed to be MBM imported from BSE-risk countries (scenario A). Since scenario A gave extremely high values, which could not have been used by cattle without physiological problems (see Annex 7), scenarios B – E were constructed. The overall share of the MBM imported from BSE-risk countries between Periods II and IV is given in Figure 8. On the basis of scenarios B – E, the amount of MBM that may have been used for cattle feeding however appears to vary between 7,032 and 30,858 tons during Period II, when the use of imported MBM was legally possible

The Netherlands

The MBM imported from the Netherlands accounted for 34 % of the total MBM imported to Finland during 1980 – 2002 (Figure 5). Available documents showed that 17,910 tons of MBM imported from the Netherlands was used directly for fur and pet animal feeding during the production years 1980 and 2002. The remaining MBM imported from the Netherlands was assumed to have been used in cattle feeding according to the “worst case scenario” in scenarios A - E. The probable share of MBM imported from the Netherlands in cattle feed during different time periods in different scenarios is given in Figure 9 .

On the basis of the estimates (scenarios A – E), the risk of the exposure of Finnish cattle population to imported MBM from the Netherlands is assessed to have been high to very high. The assessment was based not only on the quantitative dimension of imported MBM, but also on the BSE situation in the Netherlands at the time of import (SSC 2002a). Due to the import permit procedure at the time of import (see Annex 3) the assessment is based on the assumption that the imported MBM originated in the Netherlands.

Denmark

The MBM imported from Denmark accounts for 28 % of the total MBM imported to Finland between 1980 and 2002. Documentation was available for 8,356 tons of MBM that was used for the formulation of feed for fur and pet animal feed throughout the assessment time. The remaining MBM imported from Denmark between 1980 and 2002 was assumed to have been used in cattle feed formulation according to the “worst case scenario” in scenarios A - E. The probable share of the MBM imported from Denmark in cattle feed during different time periods and in different scenarios is given in Figure 10.

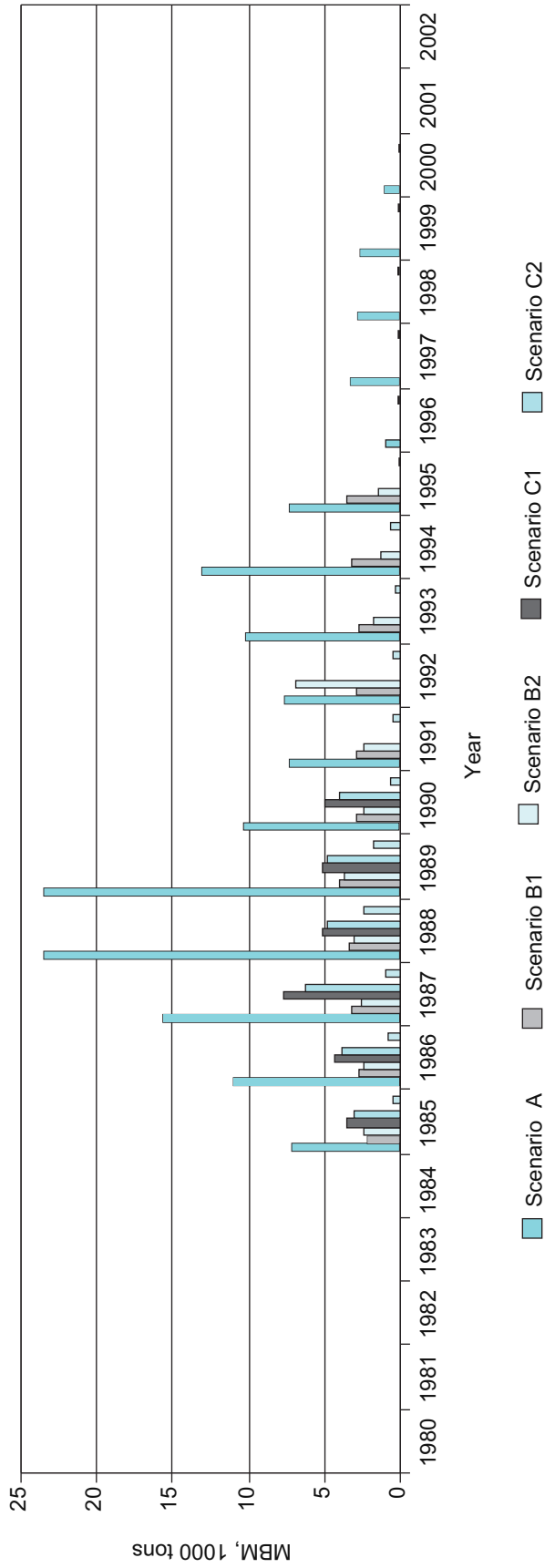

Figure 8.
The overall share of MBM (tons/a) imported from BSE countries during Periods II – IV.

Note: The value for scenario A is equivalent to the MBM value used by SSC in the assessment of the Geographical BSE-risk of Finland (SSC 2002b). The value for Scenario D is 1,217 tons during period IV.

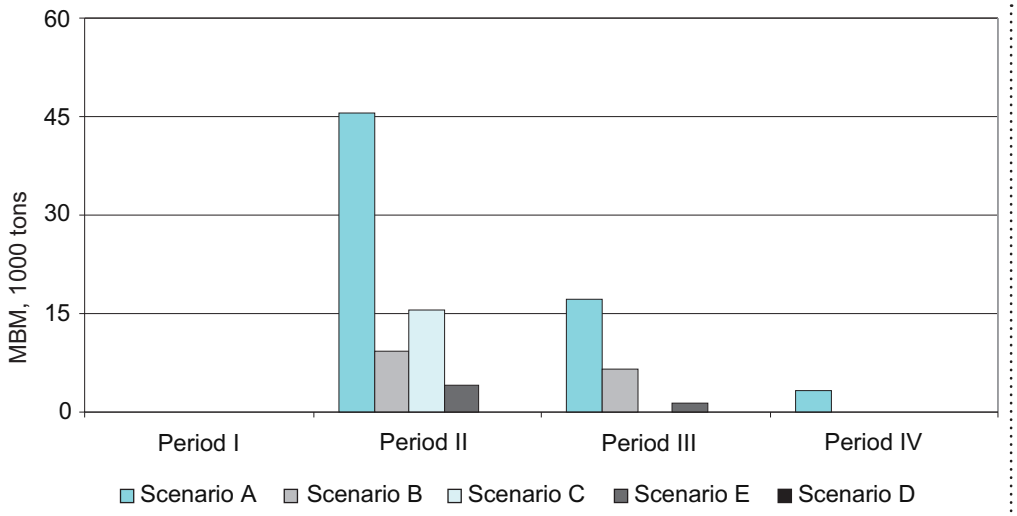

Figure 9.
The probable share of MBM imported from the Netherlands during different time periods (I - IV)
Note: The value of Scenario D is 0.002 tons during period IV.

On the basis of estimates (scenarios A – E), the risk of exposure of the Finnish cattle population to BSE via imported MBM from Denmark between 1983 and 1990 was assessed to have been moderate to very high. The assessment was based on the quantity of MBM imported and the time of import of MBM which was the period when it was considered to have been probable that MBM imported from Denmark could have presented an external challenge to the importing county (SSC 2002a)

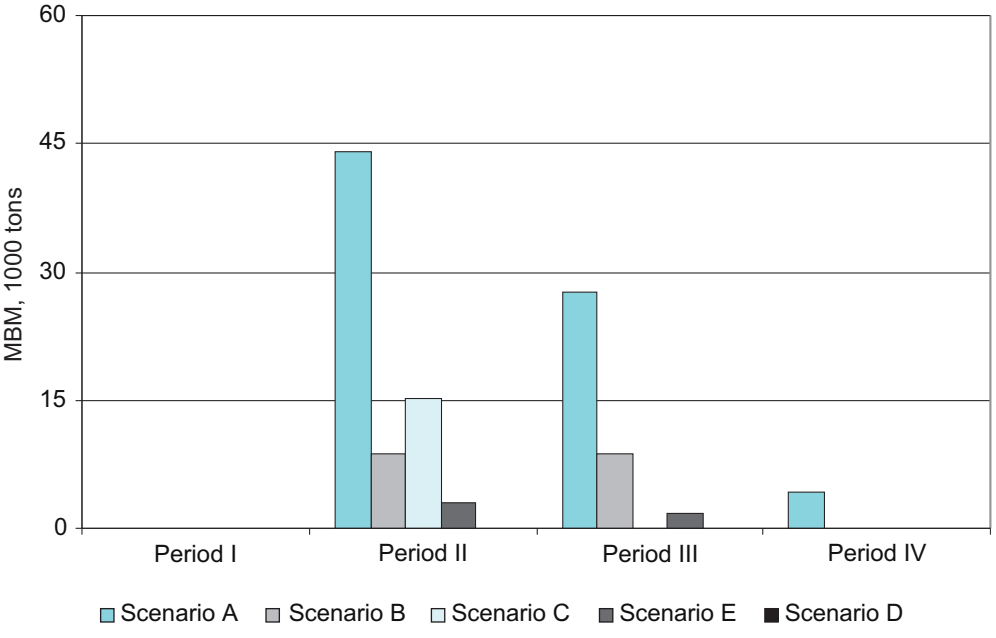

Figure 10.
The probable share of MBM imported from Denmark during different time periods (I - IV)
Note: The value for Scenario D is 0.002 tons.

Germany

The proportion of MBM imported from Germany was 5.0 % of the total MBM imported to Finland. No documentation was available on the use of imported MBM in the feeding of different species of animals. Therefore, all MBM imported from Germany was assumed to have been used in cattle feeding according to the “worst case scenario” in each scenario A –E (Table 26).

The risk of exposure of the Finnish cattle population to BSE via imported MBM from Germany during the period of import of MBM (Table 10) was assessed to have been high. The assessment was based on the BSE situation in Germany at the time of import of MBM, which was the period when it was considered, according to SSC 2002, to have been probable that the BSE-risk associated with imported live cattle/ MBM from Germany could have presented an external challenge to the importing county (SSC 2002a).

Austria, Ireland and France

Minor amounts of MBM were imported to Finland from Austria, Ireland and France (Table 10). The import from Austria took place in 1980 when MBM was not used in cattle feeding and Austria was not categorised as a BSE-risk country at that time. The imports from France and Ireland took place after the ban of the use of imported MBM in cattle feeding in 1990. Even if it is assumed that it was not used directly for cattle feeding, cross-contamination of cattle feed with these products cannot be ruled out since these products were used in mono-gastric animal feeding after 1990 (Table 31, Annex 4).

The risk of exposure of the Finnish cattle population to BSE via imported MBM from Ireland and France was assessed to be low based on the amount of MBM imported and the BSE situation in Ireland and France at the time of import (SSC 2002a, SSC 2000f, SSC 2000g). Furthermore, the time of import was after the ban of imported MBM for cattle feed in 1990. The BSE-risk from MBM imported from Austria was assessed to negligible based on the time of import because it was imported in 1980 when MBM was not used in cattle feed.

Other countries

Australia, Sweden, Norway and New Zealand are countries with no reported BSE-cases that have exported PAP to Finland. No documents were available on the use of imported MBM from Australia, New Zealand and Norway. The proportion of MBM imported from Sweden was 32% of the total amount imported. Documentation was available for 9,314 tons of MBM that was directly used for the formulation of feed for fur and pet animal feed during 1980 – 2002, whereas the rest of the imported MBM was assumed to have been used in cattle feeding.

The risk of exposure of the Finnish cattle population to BSE via imported MBM from Australia, Sweden, Norway and New Zealand was assessed to be negligible because of the BSE situation in these countries at the time of import of MBM to Finland.

This assessment is based on the knowledge of the BSE-situation in these exporting countries up to 31.10.2004 However, if the situation changes, i.e. BSE cases are detected in these countries or if it assessed that it is probable that BSE is present in these countries, the results of this risk assessment will be altered.

Other imported feed

Even though the main route for BSE-risk infection is MBM, the external challenge associated with imported animal fat, milk replacers and slaughter offal should not be neglected. These risks were however not assessed during this project and are therefore not included in the final assessment.

References

Anderson R M, Donnelly C A, Ferguson N M, Wool house M E J, Watt C J, Udy H J, MaWhinney S, Dunstan S P, Southwood T R E , Wilesmith J W, Ryan J B M, Hoinville L J, Hillerton J E, Austin A R, Wells G A H (1996). Transmission dynamics and epidemiology of BSE in British Cattle. Nature 382:779-788.

CBD (2003). Central Bovine Database, February 2003.

Customs (2002). Statistics on import of live cattle in Finland between 1980 – 1994. National board of Customs.

DEFRA (2001). Review of the origin of BSE. http://www.defra.gov.uk/animalh/bse/bseorigin.pdf.

DEFRA (2003). General statistics, DEFRA BSE information http://www.defra.qov.uk/ an i malh/bse/index. html. 2003.

EELA (2003a). Department of Pathology of the National Veterinary and Food Research Institute (EELA). 2003.

EELA (2003b). Department of Virology of the National Veterinary and Food Research Institute (EELA). 2003.

ETT (2003). Statistics on cattle imported in Finland 1995 – 2002. Association for animal disease prevention in Finland http://www.etUi/ett frame main 03.htm.

FABA (2003), Archives of Finnish Animal Breeding Association; 28.3.2003.

Heinonen R (2003). Personal communication. 2003.

Johansson S. (2003). Personal communication; 28.3.2003.

KTTK (1980 – 2002). Valtion Maatalouskemian Laitos. Vuositilastot.

KTTK (2001) BSE-tapaus Pohjoissuomalaisella karjatilalla: Selvitys käytetyistä rehuista.

KTTK (2004). Focus database.

Maatilahallituksen Tiedonanto N:o 403 (Publication of Board of Agriculture No. 403) (1982).

MAFF (2000). Information on the BSE status of the herds of origin provided to MMM in 2000.

MAFF (2001). BSE information: Tallow. http://www.maff.qov.uk/animalh/bse/index.html.

Marsh R, Bessen R, Lehmann S. (1991). Epidemiological and experimental studies on a new incident of transmissible mink encephalopathy. Journal of Genetical Virology 72:589-594.

MMM (1990). Iso-Britanniasta tuodut nautaeläimet ja BSE seuranta. (Letter on the monitoring of BSE in cattle imported from UK of the Veterinary and Food Department of the Ministry of Agriculture to owners and veterinarians of cattle imported from UK on 1.11. 1990) MMM dnro 1031/51-90.

MMM (1996). BSE-asia ajankohtaistuu. (Letter on the monitoring for BSE in cattle imported from the UK of the Veterinary and Food Department of the Ministry of Agriculture to owners and veterinarians of cattle imported from UK on 29.3 1996) MMM dnro 414/51-96.

MMM (1998). Supplemented application for BSE-free status for Finland. Letter by the Veterinary and Food Department of the Ministry of Agriculture and Forestry to the European Commission on 8 June 1998 (dnro 821/51-98).

MMM (2003). Documents related to applications for import licenses. Department of food and health, Ministry of Agriculture and Forestry.

Morignat E, Ducrot C, Roy P, Baron T, Vinard J-L, Biacabe A-G, Madec J-Y, Bencsik A, Debeer S, Eliazsewicz M, Calavs D (2002). Targeted surveillance to assess the prevalence of BSE in high-risk populations in western France and the associated risk factors. Veterinary Record 151:73-77.

OIE (2000a). OIE manual for standards for diagnostic tests and vaccines, 4th edition, 2000. Chapter 2.3.13: Bovine spongiform encephalopathy http://www.oie.int/enq/normes/mmanual/A 00060.htm 9.4.2003.

OIE (2001). Guidelines for risk analysis. OIE International Animal Health Code, 10th edition 2001, chapter 1.3.2. http://www.oie.int/enq/normes/mcode old/a 00011.htm 2.10.2002.

OIE (2004a). Number of reported cases of bovine spongiform encephalopathy (BSE) worldwide (excluding the UK) Updated 8.9. 2004. http://www.oie.int/enq/info/en esbmonde.htm 10.9. 2004.

OIE (2004b). OIE manual for standards for diagnostic tests and vaccines, 5th edition, 2004. Chapter X.9: Scrapie.http://www.oie.int/enq/normes/mmanual/A 00119.htm 18.11.2004.

Regulation (EC) No 999/2001 of the European Parliament and of the Council of 22 May 2001 laying down rules for the prevention, control and eradication of certain TSEs. OJ L 147, 31.5.2001, p. 1.

Regulation (EC) No 1774/2002 of the European Parliament and of the Council of 3 October 2002 laying down health rules concerning animal by-products not intended for human consumption. OJ L 273, 10.10.2002 p. 1-95.

Schreuder B E C, Wilesmith J W, Ryan J B M, Straub O C (1997a). Risk of BSE from the import of cattle from the UK into countries of the European Union. Veterinary Record 141:87-190.

SSC (2000a). Final Opinion of the Scientific Steering Committee on the Geographical Risk of Bovine Spongiform Encephalopathy (GBR) adopted on 6 July 2000 http://www.europa.eu.int/comm/food/fs/sc/ssc/outcome_en.html.

SSC (2000b). Report on the assessment of the geographical BSE-risk (GBR) of Finland, July 2000 http://www.europa.eu.int/comm/food/fs/sc/ssc/outcome_en.html.

SSC (2000c). Report on the assessment of the geographical BSE-risk (GBR) of Germany, July 2000 http://www.europa.eu.int/comm/food/fs/sc/ssc/outcome_en.html.

SSC (2000d). Report on the assessment of the geographical BSE-risk (GBR) of the Netherlands, July 2000 http://www.europa.eu.int/comm/food/fs/sc/ssc/outcome_en.html.

SSC (2000e). Report on the assessment of the geographical BSE-risk (GBR) of United Kingdom, July 2000 http://www.europa.eu.int/comm/food/fs/sc/ssc/outcome_en.html.

SSC (2000f). Report on the Assessment of the Geographical BSE - Risk of Ireland. July 2000. http://www.europa.eu.int/comm/food/fs/sc/ssc/outcome_en.html.

SSC (2000g). Report on the assessment of the geographical BSE-risk (GBR) of France, July 2000 http://www.europa.eu.int/comm/food/fs/sc/ssc/outcome_en.html.

SSC (2002a). Update of the Opinion of the Scientific Steering Committee on the Geographical Risk of Bovine Spongiform Encephalopathy (GBR) adopted on 11 January 2002 http://europa.eu.int/comm/food/fs/sc/ssc/out243 en.pdf.

SSC (2002b). Final report on the updated assessment of the geographical BSE-risk (GBR) of Finland, 16 May 2002 http://www.europa.eu.int/comm/food/fs/sc/ssc/outcome_en.html.

Statistics Finland (2003). Exchange rates. http://www.stat.fi/tk/tp/maailmanumeroina/04_nimi-_ja_maatiedot.xls. 30.6 2003.

Terry L A, Marsh S, Hawkins A e, Wells G A H, Spencer Y I (2003). Detection of disease-specific PrP in the distal ileum of cattle exposed orally to the agent of bovine spongiform encephalopathy. Veterinary Record 152:387-392.

Vehmaan-Kreula E (1987). Herefordsonnista huippuhinta testattujen sonnien huutokaupassa. Nautakarja 3, p. 42.

Wells G A H , Scott A C, Johnson C T, Gunning R F, Hancock R D, Jeffrey M, Dawson M & Bradley R (1987). A novel progressive spongiform encephalopathy in cattle. Veterinary Record (1987) 121:419-420.

Weybridge (2003). Annual and cumulative incidence of BSE in different birth cohorts of beef suckler cattle in Great Britain. Centre for epidemiology and risk analysis, VLA, Weybridge.21.8.2003.

WHO (2001). Fact sheet: Bovine Spongiform Encephalopathy. http://www.who.int/inffs/fact113.html.

WHO (2002). Variant Creutzfeldt - Jakob disease. Fact sheet No. 180. Revised November 2002 http://www.who.int/mediacentre/factsheets/fs 180/ en! 27.3.2003.

Wilesmith J W, Wells G A H, Cranwell M P, Ryan J B M (1988). Bovine spongiform encephalopathy: Epidemiological studies. Veterinary Record 123:638-644.

Wilesmith J W, Hoinville L J, Ryan J B M, Sayers A R (1992a). Bovine spongiform encephalopathy: aspects of the clinical picture and analyses of possible changes 1986 – 1990. Veterinary Record 130: 197-201.

Wilesmith J W, Ryan J B M, Hueston W D, Hoinville L J (1992b). Bovine spongiform encephalopathy: epidemiological features 1985 to 1990. Veterinary Record 130: 90-94.

Legislation

Commission Decision 1999/317/EC of 28 April 1999 recognising the fully operational character of the Finnish database for bovine animals (notified under document number C (1999) 854) (Only the Finnish and Swedish texts are authentic) OJ L 122, 12.5. 1999 p. 40.

Commission Directive 98/88/EC of 13 November 1998 establishing guidelines for the microscopic identification and estimation of constituents of animal origin for the official control of feedingstuffs (Text with EEA relevance)
Council Regulation (EC) No 820/97 of 21 April 1997 establishing a system for the identification and registration of bovine animals and regarding the labelling of beef and beef products. OJ L 117, 7.5. 1997 p.1-8.

MMM (2001). Maa- ja metsätalousministeriön asetus kalajauhon, rasvattomaksi puhdistetuista luista saadun dikalsiumfosfaatin ja hydrolysoidun proteiinin valmistus, kuljetus ja varastointi 6/2001. (Ministerial Decree on the processing, transportation, storing and treatment of fishmeal, dicalcium phosphate and hydrolysed proteins). 9.1.2001.

Annexes

Annex 1. Overview of cattle feeding practice

Due to the geographical location of Finland, the feeding of cattle can be categorised into two main seasons or periods. The longest feeding period is the indoor winter feeding season that starts from mid-September and lasts until the beginning or middle of May. The second and shorter period is the pasture grazing season occurring between May and September. The young stock however, can be kept on pasture until October. The pasture-grazing season is much shorter in northern Finland than in the South due to the earlier onset of autumn.

Feeding of calves

Dairy calves

According to the general recommendation for rearing young calves, the feeding practice of young dairy calves for the first two months of life can be divided into three phases (the first 3 days, 1-2 weeks and 8 weeks of life). Although the feeding recommendation is as explained below, practical application varies widely. It is recommended to feed calves with colostrum for the first 3 days of life to ensure that the calf receives good passive immunity. After colostrum feeding, the calves are fed on milk for 1-2 weeks. At the age of over 1-2 weeks, calves are usually given milk replacers. They are also gradually introduced to calf starter as well as forage (hay or silage), which helps them to develop faster from non-ruminant calves to ruminant. At the age of about 8 weeks, when the calf consumes about 1 kg per day of the calf starter, milk replacers are withdrawn from the diet and the calf is then fed with starters and silage and hay as roughage feed. From this phase of development the calf can gradually be introduced to other industrially manufactured feeds (Mäntysaari 2001).

Replacement heifer calves are fed ad libitum from weaning to the age of 3 months. During the age of 3 – 12 months, the feeding is aimed at a daily weight gain of 500 – 750 g to avoid over-feeding. Over-feeding during the early stage of development is known to affect growth and development of the udder as a result of the effects of hormones such as growth hormones, prolactiin and insulin-like growth factor. Heifers over 12 months are fed on the basis of their body condition, with adjustment for the onset of pregnancy and growth. Adjustment of feeding for growth of the young heifer and the foetus continue until calving. Three or four weeks before calving (transition period), the daily concentrate feed intake will be increased to 3 – 4 kg. During this period silage is fed either ad libitum or restricted, depending on whether or not the heifer is going to be kept on ad libitum diet during its first lactation (Mäntysaari 2001).

Calves for beef production

Beef production in Finland comprises animals of dairy breeds, as well as beef breeds and crossbreeds of dairy and beef breed origin. Bull calves born on dairy farms and heifer calves not required for replacement are reared for beef production. These calves are mainly reared on farms that have specialised for rearing bought-in calves from weaning to slaughter. Presently calves can also be reared on a three-stage rearing system. Some dairy farms also keep calves for beef production in connection to the dairy farming (Anon 2000).

Farms specialised in rearing bought-in calves usually purchase weaned calves of approximately 2–3 months old. (Early stage feeding of these calves is similar as above except that the calves are kept in-group or in individual pens and individually fed on milk or milk replacers.) Once the calf starts eating sufficient concentrate and forages, more commercial concentrate based on agro-industrial by-products and/or home-grown grain with protein supplement is given. At the age of 4 – 5 months the young calf has already developed to a ruminant and is able to feed on forage with either agro-industrial by-products or home-grown grain supplemented with protein, minerals and vitamins, in the form of total mixed ration (TMR) or conventional ration, until the animal achieves slaughter weight at the age of 1 – 2 years.

According to the present recommendation and practice of rearing calves for meat production, calves can be reared with a slightly different method called “three- stage rearing”. The “first stage” rearing of two weeks of life resembles that of replacement dairy herd calves. Farms specialised in three stage calf rearing usually purchase young stock of approximately 1 – 3 weeks old (weighing 38 – 42 kg) for temporary rearing (“the second stage”). At this early stage, calves are kept in-group pens and are fed on milk replacers and are also introduced to calf starters, commercial concentrates and forages. At the age of 5 – 6 months, the calves are transferred to the final stage (“the 3rd stage”) of rearing accommodation. From this stage until the animal achieves the desired slaughter weight the young growing animal is given a similar diet (TMR) to that for bought-in calves (Anon 2000).

Calves of suckler cow herds

Suckler cows are either pure beef breeds (Limousin, Hereford, Aberdeen Angus, and Charolais) or cross breeds of beef and dairy (Friesian, Ayrshire) breeds. Calves of suckler-cow herds are reared until the age of 5 – 6 months (weaning) with their dam on milk. Generally the feeding does not include industrially processed milk replacers, starters or compound feeds. Their additional diet is composed of forage (hay, oat or barley straw, whole-crop silage made from oat and barley) and grain with supplementary minerals. Calves from suckler-cow herd gain approximately 1.2 kg body weight per day on milk from dam and additional feeding. These calves leave the herd at the age of 5 – 6 months to be reared on bought-in calf rearing farms in a similar manner as others (Manninen 2003).

Feeding of milking cows

During the winter feeding season, feeding of dairy cattle is mainly based on grass silage, industrially manufactured protein, semi-protein and compound feeds. Many farms formulate cattle feed from home grown grain and other agro-industrial by-products (e.g. sugar beet pulp, wheat bran) supplemented with protein, minerals and vitamins. The most important protein sources are rapeseed or soybean meal or cake. The feeds are fed to cows either in the form of TMR or as conventional ration. Before the intensification of TMR feeding, it was recommended that silage is fed ad libitum whereas industrially manufactured or home mixed concentrate is

fed either on the basis of daily milk yield or on a “flat rate” basis, where the same amount of industrially processed concentrate feed or home mixed feed is fed to the cow irrespective of the amount of daily milk yield. In either of these feeding systems grass silage plays a major role during winter-feeding. Silage contributed 42% of the average annual feed intake of the milking cows in the milk-recording herds in 2002 (RAC 1970 – 2002).

During the pasture-grazing season, the feeding is based on grass and industrially processed concentrate or grass and home made grain supplemented with protein and minerals. Pasture is efficiently utilised either in the form of zero grazing or rotational grazing. Zero grazing is a system in which the sward is cut and carried to the animal, whereas in rotational grazing the cows are allowed to graze on the divided paddocks rotationally. Grazed pasture is one of the most economical feed sources for milk production compared to conventional feeds. However, profitability or cost effectivity of milk production from high yielding herds depends on several factors, including the amount of forage available, the nutritional quality of forage during the grazing period and the quality of the supplementary concentrate feed provided. However, an increasing number of farms are not practising grazing and feeding is based on silage all year around, as can be seen from Figure 12 (RAC 1970 – 2002).

Use of industrially processed feeds for cattle

The genetic makeup of dairy cattle was improved for maximum yield capacity during the last century. Due to the genetic improvement of dairy cows for higher milk yield, the demand for industrially processed and balanced concentrate feeds also increased. The average annual milk production and feed intake of milking cows in milk-recording herds is given in Figure 11 and Figure 12. To fulfil the animals’ nutrient requirement and to maximise the yield capacity of the animal, large amounts of concentrated feeds with ideal composition of nutrients such as energy, protein, minerals and vitamins were required. Most probably, a) the growing demand for concentrated feed, b) the price of protein feeds, and c) the shortage of domestic protein supply then put pressure on the feed industries to look for sources of protein supplements of other than plant origin.

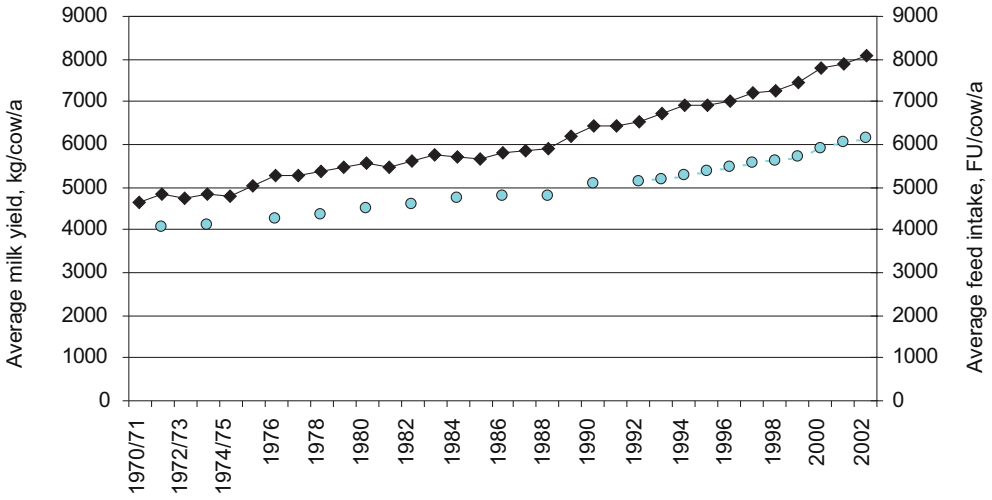

Figure 11.
Average milk production (kg/cow/a) and total feed intake (feed unit/cow/year) of milking cows in milk-recording herds (RAC 1970 – 2002).

Due to these factors, intensified research was conducted during the past three decades on in situ and in vitro rumen degradability of both imported and domestic sources of supplementary protein feeds (Setälä 1983; Vanhatalo & Aronen 1991). Besides their degradability, their efficiency in terms of milk and meat produced per kilogram of feed consumed by the animal were studied (Tuori 1992; Aronen 1990; Joki-Tokola 1991).

According to the data from the Rural Advisory Centre's reports (RAC 1970 – 2002), the average milk yield of milking cows in milk-recording herds was 4,660 kg/cow/year in 1970 and increased to 8,077 kg milk/cow/year in 2002, indicating an increase of 73% (Figure 11). Simultaneously, the increase in the average protein feed consumption of the herd during the same period increased six folds (Figure 12). Overall increase in intake of industrially processed feeds from 1970 to 2002 was 69%. The contribution of forages to the total feed intake of the milk recording dairy herds increased markedly with time and was 55% for the year 2002 and paralleled with an increased intake of industrially processed feeds (RAC 1970 – 2002).

On certain farms, individual cows have produced an average of 9,500 – 10,500 kg of milk per year (RAC 2001). Such a high yield of milk by cows requires more protein supplement in the daily ration compared to the diet for cows with lower milk production, because the diet for higher milk producing cows must fulfil the mammary demand for amino acids used in milk synthesis and also for body maintenance, gestation, and growth (Chilliard 1992).

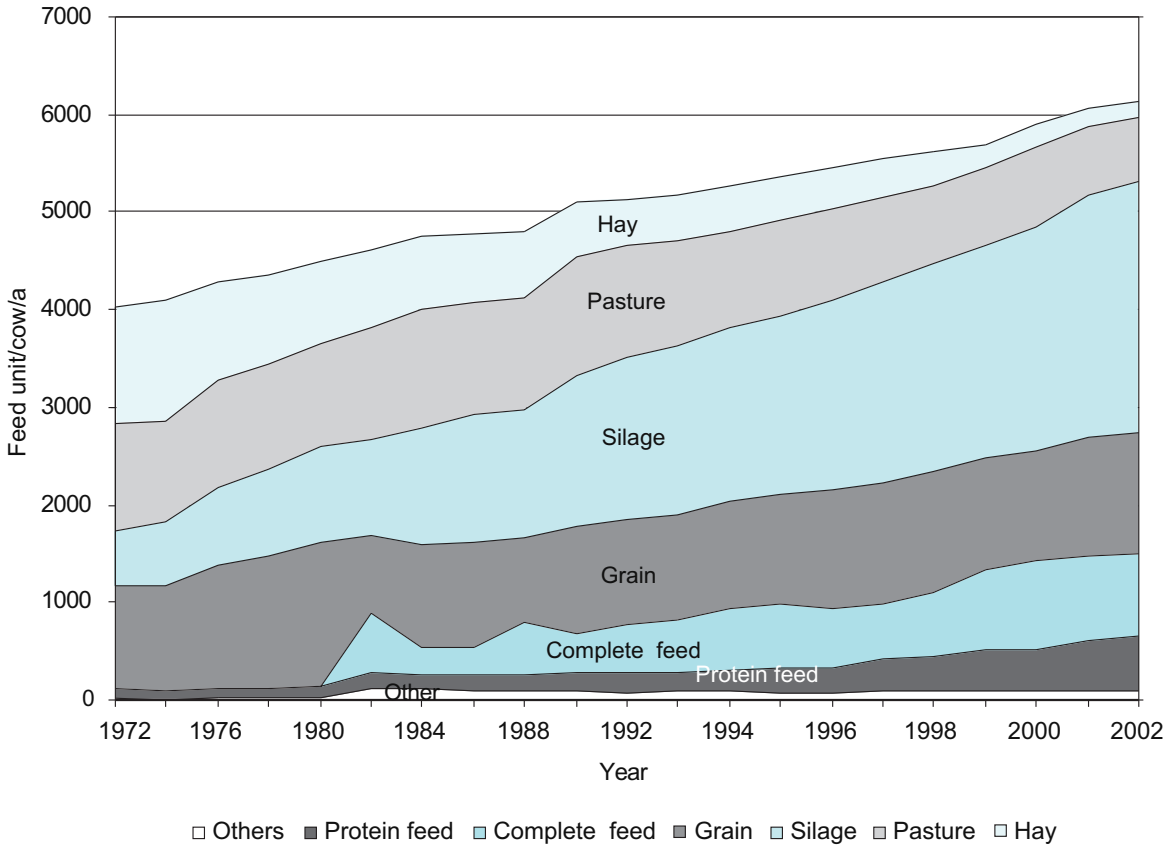

Figure 12.
Feed intake, including dairy concentrate containing protein feeds, by milking cows in milk recording herds (RAC 1970 – 2002).

The provision of balanced diet accounts for the major cost in intensive livestock production. Thus during the 1980s, one of the criteria for using processed animal protein (MBM) as an alternative protein source in cattle feed was its low price relative to oil seed protein sources (soybean, rapeseed meal). Furthermore, the quality of protein from MBM is competitive with rapeseed meal or skim milk in the diet of growing cattle. For example, a feeding trial conducted with Ayrshire bulls fed on either rapeseed meal or MBM for the whole growing period showed that bulls fed on MBM achieved relatively higher daily weight gain and carcass weight compared to those fed on rapeseed meal (Joki-Tokola 1991). Similarly, earlier work of Leibholz (1967) showed greater weight gain when 5 to 11 weeks old Friesian male calves were fed on a diet containing either MBM or dried skim milk as a protein supplement, compared to control diet.

In Finland, the energy source for ruminants has always been forage and grains or grains by-products, whereas fat has always been used in mono-gastric animal feed as an energy source. However, as understanding of the rumen functions and its manipulations advanced, feeds with higher fat content also gained acceptance as cattle feed. Thus, during the past three decades, feed manufacturers in Finland have substituted part of the grain in compound feeds for cattle by either protected or unprotected animal fat or oils to increase the energy density of the diet. The use of low cost animal fat and plant oil in cattle feed became more and more common not only because of its high energy content but also for the manipulation of fatty acid compositions in meat and milk. In Finland, the level of supplementary fat in the diet of growing bulls during 1980 – 1990 was 5% of the diet throughout growing period until the animal achieved slaughter weight (Tesfa et al 1992). The diet of the high yielding dairy cows contained approximately 3.0 -5.0% tallow or rapeseed oil (Tesfa et al 1991) or palm oil, soybean oil and calcium soap fatty acids (Tesfa et al.1998). Additionally, animal fat has also been used for the formulation of pre-weaning calf milk replacers and calf starters.

References

Anon. (2000). Naudan kolmevaihekasvatus:l Vasikat hyötykäyttöön. Nauta 3/2000:36 -38.

Aronen I (1990). Barley protein and rapeseed meal as protein supplements for growing cattle. Acta Agric. Scand. 40:297 – 307.

Chilliard Y. (1992). Physiological constraints to milk production: factors which determine nutrient partitioning, lactation persistency and mobilisation of body reserve. World Rev. Anim. Prod. 27:19 – 26.

Joki-Tokola E (1991). Lihaluujauho ja rypsirouhe sonnien valkuaisrehun. Koetoiminta ja käytäntö. 48:64.

Leibholz J (1967). The source of protein in calf diets. 1. A comparison of dried skim milk and MM. Australian Journal of Agricultural Research 18, 149 – 155.

Manninen M. (2003). Personal communication. 5.8.2003.

Mäntysaari P. (2001). Ruokinta vasikasta lehmäksi. Tieto Tuottamaan 82:78 – 83.

RAC (1970-2002). Rural Advisory Centre. Statistics of the activity of milk recording society in Finland.

RAC (2001). Rural Advisory Centre. Maidontutannon tulosseminaari 18.4.2001, Vantaa.

Setälä J (1983). The nylen bag technique in the determination of ruminal feed protein degradation. Journal of the Scientific Agricultural Society of Finland 55:1-78.

Tesfa A T, Tuori M, Syrjälä-Qvist L (1991). Replacement of grain by tallow or rapeseed oil in the diet of lactating cows an d its effects on milk yield and composition. Finn. J. Dairy Sci. 49:54 – 64.

Tesfa A T, Tuori M, Syrjälä-Qvist L (1992). The influence of partial replacement of barley with dietary fat sources on growth and feed conversion efficiency of growing bulls. Agricultural Science in Finland 1: 267 – 278.

Tesfa A T, Tuori M, Syrjälä-Qvist L (2000). The effects of dietary oil supplement on milk fat and milk conjugated linoleic acid (CLA). Maaseutukeskusten Liiton julkaisu No. 952:149 -152.

Tuori M (1992). Rapeseed meal as a supplementary protein for dairy cows on grass silage-based diet: With the emphasis on the Nordic AAT-PBV feed protein evaluation system. Agric, Sci. Finl. 1:369 – 439 (diss).

Vanhatalo A & Aronen I (1991). The ruminal and intestinal degradation estimates of either untreated or physically treated rapeseed meals measured by nylen bag techniques. Proc. of the 8th Int. Rapeseed Congr. Vol.2 (6):424 – 429.

Annex 2. Structure and dynamics of the finnish cattle population

Dairy production has traditionally been by far the most important sector of cattle production in Finland. Even the production of beef was more or less based only on dairy breeds until the 1980s. Suckler cows have been recorded separately in the statistics of the MMM only since 1981 (TIKE 1983).

Since 1980, the number of purebred beef cattle started to increase. Between 1981 and 1994 there was an almost threefold increase in the number of suckler cows, while during the same time the number of dairy cows declined by almost 40 %. The most rapid increase in the number of suckler cows took place in the beginning of the 1990s. The proportion of suckler cows in the Finnish cattle population has how-

Table 28.
Number of cattle in Finland 1980 – 2002 (Cattle, thousands)

Year	Dairy cows	Suckler cows	Bulls 1 year and over	Heifers	Calves under 1 year	Cattle total
1980[1]	719,5		109,4	232,8	676,4	1738,1
1981[1]	700,8	8,5	113,7	253,2	690,0	1766,2
1982[1]	689,2	8,1	125,4	244,2	651,7	1718,6
1983[1]	663,1	9,1	120,0	249,8	639,5	1681,5
1984[2]	659,5	7,8	125,8	233,8	630,6	1657,5
1985[2]	627,7	8,9	125,4	215,2	631,1	1608,3
1986[2]	606,8	9,1	131,4	218,0	602,0	1567,3
1987[2]	589,0	8,9	124,8	217,4	557,8	1497,9
1988[2]	550,6	9,6	130,1	215,1	538,0	1443,4
1989[2]	506,6	9,2	134,2	206,3	490,3	1346,6
1990[2]	489,9	14,2	148,9	218,8	487,9	1359,7
1991[2]	445,6	21,2	144,1	213,5	485,5	1309,9
1992[2]	428,2	27,9	143,3	211,1	462,7	1273,2
1993[2]	426,4	33,1	139,2	216,7	436,9	1252,3
1994[2]	416,7	32,6	143,5	214,8	425,4	1233,0
1995[3]	398,7	29,1	109,2	189,0	422,1	1148,1
1996[4]	392,2	31,1	114,7	201,1	406,5	1145,6
1997[4]	390,9	32,4	120,5	196,8	401,8	1142,4
1998[4]	383,1	30,6	114,8	190,3	398,3	1117,1
1999[5]	372,4	29,6	118,1	187,5	379,2	1086,8
2000[5]	364,1	27,8	114,9	185,0	364,8	1056,7
2001[6]	351,8	28,2	108,6	176,1	354,7	1019,4
2002[6]	343,1	28,7	115,9	173,1	351,0	1011,8

Note: Source of information,

1) 1980 – 1983 Information centre of the Ministry of agriculture and forestry. Sample surveys on 15th June
2) 1984 – 1994 Information centre of the Ministry of agriculture and forestry. Sample surveys on 1st June
3) 1995 Integrated administration and control system (IACS). Sample surveys on 1st May
4) 1996 – 1998 IACS and CBD. Sample surveys on 1st May
5) 1999 – 2000 CBD. Sample surveys on 1st May
6) 2001 – 2002 CBD. Sample surveys on 1st December

ever still remained low: between 1980 and 2002, the number of suckler cows never reached 10 % of the number of dairy cows (Table 28). About 90 % of beef produced in Finland still originate from dairy herds (Table 29) (FABA 2003).

The Finnish Animal Breeders Association started a beef recording program for suckler herds in 1974 (Rosenlew 1995). Hereford was the predominant breed, and for several years Hereford, Charolais and Aberdeen Angus were the only purebred beef breeds in Finland, although Limousin semen was imported for use in dairy herds. The first full breed Limousin cattle were imported to Finland in 1981 and Simmental in 1990 (MMM 2003).

Only a part of the increase of the beef cattle population was due to import of live animals, since thousands of doses of bovine sperm were imported to Finland during the 1980s and 1990s (FABA 2002). Import of bovine embryos has been much less significant (MMM 2003).

Table 29.
Proportion of different beef breeds in the herds participating in the beef-recording program in Finland in 1985 and in 1989 (Vehmaan-Kreula 1986, Vehmaan-Kreula 1990)

	1985				1989			
Breed	Number of herds	Number of suckler cows	Herds (%)	Suckler cows (%)	Number of herds	Number of suckler cows	Herds (%)	Suckler cows (%)
Hereford	95	1256	50,3	54,7	78	1083	44,3	52,1
Aberdeen Angus	61	677	32,3	29,5	53	538	30,1	25,9
Charolais	25	249	13,2	10,8	27	233	15,3	11,2
Limousin	7	94	3,7	4,1	18	224	10,2	10,8
Other	1	19	0,5	0,8				
Total	189	2295	100	100,0	176	2078	100	100

References

FABA (2002). Statistics on import of sperm. Kotieläinjalostuksen tilastokirja 1992, 1993, 1996 and 1997.

FABA (2003). Archives of Finnish Animal Breeding Association; 28.3.2003.

MMM (2003). Documents related to applications for import licenses. Department of food and health, Ministry of Agriculture and Forestry.

Rosenlew A-M. (1995). Puhtia lihakarjatarkaaliuun. Nauta 3/95 p. 82-83.

TIKE (1983).1980 – 1983 Information centre of the Ministry of agriculture and-forestry. Sample surveys on 15th June. Maatilatilastollinen vuosikirja 1983.

Vehmaan-Kreula E (1990). Lihakarjantarkkailun tulokset 1989. Nautakarja (1990) 1:6-7.

Vehmaan-Kreula E (1986). Lihakarjantarkkailu vuonna 1985. Nautakarja 2:28 - 29.

Annex 3. Control of the BSE-agent

The first risk management measures that were taken by the authorities outside the UK in order to control BSE were import restrictions intended to prevent the release of the BSE- agent from the UK to other countries. As it became clear that the BSE-agent was already present outside the UK and that it could be present in a cattle population even if no clinical cases had been detected, control measures in order to ensure food safety and to prevent the propagation and circulation of the BSE-agent in the feed chain were enacted in several other areas related to the food and feed chain.

A list of risk management decisions in the European Community (EC) legislation related to control of BSE-agent is presented in Annex 3.

Import restrictions

Restriction of import is a common means of preventing the release of an infectious agent into a country or an area. According to the rules of international trade, a country that applies import restrictions must be able to justify the restrictions, otherwise they may be considered as barriers to trade. According to the Sanitary and phytosanitary agreement (SPS-agreement) of the World Trade Organisation (WTO), all import restrictions applied to protect human or animal health in the importing country must be based on risk assessment (WTO 1994).

Until Finland joined the EU in 1995, import of live animals and animal products was subject to an import licence granted by the MMM. Because of BSE, MMM no longer granted licences for import of live cattle from the UK from October 1988 onwards (Heinonen 2003). It also banned the use of imported MBM for feeding of ruminants in 1990 (MMM 1990). In EC legislation, dispatch of cattle from the UK to other EU Member States was restricted in July 1989, but not completely banned (Commission Decision 89/469/EEC). Since then, import restrictions in the EC legislation have been extended to several products of bovine origin and also to import from Portugal. Certain restrictions have later been alleviated.

The establishments from which PAP imported to Finland between 1980 and 1994 originated from was inspected by the authorities before authorising import from a specific rendering plant. The inspection included also checking of the collection of raw material and it was assumed that the raw material remained the same when the import permits were renewed. The permits were renewed annually on request from the importer. The actual imports were accompanied by an official certificate providing specification of the country of origin and the rendering facility where it was produced. In most cases, there were no specific requirements concerning the origin of the raw material for the MBM in either the import permit issued by the MMM or specified in the document accompanying the import. Permits issued for imports from Sweden included a requirement that the MBM could not include animals that died on the farm if the MBM was aimed at being used for other animals than fur animals. This was based on a national requirement for production and use of MBM in Sweden from 1986 onwards. Imports were subjected to a border control where the accompanying documents were checked (personal communication Hakulin 2004).

Surveillance for BSE in cattle

The aim of surveillance of cattle for BSE is to detect infected animals and to exclude them from the food and feed chain. EC legislation on surveillance for BSE consists of two basic elements:

- passive surveillance in animals with clinical symptoms compatible with BSE, focused primarily on clinical cases notified as suspects (Regulation (EC) 999/2001).
- active surveillance of certain groups of cattle (monitoring), which is based on the use of rapid post mortem tests (Regulation (EC) 999/2001).

Since 1990 until May 1998, surveillance of BSE in EU-15 Member States other than UK was entirely passive: it was based on examination of the brain of animals. The surveillance was based on examination of animals showing clinical signs of BSE. Commission Decision 90/200 specifically required inspection of bovine animals for signs of BSE before slaughter (ante mortem inspection) and brains of animals showing such signs were to be submitted for examination (Commission Decision 90/2000/EEC). In 1998, the requirement was enforced so that each member state was obliged to examine a certain number of bovine brains, depending on the size of the cattle population in the country (Commission Decision 98/272/EC) The required numbers of brains to be examined were rather low and the examinations were targeted only at animals showing neurological signs compatible with BSE. In January 2001, the monitoring of BSE was extended considerably when large scale testing of animals belonging to the risk groups started. Since January 2001, all cattle aged over 30 months slaughtered for human consumption have had to be tested for BSE, although Sweden has the right to the right to derogate from this requirement (Regulation (EC) No 999/2001). Based on the classification of the EFSA of GBR II (EFSA 2004).

Mandatory notification of BSE within the EU aims to ensure that competent authorities are informed of all suspect cases of BSE in the country. The information on confirmed cases is provided to the European Commission and to other EU Member States. Scrapie became notifiable within Member States of the EU at that time in 1993 (Council Directive 91/68/EEC). The notification of other TSEs became notifiable within EU-15 Member States in May 1998 (Commission Decision 98/272/EC). In Finland, BSE and scrapie were specifically added to the list of notifiable animal diseases within the country in December 1990 (MMM1095/EEO/1990)

Requirements on notification of animal diseases in the EC legislation are based on the Council Directive 82/894/EEC. EU Member States must notify outbreaks of certain animal diseases within a given time to the Commission and to other Member States. The list of these diseases is given in the annex of this directive. BSE was added to this list in March 1990. Members of the OIE must also notify the cases to the OIE. For BSE, which is an OIE list B disease, all cases must be notified annually.

Awareness of animal keepers, veterinarians and authorities of the signs of BSE and knowledge on the required actions in case of suspected BSE is vital to make sure that all suspect cases of BSE are detected. In the EC legislation, a specific requirement for the EU Member States to ensure that all relevant personnel and authorities have knowledge on clinical signs and epidemiology of BSE has been in force since May 1998 (Commission Decision 98/272/EC).

Detection of BSE in animals 2002

There are currently no tests available for the diagnosis of BSE in live cattle. Serological tests cannot be used for the diagnosis since no immune responses to the causative agent in infected animals have been detected. There is also no method for isolation of the BSE-agent for diagnostic use in live animals (OIE 2000a).

The diagnosis of BSE can only be confirmed post mortem. It is based either on

demonstration of characteristic morphological changes in the brain by a histopathological post mortem examination or on demonstration of a modified prion protein (PrPSc) in the sample. The tests that rely on demonstration of the PrPSc are quicker than the traditional histopathological examination. The rapid tests are widely used for screening of large numbers of samples from other than suspected cases of BSE.

Demonstration of morphological changes in the brain sample

According to the EC legislation, a histopathological examination must be used in cases where BSE is suspected and the competent authority decides that the possibility of infection with BSE cannot be ruled out, except when the brain sample is autolysed or damaged (Regulation (EC) No 999/2001). The tissue sample preserved in formalin is stained and examined under the microscope. The diagnosis is based on the appearance of the characteristic spongiform changes in specific neuroanatomical locations in the central nervous system (OIE 2000a, Simmons et al 1996).

Disadvantages of this traditional method are its relative slowness and the fact that it is not usable for examining autolysed tissue samples. Its main advantage is its specificity: demonstration of the specific morphological changes detected by histopathological examination of the brain provides a definitive diagnosis of BSE (OIE 2000a).

Demonstration of PrPsc in the brain sample

(a) Rapid tests

According to EC legislation, so-called rapid tests are used for BSE monitoring (screening of large numbers of samples from targeted cattle populations, other than suspected cases of BSE) (Commission Regulation (EC) No 999/2001). However, a positive diagnosis obtained by these methods must, be confirmed by histopathology or another method laid down in the OIE Manual of standards for diagnostic tests and vaccines (immunocytochemistry, confirmatory immunoblotting or demonstration of characteristic fibrils by electron microscopy) (OIE 2000a). By the end of 2002, three rapid tests were approved by the EU (Commission Regulation (EC) No 999/2001): Currently (2004) two more tests are approwed (Commission Regulation (EC) No 999/2001 as amended)

Chemiluminescent ELISA test (Enfer test)

Sandwich immunoassay (Bio-Rad Platelia test)

Immunoblotting test (Prionics Check test)

All of these methods are based on the interaction of specific antibodies with PrP^{Sc}. The basic idea is to treat samples taken from the brainstem of the animals with a protease enzyme so that the normal prion protein in the sample is destroyed but the modified PrP^{Sc}, which resists the treatment, remains. A specific prion antigen is then added to demonstrate by an immunological reaction the possible PrP^{Sc} left in the sample. Since the antigen also reacts with the normal prion protein, false positive results may occur if the normal prion protein of the sample is not completely destroyed by the treatment with the protease enzyme.

Chemiluminescent ELISA test involves an extraction procedure and an ELISA technique and uses an enhanced chemiluminescent reagent. Sandwich immunoassay also involves denaturation and concentration steps. Immunoblotting technique not only demonstrates the prion in the sample but it also shows the differences of mo-

lecular weight of the normal and modified prion protein. It is therefore more specific than the two other rapid tests.

(b) Immunocytochemistry

This method is a combination of the traditional histopathology and immunological methods. The detection of Prpsc is based on specific antibodies but the test is performed on a tissue section that does not require any protein purification. In experimentally infected animals, immunocyto-chemistry has been demonstrated to be more sensitive than routine histopathology, since it can detect infection earlier in the incubation time, before the occurrence of the vacuolar changes in the central nervous tissue (OIE 2000a). Advantages of this technique compared to histopathology are that under certain conditions it can also be used for examination of autolysed samples and it is quicker to perform, since lengthy tissue fixation before the analysis is not required.

(c) Confirmatory immunoblotting (OIE-method)

Like the immunoblotting rapid test (Prionics), this method is based on a Western blotting procedure for the detection of the protease-resistant fragment of PrP^{Sc}. The main difference between these two methods is that in the confirmatory immunoblotting the tissue sample is first concentrated, and the test is therefore more sensitive than the immunoblotting rapid test.

(d) Electron microscopy

Negative stain electron microscopy can be used to demonstrate the characteristic fibrils composed of Prpsc in the tissue sample. The main advantage of this method is that it can also be used to examine autolysed tissue samples, but it seems to be less specific and sensitive than techniques based on immunocytochemistry or immunoblotting and it cannot therefore be used alone to confirm the diagnosis (OIE 2000a).

BSE-related culling

BSE-related culling is a mean to ensure that other cattle, which have probably been exposed to the same source of BSE-agent as a confirmed case of BSE, are excluded from the food and feed chain. According to the current EC legislation (Regulation (EC) No 999/2001), this requirement concerns all animals in the cohort of the animal in which BSE was confirmed, and also the progeny born within 2 years before or after the onset of the clinical symptoms of BSE of the dam. In the current EC requirements, the culling of the entire herd following a confirmed case of BSE has been made optional under certain conditions.

Meat and bone meal ban

Finland officially banned the use of imported MBM in ruminant feed in 1990 (MMM 59/1990). However, feed produced before the enforcement of the legislation was not withdrawn from the market and was used during 1990. The ban was communicated to domestic plants using imported raw materials. The Council Directive1994/381/EC on the prohibition of mammalian protein feeding to ruminants was implemented (MMM167/1995) on the 1st of March 1995. Nevertheless, farmers were allowed a transitional period of one year until March 1996 to use MBM containing cattle feed produced during 1995.

The use of MBM in feed for poultry and pigs was stopped on the 1st of January 2001 and the total prohibition of the use of PAP in feed for food producing animal came into force 1st of January 2001 (MMM 1239/2000). Fishmeal has not been used

for formulating feed for milking cows because of its fishy smell, taste and flavour effect on milk and milk products. Some feed mills have used fishmeal for the formulation of feed for young stock. The use of fishmeal in feed for ruminants was prohibited on the 1st of January 2001 (MMM 1239/2000), thus feed processing lines for feeds containing fishmeal and feeds without fishmeal were separated in 2001.

According to the MMM 1239/2000, feed containing PAP was removed from farms, feed mills, retail and wholesale stores starting December 2000. The regulation was communicated to media, farmers and organisations in the trade sectors by KTTK. All feed bags containing more than 300 kg feed containing PAP was systematically collected and disposed. Feed mills, farmers and distributors were compensated for the feed. By the 15th of March 2001, all feed containing PAP was removed from all farms that kept food producing animals. Farmers were ordered to destroy smaller amount of feed either by burial or by composting.

KTTK is responsible for the control and inspection of animal feed. The control activity covers rendering plants, feed mills that produce prohibited materials, non-prohibited materials, or both and feed distributors According to legislation in force in 2002 (Regulation (EC) No 999/2001 and Regulation (EC) No 1774/2002), the controls also included:

a) Imported feed and feed raw materials,
b) Processing of feed and feed materials,
c) Transportation of feed and feed raw material,
d) Storage of feed and feed material both at the feed mills, on the farms and distributing companies,
e) Use of feed for feeding food producing animals, and
f) Export and marketing of feed and feed materials

Accordingly, KTTK communicated the new regulations to the feed mills, distributors and the trade sector in 2000 to ensure full separation of feed with and without PAP during processing, storage and transportation. Similarly, KTTK instructed farmers to store feed destined for ruminants separately from other feed materials containing PAP (Regulation (EC) No 999/2001, Regulation (EC) No 1774/2002). Fishmeal was stored in approved storages according to the MMM 20/2001. Feed mills producing feed containing fishmeal for pigs and poultry were using a separate production line. MBM was not allowed to be used in the production plants which produce feed for animals used in the production of food.

According to the MMM (MMM 20/2001), all feed mills producing animal feed or feed additives, warehouse keepers, and private entrepreneurs owning transport vehicles for bulk transportation are required to have an own-control system. This decree does not include the own-control system for fur animals. In feed mills, own-control systems cover recording of intake of feed raw materials and finished products, production line/s and storage facilities.

In addition to the above mentioned controls, since the enforcement of the feed ban in 1995, there has been an additional requirement that all industrially processed feed containing prohibited PAP must be labelled with an obligatory label specifying “This compound feeding stuffs contains mammalian protein the feeding of which to food producing animal is prohibited “(MMM 41/1999 as amended by 18/2001)

Detection of processed animal protein in feeds

Cattle feed has been tested for the presence of MBM since 1997. The microscopic testing method used for detecting PAP, including cattle and fish protein, in feed and feed raw materials is the method laid down in the Commission Directive 2003/126/

EC (CEMA 97-17). The testing at the time was random sampling of a relatively small portion of the formulated feed and feed raw materials. According to KTTK, the sampling method tries to give an average view of the batch. Several factors have been recognised to affect the detection of MBM, feather meal or fishmeal in feed samples. The main factors affecting detection are a) homogeneity and particle size of the sample, b) moisture, starch and fat content, c) fibre structure of the muscle, and d) structure of the bone for the identification of land animal from marine animal (Laakso 2003).

Finland defined 0.5% as an action limit in 1999, which was also used by Germany and Denmark. Since 2000, a feed is considered positive and requires further investigation if it contains ≥0.1 % PAP. Positive samples are always tested twice. According to KTTK, contamination would result in immediate prohibition of further marketing of the feed batch and also result in a notification of the central database regarding bovine animals possibly having consumed the contaminated feed to be tested for BSE at disposal.

Specified Risk Material ban

Certain bovine tissues have been classified in the EC legislation as SRM on the basis of the pathogenesis of TSE-diseases. SRMs are the animal tissues with the highest risk of harbouring the TSE agent. According to the EC requirements, they must be strictly excluded from the food and feed chains in order to minimise the risk to human health and to cut the circulation of the BSE-agent in the feed chain.

In the current EC legislation, the following bovine tissues are designated as SRM: The skull excluding the mandible and including the brain and eyes, the vertebral column excluding the vertebrae of the tail, the spinous and transverse processes of the cervical thoracic and lumbar vertebrae and the median sacral crest and wings of the sacrum, but including the dorsal root ganglia, and the spinal cord of bovine animals aged over 12 months, and the tonsils, the intestines from the duodenum to the rectum and the mesentery of bovine animals of all ages. (Regulation (EC) No 999/2001).

Rendering

MBM is produced from discarded parts of animal carcasses by a rendering process using a combination of pressure, heat and time. The aim of rendering is to extract MBM and tallow from the processed material and to destroy possible infectious agents in it.

Two changes in rendering processes in the UK are believed to have favoured the survival of the BSE-agent in MBM: change from batch rendering to continuous rendering processes and cessation of the use of hydrocarbon solvents. The solvent extraction that had been used to maximise the extraction of tallow was abandoned in other parts of the UK than Scotland (Wilesmith et al 1991).

The requirements for rendering processes in the EC legislation have been amended, as new scientific data on their effect on the BSE-agent has become available. The current requirements for the rendering process are a pressure of 3 bar and a temperature of 133ºC for 20 minutes (Commission Decision 96/449/EC). Nevertheless, it has been found that none of the known procedures for rendering is sufficient to completely destroy the BSE-agent.

References

EFSA (2004) EFSA Scientific Report on the Assessment of the Geographical BSE-Risk (GBR) of Sweden 20.8. 2004 http://www.efsa.eu.int/science/efsa_scientific_reports/gbr_assessments/572_en.html.

Hakulin K (2004) Personal communication. 2004.

Heinonen R (2003). Personal communication. 2003.

Laakso T (2003). Personal communication. 11.4.2003.

MMM (1990a). Iso-Britanniasta tuodut nautaeläimet ja BSE seuranta. (Letter on the monitoring of BSE in cattle imported from UK of the Veterinary and Food Department of the Ministry of Agriculture to owners and veterinarians of cattle imported from UK on 1.11. 1990) MMM dnro 1031/51-90.

MMM (1990b). Lihajauhon ja lihaluurehujauhon tuontilupien lupaehtojen muuttaminen. (Letter of the Veterinary and Food Department of the Ministry of Agriculture to importers of meat meal and meat and bone meal 21.6. 1990) MMM dnro 610/544-90.

OIE (2000a). OIE manual for standards for diagnostic tests and vaccines, 4th edition, 2000. Chapter 2.3.13: Bovine spongiform encephalopathy http://www.oie.int/enq/normes/mmanual/A 00060.htm 9.4.2003.

Simmons M M, Harris P, Jeffrey M, Meek S C, Blamire I W H, Wells G A H (1996). BSE in Great Britain. Consistency of the neurohistopathological findings in two random samples in clinically suspect cases. Veterinary Record 138:175-177.

Wilesmith J W, Ryan J M B, Atkins M J (1991). Bovine spongiform encephalopathy: epidemiological studies on the origin. Veterinary Record 128:199-203.

WTO (1994). Agreement on the application of sanitary and phytosanitary measures. Article 5. http://www.wto.orq/enqlish/docs e/leqal e/15-sPs.pdf.

Legislation

Commission Decision 89/469/EEC of 28 July concerning certain protection measures relating to BSE in the UK. OJ L 226 , 03/08/1989.

Commission Decision 96/449/EC of 18th of June on the approval of alternative heat treatment systems for processing animal waste with a view to the inactivation of spongiform encephalopathy agents, OJ L 184, 24.7.1996, p. 43.

Commission Decision 90/2000/EC of 9 April 1990 concerning additional requirements for some tissues and organs with respect to BSE. OJ L 105, 25.4.1990, p.24.

Commission Decision 98/272/EC of 23 April 1998 on epidemio-surveillance for TSEs and amending decision 94/47 4/EC. OJ L 122, 24.4.1998, p. 59-63.

Commission Directive 2003/126/EC of 23 December 2003 on the analytical method for the determination of constituents of animal origin for the official control of feedingstuffs (Text with EEA relevance). OJ L 339, 24.12.2003, p 78-84.

Comission Regulation (EC) No 1494/2002 of 21 August 2002 amending Annexes 111, VII and XI to Regulation (EC) No 999/2001 of the European Parliament and the Council as regards monitoring of BSE, eradication of TSE, removal of SRM and rules for importation of live animals and products of animal origin. OJ L 225, 21.8.2002, p. 3-10.

Council Directive 91/68/EEC of 28 January 1991 on animal health conditions governing intra-Community trade in ovine and caprine animals OJ-L 46 19. 02.1991. p. 19-36.

Council Directive1994/381/EC of 27 June 1994 on the ban of protein derived from mammalian tissues for feeding ruminants. OJ L 172.7.7.1994. p. 23-24.

MMM 167/1995. Maa- ja metsätalousministeriön eläinlääkintä- ja elintarvikeosaston asetus eläinproteiinin käytöstä märehtijöiden rehuna. (Ministerial Decree on the use of animal protein as feed for ruminants). 27.1.1995.

MMM 41/1999. Maa- ja metsätalousministeriön VII eläinproteiineista valmistettujen rehuaineiden merkitsemistä koskevat säännöt (muutettu 4/2001). (Ministerial Decree on the labelling of feedingstuffs containing processed animal protein, amended as 4/2001). 14.4.1999.

MMM 1238/2000. Maa- ja metsätalousministeriön asetus eläinproteiinin tuonnista, viennistä ja käytöstä eläinten ruokinnassa. (Ministerial Decree that inhibited the use, storage, import and export of processed animal protein for farmed animals). 21.12.2000 later amended by Ministerial Decree 229/2001.

MMM 1239/2000. Maa- ja metsätalousministeriön asetus eläinproteineista ja niitä sisältävistä rehuvalmisteista (Ministerial Decree on the prohibition of feeding processed animal protein for farmed animals). 21.12.2000.

MMM 6/2001. Maa- ja metsätalousministeriön asetus kalajauhon, rasvattomaksi puhdistetuista luista saadun dikalsiumfosfaatin ja hydrolysoidun proteiinin valmistus, kuljetus ja varastointi (Ministerial Decree on the processing, transportation, storing and treatment of fishmeal, dicalcium phosphate and hydrolysed proteins). 9.1.2001.

MMM 20/2001. Maa- ja metsätalousministeriön asetus rehualan toiminnanharjoittamisesta (Ministerial Decree concerning feed operators) 5.6.2001.

Regulation (EC) No 999/2001 of the European Parliament and of the Council of 22 May 2001 laying down rules for the prevention, control and eradication of certain TSEs. OJ L 147, 31.5.2001, p. 1.

Regulation (EC) No 1774/2002 of the European Parliament and of the Council of 3 October 2002 laying down health rules concerning animal by-products not intended for human consumption. OJ L 273, 10.10.2002 p. 1-95.

Annex 4. Assessment of geographical BSE-risk (GBR) by SSC

The Scientific Steering Committee (SSC) was a multidisciplinary advisory committee established in 1997 by the Commission in the field of consumer health and food safety. The aim of SSC was to co-ordinate the work of the scientific committees set up by the Commission to address matters of consumer health (Commission Decision 97/404/EC). Due to their multidisciplinary nature, the SSC was assigned with the matters related to BSE and other Transmissible Spongiform Enchephalopaties (TSE), and a specific TSE/BSE ad hoc group was created within the frame of the SSC in order to deal with questions related to TSEs. The mandate of the SSC expired in the spring of 2003. The work on BSE has been continued under the Scientific Panel on Biological Hazards under the European Food Safety Authority (EFSA).

Within the field of BSE, the SSC has, introduced a methodology for the assessment of the geographical BSE-risk (GBR) in different countries. The aim of the GBR-assessments is to provide a qualitative indication of the likelihood for one or more cattle to be clinically or pre-clinically infected with BSE in a given country at a given point of time. The assessments also aim to predict the future trends in BSE-risk in the country in question (SSC 2000a).

The methodology is based on the assumption that BSE first developed in the UK. It is assumed that BSE was further propagated by the recycling of infected bovine tissues into animal feed, and spread to other countries through import of infected cattle and contaminated feed from the UK, and later from other affected countries. The methodology is limited to imported cattle and feed as the only potential initial sources of infection, feed as the only route of transmission of BSE and cattle as the only animals that can be infected (SSC 2000a).

The GBR-assessments by the SSC are based on the assumption that an internal challenge already existed in the UK before the 1980s. This assumption is based on the finding that several cases of BSE have been detected in birth cohorts born in the 1970s (SSC 2000a).

An important advantage of the methodology is that it does not depend on the confirmed incidence of clinical BSE. Another of its advantages is that it allows easy identification of possible additional measures that may improve the ability of a country to control BSE (SSC 2000a). Up to June 2003, SSC has assessed the GBR status of 60 countries, including all EU Member States and 35 other countries (SSC 2003).

The GBR-assessments are based on eight factors that affect the release and propagation of BSE within the assessed country:

1. Structure and dynamics of the cattle population
   - number and distribution of beef and dairy cattle, different husbandry systems by their proportion
2. Feeding
   - domestic production and use of MBM in composite animal feed, potential for cross contamination
3. Import of cattle and MBM from the UK and other BSE-affected countries
4. Surveillance of BSE
   - measures to ensure detection of BSE-cases, results of the surveillance
5. BSE-related culling
   - culling schemes, date of introduction and criteria, information on the animals already culled in the context of BSE

6. MBM-bans
   - bans on the use of MBM
   - dates of introduction and scope, measures to ensure and to control compliance
7. Specified Risk Material (SRM) -bans
   - bans on the use of SRM; requirements concerning its removal
   - dates of introduction and scope, measures to ensure and to control compliance
8. Rendering
   - Raw material used, processing conditions applied.

In order to clarify the interaction of the different factors, SSC has adopted a simplified qualitative model that illustrates the system of circulation of the BSE-agent within the cattle population and the feed chain in a country (BSE/cattle system) (Figure 13).

The eight factors mentioned above are used to estimate the two basic elements of the GBR, namely the challenge and the stability.

The overall challenge provides an approximate estimate of the amount of the BSE-agent circulating within the BSE/cattle system of a given country. It is a combination of the external and internal challenges. The external challenge refers to the likelihood and amount of the BSE-agent entering the country through import of infected cattle or MBM, whereas the internal challenge refers to the likelihood and the amount of the BSE-agent already present and circulating in the BSE/cattle system of the country. The external challenge is assessed in five-year periods. To illustrate the magnitude of the challenge, seven levels are used (extremely high, very high, high, moderate, low, very low and negligible), the point of reference being the assumed challenge resulting from import from the UK during the peak of the BSE-epidemic (1988 – 1993). The external challenge is considered to be independent of the size of the challenged BSE/cattle system (SSC 2000a).

The stability of the BSE/cattle system is defined as the ability of the system of a country to prevent the release and the propagation of the BSE-agent within its borders. It relies on the avoidance of processing of infected cattle and of recycling of the BSE-agent via the feed chain. Seven levels are used to illustrate the stability (extremely unstable, very unstable, unstable, neutral, stable, very stable and optimally stable). An unstable BSE/cattle system amplifies the circulating BSE-infectivity, whereas a stable system reduces it and a neutral system keeps it on a constant level. The main factors influencing the stability of the BSE/cattle system are feeding, rendering and SRM-removal (SSC 2000a).

In order to illustrate the development of stability and challenge over time in the assessed countries, the SSC uses a diagram combining these two elements (Figure 14). Four different GBR levels illustrate the outcome of the assessment of the GBR-status of a country (Table 30).

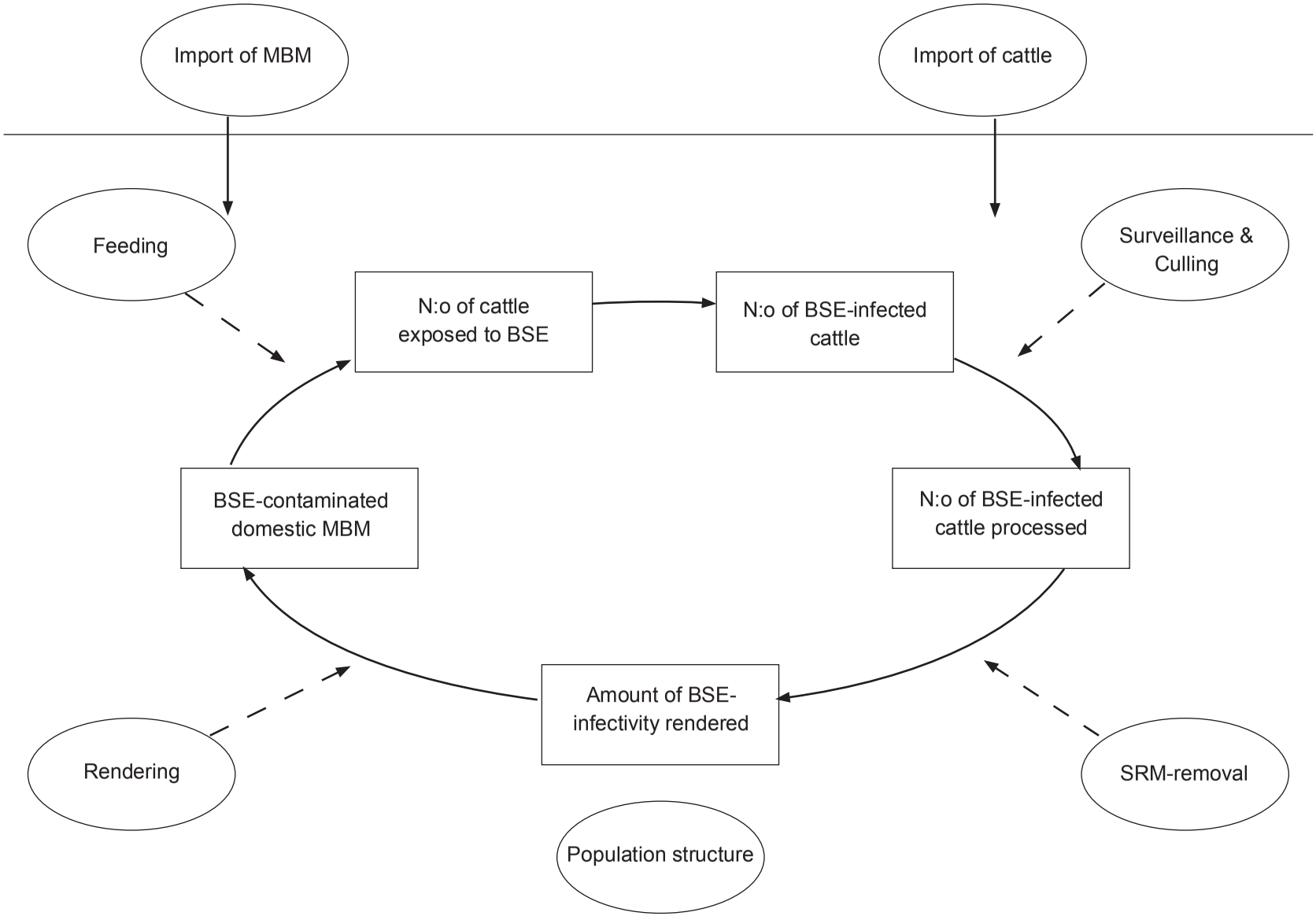

Figure 13.
The model of the BSE/cattle system used by the Scientific Steering Committee for the assessment of the Geographical BSE Risk (SSC 2000a)

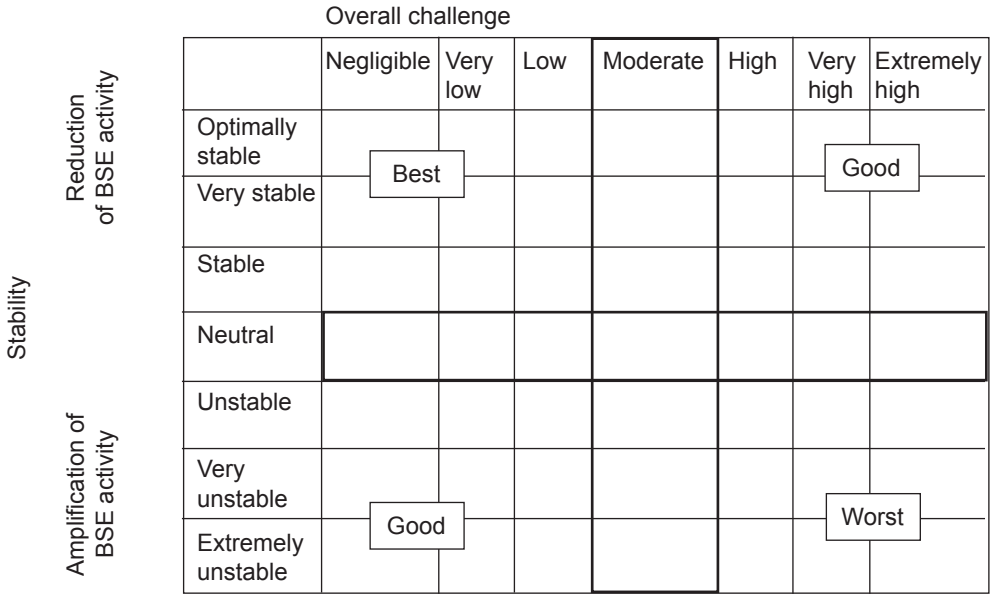

Figure 14.
Diagram used in the country reports on the assessment of the Geographical BSE Risk to illustrate the development of stability and challenge over time. Four situations are indicated (SSC 2000a)

References

EFSA (2004a) EFSA Scientific Report on the Assessment of the Geographical BSE-Risk (GBR) of Norway 20.8. 2004. http://www.efsa.eu.int/science/efsa_scientific_reports/gbr_assessments/568_en.html.

EFSA (2004b) EFSA Scientific Report on the Assessment of the Geographical BSE-Risk (GBR) of Sweden 20.8. 2004 http://www.efsa.eu.int/science/efsa_scientific_reports/gbr_assessments/572_en.html.

SSC (2000a). Final Opinion of the Scientific Steering Committee on the Geographical Risk of Bovine Spongiform Encephalopathy (GBR) adopted on 6 July 2000 http://europa.eu.int/comm/food/fs/sc/ssc/out113 en.pdf.

SSC (2000c). Report on the assessment of the geographical BSE-risk (GBR) of Belgium, July 2000 http://europa.eu.int/comm/food/fs/sc/ssc/out116 en.pdf.

SSC (2000d). Report on the assessment of the geographical BSE-risk (GBR) of Denmark, July 2000 http://www.europa.eu.int/comm/food/fs/sc/ssc/outcome_en.html.

SSC (2000e). Report on the assessment of the geographical BSE-risk (GBR) of Finland, July 2000 http://www.europa.eu.int/comm/food/fs/sc/ssc/outcome_en.html.

SSC (2000f). Report on the assessment of the geographical BSE-risk (GBR) of France, July 2000 http://www.europa.eu.int/comm/food/fs/sc/ssc/outcome_en.html
SSC (2000g). Report on the assessment of the geographical BSE-risk (GBR) of Germany, July 2000 http://www.europa.eu.int/comm/food/fs/sc/ssc/outcome_en.html.

SSC (2000i). Report on the assessment of the geographical BSE-risk (GBR) of the Netherlands, July 2000 http://www.europa.eu.int/comm/food/fs/sc/ssc/outcome_en.html.

SSC (2000j). Report on the assessment of the geographical BSE-risk (GBR) of New Zealand, July 2000 http://www.europa.eu.int/comm/food/fs/sc/ssc/outcome_en.html
SSC (2000l). Report on the assessment of the geographical BSE-risk (GBR) of United Kingdom, July 2000 http://www.europa.eu.int/comm/food/fs/sc/ssc/outcome_en.html.

SSC (2000m). Report on the Assessment of the Geographical BSE - Risk of Ireland. July 2000. http://www.europa.eu.int/comm/food/fs/sc/ssc/outcome_en.html
SSC (2002). Update of the Opinion of the Scientific Steering Committee on the Geographical Risk of Bovine Spongiform Encephalopathy (GBR) adopted on 11 January 2002 http://europa.eu.int/comm/food/fs/sc/ssc/out243 en.pdf.

SSC (2002b). Final report on the updated assessment of the geographical BSE-risk (GBR) of Finland, 16 May 2002 http://europa.eu.int/comm/food/fs/sc/ssc/out260 en.pdf.

SSC (2003). Overview of the BSE risk assessments of the European Commission's Scientific Steering Committee (SSC) and its TSE/BSE ad hoc Group Adopted between September 1997 and April 2003. Prepared under the scientific secretariat of P. Vossen, J. Kreysa and M. Goll. 5 June 2003. (Subject to editorial changes). http://europa.eu.int/comm/food/fs/sc/ssc/out364 en. pdf.

Legislation

Commission Decision 97/404/EC of the 10 June 1997 setting up a Scientific Steering Committee. OJ L 169, 27.6.1997. p. 85-87.

Table 30.
The Geographical BSE Risk level of and the external challenge and stability of countries relevant to the external challenge of Finland and the estimation of the time since when exports of cattle and MBM could have presented an external challenge to the importing country (SSC2000b-m,SSC2002, EFSA 2004a-b).

				Development of the stability over the years			
Country of origin	GBR level	R1	R2	EUS-VUS	VUS-US	US-NS	NS-S
Australia	GBR I	-	-	2000			
Austria	GBR III					2000	
Belgium	GBR III	1983	1987	95-96	97	98	99
Denmark	GBR III	1985	1990	91	92	93	97
France	GBR III	1979	1980	90	92	95	96
Germany	GBR III	1980	1988		94	96	00(?)
Ireland	GBR IV	-	-	90	90-95	90-95	96
The Netherlands	GBR III	1985	1987		91	95	96
New Zealand	GBR I	-	-	96			
Norway*	GBR II	-	-	90	2000		
Sweden*	GBR II	-	-	86	95	97	
The United Kingdom	GBR IV				91	92	97

> - from this year onwards
< - before this year
* According to the GBR assessment of the Biological Hazards Panel of the European Food Safety Authority (EFSA 2004a, EFSA 2004b)
/ - and again after

Geographical BSE risk

GBR I - Presence of one or more cattle clinically or pre-clinically infected with the BSE agent in a geographical region/country **highly unlikely**.

GBR II - Presence of one or more cattle clinically or pre-clinically infected with the BSE agent in a geographical region/country **unlikely but not excluded**.

The year since exports are could have represented an external challenge

R1 - The year since it is regarded **possible** that exports of live bovine or MBM could have represented an external challenge to the importing country

Stability

EUS-VUS - The year at which the stability of the BSE/cattle systen changed from **extremely unstable to very unstable**

VUS-US - The year at which the stability of the BSE/cattle systen changed from **very unstable to unstable**

US-NS - The year at which the stability of the BSE/cattle systen changed from **unstable to neutrally stable**

NS-S - The year at which the stability of the BSE/cattle systen changed from **neutrally stable to stable**

SV-S - The year at which the stability of the BSE/cattle systen changed from **stable to very stable**

VS-OS - The year at which the stability of the BSE/cattle systen changed from **very stable to optimally stable**

		Development of the external challenge over the years						
S-VS	VS-OS	N	VL	L	M	H	VH	EH
		86-95 / 2001-2003	80-85/ 96-2000					
	2001						80>	
		80-84				84-96	96>	
2000		<84		85-87	88-90	91>		
98-99						<86	86-87/98>>	87-98
			80-84	80-84	80-84	85-88	88>	
97	97	80-81	82-85	82-85	85-88		89/98>	90-97
98-2000						<87-88	88-90/98>	91-97
		88-2004						
2001-2003		80-85/96>	86-90		91-95			
2001	2001							
2000			85-90/97>	90-97				

Geographical BSE risk

GBR III - Presence of one or more cattle clinically or pre-clinically infected with the BSE agent in a geographical region/country **likely but not confirmed; or confirmed, at a lower level.**

GBR IV - Presence of one or more cattle clinically or pre-clinically infected with the BSE agent in a geographical region/country **confirmed, at a higher level.**

The year since exports are could have represented an external challenge

R2 - The year since it is regarded **likely** that exports of live bovine or MBM could have represented an external challenge to the importing country

External challenge

EH - The years when external challenge from imported MBM and/or cattle changed was **extremely high**

VH - The years when external challenge from imported MBM and/or cattle changed was **very high**

H - The years when external challenge from imported MBM and/or cattle changed was **high**

M - The years when external challenge from imported MBM and/or cattle changed was **moderate**

L - The years when external challenge from imported MBM and/or cattle changed was **low**

VL - The years when external challenge from imported MBM and/or cattle changed was **very low**

N - The years when external challenge from imported MBM and/or cattle changed was **negligible**

Annex 5. Potential for cross-contamination of cattle feed

In the past, many feed processing and handling equipment was not designed to ensure minimum contamination of the final feed, as it is today. Although the use of imported MBM in cattle feed was banned in 1990 and feeding of domestic MBM to cattle was banned in 1995, the risk that imported MBM may have been introduced into cattle feed on the processing line, post-production and on the farm still remained until 2001. This view is verified by the results of testing of feed and feed raw materials carried out by the KTTK since 1997. Therefore, it is assumed that the risk of cross-contamination of ruminant and mono-gastric animal feed may have continued until 2001, although it was probably decreasing towards the end of this period.

Between 1990 and 1996

At the feed mills

After the ban of imported MBM use in cattle feed in 1990, domestic MBM was permitted to be used for cattle feeding until 1995. Imported MBM was also used for feeding mono-gastric animals. After the implementation of the ban on mammalian protein for cattle feed in 1995, farmers were given a transitional period of 1 year, until March 1996, to use feeds formulated during 1995. Furthermore, even after March 1996, imported MBM could still be used for feeding mono-gastric animals. In addition, in feed mills where feed for different species was produced on the same processing line, the flushing system between the processing of these feeds may not have been effective enough to guarantee that contamination would not take place.

Feed raw material and finished products were transported by the same haulers, and transport trucks were not strictly separated. Although the trucks were cleaned before loading new feed, post-production cross-contamination may have occurred because inspection of the feed mills and supervision of warehouses and transportation facilities were not efficient during these years.

On farms

About 2 % of the farmers practised mixed farming (keeping both ruminant and mono-gastric animals), although strictly in separate buildings. Industrially formulated feed for cattle and mono-gastric animals was stored under the same premises, most probably at different corners. Animals had separate feeding troughs. It was also a common practice to have separate feed distribution facilities for different species. However, although the different species had own distribution utensils, probably these utensils were not distinctly marked or labelled. In practice, it was common to use the same scooping and distribution facilities when switching from distributing feed to cattle and then to mono-gastric animals or vice versa.

Furthermore, some farms practiced on-farm formulation (mixing) of the feed required for both cattle and mono-gastric animals instead of purchasing industry formulated feed. There are no records on how much MBM was bought directly for on-farm feed formulation. Therefore, although cattle and mono-gastric animals were kept in entirely separate buildings with separate feeding troughs, it cannot be confirmed that the feed handling/feeding equipment was adequately free of feed containing MBM. Thus, cross-contamination between feed for different species cannot be ruled out.

Between 1997 and 2001

At the feed mills

No detection method for the presence of PAP was in use prior 1997. Despite the ban of mammalian protein from cattle feed in March 1995 (effective March 1996), the ban was not a total ban on all feed for farm animals because of the use of imported MBM for mono-gastric animal feeding and the use of the same processing lines for production of feed for cattle and mono-gastric animals. Feed processing lines, warehouses for storing the raw material and the final product as well as transportation facilities for mono-gastric animals and cattle were separated in 2001.

According to the MBM detection results from KTTK (Thorstorp 2002), around 29 % of all lots (131 samples) examined in 1997 – 1998 were contaminated with more than 0,001% land animal tissue. In 1998, 92 samples were examined for the presence of MBM in cattle feed and 2 samples were found to contain levels of MBM exceeding the action threshold (>0.5 %), indicating the risk of cross-contamination 3 years after the ban Table 31).

Cross-contamination of cattle feed with MBM from mono-gastric animal feed was detected until the removal of feeds containing MBM from farms, feed mills and warehouses in March 2001. Using the microscopic method for detection of MBM in cattle feed, the number of positive samples and the level of contamination decreased gradually until 2001, as shown in Table 31.

The 451 feed samples taken during 2002 were all negative for MBM. This result may indicate the possible effectiveness of the risk management measures and surveillance programme, particularly the separation of processing, transportation and storage of feed intended for cattle and mono-gastric animals as well as the total MBM ban from feed for food-producing animals.

On farms

Until the withdrawal of all feed containing MBM from farms in March 2001, farmers practiced feed handling and feeding of animals in similar manners except for the intentional use of MBM. One sample of cattle feed taken from a farm in 2000 was detected positive, with a residual contamination level of MBM. The source of contamination was confirmed to have come from old feed remnants on the walls of the feed silo. The farm was ordered to clean the feed silo thoroughly. All animals (> 24 months of age) from this farm were subjected to BSE test on slaughter or at disposal. The feed was destroyed. According to KTTK, feed samples taken from farms during 2001 and 2002 were negative for the presence of MBM.

References

Henrik Thorstrop (2002) Unpublished results on cross contamination of meat and bone meal in Finnish ruminant feeds and its likelihood as an infectious source in Finnish cattle. 26.2. 2002.

Table 31.
Estimated cross-contamination level of cattle feed between 1996 and 2000 (Thorstrop, 2002).

Year	1996*	1997*	1998*	1999	2000	2001
Type of animals for which feed was produced						
Dairy cows, feed, tons/a	421,033	422,221	484,293	573,592	594,986	601,623
Young stocks, feed, tons/a	37,382	36,030	39,493	42,600	44,706	40,359
Total feed produced, tons/a	458,415	458,251	523,786	616,192	639,692	641,982
Total MBM imported to Finland which could have been used in cattle feeding, tons/a	9,926	11,267	11,362	14,846	0,972	NI
MBM imported from BSE-risk countries§	1,013	3,229	2,672	2,633	0,972	NI
KTTK						
Number of sample tested	-	92	✳	68	391	365
Number of samples detected positive	-	2	✳	1	2	0
Average concentration detected, %	0,031	0,031	0,031	0,02	0,02	0
Level of MBM in domestic cattle feed	0,0007	0,0007	0,0007	0,0003	0,0001	0
Assumed amount of MBM in cattle feed due to cross-contamination, tons	0,309	0,309	0,353	0,181	0,065	0
Assumed amount of MBM imported from BSE-risk countries in cattle feed due to cross-contamination, tons	0,032	0,089	0,083	0,032	0,065	0

Note:* Concentration for detection MBM for the year 1996 was based on average value of the years 1997 and 1998.
§ = after the deduction of MBM that was used for fur and pet feeding.
NI= no imports
- = no samples tested
✳ = 92 samples tested which represent the sampling years 1997 and 1998.

Annex 6. Principles used in estimation of the country of origin, time of import and time of disposal of imported cattle

Principles used in estimation of the country of origin

In the CBD there are 249 cattle which are recognised as imported cattle but for which there are no data on the country of import, since this data was not mandatory before 1998. For these cattle, the country of origin has been estimated on the basis of other data. 225 have been recognised as being imported from Denmark. The information used in making the estimation was:

Name. The name of the animal is almost always available in the CBD. Cattle have been imported mainly from the same herds of origin (herds are indicated in the name of the animal), the names of which are known to experts. The individual imported breeding animals are also otherwise often recognised by experts of the cattle breeding sector.

Breed. At certain times, cattle belonging to certain breeds were only imported from Denmark, e.g. all Simmental cattle imported between 1990 and 1992 and all Herefords imported between 1985 and 1994.

Time of import. Apart from the imports from UK, cattle were imported to Finland in 1983 – 1984 only from Sweden and only from Denmark in 1987 – 1989. The identity of 6 of the cattle imported from the UK in 1984 and 1985 is unknown. It is however assumed that they would be recognised by their name, owner and breed.

Principles used in estimation of the time of import

For cattle imported before the CBD was founded in 1995, the data on the exact time of import of the animal is not always available in the CBD. In these cases, the following information has been used for estimating the time of import:

Time of birth. The time of import can be roughly estimated on the basis of the time of birth of the animal. As a rule breeding animals were imported between 1 and 2 years of age (Puonti 2002). It is estimated that cattle born during the first half of the year (1.1. – 30.6.) were imported the next calendar year, and cattle born during the second half of the year (1.7.– 31.12.) were imported the year after. It is however possible that cattle could have been imported at any age, especially when new breeds were imported (such as Simmental and Highland cattle)

Breed. The time of import can be estimated on the basis of data on different breeds imported to Finland (MMM 2003). For example, Simmental cattle were not imported to Finland before 1990.

Country of origin. According to the Customs, there was no import of cattle from Denmark between 1982 and 1986 and no import from Sweden between 1985 and 1989, inclusive.

Principles used in estimation of the time and way of disposal

No data in the CBD. It is estimated that cattle for which there is no data in the CBD were disposed of between their time of import and 1995. If these cattle were imported after 1995, it is assumed that they were disposed of the same year when they were imported.

Last information in the CBD. For a number of cattle, the last information on their fate in the CBD is “sold”. It is assumed that these cattle have been slaughtered, at the earliest on the date of sale.

Time of import in the CBD. It is assumed that if the time of import of an animal

in the CBD is 19940101, it was alive when the CBD was founded. It is therefore assumed that the earliest possible time of their disposal was 1994.

No data on way of disposal. It is assumed that all cattle have been slaughtered for human consumption, unless there is indication that an animal has died (information in the CBD or in the herd book, or, for cattle imported from the UK, information provided by the owners). Emergency slaughtered animals are included into the number of animals assumed to have been slaughtered.

References

Puonti M (2002). Personal communication 2002.

MMM (2003). Documents related to applications for import licenses. Department of food and health, Ministry of Agriculture and Forestry.

Annex 7. Assumption and justification of the probable use of imported MBM

During the process of this assessment, it became obvious that not all documents from different sources were available for use. It was noted that the available data from the Customs, the KTTK and other sources were mutually inconsistent (Table 32, Table 33 and Table 34). KTTK's data gives higher import amounts compared to Customs and other sources, although KTTK's data do not contain marine animal tissue as do the Customs data. Furthermore, information concerning several relevant documents was largely incomplete. This can partly be explained by the fact that the documentation system at the time was not designed to take into account the risk of BSE. At that time, the feeding of MBM (domestic or imported) to cattle was legal and it was not considered as a BSE-risk factor by the authorities, cattle keepers or feed mills. The lack of documents to link several processes, from import of MBM to its final destination (the animal) caused limitation in understanding the share of imported or domestic MBM in the formulation of feed for different species of animals.

According to the view of KTTK, the PAP used in compound feed formulation for cattle was mainly domestic MBM and the imported MBM was mainly used for feeding pigs, poultry and fur- and pet animals. However, no reliable documentation was available to verify this view. Based on the available documentation and several practical factors, it was assumed that, at least, a proportion of imported MBM has probably been used in cattle feed because:

1. The overall use of MBM imported from BSE-risk countries for fur and pet animal feeding was minor compared to the total annual import between 1980 and 2002.
2. There are no records on the proportion or share of imported MBM and domestic MBM used in cattle feed formulation.
3. some of the feed ingredient certificates issued by feed mills were not available for thorough checking of the total amount of MBM used in cattle feed, and
4. Documents specifying the origin of the feed raw material/s used in domestic cattle feed production does not exist.

On the other hand however, factors such as the chemical composition of MBM and its nutrition values for different animal species do partially justify the view of KTTK.

1. The imported MBM contained higher protein (60 – 68 %) and lower ash (15 – < 30%) percentage.
2. The MBM produced in the domestic rendering plants contained relatively lower protein (53%) but higher ash (26 – 37%) percentage.
3. The use of domestic MBM with higher ash content can cause diarrhoea in fur animals, especially in mink. It can also decrease the digestibility and the efficient utilisation of the protein of MBM in mono-gastric animals.
4. Ruminants on the other hand have the ability to efficiently synthesis rumen microbial protein from feed with a lower protein content whereas mono-gastric animals require feed with a higher protein content.

Therefore, based on its higher protein and lower ash content combined with its higher nutritive value, imported MBM would be an ideal option as a protein supplement in the diet of mono-gastric-animals.

Thus, it can be assumed that a large proportion of imported MBM was used in mono-gastric animal feed formulation even when it was legally possible to feed im-

Table 32.
MBM imported (tons) into Finland from countries with reported BSE cases as reported in the updated GBR assessment of Finland (SSC 2002)

Exporting Countries		Year of import									
		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Austria	CD										
	Other										
Belgium	CD										
	Other										
Denmark	CD						5,445	5,157	11,600	14,093	10,463
	Other						4,454	4,138	11,318	13,081	8,558
France	CD										
	Other						0,023				
Germany	CD	0,262	0,202	0,182	0,222	0,397			0,023	1,100	0,001
	Other										
Ireland	CD										
	Other										
Italy	CD										
	Other										0,300
The Netherlands	CD						0,845	7,58	5,406	9,291	13,949
	Other									10,102	15,232
UK	CD										
	Other					0,013					
All non UK	CD	0,262	0,202	0,182	0,222	0,397	6,290	12,737	17,029	24,484	24,413
	Other						4,477	4,138	11,318	23,183	24,090
UK	CD										
	Other					0,013					

Note: CD = country dossier consists information provided from the country's authorities in 1998-2002; others = statistics from other sources.
Statistics at KTTK do not show MBM being imported from UK to Finland as has been reported previously.

ported MBM to cattle. However, since feed mills are no longer required to produce documents from 1980 – 1990, it is not easy to conclude with certainty what proportion of imported MBM was used for cattle feeding during this period.

Although several scenarios (A – E) had been used to estimate the probable use of MBM imported from BSE-risk countries in cattle feeding during 1983 – 1990, none of the scenarios provided an accurate result because scenario A overestimated whereas scenarios B, C and E underestimated the volumes of MBM used for cattle feeding.

For example, scenario A provided MBM values which were too high to be used in dairy feeding (Table 26), as high level of MBM in the diet causes palatability problems of the feeds which might then leads to reduced feed intake. Reduction in feed intake by dairy cows is usually followed by decrease in milk production, which then affects the income of the farmer. Furthermore, from the physiological point of view, depending on the rendering process the feeding of higher levels of MBM to cattle may alter rumen fermentation in such a way as to affect microbial protein synthesis. If the protein in MBM is not protected from rumen degradability, it degrades in

Year of import													
1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
						0,025							0,025
										0,009			0,009
4,479	6,526	9,218	8,168	11,606	0,317	0,448	3,561	4,009	0,848	1,378			97,316
4,054	7,361	8,853	7,632	9,238	1,880	0,776	3,522	3,961	0,198	1,006			90,030
			0,081	0,011			0,087	2,062	0,114				2,355
	0,023		0,047			0,025	0,162	0,135					0,415
		0,055	0,122	0,291	0,071	0,268	0,247						3,443
			0,305	0,725	0,463	0,337	0,462	0,462	2,240	0,222			5,216
						0,025							0,025
					0,025								0,025
			0,072										0,372
9,913	1,903	5,656	7,847	8,516	8,038	1,792	3,425	4,270	3,382	2,664			94,477
9,293	1,903	6,525	4,521	12,731	8,965	5,280	4,578	5,570	1,413	0,243			86,356
		0,021	0,010	0,029		0,023							0,096
14,392	8,429	14,929	16,218	20,424	8,426	2,528	7,320	10,341	4,344	4,042			197,611
13,347	9,287	15,378	12,577	22,719	11,333	6,418	8,724	10,128	3,851	1,480			182,448
		0,021	0,010	0,029		0,023							0,096

the rumen with the formation of high rumen ammonia concentration and decreased level of microbial protein synthesis. Decreased availability of microbial protein to the animal affects growth, milk production and reproduction of the animal. Higher concentrations of ammonia may also affect milk quality. Based on such practical facts, it could be said that farmers would not be likely to use high levels of MBM in dairy feeding. On the other hand, such high levels of MBM would have been acceptable in feeding fur animals, pigs and poultry, as these animals can consume feed containing up to 15 to 20% MBM. Therefore, values as high as in scenario A appears very unlikely to have been used for cattle feeding at the time when it was legally possible to feed imported MBM to cattle (Table 35).

On the other hand, on the basis of the feed palatability and physiological threshold of cattle, the estimated level of MBM in cattle feed in scenarios B and C gave values which are closer to the amount of MBM that would be considered to be within the optimum values from the point of view of practical cattle feeding (Table 35). However, these values are estimates rather than accurate values.

Table 33.
Unidentified meals and flours (tons) produced from meat, offal and grease (CCCN 2321 1000) imported into Finland from countries with and without reported BSE cases (Customs 1980-2002)

Exporting countries	Year of import									
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Austria										
Argentina										
Belgium										
Germany									0,002	
Denmark	4,059	1,938		0,293	1,837	4,455	4,05	9,714	12,533	8,032
France										
Iceland										
The Netherlands	2,833	8,640	5,239	7,310	3,540	3,586	5,496	6,475	9,036	13,932
New Zealand	7,482	1,530	1,143	1,048	1,067	1,591	0,546	0,361	0,279	0,244
Norway					0,154					
Spain										
Sweden	0,028		0,738	0,655	2,008	2,979	3,440	5,664	2,040	3,090
The United kingdom					0,035	0,002				
The United States of America										
Total	14,402	12,108	7,122	9,306	8,6410	12,613	13,536	22,214	23,890	25,298

Year of import													
1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
													4,000
				0,005	0,022	0,019	0,030	0,010					0,086
				0,025									0,025
		0,045	0,350	0,595	0,340	0,531	0,565	0,879	0,481	0,306	0,600	3,038	7,732
5,138	5,365	9,597	7,463	11,379	0,848	0,805	2,546	4,386	1,685	1,549	0,078	0,155	97,911
			0,070	0,075	0,091	0,137	0,109	0,176	0,014	0,005			0,677
							1,185						1,185
9,767	2,732	7,035	5,749	10,752	6,974	5,6320	4,904	5,622	2,309	0,237	0,006	3,270	131,076
0,033	0,034		0,021				0,005					0,000	15,384
0,036	0,035							0,538	0,268	2,243	0,082	0,007	3,363
										0,040	0,042	0,064	0,146
4,193	3,285	3,555	6,517	13,196	11,795	11,242	11,807	12,173	9,592	9,531	0,006	0,031	117,565
								0,001				0,049	0,087
									0,017				0,017
19,167	11,451	20,232	24,170	36,027	20,070	18,366	21,151	23,785	14,366	13,911	0,814	6,614	379,254

Table 34.
Processed animal protein imported (tons) into Finland from countries with and without reported BSE cases according to KTTK (KTTK 1980-2002)

Exporting countries	Year of import										
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
The Netherlands											
Meat and bone meal	2,312	5,041	3,951	7,183	3,590	3,439	6,980	5,406	9,110	13,884	9,888
Blood meal	0,195	0,442	0,975	1,002		0,845	0,600		0,181	0,065	0,025
Liver meal		0,185					0,017				
Feather meal			2,453	1,382	1,727	1,382	1,120	1,581	0,850	1,108	0,598
Austria											
Meat and bone meal	0,017										
Blood meal											
Denmark											
Meat and bone meal	1,022	1,288	0,022	0,311	1,796	4,344	4,079	10,688	13,248	9,746	4,045
Blood meal	1,909	1,303	1,033	0,746	0,627	1,101	1,078	0,912	0,845	0,717	0,434
Liver meal		0,060									
Feather meal	0,140	0,025	0,004							0,091	
Sweden											
Meat and bone meal	0,276	0,583	0,207	0,042	1,025	0,315	2,052	4,857	2,215	3,309	4,096
Blood meal			0,573	0,813	0,572	0,634	0,419	0,377	0,080		
Feather meal									0,024		
Germany											
Meat and bone meal					0,035				1,100	0,001	
Blood meal			0,182		0,362			0,023			
Liver meal	0,262	0,016		0,222							
Feather meal					0,350	0,054					
New Zealand											
Meat and bone meal	0,232	0,503	0,357	0,346	0,416	0,472	0,0277	0,100	0,037	0,061	
Blood meal					0,420			0,053			
Liver meal	0,498	0,911	0,841	0,842	1,017	0,663	0,330	0,212	0,302	0,185	0,033
Feather meal				0,054					0,850		
Norway											
Meat and bone meal							0,027				
Blood meal											
France											
Meat and bone meal											
Liver meal											
Ireland											
Meat and bone meal											
Blood meal											
Feather meal	0,039										
Australia											
Meat and bone meal											
Liver meal											
The United Kingdom											
Liver meal							0,018				
Feather meal											
Unspecified											
Total	6,902	10,357	10,598	12,943	11,937	13,249	16,748	24,209	28,842	29,167	19,119

1991	1992	1993	1994	1995	1996	1997*	1998	1999	2000	2001	2002	Total import per country
1,903	5,615	7,847	8,432	6,820	1,124	0,080	1,811	1,389				105,805
	0,041		0,105	1,218	0,668	0,027	0,732	0,795	0,943			8,859
												0,202
0,170						0,237						12,608
												0,017
					0,020							0,020
6,014	7,994	6,551	10,140	0,317	0,248	2,927	2,372	0,244	0,972			88,368
0,509	1,224	1,617	1,466	0,004	0,200	1,094	1,000	0,404	0,381			18,604
												0,060
												0,260
3,511	3,242	5,589	11,644	9,701	9,884	8,868	7,993	12,432	8,592	0,168		100,601
	0,933	0,782	0,757	0,589	1,296	0,837	0,879		0,040	0,182		9,763
												0,024
	0,034	0,066	0,047		0,050	0,072	0,144					1,549
						0,175						0,742
	0,021	0,056	0,244	0,071	0,218		0,075					1,185
			0,005							2,493		2,902
									2,493	0,707		5,752
												0,473
0,034												5,868
												0,904
							0,327					0,354
								0,208	1,078			1,286
			0,011			0,085	0,015	1,000				1,111
								0,014				0,014
					0,025							0,025
					0,390							0,390
												0,039
				0,025			0,397					0,422
					0,025		0,025					0,050
												0,018
											0,049	0,049
						1,643						1,643
12,141	19,104	22,508	32,851	18,745	14,148	16,045	15,770	16,486	14,499	3,550	0,049	369,967

Table 35.
External challenge to the Finnish cattle population via MBM imported from BSE-risk countries in different scenarios (A – E) during different periods (I – IV). MBM was not imported to Finland in 2002. For definition of abreviations see Table 26.

	Year of import							
	1980	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**
Total available MBM (DOMIMPTOT)	28,474	29,098	29,087	31,894	32,213	34,185	39,497	47,086
Domestic MBM produced, tons	24,615	21,683	24,55	24,012	25,351	25,615	26,331	26,035
All MBM imported to Finland (IMPTOT), tons	3,859	7,415	4,537	7,882	6,862	8,570	13,166	21,051
Imported MBM used for fur and pet feeding (FURPET), tons				0,04	0,509	0,712	0,716	1,915
All MBM imported to Finland which could have been used for cattle (TOTCAT), tons				7,842	6,353	7,858	12,450	19,136
All MBM imported from BSE-risk countries including unspecified origin (TOTBSE), tons					0,035	7,783	11,059	16,094
All MBM imported from BSE-risk countries which was used for fur and pet animals, tons						0,712	0,114	0,620
All MBM imported from BSE-countries which could have been used for cattle (BSECAT), tons					0,035	7,071	10,945	15,474
Unspecified imported MBM used in fur and pet animals feeding, tons								
Period	**Period I (indirect exposure)**				**Period II (direct exposure)**			
All MBM used for cattle feeding was imported from BSE-risk countries: Scenario A					0,035	7,071	10,945	15,474
Estimated use of MBM for cattle feeding based on Focus, Scenario B_1 & B_2					0,035	2,051	2,713	3,157
Estimated use of MBM used for cattle based on feed certificate, Scenario C_1 & C_2					0,035	3,462	4,326	7,659
The share of MBM imported from individual BSE-risk countries								
The Netherlands (NL)	**Period I (indirect exposure)**				**Period II (direct exposure)**			
MBM imported from the Netherlands fed to cattle; Scenario A (NLCAT)						3,439	6,980	5,406
NLCAT/BSECAT, % (PROP)						48,6 %	63,8 %	34,9 %
Scenario B_1, PROB* Focus						0,998	1,730	1,103
Scenario B_2, (NLCAT/TOTCAT)*Focus						0,898	1,521	0,892
Scenario C_1, PROP*Certificate						1,684	2,759	2,676
Scenario C_2, (NLCAT/TOTCAT)*Certificate						1,515	2,425	2,164
Scenario D,								
Scenario E (NLCAT/DOMIMPTOT)*Focus						0,206	0,479	0,362
Denmark (DK)	**Period I (indirect exposure)**				**Period II (direct exposure)**			
MBM imported from Denmark fed to cattle; Scenario A (DKCAT)						3,632	3,965	10,068
DKCAT/BSECAT, % (PROP)						51,4 %	36,2 %	65,1 %
Scenario B_1, PROB* Focus						1,053	0,983	2,054
Scenario B_2, (DKCAT/TOTCAT)*Focus						0,948	0,864	1,661
Scenario C_1, PROP*Certificate						1,778	1,567	4,983
Scenario C_2, (DKCAT/TOTCAT)*Certificate						1,600	1,378	4,030
Scenario D,								
Scenario E (DKCAT/DOMIMPTOT)*Focus						0,218	0,272	0,675
Germany (DE)	**Period I (indirect exposure)**				**Period II (direct exposure)**			
MBM imported from Germany fed to cattle; Scenario A (DECAT)					0,035			
DECAT/BSECAT, % (PROP)					100,00 %			
Scenario B_1, PROB* Focus								
Scenario B_2, (DECAT/TOTCAT)*Focus								

Year of import														Total
1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	tons
51,158	53,424	47,520	40,348	41,811	54,938	52,259	38,478							
25,448	26,423	29,491	28,92	24,926	34,885	21,985	21,615							
25,710	27,001	18,029	11,428	16,885	20,053	30,274	16,863	11,331	13,675	13,059	15,065	12,057	0,875	305,647
0,292	1,522	5,319	3,142	13,654	4,418	6,038		1,405	2,408	1,697	0,219			44,006
25,418	25,479	12,710	8,286	3,231	15,635	24,236	16,863	9,926	11,267	11,362	14,846			
23,458	23,631	13,933	7,917	13,643	14,464	18,651	7,137	1,447	4,807	4,342	2,633	0,972		172,006
	0,190	3,602	0,675	6,127	4,385	5,629		0,434	1,578	1,670				25,736
23,458	23,441	10,331	7,242	7,516	10,079	13,022	7,137	1,013	3,229	2,672	2,633	0,972		146,270
		1,717	1,966	4,207				0,317			0,219			8,426
				Period III (indirect exposure)						Period IV (indirect exposure)				
23,458	23,441	10,331	7,242	7,516	10,079	13,022	7,137	1,013	3,229	2,672	2,633	0,972		146,270
3,313	3,937	2,956	2,834	2,940	2,803	3,237	3,582							33,558
5,192	5,200	4,984												30,858
				Period III (indirect exposure)						Period IV (indirect exposure)				
9,110	13,724	6,783	1,878	0,864	4,36	3,300	6,820	0,721	-0,623	1,709	1,389			65,860
38,8 %	58,5 %	65,7 %	25,93 %	11,50 %	43,26 %	25,34 %	95,56 %	71,17 %	-19,29 %	63,96 %	52,75 %			
1,287	2,305	1,941	0,735	0,338	1,213	0,820	3,423							15,892
1,187	2,121	1,578	0,642	0,786	0,782	0,441	1,449							12,296
2,016	3,044	3,272												15,451
1,861	2,801	2,660												13,426
								0,022	-0,017	0,053	0,017			0,075
1,519	1,011	0,422	0,132	0,061	0,222	0,204	0,635							5,255
				Period III (indirect exposure)						Period IV (indirect exposure)				
13,248	9,716	3,548	5,364	6,618	5,653	9,664	0,317	0,217	2,052	0,804	0,244	0,972		76,082
56,5 %	41,4 %	34,3 %	74,07 %	88,05 %	56,09 %	74,21 %	4,44 %	21,42 %	63,55 %	30,09 %	9,27 %	100 %		
1,871	1,632	1,015	2,099	2,589	1,572	2,402	0,159							17,430
1,727	1,501	0,825	1,835	6,022	1,013	1,291	0,067							17,754
2,932	2,155	1,712												15,128
2,706	1,983	1,391												13,088
								0,007	0,056	0,022	0,008	0,181		0,273
0,858	0,716	0,221	0,377	0,465	0,288	0,599	0,030							4,719
				Period III (indirect exposure)						Period IV (indirect exposure)				
1,100	0,001			0,034	0,066	0,047		0,050	0,072	0,144				1,549
4,69 %				0,45 %	0,65 %	0,36 %		4,94 %	2,23 %	5,39 %				
0,155	0,0002			0,013	0,018	0,012								0,199
0,143	0,0002			0,031	0,012	0,006								0,193

Table 35.
External challenge to the Finnish cattle population via MBM imported from BSE-risk countries in different scenarios (A – E) during different periods (I – IV).

	Year of import							
	1980	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**
Scenario C_1, PROP*Certificate								
Scenario C_2, (DECAT/TOTCAT)*Certificate								
Scenario D,								
Scenario E (DECAT/DOMIMPTOT)*Focus								
France (FR)	**Period I (indirect exposure)**				**Period II (direct exposure)**			
MBM imported from France fed to cattle; Scenario A (FRCAT)								
FRCAT/BSECAT, % (PROP)								
Scenario B_1, PROB* Focus								
Scenario B_2, (FRCAT/TOTCAT)*Focus								
Scenario C_1, PROP*Certificate								
Scenario C_2, (FRCAT/TOTCAT)*Certificate								
Scenario D,								
Scenario E (FRCAT/DOMIMPTOT)*Focus								
Ireland (IRL)	**Period I (indirect exposure)**				**Period II (direct exposure)**			
MBM imported from Ireland; Scenario A (IRECAT)								
IRECAT/BSECAT, % (PROP)								
Scenario B_1, PROB* Focus								
Scenario B_2, (IRECAT/TOTCAT)*Focus								
Scenario C_1, PROP*Certificate								
Scenario C_2, (IRECAT/TOTCAT)*Certificate								
Scenario D,								
Scenario E (IRECAT/DOMIMPTOT)*Focus								
Unspecified	**Period I (indirect exposure)**				**Period II (direct exposure)**			
MBM imported from unspecified origin; Scenario A (UIDCAT)								
UIDCAT/BSECAT, % (PROP)								
Scenario B_1, PROB* Focus								
Scenario B_2, (UIDCAT/TOTCAT)*Focus								
Scenario C_1, PROP*Certificate								
Scenario C_2, (UIDCAT/TOTCAT)*Certificate								
Scenario D								
Scenario E (UIDCAT/DOMIMPTOT)*Focus								
Estimated annual use of MBM imported from BSE-risk countries in cattle feed, tons	**Period I (indirect exposure)**				**Period II (direct exposure)**			
Scenario A					0,035	7,071	10,945	15,474
Scenario B_1					0,035	2,051	2,713	3,157
Scenario B_2						2,385	2,385	2,553
Scenario C_1					0,035	3,462	4,326	7,659
Scenario C_2						3,115	3,803	6,193
Scenario D, assumed amount of MBM imported from BSE-risk countries in cattle feed due to cross-contamination, tons								
Scenario E (Focus): The share of MBM imported from BSE-risk countries and used for cattle is the share of import out of total available MBM, tons						0,424	0,752	1,037

Note: Period = Import years are divided into periods for the assessment of the external challenge; Scenario A = Worst case scenario where all imported MBM imported from BSE-risk countries except that was used for fur and pet animal feeding was fed to cattle (BSECAT);
Scenarios B = estimation of total MBM used in cattle feeding based on Focus-database or Scenarios C = based on feed ingredient certificate.

Year of import														Total tons
1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	
0,243	0,0002													0,244
0,225	0,0002													0,225
								0,0016	0,0020	0,0045				0,008
0,071	0,0001			0,002	0,003	0,003								0,080
				Period III (indirect exposure)					Period IV (indirect exposure)					
						0,011			0,085	0,015	1,000			1,111
						0,08 %			0,62 %	0,56 %	6,64 %			
						0,003								0,003
						0,001								0,001
									0,0023	0,0005	0,0122			0,0150
						0,001								
				Period III (indirect exposure)					Period IV (indirect ure)					
								0,025						0,025
								2,47 %						
								0,00078						0,00078
				Period III (indirect exposure)					Period IV (indirect exposure)					
									1,643					
									50,88 %					
									0,045					0,045
				Period III (indirect exposure)					Period IV (indirect exposure)					
23,458	23,441	10,331	7,242	7,516	10,079	13,022	7,137	1,013	3,229	2,672	2,633	0,972		146,270
3,313	3,937	2,956	2,834	2,940	2,803	3,237	3,582							33,558
3,058	3,622	2,403	2,477	6,839	1,807	1,298	1,516							30,343
5,192	5,200	4,984												30,858
4,792	4,7841	4,051												26,738
								0,032	0,089	0,083	0,032	0,065		0,301
2,448	1,727	0,643	0,509	0,528	0,292	0,602	0,030							8,99

Based on the proportion of the total import of individual BSE-risk country, the share of MBM imported from BSE-risk countries was then estimated as Scenarion B – E for each country. Domestic or imported MBM was not used in cattle feed between 1980 and 1982 (Period I); imported MBM was not used for cattle feeding between 1991 and 2001 (Period III and Period IV). The estimate for 1997 is biased because high volume of MBM imported from the Netherlands was reported to have been fed to fur and pet animals while the total import was less than what was imported.

References

Customs (1980 – 2002). Statistics on import of meat- and bone meal between 1980 – 2002. National board of Customs.

KTTK (1980 – 2002). Annual report on import of feed raw material and production of feeds.

SSC (2002). Final report on the updated assessment of the geographical BSE-risk (GBR) of Finland, 16 May 2002 http://europa.eu.int/comm/food/fs/sc/ssc/out260 en.pdf.

Annex 8. Legislation related to the control of BSE in the European Community 1980 – 2002

Table 36.
Legislation related to the import of cattle and products of bovine origin 1980 – 2002

Table 37.
Legislation related to the import of animal protein 1980 – 2002

Table 38.
Legislation related to the surveillance of BSE in cattle 1980 – 2002

Table 39.
Legislation related to BSE-related culling 1980 – 2002

Table 40.
Legislation related to the removal of specified risk material 1980 – 2002

Table 41.
Legislation related to the rendering of animal waste 1980 – 2002

Table 36.
Legislation related to the import of cattle and products of bovine origin 1980 – 2002

Year	Subject	Legal text	Contents	In force since	Repealed by
1989	Import from the UK, live cattle	**89/469/EEC:** Commission Decision of 28 July concerning certain protection measures relating to BSE in the UK	Dispatch of live cattle from the UK to other Member States: Bans dispatch of cattle born before 18th July 1988 or born to affected females (suspected or confirmed)	Date of notification	D94/474
1990	Import from the UK, live cattle	**90/59/EEC:** Commission Decision of 7 February 1990 amending Decision 89/469/EEC concerning certain protection measures relating to BSE in the UK	Amendment of D89/469/EEC: Authorises the dispatch of the following (UK to other MS): a) calves intended for slaughter before the age of 6 months b) cattle born outside the UK but moved into the UK after 18 July 1988	1.3.1990	D94/474
1990	Import from the UK, certain bovine tissues	**90/200/EEC:** Commission Decision of 9 April 1990 concerning additional requirements for some tissues and organs with respect to BSE	Restrictions on the dispatch of certain bovine tissues and organs from the UK (brain, spinal cord, thymus, tonsils, spleen, intestines; placental tissue, cell cultures, serum etc).	Date of notification	D94/474
1990	Import from the UK, meat; identification of dispatched live calves	**90/261/EEC:** Commission Decision of 8 June 1990 amending Decision 89/469/EEC concerning certain protection measures relating to BSE in the UK and Decision 90/200/EEC concerning additional requirements for some tissues and organs with respect to BSE	Identification of calves dispatched from the UK	Date of notification	D94/474/EEC
1992	Import from the UK, embryos	**92/290/EEC:** Commission Decision of 14 May 1992 concerning certain protection measures relating to bovine embryos in respect of BSE in the UK Restrictions on the dispatch of bovine embryos from the UK	Bans the dispatch of embryos of females which were born before 18th July 1988 or which are offspring of females in which BSE is confirmed or suspected	15 days after the notification	
1994	Import from the UK, live cattle, meat, meat products	**94/474/EC:** Commission Decision of 27 July 1994 concerning certain protection measures relating to BSE and repealing Decisions 89/469/EEC and 90/200/EEC	Amendments to the conditions for dispatch of calves and certain products from the UK	Date of notification	R01/1326

1994	National rules on import requirements, concerning BSE	EEA agreement; notification to the Commission of the national requirements based on the EEA agreement; Annex I, Chapter I, Article 5	EFTA states may continue to apply their own rules with respect to BSE. These rules must be based on objective criteria in a non-discriminatory manner and should be communicated to the Community	15.7.1994	Membership of Finland in EU, 1.1.1995
1996	Import from the UK, live cattle and products	**96/239/EC:** Commission Decision of 27 March 1996 on emergency measures to protect against BSE	UK embargo: Total ban on dispatch of live cattle, cattle products and mammalian MBM from the UK	Date of notification	D98/256
1996	Import from the UK	**96/362/EC:** Commission Decision of 11 June 1996 amending Decision 96/239/EC on emergency measures to protect against BSE	Conditional lifting of the ban for certain cattle products: semen, gelatine, tallow	Date of notification	D98/256
1997	Restriction on trade in MBM	**97/735/EC:** Commission Decision of 21 November 1997 concerning protection measures with regard to trade in certain types of mammalian animal waste	Prohibition of trading between member states except under certain circumstances, MBM that was not produced in accordance with the Annex to Decision 96/449/EC. The same prohibition applies to third countries so as to prevent deflection of trade.		399D0534
1998	Import from the UK, live cattle and products	**98/256/EC:** Council Decision of 16 March 1998 concerning emergency measures to protect against BSE, amending Decision 94/474/EC and repealing Decision 96/239/EC	Amends the UK embargo: Reinforcement of controls and first steps towards lifting the ban under Export Certified Herds Scheme of Northern Ireland (Repeals D96/239/EC)	Date of notification	
1998	Import from the UK	**98/351/EC:** Commission Decision of 29 May 1998 setting the date on which dispatch from Northern Ireland of bovine products under the Export Certified Herds Scheme may commence by virtue of Article 6(5) of Council Decision 98/256/EC	Date on which dispatch from Northern Ireland may commence (1/6/1998)	1.6.1998	
1998	Import from the UK	**98/564/EC:** Commission Decision of 7 October 1998 amending Council Decision 98/256/EC as regards certain emergency measures to protect against BSE	Dispatch of BSE samples for scientific research may be authorised by the UK	Date of notification	

Year	Subject	Legal text	Contents	In force since	Repealed by
1998	Import from Portugal	**98/653/EC:** Commission Decision of 18 November 1998 concerning emergency measures made necessary by the occurrence of BSE in Portugal	(Portugal embargo) Total ban on dispatch of live cattle and all cattle products from Portugal	Date of notification	D2001/367/EC
1998	Import from the UK	**98/692/EC:** Commission Decision of 25 November 1998 amending Decision 98/256/EC as regards certain emergency measures to protect against BSE	Amends the UK embargo - Principles of the second step towards lifting the ban under the Date-based Export Scheme applicable in the entire UK	Date of notification	
1999	Import from the UK	**1999/514/EC:** Commission Decision of 23 July 1999 setting the date on which dispatch from the UK of bovine products under the date-based export scheme may commence by virtue of Article 6(5) of Council Decision 98/256/EC	Date on which dispatch from the UK of certain bovine products may commence (1/8/1999)	1.8.1999	
1999	Import from Portugal	**99/517/EC:** Commission Decision of 28 July 1999 amending Decision 98/653/EC concerning emergency measures made necessary by the occurrence of BSE in Portugal	Extension of the ban against Portugal	Date of notification	
1999	Import from Portugal	**1999/713/EC:** Commission Decision of 21 October 1999 amending Decision 98/653/EC concerning emergency measures made necessary by the occurrence of BSE in Portugal	Dispatch of MBM for incineration and fighting bulls	Date of notification	
2000	Import from Portugal	**2000/104/EC:** Commission Decision of 31 January 2000 amending Decision 98/653/EC concerning emergency measures made necessary by the occurrence of BSE in Portugal	Extension of the ban against Portugal	Date of notification	
2000	Import from Portugal	**2000/345/EC:** Commission Decision of 22 May 2000 setting the date on which dispatch from Portugal to Germany of certain products for the purpose of incineration may commence by virtue of Article 3(6) of Decision 98/653/EC	Starting date for the dispatch from Portugal of MBM for the purpose of incineration	Date of notification	
2000	Import from Portugal	**2000/371/EC:** Commission Decision of 6 June 2000 setting the date on which dispatch of fighting bulls from Portugal to France may commence by virtue of Article 3(7) of Decision 98/653/EC	Starting date for the dispatch from Portugal of fighting bulls to France		

2000	Import from Portugal	**2000/372/EC:** Commission Decision of 6 June 2000 setting the date on which dispatch of fighting bulls from Portugal to Spain may commence by virtue of Article 3(7) of Decision 98/653/EC	Starting date for the dispatch from Portugal of fighting bulls to Spain		D01/376
2001	Import from Portugal	**2001/376/EC:** Commission Decision of 18 April 2001 concerning measures made necessary by the occurrence of BSE in Portugal and implementing a date-based export scheme	Principles for lifting the Portuguese ban under a Date-based Export Scheme (Repeals D 98/653/EC)		
2001	Import from Portugal	**2001/577/EC:** Commission Decision of 25 July 2001 setting the date on which dispatch from Portugal of bovine products under the Date-Based Export Scheme may commence by virtue of Article 22(2) of Decision 2001/376/EC	Date on which dispatch from Portugal of certain bovine products may commence (1/8/2001)		
2002	Import from the UK, live cattle, MBM	**2002/670/EC:** Commission Decision of 20 August 2002 amending Council Decision 98/256/EC concerning emergency measures to protect against BSE	Adaptation of some date-based export scheme (DBES) conditions. UK still not allowed to dispatch the following: live bovine animals, mammalian meat meal, bone meal, MBM and animal feed or fertilisers containing them	1.4.2002	

Table 37.
Legislation related to the import of animal protein 1980 – 2002

Year	Subject	Legal text	Contents	In force since	Repealed by
1990	Notification of animal disease	**90/425/EEC:** Commission Decesion of 6 March 1990 on the notification of animal disease within the community temporarliy amending the frequency of notification for BSE		27.7.1994	392D0450
1994	Ban of mammalian protein	**94/381/EC:**Commission Decision of 27 June 1994 concerning certain protection measures with regard to BSE and the feeding of mammalian derived protein	Ban of the use of protein derived from mammalian tissue for feeding ruminants. Member States shall prohibit the feeding of protein derived from mammalian tissue to ruminant species. However, Member States which enforce a system that makes it possible to distinguish between animal protein from ruminant and non-ruminant species shall be authorised, by the commission under the procedure provided for by the Article 17 of Directive 90/425/EEC, to permit the feeding of protein from species other than ruminants to ruminants.		
1995	Derogation to the feed ban	**95/60/EC:** Commission Decision of 6 March.1995 amending Decision 94/381/EC concerning certain protection measures with regard to BSE and the feeding of mammalian derived protein	Certain animal products such as milk, gelatine, amino acids produced from hides and skins and dicalcium phosphate derived from defatted bone and dried plasma and others blood products were exempted from the provisions of Decision 94/381/EC.		D 94/381/EC, 301D1326
1997	Lists of prohibited protein derived from mammalian tissue	**97/47/EC:** Commission Decision 1997 amending the Annexs to Council Directives 77/101/EEC, 79/373/EEC and 91/357/EEC	Established a list of ingredients whose use is prohibited in compound feedingstuffs for example protein derived from mammalian tissue such as milk and milk products, gelatine, amino acids obtained from hides and skins, dicalcium phosphate derived from defatted bone and dried plasma and otherblood products.	1.12.1997	
1999	Feeding of mammalian protein to ruminants	99/129/EC:Commission Decision January 199 amending for the 2nd time Decision 94/381/EC concerning protection measures with regards to BSE and the feeding of mammalian derived protein	Prohibits the feeding of protein derived from all mammalian species to ruminant as amended by Decision 95/60/EC(4); whereas hydrolysed protein with a molecular weight below 10,000 daltons which have been derived from hides and skins of animals which have been slaughtered in a slaughter house and undergone ante mortem inspection and produced according to EU standard were extended.		399D129R(0)
2000	Temporary ban of processed animal protein	2000/766/EC:Commission Decision December 2000 concerning certain protection measures whith regard to BSE and feeding of animal protein	Prohibition of the feeding of processed animal protein, such as MBM, MM, blood meal, poultry meal, fish meal, dry greaves, feather meal, dicalcium phosphate, gelatine and any other similar products including mixtures, feedingstuffs, feed additivies and premixtures, containing these products to farmed animals which are kept, fattened or bred for the production of food.	1.1.2001	

Table 38.
Legislation related to the surveillance of BSE in cattle 1980 – 2002

Year	Subject	Legal text	Contents	In force since	Repealed by
1990	Notification of BSE	**90/134/EEC:** Commission Decision of 6 March 1990 amending for the second time Council Directive 82/894/EEC on the notification of animal diseases within the Community and temporarily amending the frequency of notification for bovine spongiform encephalopathy	BSE is temporarily added to the list of diseases which are notifiable under Directive 82/894/EEC (until 30th June 1992). Member States must notify all cases of BSE to the Commission at least the first working day of the following week. Extensions: 92/450/EEC: Until 31.12.1997, 98/12/EEC: Until 31.12.2002		D92/450
1990	Surveillance of clinical cases at slaughterhouse	**90/200/EEC:** Commission Decision of 9 April 1990 concerning additional requirements for some tissues and organs with respect to BSE	Clinical suspicion of BSE in ante mortem examination: separate slaughtering and retention, histological evaluation of the brain for evidence of BSE. Confirmed case: destruction of the carcass and offal.		D94/474
1992	Notification of BSE	**92/450/EEC:** Commission Decision of 30 July 1992 amending for the third time Council Directive 82/894/EEC on the notification of animal diseases within the Community and temporarily amending the frequency of notification for BSE	Extension of the compulsory notification of BSE until 31st December 1997 (see 90/134/EEC)	1.1.2001	D98/12
1994	Surveillance of clinical cases at slaughterhouse	**94/474/EC:** Commission Decision of 27 July 1994 concerning certain protection measures relating to BSE and repealing Decisions 89/469/EEC and 90/200/EEC	Clinical suspicion of BSE in ante mortem examination: separate slaughtering and retention, histological evaluation of the brain for evidence of BSE. Confirmed case: destruction of the carcass and offal. Same provision as in 90/200/EEC, nothing added		R01/1326
1997	Targeted surveillance	National requirement			

Year	Subject	Legal text	Contents	In force since	Repealed by
1998	Notification of BSE	**98/12/EC:** Commission Decision of 15 December 1997 amending for the fourth time Council Directive 82/894/EEC on the notification of animal diseases within the Community and temporarily amending the frequency of notification for BSE	Extends the compulsory notification of BSE	testing 1.6.2001 at the latest	
1998	Passive surveillance; notification of suspect cases; edu cation	**98/272/EC:** Commission Decision of 23 April 1998 on epidemio-surveillance for TSEs and amending Decision 94/474/EC	1. Passive surveillance for BSE. Definition on minimum number of bovine brains that have to be examined by each member state. Selection of subpopulations (clinical signs compatible with BSE; higher risk animals); 2. Suspected cases of BSE: immediate notification of to the competent authority; movement restrictions, official investigation. Unless ruled out: killing and examination; 3. Education; 4. Reports to the Commission	1.5.1998	R01/1248
2000	Passive surveillance; rapid tests for screening	**2000/374/EC:** Commission Decision of 5 June 2000 amending Decision 98/272/EC on epidemio-surveillance for TSEs	Increased number of samples to be examined by each member state; selection criteria, age limit 24 months. Introduction of rapid post-mortem test for screening for BSE. Reports to the Commission.	1.1.2001	R01/1248
2000	Active monitoring: testing of OTMs	**2000/764/EC:** Commission Decision of 29 November 2000 on the testing of bovine animals for the presence of BSE and amending Decision 98/272/EC on epidemio-surveillance for TSEs	Testing: since 1.1.2001: risk groups: emergency slaughtered or sick, slauhghtered for human consumpton: all; fallen stock: by sample. Age limit 30 months. Since 1.7.2001: all healthy cattle over 30 months (derogation for Finland, Sweden and Austria). Obs! In reality, testing of OTMs became compulsory in other member states already since 1.1.2001 due to 2000 Regulation (EC) No 2777/2000	1.1.2001	R01/1248
2000	Active monitoring (placing on market of beef)	**2000 Regulation (EC) No 2777/2000** of 18 December 2000 adopting exceptional support measures for the beef market	Meat from bovine animals aged more than 30 months and slaughtered in EC after 1 January 2001 can only be released for consumption in the Community or for export if tested negatively for BSE; derogation for Finland, Sweden and Austria. Conditions for purchasing for destruction.	1.1.2001	

2001	Active monitoring	**2001/8/EC:** Commission Decision of 29 December 2000 amending Decision 2000/764/EC on the testing of bovine animals for the presence of BSE and updating Annex IV of Decision 98/272/EC on epidemio-surveillance for TSEs	Sampling, testing: includes animals purchased for destruction in accordance with Regulation (EC)2777/2000		
2001	Active monitoring	2001 Regulation **(EC) No 999/2001** of the European Parliament and of the Council of 22 May 2001 laying down rules for the prevention, control and eradication of certain TSEs	Previous requirements stay in force	1.7.2001	
2001	Active monitoring	2001 Commission Regulation **(EC) No 1248/2001** of 22 June 2001 amending Annexes III, X and XI to Regulation (EC) No 999/2001 of the European Parliament and of the Council as regards epidemio-surveillance and testing of TSEs	Age limit 24 months for testing of risk groups	1.7.2001	
2001	Active monitoring	2001 Commission Regulation **(EC) No 1326/2001** of 29 June 2001 laying down transitional measures to permit the changeover to the Regulation of the European Parliament and of the Council (EC) No 999/2001 laying down rules for the prevention, control and eradication of certain TSEs, and amending Annexes VII and XI to that Regulation	Transitional measures		
2002	Active monitoring	2002 Commission Regulation (EC) No 270/2002 of 14 February 2002 amending Regulation (EC) No 999/2001 of the European Parliament and of the Council as regards specified risk material and epidemio-surveillance for TSEs and amending Regulation (EC) No 1326/2001 as regards animal feeding and the placing on the market of ovine and caprine animals and products thereof	Derogation from testing of OTMs for Finland and Austria repealed.	1.4.2002	
2002	Active monitoring	2002 Commission Regulation (EC) No 1494/2002 of 21 August 2002 amending Annexes III, VII and XI to Regulation (EC) No 999/2001 of the European Parliament and the Council as regards monitoring of BSE, eradication of TSE, removal of SRM and rules for importation of live animals and products of animal origin	Derogation for testing of fallen stock on remote areas		

Table 39.
Legislation related to BSE-related culling 1980 – 2002

Year	Subject	Legal text	Contents	In force since	Repealed by
1990	Measures related to confirmed case at slaughterhouse	**90/200/EEC:** Commission Decision of 9 April 1990 concerning additional requirements for some tissues and organs with respect to BSE	Destruction of the carcass and offal in case of confirmed BSE in a slaughterhouse		D94/474
1994	Measures related to suspect case at slaughterhouse	**94/474/EC:** Commission Decision of 27 July 1994 concerning certain protection measures relating to BSE and repealing Decisions 89/469/EEC and 90/200/EEC	Clinical suspicion of BSE in ante mortem examination at slaughterhouse: separate slaughtering and retention, histological evaluation of the brain for evidence of BSE. For confirmed cases, same provision as already in CD 90/200/EEC.		R01/1326
1998	Measures related to suspect case on farm	**98/272/EC:** Commission Decision of 23 April 1998 on epidemiosurveillance for TSEs and amending Decision 94/474/EC	Animal showing signs giving rise to the suspicion of BSE: movement restrictions; if BSE cannot be ruled out: killing and examination	1.5.1998	
2001	Eradication of BSE following confirmed case	2001 Regulation **(EC) No 999/2001** of the European Parliament and of the Council of 22 May 2001 laying down rules for the prevention, control and eradication of certain TSEs	Eradication of BSE (Annex VII). Following a confirmed case of BSE, killing and destruction of the herd; in case of a female animal, embryos, ova and the last progeny, born or collected within 2 years of the clinical onset of BSE; all animals of the cohort	1.7.2001	
2001	Eradication of BSE following confirmed case	2001 Commission Regulation **(EC) No 1326/2001** of 29 June 2001 laying down transitional measures to permit the changeover to the Regulation of the European Parliament and of the Council (EC) No 999/2001 laying down rules for the prevention, control and eradication of certain TSEs, and amending Annexes VII and XI to that Regulation	Culling of the entire herd is made optional, depending on the prevailing local situation	1.7.2001	
2002	Eradication of BSE following confirmed case	2002 Commission Regulation **(EC) No 1494/2002** of 21 August 2002 amending Annexes III, VII and XI to Regulation (EC) No 999/2001 of the European Parliament and the Council as regards monitoring of BSE, eradication of TSE, removal of SRM and rules for importation of live animals and products of animal origin	Repealing of the provisions on the destruction for bovine embryos and ova from BSE-cases	25.8.2002	

Table 40.
Legislation related to the removal of specified risk material 1980 – 2002

Year	Subject	Legal text	Contents	In force since	Repealed by
1997	Specified risk material and prohibition of the use of SRM	**97/534/EC:** Commission Decision of 30 July 1997 on the prohibition of the use of material presenting risks as regards TSEs	Definition of SRM (skull of bovine, ovine and caprine animals; spleen of ovine and caprine animals) Prohibition of the use of SRM for any purpose; prohibition of the use of the vertebral column of ruminants for the production of mechanically recovered meat. Staining and disposal of SRM. Controls by the MS competent authorities	postponed several times, never entered into force	D00/418
1998	Specified risk material	**98/248/EC:** Council Decision of 31 March 1998 amending Commission Decision 97/534/EC on the prohibition of the use of material presenting risks as regards TSEs	Postponement of the date of application of CD 97/534/EC (to 1/1/1999)		
1998	Specified risk material	**98/745/EC:** Council Decision of 17 December 1998 amending Commission Decision 97/534/EC on the prohibition of the use of material presenting risks as regards TSEs	Postponement of the date of application of the CD 97/534/EC (to 31/12/1999)		
1999	Specified risk material	**1999/881/EC:** Council Decision of 14 December 1999 amending Commission Decision 97/534/EC on the prohibition of the use of material presenting risks as regards TSEs	Postponement of the date of application of CD 97/534/EC (to 30/6/2000)		
2000	Specified risk material	**2000/418/EC:** Commission Decision of 29 June 2000 regulating the use of material presenting risks as regards TSEs and amending Decision 94/474/EC	Definition of SRM; its removal and destruction; slayghter techniques; official controls	30 June 2000	R01/1326
2001	Specified risk material	**2001/2/EC:** Commission Decision of 27 December 2000 amending Decision 2000/418/EC regulating the use of material presenting risks as regards TSEs	Extension of the list of SRM (bovine intestines)	1.1.2001	
2001	Specified risk material	**2001/233/EC:** Commission Decision of 14 March 2001 amending Decision 2000/418/EC as regards mechanically recovered meat and bovine vertebral column	Extension of the list of SRM (vertebral column of bovine animals over 12 months of age)	31.3.2001	R01/1326
2002	Specified risk material	2002 Commission Regulation **(EC) No 270/2002** of 14 February 2002 amending Regulation (EC) No 999/2001 of the European Parliament and of the Council as regards specified risk material and epidemio-surveillance for TSEs and amending Regulation (EC) No 1326/2001 as regards animal feeding and the placing on the market of ovine and caprine animals and products thereof	Extension of the list of SRM (bovine mesentery)	1.4.2002	
2002	Specified risk material	2002 Commission Regulation **(EC) No 1494/2002** of 21 August 2002 amending Annexes III, VII and XI to Regulation (EC) No 999/2001 of the European Parliament and the Council as regards monitoring of BSE, eradication of TSE, removal of SRM and rules for importation of live animals and products of animal origin	Amendment of the definition of SRM (Exclusion of wings of the sacrum of bovine carcasses)		

Table 41.
Legislation related to the rendering of animal waste 1980 – 2002

Year	Subject	Legal text	Contents	In force since	Repealed by
1990	Rendering of animal waste	**Council Directive 90/667/EEC** of 27 November 1990 laying down the veterinary rules for the disposal and processing of animal waste, for its placing on the market and for the prevention of pathogens in feedstuffs of animal or fish origin and amending Directive 90/425/EEC	Basic minimum requirement for heat treatment of high risk animal waste: 133 °C / 20 min / 3 bar. Alternative systems may be approved by a comitology procedure.	31.12.1991	R02/1774
1992	Rendering of animal waste	**92/562/EEC:** Commission Decision of 17 November 1992 on the approval of alternative heat treatment systems for processing high-risk material	Processing of high risk animal waste by alternative heat treatment systems to the requirement in directive 90/667/EEC. Requirements for the systems; control. (With a view of inactivating conventional infectious agents)	Date of notification	
1994	Rendering of animal waste	**94/382/EC:** Commission Decision of 27 June 1994 on the approval of alternative heat treatment systems for processing animal waste of ruminant origin, with a view to the inactivation of spongiform encephalopathy agents	Processing of high risk animal waste by alternative heat treatment systems to the requirement in directive 90/667/EEC. Requirements for the systems; control. (With a view of inactivating BSE agent)	1.1.1995	D96/449
1995	Rendering of animal waste	**95/29/EC:** Commission Decision of 13 February 1995 amending Decision 94/382/EC on the approval of alternative heat treatment systems for processing animal waste of ruminant origin, with a view to the inactivation of spongiform encephalopathy agents	Processing of high risk animal waste by alternative heat treatment systems to the requirement in directive 90/667/EEC. Requirements for the systems; control. (With a view of inactivating BSE agent)	Date of notification	D96/449
1996	Rendering of animal waste	**96/449/EC:** Commission Decision of 18 July 1996 on the approval of alternative heat treatment systems for processing animal waste with a view to the inactivation of spongiform encephalopathy agents	Pressure cooking system for processing mammalian waste, excluding fats. Inactivation of TSE agents; minimum for all systems 133 °C at 3 bar for a minimum period of 20 minutes	1.4.1997	D99/534
1999	Rendering of animal waste	**1999/534/EC:** Council Decision of 19 July 1999 on measures applying to the processing of certain animal waste to protect against TSEs and amending Commission Decision 97/735/EC	Processing of low risk and high risk mammalian animal waste (MBM and tallow). Checks, records (purification of rendered fats derived from ruminant waste into force 1.1.2000)	1.7.1999 1.1.2000	R02/1774
2000	Rendering of animal waste	**2000/418/EC:** Commission Decision of 29 June 2000 regulating the use of material presenting risks as regards TSEs and amending Decision 94/474/EC	Official controls in rendering plants to control the application of the prohibition of the use of SRM	30.6.2000	R01/1326

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Kuvat: EELA, Finfood OY, Kirsti Siekkinen, Mikko Tuori, Merja Ojala

ISSN 1458-6878

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