

Final report

on the

updated Assessment of the

Geographical BSE-Risk of

SINGAPORE – 2003

6 March 2003

NOTE TO THE READER

Independent experts have produced this report, applying an innovative methodology by a complex process to data that were supplied by the responsible country authorities. Both, the methodology and the process, are described in detail in the final opinion of the SSC on "the Geographical Risk of Bovine Spongiform Encephalopathy (GBR)",

6 July 2000 and its update of 11 January 2002. These opinions are available at the following Internet address:

<http://europa.eu.int/comm/food/fs/sc/ssc/outcome_en.html>

This report, and the opinion of the SSC based on it, is now serving as the risk assessment required by the TSE-Regulation EU/999/2001 for the categorisation of countries with regard to their BSE-status. The final BSE-status categorisation depends also on other conditions as stipulated in annex II to that TSE-Regulation.

1. DATA

- The available information was sufficient to carry out the qualitative assessment of the GBR.

Sources of data

Country dossier consisting of:

- Country dossier (CD) consisting of information provided from the country's authorities in 2000 - 2002.

Other sources:

- EUROSTAT data on export of "live bovine animals" and on "flour, meal and pellets of meat or offal, unfit for human consumption; greaves" (customs code 230110), covering the period 1980-2001.
- UK-export data (UK) on "live bovine animals" (1980-1996) and on "Mammalian Flours, Meals and Pellets", 1988-1996. As it was illegal to export mammalian meat meal, bone meal and MBM from UK since 27/03/1996, exports indicated after that date under customs code 230110 should only have included non-mammalian MBM.
- Export data from Cyprus, the Czech Republic, Estonia, Hungary, Lithuania, Romania, Slovenia and Switzerland.

2. EXTERNAL CHALLENGES

2.1 Import of cattle from BSE-Risk¹ countries

- According to the CD, Singapore has not imported any live cattle from the UK or any other BSE-affected country. This statement is supported by UK, EUROSTAT and other export data.
- Singapore imported considerable numbers of cattle from Australia, Malaysia and New Zealand in 1990 (641 cattle) and in 1991 (506 cattle). It is explained that they were imported mainly for breeding purposes to restock their relocated dairy farms.

2.2 Import of MBM² or MBM-containing feedstuffs from BSE-Risk countries

- According to the CD, Singapore is a major transshipment hub for the region. The authorities do not register products if they do not enter Singapore's territory, and remain in the Free-Trade Zone between transshipment. Imports into Singapore require an import permit. There was one import permit issued for MBM (coded 2301 10) for an import from The Netherlands. All other import permits were issued for petfood in processed form (coded 2309 10), i.e. only as complete pet food in extruded form or as canned petfood. Petfood was imported from Germany, The Netherlands, France, the UK and Austria with details on the manufacturer.

¹ BSE-Risk countries are all countries already assessed as GBR III or IV or with at least one confirmed domestic BSE case.

² For the purpose of the GBR assessment the abbreviation "MBM" refers to rendering products, in particular the commodities Meat and Bone Meal as such; Meat Meal; Bone Meal; and Greaves. With regard to imports it refers to the customs code 230110 "flours, meals and pellets, made from meat or offal, not fit for human consumption; greaves".

- Since 1996, importation of ruminant (beef) offal is restricted only to countries free of BSE over the past 6 years prior to slaughter of the animals and export of products to Singapore. The products are meant only for human consumption.
- According to data supplied by Switzerland, 2,525 tons of MBM were exported to Singapore in 1990.
- Another 3,595 tons were exported from different Member States other than UK to Singapore. This MBM was mainly from Italy (1,358 tons), France (1,183 tons) and Ireland (987 tons).
- According to Eurostat, the UK exported 1,876 tons to Singapore. However, in the updated UK export statistics for mammalian MBM (covering 1988-1996) Singapore is not mentioned at all. Therefore, the 801 tons exported to Singapore in 1991 are not taken into account. The mentioned export in 1996 (687 tons) either did not happen at all or was of poultry origin. MBM exports from UK to Singapore from 1997 to 2000 (339 tons) were most probably of poultry origin because since April 1996 the export ban for bovine products from the UK was in force.
- The authorities of Singapore provided convincing arguments to assume that only the consignment from the Netherlands in 1985 in fact entered the territory of Singapore. It is further assumed that the other consignments reported by exporting countries only entered the free zone of the Singapore port.

Country:	Data	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	0	1	Total
Belgium	CD																							0
	other																						5	5
France	CD																							0
	other														1183									1183
Germany	CD																							0
	other																		26			25		51
Ireland	CD																							0
	other														210			207		256	314			987
Italy	CD																							0
	other								53								820	485						1358
Netherlands	CD						3773																	3773
	other																11							11
Switzerland	CD																							0
	other											2525												2525
UK	CD																							0
	other							49					801					687	321			18		1876
TOTALS																								
non UK	CD	0	0	0	0	0	3773	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3773
	other	0	0	0	0	0	0	0	53	0	0	2525	0	0	0	1393	831	485	233	0	256	344	0	6120
UK	CD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	other	0	0	0	0	0	0	49	0	0	0	0	801	0	0	0	0	687	321	0	0	18	0	1876

Table 1: MBM imports into Singapore (CD) and corresponding exports from BSE-Risk countries. Source for export data: Eurostat and UK export statistics and, where available, export statistics from other BSE-Risk countries. Note: Only imports in Risk periods (grey shaded) are taken into account for assessing the external challenge. Risk periods are defined according to the SSC opinion of January 2002.

2.3 Overall assessment of the external challenge

The level of the external challenge that has to be met by the BSE/cattle system is estimated according to the guidance given by the SSC in its final opinion on the GBR of July 2000 (as updated in January 2002).

- Live cattle imports:

The country did not import over the period 1980 to 2001 any live cattle from BSE risk countries.

- MBM imports:

In total the country imported over the period 1980 to 2001 7,996 tons of MBM (Eurostat and other data) from BSE-risk countries, of which 1,876 tons came from the UK. Broken down to 5-years periods the resulting external challenge is as given in table 2. This assessment takes into account the different aspects discussed above that allow to assume that certain imported MBM did not enter the domestic BSE/cattle system or did not represent an external challenge for other reasons.

External Challenge experienced by SINGAPORE				
<i>External challenge</i>		<i>Reason for this external challenge</i>		
Period	Overall Level	Cattle imports	MBM imports	Comments
1980 - 1985	Moderate	Negligible	Moderate	
1986 - 1990	Negligible		Negligible	
1991 - 1995				
1996 - 2000				

Table 2: External Challenge resulting from live cattle and/or MBM imports from the UK and other BSE-Risk countries. The Challenge level is determined according to the SSC-opinion on the GBR of July 2000 (as updated in January 2002).

On the basis of the available information, the overall assessment of the external challenge is as given in the table above.

3. STABILITY

3.1 Overall appreciation of the ability to avoid recycling of BSE infectivity, should it enter processing

Feeding:

Feed ban

The feeding practice and the feed composition have remained unchanged over the last 15-20 years. Animal-derived feed products are not used for ruminant feeding on local farms for the following two reasons:

- Cattle farms supply milk on a regular basis to Hindu temples for religious purposes. Therefore the CD states that feed used must be of plant origin.
- Since 1997, the feeding of mammalian MBM to ruminants is prohibited in Singapore. The "Feeding Stuff Act CAP 105" of 1997 allows the control over the composition and use of animal feedingstuff.
- It can be assumed that the mentioned religious constraint is equal to a non-official MBM to ruminant ban.

Potential for cross-contamination and measures taken against

- There are 7 commercial feed mills licensed by AVA. Only one of them produces complete feed for poultry and pigs, mainly for export and to supply complete feed to one local quail farm. The MBM used is obtained from non-European countries. The remaining 6 feed mills manufacture premixes for export and according to the country dossier they do not use ingredients of animal origin. There is no local feed mill producing commercial feed for ruminants.
- The three dairy cattle farms re-established in 1990 (altogether 700 animals) in Singapore mix their own feed. They do not use animal-derived feed products but only grass, hay, corn straw, molasses, soy bean cake, soy bean pulp, wheat bran, wheat pollard, corn, lentils, bean sprouts, mineral mix (does not contain ingredients of animal origin) and peanut skin. These ingredients are mainly locally sourced and imported directly to the farm.

Control of Feed bans and cross-contamination

- Feed mills are annually inspected on sanitation management, handling and storage of the products, risk of cross-contamination and re-contamination of products, audit of processing systems and to ensure compliance with the licensing conditions.
- As there are no animal by-product processing plants in Singapore to obtain MBM, AVA, (Veterinary Service of Singapore) controls only MBM imports.

Conclusions on cross-contamination:

- According to the available information the only measure in place to reduce cross-contamination of cattle feed with any mammalian protein is licensing of farms and controls of farms by the Veterinary Authority at least every two weeks.
- These checks include visual inspections of feed to ensure the MBM ban is adhered to. This measure can only detect MBM already mixed in if there is at least about 2% present of it included in the mix. It could, however, recognise stocks of it. Since no compound feed for cattle is produced locally and all feeds are mixed on farm, it can be assumed that it is highly unlikely that cross-contamination takes place.

Rendering:

A rendering industry does not exist in Singapore and did not exist during the reference period (1980-2001). There is also no sub-industrial scale rendering. The small number of animals slaughtered (averaged less than 160 heads of cattle per year over the last 5 years) would not provide sufficient raw material. Cattle slaughtered between 1995-2000 were largely from Australia with a small proportion from an accredited feedlot in Malaysia and were imported for religious slaughter. Slaughter of cattle at the local abattoir has ceased in March 2000. Slaughter offal, including condemned material and fallen stock is incinerated at 900°C in an incinerator attached to the only slaughterhouse that exists in Singapore. The slaughterhouse currently (2002) only slaughters imported pigs from an approved farm on an Indonesian Island south of Singapore.

SRM and fallen stock

There is no SRM-ban in place in Singapore. SRM from animals fit for human consumption is used for human consumption after passing post mortem inspection.

Fallen stock from local cattle farms are either buried on-farm or disposed through licensed contractors. These are required to dispose these carcasses by incineration at one of three public incinerators in Singapore catering to the general disposal of waste materials. All waste in Singapore (other than construction waste) is disposed off only by incineration. Dumping of waste in landfills, other than construction waste, is not allowed. Culled stock and bull calves are currently being exported to Malaysia, no further explanation thereon is provided.

Conclusion on the ability to avoid recycling

In light of the above-discussed information it has to be assumed that the BSE agent, should it have entered the territory of Singapore would not have been recycled and could not have been amplified.

3.2 Overall appreciation of the ability to identify BSE-cases and to eliminate animals at risk of being infected before they are processed**Cattle population structure**

Singapore has a very small cattle population of 700 cattle of which 99 % are dairy cattle. There are only 6-8 breeding bulls in the herd, bull calves are exported to Malaysia. The average age of population is over five years and the age of slaughter is between 6 and 7 years.

Cattle dairy farms were closed between 1985-1989 due to relocation to an "Agrotechnology Park". All three cattle farms were set up at their present location after 1990. The farms were re-stocked using cattle purchased mainly from Australia.

According to the CD, co-species farming does not exist. There are no pig farms, one dairy goat farm, 5 layer hen farms, 2 quail farms and 90 fish farms.

Detailed information is provided on the husbandry practices for farmed species other than cattle. These include layer hens for which complete feed is imported from Malaysia or mixed on farm using fishmeal as protein source. Quail farms use fishmeal or soybean as protein source. The only goat farms imports commercial pelleted feed free of animal protein. There are no feed mills manufacturing fish feed.

BSE surveillance

Notification of BSE is compulsory since 1994.

A description is given of the criteria for a BSE-suspect including display of neurological signs and loss in production. Diagnosis will further be made based on histopathological examination of the brain and detection of BSE-specific prion proteins using test kits. The use of the PRIONICS-test kit is under evaluation.

No compensation is foreseen to cover the market value of confirmed BSE-cases or for culled suspects.

Awareness/training measures are in place and continuous training for officers in AVA is provided through scientific journals, periodicals and educational videos. All veterinary officers in the AVA are graduates of British Commonwealth universities with degrees recognised by RCVS, UK or of American veterinary degrees which are recognised by AVMA, USA. An US-trained veterinary anatomic pathologist with experience in the histopathological diagnosis of BSE, is deployed at the Central Veterinary Laboratory of AVA. This laboratory undertakes post mortem and laboratory examinations of animal specimens for the detection of animal diseases in Singapore.

Passive surveillance

The passive surveillance is based on detection of clinically affected animals through detection of neurological signs but during the last 10 years no CNS- suspects were analysed for BSE.

Active surveillance

An active BSE surveillance has been implemented since February 2001. It includes: clinical observation of animals and euthanasia of suspected cases for further investigation, collection of CNS tissue from every fallen stock and from every killed cattle of 30 months of age or older. Data on the number of examinations are not available.

3.3 Overall assessment of the stability

For the overall assessment of the stability the impact of the three main stability factors (i.e. feeding, rendering and SRM removal) and of the additional stability factors, mainly cross-contamination and surveillance plus culling, has to be estimated. Again the guidance provided by the SSC in its opinion on the GBR of July 2000, as modified in 2002, is applied. A summary is shown in table 3.

Feeding:

Feeding MBM to cattle was legally possible until 1997 but the information provided indicates that it was uncommon practice for dairy cattle to be fed with MBM, based on a de facto (non-official) feedban.

The available information on the control of the 1997 feed-ban does not allow judging the efficiency of the feed-ban. However, cattle feed is mixed on-farm and the farms are regularly controlled. No animal protein is contained in cattle feed rations. Due to the very specific circumstances of cattle husbandry and feeding in Singapore it can be assumed that also cross-contamination is practically excluded. Therefore it is assumed that feeding was “**reasonably OK**” throughout the reference period.

Rendering:

There is no rendering industry or sub-industrial rendering in Singapore. Therefore, rendering is assessed as being "OK".

SRM-removal:

There is no SRM ban but all SRM of animals fit for human consumption is destined for human consumption. If condemned, it would be incinerated. Therefore SRM-removal is assessed as being "OK".

BSE surveillance:

BSE surveillance was insufficient, even if the very small herd size makes the detection of clinical cases highly likely. Since February 2001 active surveillance measures are taken. Therefore surveillance did not influence the stability before 2001, but improves it since then.

Stability of the BSE/cattle system in SINGAPORE over time					
Stability		Reasons			
Period	Level	Feeding	Rendering	SRM	BSE surveillance
1980 - 2000	Very stable	reasonably OK	OK	OK	↓
2001 -					→

Table 3: Stability resulting from the interaction of the three main stability factors and the other stability factors. The Stability level is determined according to the SSC-opinion on the GBR of July 2000.

On the basis of the available information it has to be concluded that the country's BSE/cattle system was very stable throughout the reference period. This indicates that incoming BSE infectivity would not have been recycled but would have been eliminated from the system.

4. CONCLUSION ON THE RESULTING RISKS

4.1 Interaction of stability and challenges

In conclusion, the stability of the BSE/cattle system of Singapore in the past and the external challenges the system has coped with are summarised in table 4 below.

From the interaction of the two parameters “stability” and “external challenge” a conclusion is drawn on the level of “internal challenge” that emerged and had to be met by the system, in addition to external challenges that occurred.

INTERACTION OF STABILITY AND EXTERNAL CHALLENGE IN SINGAPORE			
Stability		External Challenge	Internal challenge
Period	Level	Level	
1980 – 1985	Very stable	Moderate	Highly unlikely*
1986 - 2000		Negligible	

Table 4: Internal challenge resulting from the interaction of the external challenge and stability. The internal challenge level is determined according to guidance given in the SSC-opinion on the GBR of July 2000.

* In 1989 / 1990 all cattle have been slaughtered because after relocation of the holdings these were completely restocked. This was at the time when an internal challenge could have emerged due to MBM imported in 1985.

An external challenge resulting from cattle imports could only lead to an internal challenge once imported infected cattle were rendered for feed and this contaminated feed reached domestic cattle. As Singapore has not imported cattle in the reference period this source for a challenge can be excluded.

On the other hand imports of contaminated MBM would lead to an internal challenge in the year of import, if fed to cattle. The feeding system is of utmost importance in this context. If it could be excluded that imported, potentially contaminated feed stuffs reached cattle, such imports might not lead to an internal challenge at all.

In the case of Singapore a moderate external challenge occurred in 1985, due to import of MBM from the Netherlands. Theoretically this could have led to an internal challenge in the year of importation. However, as mentioned earlier, due to the very specific situation in Singapore, it seems unlikely that MBM ever reached cattle.

In view of the above-described reflection it is very unlikely that the registered external challenges could have led to any internal challenge during the whole reference period. Should a small internal challenge have emerged this would have met an at least stable system in which infectivity would not have been recycled. If the worst case assumption is made that the MBM from the Netherlands was fed to cattle in 1985, this could have led to domestic BSE cases but they would have not been recycled and any infectivity that might have existed in cattle in Singapore was eliminated in 1989 - 1990 when the existing cattle population was slaughtered or culled.

4.2 Risk that BSE infectivity entered processing

A theoretical risk that infectivity entered processing arose in 1989 - 1990 when possibly infected domestic cattle were slaughtered. In the light of the fact that domestic cattle had no access to MBM this scenario seems unlikely. After 1990, when the cattle herd was build up again, a processing risk can be excluded.

4.3 Risk that BSE infectivity was recycled and propagated

Because of the absence of a rendering industry BSE infectivity could not have been recycled and propagated.

5. CONCLUSION ON THE GEOGRAPHICAL BSE-RISK

5.1 The current GBR as function of the past stability and challenge

The current geographical BSE-risk (GBR) level is I, i.e. it is *highly unlikely* that domestic cattle are (clinically or pre-clinically) infected with the BSE-agent.

5.2 The expected development of the GBR as a function of the past and present stability and challenge

- Because of the import controls in combination with the feeding practices, the non-existence of rendering and the improved surveillance the probability of cattle to be infected with the BSE-agent will remain very low.

5.3 Recommendations for influencing the future GBR

- Effectively controlling the feed ban by checking cattle feed prepared on the farms for the presence of MBM will further improve the stability of the system.