Report

on the Assessment

of the

Geographical BSE Risk of

URUGUAY

1. Data

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

Sources of data

Country data:

- Document on the TSE Status of Uruguay, provided by the country on 19 June 2000 ("Determination of the sanitary qualification in relationship with TSE").
- Comments to the Draft report on the assessment of the BSE risk of Uruguay (24/11/2000).
- Additional information on the assessment of GBR of Uruguay, received on 14 December 2000 and 3 January 2001.

Other Sources:

- EUROSTAT data on "live bovine animals" and on "flour, meal and pellets of meat or offal, unfit for human consumption; greaves", covering the period 1988 to 1999.
- French export data on live bovine animals covering the period 1988-1997 (country dossier from 29/07/1998).
- UK-export data on "live bovine animals", 1980-98 and on "Mammalian Flours, Meals and Pellets", 1980-2000. As it was illegal to export mammalian meat meal, bone meal and MBM from UK since 27/03/1996, exports indicated after that date may have included non-mammalian MBM.

2. EXTERNAL CHALLENGES

2.1 Import of cattle from BSE affected countries

- Seven cattle (8 according to the UK export data) have been imported in 1980 and two pure-bred bulls (for reproduction purposes) in 1988. The animals imported in 1980 were 4 male and 3 female cattle, all born in UK between September 1977 and September 1979. The animals imported in1988 were born in 1987. All animals were pedigree Hereford cattle. At present all the animals have died and were destroyed on the farm, none of them was sent for slaughter or rendered. The four farms of destination of the animals were inspected many times by the professional staff from the Division of Animal Health and symptoms that could rise suspicion for BSE were never observed.

- According to Eurostat data 271 cattle were exported from France in 1988 and one in 1994, the purpose of these exports was not clear. However, after consultation of French national export statistics and contacts with the French authorities, it was confirmed that these data are not correct and no such exports have taken place. Also the Uruguay authorities could not find any reference to these imports in their statistics (two sources checked: Uruguayan Rural Society (ARY) and the Animal Health Division (DSA)).

- The country dossier states that: "In most cases, the importation was carried out exclusively for reproduction aims".

- Since 1994 there was a substantial drop in general cattle imports due to the fact that no foot and mouth disease vaccinated animals were admitted to be imported anymore.

- According to the country dossier Uruguay has since the end of the eighties only permitted admission of bovines and their products and by-products as well as genetic material from countries without BSE incidence in domestic cattle. If a country had imported BSE-cases, the description of the methodology used for the eradication of the outbreak was always required, prior to allowing imports from that country.

Import of live cattle (n/year) into URUGUAY from BSE-affected countries			
Period	**UK**		
Source:	**CD**	**EU**	**UK**
1980	7		3
1981			5
1982			
1983			
1984			
1985			
1986			
1987			
80-87:	**7**		**8**
1988	2		
1989		2	2
1990			
1991			
1992			
1993			
88-93:	**2**	**2**	**2**
1994			
1995			
1996			
1997			
1998			
1999			
94-99:			

Table 1: Live Cattle imports. Shading indicates period of different risk that UK-exports carried the BSE agent, 1988-1993 being the period of highest risk. All imports are normally for breeding. Sources of data: CD= Country Dossier, EU = EUROSTAT (1988-1999), UK=UK-export statistics (1980-1998). No imports from any other BSE-affected countries.

2.2 Import of MBM or MBM-containing feedstuffs from BSE affected countries

- According to Uruguay as well as the Eurostat and UK data, no imports of MBM- or MBM-containing feedstuffs neither from UK or any other BSE-affected country has occurred in the given periods.

- According to the country dossier, in order to prevent the introduction of TSE or other diseases, the necessary sanitary certificates should accompany all imported animals, products of animal origin and genetic material.

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.

On the basis of the available information the overall assessment of the external challenge is as given in the table. Uruguay was exposed to an overall negligible external challenge throughout the reference period (1980-1999).

External Challenge experienced by URUGUAY				
External challenge		***Reason for this external challenge***		
Period	**Level**	**Cattle imports**	**MBM imports**	**Comment**
1980-1999	negligible	negligible	negligible	Assuming that no potentially infected non-registered imports took place

Table 2: Assumed overall external challenge.

3. STABILITY

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

Feeding:

The general husbandry system for Uruguay cattle is extensive pasture.

Since 17 April 1996 it is prohibited in Uruguay to feed animal MBM and bone meal to ruminants, canines and felines (Decree 139/996). Dog and cat food is excepted from this prohibition of the use of protein concentrates derived from mammals. Mineral concentrates derived from calcinated bones are allowed to be fed to ruminants.

Already before the ban, according to the Uruguay dossier, the use of protein concentrates for ruminants was exceptional. Beef and dairy cattle feed was and is only supplemented by hay, silage or straw treated with non-protein nitrogen sources or protein supplements of vegetal origin.

For the dairy industry, the production system is mainly open field grazing and 85% of it is grouped in a single co-operative. It provides the animal feed, based on wheat by-products, cotton seed, sunflower meal, soy meal, gluten meal, gluten feed and other products of plant origin. It is reported that, in 1997, an average of 193g of concentrates per litre of milk produced were used for dairy cattle. This feed is used to act as supplementary feed on pastures and there is no production of feed for other species. It is argued that for dairy cattle, production costs must be kept low in order to compete and that in no case high production is a goal. The protein percentage (on a dry matter basis) in cultivated grasslands and annual fodder crops varies from 15% to 20%, and it is considered that the diet of high production cows should not exceed 16%. The energy needs are obtained from grain supplementation (maize) and low cost protein supplementation of vegetal origin (sunflower meal and wheat bran). At present, the impact on reproduction of diets high in protein, 20% or more, is being investigated.

For beef and mutton production, the system used is based on open field grazing, with low use of concentrates of plant origin. With regard to growth and finishing of beef cattle, 10-12% of protein in the diet after weaning is enough to allow full expression of growth genetic potential. Moreover an excess of protein in the cattle diet produces high amounts of urea, which is very costly to metabolise from the energetic point of view. Furthermore, possible intoxication with nitrates and nitrites is a problem. Uruguay stated that “the fattening in feedlots is minimum, approximately 30,000 steers per year. Preserved fodder and concentrates made with grains is used when the economic equation so enables.”

Concerning the protein containing commodities, prices per ton were provided. These showed that MBM was significantly more expensive than sunflower or wheat

bran proteins since 1984 (Table 3). However, if protein content is taken into account, the MBM commodity might have been competitive with vegetal protein sources.

However, in view of the lacking economic incentive, the sufficient supply of plant protein, and the expected negative impact of excess protein on cattle productivity and potentially re-production, it can be assumed that feeding MBM to cattle was and is not regarded to be attractive.

	MBM	SM	MBM/SM		WB	MBM/WB	
Year	45/50[1]	37/42[1]	Tons[2]	Protein[3]	12/14[1]	Tons[2]	Protein[3]
1984	253,8	155,6	1,63	1,34	74,1	3,43	0,94
1985	126,9	87,8	1,45	1,19	58,2	2,18	0,60
1986	167,0	90,2	1,85	1,52	63,3	2,64	0,72
1987	209,3	127,4	1,64	1,35	68,3	3,06	0,84
1988	258,3	186,6	1,38	1,14	71,8	3,60	0,98
1989	243,3	147,7	1,65	1,35	97,3	2,50	0,68
1990	191,2	117,4	1,63	1,34	65,2	2,93	0,80
1991	201,4	103,2	1,95	1,60	70,5	2,86	0,78
1992	199,6	103,1	1,94	1,59	96,5	2,07	0,57
1993	238,8	139,3	1,71	1,41	92,0	2,60	0,71
1994	254,5	144,3	1,76	1,45	88,2	2,89	0,79
1995	244,1	104,6	2,33	1,92	91,9	2,66	0,73
1996	280,0	148,8	1,88	1,54	120,0	2,33	0,64
1997	281,0	144,2	1,95	1,60	93,7	3,00	0,82
1998	257,2	114,7	2,24	1,84	69,8	3,68	1,01
1999	252,1	97,6	2,58	2,12	73,9	3,41	0,93
2000	265,7	115	2,31	1,90	102,5	2,59	0,71
Average:	*230,8*	*125,1*	*1,88*	*1,54*	*82,2*	*2,85*	*0,78*

Table 3: Prices of meat and bone meal (MBM), sunflower meal (SM) and wheat bran (WB) at June of each year (USD/Ton); [1] Percentage protein, [2] Relative price of MBM to SM or WB per ton of commodity; [3] Relative price of MBM per unit protein. Relative prices calculated with the average protein content (MBM=47.5%, SB=39%, WB=13%).

The cost relation of animal to plant proteins indicates that MBM was always a more costly protein source as sunflower meal while it was a cheaper protein source than wheat bran. However, in view of the perceived disadvantages of excess proteins and the apparently sufficient supply of plant protein, it is assumed that MBM was normally not fed to cattle, even before 1996, when it was legally possible.

Rendering:

The Uruguay authorities reported two different types of rendering.

- Bones, fat trimmings and cuts derived from animals approved for human consumption that are produced in slaughter lines and during de-boning production are rendered into MBM for feed. This is either as a sub-product of large slaughtering plants or a main product of plants that purchase raw material

of the slaughtering plants. Raw materials for rendering are separated by species since these species are never slaughtered at the same time in a particular plant.

This material is ground in parts smaller than 1 cm and rendered for feed production. The thermal process applies steam inside the jacket and agitator of the digester, under an average steam pressure within different plants of 6-7 kg/cm^2, equivalent to a temperature of 165-170°C of the steam. This means, depending on the gradient, that the batch is cooked at temperatures of 135-140°C for 2 to 3 hours but under atmospheric pressure. Because the rendering process occurs under atmospheric pressure, it is not equivalent with the 133/20/3 standard.

The domestic MBM-production of about 40,000 tons per year is intended either for export to (mainly) Brazil and Japan, or as protein concentrate in feed for swine, poultry and pet animals.

- All bovines fallen in the holding pens within the slaughter plant are taken to the ante-mortem sanitary necropsies complex in order to be tanked within the complex. In this case, the brains are sent to the laboratory. All condemned raw materials are sterilised in a sanitary tank using humid heat (sanitary digester). The operating conditions involve a minimum manometric steam-pressure of $2kg/cm^2$, which assures a steam-temperature of 133°C, and a minimum time of 2 hours. The material destined for this purpose is not cut/ground before entering the tank and the opening of the sanitary tank is big enough to enter a whole bovine. The final product leaving the sanitary tank is used to produce fertilisers. It is never mixed with rendered materials. Its composition is of 60-70% moisture, 20-21% fat, 4-6% protein and 10-11% tricalciphosphate. The product is used in small farms devoted to fruit and vegetable production. No cattle are grassed on this soil and the fertilisers are incorporated in any case to the soil before the sawing or after grazing.

SRM and fallen stock

There is no official SRM-ban. Brain and spinal cord derived from animals declared fit for human consumption by the official Veterinary Inspection Service are processed and destined for human consumption, both for the domestic market and for export. They will therefore normally not enter the MBM-production described above.

Those derived from condemned animals are sterilised under water steam in a sanitary tank in the slaughter plant, together with the head and carcass (see above). The product from this process is used as fertiliser but not as feed.

Bovines fallen in pastures are destroyed (burned or buried) on the spot but not rendered.

Cross-contamination:

Most of the feed plants produce feeds for one species only. Ninety percent of the industrial poultry production and 60% of the swine production are vertically integrated. The plants processing feeds for several animal species do not have separate lines. They perform thorough cleaning between lots, using grain, which is passed through several times. This grain is separated, individualised and used as feed for non-ruminants.

Cross-contamination during transportation is very unlikely since only poultry feeds are transported in bulk, feed for all other species is transported in bags.

Finally, the legal regulations in force establish obligatory labelling of all animal feeds, specifying the animal species of destination.

According to the Uruguay dossier, feed controls and inspections are carried out by the General Direction of Agricultural Services (DGSA) both on national productions as on imported goods. As from 1996, controls were put in place in order to enforce the above-mentioned ban. Both reviews of the registers at the feed companies was performed (to check the ban on protein concentrates of animal origin and bone meals) as well as examination of the feeds. These included microscopic techniques and an Elisa test (Cortec's Diagnostics, UK). The control over imported products is 100% upon entrance and domestic products were sample. The sampling standard used is UNIT (Uruguay Institute of Standardisation) 609-81 (1st revision). This standard establishes the lot number and the sampling levels to consider, taking into account if the product is packed or in bulk. The sampling plan is shown in Table 4. Results of controls are shown in Table 5. When these controls yield unsatisfactory results, the company must either destroy the products or re-export it. In both cases the procedure is carried out under the surveillance of an official inspector. The percentage of positive samples was very low since the beginning and positives were only detected in imported material. The affected lots were either destroyed or re-exported, according to the case. No positive samples were found in domestically produced feedstuffs.

Number of sacs in the lot	Normal level	Simplified level
1 – 9	All	1 – 3
10 – 15	10	4
16 – 25	12	5
26 – 35	15	6
36 – 49	17	7
50 – 64	20	8
65 – 80	23	9
81 – 100	25	10
101 – 120	27	11
121 – 180	30	13
181 – 250	35	15
251 – 400	43	17
401 – 600	56	22
601 – 800	69	28
801 - 1200	80	32

Table 4: Sampling frequency per batch according to UNIT 609-81 REV. 1.

	Year 1996		Year 1997		Year 1998		Year 1999	
	Local	Imports	Local	Imports	Local	Imports	Local	Imports
Total of samples analysed*	374	1443	467	1762	465	2281	403	2414
Positive*	0	14	0	2	0	0	0	0

Table 5: Number of samples from local production or imported feeds analysed and results.

Controls are in place and contamination during transport is almost excluded while it can still occur in feed-mills. Overall the risk of cross-contamination is regarded as limited.

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 Uruguay territory could have been recycled but probably not 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

Period	Total (all ages) (*1000)	Average number of cattle ≥ 2 years (*1000)						
		male		female			Total stock ≥ 2 years	% of total stock
		meat	breeding	meat	dairy	breeding		
1980-84	10,519	1,788	175	896	368	3,489	6,641	63.1
1985-89	9,678	1,587	151	791	382	3,061	5,972	61.7
1990-94	9,618	1,627	139	704	397	3,212	5,999	62.4
1995-99	10,457	1,607	148	546	428	3,686	6,415	61.3

Table 6: Key data on the bovine cattle population

In the country dossier data are provided for cattle, sheep and goats with breakdown for the first one in age-groups, sex and purpose (beef or dairy, see table 6, above). Data are available since 1980. They show a total cattle herd of about 10 million heads, including about 3-3.7 million breeding cows, 0.55-0.9 million fattening cows and about 2.1 million steers and heifers over 2 years of age. 0.4 million cattle are dairy cows over 2 years. In total 6 - 6.6 million cattle are older than two years. Of the average bovine population of 10.068 million animals, 17.9% were male over two years and 44.2% were female over two years of age (together 62.1%).

Bulls are slaughtered at an average age of 5 years or more. For steers, the average age at slaughter is under 4 years. For cows in general, the average age is at least 6

years and for dairy cows at least 7 years. This implies that most cattle would normally reach an age when signs of BSE could be expected to appear, if they would be infected in the first year of life.

Co-farming is normally not performed on industrial farms, but it can occur on smaller farms, intended for local production. If so, pigs are usually raised in paddocks, mainly grazing and eating bovine or ovine offal, from animals slaughtered for meat at the farm. Pigs are given grain supplements for final fattening and sometimes kitchen leftovers. Poultry is usually kept in independent paddocks and are fed mainly kitchen leftovers and grain. According to this information it is concluded that accidental feeding of bovines with animal protein supplemented feed on farms where co-farming exists, cannot be excluded, albeit deliberate cross-feeding seems to be unlikely.

Surveillance and culling

Over the years the following measures are undertaken:

- Since 1987 training measures on TSEs are in place. Details are provided in Table 7.
  - Technical conferences for private and public veterinarians and breeders as to inform them on the symptomatology of the disease were held.
  - TSE was included in the advanced courses of the School of Veterinary Medicine.
  - Several courses with a view to training public and private human resources in TSE diagnosis were provided.
  - Participation in the regional meetings of the WHO/Pan-American Health Organisation.
  - Two people were trained on BSE diagnosis and epidemiology in Switzerland (September 1994).

- Since 1989, compensation is covering the full market value of sacrificed animals as described in Law 16.082, dated 18 October 1989.

- In 1992, according to the Uruguay dossier, a “programme for the Active Epidemiological Surveillance so as to assist all those cases with a central nervous problem" was established. In this, a sampling protocol and basic elements of biological security were approved. As no further information was presented, it is assumed that it concerns general guidance whenever any central nervous problem occurs, but does not specifically address BSE.

- In 1994 notification of BSE became compulsory (Decree 351/994 and sanitary law).

  No description is given of the criteria for a BSE-suspect, but a resolution of the General Direction of Livestock Services on a surveillance system of TSE (dated 15/01/1996) specifies that all animals with nervous symptoms or locomotion disorders of central origin have to be reported as these will be systematically examined for BSE.

TRANSMISSIBLE SPONGIFORM ENCEPHALOPATHIES

Disertaciones tienicas y charlas a productores

1987	Centro Veterinario de Colonia	36 Veterinarios	27 Productores	25 Estudiantes
1988	Centro Veterinario de Treinta y Tres	45 Veterinarios	18 Productores	
1989	Centro Veterinario de Lavalleja	27 Veterinarios		
1989	Centro Veterinario de Maldonado,	3 2 Veterinarios		
1990	Pasantia Estudiantes - Soriano	16 Veterinarios	24 Productores	75 Estudiantes
1991	Centro Veterinario de Colonia - COLAVECO	44 Veterinarios	32 Productores	22 Estudiantes
1991	Centro Veterinario de Colonia	50 Veterinarios		
1992	Instituto de Neurologia Facultad de Medicina	22 Médicos		15 Estudiantes
1992	Sociedad de Buiatria	Veterinarios		
1992	Centro Veterinario de Salto	28 Veterinarios		
1993	no data			
1994	Servicio Veterinario y Remonta Ejerdio	12 Veterinarios		36 Estudiantes
1995	Reuni6n Tecnica Duramo	43 Veterinarios		
1996	Pasantia Estudiantes - Mariscala Lavalleja	12 Veterinarios	27 Productores	69 Estudiantes
1997	Centro Veterinario de Cerro Largo	54 Veterinarios	18 Productores	33 Estudiantes
1998	Sociedad Uruguaya de Anatomia Pato16gica	18 Médicos		
2000	Simposio Internacional Enferinedades Prionicas	145 Profesionales		46 Estudiantes
2000	Jornadas Teknicas de Facultad de Veterinaria	39 Veterinarios		124 Estudiantes
2000	XXI Congreso Mundial de Buiatria (en preparaci6n)			

Table 7: Extension Activities about TSE during the period 1987-2000

- Since 1994 a more intensified training and information campaign on BSE has been established and several awareness and training measures are in place. On the basis of the available information the efficiency of the measures taken since 1994 is judged to be rather high.

- Since 1994 a passive surveillance system has been installed and cattle brains have been examined for BSE, without any lesions compatible with TSE being observed. Results are given in table 8.

- In 1995 a retrospective survey of brains of cattle with pathologies of the CNS was carried out going back until 1972 (also table 8). Of a total of 433 cattle brains examined, none showed lesions compatible with BSE. Data are provided in the country dossier for 1988 (37 animals examined) as an example and they show that animals of all ages were included in this study, although most of them are more than 2 years old. Samples are examined according to the provisions of the Manual of Standards for Diagnosis tests and vaccines of the OIE.

- On 15/01/1996 an official system of TSE Surveillance was developed, according to the resolution adopted by the general meeting of the OIE. Instructions and forms were established for the different participants.

- Since 1998 an active surveillance with random sampling in 5-year old bovines and older is carried out. Samples were taken at slaughtering plants inspected by the Animal Industry Division. Cases were selected within those which presented traumatic problems, changes in behaviour, cachexia, confiscation of heads due to tumoral or infectious problems, animals dead during transportation to the slaughtering plants, animals fallen in ante mortem observation yards and all animals older than 8 years with or without clinical symptoms. Results are given in Table 8. Additionally also other animal species were examined in this surveillance programme.

Examination of cattle brains for BSE in Uruguay								
Year	**N° of cattle brains examined for BSE**	**Results**	**Year**	**N° of cattle brains examined for BSE**	**Results**	**Year**	**N° of cattle brains examined for BSE**	**Results**
1972	**15**	Negative	**1983**	**35**	Negative	**1994**	**6***	Negative
1973	**9**	Negative	**1984**	**47**	Negative	**1995**	**17***	Negative
1974	**4**	Negative	**1985**	**34**	Negative	**1996**	**6***	Negative
1975	**5**	Negative	**1986**	**25**	Negative	**1997**	**24***	Negative
1976	**15**	Negative	**1987**	**37**	Negative	**1998**	**33* +499#**	Negative
1977	**12**	Negative	**1988**	**37**	Negative	**1999**	**58* + 263#**	Negative
1978	**7**	Negative	**1989**	**25**	Negative			
1979	**18**	Negative	**1990**	**22**	Negative			
1980	**19**	Negative	**1991**	**12**	Negative			
1981	**9**	Negative	**1992**	**14**	Negative			
1982	**5**	Negative	**1993**	**27**	Negative			

Table 8: Examination of cattle brains for BSE in Uruguay. 1972-1993: Retrospective examination of brains of cattle with CNS-symptoms, carried out in 1995. 1994-1999: Brains from cattle notified as CNS-suspects*. 1998-1999: Brains from cattle notified as CNS-suspects* plus cattle >5 years sampled at slaughter ("active surveillance")# until 31/07/1999.

The following differential diagnoses were most common: bacterial encephalitis, hepato-encephalopathies due to poisoning, poly-encephalomacia, babesiosis, metabolic disorders, traumatisms and tumoral and parasitic pathologies.

The number of bovine brains to be examined according to the OIE would be 300 to 336 annually, based on the stock analysis. This number was not reached until 1998.

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 SRMs) 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 is applied.

Feeding of MBM to cattle was legally possible until 1996, even if apparently uncommon before that date. The efficiency of the MBM-ban is not sufficiently

demonstrated and controlled. Feeding is therefore assumed to be reasonably OK throughout the reference period.

Rendering is not equivalent with the 133/20/3 standard and therefore is assumed to be not OK.

SRM from animals fit for human consumption are eaten, this factor can be considered to be OK. SRM from condemned or fallen stock is processed for fertilisers and does normally not reach cattle. Therefore SRM is de facto removed.

Uruguay would probably not be able to detect small numbers of clinical BSE-cases and cross-contamination of cattle feed with MBM cannot be excluded. However, since 1996 both factor together enhance the overall stability to some extent.

<table>
<tr><th colspan="6">Stability of the BSE/cattle system in URUGUAY over time</th></tr>
<tr><th colspan="2">Stability</th><th colspan="4">Reasons</th></tr>
<tr><th>Period</th><th>Level</th><th>Feeding</th><th>Rendering</th><th>SRM</th><th>Other</th></tr>
<tr><td>1980-85</td><td rowspan="8">Neutrally stable</td><td rowspan="8">Reasonably OK</td><td rowspan="8">Not OK</td><td rowspan="8">OK</td><td rowspan="5"></td></tr>
<tr><td>1986-87</td></tr>
<tr><td>1988-90</td></tr>
<tr><td>1991-93</td></tr>
<tr><td>1994-95</td></tr>
<tr><td>1996-97</td><td rowspan="3">↑</td></tr>
<tr><td>1998-99</td></tr>
<tr><td>At current</td></tr>
</table>

Table 9: Stability resulting from the three main stability factors and the other factors. The surveillance is seen to enhance stability to some extent since 1994.

On the basis of the available information it has to be concluded that the country's BSE/cattle system was and is neutrally stable, i.e. incoming or already present BSE could be recycled but would most probably not be amplified.

4. CONCLUSION ON THE RESULTING RISKS

4.1 Interaction of stability and challenges

The conclusion on the stability of the Uruguay BSE/cattle system and on the external challenges the system had to cope with over time, are summarised in the table below. From the interaction of "stability" and "external challenge" a conclusion is drawn on the level of "internal challenge" that emerged and that had to be met by the system, in addition to the external challenge that occurred.

It can be seen that the neutrally stable system was exposed to a negligible external challenge. This makes the presence of an internal challenge highly unlikely.

INTERACTION OF STABILITY AND EXTERNAL CHALLENGE IN URUGUAY			
Period	Stability	External challenge	Internal challenge
1980-85	Neutrally stable	Negligible	**Highly unlikely**
1986-87			
1988-90			
1991-93			
1994-97			
1998-99			
At current			

Table 10: Internal challenge in function of stability and external challenge.

4.2 Risk that BSE infectivity entered processing

As no BSE was imported in the country (negligible external challenge), the risk that BSE infectivity entered processing was always negligible.

4.3 Risk that BSE infectivity was recycled and propagated

As no BSE was imported in the country, the risk that BSE infectivity entered processing was always negligible. As it was not processed, it could not be 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

- As long as the external challenge remains negligible, the probability of cattle to be (pre-clinically or clinically) infected with the BSE-agent will remain very low.
- Due to the neutrally stable system, any substantial external challenge could lead to a higher GBR, that would than remain constant until another external challenge occurs.

5.3 Recommendations for influencing the future GBR

- In order to ensure that the GBR remains as low as at present it is recommended that, in addition to minimising the external challenge, additional efforts are made to enhance the stability of the system.