Ref: AS00-100

NEW ZEALAND'S REVISED CASE TO BE RECOGNIZED AS A COUNTRY FREE FROM THE TRANSMISSIBLE SPONGIFORM ENCEPHALOPATHIES

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Ministry of Agriculture and Forestry
December 2001

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Part One. New Zealand's 2001 TSE freedom case.

1. Introduction

In 1998 New Zealand presented the European Commission with its case to be recognised as a country free from transmissible spongiform encephalopathies. A SSC assessment of this document resulted in the EC giving New Zealand a category I GBR assessment i.e. recognition that it is highly unlikely that one or more cattle are infected with BSE. Under the EC's TSE Regulation 999/2001/EC, the Commission requires New Zealand to re-apply for a BSE classification.

This document consitutes New Zealand's updated application for GBR assessment. It concentrates on information which is new or has changed since the original case was submitted. However, for completeness, the original case for BSE freedom is also included.

Executive summary

New Zealand's livestock populations are free from the transmissible spongiform encephalopathies, **scrapie** of sheep and goats, **BSE** of cattle, and chronic wasting disease of deer. This statement of freedom is based on the following evidence:

- In the two incidents (1952, 1976) where **scrapie** has been detected in sheep imported into New Zealand, the disease was eradicated by the slaughter and disposal of all in-contact sheep and resting or destocking pastures.
- **BSE** has never been recorded or reported in New Zealand.
- Passive surveillance for **scrapie** has been undertaken by the Ministry of Agriculture since 1952.
- Since 1990 New Zealand has had an active surveillance programme to monitor livestock for **scrapie**, **BSE** and chronic wasting disease of deer.
- New Zealand’s claim to be free from **scrapie** and **BSE** has been recognised explicitly and implicitly by many regulators, scientists and academics.
- New Zealand received a category I rating following the European Commission SSC GBR assessment in 1998.

New Zealand is confident it will remain free from the transmissible spongiform encephalopathies for the following reasons:

- **Scrapie** has been notifiable in New Zealand since 1955.

- **BSE** has been notifiable since 1989.
- **All** spongiform encephalopathies of animals have been notifiable since the Biosecurity Act was promulgated in 1993.
- With the exception of the attempt to import British sheep in the 1970s (when scrapie was detected during quarantine and the sheep destroyed), from 1952 to 1984 the importation of sheep and goats was prohibited from all countries except Australia.
- Since 1984 the importation of sheep and goat bloodlines has been permitted only from certain countries assessed as posing a negligible **scrapie** risk.
- Imported sheep have been subject to quarantine restrictions which are now based on bioassay and a minimum 3 year quarantine period. The earlier programs were based on a 5 year quarantine.
- All importations are subject to an embryo transfer barrier between animals born in a foreign country and local livestock.
- The importation from the United Kingdom of live cattle, and bovine semen and embryos, was suspended in December 1988 and May 1989 respectively.
- Following the adoption by *Office International des Epizooties* in May 1992 of Articles covering the safe trade in bovine products, New Zealand resumed imports, with additional BSE safeguards, of British bovine **embryos** and **semen** in October 1993.
- Importation of bovine semen and embryos was again suspended in March 1996 while new evidence on the **BSE** agent was evaluated.
- No meat and bone meal was imported into New Zealand from before the Second World War until 1962. After 1962 meat and bone meal importation from Australia, another BSE-free GBR category I country, was permitted subject to import permit. However, this was not intended for use as stockfeed. None has been imported for a number of years, however, and all importation is now prohibited.
- There is a government-funded border control service within the New Zealand Ministry of Agriculture and Forestry whose purpose is to monitor the importation of animals, plants and their products and intercept any such importation that is either prohibited or without specific importation documents. This service is situated at all ports of entry into the country.
- The government funded exotic disease response program has a response capability for the transmissible spongiform encephalopathies.
- The absence of **scrapie**, and New Zealand's grass-fed, pasture based cattle management system, ensures that there is little likelihood of **BSE** entering the cattle population from this source, even if scrapie were considered the origin of BSE.

- Since 1990, the Ministry of Agriculture's active surveillance programs have included:

    - a retrospective study (with negative results) on fixed bovine brains held in New Zealand animal pathology collections,

    - an active education program to inform veterinarians and farmers of the clinical signs associated with the transmissible spongiform encephalopathies,

    - a financial credit to veterinarians if they submit for laboratory examination brains from sheep, goats, cattle or deer exhibiting signs of progressive central nervous system disease,

    - monitoring of the thirteen cattle imported into New Zealand from the United Kingdom between 1982 and 1988,

    - histopathological screening of brain tissue from all sheep, goat, cattle or deer submitted because the animal was exhibiting clinical signs of a nervous disease to either the Ministry of Agriculture Animal Health Laboratories, or the Ministry of Agriculture-approved private veterinary diagnostic laboratory or Massey University veterinary post mortem facility. Commencing in 1998 the Government funded the cost of the laboratory examination for brains from cattle, sheep and goats, 2 years of age and older, and

    - laboratory examination of brains from cattle, sheep, goats and deer which exhibited central nervous signs at ante mortem inspection prior to slaughter.

2. Developments since 1998

Since 1998 and the European Commission's GBR assessment of New Zealand, measures have been taken to improve the assurances New Zealand is able to offer with respect to its freedom from BSE.

These measures and developments include:

- The development and implementation of a MAF BSE Programme: Trade Risk Mitigation Standard for *Prevention and Control of Certain Transmissible Spongiform Encephalopathies.* This programme includes;

    - The National Centre for Disease Investigation (MAF) has been accredited under both ISO:17025 and MiLab to perform diagnostic testing for BSE using the "Prionics-Check" BSE Test, manufactured by Prionics, Zurich. There are two approved signatories for this test, both of whom were trained in Zurich. MAF expects to test up to 2,000 by the end of June 2002.

    - The implementation of a programme to sample and test brain material from fallen stock, emergency slaughter stock, and any imported cattle.

- The completion of a BSE "gaps analysis" in which all potential BSE risk-pathways were identified and addressed.

- Further circulars were sent to veterinarians, farmers and the agricultural industries (See 6. Circulars sent to Veterinarians, Farmers and Agricultural Industry during 2001). To alert them to the need to comply with the ruminant to ruminant feed ban and other relevant measures.

- The surveillance programme for all TSEs of livestock which was started in 1990 continued to operate (See tables 1,2 and 3 below).

- The European Commission purchased 1,024 brains from clinically normal sheep for use as negative controls to validate diagnostic tests for TSEs in small ruminants.

- Further articles advising farmers, veterinarians and agricultural scientists of the signs of BSE, the requirements of the Ruminant Protein Regulations and related matters have appeared in various publications including *Biosecurity*, *Food Focus*, *AgScience* etc

- New Zealand's MAF has established a high-level BSE Steering Group made up of senior officials of MAF Biosecurity, MAF Food, MAF Policy, Ministry of Health and Ministry for Research, Science and Technology. This BSE Steering Group meets monthly to coordinate policies with respect to BSE.

- New Zealand's MAF has established a BSE Communication Group to disseminate

information on BSE issues to the public, the farming sector and industry groups.

- New Zealand's MAF has established a BSE Liaison Group in which officials from MAF Biosecurity, MAF Food, MAF Policy and Ministry of Health meet regularly with representatives of farming groups, producer boards, meat, food, fertiliser industry groups, farm service groups, and consumer organisations, to discuss and explain policies with respect to BSE risks, awareness, surveillance and prevention.

3. Conclusion

The Commission's *Report on the Assessment of the Geographical BSE-risk (GBR) of New Zealand*, July 2000, concluded that the current geographical BSE-risk level is I. That is, it is highly unlikely that domestic cattle are clinically or pre-clincally infected with the BSE agent. However, the commission's assessment was critical of some aspects of what it called the "stability " of the New Zealand "BSE/cattle system." The commission's assessment suggested that New Zealand could do more to insure that BSE infectivity would not be amplified and propagated, should it be introducted. The assessment also recommended that New Zealand's ability to detect an incursion of BSE be enhanced.

Following the European Commission's GBR assessment of New Zealand, the Ministry of Agriculture and Forestry has undertaken a number of initiatives to reduce further the likelihood of BSE introduction, to enhance surveillance for the disease, to raise awareness of BSE issues throughout the livestock sector and associated industries, and to reduce the risk that introduced infectivity would be recycled.

The European Commission previously categorised New Zealand into the lowest risk GBR category. In the current process of reassessment, the Commission cannot conclude other than New Zealand still represents the lowest possible geographical BSE risk.

4. MAF BSE Trade Risk Mitigation Programme

MAF BSE PROGRAMME:

TRADE RISK MITIGATION - STANDARD FOR PREVENTION AND CONTROL OF CERTAIN TRANSMISSIBLE SPONGIFORM ENCEPHALOPATHIES

A SUMMARY DOCUMENT

Issue No:1
Version: 1.0

1 December 2001

INFORMATION

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FOREWORD

The MAF BSE Programme Standard outlines the requirements, structure and responsibilities of the parties involved and the outcomes to be achieved.

This Standard consists of five sub-components:

Part A: General Requirements

Part B: MAF BSE Programmes – General Standard Requirements

Part C: Bovine Spongiform Encephalopathy (BSE) - Cattle

Part D: BSE – Operational Requirements

Part E: Action on Suspected Clinical Cases/Suspicious Laboratory results

Designated Animal Product Officers are responsible for following up on the Standard requirements and as specified in relevant related documents (e.g. OMAR's).

RELATED DOCUMENTS

- MAF Standard 153 Series,
- MILAB Laboratory Approval Scheme.

RELATED LEGISLATION

- Animal Products Act 1999
- Biosecurity Act 1993
- Resource Management Act 1991
- Official Information Act 1982
- Privacy Act 1993
- Health and Safety in Employment Act 1992

LIST OF ANNEXES

PART A – GENERAL

1.1 Introduction

The Ministry of Agriculture and Forestry (MAF) is established under the Ministry of Agriculture and Forestry (Restructuring) Act 1997.

1.2 Purpose

This Standard outlines agreed MAF Food Assurance Authority and MAF Biosecurity Authority requirements for specific activities that have to be carried out as a part of MAF BSE Programme. The MAF BSE Steering Committee has approved these activities.

1.3 Intention

This Standard specifies requirements for designated Animal Product Officers to carry out activities, particularly through the compliance and verification functions, including collection of samples for laboratory testing. It also includes requirements that may require farm visits.

1.4 Definitions

	Definitions
Approved Test	Tests as approved under the MAF Food MILAB Laboratory Approval Scheme for: a) Screening, and b) Confirmation.
Audit	An evaluation to determine the degree of conformity with prescribed criteria, and to provide a basis for ongoing improvement. This may include international audits.
MAF	Ministry of Agriculture and Forestry
MAF Food	Ministry of Agriculture and Forestry Food Assurance Authority
MAF BA	Ministry of Agriculture and Forestry Biosecurity Agency
MAF VA	Ministry of Agriculture and Forestry Verification Agency
MILAB Laboratory Approval Scheme	MAF Food (Animal Products) laboratory approval scheme. The Scheme is recognised under the APA 1999 – Animal Products (Accredited Persons Specifications) Notice 2001
NCDI	MAF National Centre For Disease Investigation and diagnosis of infectious diseases of animals. It includes: a) National Animal Health Reference Laboratory, and b) Exotic Disease and Response Centre
Performance Standards	The standard set from time to time in terms of MILAB Laboratory Approval Scheme and this Memorandum of Understanding.

Providers of services	All or any participating laboratories in designated MAF Food programmes.

PART B – MAF BSE PROGRAMMES GENERAL STANDARD REQUIREMENTS

2.1 Service Response

The Standard outlines MAF Food Programmes requirements for service response that includes:

a) Compliance with MAF Food requirements to confirm the robustness of the New Zealand system that provides the basis for market assurances for animal products as specified by relevant legislation,

b) Samples collection from targeted animals submitted for rendering and slaughter. This is in addition to existing surveillance programmes that are carried out under the Biosecurity Act 1993,

c) Deliverables to be produced on, or before schedule,

d) Implementation of the programmes within agreed budget,

e) Specified timeliness related to issues that might impact on the objectives of the programmes,

f) Provision of designated Animal Product Officers to support MAF Food staff in carrying out their responsibilities.

2.2 Participants

Designated MAF staff, MAF Food Assurance Authority staff, and Animal Product Officers.

2.3 Statutory responsibilities of Animal Products Officers

Statutory responsibilities of designated Animal Product Officers are to be set out within the Animal Products Act 1999.

PART C: BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) - CATTLE

3.1 Introduction

MAF BSE Programme has four components:

a) Food safety component/Trade risk mitigation,

b) Animal Health Status (field surveillance for BSE in live animals),

c) Communications with stakeholders,

d) Food Standards group

The Standard's requirements relate to food safety/trade risk mitigation component of the MAF BSE programme.

3.2 Food safety/Trade Risk Mitigation

New Zealand is classified as a Category 1 country ("BSE free") based on the European Commission "Report on the Assessment of the Geographical BSE Risk (GBR) of New Zealand", July 2000.

3.3 Purpose

The Standard outlines MAF Food requirements for MAF VA to carry out specific tasks under MAF BSE Programme to enable MAF Food to:

a) Support official overseas market assurances,

b) Mitigate any risk to trade,

c) Maintain New Zealand BSE free status.

PART D: BSE – OPERATIONAL REQUIREMENTS

4.1 Background

In relation to New Zealand maintaining BSE free status, certain measures have been taken at the border in regard to imports; plus enforcement of ruminant to ruminant feed ban and testing of brain tissue collected from specified categories of cattle.

4.2 Monitoring/control - Live animal imports (cattle, deer, sheep, goats)

Imported animals are marked with a permanent, life-long identification as approved under section 50 of the Biosecurity Act 1993. The statutory approval means that it is an offence to remove, alter or deface a MAF IMPORT eartag except with the written permission of an Animal Product Officer.

a) Imported live animals are subject to monitoring from the entry to New Zealand throughout their life. Owner is required to inform MAFof:

- Death of animal from illness, in jury or from old age,
- Slaughter of the animal at slaughterplants,
- Slaughter of the animal – home kill,
- Sale of the animal
- Imported animal cannot be located
- MAF IMPORT metal or plastic eartags - Replacement

b) It is an offence against the Biosecurity (Imported Animals, Embryo and Semen information) Regulations 1999 should every owner, or person in charge of an imported animal:

- supplies misleading information to Animal Products Officer, or
- fails to notify the matters above in the time required,

b) Should such an event occur, the owner is liable, on summary conviction, to a fine and the Animal Product Officer shall inform MAF Food for immediate follow up,

4.3 Monitoring/control – Importation of animal feed/animal feed components

4.3.1 Meat and Bone Meal

NOTE: Importation of meat and bone meal is PROHIBITED.

4.3.2 Importation of stock food(rations)

a) Importation of stock food rations is subject to a MAF Permit following an application to import stock food (rations), fish meal, vegetable meal protein, and whole grain.

b) Imported stock food rations are subject to sample collection as per MAF sampling regime.

4.4 Monitoring/control – Re-imported/Returned New Zealand Products

4.4.1 Animal products Act 1999: Overseas Market Access requirements – Specifications and Directions

a) Refer to *OMAR 01/172: Import of Foreign Animal Material and Animal Products and Return To New Zealand of New Zealand Animal Material and Animal Products For Domestic Use or Export (excluding sections 4.7, 4.8, 4.9, 4.10 & 5.2)*

http://www.maf.govt.nz/animalproducts/publications/omar/01-172.htm

4.5 Monitoring/Control – Imported Deer Velvet

4.5.1 Animal Products Act 1999: Overseas Market Access requirements

Note: An OMAR will be issued by 1 January 2002.

4.6 Monitoring/Control – Sample collection of animal feed intended for feeding to ruminants

Given the recent confirmation of the spread of BSE to several European countries, overseas markets want assurances that TSE-free countries such as New Zealand are nonetheless actively looking for the disease and enforcing prudent measures against any spread.

4.6.1 Purpose of the testing programme

a) To sample and test the range of manufactured cattle feeds for the presence of ruminant protein as one of several measures for demonstrating compliance with the ruminant to ruminant feed ban regulations: Biosecurity (Ruminant Protein) Regulations 1999.

b) The regulations are designed to:

- prevent the spread of BSE through animal feeds,
- provide evidence for market access,

- provide confidence to the New Zealand public; and
- provide confidence to ruminant owners using manufactured feed that it is true to label.

4.6.1.1 Strategy

a) The sampling programme is focused on BSE, the main disease of concern and therefore feeds compounded for calves and cattle should be preferentially sampled,

b) For the same reason, the samples will be assigned to the species-specific protein tests in the ratio of 3 bovine tests to 1 ovine test,

c) The programme includes two components:

- a random sampling component (for which the total number of samples is approx. 300); and
- a targeted sampling component (for which the total number of samples is approx. 150).

d) The collection of 300 samples of **cattle feeds** on a random basis will enable to detect at least 1 non-compliant sample (e.g. cattle feed containing ruminant protein) if the prevalence of non-compliance is greater than 1% at a 95% confidence level,

e) The collection of the samples will be operated at feed mills and renderers that have registered programmes (categories 1 and 2), feed mills which do not require registered programme and feed merchants (category 3),

f) The collection of the samples will also include imported feeds for inclusion in cattle feeds,

g) The collection of 150 targeted samples will enable to collect data in relation to the risks associated with the cross contamination of **ruminant feeds** when production change overs occur (change from non ruminant feed to ruminant feed). The targeted sampling will be operated at feed mills that have registered programmes (category 1).

4.6.1.2 Phase 1 – sampling period June/July 2001

Animal Products Officers shall:

a) Collected samples from feedmills that are required to operate under registered ruminant protein control programmes (category 1). This is the sector of the feed industry where there is the greatest risk of ruminant feed being contaminated by ruminant protein. This phase will include also renderers (category 2), which have a registered programme and produce feed for ruminants. A total of 20 premises will be included in this first phase,

b) Both random and targeted samples will be collected, as described in the attached sampling programme for phase 1,

c) The number of samples allocated to each one of the premises is proportional to their respective total annual production of cattle feeds and/or ruminant feeds. The allocation of samples throughout the year will reflect the production pattern of each premise (e.g. seasonal).

4.6.1.3 Phase 2 – sampling period August 2001 – June 2002.

Animal Products Officers shall:

a) In addition to feedmills and renderers operating registered programmes, cattle feed samples will be collected from feed mills not requiring registered programmes and feed merchants (category 3) on a random basis. Imported feeds (category 4) will also be monitored,

b) The number of samples allocated to the different categories will be proportional to their respective share of the market as it relates cattle feeds and/or ruminant feeds.

4.6.2 Authority to take samples

Designated staff hold appointments as Animal Products Officers under the Animal Products Act 1999 (APA). They have powers to enter premises (s87), examine records and take samples (s88) for the purpose of determining whether any animal material or animal product or associated thing is in compliance with the requirements of the APA.

Each ruminant protein control programme contains a commitment to cooperate with MAF inspectors and authorised persons exercising their duties and powers. Complementary measures are being developed under the Biosecurity Act 1993 and the Agricultural Compounds and Veterinary Medicines Act 1997 to ensure sampling powers are available at every point along the feed chain.

4.6.3 Phase 1 - Premises to be sampled

4.6.3.1 Category 1: Feed mills that have registered programmes under the Biosecurity Act 1993

There are currently 17 feed mills that have registered programmes. Animal Products Officers shall:

a) Random sample calf or cattle feed product lines that have completed manufacture (and packaging, if any),

b) Target sample the first mixer-batch or product run after changeover from producing feeds containing ruminant protein, in real-time (i.e. prior to bagging or binning),

c) Secondary target: horse feed during production as a flush feed (i.e. no added ruminant protein, but labeled not to be fed to ruminants); and

d) All product formats are eligible: meal, pellets (may include crumbles, kibbles etc).

4.6.3.2 Category 2: Renderers of non-ruminant protein meals that have registered programmes

There are currently 3 rendering plants that have registered programmes for the production of non-ruminant protein meals. Animal Products Officers shall:

a) Random sample non-ruminant protein (e.g. fishmeal, feathermeal) labeled suitable for inclusion in feed intended for ruminant animals,

4.6.4 Phase 2: Additional premises – sampling period August 2001 - April 2002

The following sampling categories will be added to the sampling programme from August 2001:

4.6.4.1 Category 3: Feed mills not requiring registered programmes and feed merchants

Animal Products Officers shall:

a) Sample 55 premises (not in category 1) that are listed in the 'stock foods' category in the Yellow Pages; and,

b) Random sample calf and cattle feeds (bagged and bulk).

4.6.4.2 Category 4: Imported feed proteins – period 3 July 2001 – 20 February 2002

Animal Products Officers shall, based on indicative list of imports for the period 3/7/01 to 20/2/02 collect:

a) At least 1 fishmeal sample from each of 8 sending countries;

b) At least 1 compound feed sample from Australia and Fiji; and

c) At least 1 soy meal sample from USA and Australia.

Some shipments could be sampled at category 1 and 3 feedmills if records were available confirming distribution and segregation.

4.6.5 Prior notice of sampling

Prior notice of sampling shall not be given to premises for random samples. The selection of a sampling day and time will be random and will be maintained confidential by the samplers.

Operators seek to minimise the number of changeovers between monogastric and ruminant feeds. There will often be a weekly or daily production pattern that should legitimately influence the timing of the visits for the targeted samples.

4.6.6 Sampling tools

Animal Products Officers shall:

a) Use flat-bottomed shovel with vertical sides;

b) Have sampling spear with container incorporated;

c) Have dividing screen for taking final samples; and

d) Sample the full width of flowing feed during manufacture,

e) Clean tools between feed batches/product lines,

f) Seal pierced bags with MAF official tape.

4.6.7 Subsamples (incremental samples)required to sample a feed batch or product line

Most feedmills have one or two-tonne capacity mixers and process by batch. Targeted samples should be taken from the bagging line during bagging, rather than through the bag walls after the bags have been sealed and stacked.

Animal Products Officers shall take samples from:

a) Bulk feed that is a batch or run of less than 2.5 tonnes - take at least seven incremental samples, for an aggregated sample of at least 4kg,

b) Bulk feed that is a batch or run of more than 2.5 tonnes: 4.472 times the number of tonnes, up to a maximum of 20 (to be reviewed post-calibration programme) incremental samples, for an aggregated sample of at least 4kg. If the run is more than five tonnes, all the required samples need only be taken from within the minimum number of bins or bays that hold at least 5 tonnes; and

c) Bagged feed that is a batch or run of more than 0.5 tonnes and contained in sealed, 40kg to 1000kg capacity bags:

- 1 - 4 bags - sample all bags,
- 5-16 bags - sample 4 bags,
- 16 bags - sample the square root of the number of bags up top a maximum of 20 bags sampled. Aggregated samples in each case must weigh at least 4kg.

4.6.7.1 Final sample

The final sample of 0.5 kg is drawn from the 4kg-aggregated sample. A second 0.5kg sample should officially sealed and put in the operator's care for retention for at least 3 months as a backup sample for the operator's assurance and for possible re-testing by the operator or MAF.

4.6.7.2 Supporting information

Animal Products Officers shall collect the following supporting information:

a) A copy of the production schedule;

b) Batch number;

c) Product brand, formulation (all added proteins), and recommended species for feeding; and

d) Text of RPR label notice.

NOTE: Do not sample damaged or open bags and damaged or deteriorated feed. Record state of general hygiene, action on any spillage, and any observations concerning feed that shows evidence of contamination by other feed, or by protein meals, that is not obviously designated for reworking into non-ruminant feeds or destruction.

4.6.7.3 Coding of samples

Coding - a unique identification mark shall be given to each sample. The identification mark must include the following components:

a) The letter R for a random sample;

b) The letter T for a targeted sample; and

c) An individual number followed by sampling person initials.

E.g. : R01NS (random sample number 1, collected by: insert name/surname of the person who collected the sample)

4.6.7.4 Submission of samples

Animal Products Officers shall ensure that each sample is:

a) Individually packaged in clean, free of contaminants, leak proof, durable plastic bag,

b) Sealed with MAF sealing tape, to close the sampling bag and to close the outer packaging,

c) Clearly and individually identified including:

- a unique identification mark/number (see coding);
- sampling date;
- sampling location (e.g. name of premises);
- Accompanied by the attached submission form - one form shall be completed for each sample;

d) Held secure at all times; and

e) Maintained in a cool environment,

Sample details shall be recorded to readily allow traceback to day, time of processing and the batch/product line. Copies of completed forms shall be kept by the sampler for records.

Samples shall be submitted by courier within 5 days of sampling to:

AgResearch Ltd

Ruakura MIRINZ Centre

East Street

Hamilton

4.6.8 Allocation of tests by ruminant species

Every fourth batch of 35-40 samples received shall be assigned to testing for ovine protein. Annually therefore, 3 feed samples will be assigned to the bovine protein test for every 1 assigned to ovine test.

The rationale is that, while the cattle disease BSE is the primary disease of concern, neither the feed ban regulations nor the domestic rendering industry distinguishes between ruminant species.

Assumptions:

a) Although ruminant protein sold into the domestic feed industry is generally undifferentiated as to species of origin, some renderers process only bovine or ovine material, permanently or seasonally;

b) About two thirds of MBM is exported. Ovine-only meals are produced specifically for export to European or North American manufacturers of premium pet foods; and

c) The killing season for sheep is more concentrated than for cattle, so some MBM is likely to be entirely ovine.

4.6.9 Procedure for positive test results (refer to Analytical Procedures for details)

a) A designated MAF Food person will be informed within 24 hours of any positive findings after the initial analysis is completed,

b) Positive samples will be retested within the laboratory forthwith, and an Animal Products Officer shall conduct a traceback exercise at the same time.

c) If the second result is negative, a third test must be run. Space permitting, the sample may also be scheduled to be run using the other species test.

d) Any enforcement action will only be considered in the context of the traceback investigation and on a case-by-case basis. Beyond the calibration programme, issues such as retesting, targeted testing, and paying for additional testing will be matters for consultation between MAF and industry groups.

4.6.10 Compensation and cost of testing

No compensation is payable for the value of the final sample or the loss, or downgrading, of the aggregate samples. The calibration programme is being funded by the red meat industry.

4.6.11 Confidentiality

Test results are confidential to the Ministry of Agriculture and Forestry.

Feedback will be provided by MAF to operators on their own results and unattributable results from the wider testing programme. Any published results will be unattributable to an operator.

4.7 Monitoring/Control – laboratory testing of animal feed samples

This is subject to a specific MAF contract with a testing laboratory as per agreed procedures.

4.8 Instruction on the collection and dispatch of cattle brain stem samples for PRIONICS testing

The sampling programme is focused on BSE, the main disease of concern and therefore cattle brains have to be sampled.

These instructions are intended to act as a guide for collection of cattle brainstem samples for BSE trade risk Mitigation survey. They should be used in conjunction with other training material provided by MAF (e.g. CD-ROM, video, etc)

Samples of brainstem are collected for the PRIONICS Western Blot test. The samples collected will be cut into two halves – one will be used for PRIONICS test, the other half will be used for histology (refer to section 4.8.5).

Samples must fulfil all the specified criteria in order to be tested. Samples that do not fit criteria listed in this section will not be tested and appropriate explanation will be provided and signed by an approved laboratory signatory.

Appropriate procedures (refer to section 5) will be followed in a case of suspicious result from laboratory testing of either suspected clinical cases, or samples collected at rendering plants, and slaughterplants.

MAF VA shall collect carry out the following:

4.8.1 Collection of cattle brain samples at ME plants

NOTE: Only cattle with 4 permanent incisors will be sampled

a) All dead on arrival (DOA),

b) All dead in yards (DIY),

c) All not passed ante-mortem inspection, and fit the “case definition”

d) All presented for emergency slaughter and fit the “case definition”,

e) All Imported cattle from other countries, regardless of the age.

Collection of brain samples is COMPULSORY from ALL animals that fits the category 4.8.1(a) and 4.8.1(b).

Collection of brain samples from animals in the category 4.8.1(c), 4.8.1(d) and 4.8.1(e) will be as per "case definition" (refer to Section 4.8.1.1),

Collection of brain samples from animals in category 4.8.1(f) is COMPULSORY to all live cattle imported to New Zealand from other countries, regardless of the age.

Any suspected clinical BSE case shall be reported through **0800 809 966** line to NCDI, and MAF Food shall be informed immediately (refer to Part E). In such cases MAF VA will follow up instructions given by NCDI.

4.8.1.1 BSE case definition – Suspected clinical cases

As per OIE Manual of Standards for Diagnostic Tests and vaccines, 1996, Chapter 3.2.1.3 – "presenting signs, though variable, usually include behavioral changes, apprehension, and hyperaesthesia.

For example, affected cows may be reluctant to enter the milking parlour, or may kick vigorously during milking. In dry cows especially, pelvic limb incoordination and weakness can be the first clinical feature to be noticed. Neurological signs predominate throughout the clinical course and may alter many aspects of altered mental status and behavior, abnormalities of posture and movement, and aberrant sensation, but the most commonly reported are apprehension, pelvic limb ataxia, and hyperaesthesia to touch and sound. Affected cows will sometime stand with low head carriage, the neck extended and the ears directed caudaly. Abnormalities of gait include swaying of the pelvic quarters and pelvic limb hypermetria – features that are not most readily appreciated when cattle are observed at pasture. Gait ataxia may also involve the pectoral limbs and, with advancing severity of locomotor signs, general weakness, resulting in falling and recumbency, can dominate the clinical picture. There has been no change in the clinical picture of BSE during the epidemic in the UK from 1985 to date (May 1996). Clinical signs are essentially similar in other countries where BSE occurred.

The intense pruritus, characteristic of some sheep with scrapie is not prominent in cattle with BSE, though in proportion of cases there is rubbing and scratching activity, general clinical feature of loss of bodily condition, decreased liveweight, and reduction in milk yield often accompany nervous signs as the disease progresses.

The protracted clinical course, extending usually over a period of weeks or months eventually require slaughter on welfare considerations.

Early in the disease course, the sign may be subtle, and thus prevent clinical diagnosis on an initial examination. Continued observation of such equivocal cases, together with appropriate clinical pathology procedures to eliminate differential diagnoses, especially metabolic disorders, will establish essential progressive pattern of signs. Some early clinical signs of BSE may show similarities with features of nervous ketosis, hypomagnesaemia and encephalitic listeriosis, and may sometimes be exacerbated following stress, such as that caused by transport.

4.8.2 Collection of cattle brain samples at rendering plants

a) Follow the requirements of section 4.8.5,

b) Collection of samples will be on a random basis as per protocol specified by MAF Food (NOTE: NCDI to provide a sampling strategy),

c) MAF VA shall ensure that no sample is collected from animals that do not fit the requirements of this specification,

d) MAF VA shall ensure that rendering plants follow up MAF Food requirements (refer to section 4.8.2.1).

4.8.2.1 Selection and Identification of Fallen Cattle Submitted for Brainstem Sampling,

a) The purpose of this requirements is to ensure that all brainstem samples are selected from appropriate animals, and can be traced back to the farm from which the donor animal was collected,

b) This procedure is applicable to the sampling programme applied at the following locations (the companies):

- Wallace Corporation, Waitoa, BPW15.
- Slinkskins Ltd, Mataura.

Note: *At MAF's discretion, this may include other locations (companies)*

c) Cattle from which brainstem material is sampled for the purpose of BSE surveillance must be:

- traceable back to the owner and property of origin
- less than 24 hours since death
- greater than 24 months of age.

d) When a farmer notifies that an adult bovine has died and requires pick-up, the company telephonist will note:

- farmer name and address
- approximate time of death
- where available, the cause of death

e) Company driver that collects fallen adult bovine and following information:

- if the time of death as per pick-up sheet was after 4.00PM on the previous day the driver shall place a sequentially numbered tag in the right ear and records the number on the pick-up sheet,
- where available, the AHB or MINDA ear tag numbers shall be used, including
  - herd number
  - individual animal number, and any other identification number that may have been applied by the farmer
- returns the pick-up sheets with tag numbers to the office where it is copied to MAFVA.

Note: Because the minimum age for brainstem collection is 24 months, heifers should not be tagged.

f) Company workers.

The sequence of events may vary between localities, and should be agreed between local MAFVA staff and company management. It should include requirement to:

- remove the skin from the target animals,
- make the head available for brainstem collection,
- provide company documentation to enable reconciliation of brainstem sample with the name and address of the owner of the sampled animal including AHB / MINDA herd and individual animal identification.

g) MAFVA staff.

- Check the age of the animal. **Only cattle with at least 4 permanent incisors will be sampled,**
- Collect brainstem material according to directions,
- Divide the sample longitudinally and place each half in a separate bottle,
- Add buffered formalin to one pottle and retain the second for freezing,
- Complete the submission form after noting the name and address of the farmer who submitted the animal,
- Identify the samples with a code consisting of the initials of the person taking the sample and the sequential tag number, e.g., the sample taken by Lew Kempson from the animal bearing tag no. 58 will be identified by LK/058. Enter the code number onto the submission form.

4.8.3 Unsuitable Samples

NOTE: NCDI has specifically been instructed NOT TO PROCESS SAMPLES THAT ARE NOT CONSIDERED FIT FOR LABORATORY TESTING. Should such samples be received, NCDI shall contact MAF Food for a follow up with a sender.

NCDI shall not test samples if:

a) Autolysed,

b) Not anatomically identifiable,

c) Delayed in transit that affect the quality of the sample,

d) Grossly contaminated,

e) Not accompanied by appropriate, complete documentation as specified by NCDI,

f) Not clearly labeled.

4.8.4 Equipment Required

a) Euthanasia of live animals - rompun and euthatal,

b) Removal of head - curved butcher knife, scabboard and steel – **Note:** wash and sanitise after use,

c) Prionics spoon, either plastic or stainless steel – **Note:** clean with running water between samples,

d) 50-100 ml plastic screw cap sample container – **Note**: does not need to be sterile,

e) 4% neutral buffered formalin - for fixing brains for histology,

f) Protective clothing (e.g. overalls, gumboots etc.) and disposable gloves – **Note:** wash and sanitise after use.

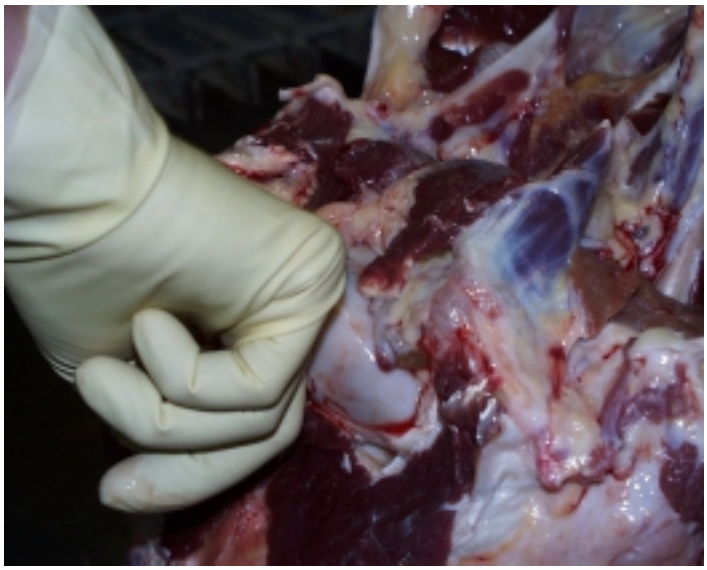
4.8.5 Sampling - Removal of the Brainstem

a) Remove the head, sectioning just caudal to occipital condyles,

b) Turn the head upside down and locate the foramen magnum,

c) Gently separate the brain stem from connecting nerves and other tissue. This can be done by inserting a gloved finger between the brainstem and the surrounding membrane and gently circumscribing the caudal part of the brainstem. Try not to crush the brainstem. Disposable gloves should be used for this part of the procedure. Change gloves between animals,

d) The figure below shows this part of the procedure.



e) If there is concern that there may be skull fractures resulting in sharp bone edges, then the prionics spoon can be used instead of a finger to sever these attachments (see below),

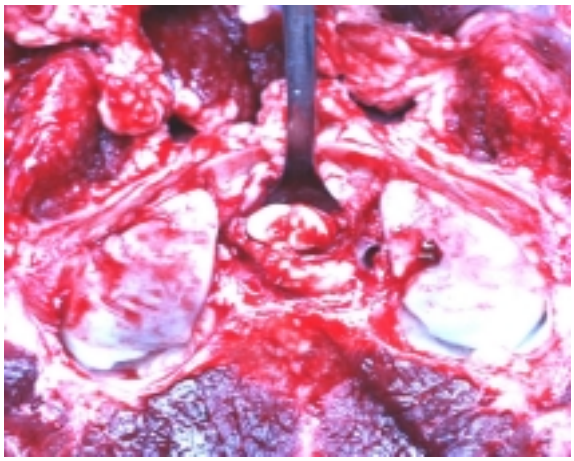
f) Insert the prionics spoon in the ventral side of the brainstem, with the concave surface of the spoon downwards. It is important to insert the spoon between the sheath encapsulating the brainstem and the brainstem itself.

g) The blade of the spoon is inserted 7-8cm, which should be possible without any resistance,

h) If the brainstem has not been fully separated from the surrounding tissue, rotate the spoon 90^{o} clockwise and counter clockwise to cut nerves etc,

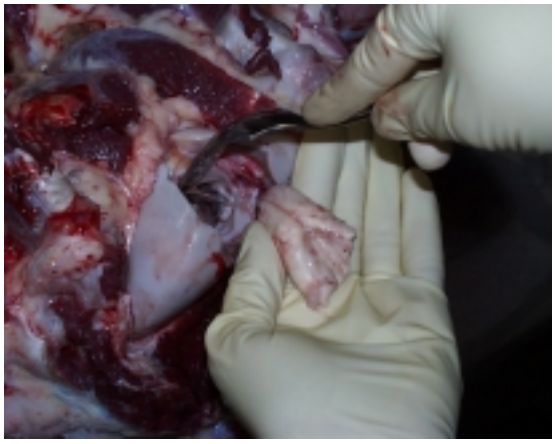
i) Lift the handle of the spoon to force the blade of the spoon down through the brainstem, separating it from the rest of the brain,

j) The head and spoon should now look like this:

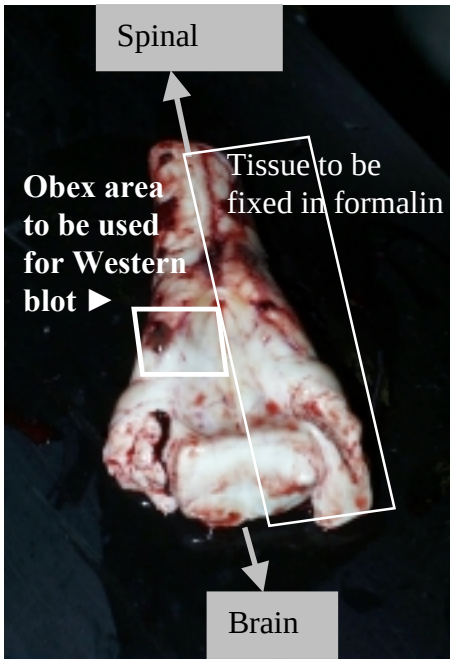


k) Pull back on the spoon to ease the severed brainstem out of the skull. If any of the nerves or connective tissue are still attached, it may be necessary to rotate the spoon 90^{o} to the left and right side before this is possible,

l) Collect the brainstem with a gloved hand



m) The removed brainstem should look like this:



Brainstem from cattle as it will appear after removal from the head.

n) Split the brainstem sample in two halves. That means that a sample from one animal will have two sub-samples:

- One half of the brainstem shall be put into an individual, 50-100ml sample container with screw cap lids and fixed with formalin immediately after collection,
- Another half of the brainstem shall be put into another individual, 50-100ml sample container with screw cap lids vial and kept frozen (-20^{o}C) until dispatch.

4.8.6 Storing of samples

a) Samples shall be held secure at all times at establishments. Secure at all times means that the samples shall be stored in a manner that will indicate whether a security breach or tempering has occurred,

b) An anti-tempering device shall be used for samples dispatched to the laboratory (e.g. MAF sealing tape). If MAF sealing tape is used, previously applied sealing tape to outer packaging shall be removed before the "new" MAF sealing tape is applied. All anti-tempering devices shall be secure at all times,

c) Samples shall be maintained in a suitable condition until reception at the laboratory. This includes arrangements for the dispatch and transport of the samples to the laboratory,

d) Samples shall be clearly identified at all times an audit trail shall exist which unequivocally establishes the origin of an animal.

4.8.7 Dispatch of samples

a) Dispatch the samples on Monday, by an overnight courier in a water tight container,

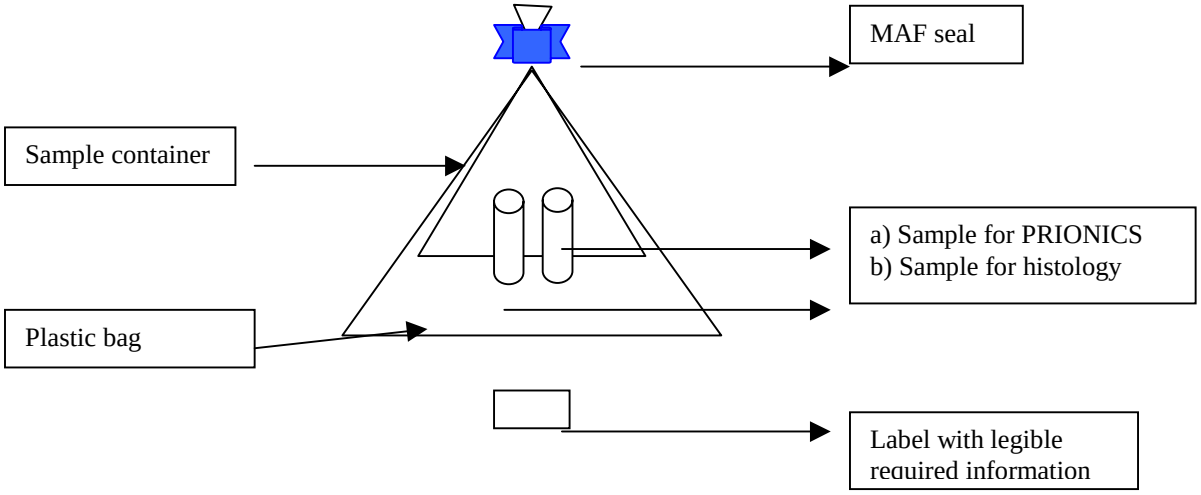
b) Pack the samples in ice pack to ensure the temperature of the sample do not exceed +4^{o}C during the transport. Courier delivery address is:

National Centre for Disease Investigation
Ward St
Wallaceville
Upper Hutt

c) Samples dispatched in chilly bins shall be sealed at the time of packaging with MAF sealing tape such that the tape or the packaging is damaged if tampering occurred,

d) The chilly bins enclosing the samples may be sealed with MAF sealing tape.

e) Example for samples dispatched in chilly bins:



4.9 Authority to take samples

MAF VA staff:

a) Hold appointments as animal product officers under the Animal Products Act 1999 (APA),

b) Have powers to enter premises (s87), examine records and take samples (s88) for the purpose of determining whether any animal material or animal product or associated thing is in compliance with the requirements of the APA.

4.10 Confidentiality

Test results are confidential to the Ministry of Agriculture and Forestry. Feedback will be provided by MAF to MAF VA as deemed appropriate.

4.11 Disposal of animals

NOTE: refers to cattle dead on arrival [section 4.8.1 (a)] and dead in yards [section 4.8.1 (b)]

Unless there is a reasonable grounds to report the case through MAF Exotic Disease hotline (0800 809 966), carcasses of animals that have been sampled will be disposed of by using already established procedures that plants have to follow when dealing with such stock.

PART E: SUSPECTED CLINICAL CASES/SUSPICIOUS LABORATORY RESULT

5.1 Initial Investigation

All suspected clinical cases of BSE (or other TSEs), shall be reported to the MAF Exotic Disease hotline number (0800 809 966). All suspected clinical cases shall be investigated by the National Centre for Disease Investigation (NCDI) as required by MAF Standard 153 Series. The Directors (Animal Biosecurity and Animal Products) will be kept informed of all such investigations.

All suspicious laboratory results obtained from samples that have routinely been tested shall be reported to the Directors (Animal Biosecurity and Animal Products) immediately.

Initial investigation of suspected clinical cases reported from a farm shall be carried out by the National Centre for Disease Investigation.

Initial investigation of suspected clinical cases reported from a slaughterplant may be carried out by a veterinarian at the slaughterplant if instructed by the National Centre for Disease Investigation.

In situations where the National Centre for Disease Investigation cannot confidently rule out BSE during initial investigation of suspected clinical cases in cattle, brain samples shall be collected from such animals and submitted for the laboratory testing.

The basic criteria that the Directors (Animal Biosecurity and Animal Products) shall take into consideration when determining reasonable suspicion of a possible case of BSE (or other TSEs) are as follows:

a) Expert opinion on the outcome of Prionics Western Immunoblot testing suggests a true positive and fixed tissues are unsuitable for histopathology; OR

b) Expert opinion on the outcome of histopathological examination suggests a true positive; OR

c) Combined expert opinions from Prionics Western Immunoblot testing and histopathological examination suggest a reasonable likelihood of a true case of BSE.

5.1.1 On-farm investigation

a) On-farm investigation shall identify, trace and instigate isolation measures for:

- the dam of the cattle under investigation;
- any siblings born within 2 years before or after the date of birth of the cattle under investigation;
- if the cattle under investigation is female, any progeny born within 2 years prior to it being sampled for the Trade Risk Mitigation Survey;
- all cattle either born in the same herd as, and within 12 months of the birth of, the cattle under investigation or reared together with the cattle under investigation during the first year of their life, and, in both situations, which

may have consumed the same potentially contaminated feed as that which the affected cattle consumed during the first year of their life,

- Trace back of the laboratory brain samples to a specific animal derived from a specific farm.

d) Movement restrictions may need to imposed on the farm to prevent live cattle being removed from the farm until a final judgement has been made,

e) Investigation of on-farm animal feed formulations, supplements or concentrates that may contain ruminant protein, and any other feeding material which may have been contaminated with ruminant protein,

f) MAF NCDI procedures for on-farm investigations for BSE are included as Appendix 2.

5.1.2 Traceforward of animal products

This activity shall be carried out by MAF verification Agency and will include:

a) Tracing of meat product for human consumption derived from animals within the birth cohort of the cattle under investigation, and

b) Supervision of isolation of any meat product that has not already entered retail or export distribution networks.

5.2 Response Action

Should a suspected case be confirmed using a confirmatory test (Note: this will be done at an overseas laboratory), a response will inevitably involve multiple agencies and require co-ordination across all groups.

MAF Biosecurity Authority will utilise suppliers contracted to provide services in accordance MAF 153 Standard for Exotic Disease Programmes of Animals and applying powers under the Biosecurity Act 1993.

Both MAF Biosecurity Authority and MAF Food Assurance Authority shall:

a) Work together with respect to tracing and other actions for meat and meat product, on-farm measures and overall response policies,

b) Involve the Ministry of Health in day-to-day operations, decision-making, and response policy formulation. The co-ordination mechanism will be conference calls and/or the establishment of Technical Advisory Groups with specific terms of reference, as described in procedures manuals under the MAF 153 Standard for Exotic Disease Programmes of Animals.

c) MAF VA will be involved in verifying compliance with technical directives and overseas market access requirements issued by MAF Food under the Animal Products Act 1999.

5.2.1 On-farm

In the event of overseas testing confirming a **positive** result:

a) Destruction of cattle and meat product that may be under restriction during the initial investigation,

b) Destruction of all cattle on the farm of origin of the positive case and all members of the birth cohort which have been traced,

c) Sampling of the dam, all cattle on farm and in the birth cohort for BSE,

d) Disposal of all parts of all destroyed cattle (with the exception of samples taken for diagnostic evaluation) by a method approved by MAF. The preferred method of disposal will be rendering at an approved facility under MAF VA supervision, with meat-and-bone meal treated as a risk good and incinerated.

5.2.2 Tracing and isolation of product

MAF VA shall work closely with MAF NCDI and other approved MAF 153 Standard suppliers to ensure the ability to verify all response outcomes as required by technical directives and overseas market access requirements issued by MAF Food under the Animal Products Act 1999.

MAF VA will supervise the trace forward process. Procedures for tracing and isolating meat product from any identified property will be those specified in manuals approved by the Director of Animal Biosecurity under the MAF 153 Standard for Exotic Disease Programmes of Animals.

5.2.3 Communication strategy

Upon making a decision to initiate an investigation or response, the Directors (Animal Biosecurity and Animal Products) will, as appropriate, provide briefings to:

- The Minister for Biosecurity,
- The Minister of Agriculture,
- The MAF BSE Coordinating Group,
- The BSE Liaison Group,
- The Independent BSE Expert Science Panel,
- Treasury

The BSE Liaison Group, the Animal Biosecurity Consultative Committee, and the Government's Independent BSE Expert Science Panel will be invited to a meeting to address issues and course of action in regard:

- The Trade Risk Mitigation Survey for BSE,
- The laboratory findings that initiated the investigation,

- The procedure for confirming the diagnosis (likely to be by examination using immunohistochemistry in overseas laboratories),
- The measures to be implemented

5.3 Laboratory testing - Compliance with laboratory specifications

a) Laboratory testing/interpretation of results shall be carried out as outlined in Annex 1, using approved tests (refer to Annex 2)

b) The laboratory shall advise MAF Food in advance, whenever it is unable to comply with any specification contained within this and other relevant documents,

c) MILAB Scheme identify steps that will be taken in a case of non-compliance with specifications identified during an external quality systems, administrative, or technical audit which may have the potential to undermine the integrity of the MAF Food,

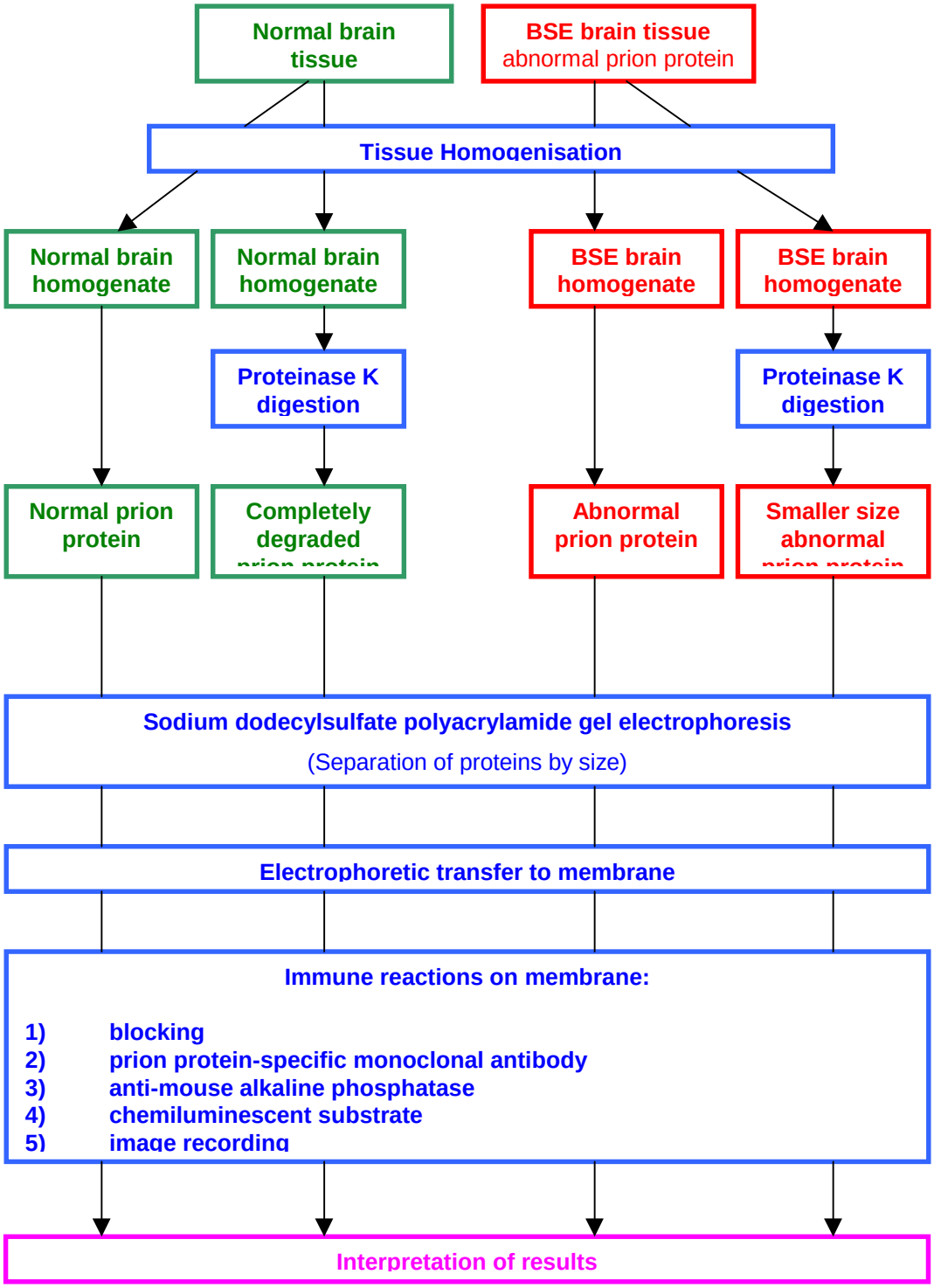
d) MAF Food will provide in writing what actions are required by the laboratory to correct non-conformances, and the time frame for resolution of the problem(s),

e) Failure to satisfactorily address the issues contained in the probationary notice within the stipulated time frame will result in removal of MAF Food approval.

ANNEX 1: SCREENING TEST – PRIONICS WESTERN IMMUNOBLOT

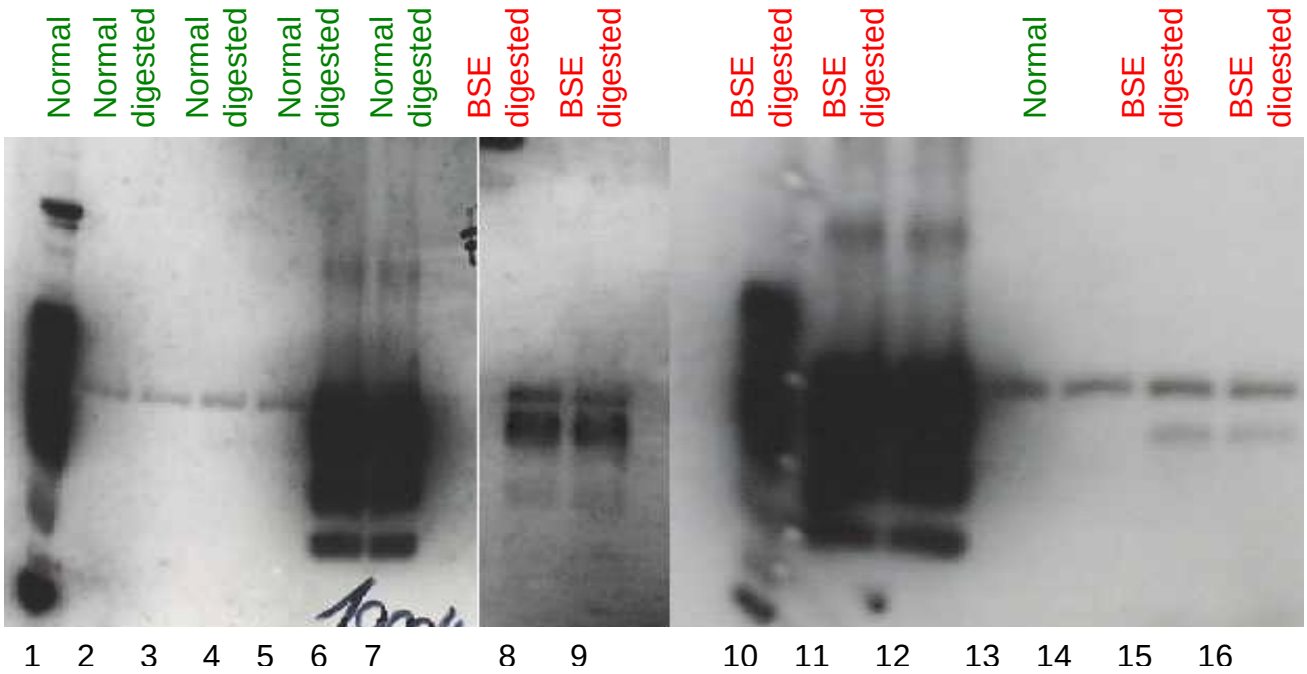
STEP 1:

1.1 Test Principle



1.2 Interpretation of Results:

1.2.1 Prionics Western immunoblot results of a European laboratory:



Legend:

Lanes 1 and 10: Undigested normal brain homogenate used as positive control. This is non-infected tissue.

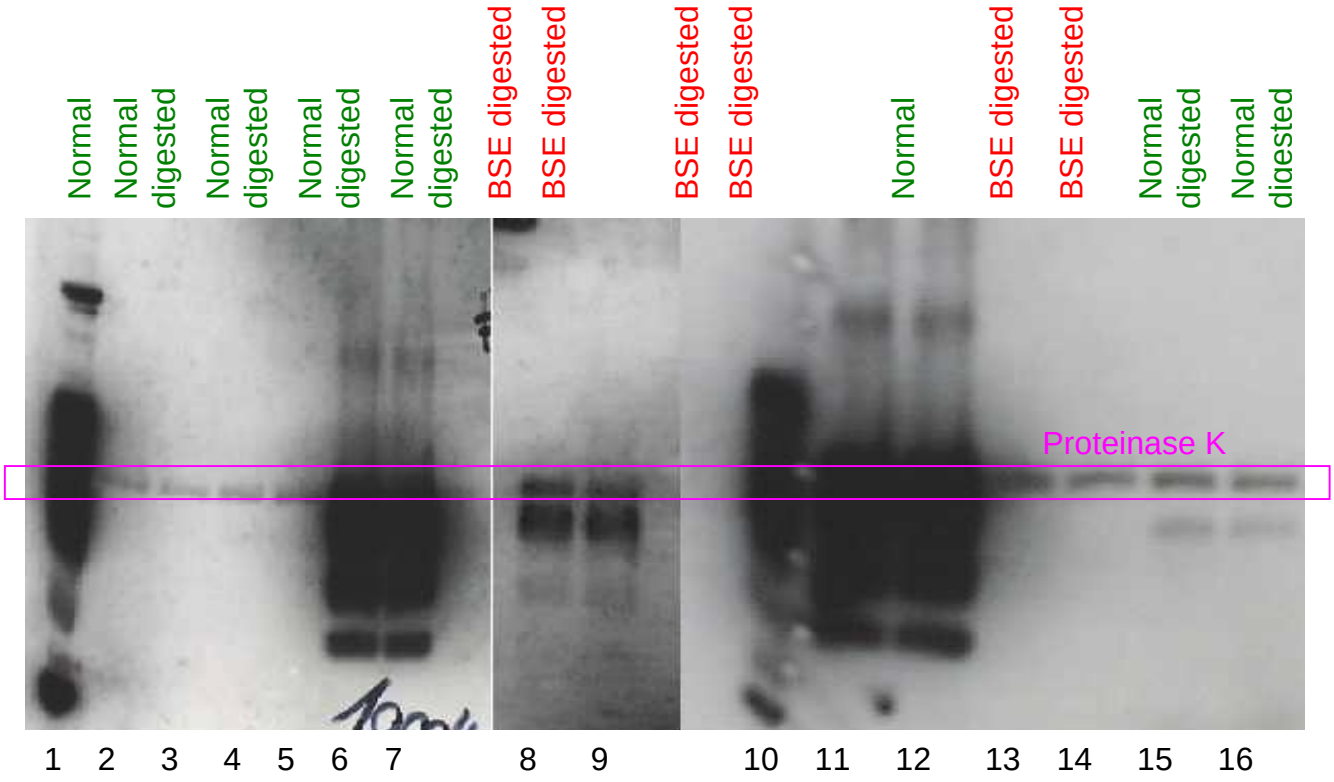
Lanes 2-5, 13-16: Digested normal brain homogenates (non-infected),

Lanes 6, 7, 11, 12: Digested BSE brain homogenates. Strong staining,

Lanes 8, 9: Digested BSE brain homogenates. Weak staining.

1.2.2 Proteinase K bands

Proteinase K bands are visible and are used as a reference point:



1.2.3 Identification of prion protein bands:

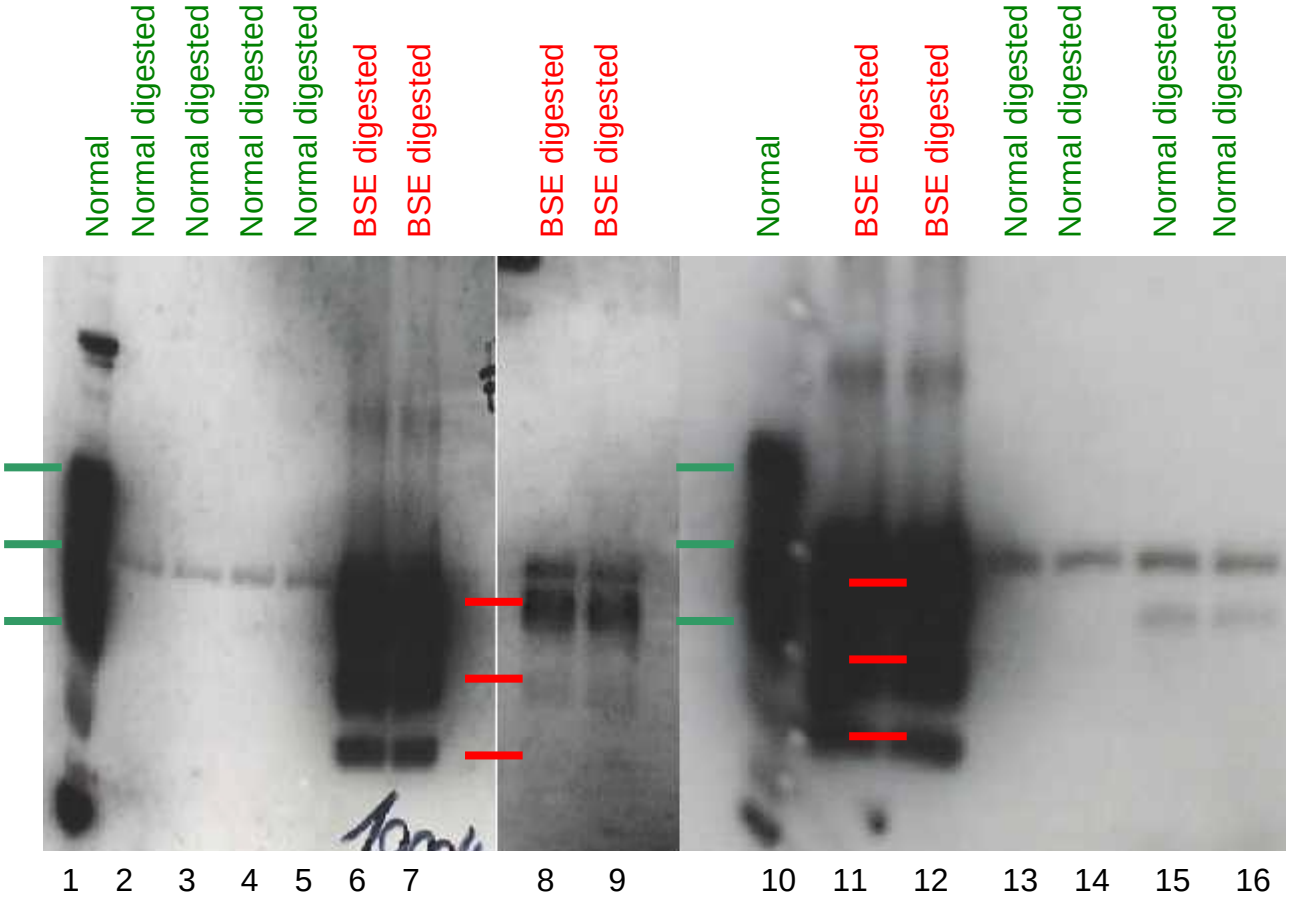
Normal brain homogenates without proteinase K digestion (lanes 1 and 10) show three typical bands (green bars) in the 27-35 kDa range.

Normal brain homogenates with proteinase K digestion (lanes 2-5, 13-16) show only the proteinase K band (for the extra band in 15 and 16 see later).

BSE brain homogenates with proteinase K digestion (lanes 6-9, 11, 12) show three typical bands which are smaller than the bands of normal prion protein (red bars).

Not shown here are BSE bands without proteinase K digestion, which would look identical to normal brain homogenates (without proteinase K digestion).

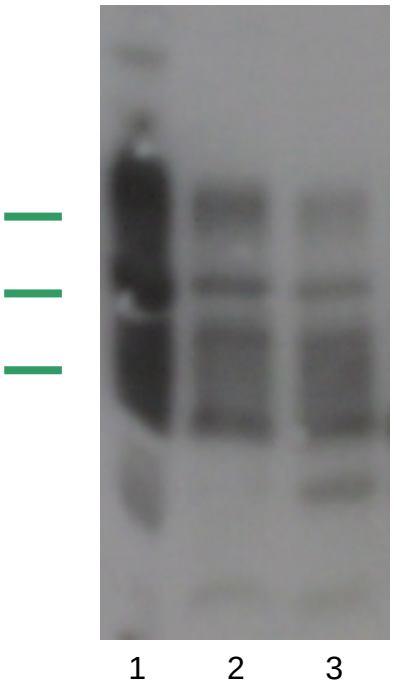
The three major prion protein bands represent the same polypeptide (same amino acid sequence) but with various



degrees of glycosylation.

1.2.4 Incomplete proteinase K digestion

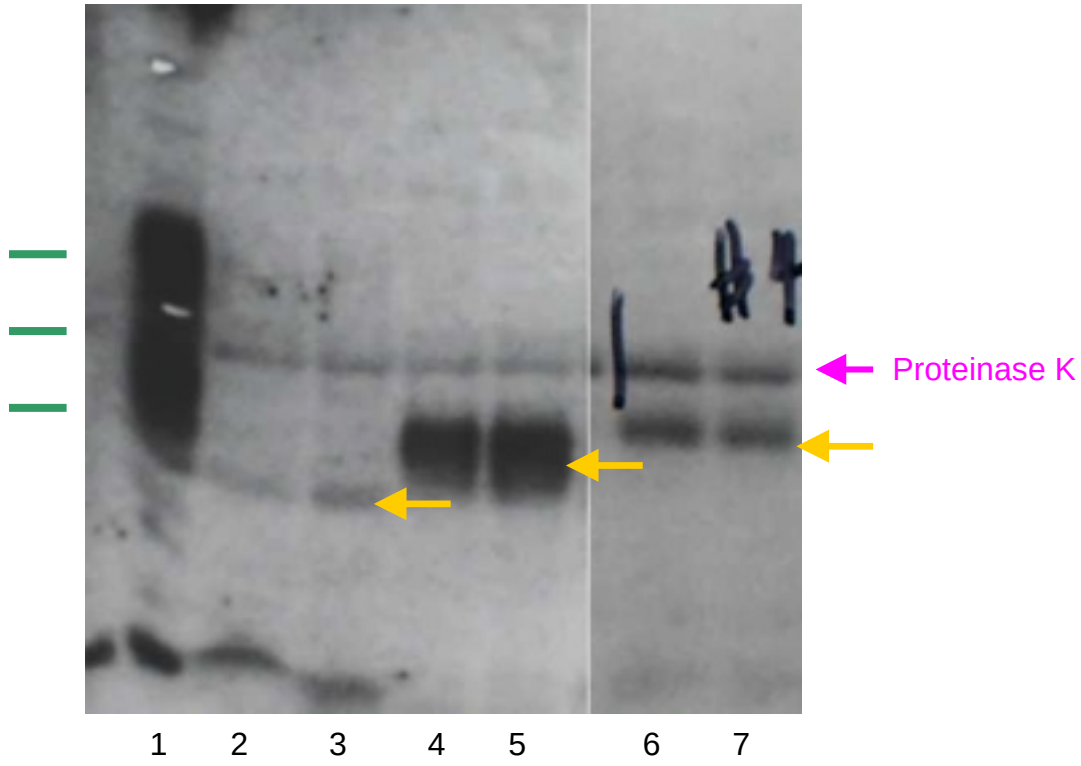
Incomplete proteinase K digestion can lead to appearance of bands in normal brain homogenates (lane 2 and 3) of identical size to undigested normal brain homogenate (lane 1). Such staining is readily distinguishable from bands of BSE prion protein.



1.2.5 Non-Specific staining

Non-specific bands in proteinase K-digested normal brain homogenates (lanes 2-7) occur with low frequency (yellow arrows) but are distinguishable from specific staining.

Lane 1 shows undigested normal brain homogenate.



STEP 2:

2.1 Suspicious results in PRIONICS test

Case 1:

A suspicious result could be a non-specific band, which would appear to be of identical size to the BSE prion band (after digestion).

Case 2:

Incomplete proteinase K digestion of normal prion protein.

NOTE: For both Case 1 and Case 2, the test will be repeated. The samples will be run directly next to the control sample (undigested normal brain homogenate) in order to exactly determine the position and size of the band.

STEP 3:

3.1 Confirmatory Tests

If the results are still unclear after repeating the Prionics test, formalin-fixed and fresh (frozen) samples will be sent for confirmatory testing by:

a) Histopathology,

b) Immunohistochemistry,

c) SAF-detection

These tests will be performed in designated overseas reference laboratory

STEP 4:

4.1 Confirmatory tests – follow up

If there are still unclear results, i.e. the sample looks suspicious in at least one of the confirmatory tests, a formalin-fixed sample will be sent for:

a) PET-blot.

ANNEX 2: MAF FOOD APPROVED TESTS FOR BOVINE SPONGIFORM ENCEPHALOPATHY

10.0 **Bovine Spongiform Encephalopathy/TSE**	***A) Screening Tests*** *A.1 – Rapid BSE Tests: Prionics Western Immunoblot and ELISAs* Moynagh, J., Schimmel, H. (1999) The evaluation of tests for the diagnosis of transmissible spongiform encephalopathy in bovines. Preliminary Report, European Commission. ***B. Confirmatory tests*** *B.1 - Histopathology* OIE Manual of Standards for Diagnostic Tests and Vaccines, 3rd Ed., 1996, Chapter 3.2.13. Bovine Spongiform Encaphalopathy Http://www.oie.int/eng/normes/mmanual/A_00057.htm *B.2 - Immunohistochemistry* Haritani M., Spencer Y.I. & Wells G.A.H. (1994). Hydrated autoclave pretreatment enhancement of prion protein immunoreactivity in formalin-fixed bovine spongiform encephalopathy-affected brain. *Acta Neuropathol*., **87**, 86-90. Wells G.A.H. & Wilesmith J.W. (1995). The neuropathology and epidemiology of bovine spongiform encephalopahty. *Brain Pathol*., **5**, 91-103. *B.3 – Prionics Western immunoblot:* Schaller O, Fatzer R, Stack M, Clark J, Cooley W, Biffinger K, Egli S, Doherr M, Vandevelde M, Heim D, Oesch B, Moser M (1999) Validation of a Western immunoblotting procedure for bovine PrP^{Sc} detection and its use as a rapid surveillance method for the diagnosis of bovine spongiform encephalopathy (BSE). Acta Neuropath. 98: 437-443. *B.4 – Scrapie-associated Fibrils* Stack MJ, Keyes P, Scott AC (1996) The diagnosis of bovine spongiform encephalopathy and scrapie by the detection of fibrils and the abnormal protein isoform. In: Baker HF, Ridley RM (eds) Prion diseases. Humana Press, Totowa, pp 85-103.	As defined by MAF BSE Programme	All markets

5. TSE 2001 Surveillance data

Table I: The number of cases from animals of all ages with a history of nervous disease submitted to New Zealand laboratories from 1 January 2001 to 30 September 2001

No. of submissions	Cattle	Sheep	Farmed Deer	Goats	Lamoids
1 Jan - 30 Sept 2001	289	42	6	10	5

Table II: Laboratory diagnoses for animals 2 years of age and older that had a clinical history of nervous disease from 1 January 2001 to 30 September 2001

Diagnosis	Cattle	Sheep	Goats	Deer
Bacterial infection (excluding those listed)	5		1	
Brain tumour	2			
Enterotoxaemia/FSE				
Hepatic encephalopathy	9	1	2	
Listeriosis	13	20		
Malignant catarrhal fever	8			
Metabolic disease	15	3	1	
Mineral toxicoses				
Plant poisoning	2			
Polioencephalomalacia	3	1		
Low copper				
Tetanus				
Renal disease	1			
Charolais ataxia	1			
Myonecrosis				
Adenovirus				
No diagnosis made	90	6	4	2
Totals	**149**	**31**	**8**	**2**

Table III: Number of brains from animals 2 years of age and older that were histologically screened for a TSE from 1 January 2001 to 30 September 2001

Species	Number examined	No. sent to Weybridge	No. positive for TSE
Cattle	62	0	0
Sheep	1051*	2	0
Goats	3	0	0
Deer	5	0	0

* This total includes an additional 1,024 brains from clinically normal sheep, 3 years and older, collected on behalf of the European Commission, that were also screened for the histopathological lesions of scrapie. The Commission will use these samples as negative controls in trials to validate diagnostic tests for scrapie.

The National Centre for Disease Investigation (MAF) has been accredited under both ISO:17025 and MiLab to perform diagnostic testing for BSE using the "Prionics-Check" BSE Test, manufactured by Prionics, Zurich. There are two approved signatories for this test, both of which have received hands on training in Zurich. NCDI expects to test 2,000 to 2,500 samples between November 2001 and June 2002.

Please note that the NCDI has only just started receiving samples, and is currently testing the first few hundred.

6. Circulars sent to Veterinarians, Farmers and Agricultural Industry during 2001

In addition to the circulars below Federated Farmers of New Zealand published an article in its newsletter *Federation Update No. 3/2001* reminding farmers about the Ruminant Protein Regulations. This newsletter is circulated to 16,000 rural box holders. This is an example of how Federated Farmers has assist in ensuring that Farmers receive and understand information relating to BSE.

(The actual appearance of the circulars in terms of font and layout differ to that below. This is the text that was used and supplied to the printers for creating the circulars.)

Circular 6.1
Insert for VetScript

Dear Veterinarian,

The information on the reverse side of this page is aimed at farmers, and is designed for you to place on your practice notice board for their information.

If you wish to receive further copies of the information page, please contact Ashley Edge, MAF Biosecurity, phone 04 474 4213, email edgea@maf.govt.nz

Yours sincerely,

Derek Belton
Director Animal Biosecurity

June 2001

Circular 6.2

Reminder to Farmers

The Biosecurity (Ruminant Protein) Regulations 1999 forbid the feeding of ruminant protein to ruminant animals.

Although New Zealand is free of both BSE (bovine spongiform encephalopathy, sometimes called "mad cow disease") and scrapie, our credibility as a source of safe food and our access to overseas markets depends on all food producers abiding by legal requirements such as this ban.

These regulations require that:

- **YOU MUST NOT provide feeds containing meat and bone meal, blood meal, or bone meal to any ruminant animal (including sheep, beef and dairy cattle, deer or goats); or allow these animals access to these feeds.**
- **YOU MUST NOT allow ruminant proteins such as "blood and bone" that has been applied as a fertiliser to be consumed by ruminant animals during subsequent grazing.**
- **YOU MUST NOT use ruminant proteins in silage making.**
- **YOU SHOULD ALWAYS check the label of feeds fed to cattle, sheep, goats and deer to ensure they don't include ruminant proteins.**

For more details, contact

Ashley Edge, MAF Biosecurity, phone 04 474 4213, email
edgea@maf.govt.nz
or visit the MAF website
http://www.maf.govt.nz/Standards/anbio/disstat/tse-faq.htm

Ref: 1420-12

Circular 6.3
To all registered veterinarians

CIRCULAR

Transmissible Spongiform Encephalopathies: Bovine Spongiform Encephalopathy (BSE), Feline Spongiform Encephalopathy (FSE), Scrapie, and Chronic Wasting Disease (CWD) of deer

This circular is to remind you as a veterinarian about

- the nature and significance of these diseases,
- your responsibilities to be vigilant for signs of disease that might be the first indication of the presence of these diseases in New Zealand
- the part you play in informing your clients about these diseases.

Important points that should be noted are –

– All transmissible spongiform encephalopathies are notifiable under the Biosecurity Act 1993. MAF provides financial incentives to veterinary practitioners to encourage the submission of brains from certain cases of nervous disease in cattle, sheep, goats and deer for laboratory examination.

– Feeding of ruminant protein to ruminants is banned.

– CWD should be considered in the differential diagnosis of any severe pneumonia in deer.

– Cases of FSE in cats are a real possibility in New Zealand.

– Dead pets should be disposed of by incineration or burial.

– While it is unlikely that BSE will occur in cattle in New Zealand, it is likely at some time in the future that variant Creutzfeldt-Jakob Disease (vCJD) will be seen in humans in New Zealand.

Derek Belton
Director Animal Biosecurity

June 2001

Bovine Spongiform Encephalopathy (BSE)

Epidemiological summary

- Bovine spongiform encephalopathy is a fatal, non-contagious, feedborne nervous disease of cattle. It is one of the group of diseases known as transmissible spongiform encephalopathies (TSEs), which cause subacute spongiform encephalopathy in different species, due to proliferation of an altered form of a normal intracellular protein.
- It is mainly confined to the United Kingdom. The UK has the highest level of BSE with about 180,000 cases confirmed since 1988. Small numbers of cases have occurred in other countries as a result of importation of live cattle from the United Kingdom or the feeding of British meat and bone meal to local cattle.
- The BSE epidemic is declining and has been for the past 5-10 years.
- Scientific evidence supports the view that BSE is not transmissible between cattle, or through semen or embryos. If transmission from cow to calf occurs before birth then this is extremely rare.
- Infectivity in naturally occurring cases of BSE is confined to the central nervous system and the eye. This is consistent with the evidence that infection does not spread from animal to animal, other than as a feed-borne infection, and with the view that BSE is not transmissible through semen or embryos.

The New Zealand situation - BSE

- New Zealand has never had a case of BSE and is free from scrapie.
- There has been a ban on imports of live cattle from the UK since 1988. Importation of live cattle from Europe is not permitted.
- New Zealand does not allow the importation of meat and bone meal for feeding to livestock and has not for decades. New Zealand's livestock industry is primarily pastoral-based and uses little meat and bone meal. Regulations prohibiting feeding ruminant tissues to ruminants came into force on 1 January 2000. The regulations replaced a voluntary industry ban which had operated since mid-1996.
- The importation of bovine embryos from the UK has been suspended since April 1996.
- The importation of bovine semen from the UK was prohibited from early 1996 until January 2000, when importation was permitted to resume in accordance with the OIE International Animal Health Code.
- New Zealand’s conditions covering the importation of cattle embryos and semen from countries (other than the UK) in which cases of BSE have been reported are based on the OIE International Animal Health Code with some additional safeguards over and above the OIE requirements.
- New Zealand has a targeted surveillance program to identify BSE, should it occur here. The causal agent of BSE is a notifiable organism.

Your role in maintaining New Zealand's free status

While it is unlikely that BSE will ever be seen in New Zealand, it is vital that veterinarians remain on the alert for any cases that might resemble BSE. This vigilance helps to ensure that, should BSE occur in New Zealand, it would be rapidly detected and dealt with. It also gives our trading partners greater confidence in our continued TSE-free status.

Diagnosis of BSE

Clinical signs develop gradually over weeks to months. The first signs may be subtle behavioural changes, progressing to nervousness, excitability, and abnormal gaits or posture. Weight loss, ataxia and paresis are common. The disease is incurable and fatal, usually over a course of about 3 months.

Diagnosis is by histopathology of brain tissue. If you suspect BSE, you should phone MAF's Exotic Pests and Diseases Hotline on **0800 80 99 66** or contact MAF's National Centre for Disease Investigation on 04 526 5600 to discuss submission of appropriate samples.

All transmissible spongiform encephalopathies, including BSE, are notifiable under the Biosecurity Act 1993. Any person suspecting a TSE in an animal in New Zealand must notify MAF. This would apply especially to a veterinarian who sees a case of non-responsive progressive nervous disorder in cattle.

Incentives to investigate nervous disease in cattle

Although BSE is unlikely to occur in New Zealand, we must maintain a continuous BSE surveillance and monitoring programme to internationally accepted standards to maintain our status as BSE-free.

MAF provides financial incentives to encourage laboratory submissions by veterinary practitioners of brains from cattle exhibiting clinical signs of progressive non-metabolic central nervous disease.

For **dairy cattle** 2 years of age or older, showing these signs, MAF will –
– pay the farmer ($30) and the veterinarian ($80) to assist with the costs of clinical examination of the animal, upon completion of submission of a standard questionnaire to MAF.
– if the animal is euthanased or freshly dead, and the veterinarian removes the brain for laboratory examination, pay the veterinarian $60 for removing the brain and submitting it.
– pay the laboratory for the removal of the brain (if necessary) and for the histopathological examination.

For **beef cattle, sheep, goats and deer** 2 years of age or older, showing these signs, MAF will
– if a TSE has been suspected by the submitting veterinarian and appropriate samples are submitted, provide the veterinarian with a $100 credit at the laboratory.
– pay the laboratory for the removal of the brain (if necessary) and for the histopathological examination.

For further information on these incentives contact Roger Poland, Programme Coordinator, Surveillance on 04 498 9820 or email polandr@maf.govt.nz

Risk to human health

BSE belongs to the group of TSEs, several of which can affect humans. The most commonly known disease in this group among humans is Creutzfeldt-Jakob disease (CJD), a rare and fatal form of dementia that mainly occurs in individuals between the ages of 40 and 80.

CJD is not a new disease among humans, but in 1996, scientists discovered a new variety of CJD that occurs predominantly in younger people. The cases were also different from classical CJD in that the disease progressed more slowly and histopathology was different. The protein that accumulates in the brains of individuals with this new form of CJD resembled that found in cattle infected with BSE, rather than that found in classical CJD. Because of these differences, the new illness in humans is known as variant CJD or vCJD.

The occurrence of a new form of CJD in the UK, where there is a high incidence of BSE, suggested a link between the two diseases. The most likely origin of this new disease was human exposure to the BSE agent, through consumption of "risk materials" associated with British beef, including brain tissue, spinal cord and mechanically recovered meat (see below).

Like BSE in cattle, vCJD is always fatal in people. As of March 2001, 95 cases of vCJD (some unconfirmed) had been discovered in the UK.

Measures to protect human health in BSE affected countries

In countries where BSE occurs, the parts of cattle most likely to carry BSE must not be permitted to enter the human food chain. These parts are known as Specified Risk Material (SRM) and include brain tissue and spinal cord. As a precaution, SRM from sheep is also excluded from human consumption.

Some meat products include mechanically recovered meat (MRM): meat stripped from the bone at high pressure because it is impossible to remove by hand. Because MRM taken from the spine can include fibres of central nervous tissue that may carry BSE infectivity, the use of MRM from the backbones of grazing animals is now banned in BSE-affected countries.

The New Zealand situation - Variant CJD

Imports of beef and beef products from the UK were suspended in 1996. Early this year, all imports of beef and beef products from the European Union were suspended.

Variant CJD (vCJD) has never been diagnosed in New Zealand. While it is unlikely that BSE will occur in cattle in New Zealand, it is likely at some time in the future that vCJD will be seen in humans in New Zealand. This is because many New Zealanders lived in the UK in the period of highest risk from 1980 to 1996 and ate British beef which may have included risk material. In addition, some New Zealanders might have been exposed to risks from products imported from the UK before the ban that was imposed in 1996. The risk to individuals is extremely low. Fewer than 100 cases of vCJD have ever been detected anywhere in the world.

Feline Spongiform Encephalopathy (FSE)

FSE is a fatal, progressive neurological disease of cats characterised by abnormal behaviour, locomotor disturbance and, in most cases, altered sensory responses. It is one of the group of diseases known as transmissible spongiform encephalopathies (TSEs), which cause subacute spongiform encephalopathy in different species, due to proliferation of an altered form of a normal intracellular protein.

FSE has been seen only in felines: including cats, cheetahs, puma, ocelot and mountain lion.

All these cases are thought to have become infected by eating bovine tissues infected with bovine spongiform encephalopathy (BSE).

The New Zealand situation

CATS ARE IMPORTED INTO NEW ZEALAND FROM THE UK, THE ONLY COUNTRY WHICH HAS EXPERIENCED A SIGNIFICANT EPIDEMIC OF BSE. THE INCUBATION PERIOD OF FSE, BETWEEN EXPOSURE TO INFECTED TISSUES AND DEVELOPMENT OF CLINICAL SIGNS IS LONG, PROBABLY FROM A MINIMUM OF 1 YEARS TO 10 YEARS OR MORE. THIS MEANS THERE IS A POSSIBILITY THAT AN IMPORTED CAT COULD DEVELOP FSE. THIS IN ITSELF SHOULD POSE NO RISK TO OTHER ANIMALS, OR TO HUMANS, PROVIDED OF COURSE THAT TISSUES FROM THE CAT ARE NOT FED TO OTHER ANIMALS.

While it is unlikely that FSE will ever become a problem in New Zealand, isolated cases could occur in imported cats. Veterinarians should be aware of this possibility and include FSE in the differential diagnosis of nervous disease in cats, especially imported cats.

Diagnosis of FSE

Clinical signs develop gradually over several weeks. The first signs may be changes in behaviour, such as unprovoked attacks on family members or other pets, or increased timidity. Ataxia, usually first in the hindlimbs, abnormal behaviour and hyperaesthesia may be accompanied by one or more other signs such as hypersalivation, altered grooming, abnormal head posture, muscle fasciculation, polydypsia or polyphagia. The disease is incurable and fatal, usually over a course of about 8-12 weeks.

Diagnosis is by histopathology of brain and spinal cord tissue. If you suspect FSE, you should phone MAF's Exotic Pests and Diseases Hotline on **0800 80 99 66** or contact MAF's National Centre for Disease Investigation on 04 526 5600 to discuss submission of appropriate samples.

All transmissible spongiform encephalopathies, including FSE, are notifiable under the Biosecurity Act 1993. Any person suspecting a TSE in an animal in New Zealand must notify MAF. This would apply especially to a veterinarian who sees a case of non-responsive nervous disorder in a cat where FSE is a possibility.

Note that there would be no justification for destroying in-contact cats in the same household as an infected cat.

Disposal of dead pets

Dead pets should be disposed of by incineration or burial. Their remains must not be disposed of in a way that could lead to their being rendered into animal feed or fertiliser.

Scrapie

Scrapie is a progressive, fatal neurological disease of sheep and goats. It is one of the group of diseases known as transmissible spongiform encephalopathies (TSEs), which cause subacute spongiform encephalopathy in different species, due to proliferation of an altered form of a normal intracellular protein.

Scrapie occurs in Europe (including Belgium, Cyprus, France, Iceland, Ireland, Norway and the United Kingdom) and in the United States, Canada and Japan.

It is likely that the bovine spongiform encephalopathy (BSE) outbreak in the UK stemmed from feeding of meat and bone meal derived from scrapie-infected sheep to cattle.

Unlike BSE in cattle or FSE in cats, scrapie transmits from animal to animal.

Scrapie has occurred in New Zealand in imported sheep, and was eradicated by slaughter of newly imported animals and all in-contact sheep.

Veterinarians must remain on the alert for any cases that might resemble scrapie. This vigilance gives our trading partners greater confidence in our continued TSE-free status. It also helps to ensure that, in the unlikely event that should scrapie occur in New Zealand, it would be rapidly detected and dealt with.

Diagnosis of scrapie

The incubation period is long and variable. Clinical disease is seen usually in 2-5 year old animals. Behavioural changes, such as excitability, nervousness or aggressiveness, and abnormalities of gait and posture or hyperaesthesia may be seen. Pruritis is common leading to skin damage and loss of wool. Wasting and debility may occur. Death follows usually 2-6 weeks after onset of signs. Scrapie is incurable.

Diagnosis is by histopathology of brain and spinal cord tissue. If you suspect scrapie, you should phone MAF's Exotic Pests and Diseases Hotline on **0800 80 99 66** or contact MAF's National Centre for Disease Investigation on 04 526 5600 to discuss submission of appropriate samples.

All transmissible spongiform encephalopathies, including scrapie, are notifiable under the Biosecurity Act 1993. Any person suspecting a TSE in an animal in New Zealand must notify MAF. This would apply especially to a veterinarian who sees a case of non-responsive nervous disorder in sheep or goats where scrapie is a possibility.

Chronic wasting disease (CWD) of deer

CWD is a progressive, fatal neurological disease of deer and elk in the United States and Canada. It is one of the group of diseases known as transmissible spongiform encephalopathies (TSEs), which cause subacute spongiform encephalopathy in different species, due to proliferation of an altered form of a normal intracellular protein.

Unlike BSE in cattle or FSE in cats, CWD transmits from animal to animal.

Veterinarians must remain on the alert for any cases that might resemble CWD. This vigilance helps to ensure that, in the unlikely event that should CWD occur in New Zealand, it would be rapidly detected and dealt with. It also gives our trading partners greater confidence in our continued TSE-free status.

Diagnosis of CWD

CWD causes progressive weight loss with behavioural changes. Salivation, polydypsia and polyuria are common signs. Often inhalation pneumonia occurs due to nervous dysfunction, so CWD should be considered in the differential diagnosis of any severe pneumonia in deer.

The disease is fatal and incurable.

Diagnosis is by histopathology of brain and spinal cord tissue. If you suspect CWD, you should phone MAF's Exotic Pests and Diseases Hotline on **0800 80 99 66** or contact MAF's National Centre for Disease Investigation on 04 526 5600 to discuss submission of appropriate samples.

All transmissible spongiform encephalopathies, including CWD, are notifiable under the Biosecurity Act 1993. Any person suspecting a TSE in an animal in New Zealand must notify MAF. This would apply especially to a veterinarian who sees a case of non-responsive nervous disease or severe pneumonia in deer consistent with CWD.

Feeding of ruminant protein to ruminants is banned

Veterinarians are asked to assist in reminding farmers of the need to avoid feeding of ruminant protein to ruminant animals. This provision protects New Zealand's reputation as a producer of clean, safe and wholesome food and is critical to our maintaining access to valuable export markets for our animal products. It also ensures that, should a case of bovine spongiform encephalopathy (BSE) occur in New Zealand, either from an imported source or as an isolated spontaneous case, there is no possibility of the disease spreading to other animals.

Veterinarians are asked to be aware of the following and pass it on to their farming clients:

Reminder to Farmers

The Biosecurity (Ruminant Protein) Regulations 1999 forbid the feeding of ruminant protein to ruminant animals.

Although New Zealand is free of both BSE (bovine spongiform encephalopathy, sometimes called "mad cow disease") and scrapie, our credibility as a source of safe food and our access to overseas markets depends on all food producers abiding by legal requirements such as this ban.

These regulations require that:

- **YOU MUST NOT provide feeds containing meat and bone meal, blood meal, or bone meal to any ruminant animal (including sheep, beef and dairy cattle, deer or goats); or allow these animals access to these feeds.**
- **YOU MUST NOT allow ruminant proteins such as "blood and bone" that has been applied as a fertiliser to be consumed by ruminant animals during subsequent grazing.**
- **YOU MUST NOT use ruminant proteins in silage making.**
- **YOU SHOULD ALWAYS check the label of feeds fed to cattle, sheep, goats and deer to ensure they don't include ruminant proteins.**

For more details, contact
Ashley Edge, MAF Biosecurity, phone 04 474 4213, email edgea@maf.govt.nz
or visit the MAF website
http://www.maf.govt.nz/Standards/anbio/disstat/tse-faq.htm

Circular 6.4

26 November 2001

To all Garden Centres
Agricultural Supply Merchants

New Zealand needs your help to retain its BSE-free status

The cattle disease bovine spongiform encephalopathy (BSE or "mad-cow" disease) in the United Kingdom and other parts of Europe has undermined the confidence of European consumers towards eating beef. Fortunately New Zealand is BSE-free and, as a country dependent on agriculture for its economic survival, it is vital we remain free of the disease. The purpose of this letter is to advise you what steps you can take to help.

How can Garden Centres and Agricultural Supply Merchants Help?

New Zealand has an extensive BSE Programme. The Biosecurity (Ruminant Protein) Regulations 1999 are a part of this and forbid the feeding of ruminant protein to ruminant animals. This is because research indicates that BSE is spread when cattle are fed ruminant meat and bone meal contaminated with the BSE agent. The Regulations, or the "ruminant feed ban" as they are commonly known, ensures that in the unlikely event that any New Zealand cattle become infected with BSE, the disease would not be passed on to other stock as happened in Europe.

The Regulations require that any person who produces, trades in, or distributes fertilisers or stock feed containing ruminant protein must ensure that it is labelled as follows :

"Notice : not to be fed to sheep, cattle, deer, alpacas, goats or other ruminant animals"

If you sell animal feed that carries the above notice, or either of the following statutory notices :

"Notice : suitable for feeding to *[insert ruminant species or type]*" or
"Notice : suitable for inclusion in feed intended for ruminant animals"

then you are a "feed supplier" under the regulations. Unless you re-mix or re-bag feeds on your premises, your main responsibilities are to replace lost or illegible label notices on the products you stock, and to ensure your staff are fully informed about the requirements of the regulations.

"Ruminant protein" is protein derived from the tissue of a ruminant, except dairy produce. It includes the by-products from the slaughter of ruminant animals such as meat and bone meal, blood meal, bone meal and blood and bone fertilisers.

"Ruminant animals" include sheep, dairy and beef cattle, calves, deer, llamas, alpacas and goats.

Please make sure that the products you stock are clearly labelled as above. We would also ask you to take every opportunity to make sure your customers are aware of the regulations.

Fertilisers that are based on unadulterated fish meal or fish "blood and bone" and contain no ruminant protein are not restricted by this ban.

Over the next few months, MAF will be undertaking an audit to verify that these requirements are being met. Protecting New Zealand's BSE-free status is vital for our consumers, farmers, producers and exporters and we all need to play our part.

Should you have any queries, please check the MAF website at

www.maf.govt.nz/biosecurity/pests-diseases/animals/tse

or call Ashley Edge, MAF Biosecurity, on 04 4744100.

Yours sincerely

MAF Biosecurity Authority

MAF Food Assurance Authority

Meat New Zealand

Meat Industry Association of NZ (Inc)

New Zealand Dairy Board

New Zealand Game Industry Board

Federated Farmers of New Zealand (Inc)

Circular 6.5

30 May 2001

Dear Livestock Owner

Protect New Zealand's Market Access and Your Profitability!

The cattle disease bovine spongiform encephalopathy (BSE or "mad-cow" disease) in the United Kingdom and other parts of Europe has undermined the confidence of European consumers towards eating beef. Fortunately New Zealand is BSE free. It is important for New Zealand to stay this way in order to ensure that international consumers have the confidence to choose New Zealand red meat. The purpose of this letter is to advise you what steps you can take to help ensure New Zealand continues to be internationally recognised as BSE free.

How Can Livestock Owners Help?

The most important thing livestock owners need to know is that the feeding of ruminant protein to ruminant animals is forbidden under the Biosecurity (Ruminant Protein) Regulations 1999. This is because research indicates that BSE is spread when cattle are fed ruminant meat and bone meal contaminated with the BSE agent.

The Biosecurity (Ruminant Protein) Regulations 1999 or the "ruminant feed ban" as it is commonly known, ensures that in the unlikely event that any New Zealand cattle become infected with BSE, the disease would not be passed on to other stock, as happened in the UK and some European countries.

"Ruminant proteins" are the by-products from the slaughter of ruminant animals and include: meat and bone meal, liquid blood and bone, blood and bone meal, dried blood meal, and blood and bone fertiliser.

"Ruminant animals" include sheep, cattle/dairy cows/calves, deer, goats, llamas and alpacas.

The ruminant feed ban requires that you:

1. **Do not** provide or allow feeds containing ruminant protein such as meat and bone meal, liquid blood and bone, blood and bone meal, dried blood meal or other ruminants proteins (excluding dairy products) to be fed to any ruminant animal (including sheep, cattle/dairy cows/calves, deer, goats, llamas and alpacas).

2. **Do not** allow ruminant proteins such as meat and bone meal, liquid blood and bone, blood and bone meal that have been applied to pastures as a fertiliser to be consumed by

ruminant animals during subsequent grazing.

It is vitally important that ruminant protein is not fed to ruminants in any form. This includes ensuring that:

- cattle and calf feeds do not contain ruminant proteins – check the label or ask your supplier;
- ruminant proteins are not used in silage making;
- ruminant and non ruminant feeds are clearly labelled and kept separate;
- garden fertilisers that contain ruminant by-products such as blood and bone are kept away from where you store ruminant feeds;
- poultry or pig feeds are not fed to ruminant animals;
- if you use blood and bone fertiliser in the garden make sure that ruminant animals don't have access to the fertiliser;
- ruminant proteins are not spread on pasture and then consumed by ruminant animals during subsequent grazing.

Look, check and ask a vet

The signs of BSE include the loss of control of limbs, trembling, wide-eyed staring, swaying of the head and erratic behaviour including charging. However unlikely it may seem, if you suspect an animal is showing signs of BSE you should notify your local veterinarian immediately.

Thank you for your time in reading this letter and your co-operation in keeping New Zealand BSE free. Should you require any further information or clarification, look up the MAF website: **www.maf.govt.nz** or contact MAF tel: 04 474 4100.

MAF Biosecurity Authority
MAF Food Assurance Authority
Meat New Zealand
Meat Industry Association of New Zealand (Inc)
New Zealand Dairy Board
New Zealand Game Industry Board
Federated Farmers of New Zealand (Inc)

What is BSE?

BSE, also known as "Mad cow disease", is one of a group of brain wasting diseases generally known as transmissible spongiform encepalopathies (or TSEs). It occurs in adult cattle and was first identified in Britain in 1986. The disease is considered to have an incubation period of 3 to 5 years in animals. Brain cells develop microscopic holes resulting in the loss of control of limbs, trembling, wide-eyed staring, swaying of the head, and erratic behaviour including charging.

Scrapie is a different TSE that has been known for about 250 years to occur in sheep and goats. In addition, other TSEs include chronic wasting disease (CWD) that occurs in deer and elk, and transmissible mink encephalopathy (TME) that has been occasionally reported in mink since the 1960s. None of these TSE disease occur in NZ and it is vital we keep it this way.

Part Two. The original New Zealand BSE freedom case

Introduction

Executive summary

New Zealand's livestock populations are free from the transmissible spongiform encephalopathies, **scrapie** of sheep and goats, **BSE** of cattle, and chronic wasting disease of deer. This statement of freedom is based on the following evidence:

- In the two incidents where **scrapie** has been detected in sheep imported into New Zealand, the disease was eradicated by the slaughter and disposal of all in-contact sheep and resting or destocking pastures.
- **BSE** has never been recorded or reported in New Zealand.
- Passive surveillance for **scrapie** has been undertaken by the Ministry of Agriculture since 1952.
- Since 1990 New Zealand has had an active surveillance programme to monitor livestock for **scrapie**, **BSE** and chronic wasting disease of deer.
- New Zealand's claim to be free from **scrapie** and **BSE** has been recognised explicitly and implicitly by many regulators, scientists and academics.

New Zealand is confident it will remain free from the transmissible spongiform encephalopathies for the following reasons:

- **Scrapie** has been notifiable in New Zealand since 1955.
- **BSE** has been notifiable since 1989.
- **All** spongiform encephalopathies of animals have been notifiable since the Biosecurity Act was promulgated in 1993.
- With the exception of the abortive attempt to import British sheep in the 1970s, from 1952 to 1984 the importation of sheep and goats was prohibited from all countries except Australia.
- Since 1984 the importation of sheep and goat bloodlines has been permitted from certain countries assessed as posing a low **scrapie** risk.
- Imported sheep have been subject to quarantine restrictions which are now based on bioassay and a minimum 3 year quarantine period. The earlier programs were based

on a 5 year quarantine.

- All importations are subject to an embryo transfer barrier between animals born in a foreign country and local livestock.

- The importation from the United Kingdom of live cattle and bovine semen and embryos was suspended in December 1988 and May 1989 respectively.

- Following the adoption by *Office International des Epizooties* in May 1992 of Articles covering the safe trade in bovine products, New Zealand resumed imports, with additional BSE safeguards, of British bovine **embryos** and **semen** in October 1993.

- Importation of bovine semen and embryos was again suspended in March 1996 while new evidence on the **BSE** agent was evaluated.

- Since 1962, only Australian meat and bone meal, which had been heat treated and was accompanied with a valid import permit, has been permitted entry to New Zealand.

- There is a government-funded border control service within the New Zealand Ministry of Agriculture and Forestry whose purpose is to monitor the importation of animals, plants and their products and intercept any such importation that is either prohibited or without specific importation documents. This service is situated at all ports of entry into the country.

- The government funded exotic disease response program has a response capability for the transmissible spongiform encephalopathies.

- The absence of **scrapie**, and New Zealand's grass-fed, pasture based cattle management system, ensures that there is little likelihood of **BSE** entering the cattle population.

- Since 1990, the Ministry of Agriculture's active surveillance programs have included:

    a) a retrospective study (with negative results) on fixed bovine brains held in New Zealand animal pathology collections,

    b) an active education program to inform veterinarians and farmers of the clinical signs associated with the transmissible spongiform encephalopathies,

    c) a financial credit to veterinarians if they submit for laboratory examination brains from sheep, goats, cattle or deer exhibiting signs of progressive central nervous system disease,

    d) monitoring of the thirteen cattle imported into New Zealand from the United Kingdom between 1982 and 1988,

e) histopathological screening of brain tissue from all sheep, goat, cattle or deer submitted because the animal was exhibiting clinical signs of a nervous disease to either the Ministry of Agriculture Animal Health Laboratories, or the Ministry of Agriculture-approved private veterinary diagnostic laboratory or Massey University veterinary post mortem facility. Commencing in 1998 the Government funded the cost of the laboratory examination for brains from cattle, sheep and goats, 2 years of age and older, and

f) laboratory examination of brains from cattle, sheep, goats and deer which exhibited central nervous signs at ante mortem inspection prior to slaughter.

New Zealand is demonstrably free from scrapie and BSE

New Zealand's livestock populations are free from the transmissible spongiform encephalopathies, **scrapie** of sheep and goats, **BSE** of cattle, and chronic wasting disease of deer. **All** transmissible spongiform encephalopathies of animals are gazetted as notifiable diseases under the Biosecurity Act 1993.

The statement of freedom is based on the following evidence.

1. Structure and dynamics of the cattle, sheep and goat populations

1.1 Land usage

Land usage includes farming (pastoral, horticultural and crops), forestry, and conserved Crown lands including mountains and forests. Inland water resources (lakes and rivers) are used for hydroelectric projects, irrigation and recreation. While agriculture is predominantly pastoral there are also an efficient horticultural, cropping and silviculture sectors.

All classes of livestock, with varying stocking densities, are found throughout the country. Sheep farming predominates in the south and east of the South Island, while beef cattle numbers are greater in the north and east of the North Island. Dairying is concentrated in the Waikato, Taranaki and Manawatu regions, but populations of dairy farms are established throughout both islands.

Farming occurs on the Chatham Islands, but the production is not significant from a national perspective and the stock are quite isolated from the national herd/flock.

Livestock production is based on a grazing farm management system with only minimal concentrate supplement and few, recently developed, feedlot operations. Grass growth is seasonal, largely dependent on location and climatic fluctuations, but normally occurs between 8-12 months of the year. Although livestock are rarely housed, pasture supplements (hay, silage, brassica crops etc) are essential in many areas during winter. Animal proteins are not recycled through animal feeds. The more intensive industries, pigs and poultry, which depend on concentrate feeding, have a degree of vertical integration. The average livestock farmer is well-educated and experienced in animal husbandry.

1.2 Stock numbers

Stock numbers by type and age are listed in the following tables.

Table I: Number of sheep on farm as at 30 June 1995.

Rams (two tooth and over)	516,374
Ewes (two tooth and over)	34,541,537
Ewe hoggets	9,574,860
Hoggets - ram	578,549
Hoggets - wether	2,160,143
Wethers (two tooth and over)	1,246,002
Other sheep	198,807
Total Sheep	**48,816,271**

Table II: Lambing during year ended 30 June 1995.

Lambs marked and/or tailed	37,017,649

Table III: Number of dairy cattle on farm as at 30 June 1995.

Dairy cows & heifers 2 years old and over	2,715,458
Rising 2 year old dairy heifers	596,163
Rising 1 year old dairy heifers and heifer calves	722,841
Bobby calves still on farm at 30 June 1995	17,807
Other dairy cattle	6,004
Total dairy cattle	**4,089,817**

Table IV: Dairy cattle calving during year ended 30 June 1995.

Dairy calves born	2,499,028

Table V: Beef cattle on the farm as at 30 June 1995.

Beef cows & heifers to be used for breeding	2 years old & over	1,425,379
	1 & under 2 years	191,481
Beef cows & heifers not used for breeding	2 years old & over	149,694
	1 & under 2 years	351,766
Beef heifers and heifer calves	Under 1 year old	647,782
Steers 2 years old & over		405,751
	1 year & under 2 years	679,788
	calves under 1 year	596,650
Non breeding bulls (all ages) ie. beef bull & dairy bull beef		604,221
Beef breeding bulls (all ages) not bull beef		88,052
Other beef cattle		41,943
Total Beef cattle		**5,182,508**

Table VI: Beef calves weaned during year ended 30 June 1995.

Total beef calves born & weaned on property	1,518,903

Table VII: Deer on farm as at 30 June 1995

Males 2 years old & over		204,975
	Under 2 years	249,424
Femalesmated since 30 June 1995		508,582
	Other	201,573
Other deer		14,150
Total Deer		**1,178,704**

Table VIII: Deer born on farm during year ended 30 June 1995

Deer (fawns and calves) weaned on farm	367,108

Table IX: Goats on the farm as at 30 June 1995

Total goats (excluding feral goats)	**227,942**

Table X: Number and type of farms as at 30 June 1995

Farm type	Number of farms
Dairying	14,747
Sheep	14,299
Beef	11,648
Deer	2,070
Mixed livestock	3,703
Goat	100

Figure I: Map from Agriculture Statistics 1994-95, Statistics New Zealand

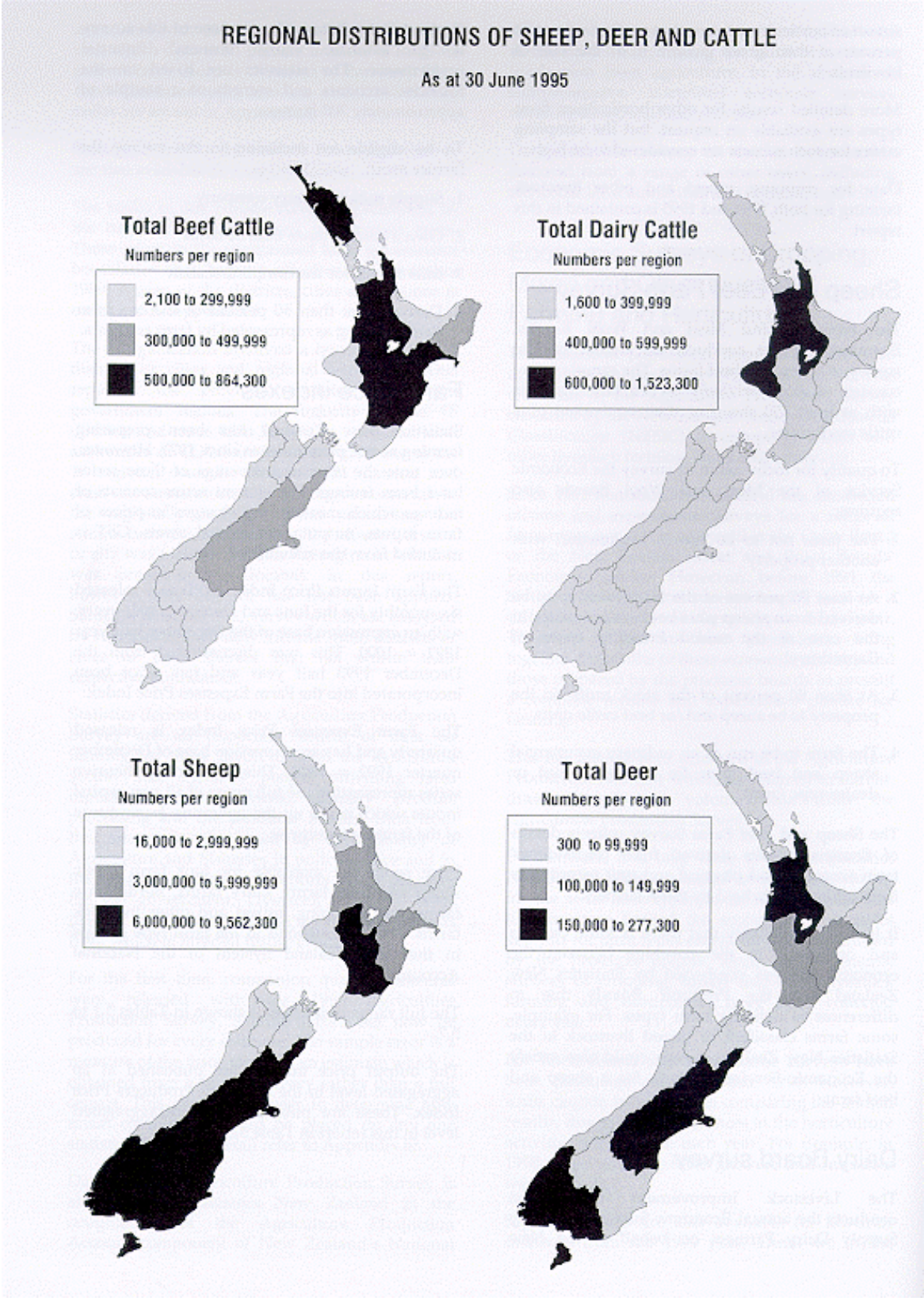


Table XI: Numbers of livestock slaughtered 01/01/1997-12/31/1997

Animal	Total kill
Lambs	26,963,956
Hoggets	252,643
Rams	37,403
Other adult sheep	5,524,364
Total adult sheep	5,814,410
Calves	1,374,335
Vealers	13,806
Calves and vealers	1,388,141
Heifers	520,418
Steers	809,918
Cows	745,745
Bulls	353,517
Heifers and cows	1,266,163
Steers and bulls	1,163,435
Total adult cattle	2,429,598
Goats	157,250

1.3 Identification of stock

There is no legal compulsion to identify stock. However, ear-tagging and branding, which includes earmarking and hide marking, are used almost universally for ownership identification and breeding purposes.

Disease control regulations under the Biosecurity Act 1993 require identification of infected animals. This is done under the supervision of personnel of the Government veterinary service or an officer accredited to do so. Close to 100% of dairy cattle are identified by the Livestock Improvement Corporation (a subsidiary of the Dairy Board) and are traceable through the Corporation's databases.

As part of New Zealand's bovine tuberculosis control program there is a requirement on all

cattle and deer farmers that cattle or deer can not be moved without a tuberculosis declaration card which provides some traceback ability.

1.4 Identification of Imported Animals

To meet market access requirements all sheep, goats and cattle imported into New Zealand are now identified by official MAF eartags. The tags are uniquely numbered, and denote that the animal has been imported, either by the letters "IMP" (printed on the white plastic tags) or the word "IMPORTED" (printed on the metal tag). In addition the tags are uniquely numbered. Products or by-products from an imported animal will be unacceptable for export to some markets eg. the United Kingdom.

The identification system will have a legal basis through the Biosecurity Act 1993 and regulations are currently being prepared which will require that the tags are to remain in the animal's ears for the entire life of the animal and that the owner must notify MAF if the tag is lost or becomes illegible, so that a replacement tag can be issued. It will be an offence to remove, deface or amend tag.

A register of imported animals, their owners and property of residence, is maintained by the Chief Meat Veterinary Officer. The register is updated every time animals are transferred to new owners, or when animals are sent to slaughter or die.

1.5 Genotyping of New Zealand sheep

The susceptibility of New Zealand sheep to scrapie had previously been demonstrated by Hourrigan in the United States.

Genotyping studies conducted at the BBSRC/MRC Neuropathogenesis Unit, Edinburgh have demonstrated that there are sheep in the New Zealand flock that are fully susceptible to **scrapie**, thus reinforcing the contention that scrapie would manifest itself if present in this country. During 1994 and 1995, 224 New Zealand Cheviot and Suffolk sheep were genotyped at the Neuropathogenesis Unit. Of the 102 Cheviot sheep, 17% were found to be of a susceptible genotype (VA_{136} RR_{154} QQ_{171}). In the case of the 112 Suffolks, 44% were of the highly susceptible AA_{136} RR_{154} QQ_{171} genotype.

These results were confirmed in 1997 when the Institute for Animal Science and Health (ID-DLO), Lelystad, The Netherlands and the Central Veterinary Laboratory, Weybridge, United Kingdom genotyped an additional 400 New Zealand sheep of various breeds.

2. Animal Trade

2.1 History of trade

The establishment of the New Zealand sheep-farming industry in the 19th century was accomplished without the introduction of scrapie. Possible reasons for this are discussed in Appendix I.

There have been two incidents when **scrapie** has been detected in sheep imported into New Zealand. The first was associated with the importation of Suffolk sheep in 1950 and involved the slaughter of sheep in 1952 and 1954. The second incident occurred in the 1970s in sheep which were still in quarantine. One breed of sheep was slaughtered in 1976 and the entire importation in 1977. In both incidents the disease was eradicated by the slaughter and disposal of all in-contact sheep, and resting or destocking pastures.

- In 1952 **scrapie** was diagnosed in a 3-year-old Suffolk ram and two 3-year-old Suffolk ewes imported from England in 1950. All the Suffolk sheep on the property and high risk animals that had been moved from the property were slaughtered. In 1954 the disease was confirmed on one farm in four sheep that had originated from the flock affected in 1952. All in-contact animals were slaughtered and pastures were rested. A total of 4,339 sheep were slaughtered and 191 farms were quarantined for 3 years.

- In 1976 a case of **scrapie** was diagnosed in a ewe being held in quarantine on an off-shore island. The animal was the offspring of an East Friesian ewe, one of a number of sheep representing four breeds imported from Britain. All the imported East Friesian sheep and their New Zealand-born progeny were destroyed and the quarantine was extended for all the remaining sheep. In 1977 a Finnish Landrace ewe amongst these remaining sheep developed the disease while still in quarantine. At that point all the sheep associated with that importation were slaughtered, incinerated and their ashes buried. The land on which they were grazed has never been restocked. There have been no further attempts to import sheep or goats from the United Kingdom.

BSE has never been recorded or reported in New Zealand. Not only is **scrapie** absent, but the cattle management system ensures that there is little likelihood of the disease entering the cattle population. **BSE** is essentially a feedborne disease spread through the practice of feeding cattle a ration containing meat and bone meal. New Zealand's cattle and sheep industries are based on grass-feeding and there has never been much demand for concentrates for feeding ruminants, particularly those containing meat and bone meal. The importation of bone meal has been restricted since early this century as a measure to exclude anthrax, which also does not occur in New Zealand (see Appendix II). So far as can be determined, importation of meat and bone meal for use in livestock rations has never occurred from any country except Australia. Since 1962, only Australian meat and bone meal, which has been heat treated and is accompanied with a valid import permit, has been permitted entry to New Zealand.

The feeding of meat and bone meal to ruminants is currently subject to a voluntary industry-wide prohibition pending the promulgation of legislation giving such a prohibition the force of law.

Since 1990 New Zealand has had an active surveillance program to monitor livestock for **scrapie**, **BSE** and chronic wasting disease of deer. Passive surveillance for **scrapie** has been undertaken by the Ministry of Agriculture since 1952 and **scrapie** has been notifiable since 1955.

Extensive protective measures are in place to prevent the introduction of **BSE** or **scrapie**:

- **Scrapie** has been notifiable in New Zealand since 1955, and associated compensation was available under the Stock Act 1908, and the Animals Act 1967. Compensation under the Biosecurity Act 1993 is currently being reviewed.

- **BSE** has been notifiable since 1989.

- **All** spongiform encephalopathies of animals have been notifiable since the Biosecurity Act was promulgated in 1993.

- With the exception of the abortive attempt to import British sheep in the 1970s, referred to above, from 1952 to 1984 the importation of sheep and goats was prohibited from all countries except Australia. Since 1984 the importation of sheep and goat bloodlines has been permitted from certain countries assessed as posing a low **scrapie** risk.

Such importations have been made from Denmark, Finland, Sweden, Zimbabwe and Israel. Even though New Zealand experts consider these countries to constitute minimal risk, so far as scrapie is concerned, imported sheep have been subject to quarantine restrictions which are now based on bioassay and a minimum 3 year quarantine period. The first of these was released in December 1994. The earlier programs (Denmark, Finland, Zimbabwe) were based on a 5 year quarantine (see Appendix III).

All importations are subject to an embryo transfer barrier between animals born in a foreign country and local livestock. The bioassay involves mesenteric lymph node tissue from the embryo donors being inoculated by the intracerebral and intraperitoneal route into young goats, five goats per sheep sampled. The sentinel goats are monitored for clinical signs of disease and slaughtered at the end of the program when their brains are examined for evidence of **scrapie**.

The embryo-derived progeny of the original imports are released only if these findings are negative and there has been no histopathological evidence of scrapie in exotic animals which have died during the program. The sentinels and exotic animals are subject to a careful monitoring for scrapie throughout the quarantine period. Any original import, their first generation progeny, or sentinel, of any age, which dies is subject to a full necropsy

examination by a government veterinarian within two hours to ascertain the cause of death. In addition, the brain is examined for evidence of scrapie. In cases where autolysis has compromised the ability to conduct appropriate histopathological examination, brain tissue is sent to the Central Veterinary Laboratory, Weybridge, United Kingdom, for examination for SAF.

In these programmes, any exotic animal less than 12 months showing signs suggestive of neurological disease, and animals more than 12 months that die, have their brains examined for evidence of scrapie. Before the termination of the program the original imports are slaughtered and their brains are examined. A single case of **scrapie** at any stage in the quarantine program would result in the destruction of all the animals in the program as happened in 1977.

With respect to importation of meat and bone meal, since 1962 the only product permitted entry has been that from Australia.

A government-funded border control service within the New Zealand Ministry of Agriculture and Forestry monitors the importation of animals, plants and their products and intercepts any importation that is either prohibited or without specific importation documents. This service is situated at all ports of entry into the country.

In response to the **BSE** epidemic, the importation of live cattle and bovine semen and embryos from the United Kingdom was suspended in December 1988 and May 1989 respectively. Following the adoption by *Office International des Epizooties* in May 1992 of Articles covering the safe trade in bovine products, New Zealand resumed imports of British bovine embryos and semen in October 1993. Importation of live cattle was not resumed. Importation of bovine semen and embryos was again suspended in March 1996 while new evidence on the BSE agent was evaluated.

The government funded exotic disease response program has a response capability for the transmissible spongiform encephalopathies.

2.2 Import details for goats, cattle, sheep, including semen and embryos.

Table XII: Importations from different countries, 1985

1985	AUSTRALIA	USA	CANADA	UK	AUSTRIA	NORWAY
EMBRYOS						
GOATS	700					
CATTLE			1008	130		
SHEEP						
SEMEN						
GOATS						
CATTLE	41607		25120	55730	3850	300
SHEEP	1permit					
ANIMALS						
GOATS	3705					
CATTLE	9	1	1	3		
SHEEP	59					

Table XIII: Importation from different countries, 1986

1986	AUSTRALIA	USA	CANADA	UK	DENMARK	FINLAND	ZIMBAB
EMBRYOS							
GOATS	3190						1000
CATTLE	50		290	50			
SHEEP	20						
SEMEN	No semen records found.						
GOATS							
CATTLE							
SHEEP							
ANIMALS							
GOATS	24580						
CATTLE	33	1	9	4			
SHEEP	322				255	107	

Table XIV: Importations from different countries, 1987

1987	AUSTRALIA	USA	CANADA	UK	AUSTRIA	ZIMBAB	GERMANY
EMBRYOS							
GOATS	5585					1514	
CATTLE			432	782			250
SHEEP	405		38				
SEMEN							
GOATS	2587						
CATTLE	31910	29725	25004	27590	800		300
SHEEP	7747						
ANIMALS							
GOATS	3844						
CATTLE	42			6			
SHEEP	162						

Table XV: Importations from different countries, 1988

1988	AUSTRALIA	USA	CANADA	UK	DENMARK	AUSTRIA	BELGIUM	GERMANY	ZIMBAB
EMBRYOS									
GOATS									2225
CATTLE	192		281	1065					
SHEEP	1406								200
SEMEN									
GOATS	636								
CATTLE	122410	90882	47346	87374	400	1650	500	900	
SHEEP	5805								
ANIMALS									
GOATS	704								
CATTLE	43		3						
SHEEP	288								

Table XVI: Importations from different countries, 1989

1989	AUSTRALIA	USA	CANADA	UK	DENMARK	SWEDEN	BELGIUM	ZIMBAB
EMBRYOS								
GOATS				305				974
CATTLE	325		956	907				
SHEEP	482							
SEMEN								
GOATS	2442							
CATTLE	43281	98325	127591	4750	200	280	8000	
SHEEP	4991							
ANIMALS								
GOATS	13							
CATTLE	20		36					
SHEEP	21							

Table XVII: Importations from different countries, 1990

1990	AUSTRALIA	USA	CANADA	UK
EMBRYOS	No Embryo records found.			
GOATS				
CATTLE				
SHEEP				
SEMEN				
GOATS	4700			32
CATTLE	50538	4608	34045	43938
SHEEP	14794			
ANIMALS	No Animal records found.			
GOATS				
CATTLE				
SHEEP				

Table XVIII: Number of import permits issued between 1983 and 1988

Number of Import permits issued 1983 to 1988.						
	1983	**1984**	**1985**	**1986**	**1987**	**1988**
CATTLE	**7**	**26**	**11**	**30**	**31**	**27**
GOATS	**0**	**27**	**136**	**308**	**71**	**44**
SHEEP	**0**	**0**	**21**	**48**	**43**	**49**
SEMEN	**113**	**127**	**149**	**164**	**119**	**142**
EMBRYOS	**3**	**13**	**22**	**24**	**31**	**27**

Table XIX: Total Numbers Imported

	1985	1986	1987	1988	1989	1990
EMBRYOS						
GOATS	700	4190	7099	2225	1279	NO RECORD
CATTLE	1138	390	1464	1538	2188	NO RECORD
SHEEP		20	443	1606	482	NO RECORD
SEMEN						
GOATS		NO RECORD	2587	636	1912	4732
CATTLE	126607	NO RECORD	115329	350562	282427	133129
SHEEP	1PERMIT	NO RECORD	7747	5805	482	14794
ANIMALS						
GOATS	3705	24588	3894	704	13	NO RECORD
CATTLE	14	47	48	46	56	NO RECORD
SHEEP	59	684	162	288	21	NO RECORD

2.3 International recognition of New Zealand's scrapie and BSE free status

New Zealand's **scrapie**-free status is widely recognised by people with expert knowledge of the spongiform encephalopathies. New Zealand's freedom from **scrapie** and **BSE** has been explicitly acknowledged by a number of national veterinary services, medicine regulatory agencies, pharmaceutical manufacturers, scientists and academics. Some examples of such explicit recognition include;

- The British Government recognised New Zealand's scrapie- and BSE-free status by specifically exempting New Zealand sheep from measures imposed under The Heads of Sheep and Goats Order 1996. [Statutory Instrument No. 2264].

- The French Government recognised New Zealand's scrapie- and BSE-free status in the decree of 10 September 1996 granting a special derogation for the importation into France and the marketing of various products of New Zealand origin. [Journal Officiel de la République Francaise, 12 September 1996].

- The Chairman of the BSE sub-group of the European Commission's Scientific Veterinary Committee, R. Bradley, describing a British experiment to determine if **BSE** could be transmitted by embryo transfers wrote "All the constituents of animal origin ...were...sourced from New Zealand, a country devoid of **scrapie** and **BSE** in its national flocks and herds." (*Livestock Production Science*, 38, 51-59, 1994.)

- In the UK, the independent Spongiform Encephalopathy Advisory Committee, in a September 1994 report "Transmissible Spongiform Encephalopathies: A Summary of Present Knowledge and Research" explained that the 349 recipients used in a major experiment to determine whether embryos derived from **BSE**-infected cattle are infective were "...cattle imported from New Zealand, a country with neither **BSE** nor **scrapie**."

- Dr B.E.C. Schreuder, a member of the BSE sub-group of the European Commission's Scientific Veterinary Committee, in an article "Animal spongiform encephalopathies - an update Part 1. **Scrapie** and lesser known animal spongiform encephalopathies." *Veterinary Quarterly* ,16 (3), 174-81, 1994, wrote "....and only Australia, New Zealand, and South Africa appear to be free of the disease."

- Dr Richard Kimberlin, a member of the BSE sub-group of the European Commission's Scientific Veterinary Committee and the British Spongiform Encephalopathy Advisory Committee, has visited New Zealand on a number of occasions to advise the New Zealand Ministry of Agriculture on biosecurity and surveillance aspects of scrapie and BSE. Dr Kimberlin's recognition of New Zealand's scrapie-free status has been stated in a number of publications;

    - Kimberlin, R. H. (1981) Scrapie. *British Veterinary Journal* 137, 105-112.

    - Kimberlin, R. H. (1981) Scrapie as a model slow virus disease: problems, progress and diagnosis. In: *Comparative Diagnosis of Viral Diseases. Volume III, Vertebrate Animal and Related Viruses.* Edited by E. Kurstak and C. Kurstak, pp. 349-390. Academic Press, New York.

    - Kimberlin, R. H. (1983) Problems of long incubation viral diseases and their eradication. In: *Sheep Production*. Edited by W. Haresign, ch. 15, pp. 299-316. Butterworths, London.

    - Kimberlin, R. H. (1991) Scrapie. In: *Diseases of Sheep*. Edited by W. B. Martin and I. D. Aitken, 2nd edition, pp. 163-169. Blackwell Scientific Publications, Oxford.

- New Zealand is recognised as **scrapie** free by Professor Dominiqué Dormont, Chairman of the French Comite Interministeriel sur les ESST. In his report of 27 June 1996 [document no. 02/96], Professor Dormont says, "Enfin, l'Australie et la Nouvelle Zelande sont des pays indemnes de tremblante du mouton." ["Finally, Australia and New Zealand are countries free from scrapie of sheep."]

- Because New Zealand was recognised as scrapie-free, sheep from New Zealand were used in a major US study of the epidemiology of natural scrapie. They were found to be fully susceptible when exposed to infection. [Hourrigan, J, Klingsporn A, Clark, WW, de Camp, M (1979). Epidemiology of scrapie in the United States. In: *Slow Transmissible Diseases of the Nervous System*. Edited by S. B. Prusiner and W J Hadlow, volume 1. Academic Press, New York. Pp. 331-256.]

- The World Health Organisation document WHO/EMC/ZOO/96.1, *Report of a WHO Consultation on Clinical and Neuropathological Characteristics of the New Variant of CJD and other Human and Animal Spongiform Encephalopathies*, Geneva, 14-16 May 1996, states [page 4] "The absence of **BSE** and **scrapie** in Australia and New Zealand makes the epidemiological surveillance of CJD an important source of information for assessing the zoonotic risk of these diseases."

- In the Report of the Meeting of the OIE Ad Hoc Group on Bovine Spongiform Encephalopathy, Paris, 1-2 September 1994, the co-chairman Professor Carleton Gajdusek wrote of "**scrapie**-free countries like...New Zealand."

- N. Sargison, the British writer of an article "**Scrapie** in sheep and goats",. *In Practice*, November/December, 467-69, 1995, states that "... prompt identification and slaughter of imported sheep has kept these countries [New Zealand and Australia] **scrapie** free."

- In a paper entitled "**Scrapie**", published in *Revue Scientifique et Technique de l'Office des Epizooties*, volume 11, number 2, pages 491-537, 1992 , L.A. Detwiler stated "At present, the only countries which are generally accepted as being **scrapie** free are Australia and New Zealand".

- Canadian writers L. Petrie, B. Heath and D. Harold, in "**Scrapie**: Report of an outbreak and brief review", (*Canadian Veterinary Journal*, 30, 321-27, 1989) state "Authorities in New Zealand and Australia have been particularly vigilant in preventing the disease [**scrapie**] from becoming established in their national flocks."

- Because researchers at the BBSRC/MRC Neuropathogenesis Unit, Edinburgh, are confident New Zealand is **scrapie**-free, New Zealand origin milk powder is used to rear lambs involved in studies underway examining whether scrapie can be transmitted by embryo transfer.

- New Zealand origin bovine cerebrospinal fluid was used as negative control material in the development of a test for **BSE** developed at the Central Veterinary Laboratory, Weybridge.

- The New Zealand Ministry of Agriculture has agreed to provide British MAF

with samples of bovine urine to use as negative controls in the validation of an experimental urine test for **BSE**.

- Because New Zealand is recognised as free from the spongiform encephalopathies, researchers at the Institute for Animal Science and Health (ID-DLO), Lelystad, the Netherlands, are presently discussing with the New Zealand Ministry of Agriculture sheep material of New Zealand origin for use in **scrapie** research.

- The British Ministry of Agriculture, Fisheries and Food purchased New Zealand sheep for use in experiments on **scrapie** and **BSE**.

- The New Zealand Ministry of Agriculture has agreed to provide cattle brains for use as negative control material in experimental tests for BSE being developed at the British Central Veterinary Laboratory.

- New Zealand-origin sheep are to be used as scrapie free animals in a joint embryo transfer study being conducted by researchers at Utah State University.

- The New Zealand Ministry of Agriculture and Forestry provided brains from 1,000 cattle to be used as the negative control material in the large scale validation trials of four BSE diagnostic tests conducted under the auspices of Directorate-General XXIV of the European Commission, completed in June 1999. In the report of that trial, it was stated that “New Zealand was selected as the source for the negative material because of its widely recognised high status as regards freedom from TSE diseases.”

- The New Zealand Ministry of Agriculture and Forestry has agreed to provide sheep tissue sample for use as negative control samples in a validation study of a scrapie test developed by USDA Agricultural Research Service scientists in Pullman, Washington

2.4 Use made of imported animals, embryos or semen

Animals, embryos and semen are imported because they are perceived to be of superior genetic merit and so are used to improve breeding stock. No animals are imported for slaughter as such. However imported animals or those derived from imported genetic material will at the end of productive life be slaughtered.

2.5 Mechanisms used by slaughterhouses to identify animals and their origins, as well as data from these procedures.

The companies operating slaughterhouses identify animals by their ear tags, which are inserted by producers. There is as yet no national system of unique identification.

3. Animal Feed

Since 1962 only Australian meat and bone meal (MBM) which has been heat treated and accompanied with a valid import permit has been permitted entry into New Zealand. This material was not imported for use as stockfeed.

While ruminant material is the mainstay of the rendering industry and rendering in turn is a vital service to the meat industry itself, meat and bone meal has historically only ever been fed to a small minority of the ruminant population during critical periods of their lives. Most New Zealand ruminants are weaned onto grass and will never have access to any compound stock feed or feed supplement of any kind.

Approximately 733,000 tonnes of stock feed is compounded in New Zealand each year by NZFMA for domestic use, of which only about 70,000 tonnes is from ruminant material (72% of meat and bone meal produced is exported).

Most of the meat and bone meal used domestically is fed to non-ruminants, principally poultry and pigs

4. Meat and Bone Meal (MBM) Bans

A voluntary ban on the inclusion of ruminant protein (other than dairy protein) in stock feeds manufactured for ruminants was implemented in New Zealand in May 1996. This action was in response to the discovery in British patients of a new variant of Creutzfeldt-Jakob disease (nvCJD). The voluntary ruminant to ruminant feed ban was agreed between the New Zealand Feed Manufacturers Association (NZFMA) and Ministry of Agriculture on the understanding that legislation would follow to make it a statutory offence to feed ruminant protein to ruminant animals.

A public discussion paper has been produced and distributed as part of consultation with industry and the public. Submissions have now been received and analysed and the ruminant to ruminant feed ban is currently being drafted into legislation and should take effect from October 1998.

5. Specified Bone Offal (SBO) and Specified Risk Materials (SRM) Bans

Because of New Zealand's scrapie, BSE and chronic wasting disease freedom there are no specified bovine offals (SBO) or specified risk material (SRM) bans in place.

The Ministry of Agriculture and Forestry believe that risk management measures should be proportional to the risks and that the imposition of SBO or SRM bans would be excessive.

6. Surveillance of TSE, with Particular Reference to BSE and Scrapie

The Ministry of Agriculture and Forestry has an annual tax-payer funded animal disease surveillance budget of NZ$6.3 million and an exotic disease response budget of NZ$6.4 million. With respect to the transmissible spongiform encephalopathies, the Ministry has undertaken the following active surveillance programs:

- a retrospective study on fixed bovine brains held in New Zealand animal pathology collections.

- an active education program to inform veterinarians and farmers of the clinical signs of the transmissible spongiform encephalopathies.

- a financial credit to veterinarians if they submit for laboratory examination brains from sheep, goats, cattle or deer exhibiting signs of progressive central nervous system disease suggestive of a transmissible spongiform encephalopathy.

- monitoring of the twelve cattle imported into New Zealand from the United Kingdom between 1982 and 1988.

- histopathological screening of brain tissue from all sheep, goat, cattle or deer submitted because the animal was exhibiting clinical signs of a nervous disease to either the Ministry of Agriculture Animal Health Laboratories, or the Ministry of Agriculture-approved private veterinary diagnostic laboratory or Massey University veterinary post mortem facility. Commencing in 1998 the Government funded the cost of the laboratory examination for brains from cattle, sheep and goats, 2 years of age and older, and

- laboratory examination of brains from cattle, sheep, goats and deer which exhibited central nervous signs at ante mortem inspection prior to slaughter.

6.1 Surveillance prior to 1990

6.1.1 Sheep: The present system of targeted active surveillance for **BSE**, **scrapie** and chronic wasting disease was established in 1990. However, a passive surveillance system for scrapie had existed for many years. Between 1955 and 1962 the Department of Agriculture's Wallaceville veterinary laboratory examined 1,700 ovine brains. These were collected from sheep exhibiting signs of central nervous disease, neonatal deaths and abortions. The diseases reported in adult sheep were listeriosis, polioencephalomalacia, brain abscesses, ryegrass staggers, coenurosis, pregnancy toxaemia, hypocalcaemia and esosinophilic meningoencephalitis.

In the decade 1980 to 1990, the Ministry of Agriculture's animal health laboratories received samples from cases of ovine nervous disease from 2,340 flocks. Submissions averaged 313 (range 291-333) per year from 1980 to 1987, and 107 (range 101-111) per year from 1987 to 1990. The decrease in submission rate after 1987 is attributable to the introduction of laboratory charges. Aetiological diagnoses were made in 43.4% of cases (range 35% to 55% per year).

The most commonly diagnosed conditions in which an aetiological diagnosis was possible were cerebral listeriosis (330 cases), polioencephalomalacia (198 cases) and *Clostridium perfringens* type D enterotoxaemia/focal symmetrical encephalomalacia (150 cases). All other disorders individually constituted fewer than 1% of the total of diagnosed cases and included bacterial infections (*Actinobacillus lignieresii*, *A. pyogenes*, *Clostridium tetani*, *Corynebacterium pyogenes*, *Fusobacterium necrophorum*, *Salmonella* species, *Staphylococcus aureus*, *Streptococcus* species and *Yersinia pseudotuberculosis*), toxicoses (arsenic, lead, organophosphates, salt), hepatic encephalopathy mainly due to chronic sporidesmin toxicity, neoplasia, ryegrass staggers, hypomagnesaemia, hypocalcaemia and trauma.

6.1.2 Goats: Goats too were the subject of passive surveillance for **scrapie**. Between 1980 and 1990 the submission of samples for investigation of diseases presenting with nervous signs reflected the wax and wane of popularity of goat farming. From 1980 to 1986 the annual submission rate increased steadily from 49 cases in 1980, peaking at 323 in 1986. From 1986 there was a sharp reduction in submissions, with only 11 cases reported in 1990. Between 1980 and 1990 a total 1,091 goat cases were submitted to Animal Health Laboratories. Aetiological diagnoses were recorded in 355 cases (32.5%), the most common being vitamin B1 deficiency (122 animals), cerebral and spinal listeriosis (107) and copper deficiency/swayback (41).

Bacteria other than *Listeria monocytogenes* were recovered from a further 17 goats, with *Actinobacillus pyogenes*, *Staphylococcus aureus*, *Fusobacterium necrophorum* and *Salmonella* species being isolated. Neurological signs considered to be related to enterotoxaemia caused by *Clostridium perfringens* type D were recorded in 20 goats. Other diseases, which individually constituted fewer than 1% of the total cases examined, included plant poisonings (cherry laurel, lily of the valley, oleander, privet, rhododendron), hepatic encephalopathy due to ragwort toxicity and fascioliasis, chemical poisonings (arsenic, organophosphates, lead), metabolic disorders (ketosis, hypomagnesaemia, hypocalcaemia), tetanus, inherited disease (ß mannosidosis), caprine arthritis encephalitis, neoplasia and trauma.

6.1.3 Cattle: A computerised laboratory information system was set up in 1973. Between the setting up of this computerised system and 1989, the Animal Health Laboratories received submissions from 7,271 cases of neurological disease in cattle. Specific diagnoses were made in only 2,690 of these, usually because samples submitted were inadequate. Where diagnoses could be made, the most commonly diagnosed causes of central nervous disease signs in cattle were metabolic disease (38.5% of cases), poisoning (18.5%), bacterial disease (8.5%), polioencephalomalacia (8.5%) and hepatic encephalopathy (7.5%). Miscellaneous diagnoses

were made in a further 18.9% of cases.
6.1.4 Deer: Species of deer farmed in New Zealand include red deer (*Cervus elaphus*), elk (*Cervus elaphus nelsoni*), fallow deer (*Cervus dama*) and sika deer (*Cervus nippon manchuricus*). Mule deer (*Odocoileus hemionus hemionus*), black tailed deer (*Odocoileus hemionus columbianus*) and white tailed deer (*Odocoileus virginianus*), species in which chronic wasting disease has been reported in the United States, are **not** present in New Zealand.

Between 1973 and the establishment of the current targeted active surveillance program for spongiform encephalopathies, Animal Health Laboratories received submissions from 745 cases of deer exhibiting signs of central nervous system disorder. Specific diagnoses were made in 276 cases (37%).

The most common diagnoses were malignant catarrhal fever (35%), nutritional deficiencies (30%), bacterial diseases (12.5%) and polioencephalomalacia (4.5%).

6.1.5 Mink: There are no mink, either wild or farmed, in New Zealand. Mink have never been imported into New Zealand.

6.2 Retrospective study

In October 1988 a retrospective study of fixed, adult (over the age of 18 months) bovine brain sections held in Ministry of Agriculture and Massey University collections was undertaken for histopathological evidence of **BSE**. A total of 50 brains were reexamined and no lesions suggestive of **BSE** were found.

6.3 Awareness program

Written information in the form of circulars and “information kits” has been sent on a number of occasions to all registered veterinarians and livestock industry organisations to increase their awareness of the clinical signs associated with the transmissible spongiform encephalopathies in cattle, deer, goats, sheep and domestic cats. In all such communications recipients are reminded of their obligation under the Biosecurity Act to notify the Ministry of Agriculture and Forestry should they suspect a case of one of the transmissible spongiform encephalopathies.

Publicity about **BSE**, **scrapie** and chronic wasting disease has appeared regularly in agricultural and veterinary publications such as *The New Zealand Veterinary Journal, Vetscript, Surveillance, The Deer Farmer, The New Zealand Farmer, Straight Furrow, Vet Cervus* and Animal Health Laboratory newsletters.

There are approximately 1,990 veterinarians registered in New Zealand, of whom 230 are employed by the Ministry of Agriculture and Forestry and 970 are in clinical practice.

The Ministry of Agriculture and Forestry operates a series of Agricultural Security Consultative Committees in which officials, representatives of the livestock industry organisations and the veterinary profession meet regularly to discuss matters such as importation policies, disease surveillance and exotic disease preparedness. **BSE** and **scrapie** have been on every agenda since the first ASCC was established in 1991.

Even before the Ministry of Agriculture initiated its BSE awareness program in 1990, the New Zealand Veterinary Association's Sheep and Beef Cattle Society (290 members) had promoted awareness of **scrapie** amongst its members at three of its annual conferences (1977, 1985 and 1989). The New Zealand Veterinary Association's *New Zealand Veterinary Journal* published extensive correspondence on scrapie during the late 1970s following the abortive attempt to import sheep from the United Kingdom.

Veterinary undergraduates at the Massey University veterinary school receive a number of lectures and tutorials on **scrapie** and the other spongiform encephalopathies. The standard New Zealand sheep medicine text for veterinary undergraduates, *The Sheep: Health, Disease and Production* (Bruere, AN, West, DM, 1993), has extensive coverage of scrapie and related diseases.

Videos produced in the UK and Australia on the clinical aspects of **BSE** and **scrapie** have been used extensively by the Ministry of Agriculture and Forestry in training exercises with their own staff, final year veterinary students and veterinary practitioners. The Ministry of Agriculture and Forestry has provided copies of videos on scrapie and BSE to farmers' organisations.

6.4 Veterinary practitioner incentive

To encourage the submission to laboratories of brains from cattle, deer, goats and sheep exhibiting non-responsive nervous signs suggestive of a transmissible spongiform encephalopathy, a financial credit of $100, is provided to veterinary practitioners when such brains are received.

6.5 Laboratory screening

The Ministry of Agriculture's five regional Animal Health Laboratories, and one Ministry of Agriculture-approved private veterinary diagnostic laboratory, partake in a comprehensive screening program for the transmissible spongiform encephalopathies. The program comprises three components, which are as follows:

- screening, by laboratory veterinarians, of all laboratory submissions with a clinical history of nervous disease, to exclude the diagnosis of a transmissible spongiform encephalopathy,

- screening, by veterinary histopathologists, of all brains from adult animals with a clinical history of nervous disease to detect lesions of the transmissible spongiform encephalopathies. Commencing in 1998, the cost of this examination for cattle, sheep and goats is covered by Government funds, and

- investigation (including the collection of samples for laboratory examination), by Ministry of Agriculture veterinarians of cases where veterinary practitioners suspect a transmissible spongiform encephalopathy on the basis of clinical signs. This category also includes cases which on the bases of the clinical history, the laboratory pathologist includes transmissible spongiform encephalopathy in the differential diagnosis.

6.5.1 Screening of all laboratory submissions with a history of nervous disease;

From January 1990 to December 1997 laboratory veterinarians screened 5,353 cases with presenting clinical signs of nervous disease in cattle, sheep, goats and farmed deer. (Until January 1996 the clinical history code for farmed deer included illthrift as well as nervous disease. Since then the code has been limited to nervous disease.) These cases were referred to the laboratories for testing by veterinary practitioners. Cases were submitted for a variety of reasons, but spongiform encephalopathy was not explicitly suspected by the submitter. Nevertheless, as part of the surveillance program, in all cases the pathologists excluded the diagnosis of an infectious transmissible spongiform encephalopathy on the basis of clinical history and/or laboratory tests. The breakdown of the case numbers on a species basis is presented in Table XX.

Table XX: The number of cases with a clinical history of nervous disease submitted to Veterinary Diagnostic Laboratories, January 1990-December 1997.

Year	*Cattle*	*Sheep*	*Farmed deer*	*Goats*
1990	427	114	191	27
1991	363	104	158	26
1992	443	147	163	31
1993	538	161	214	22
1994	585	168	198	26
1995	431	106	186	21
1996	489	135	35	12
1997	581	189	36	31
Total	3857	1124	1181	196

In farmed deer the clinical history for the period January 1990 to December 1995 was nervous disease or illthrift. Commencing in 1996 the code was limited to nervous disease.

Cattle: Since January 1990, the laboratories have handled 3,857 bovine cases which had a clinical history of nervous disease. Of these, 2,452 cases were associated with cattle one year of age or older and a diagnosis was made for 913 of the cases (37%). The breakdown of the diagnoses is as follows:

Metabolic disease - 494 cases (20%),
Hepatic encephalopathy - 82 cases (3%)
Polioencephalomalacia -57 cases (2%),
Listeriosis - 44 cases, chemical poisonings - 41 cases, malignant catarrhal fever - 40 cases, bacterial infections other than listeriosis - 38 cases, and myonecrosis - 37 cases, (1- 2% for each disease).

All other disorders individually constituted fewer than 1% of the 2,452 cases examined and included toxicoses (lead, organophosphates, 1080), inherited diseases, trauma, neoplasia, ryegrass staggers, trace element deficiencies and plant poisonings.

Sheep: Since January 1990, the laboratories have handled 1,124 ovine cases which had a clinical history of nervous disease. Of these, 576 cases were associated with sheep one year of age or older and a diagnosis was made for 478 of the cases (82%). The breakdown of the diagnoses is as follows:

Listeriosis - 172 cases (30%),
Metabolic disease - 98 cases (17%),
Polioencephalomalacia - 76 cases (13%),
Bacterial organisms (excluding *Clostridium perfringens* type D) - 48 cases (8%), and *Clostridium perfringens* type D enterotoxaemia/focal symmetrical encephalomalacia - 26 cases (5%).

All other disorders individually constituted fewer than 1% of the 576 cases examined and included toxicoses (copper, lead, organophosphates, 1080, salt), hepatic encephalopathy mainly due to chronic sporidesmin toxicity, neoplasia, ryegrass staggers, trace element deficiencies and plant poisonings.

Deer: Since January 1990, the laboratories have examined 208 brains from farmed deer one year of age or older and a diagnosis was made for 87 cases (42%). The breakdown of the diagnoses is as follows:

Malignant catarrhal fever - 29 cases (14%)
Copper deficiency - 25 cases (12%)
Polioencephalomalacia, listeriosis and other bacterial infections - 6 cases each (3%).
Ryegrass staggers - 3 cases (1%)

All other disorders individually constituted fewer than 1% of the 208 cases examined and included mineral toxicoses, hepatic encephalopathy, neoplasia, plant poisonings and trauma.

Goats: Since 1990, 196 caprine cases with a clinical history of nervous disease have been submitted. Of these, 91 belonged to animals one year of age or older. A diagnosis was recorded in 50 cases (55%). The breakdown of the diagnoses is as follows:

Polioencephalomalacia - 13 cases (14%),
Listeriosis - 14 cases (15%), and
Bacterial organisms - 10 cases (11%)

Other diseases, which individually constituted fewer than 2% of the 68 cases examined, included copper deficiency/swayback hepatic encephalopathy, metabolic disorders and inherited diseases.

The diagnoses for all species are very similar to those reported for the period 1980-1990, except that in the 1990 to 1997 period there were more cases of metabolic disease in sheep. These were cases submitted to the South Island laboratories in associated with several severe spring snow storms.

6.5.2 Screening of all brains by histopathology;

Veterinary pathologists undertake routine histopathological screening for the spongiform encephalopathies of all brains from animals over the age of 1 year with a clinical history of a nervous disease. In the majority of these cases the clinical signs were not suggestive of a spongiform encephalopathy. Since January 1994, 942 brains have been screened. The information on a species basis is presented in Table XXI. Although this table only contains statistics for the number of brains examined since January 1994, there has been no significant change in the laboratory submission rate of fixed brain tissue since June 1986 when the laboratories introduced a charging structure for farmed animal cases.

The diagnoses obtained from this screening are included in Section 6.5.1.

Table XXI: Histopathological screening for transmissible spongiform encephalopathies in New Zealand. The number of brains screened from animals over the age of 1 year which were exhibiting central nervous signs.

No. examined	*Cattle*	*Sheep*	*Goats*	*Deer*
Jan 1994 - Dec 1996	233	310	44	63
1997	108	138	11	35
Total	341	448	55	98
No. positive for a TSE	0	0	0	0

6.5.3 Investigation into cases with a clinical history suggestive of a spongiform encephalopathy;

From September 1989 to December 1997 laboratory pathologists, and on some occasions field veterinarians, have investigated two buffalo, 70 cattle, five elk, six deer, eight sheep, one dog and six cats, either at the request of veterinary practitioners, or because the clinical history on laboratory submission forms indicated that a transmissible spongiform encephalopathy should be included in the differential diagnosis. All the animals except for several of the elk, which were illthrifty, exhibited nervous signs. Of the 70 cattle cases that were investigated, two animals recovered after treatment for metabolic disease and the results of the histopathological examination of the 68 brains from the remainder are presented in Table XXII. Listeriosis and hepatic encephalopathy accounted for 31% of the cases. The results associated with the eight sheep that were investigated are presented in Table XXIII. All suspected cases of transmissible spongiform encephalopathy examined are reported in *Surveillance*, the quarterly animal health publication of the New Zealand Ministry of Agriculture and Forestry.

Table XXII: Histological results from 68 cattle where BSE was included in the clinical differential diagnosis September 1989 - December 1997

Diagnosis	Number of animals
Brain oedema	1
Brain abscess/suppurative meningitis	2
CNS tumour	3
Hepatic encephalopathy	8
Inherited disease	2
Listeriosis	14
Malignant catarrhal fever	3
Polioencephalomalacia	4
Spinal cord trauma	5
Spongiform change (inconsistent with **BSE**)	2
Vascular lesion	1
No histopathological lesions in brain	23

NB: A total of 42 of these cases also appear in Table 2.

Table XXIII: Results of the eight sheep cases where scrapie was included in the clinical differential diagnosis September 1989 - December 1997

Diagnosis	Number of animals
Compressive myelopathy	1
Hepatic encephalopathy	1
Johne's disease	1
Listeriosis	1
Photosensitivity/dermatophilosis	1
Photosensitivity	2
Ryegrass staggers	1

6.5.4 Diagnostic techniques;

The laboratories use standard diagnostic techniques in screening tissues from animals suspected of being affected by one of the spongiform encephalopathies. Diagnostic criteria are those outlined in OIE's *Manual of Standards for Diagnostic Tests and Vaccines*. A *Standard for the diagnosis of transmissible spongiform encephalopathies of animals* was introduced in 1997 to ensure uniformity in the laboratory handling, examination, reporting and recording of nervous disease cases. The laboratories employ a number of pathologists who are Diplomates of the American College of Veterinary Pathologists. In 1990 Dr William Hadlow, recognised as a leader in the field of **scrapie** research and an internationally respected pathologist, provided tuition on **scrapie** histopathology to the Ministry of Agriculture's pathologists. A pathologist also received tuition on **BSE** and **scrapie** at the British Central Veterinary Laboratory and in 1996 three pathologists were tutored in the diagnosis of spongiform encephalopathies by Dr Gerald Wells at a workshop in Australia. Reference slides from British **BSE** cases and cases of **scrapie** are used for training purposes and are held in the Ministry of Agriculture's National Pathology Registry.

In instances when nervous tissue from suspected cases of spongiform encephalopathy has been autolysed, or is otherwise unsuitable for histological screening, or the histopathologist requires additional information as in recent cases from a dog and deer tissues are sent to the British Central Veterinary Laboratory to be examined for the presence of scrapie associated fibrils (SAF). Up to January 1998, tissue samples from 18 cases had been sent to the United Kingdom to be examined for SAF, with negative results in all cases.

6.6 Monitoring of imported cattle

An active surveillance program was established in 1989 to monitor the 13 cattle imported from the UK between January 1982 and December 1988. The owners of the animals and their veterinarians were provided with information about **BSE** and instructed to notify the Ministry of Agriculture should any of the animals exhibit signs of nervous disease. Ministry of Agriculture Veterinary Officers visit the owners and inspect the cattle annually, with the frequency of inspection increased to every 6 months in 1996. One bull has been exported, and eight have been slaughtered because they were no longer required for breeding purposes. One cow died during a severe snow storm. By May 1999 only one cow was still alive. She had been imported as heifers in 1987. She will, nonetheless, be kept under surveillance until she dies or is slaughtered.

In May 1999 MAF obtained from MAFF UK the subsequent BSE history of the herds from which the thirteen cattle had been imported in the 1980s. This information, and details of dates of birth, importation and death are given in Annex IV of Appendix IV.

6.7 Feline spongiform encephalopathy (FSE)

FSE has never been diagnosed in New Zealand. It is a notifiable disease under the Biosecurity Act 1993 and the Ministry of Agriculture has sent a circular to all registered veterinarians describing the clinical signs, the epidemiology and the requirement to notify the Ministry should the disease be suspected. Six cat cases where the disease was suspected have been referred to the Ministry of Agriculture's Animal Health Laboratories. None of these cases had histopathological lesions of a spongiform encephalopathy.

Between January 1991 and December 1995, 1,034 cats were imported from the United Kingdom. Records are not kept on the location of these animals, but veterinary practitioners have been alerted via circulars and laboratory newsletters of the importance of notifying suspected cases of FSE.

In April 1996 the importation of pet food containing bovine material from the United Kingdom was suspended. Pet food containing ovine material is permitted entry, without an import permit, if it is commercially packed, shelf-stable, and hermetically sealed. Some highly processed products are also approved for unconditional entry.

6.8 Creutzfeldt-Jakob disease (CJD)

In New Zealand between 1980 and 1995 there was an average annual incidence of 0.8 cases of CJD per million people. The rate was relatively stable with no cases having features suggestive of the variant form of CJD. The incidence was highest in those aged 60-79 years of age. Seven cases were linked to iatrogenic modes of transmission (growth hormone and cadaveric dura mater). The disease was made notifiable on 1 July 1996 and an enhanced surveillance system and case register were put in place. The register is maintained by the

Department of Medicine, University of Otago, Dunedin. In the last annual report, August 1997, three cases of sporadic CJD had been reported, one in a 70-year-old woman, one in a 64-year-old male and one in a 66-year-old male.

7. Rendering and Feed Processing

7.1 The rendering industry

Currently there are 41 facilities licensed under the Meat Act 1981 that render animal waste to meat and bone meals and tallow. Most facilities (79 %) are attached to the meat works which they primarily serve together with other processing sites operated by the same company. The remaining 21 % of renderers do not have a single dedicated waste source but collect material from slaughterhouses, butchers, tanners, further processors, pet food manufacturers or directly from farmers.

All 41 facilities which render animal waste produce meat and bone meal from waste which includes ruminant tissues. Approximately 246,000 tonnes of meat and bone meal are produced at these premises annually by rendering 1.1 million tonnes of raw material. In 1996, an estimated 72 % of meat and bone meal was exported. Eighteen renderers produce blood meal from time to time.

The use of meat and bone meal for fertiliser has dropped considerably over the last 20 years, probably because of the increased versatility of the product as a stock feed ingredient in domestic and foreign markets. The Ministry of Agriculture and Forestry estimates less than 1,000 tonnes of meat and bone meal per year is now used as fertiliser. Much of this is sold for home garden use as “blood and bone”.

7.2 Rendering systems

Not all of the possible permutations of rendering systems are presented here. The intent is to provide information about the most representative systems found in New Zealand.

7.2.1 Batch dry rendering

This system is the oldest type still in wide use throughout New Zealand.

Of the licenced rendering premises, some 33% have this system, rendering approximately 33% of the raw material processed at licensed premises and producing an estimated 56,000 tonnes annually of meat and bone meal (MBM).

A batch of raw material, which has been prebroken, is indirectly heated in a mechanically agitated, steam jacketed vessel called a melter. Fat is released and moisture is gradually boiled off leaving a mixture of fat, dried protein and bone. During the initial heating process, the melter's vents are left open, allowing the moisture to escape. The temperature reached in the melter is about 105^{o} C until the water is removed. The vents are closed and pressure builds up within the vessel,

usually between 2 - 3 bars. Time and temperature/pressure parameters vary, but a typical cycle would last a total of 180 minutes, and the pressure cycle of about 30 minutes duration will be applied after about an hour. An equivalent temperature of about 135^{o} C is achieved during this pressure step. This step improves the sterilisation, breaks down hair and wool, and softens bone. The pressure is then gradually vented. The process ends when the desired moisture content is achieved, typically between 3% and 9%. The temperature is used as an indicator of the moisture content. Occasional renderers do not include the pressure cycle.

The load is then discharged for further processing to separate the fat and solids. The process invariably starts using a simple percolating pan where the mixture is left for about 30 minutes to allow the free fat to float to the top where it can be drained off. The remaining material in the percolator is then treated to remove further fat. A mixture of methods can be used to achieve this separation. Commonly in New Zealand a screw press is used, but centrifuges or hydraulic presses are also possible. The fat (or tallow) obtained is then further refined and treated to remove the very fine particles of protein and residual water. This is usually done by the use of "polishing" centrifuges. Often also sulphuric acid is added to the mixture to assist the refining process.

The remaining solids (known as cracklings) are then milled to a consistent particle size and sold as MBM. A number of types and grades of MBM and tallow are possible depending on the composition of raw material, the process, and the type and degree of refining.

The standard sized melter (also called an "I well") will take between 2,000 and 3,000 kg. The exact amount is varied according to the composition of the raw material. Most plants in New Zealand will have a bank of I wells which operating in staggered cycles.

Typically a load of 3,000 kg will yield 750 kg of tallow and 750 kg of MBM. This is highly variable however.

7.2.2 Centrimeal semi-continuous process

This rendering system is occasionally used in New Zealand. Currently, there is one licensed rendering facility of this type, rendering approximately 5% of the total raw material processed in all licensed premises, and producing around 5,000 tonnes annually of MBM.

This system incorporates features of both wet and dry rendering. It is based on a short batch cooking cycle with only partial evaporation in a melter vessel, and subsequent continuous centrifugal separation of tallow, sludge and process water. The process water is recycled to the melter and the sludge is dried to MBM in a continuous dryer. The cooking cycle in the melter is approximately 60 minutes, which includes a 15 minute pressure cycle at 2.5 bars (equivalent to 135^{o} C).

7.2.3 Continuous dry rendering

1. High temperature

The typical system used in New Zealand is the "Keith Continuous". Of the licenced rendering premises, 11% have this system, rendering approximately 10% of the total raw material processed by licensed premises, and producing around 16,000 tonnes annually of MBM.

Continuous dry rendering is essentially the same as batch dry rendering with the following changes:

1. The flow of raw materials and rendered fat and crackling is continuous and at a constant level. Some systems are run on a semi-continuous basis with regular injections of a pulse of material rather than a true continuous flow.

2. There is no pressure cycle.

3. Temperatures within the system are at a gradient, with the input and output temperatures being measured.

Raw material, reduced to an even particle size, goes to a low level feed screw which discharges below the liquid level in the cooker to prevent discharge of vapours. Once the cooker is filled, the material is brought up to the operating temperature which can vary between 125^{o}C and 130^{o}C (taken at the discharge end). The time taken for this is between 160 and 180 minutes. The cooked material is then discharged at a constant rate and raw material is added at the other end at a similar rate. Retention time is approximately 120 minutes.

The efficiency of this system relies heavily on the capacities of the auxiliary equipment which precede and follow the continuous cooker. This, for example, would include the ability of the prebreakers and the meal driers to keep up with the cooker demands. Problems with supply of raw materials and with drying MBM lead to some companies adopting a pulse system instead of the true continuous system.

2. Low temperature

The common system present in New Zealand is the MIRINZ low temperature rendering system (MLTRS). There are slight variations. Of the licenced rendering premises, 30% have this system, rendering approximately 28% of the total raw material processed by licensed premises, and producing around 48,000 tonnes annually of MBM.

This system was designed to overcome some of the production limitations imposed by the older high temperature systems. In short high temperature systems tend to :

- overcook the tallow produced, reducing its versatility and therefore value (the levels of glycerides drops with harsher heat treatment, and the bleachability of the tallow is adversely affected by the excess heat).
- increase the emulsification of the tallow, making it more difficult to refine.
- denature the protein in the MBM, reducing its digestability and therefore its value as a stockfood additive.
- be energy hungry.
- be investment capital and space hungry.

Because the MLTRS overcomes the above limitations, this system produces the better quality tallows and MBM and has become the rendering system most commonly installed in new or upgraded plants.

Prebroken raw material is ground to a particle size of about 12.5 mm. The raw material is pumped into the rendering vessel at a controlled rate. A proportion (25-50%) of recycled tallow is also added to assist the material to flow like a liquid.

The vessel is an indirectly heated cylindrical container with high speed agitators so designed to only allow rendered material to rise to the top where it is allowed to exit. The temperature of the vessel is maintained at 95 ^{o}C and the residence time of material is between 2 - 10 minutes. Rendered material is pumped into a decanter centrifuge where the fat is rapidly separated, leaving a solid phase with 60 -65 % water and 6-8% residual fat. This solid phase is then fed into a drier system which can either be of continuous or batch types. It is this process step that provides the degree of "sterilisation" required.

7.3 The stock feed industry

Meat and bone meal is the principal source (42 % in 1996) of protein in compounded animal feeds in this country. It is commonly included in pig and poultry rations prepared by feed manufacturers or by individual pig and poultry farmers with their own feed mills.

In excess of 733,000 tonnes of stock feed is compounded in New Zealand each year by NZFMA members. About 50 % is consumed by poultry.

Most meat and bone meal used domestically is fed to non-ruminants, principally poultry and pigs. About half the protein used in the poultry segment of the feed market is now vegetable protein (usually US soybean meal) or fishmeal protein. On-farm milling is only found in the egg production sector of the poultry industry.

In the pork sector, 70 to 80 % of the compound feed is produced by "home milling", often with the inclusion of ingredients or supplements purchased from commercial feed mills.

7.4 On-Farm Feeding Practices

While ruminant material is the mainstay of the rendering industry and rendering in turn is a vital service to the meat industry itself, meat and bone meal has historically only ever been fed to a small minority of the ruminant population during critical periods of their lives. Most New Zealand ruminants are weaned onto grass and will never have access to any compound stock feed or feed supplement of any kind.

In 1995, the year before the voluntary feed ban was implemented, approximately 12 % of the stock feed compounded in New Zealand was fed to ruminants (5 % to calves and 7 % to dairy cows and other ruminants). Some of those stock feeds contained added protein, an amount which the Ministry of Agriculture and Forestry estimates was equivalent to 8,000 tonnes of (mostly ruminant) meat and bone meal. It is this quantity of high protein feedstock which has been replaced by fish meal, milk powder, soybean meal or other vegetable protein under the voluntary feed ban.

8. BSE and Scrapie-related Culling

As previously mentioned there have been two incidences of scrapie in New Zealand both associated with the importation of sheep from the United Kingdom. In these cases all in contact animals were slaughtered and the pastures rested. Whole of herd slaughter remains the most probably response to a case of BSE/scrapie in New Zealand.

9. Conclusion

New Zealand is free from the transmissible spongiform encephalopathies, **scrapie** of sheep, **BSE** of cattle, and chronic wasting disease of deer. This claim is based on long-standing policies designed to prevent the introduction of these diseases, and surveillance programs designed to detect them. Passive surveillance for **scrapie** has been operative since 1952, and the disease was made a notifiable disease in 1955. **BSE** was made notifiable in 1989. New Zealand's surveillance programs for **scrapie, BSE** and chronic wasting disease have been in place in their present form since 1990.

New Zealand's claim to be demonstrably free from **scrapie** and **BSE** has been recognised explicitly and implicitly by many regulators, scientists and academics.

The information presented demonstrates that New Zealand livestock are free from the spongiform encephalopathies, **scrapie** of sheep and goats, **BSE** of cattle, and chronic wasting disease of deer.

Appendix I: The establishment of the New Zealand sheep-farming industry

Scrapie Freedom

An essay on the scrapie-free development of
the New Zealand Sheep Industry

A. N. Bruère
February 1997[1]

Abstract

This paper chronologically documents the importation of sheep into New Zealand from the early stages of the nineteenth century until 1991. It includes the details of the various breeds imported and how these were varied to meet the changes which took place as sheep farmers moved from wool production to producing both wool and mutton. It emphasises the responsibility the early settlers took on themselves for disease control during the mass development of this industry and the efforts they made to control and finally eliminate sheep scab in 1898. With the establishment of the Department of Agriculture in 1893 effective national disease diagnosis and control measures were enacted

Reasons for the non-entry of the scrapie agent with these importations are given. These include the suggestions that the disease was localised to certain areas of Britain and had not infected many of the purebreeds which were imported at that time. Further, there is historical evidence that changes in the British sheep industry in the last century increased for a time the numbers of sheep killed for mutton before two years of age (i.e. before the symptoms of scrapie normally develop). The outbreaks of scrapie which occurred in New Zealand in 1952 and 1954 were due to infected Suffolk sheep imported in 1950. This coincided with similar experiences in other countries, including Australia, South Africa and North America. In 1954 scrapie was eradicated in New Zealand and occurred again in quarantined sheep only in 1976 and 1977. The entire flock of sheep was destroyed and disposed of by burning and burying. New Zealand remains scrapie-free and with all subsequent importations of exotic sheep great attention has been paid to ensuring that they have been sourced from low risk scrapie countries. In addition modern quarantine and surveillance

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procedures are used, which reduce the risk of scrapie entering the country to the lowest possible level.

Introduction

Freedom from the disease scrapie in the national sheep flock of any country is a treasure to be jealously guarded and a trade status of great significance. New Zealand and Australia are two major sheep farming countries which are recognised internationally as free of scrapie. How it came to be can never be proven, but extensive investigation of historical records dealing with the importation of sheep into both countries provides no evidence of scrapie in any of these sheep in the nineteenth century.

Only on one occasion in each country did scrapie occur in Suffolk sheep imported in 1950 from the United Kingdom. The occurrences were in 1952 and 1954 in New Zealand and in 1951 and 1952 in Australia. In both instances effective control measures eliminated the disease which has never reappeared in either country. In New Zealand scrapie was detected in recently imported sheep held in quarantine in 1976. Total slaughter of the imported consignment was undertaken and the quarantine areas are never to be used again for livestock. None of these sheep was ever in contact with sheep of the national flock.

In the nineteenth century large numbers of sheep and a variety of sheep breeds were exported from Europe, mainly Britain, to developing parts of the world. These countries included North and South America, Australia, New Zealand and South Africa. Most of the imported New Zealand sheep came from Britain and Australia. The Australian imports were also from Britain but did include sheep from Germany, Spain and France.

By the mid twentieth century scrapie had been reported in Canada, the United States of America, Australia, New Zealand, South Africa and in other sheep raising countries of the world. In New Zealand, Australia and South Africa the small occurrences of scrapie were contained and all scrapied sheep were destroyed. These three countries all claim scrapie freedom. The spread of scrapie in this century has principally been due to the importation of scrapie-infected Suffolk and Hampshire Down sheep from Britain. ***See Table 1.***

Table 1.
Recorded occurrences of natural scrapie outside Europe, 1930-1980
Modified after Parry (1983)

Region	Date	Breeds affected
North America		
Canada Ontario	1938	Suffolk, imported from U.K.
U.S.A. Michigan	1947	Suffolk, from U.K. and Canada
California	1952	Suffolk, imported
Ohio	1952	Suffolk, imported from Canada
Many states	1960	Mainly Suffolk: also Cheviot, Hampshire and Montadale
South America		
Colombia	1968-1971	Hampshire and Dorset Down, imported from U.K.
Brazil	1977	Hampshire Down (same flock of origin as in Colombia)
South Africa	1964 - 1972	Hampshire Down, imported from U.K.
East Africa		
Kenya	1970	Hampshire Down, imported from U.K.
Australia	1952	Suffolk, imported from U.K.
New Zealand	1952-1954	Suffolk, imported from U.K.
India		
Himalayan foothills	c. 1940	Local mountain breed, with imported Rambouillet stock

There is no reference to scrapie-disease in any of the millions of sheep imported and bred in either Australia or New Zealand during the nineteenth century or the first half of the twentieth century. At the same time scrapie was well recognised in Britain and other European countries. The total absence of the disease in both countries is hard to explain. However, the careful examination of historical records does suggest some good reasons why during the mass development of their sheep industries Australia and New Zealand remained scrapie-free.

While this essay deals primarily with the New Zealand national flock, consideration must also be given to Australian developments, since over time many sheep, mainly Merinos have been imported to New Zealand from Australia.

New Zealand Sheep Imports 1890s - 1950s

While the Merino was the major breed imported and bred in New Zealand up to the1890s a number of other breeds were also being imported. These came almost entirely from Britain. As well as the Southdown, English Leicester, Border Leicester, Cheviot and Romney Marsh mentioned previously, other breeds came from the large variety of local breeds which had evolved in Britain over the years. These included Lincolns, Shropshires, Scottish Blackface, Cotswolds, Dartmoors, Wensleydales, Ryelands, Suffolks, Hampshires, Dorset Horns, Oxford Down, Roscommon and probably others. Some of these were not suited to their new environment and their breeding was discontinued. (e.g. Scottish Blackface, Cotswolds, Oxford Down, Roscommon, Dartmoors, Wensleydales and Tunis). The Bharal imported in 1909 were for zoological purposes and probably the Tunis was for the same reason, but the records are not clear.

From Gilruth's time onwards the Department of Agriculture records suggest that most of the sheep which came from Britain were carefully selected and inspected for the presence of disease before embarkation. On arrival in New Zealand they were held in quarantine at one of the three quarantine stations which were established early in the 1890s. These were Quail Island in Lyttleton Harbour, Somes Island in Wellington Harbour and Motuihi in Auckland Harbour. The period of quarantine for sheep was a month and the main concern of the times was the exclusion of sheep scab and foot and mouth disease. Foot and mouth disease appeared several times in Europe during this period. The New Zealand Department of Agriculture reports state its occurrence in England in 1912-1913, 1914 and 1925-1926.

Between 1893 and 1913, over 1572 sheep were imported into New Zealand for stud purposes. The majority of these came from Britain, although Merinos from Australia were apparently quarantined under the same conditions as the British sheep. Unfortunately the details of the breeds and the port of origin were not mentioned in the Departmental reports after the early 1920s. Also, during World War I and World War II, the importations of livestock from the United Kingdom were very restricted. Nevertheless Table II gives a good picture of the nature and numbers of the various breeds imported earlier in the twentieth century. Probably the importations up to 1954 were similar, although breeds such as the Lincoln, Shropshire and Ryeland tended to fall from favour, and as mentioned breeds like the Wensleydale, Oxford Down, Roscommon and Scottish Blackface died out entirely.

In the late 1890s and into the earlier part of this century the Lincoln and English Leicester were used extensively in crossbreeding with the Merinos to produce halfbred sheep which were dual purpose and preceded the later rapid expansion of the Romney breed. Potentially any one of these breeds could have been the carrier of the scrapie agent and in hindsight selecting sheep from so many sources was the most likely way to import scrapie. But it did not happen until 1950 when it occurred in Suffolk sheep, a matter discussed later.

Table II

Sheep imported to New Zealand 1893-1913

(From Quarantine Records - 1907 not available)

Breed	Number of Rams	Number of Ewes	Total
Bharal	4 sheep - sex not stated		4 (Zoo animals)
Border Leicester	62	65	127
Cheviot	9	66	75
Dartmoor	2	5	7
Dorset Horn	7	22	29
English Leicester	36	44	80
Hampshire	4	-	4
Lincoln	47	15	62
Merino	304	-	304
Oxford Down	11	11	22
Romney Marsh	191	155	346
Roscommon	4	10	14
Ryeland	28	70	98
Scottish Blackface	2	4	6
Shropshire	89	83	172
Shropshire Down	4	4	8
Southdown	72	121	193
Suffolk	1	4	5
Tunis	2	6	8
Wensleydale	2	6	8
TOTAL	**881**	**691**	**1572**

Scrapie in Britain

Scrapie has probably existed in Britain for over two centuries and the earliest report of it by that name was in 1853 in Cheviot x Leicester sheep. Earlier reports (1799) from that country from Norfolk described the disease as rubs and the affected sheep as rubbers. Even at that stage the clinical aspects of the disease were well defined and a shepherd's description of the time is as follows:

"They rub themselves in all attitudes - skins are clean without the least sign of scab - never observed that it was catching - the better the food the worse they become - some few taken as if mad, jumping and staggering as if drunk; but very few have all these symptoms - die in three or four months". The disease was thought to be incurable.

It is believed that scrapie entered Britain by either way of Spanish Merinos imported directly from Spain or Merinos imported directly from Saxony in Germany. The support for this conclusion is based on the first accounts of the disease in Britain being given in connection with a flock in which there was direct evidence of Merinos having

been introduced and it was given a few years after the chief introduction of Merinos into England. Although scrapie may have been present in some flocks in the 1700s it does not appear to have been widespread. Valuable support for this belief comes from the legendary work of the pioneer livestock breeder, Robert Bakewell (1725-1795). In all his extensive breeding programmes, mainly with Leicester sheep, he made no mention of scrapie. The diseases of chief concern at the time appear to have been liver fluke (known as liver rot) and footrot. However, numerous reports suggest that by the beginning of the nineteenth century scrapie was well established in Britain and in some flocks was causing very high losses. A flock owner in Cambridgeshire reported the loss of 240 out of 500 sheep. It was also reported in Lincolnshire (1799) and in Yorkshire (1812). It was also present in sheep in Northumberland and the Borders. An important point which emerges from many of these reports is that the stockmen who noticed it were sure that this was a new disease. It was different from sturdy (*Coenurus cerebralis* infestation) and was not scab as the skins were described as "rubbed clean" (little or no scab formation).

The vexing point about scrapie in Britain is that until recently it was not a notifiable disease of sheep, hence it is extremely difficult to estimate its prevalence at any time, or to study its epidemiology in that country. Further, making it notifiable does not mean that all cases will be reported. Sir John M'Fadyean in 1913 was well aware of this point and is quoted as follows:

"There is still quite naturally a tendency towards concealment, it is not possible to form any estimate as to the number of farms on which it occurs. Available evidence suggests its distribution is very irregular". He goes on - "It is especially prevalent in large tracts of hill pasture, where throughout their lives the sheep are seldom or never seen except by the owner or his shepherds. As might be expected, when knowledge of the existence of the disease on a farm does leak out, that can often be traced back to information passed on more or less casually from one shepherd to another".

In summarising numerous reports, it would appear that the overt disease either disappeared from or was dramatically reduced in incidence in the British sheep population somewhere between 1800 and 1850. (A period when many of our earlier importations of a variety of breeds took place). This point is explained by Sir Stewart Stockman (1913) who claimed that at that time in many regions, the production of mutton with the consequent breeding for slaughter led to the removal of many sheep before the scrapie age of two years. It is also believed that probably following the serious occurrences and then apparent lessening of the disease in some traditional sheep raising areas, that the majority of purebred sheep flocks were not affected until more recent times. However, the most likely reason that many breeds such as the Romney Marsh or Kent sheep remained free of scrapie is that they were confined to particular parts of the country and were not involved in cross-breeding.

From the New Zealand position the latter point has real significance, since the Romney Marsh (later in New Zealand, the New Zealand Romney) became the

backbone breed of our sheep industry. It seems that none of the Romney sheep imported into New Zealand were scrapie carriers and further the purebred Kent sheep of that time and even till as late as 1977 have never been scrapie infected. In 1976 the writer had occasion to visit a number of Kent Romney Marsh stud farms. The owners of these assured me that scrapie had not occurred in the history of their sheep. A very experienced veterinary surgeon, Mr. R.G.Ogle, who had practised in Kent since the 1940s also confirmed this opinion and said that only when exotic breeds of sheep (Finn, East Friesian etc) had been recently introduced to the area had scrapie appeared in cross-bred sheep. His opinion was confirmed by a report from Mr. Finlay, Veterinarian of the Ministry of Agriculture, Veterinary Investigation Offices at Wye, Ashford in Kent, who stated that:

"They carry out disease investigation over the whole of South East England and between 1971 to 1977 he was able to say that there was no recorded case of scrapie in Romney sheep, nor had he ever heard of one".

The last importations of Romney Marsh sheep into New Zealand were well before this time. In all probability those that were imported earlier, were by good fortune, scrapie free. With respect to the other breeds, we can only assume that their disease status was the same as the Romney, scrapie free. So the New Zealand sheep industry remained free of scrapie until 1952. There is still an important point to be explained. Scrapie has been recognised in Suffolk sheep in Britain for many years and this breed has been responsible for the spread of scrapie not only to other countries (Table 1) but since the Suffolk is a main x-breeding sire in Britain, to many farms in that country as well. Therefore, why was scrapie not introduced into New Zealand by Suffolk sheep before 1952? Again only the facts on importations can be presented, and these with an obvious degree of luck give the answer.

The first Suffolk sheep were imported into Auckland New Zealand in 1903 by Mr A Loader. However, there is no record of their fate. The next importation was in 1913 by G. Gould of Canterbury who is generally considered to have started the limited use of this breed which remained in very small numbers until the 1970s when its use became popular as a terminal sire. The Suffolk was seldom used as a terminal sire in the first half of this century because the main export lamb trade was based on a small 10kg - 12kg carcass. These were mainly produced by crossing the Southdown rams with Romney, Halfbred or other wool producing breeds. The black fibre produced by the Suffolk caused meat inspection problems in the export trade, which also impeded its use in New Zealand. This was to change later as the meat industry had an increasing demand for heavier and leaner carcasses. Hence the increase in popularity of the larger mutton breeds such as the Suffolk, Dorset Horn and Texel. By 1940 there were only nine small registered Suffolk flocks and further importations ceased for over 10 years because of war. The first appearance of scrapie in New Zealand was

in a Suffolk ram in 1952 imported into New Zealand in 1950. The slow acceptance of the Suffolk breed in New Zealand has most likely been the main reason that the disease never occurred here before this time.

The 1952 - 1954 Eradication of Scrapie in New Zealand

At almost identical times scrapie was diagnosed in Suffolk sheep imported into Australia and New Zealand. So two large sheep raising countries, both of which had entirely scrapie-free flocks were then threatened with scrapie. Fortunately both countries were able to contain and eradicate the disease. The attitude to sheep importations in both countries changed dramatically and neither country from then, until 1973, allowed importations of sheep other than between themselves.

On 26 January 1950 a Suffolk ram and five Suffolk ewes from separate farms in Suffolk and York in England were released after thirty days in quarantine in Auckland. The sheep had been born in England in 1949. They were moved to a farm in the Ashburton district of mid-Canterbury where Suffolk and South-Suffolk sheep were bred. The subsequent appearance of scrapie in the ram and two of the ewes in 1952 was described by Brash (1952). However, without detracting from that historical report, the writer is able, with the permission of K.G.Haughey of Sydney, to add some details to that saga which emphasise the value to a country of well trained and alert rural veterinarians. Haughey, who at the time had only recently graduated from Sydney Veterinary School, was certainly one of them.

The Suffolk ram was first seen by Haughey on 14 March 1952, just over 2 years after its release.

He writes:

“When I first saw the Suffolk ram No.94 on the 14th March, 1952, the outstanding symptom was one of persistent and intense pruritis. He was dejected in appearance, rather low in condition and had large areas on his back, ribs, head and hind quarters denuded of wool, the skin being covered with small scabs reminiscent of mange conditions. There was no temperature reaction in the ram or the ewes examined later. There was epididymitis of the tail of the right testicle. A parasitic skin condition was at first suspected. Skin scrapings, however, proved negative on examination. The owner was advised to isolate and shear the ram, then spray once weekly for three weeks with Gammexane sheep dip. In view of the history of importation and despite the long period the sheep had been in New Zealand, the possibility that the condition might be Sheep Scab was not to be neglected. After seeing the ram again on the 19th March 1952, when no improvement was evident, Livestock Division, Christchurch was contacted the same day. Mr.A.Howes, M.R.C.V.S. visited the property and no action was taken. When revisited again on the 21st March 1952, the ram was considerably brighter and

wool growth evidenced a considerable measure of relief from irritation, although scratching still elicited a measure of approach. Locomotor ataxia manifest by crossing the hind legs when walking had also appeared. One was deluded into thinking that gammexane was responsible for the improvement, whereas now it appears that improvement occurred in spite of treatment. The owner's nephew Mr.A.Campbell, B.V.Sc., whilst visiting the property about this time had made the original suggestion that the condition might be **Scrapi**e but in view of the apparent recovery and also the fact that only one isolated case had occurred this was neglected. When visiting the property again on May 30th 1952, although wool growth was quite good, itching was still evident. Posterior paresis was almost complete, the ram being able to stand only with assistance. Nervous twitching etc. was also quite apparent. On the 27th June the owner rang to say he had two more Suffolk ewes affected with a similar condition. It was now apparent that in view of the long incubation period that there was a fair possibility of the condition being Scrapie and it was promptly reported to the Livestock Division, Christchurch, the same day....."

The control measures applied were described by Brash (1952) as follows:-

The entire Suffolk flock of 156 sheep was slaughtered, together with four South-Suffolk rams and five Border Leicester ewes which had been grazed with the Suffolk flock. Permission to restock was given four weeks after slaughter. Southdown-Suffolk lambs which had been grazed with Suffolk lambs only on green feed during winter were not slaughtered.

A further problem of control was presented by the fact that Suffolk sheep sold in 1952 had been grazed with the imported sheep. Sheep sold in 1950 and 1951 had not been in contact with the imported animals. A total of 45 Suffolks were sold in 1952 and distributed to 10 separate farms. Most of the sheep sold in 1952 were born in 1950 and included five ewes and six rams which were progeny of the infected ram. These ewes and rams were all born in 1950. All sheep sold in 1952 were traced and slaughtered in July, but no other sheep in the flocks which had purchased Suffolks from the infected flock were slaughtered.

Unfortunately scrapie was diagnosed on a farm in Southland in July 1954. There were four definite cases and two doubtful, all in ewes. The outbreak was traceable to the first outbreak of the disease in Canterbury in 1952, in which only the affected stud and its contacts were eliminated, the sheep therein having been run separately and on separate paddocks from the rest of the farm.

The affected farm in Southland, the farm in Canterbury where the original outbreak had occurred in 1952, and all farms to which any sheep from either of these two farms had been taken were placed in quarantine. The quarantine measures applied to sheep and goats. All sheep or goats which had been exposed to scrapie disease were

destroyed. This involved all sheep on the two outbreak farms, and those which had left these farms, a total of 4,399. One hundred and ninety one farms (191) mostly in Southland and South Canterbury were put under quarantine for three years.

The control measures enforced included:-

- Quarantining of all affected farms as mentioned.
- Destruction of all sheep which had been exposed to scrapie, as set out above.
- The sheep on all farms which had received "exposed" sheep were only to leave the farms for slaughter, and vehicles which transported them were disinfected before use by other stock.
- The quarantine on farms which had received exposed sheep was for a period of three years from the date on which sheep had come to the farm. Owners were permitted at any time to have all sheep on their farms slaughtered, at their own cost and restock without restrictions after the farm had been clear of sheep and goats for a month.
- When the three year period mentioned in the foregoing paragraph was completed, all sheep and goats were given a thorough veterinary examination and if in good health, the restrictions were raised.
- Farms on which scrapie had occurred were permitted to restock without restrictions three months after all sheep and goats had been removed for slaughter.

Scrapie Compensation and Scrapie Control Committees were set up and it was concluded, according to the Department of Agriculture Annual Report of 1955:

"These extensive control measures should keep the flocks of New Zealand free from scrapie and safeguard the valuable and expanding trade in stud sheep."

The 1956 Report of the Department of Agriculture noted that no further cases of scrapie had been reported although on five different farms suspicious symptoms had been investigated. There were still five farms in Canterbury, forty-two in Southland and one farm in the Wairarapa under the three year scrapie quarantine restrictions. That year £20,675 was awarded by the Scrapie Compensation Committee to farmers adversely affected by the restrictions.

Over forty years later there have been no cases of scrapie in New Zealand sheep other than the quarantine cases of 1976.

Scrapie in Quarantined Sheep 1976-1977

As early as 1969 animal production scientists and some members of the sheep farming community were keen to import some breeds of sheep with desirable production traits into New Zealand. It was believed by this group that new genetic material was needed if the New Zealand sheep industry was to significantly increase production. The following is an extract from the statement released by a body known as the Maximum Security Quarantine Advisory Committee.

"The Maximum Security Quarantine Advisory Committee, appointed in 1969, gave consideration to overseas breeds most likely to contribute to sheep improvement, and recommended priorities in the choice of breeds for controlled experimental importation and evaluation by the Ministry of Agriculture. The Committee gave greatest emphasis to increasing the productive efficiency of commercial breeding flocks through higher lambing percentage, but also stressed the importance of growth rate of lambs to slaughter, fleece weight, wool quality, carcass merit, ease of lambing and adaptability to local conditions. On the basis of performance information and experience available from overseas, the committee recommended importation of the following breeds for evaluation in New Zealand.

Finnish Landrace - exceptional prolificacy but poor growth and wool production and unusual conformation;

East Friesian - outstanding milk production and very high fertility;

Texel, German Whiteheaded Mutton and Bleu du Maine - high fertility, growth and fleece weight and possibly useful carcass attributes and hardiness features;

Oxford Down - excellent growth rate and lean meat production, good fertility and wool production."

Unfortunately the committee at that time had no veterinary members and there were several aspects of the proposed importation procedures and proposed quarantine, which were questionable. However, in December 1972 over a hundred sheep of exotic breeds, including Finnish Landrace (now called Finn sheep), East Friesian, German Whiteheaded Mutton and Oxford Down arrived on Somes Island to begin a breeding programme involving a five year quarantine. Other quarantine farms were established on Mana Island and Crater Block at Rotorua. These were designated high security stations and all the necessary security measures were taken to ensure no risk of disease transfer to the national flock.

The programme ultimately involved approximately 5,000 sheep as crossbreeding was developed on Mana Island and Crater Block. There was considerable unease and

criticism over the importation from within the sheep industry and also the New Zealand Veterinary Profession. This was understandable as the sheep had all been sourced from the United Kingdom where scrapie is endemic and widespread. Further, the sheep were chosen from a number of flocks (believed to be 23) with only the owner's word that scrapie did not occur in that flock.

The other weak point in the selection was that veterinary advice to the importing body stated that by selecting sheep over 42 months of age, which would have been at least 7 years old at the time their progeny were released, would almost entirely eliminate the risk of scrapie infection. Alarmingly the Quarantine Advisory Committee was told prior to the arrival of the sheep in New Zealand that:

"In the light of present knowledge, complete absence of clinical symptoms or post-mortem evidence of scrapie in sheep of this advanced age can be accepted as proof that they are not infected." This opinion ignored the fact that scrapie may clinically miss a generation but reappear in subsequent progeny.

The weakness was obvious. Post-mortem evidence could not be obtained. On 30 September 1976 an East Friesian ewe on Mana Island quarantine showed signs of irritation and inco-ordination. The clinical examination confirmed signs consistent with an infectious chronic neurosis, which included an exaggerated scratch reflex. The ewe and her two lambs were badly affected with scabby mouth and Dermatophilosis. The ewe also had periodontal disease and was in very poor condition. She died on 15 October 1976. Her brain tissue showed the typical neurological vacuolation and status spongiosus needed to confirm scrapie.

So scrapie occurred for the second time in our history and, by a peculiar co-incidence, on the very off-shore island that had been designated as our first sheep farm! Following this event there was still debate between the animal production and veterinary groups over the salvaging of some of the imported sheep. Some strongly pressed for total destruction of all sheep in each of the quarantines, while others believed that destruction of "contact" animals would be sufficient. Initially only 300 sheep on Mana Island and 391 sheep at Crater Block were destroyed and the cross-breeding experiments continued into 1977 when a further case of scrapie in a Finnish Landrace ewe was diagnosed and the entire experiment was finally terminated amidst considerable disharmony between opposing groups.

Had the events of the late 1980s and 1990s and the development of BSE (bovine spongiform encephalopathy) and its possible link with the human encephalopathy, Creutzfeldt-Jakob been known at the time, the risk of these experiments would have been more emphatically understood. It is the writer's opinion that even as late as the 1970s there were still many who believed that scrapie could be lived with. It was

often pointed out that the British sheep industry still thrived in spite of scrapie and that the scrapie risk could be equated against the production advantages of improved breeds of animals.

Unfortunately epidemiological modelling and risk assessment with scrapie disease is extremely difficult because of lack of reliable data on several vital points. These include animal susceptibility, incubation period, percentage of carrier animals and finally animals may be infected but die before clinically affected by the disease.

But for all the anguish caused by the 1970s experience the over-riding fact is that New Zealand is still scrapie-free. Land which was used as quarantine has never been farmed with animals since. Mana Island is being restored as a nature reserve and Crater block has been planted with trees. In hindsight the 1970s experience has had its positive effects and key points about scrapie exclusion have been more clearly recognised, so that the 1980s -1990s importations of exotic breeds of sheep were successful. The New Zealand Ministry of Agriculture had gained more experience and was in a better position to ensure that the 1950s and the 1970s episodes were never again repeated.

The Finnish/Danish Importations 1985-1991

Early in the 1980s similar arguments to those raised in the late 1960s were again raised by animal production scientists. The main objective was to import Finn sheep, because of their high fertility. For years the lambing performance of the New Zealand national flock had seldom been over 100%. It was believed that to maintain the economic viability of the sheep industry that the national lambing percentage must be raised and that by crossbreeding, with the Finn in particular, improvements could be achieved.

The changing need for more highly muscled carcass sheep with less fat was also believed to be desirable and breeds such as the Texel and the German Whiteheaded Mutton were considered valuable in this respect. The urgent case for the importation of these breeds was strongly presented by leaders of the Research Division of the Ministry of Agriculture and Fisheries. The claims for the improved production likely with the introduction of these breeds were extravagant and the promoters of the project believed that improved production could be balanced against the risk of importing new diseases, notably scrapie. Fortunately previous failure had alerted the livestock industries to mount strong opposition to the initial proposal.

The proposal was to import sheep from the United States of America a country where scrapie existed. The animals were to have come from the United States Department of Agriculture Clay Research Centre in Nebraska, which was claimed to be scrapie-free. In spite of these claims the Quarantine Advisory Committee ruled that the imports were too risky and the then Director of the Animal Health Division,

Dr.George Adlam undertook an extensive search for the desired breeds from a reliably scrapie-free source. Eventually it was found that the small flocks of Denmark and Finland had been scrapie-free for nearly a hundred years. Elaborate importation and quarantine plans were drawn up and two separate groups of animals were imported to New Zealand; one group by the Ministry of Agriculture and Fisheries and the other by a private company which was later taken over by the New Zealand Dairy Board and called LambXL.

These were the largest importations and proliferation of exotic sheep since the earlier part of this century. All the animals were kept in high security quarantine stations and only the embryos and semen from these were allowed to be taken to secondary quarantine stations for breeding up in donor sheep. The quarantine was for five years from the arrival of the original sheep before any of the progeny could be released. With the Lamb XL sheep bioassay of lymph node from some embryo donor ewes took place, tissue being inoculated into both sheep and goats. Some of these were slaughtered at the end of the programme and their brains examined for any evidence of scrapie. All sheep which died during quarantine were carefully autopsied and a full histopathological examination made of their brain tissue. Before release of the bred-up progeny, the brains of the original donor sheep were also examined.

This project proved satisfactory and as a result the Finn, German Whiteheaded Mutton, Texel, Gotland and Oxford Down were added to the breeding potential of the New Zealand sheep industry. Six years from release there have been no reported, or even suspicious, cases of scrapie in the progeny of these animals.

Conclusion

From the available evidence it would seem that the sheep flocks of New Zealand and Australia remained free of scrapie until the 1950s, when both countries experienced minor outbreaks caused by Suffolk sheep imported from Britain. The most likely reason for the scrapie-free development of these sheep industries is that the source animals were purebreeds which were not scrapie-infected. Most evidence for the international spread of scrapie, in this century, to such countries as Australia, New Zealand, South Africa and North America suggests that it was the Suffolk and to a lesser extent the Hampshire Down breeds that were responsible. The former breed is the most popular crossbreeding sire in use in the United Kingdom and has probably caused much of the scrapie spread in that country. It has been responsible for 90% of cases of natural scrapie occurring in the U.S.A.

Modern genetic studies of restriction fragment length polymorphism RFLP in sheep genotyping, confirm previous studies that scrapie is a partly genetically controlled disease. Clinical evidence would then suppose that some breeds e.g. the Suffolk,

contain more sheep with the susceptible genotype. At least we may be close to a more scientific explanation of the mystery of scrapie-freedom and scrapie disease.

However, there are still unanswered questions. For example, the extraordinary ability of the agent to survive procedures which destroy most infectious agents, was most dramatically demonstrated by the accidental transmission of scrapie to 7% of the recipients of 18,000 doses of formalised louping ill vaccine used at the Moredun Institute in Scotland in 1935. This experience and others which demonstrate the extraordinary nature of the scrapie agent impel countries like New Zealand and Australia which are free of this disease to be ever more vigilant and cautious in protecting this status. While advances in the knowledge of scrapie and other animal and human neuropathies continue and new techniques are emerging which suggest that tests may be possible to detect scrapie-carriers, their practical application is probably still some years away. Although Gajdusek in 1976 was able to transfer the scrapie agent to several species of higher primates, the belief that scrapie was a human health risk was largely discounted by veterinary and medical opinion. However, with the appearance of BSE in Britain, either before or about 1986, the position changed dramatically and medical science now continues to look for its association with human dementias such as Creutzfeldt-Jacob disease.

The cost of these diseases to the sheep and cattle industries of Britain has run into billions of dollars. Indeed, it is a very sad reflection that the animal industries of the country which gave the developing world so many useful breeds of sheep and cattle and for many years was the world's chief stud farm, are now so limited by scrapie and BSE which many believe originated from scrapie.

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Appendix II: Bone meal importations into New Zealand before 1950.

New Zealand sheep and cattle raising has always differed from that practised in Europe in one major respect; meat and bone meal has very, very seldom been fed to sheep and cattle in this country. This is because New Zealand ruminant farming has always been based on the use of low-cost pasture and fodder crops rather than the more expensive concentrate feeds.

In more recent times, when concentrate feeding has been practised to a limited extent, rations have been based, in the main, on vegetable sources of protein. There has been a limited use of locally produced meat and bone meal, mainly in calf supplements.

New Zealand is an exporter of meat and bone meal and, so far as it has been possible to determine, importation of meat and bone meal for use in livestock rations has never occurred, with the exception of imports from Australia. Since 1962, importation of meat and bone meal from Australia has been permitted, subject to appropriate heat treatment.

Nevertheless, in the past there were importations of bone meal. This material, however, was used as a fertilizer, not a stock food, and the trade ceased in the 1930s as the imposition of stringent safeguards against the introduction of anthrax rendered it relatively expensive.

In 1903 there were eight confirmed outbreaks of anthrax. At least one man died and three others were affected by the disease, recovering only after each had gone through a serious illness. In every case imported bone, used for fertilizer, was considered the source of infection. As result of these disease outbreaks it was recommended that all future imports of bone be sterilised.

The first superintendent of bone sterilising was appointed on 7 July 1903. His first task was to examine the sterilising methods currently in use and to determine the most effective. Previously, bones had been sterilised before disintegration, because at this stage the treatment was easier and could be applied in the ordinary cylindrical digester, while the fine bonemeal used as fertilizer requires an entirely different style of steamer in order that the steam may penetrate all parts of the charge.

The moist-steam treatment was considered by authorities on sterilisation to be the most effective, especially in the case of bonemeal. It was decided to sterilise at the manufacturers' works in Australia and India, under supervision of inspectors from New Zealand, as the cost of establishing purpose-built sterilisation plants in New Zealand was considered too high. New regulations for the introduction of animal

"manures" into New Zealand were gazetted on 16 March 1905 (At the time bonemeal for fertilizer was referred to as manure). The regulation prohibited the importation of animal fertilizer from any country other than India or Australia. It was recognised sterilised bonemeal could become contaminated in ships carrying both raw bonemeal as well as sterilised meal. Accordingly the new regulations prohibited any contact between the sterilised bones and untreated animal fertiliser in the mills and during transit.

In 1905 153,948 bags of bonemeal was imported, Australian bags weighed 224 lb net and most Indian bags weighed 140 lb weight.

In most cases Australian mill owners made the necessary alterations, at considerable cost, to comply with the new regulations. Indian manufacturers received the new regulations with much trepidation at first but soon had operations running smoothly. In the year ending 31 March 1909 39,272 bags of animal fertilizer were imported from Australia.

In 1911 the Inspector in India reported that the methods adopted for drying the fertilizer were unsatisfactory, and steps were taken to correct them. Evidence was obtained of the fertilizer having become contaminated, evidently during the long process of drying after sterilization, by the organism of malignant oedema. This disease was not scheduled in our Act, but it was considered that if this organism could gain access to the material after it had been sterilised, other more dangerous organisms might also do so. Hence the provision of proper driers was required.

Demand for bone fertilizer fell during 1912, apparently due to increased cost for the product. Reduced demand meant a reduction in inspection fees received and the cost of inspection exceeded the revenue. Close supervision by the inspector found no evidence of malignant oedema. The demand for Indian animal fertilizer continued to decline in 1913. The First World War also impacted on the trade, primarily by making shipping unavailable. By 1920-21 very little animal fertilizer was being imported from India. In 1921-22 only 2,135 tons of animal fertilizer were imported from India. Imports from Australia were also down on the previous year.

Imports from Australia increased by 359 tons in 1922-23, while Indian imports showed a considerable decrease. Imports increased from Australia and India in 1923-24 but dropped again the following year. In 1926 the amount of bonedust and bone char imported was 2,085 tons, in 1928 it was 725 tons and in 1930, 1,420 tons. By 1932 the importation of bonedust and bone char was down to 180 tons. In 1932 the importation of bonedust was prohibited from all countries.

Since 1962, the importation of meat and bone meal from Australia has been permitted, subject to its being heat treated and accompanied by a valid import permit.

Appendix III: Importations of small ruminants into New Zealand since 1985

Year imported	*Country of origin*	*Species*	*Genetic material*	*Released from New Zealand quarantine*
1985	Finland/Denmark	sheep	embryos	November 1990
1986	Finland/Denmark	sheep	adult sheep	November 1990
1988	Zimbabwe	goats	embryos	April 1993
1989	Zimbabwe	sheep	embryos	August 1994
1991	Israel	sheep	embryos	December 1994
1992	Sweden	sheep	adult sheep	March 1996

Appendix IV: Supplemental information provided to the EU (May 1999)

Information Necessary to Support Applications for Evaluation of the Epidemiological Status of Countries with Respect to Transmissible Spongiform Encephalopathies: New Zealand's Response to the European Commission Request for Additional Information.

4 May 1999

The following is the New Zealand Ministry of Agriculture and Forestry's (MAF) response to the questions posed in the Annex of Mr Horst Reichenbach's letter 23 April 1999 (B1/JK/jtD(99)). Mr Reichenbach requested that all information be given by year for the last 10-15 years in order to allow trends to be assessed.

1. Structure and dynamics of the animal population

a) Absolute numbers per breed, alive and at time of slaughter - sheep, goats and cattle

b) Age distribution of animals per type at time of slaughter

National data on the breeds of the sheep, goats and cattle are not collected in New Zealand. However, information has been sourced from breed societies, The New Zealand Meat and Wool Boards' Economics Service and the Livestock Improvement Corporation.

The national beef breeding herd is composed of Angus, Hereford and crossbred cattle. The traditional British breeds are crossed with terminal sires from a number Continental breeds. In 1997/98 the national dairy herd was made up of Holstein-Friesian 64.5%, Jersey 18.9%, Holstein-Friesian/Jersey crossbreds 32.1%, and Ayrshire 1.5%.

In 1996 the national sheep flock was composed of Romney 58%, Coopworth 10.3%, Perendale 6.6%, Corriedale 5.5%, Merino 6.9% and others 12.7%. In recent years crossbred sheep have increased in numbers as rams from several recently imported breeds have been crossed with the traditional breeds. The rams belong to the following breeds; East Friesian, Finnish Landrace and Texel.

Table I shows livestock numbers for the period June 1989 to 1998. Cattle numbers are separated into beef and dairy cattle.

Table I: New Zealand livestock numbers in thousands from June 1989 to 1998

As at June	Brdg Ewes	Total Sheep	Brdg Cows	Total Beef	Dairy Cows	Total Dairy	Total Deer	Total Goats
1989	41414	60569	1355	4526	2621	3302	846	1222
1990	40453	57852	1386	4593	2723	3441	1052	1063
1991	36631	55162	1388	4671	2642	3429	1256	793
1992	36684	52568	1419	4676	2723	3468	1388	533
1993	35375	50298	1463	4758	2808	3550	1320	353
1994	34438	49466	1577	5048	2994	3839	1401	284
1995	33693	48816	1617	5183	3153	4090	1394	NA
1996	33447	47394	1596	4852	3220	4165	1467	228
1997e	33223	47003	1592	4808	3280	4243	1667	NA
1998e	32524	46150	1444	4423	3376	4367	1838	NA

Brdg = breeding

e = estimate

NA = not available

The numbers of animals slaughtered, their sex and age for the time period 1 October 1988 to 30 September 1998 are shown in Annex 1. The ages at slaughter are lambs (animals prior to the eruption of the two front incisor teeth), hoggets (animals prior to the eruption of the second pair of incisor teeth) and adult sheep (animals with a full complement of teeth).

c) *Geographic distribution of animals by husbandry systems, herd systems, and production purposes*

Sheep and beef cattle

Throughout New Zealand feeding systems are pastorally based, with a move everywhere over the past 15 years to all grass wintering. Hay and silage are used in drought periods and to supplement low winter pasture growth rates. Brassica crops are used to finish stock in the summer and to feed some capital breeding stock in colder parts of the country over the winter period.

Stocking rates per hectare have declined in recent years in an effort to increase per head production and to get better labour efficiencies. Over the last 10 years the average stocking rates per hectare have declined by 9% to an overall average of 6.5 stock units per grazeable hectare. The range from the high country to finishing flats is from less than one stock unit per hectare up to 16 per hectare.

The average sheep flock is currently 2,604 animals and the average beef herd is 205 cattle. These are increases from approximately 2,200 sheep and 180 cattle 10 years ago.

Regionally, there has been a sharper decline in the number of sheep in the Northland, Auckland, Waikato regions of the North Island and in the Canterbury and Southland region of the South Island. This is due in the North Island to husbandry problems such as fly strike (myiasis) and facial eczema (sporidesmin toxicity) and in the South Island to the relative increase in the profitability of dairy farming.

Fine wooled Merino sheep, once the domain of the South Island high country, are now farmed in dry parts of the North Island.

Increasingly, farmers are being asked to become accredited by the processing companies procuring farm products. The accreditation requirements are market driven. Inspectors accredit farmers for such things as disease status, safe animal handling systems, hygiene, and the safe and prudent use of animal remedies, herbicides, and pesticides.

Dairy cattle

The trend in dairying in recent years has been towards larger herd sizes and higher per cow production. The average herd size has increased from 151 cows in milk in 1988 to 220 cows in 1998. Production per cow has increased from 154 kg of milk fat to 168 kg over the last 10 years.

Until recently there had been a trend towards the feeding of increasing amounts of concentrate feed (pelleted feed) to increase per head production. However the marginal increase in milk production through supplementary feeding now barely matches the true value of the extra milk produced and so this practice has declined. The pelleted feeds do not contain ruminant-derived meat and bone meal. Indeed, as was emphasised in New Zealand's earlier submission, meat and bone meal has only ever been fed to a small minority of cattle in New Zealand.

With respect to the regional distribution of dairying, in 1999, 86 % of herds were in the North Island and 14 % were in the South Island.

It is forecast that growth is likely to slow as the payment for additional milk is likely to be linked to the market value of the extra milk produced. However, growth is likely to be higher in the South Island where there are better opportunities for large scale dairy farming.

d) *System of identification and capacities for tracing animals*

While there has been no legal compulsion to identify livestock, ear-tagging, earmarking or hide marking are used almost universally for ownership identification and breeding purposes. This will change in July 1999 when new legislation will require the identification of all cattle and farmed deer.

Since 1986 progeny in 96% of dairy cattle herds can be readily traced by the Livestock Improvement Corporation (LIC). Extensive records are also held going back many years prior to 1986. Virtually all dairy animals and some dairy-breed beef animals are identified using this system and others could be traced using farm records and the LIC's extensive database of DNA profiles of semen donor bulls. The LIC identification system uses dual whole-of-life ear-tags that will be integrated with the new national identification programme for cattle and deer.

Cattle from many, but not all, beef-breed herds could be traced through a range of animal recording databases maintained by artificial breeding companies, pedigree breed societies, animal performance recording schemes and records maintained at the farm business level. For example, approximately half of the beef-breed herds that use artificial insemination contribute to animal recording databases which can readily provide traceability.

All cattle and farmed deer in New Zealand will be identified under new legislation

coming into force 1 July 1999. Animals born after that date must, after reaching 30 days of age, be officially identified before they are first moved from their herd of birth. Both a primary plastic ear-tag and a secondary device must be used and these must be maintained so that the animal remains identified during every subsequent movement over its lifetime. A primary tag carries an approved logo, a unique herd number and an animal number. A bar code containing both numbers will be read at the time of slaughter and the database of active identifiers will be updated by electronic means.

When cattle and deer are moved, each consignment is accompanied by a Tuberculosis Status Declaration Card, which is then retained by the purchaser. This is a long-standing requirement of New Zealand's tuberculosis control programme.

Regulations updating and extending record-keeping requirements for imported animal genetic material have been drafted. The *Biosecurity (Imported Animals, Embryos and Semen) Regulations 1999* will ensure lifetime traceability of animals imported as embryos and the traceability of imported semen to identified recipient animals. In practice, the artificial breeding industry already records the distribution of all semen, imported and domestic.

New Zealand occasionally imports livestock from a very limited range of countries for breeding purposes. Live animals are identified as imports with dual official MAF ear-tags when being prepared for export to New Zealand. The lifetime movements of these animals are individually monitored by MAF.

2. Animal Trade

a) *Imports and exports by year, type of animal (beef/dairy) and country of origin, and if possible, also age at moment of import*

The information on imports between January 1990 and April 1999, for beef and dairy cattle and country of origin is presented in Table II. Table III summarises the data by country of origin. During this period cattle were imported from only three countries; Australia, USA and Canada. Overall, 83% of the animals were imported from Australia. Ninety-six percent of the beef cattle came from Australia, and 58% of the dairy cattle were imported from USA. The number of cattle imported has dropped off dramatically since 1995 and reflects the economic down-turn in beef cattle farming, due to

depressed returns and adverse climatic conditions. Figures for the years 1986 to 1989 are presented on pages 17 and 18 of the document *New Zealand's case to be recognised as a country free from the transmissible spongiform encephalopathies*, July 1998. New Zealand suspended the importation of live cattle from the UK in December 1988.

Table II: Cattle imports into New Zealand: 1990 - April 1999

(Year, type of animal (beef/dairy) and country of origin)

Year	Country of Origin	Beef	Dairy
1990	Australia	77	9
	USA	6	36
	Canada	1	0
1991	Australia	33	16
	USA	3	20
	Canada	1	0
1992	Australia	85	2
	USA	1	0
	Canada	0	0
1993	Australia	50	7
	USA	0	6
	Canada	2	0
1994	Australia	17	1
	USA	0	2
	Canada	0	1
1995	Australia	52	2
	USA	0	0
	Canada	0	0
1996	Australia	18	2
	USA	0	0
	Canada	0	0
1997	Australia	11	3
	USA	0	1
	Canada	0	0
1998	Australia	15	1
	USA	0	0
	Canada	0	0
1999 (April)	Australia	0	2
	USA	0	0
	Canada	0	0

Table III: Total number of cattle imported into New Zealand between 1990 and April 1999 and the country of origin

Country	Beef cattle	Dairy cattle	Total
Australia	358	45	403
USA	10	65	75
Canada	4	1	5
Total	372	111	483

New Zealand suspended the importation of bovine embryos and semen from the UK in May 1989, but followed the adoption by the *Office International des Epizooties* in May 1992 of Articles covering the safe trade in bovine products, resumed imports of semen and embryos in October 1993. These imports were again suspended in March 1996 while new evidence on the BSE agent was evaluated. During the period October 1993 to March 1996, a total of 139 embryos were imported from the UK and 19 embryos were imported from France (Table IV). These embryos were from beef cattle.

Table IV: Bovine embryos imported into New Zealand from October 1993 to March 1996

Year	UK	USA	Australia	Canada	Netherlands	Denmark	France
from Oct 1993	124	226	113	165	0	0	0
1994	15	971	295	485	193	0	0
1995	0	1,056	572	345	157	59	19
to March 1996	0	177	46	0	0	0	0
Total	139	2,430	1,026	995	350	59	19

New Zealand experts are at a loss to see how the figures for animals **exported** can assist the Commission's experts assess New Zealand's BSE-free status. Nevertheless, Table V contains the figures for animals exported from New Zealand between 1989 and 1998.

Table VI contains the export figures for cattle and bovine germplasm for the period 1998 to 1991 on the bases of importing country. Figures for all animal species exported from New Zealand between 1989 and 1998 sorted on the basis of the importing country are presented in Annex 2.

Table V: Animals exported from New Zealand 1989 to 1998

Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Cattle	17245	9178	7012	7585	7597	7773	4805	6279	2978	8372
Deer	12255	7695	4512	2023	891	908	10	8	12	6
Goats	1150	366	689	152	223	3304	1674	1065	898	1224
Horses	5389	4617	3214	3040	3313	3441	3111	2990	2942	3491
Lamoids	44	1444	1262	526	32	67	20	14	0	10
Poultry	6448192	876386	1117062	843617	5364639	3668782	3273623	6029517	7191738	350823
Sheep (Breeding)	3690	627	1256	77	1813	9473	4198	2550	232	5354
Sheep (Slaughter)	868960	1584240	950018	1452442	1357785	723913	686986	480984	118378	200513

Table VI: Cattle and bovine germplasm exported from New Zealand between 1998 and 1991 on the basis of importing country

Years 1998 -1991		Africa	Asia	Australia	Canada	Europe except UK	Middle East	Pacific Islands	Cent & Sth Amer	UK	USA
'98	cattle	1,215		3,310		64	3,783				
	embryos	755	1,395	151		406		5	10		185
	semen	8,560	21,500	111,984	2,883	14,510		1,500	82,702	39,310	11,447
'97	cattle		2,974					4			
	embryos			752		77			333	181	22
	semen	5,435	3,250	36,539		82,710	1,700	480	61,490	3,700	43,851
'96	cattle		5,968		7		253	45		6	
	embryos			354					49	6	
	semen	200	12,200	41,547	888			300	19,287	25,681	500
'95	cattle		4,668	9				128			
	embryos & semen		500	51,501	508	8,758		350	26,751	21,439	4,812
'94	cattle		6,714	19		93		22	925		
	embryos & semen	7,200	50	36,784	95	29,559			38,935		5,34
'93	cattle		3,346	37		12		5	4,192	5	
	embryos & semen			27,240	754	18,298		220	14,850	37,847	1,920
'92	cattle		5,375	52				85	2,073		
	embryos & semen	480		40,496	2,550	15,256		380	6,988	109,143	7,542
'91	cattle		4,291	25					2,332	226	
	embryos			92							
	semen		386	41,635	1,841	2,580		3,800	4,600	71,443	3,547

2) Use made of imported animals, embryos and semen (in particular if imported from UK or other countries now known to have BSE)

As stated in section 2.4 of New Zealand's July 1998 submission, animals, embryos and semen are imported because they are perceived to be of superior genetic merit and so are used to improve breeding stock. No animals are imported for slaughter as such. However, imported animals, or those derived from imported genetic material, will be slaughtered at the end of their productive usefulness. No more explicit information is available, other than that given in section 6.6 of New Zealand's July 1998 submission where we described the monitoring of the 12 cattle which had been imported from the UK between January 1982 and December 1988.

It should be noted that in all categories the volume of imports relative to the total population is extremely small. As any risk is proportional to volume of trade, clearly the risk that New Zealand might have imported a BSE-infected animal is vanishingly small.

3) Mechanisms used by slaughterhouses to identify animals and their origins and data from these procedures

Animals arriving at slaughter houses are positively identified on a mob basis by pen-cards. These pencards enable the animals within the mob to be traced back to the farm of origin. Mob or farm of origin identification is maintained during the slaughter process. This identification system and the information pertaining to it, must be gathered, and maintained, by the company under the requirements of the Meat Act 1981, Section 43, and is periodically audited by MAF.

By its very nature, trace-back of rendered product is not specific to 'individual animals'. Product produced by batch-processes can be traced to specific periods of production, and from there to mobs of animals and a selection of farms. However, for material produced by continuous-processes, it would more likely require trace-back to take account of a whole days production or possibly even multiple days production.

The Meat Act 1981 states:

***'43. KEEPING OF RECORDS**--*

(1) The licensee of every licensed slaughterhouse, deer slaughtering premises, byproducts premises, or rabbit processing house shall keep at the premises a record book in which shall be entered daily the following particulars relating to all animals slaughtered or, with respect to a byproducts works, killed at the premises during the day:

(a) The number, species, and sex of the animals:

(b) The name and address of the owner of the animals, or, if the licensee is the owner, of the person from whom the animals were purchased or obtained, and the date of taking delivery:

(c) In the case of a rural slaughterhouse or custom-killing premises, the colour of each head of cattle, and every brand, earmark, or other distinguishing mark on each head of cattle or sheep:

(d) Such other particulars as may be prescribed.

(2) If the licensee of any premises to which this section applies fails on any day to make in the record book any entry required to be made under this section, or knowingly makes a false entry therein, he commits an offence against this Act.

(3) The record book shall at all times during working hours be open to inspection by any Inspector or member of the Police.

Cf. 1964, No. 71, Ss.44, 61L; 1968, No. 38, Ss.8 (6) (c), 12'

In respect of records required to be kept by approved by-products premises, the Meat Regulations (1969) require:

*'**R. 261. RECORDS TO BE KEPT**--*

The proprietor of an approved by-products works shall keep such records of--

(a) Raw materials being processed as will enable the nature and origin of the raw material to be determined, and these records shall include, in the case of dead stock, the names of persons from whom the dead stock was collected or who delivered such dead stock on each day of operation; and

(b) Temperatures maintained during processing; and

(c) Times for which such treatment is maintained; and

(d) Volume and nature of manufactured by-products; and

(e) Such other particulars as the Director may require to enable him to authorise certification of the manufactured by-products under regulation 260 of these regulations.'

3. Animal feed

1) Domestic production and use of MBM and imports of MBM (specifying country of origin) and its use, in particular with regard to:

- % of cattle that obtained/could have obtained MBM in the past
- type of feed for cattle that includes MBM (today and in the past); age it might has been given
- data on rendered material and rendering processes

Historically, only small quantities of meat and bone meal were fed to dairy calves and town supply dairy cows.

The following estimates (in thousands) of dairy calves reared are based on numbers of relevant stock (rising one-year-old):

June year	1989	1993	1995	1996
Bull calves for beef			889	521
Bull calves for brdg			12	12
Hfr calves for brdg			723	716
Total	1205	1444	1624	1249

The decrease in the number of dairy calves retained for beef production in 1996 was attributable to the decline in beef prices. Protein meals for those animals contained 5-9% meat and bone meal until the voluntary ban on the inclusion of ruminant protein (other than dairy protein) was implemented in May 1996. The other components of the meal were grain by-products, soya bean meal and tallow.

The total quantity of manufactured concentrate feed produced in 1995-96 is summarised below.

	1995	**1996**
Total calf feed (tonnes)	35,725	28,000
Total dairy feed (tonnes)	40,316	22,240
Total beef, sheep, deer, goats (tonnes)	11,720	4,560

2) Exported MBM (specifying country of destination) if available

New Zealand's experts are at a loss to see how providing details of our MBM exports can in any way assist the Commission's experts to evaluate our country's BSE-free status. New Zealand does not maintain a formal national database of exported meat and bone meal and tallow. Notwithstanding, information is maintained by Statistics New Zealand (Figure 1). However, this is limited by the validity and labelling of data submitted, and early data (pre- 1990) do not correlate with information obtained from industry. In addition, the data obtained to date do not include 1996-1998. However, this should be available shortly.

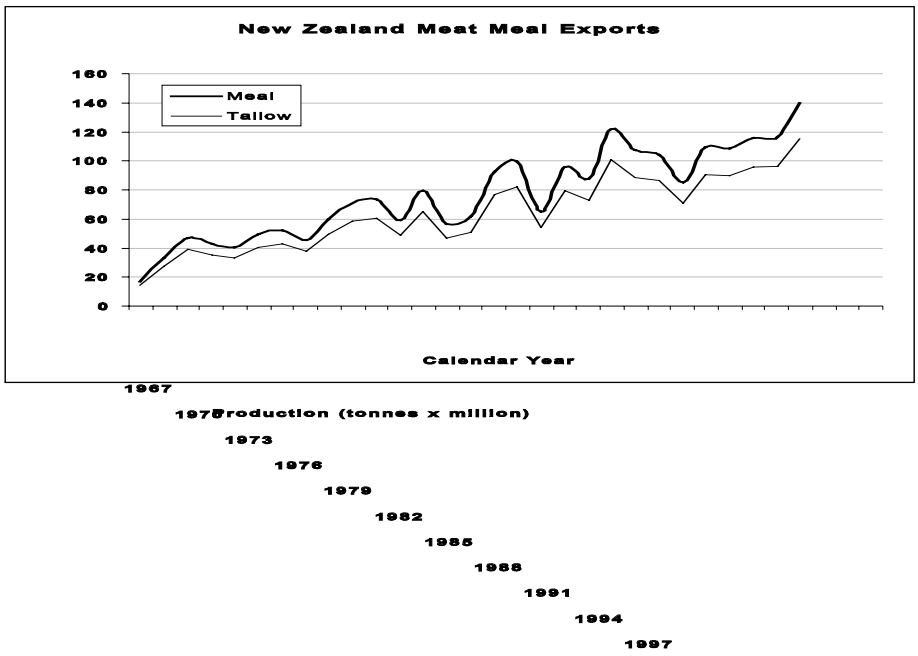

Figure 1: Statistics New Zealand profile of exports of meat and bone meals. Tallow calculated as a proportion of yield: 19% tallow to 23% meal.

Industry sources indicate that the current annual production of MBM is ~180 kilotonnes (kT) with ~130 kT exported and ~50 kT used domestically. In contrast to the profile provided by Statistics New Zealand, industry sources indicate that overall production of MBM has dropped over the last 15 years from 220 kT, primarily because of the drop in overall stock numbers. Domestic usage has also dropped from 60 kT because of the animal feed ban.

Annual production of tallow is currently 100 kT with 20 kT used domestically. A request for historical data on tallow production has been submitted to Statistics New Zealand, and industry.

In terms of export MBM, 80-90% goes to Japan and Indonesia, 10% to the Philippines and Malaysia, some to the US, and no more than 3% to the EU. This proportion has been fairly consistent over the last several years.

4. Meat and bone meal (MBM) ban

Complete description; dates of introduction; actual implementation, policing and compliance figures; possibilities of cross-contamination

The present industry-adopted ban on the feeding of ruminant MBM to ruminants will continue in effect until the legislation described below comes into force. The present ban has been well accepted by the member companies of the New Zealand Feed Manufacturers Association (NZFMA). The NZFMA has comprehensive coverage of commercial feed production and includes representation for on-farm feed mills.

Feed industry statistics indicate to MAF that the market demand for all concentrate rations intended for ruminants declined following the implementation of the voluntary feed ban. The small volume of MBM formerly used in cattle rations has been replaced by other sources of protein (primarily of plant origin). The extra cost of this change has been largely absorbed by the manufacturers.

MAF has now completed instructions for *Biosecurity (Ruminant Protein) Regulations* for submission to the Parliamentary Counsel Office (the official law drafters).

Under the regulations, industry operators who manufacture feeds which include feed intended for ruminant animals, whether for sale or consumption on the operator's premises, must operate a ruminant protein control programme to manage the risks of cross-contamination and product mis-labelling occurring on their premises. The control programmes must be recognised by MAF and must be audited by independent verification agencies.

If a product contains MBM, there will be an explicit requirement that it be labelled as not suitable for feeding to ruminants. Such warnings will be displayed on all feeds, some forms of pet food, MBM, and blood and bone fertiliser.

Forms known as "Feed Ban Observance Declarations" will be available for the assurance of buyers of ruminant feed, or ruminant animals. These declarations will state that the supplier produced the feed or the animals in the knowledge of the regulations, and in compliance with the regulations.

MAF will have the power to require named operators, or classes of operator, in the feed industry generally to keep and supply production and inventory records and feed samples.

The regulations are expected to come into force in the second half of 1999 and to be fully implemented during the 12 months following. Compliance and enforcement will be the responsibility of the MAF Biosecurity Authority in conjunction with the Ministry's Compliance Group and Enforcement Unit.

5. Surveillance for TSE, with particular reference to BSE and scrapie

a) Incentives for reporting cases, compensation and reward schemes

New Zealand's July 1998 submission described how a financial incentive to veterinary practioners has been offered since 1990. However, MAF has since initiated an enhanced surveillance programme, which began in January 1999, for bovine spongiform encephalopathy (BSE). It has been developed in response to a revision of the surveillance and monitoring programme guidelines adopted by the *Office International des Epizooties* at the General Session in May 1998. The enhanced surveillance programme now has an annual target of 300 brains, from cases of nervous disease in cattle over 2 years old.

MAF has in place a programme which ensures that all brains submitted to animal health laboratories for routine diagnostic purposes are also screened for BSE. Further, MAF operates a monitoring programme at slaughterhouses to obtain brains from any cattle displaying signs of nervous disease.

The number of brains examined for evidence of BSE was 76 in 1996, 108 in 1997 and 78 in 1998. These brains were from cattle exhibiting signs of central nervous system disease. In 1998 an additional 1,009 brains from clinically normal cattle, 4 years and older, collected on behalf of the European Commission, were also screened for the histopathological lesions of BSE. The Commission will use these samples as negative controls in trials to validate diagnostic tests for BSE. MAF considers that the Commission's choice of New Zealand as the source of the brains to be used as negative control material is implicit recognition that New Zealand's cattle population is free from BSE.

In an attempt to increase the number of cattle brain submissions to diagnostic laboratories, MAF has redesigned the incentive programme to target farmers and veterinarians more effectively. This incentive programme has been developed in consultation with the Dairy Cattle Veterinarian's Branch of the New Zealand Veterinary Association and participating MAF-approved animal health laboratories (of which there are seven dispersed throughout the North and South Islands). The programme is focussing on dairy cattle, as these are the segment of the cattle population that has the highest degree of contact with farmers and veterinarians. The scheme also requires the veterinarian to complete a questionnaire, the results of which MAF will use to gain a better understanding of the incidence and profile of nervous disorders in the New Zealand dairy cattle population.

The transmissible spongiform encephalopathy (TSE) surveillance incentive programme which was initiated in 1990 will continue to operate as usual, in order to provide TSE monitoring of beef cattle, sheep, goats and deer. The financial incentives for farmers and veterinarians are:

- Free laboratory brain removal and histopathological examination of brains from nervous disease cases in adult (ie greater than 2 years old) cattle, sheep, goats, and deer.

- A $100 credit to the practitioner's laboratory account whenever a TSE is suspected on clinical grounds and the appropriate samples are submitted.

Costs for TSE surveillance

During 1998, the costs for the current TSE incentive programme (all species) were as follows:

New Zealand laboratory costs:	$ 11,770
Incentives:	$ 4,400
Overseas laboratory costs:	$ 195
Total	**$16,365**

Anticipated costs for the new BSE Surveillance Incentive Programme;

It is expected that to obtain 300 cattle brains under the new incentive scheme, it will

cost in the order of **$127,000**. This is based on the assumption that some 900 - 1,000 call-outs to farms will need to be made by veterinarians in order to obtain 300 brains from cattle that fit the appropriate clinical profile. In addition, the budget will have paid for the completion of 900-1,000 questionnaires, which will then be used to develop the characterization of nervous disorders in New Zealand dairy cattle.

The funding for the new scheme will be derived from the fees charged by MAF for dairy product export certificates. For a number of years MAF has been transferring $7.00 of the fee charged for each certificate (if it contained any animal health status assurances) to an account dedicated to a surveillance project in the dairy sector. This revenue has traditionally been applied to the costs of surveys or disease investigations in dairy cattle. However, because of the pressing need to obtain 300 brains, this funding will now be applied to meeting the additional costs of the BSE surveillance incentive programme.

b) Method of laboratory diagnosis and recording of suspect cases of BSE and scrapie

Annex 3 outlines the standard for the diagnosis of TSEs used in all laboratories which screen suspect cases and report to MAF. The seven laboratories currently involved are:

- Five AgriQuality Animal Health Laboratories (formerly government laboratories) located in Auckland, Ruakura, Palmerston North, Christchurch and Invermay (now called Labnet Invermay).

- Alpha Scientific Ltd.

- Labworks (formerly Lincoln Animal Health Laboratory).

Although no new diagnostic tests/procedures have been implemented in New Zealand, all cases which are 'not negative' on histological screening are referred to the Central Veterinary Laboratory, Weybridge, UK for additional testing. In 1998 brain tissue from one cow was sent to Weybridge and it was negative for SAF. The cow was a 3-year-old Jersey that had been ataxic for 3 to 4 weeks and was "star gazing". The histopathology findings were a nonspecific spongiosis suggestive of a hepatic encephalopathy. This diagnosis was supported by the clinical pathology results.

Until November 1998 five of the six animal diagnostic laboratories that handled production animal cases were government-owned. MAF had a contract with the privately owned laboratory to examine central nervous disease cases for the

transmissible spongiform encephalopathies.

c) Existing system or current plans for targeted active surveillance;

The results from the 1998 TSE surveillance programme are presented in Tables VII to IX.

In May 1998, MAF received a request from the European Commission to supply 1,000 sets of brain and spinal cord from 4-year-old cows of mixed breeds, to be used as negative controls in the validation of four different diagnostic tests for BSE. The samples were dispatched in November 1998. The Commission proposes to act as the broker of these samples and dispatch them, in coded form, to those parties which have been authorised by the Commission to conduct this research. The results of this trial will be known in June to July 1999.

MAF considers that the Commission's decision to validate BSE diagnostic tests using New Zealand tissues as the negative control material constitutes an implicit recognition of New Zealand's BSE freedom.

Table VII: The number of cases from animals of all ages with a history of nervous disease submitted to New Zealand laboratories in 1998

No. of submissions	Cattle	Sheep	Farmed Deer	Goats	Lamoids
1998	584	121	40	20	8

d) Incidence of neurological disorders in which TSE could not be excluded on clinical grounds in any animal species

The estimation of these figures is one of the objectives in the questionnaire that MAF is using in the new BSE surveillance scheme. It is extremely difficult to make meaningful estimates of any disease "incidence" on the basis of laboratory submissions. This reality is recognised by epidemiologists in all countries. Nevertheless, in New Zealand's submission of July 1998, section 6 provided good data on the relative incidences of neurological disease in all farmed ruminants.

With the exception of rabies, which has never occurred in New Zealand, these relative incidences are comparable, both numerically and in terms of quality of data, with those reported in other developed countries.

Table VIII: Laboratory diagnoses for animals 2 years of age and older that had a clinical history of nervous disease during 1998

Diagnosis	Cattle	Sheep	Goats	Deer
bacterial infection (excluding those listed)	4	1		
brain tumour	1			
enterotoxaemia/FSE				
hepatic encephalopathy	16	1		
inherited disease				
listeriosis	18	22	7	
malignant catarrharal fever	4			1
metabolic disease	68	2		1
mineral toxicoses				
plant poisoning				
polioencephalomalacia	18	8	2	1
spinal cord trauma	1			
bovine viral diarrhoea	1			
low copper	3			1
“colic”	1			
no diagnosis made	108	12	4	7
Totals	**243**	**46**	**13**	**11**

Table IX: Number of brains from animals 2 years of age and older that were histologically screened for a TSE during 1998

Species	No. examined year to date	No. sent to Weybridge	No. positive for TSE
Cattle	78	1	0
Sheep	28	0	0
Goats	5	0	0
Deer	15	0	0

e) Clarification of tables XX, XXI, XXII

Table XX. The table is correct, the figure in para 6.5.1 should read 6,358. Table XX has the figures for all ages of animals that were submitted to the laboratories with a clinical history of central nervous disease.

Table XXI. These figures are for animals over 1 year of age that were exhibiting central nervous signs, and for which fixed brain was submitted to the laboratory. BSE was included in the differential diagnosis of 42 of the 341 cattle.

Table XXII. This covers a longer time period than Table XXI . The figures are for cases where BSE was suspected on the basis of clinical signs, included in the differential diagnosis.

6. Rendering and feed processing

Much of the information requested has already been covered in New Zealand's July 1998 submission and in a subsequent publication entitled "*Equivalence of Time/Temperature Parameters for Processing of Processed Animal Proteins Intended for Export to the European Community*". Refer attachment.

a) Systems used and data on process conditions (time, temperature, pressure, batch or continuous) over the last 10-15 years. How did the situation change? What was/is the share of the different systems of production on the entire domestic production?

Each of these systems is described in section 7.2 of New Zealand's July 1998 publication and in section 6.2 of the publication "*Equivalence of Time/Temperature Parameters for Processing of Processed Animal Proteins Intended for Export to the European Community*".

New Zealand processors generally use several render systems that fall in to two types of rendering process. One is the high pressure process using steam in an enclosed cooking vessel, the other is a low temperature rendering process that cooks at atmospheric pressure but can deliver high temperatures during the drying phases. New Zealand predominantly uses the latter category of processing and has done so for past 10 years.

The time/temperature parameters and expected microbiological outcomes of rendering systems used in New Zealand are described in detail in sections 5 and 6.4 of New Zealand's publication "*Equivalence of Time/Temperature Parameters for Processing of Processed Animal Proteins Intended for Export to the European Community*".

The current New Zealand regulatory standard requires a temperature ≥ 90°C for 10 minutes in moist heat; all New Zealand rendering systems currently achieve this standard. This time temperature parameter is sufficient to kill vegetative cells of the pathogenic bacteria and viruses of concern, e.g., *Salmonella*. Some establishments achieve the higher time temperature parameter of ≥ 115°C for 1 hour, or equivalent, which is sufficient to kill *Bacillus anthracis*, the traditional target organism for high temperature rendering processes.

Anthrax has previously occurred in New Zealand; the last reported case was in 1954.

Rendering systems - Proportion of national production

System specifications based on 1996 data are:

System	National proportion of premises (%)	National proportion raw material (%)	Annual output (tonnes)
Batch dry rendering	34.2 %	33%	~55,000
Centrimeal semi-continuous	2.4 %	5%	~8,000
Continuous dry rendering High temperature	12.2 %	10%	~17,000
Batch/Continuous dry rendering Low temperature	51.2 %	52%	~86,000

We are currently unable to expand this information to other years without accessing

individual company data, a process impossible under the tight time-frame provided.

Change in rendering systems

The only change in New Zealand rendering systems over the last 10-15 years has been the introduction of low-temperature rendering. Sterilization temperatures, while not achieved during the cooking phase, are met during the drying phase. MAF require that driers in low temperature rendering systems have been scientifically validated as meeting the required time/temperature parameters.

b) Nature of the records of rendering and processing plants (batch or continuous?)

The New Zealand Meat Regulations (1969) require that the company must maintain records. Our publication "*Equivalence of Time/Temperature Parameters for Processing of Processed Animal Proteins Intended for Export to the European Community*" describes the requirement stated in the Meat Regulations for maintenance of documentation.

The Meat Regulations require that licensees furnish to MAF a detailed description of the premises, nature of the byproducts to be produced, sterilizing facilities, sterilizing temperatures, and any other relevant information.

New Zealand MAF Standard 8 (IS8) further states that the production systems required to produce a product or byproduct, including production criteria, process outcomes and verification activities, shall be described in a suitably formatted and auditable document.

IS8 also states that the documented production system shall be competently evaluated (validated) by the licensee to confirm that it is complete and is capable of delivering the required regulatory outcomes. Parameters that affect the ability of the process to achieve the documented temperature/time requirements must be identified and evaluated. Such factors will include particle size, product input volumes/residency times, moisture, fat content, and protein/ash ratio.

The Meat Regulations require that the licensee maintain records of the origin and nature of raw materials, temperatures maintained during processing, times for which such treatment is maintained, volume and nature of manufactured byproducts, and any other parameters that may influence processing (e.g. pressure).

The Meat Regulations (1969) require;

'R. 261. RECORDS TO BE KEPT--

The proprietor of an approved by-products works shall keep such records of--

(a) Raw materials being processed as will enable the nature and origin of the raw material to be determined, and these records shall include, in the case of dead stock, the names of persons from whom the dead stock was collected or who delivered such dead stock on each day of operation; and

(b) Temperatures maintained during processing; and

(c) Times for which such treatment is maintained; and

(d) Volume and nature of manufactured by-products; and

(e) Such other particulars as the Director may require to enable him to authorise certification of the manufactured by-products under regulation 260 of these regulations.'

c) Quantitative and qualitative parameters of MBM and tallow production by rendering system.

Data by year, over the last 10-15 years, on:

- *total domestic production (if possible per type of process)*
- *use of domestic production (export and internal use by species)*

As described in the answer to question 3(b), New Zealand is unable to provide consistent historical data for MBM and tallow production without accessing individual company data, a process impossible under the tight time-frame provided. However, comparative production statistics for rendering systems for 1996 are presented below.

System	National proportion of premises (%)	National proportion raw material (%)	Annual output (tonnes)
Batch dry rendering	34.2 %	33%	~55,000
Centrimeal semi-continuous	2.4 %	5%	~8,000
Continuous dry rendering: High temperature	12.2 %	10%	~17,000
Batch/Continuous dry rendering: Low temperature	51.2 %	52%	~86,000

For data describing the domestic end use of MBM on a species basis refer 3 (a).

d) Geographical origin of rendered materials

- *the way they are kept*
- *the way and by whom the checks are performed.*

Geographical origin

New Zealand is a series of islands separated from its closest neighbour countries by the Tasman Sea.

Raw material for rendering is primarily sourced from animals that have been born and raised in New Zealand. Animals and animal products that have been imported into New Zealand under MAF import health standards may be rendered. The amount of raw material that would fall into this category would be infinitesimal. New Zealand individually identifies imported animals. Identification is maintained throughout the animals' life.

Handling

Regulatory control of handling of raw materials for rendering is described in section 2 of our publication "*Equivalence of Time/Temperature Parameters for Processing of Processed Animal Proteins Intended for Export to the European Community*".

The Meat Regulations were developed around contemporary Good Manufacturing Practice (GMP) using principles that now form the back-bone of HACCP. As a consequence, the Meat Regulations specify critical control points for the manufacture of PAP that are utilized by the licensee to maintain control of the premises. These include:

- control of handling and transportation of raw materials to prevent spread of infection;
- use of an approved method of sterilization, with appropriate sterilization temperatures; and
- prevention of re-contamination of meals following heat treatment, through the requirement for provision of adequate storage facilities and maintenance of vermin prevention programmes.

MAF has published a model HACCP plan for rendering to provide guidance to industry in the determination of critical control points for their specific rendering process. In addition, a code of practice for the hygienic production of rendered products has been developed by the New Zealand industry, and the Meat Industry Research Institute of New Zealand (MIRINZ) has published a bulletin entitled Rendering Hygiene: Avoiding contamination of meals. Additional guidelines are available to industry. The MAF HACCP plan and the code of practice are annexed in our publication "Equivalence of Time/Temperature Parameters for Processing of

Processed Animal Proteins Intended for Export to the European Community"

The Meat Regulations (1969) require;.

'R. 257. HANDLING OF RAW MATERIALS--

(1) All dead stock and material intended for rendering in an approved by-products works shall be held, handled, and transported in such a way as to avoid any spread of infection.

(2) No dead stock or material referred to in subclause (1) of this regulation shall be removed from an approved by-products works for any purpose whatsoever:

Provided that nodding in this subclause shall prevent the removal of any skin, hide, tail hair, hair, or wool derived from such dead stock, other than from dead stock affected by any disease referred to in the Second Schedule to these regulations.

(3) All dead stock and raw material delivered to an approved by-products works shall be subjected to a method of sterilisation which the Director has approved.

(4) Hides, skins, tail hair, hair, and wool from stock, other than those affected by any disease referred to in the Second Schedule to these regulations, shall be dealt with in accordance with the normal practice of the industry.

(5) The handling of raw material and flow of product shall be so conducted that no contact whatsoever between the raw material and the sterilised product takes place or can take place.

(6) All possible precautions shall be taken in an approved by-products works to ensure that contamination of the manufactured by-products does not take place.

(7) All manufactured by-products in an approved by-products works shall be properly held, packaged, identified, and stored under suitable conditions separate and apart from any raw material.'

Regulatory control of rendering in New Zealand

Regulatory control of all aspects of rendering is described in sections 2 & 3 of New Zealand's publication "*Equivalence of Time/Temperature Parameters for Processing of Processed Animal Proteins Intended for Export to the European Community*".

Philosophy

The essence of the New Zealand rendering control programme is not in any one of the regulatory sub-programmes, but in the regulatory programme in its totality, including the disease surveillance programme, the process control programme, the microbiological verification programme, and New Zealand regulatory supervision programme. That is the strength of the New Zealand system. It is that strength that delivers the assurances required for placing on the domestic and export markets.

Legal Basis

The Meat Act 1981 and the Meat Regulations provides the legal basis for ensuring that regulated industries comply with regulatory standards and describes in Section 11 the legal obligations for exporters.

In addition to Section 11 of the Meat Act, Section 6 provides for disposition of product not in conformance with standards/specifications. This means that any inspector appointed by MAF can require the destruction of product or may apply an other condition deemed necessary to ensure that non-conforming product is not placed on the domestic or export market.

Licensing

Rendering premises must be licensed under the Meat Act 1981 as "Approved By-products Works" by the New Zealand Ministry of Agriculture and Forestry (MAF).

Regulatory supervision

New Zealand's designated Competent Authority is the Ministry of Agriculture and Forestry. In its capacity as Competent Authority, MAF is responsible for specifying/setting standards, compliance inspections of processors/exporters and legislative enforcement.

In addition, the Meat Regulations provide authority for the MAF Inspector to take samples to verify that the heat treatment given to the product is adequate or whether any re-contamination of manufactured byproduct has occurred.

e) f) g) Type of raw material used (for all species)

8) Parameters on separate processing lines for materials from healthy and suspected animals. What about the use of fallen stock ?

Thirty seven of the forty one establishments licensed to render by-products use raw materials derived from the waste of animals processed for human consumption, animals condemned during slaughter, and animals that have died in transit or in the yards at the slaughter house. The vast majority of MBM (78 %) is processed from these premises.

Four licenced establishments also include animals that have died or have been killed on the farm.

Premises may elect to exclude "high risk" material defined under Article 3 of Directive 90/667/EEC In this case, product would be deemed "low risk" providing the establishment can demonstrate to MAF that co-minglement has not occurred.

Note

It is important to realise that fallen sheep are very, very seldom rendered in New

Zealand. Costs and distances mean that it is improbable that any sheep farmer will send for rendering sheep dying on the farm. Dead sheep are generally disposed of by deep burial in so-called 'offal pits' which have heavy covers to prevent access by dogs.

1) Transport and storage systems for MBM or feed containing MBM. Are there possibilities of cross-contamination at this stage ?

Requirements to prevent cross-contamination during storage and transport are covered under the Meat Regulations and are described in section 2 of our publication "*Equivalence of Time/Temperature Parameters for Processing of Processed Animal Proteins Intended for Export to the European Community*".

The Meat Regulations specify "critical control points" for the manufacture of PAP that are utilized by the licensee to maintain control of the premises.These include:

- control of handling and transportation of raw materials to prevent spread of infection;
- use of an approved method of sterilization, with appropriate sterilization temperatures; and
- prevention of re-contamination of meals following heat treatment, through the requirement for provision of adequate storage facilities and maintenance of vermin prevention programmes.

MAF has published a model HACCP plan for rendering to provide guidance to industry in the determination of critical control points for their specific rendering process. In addition, a code of practice for the hygienic production of rendered products has been developed by the New Zealand industry, and the Meat Industry Research Institute of New Zealand (MIRINZ) has published a bulletin entitled Rendering Hygiene: Avoiding contamination of meals. Additional guidelines are available to industry. The MAF HACCP plan and the code of practice are annexed in our publication "*Equivalence of Time/Temperature Parameters for Processing of Processed Animal Proteins Intended for Export to the European Community*"

The Meat Regulations (1969) require;.

'R. 257. HANDLING OF RAW MATERIALS--

(1) All dead stock and material intended for rendering in an approved by-products works shall be held, handled, and transported in such a way as to avoid any spread of infection.

(2) No dead stock or material referred to in subclause (1) of this regulation shall be removed from an approved by-products works for any purpose whatsoever:

Provided that nodding in this subclause shall prevent the removal of any skin, hide, tail hair, hair, or wool derived from such dead stock, other than

from dead stock affected by any disease referred to in the Second Schedule to these regulations.

(3) *All dead stock and raw material delivered to an approved by-products works shall be subjected to a method of sterilisation which the Director has approved.*

(4) *Hides, skins, tail hair, hair, and wool from stock, other than those affected by any disease referred to in the Second Schedule to these regulations, shall be dealt with in accordance with the normal practice of the industry.*

(5) *The handling of raw material and flow of product shall be so conducted that no contact whatsoever between the raw material and the sterilised product takes place or can take place.*

(6) *All possible precautions shall be taken in an approved by-products works to ensure that contamination of the manufactured by-products does not take place.*

(7) *All manufactured by-products in an approved by-products works shall be properly held, packaged, identified, and stored under suitable conditions separate and apart from any raw material.'*

Annex 1: Slaughter statistics for June 1988 to 1998

New Zealand 01/10/1988 - 30/09/1989 Printed 20/01/1993

	Graded for Export			Graded for Local			Graded Totals			Condemned	Total
Animal	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Kill**
Lambs	29,110,878	376,416,734	12.93	1,098,263	15,379,880	14.00	30,209,141	391,796,614	12.97	93,025	30,302,166
Hoggets	88,799	1,598,391	18.00	809,067	16,034,111	19.82	897,866	17,632,502	19.64	1,918	899,784
Rams	8,661	208,182	24.04	23,780	733,045	30.83	32,441	941,227	29.01	554	32,995
Other Adult Sheep	6,813,292	130,456,423	19.15	1,672,821	36,098,114	21.58	8,486,113	166,554,537	19.63	338,168	8,824,281
Total Adult Sheep	6,910,752	132,262,996	19.14	2,505,668	52,865,270	21.10	9,416,420	185,128,266	19.66	340,640	9,757,060
Calves	842,885	13,444,687	15.95	109	1,739	15.95	842,994	13,446,426	15.95	17,051	860,045
Vealers	2,435	293,736	120.63	13,906	1,716,750	123.45	16,341	2,010,486	123.03	40	16,381
Calves & Vealers	845,320	13,738,423	16.25	14,015	1,718,489	122.62	859,335	15,456,912	17.99	17,091	876,426
Heifers	144,388	29,901,579	207.09	339,416	67,769,527	199.67	483,804	97,671,106	201.88	188	483,992
Steers	624,769	175,387,094	280.72	118,023	30,177,528	255.69	742,792	205,564,622	276.75	1,010	743,802
Cows	619,638	113,850,359	183.74	6,480	1,301,906	200.91	626,118	115,152,265	183.91	4,532	630,650
Bulls	429,420	115,923,715	269.95	740	181,705	245.55	430,160	116,105,420	269.91	405	430,565
Heifers & Cows	764,026	143,751,938	188.15	345,896	69,071,433	199.69	1,109,922	212,823,371	191.75	4,720	1,114,642
Steers & Bulls	1,054,189	291,310,809	276.34	118,763	30,359,233	255.63	1,172,952	321,670,042	274.24	1,415	1,174,367
Total Adult Cattle	1,818,215	435,062,747	239.28	464,659	99,430,666	213.99	2,282,874	534,493,413	234.13	6,135	2,289,009
Pigs (up to 50 kg)	1,150	47,463	41.27	230,699	9,539,971	41.35	231,849	9,587,434	41.35	373	232,222
Pigs (over 50 kg)	18,466	1,126,437	61.00	510,178	31,035,322	60.83	528,644	32,161,759	60.84	905	529,549
Choppers	-	-	-	19,185	2,338,156	121.87	19,185	2,338,156	121.87	238	19,423
Total Pigs	19,616	1,173,900	59.84	760,062	42,913,449	56.46	779,678	44,087,349	56.55	1,516	781,194
Goats	210,697	2,446,697	11.61	7,102	90,183	12.70	217,799	2,536,880	11.65	3,354	221,153
Horses	-	-	-	-	-	-	-	-	-	-	-

New Zealand **01/10/1989 - 30/09/1990** **Printed 20/01/1993**

	Graded for Export			Graded for Local			Graded Totals			Condemned	Total
Animal	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Kill**
Lambs	24,045,771	331,993,410	13.81	1,025,404	15,006,010	14.63	25,071,175	346,999,420	13.84	77,761	25,148,936
Hoggets	80,512	1,500,048	18.63	694,663	13,916,308	20.03	775,175	15,416,356	19.89	900	776,075
Rams	22,388	481,256	21.50	17,052	519,839	30.49	39,440	1,001,095	25.38	626	40,066
Other Adult Sheep	5,096,471	102,015,374	20.02	1,577,289	34,602,753	21.94	6,673,760	136,618,127	20.47	184,903	6,858,663
Total Adult Sheep	5,199,371	103,996,678	20.00	2,289,004	49,038,900	21.42	7,488,375	153,035,578	20.44	186,429	7,674,804
Calves	711,230	11,513,115	16.19	1,458	22,328	15.31	712,688	11,535,443	16.19	12,546	725,234
Vealers	1,173	144,629	123.30	8,733	1,122,276	128.51	9,906	1,266,905	127.89	21	9,927
Calves & Vealers	712,403	11,657,744	16.36	10,191	1,144,604	112.32	722,594	12,802,348	17.72	12,567	735,161
Heifers	97,412	20,974,235	215.31	288,207	58,677,167	203.59	385,619	79,651,402	206.55	211	385,830
Steers	487,064	141,819,676	291.17	111,527	28,483,400	255.39	598,591	170,303,076	284.51	178	598,769
Cows	552,061	100,160,264	181.43	9,575	1,871,519	195.46	561,636	102,031,783	181.67	3,139	564,775
Bulls	382,307	105,725,453	276.55	3,444	963,878	279.87	385,751	106,689,331	276.58	216	385,967
Heifers & Cows	649,473	121,134,499	186.51	297,782	60,548,686	203.33	947,255	181,683,185	191.80	3,350	950,605
Steers & Bulls	869,371	247,545,129	284.74	114,971	29,447,278	256.13	984,342	276,992,407	281.40	394	984,736
Total Adult Cattle	1,518,844	368,679,628	242.74	412,753	89,995,964	218.04	1,931,597	458,675,592	237.46	3,744	1,935,341
Pigs (up to 50 kg)	3,881	161,829	41.70	226,720	9,415,404	41.53	230,601	9,577,233	41.53	470	231,071
Pigs (over 50 kg)	25,754	1,579,568	61.33	473,716	28,957,073	61.13	499,470	30,536,641	61.14	666	500,136
Choppers	9	1,123	124.78	17,654	2,145,680	121.54	17,663	2,146,803	121.54	184	17,847
Total Pigs	29,644	1,742,520	58.78	718,090	40,518,157	56.42	747,734	42,260,677	56.52	1,320	749,054
Goats	150,889	1,879,146	12.45	9,119	119,139	13.06	160,008	1,998,285	12.49	2,197	162,205
Horses	-	-	-	-	-	-	-	-	-	-	-

New Zealand **01/10/1990 - 30/09/1991** **Printed 10/05/1996**

	Graded for Export			Graded for Local			Graded Totals			Condemned	Total
Animal	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Kill**
Lambs	26,266,951	369,563,614	14.07	943,790	14,024,526	14.86	27,210,741	383,588,140	14.10	64,161	27,274,902
Hoggets	41,750	770,170	18.45	562,105	11,388,798	20.26	603,855	12,158,968	20.14	892	604,747
Rams	3,540	83,870	23.69	16,001	480,434	30.03	19,541	564,304	28.88	321	19,862
Other Adult Sheep	5,102,996	102,554,303	20.10	1,339,389	30,242,778	22.58	6,442,385	132,797,081	20.61	166,264	6,608,649
Total Adult Sheep	5,148,286	103,408,343	20.09	1,917,495	42,112,010	21.96	7,065,781	145,520,353	20.60	167,477	7,233,258
Calves	730,707	12,293,655	16.82	332	5,515	16.61	731,039	12,299,170	16.82	9,623	740,662
Vealers	105	8,163	77.74	6,271	783,378	124.92	6,376	791,541	124.14	26	6,402
Calves & Vealers	730,812	12,301,818	16.83	6,603	788,893	119.47	737,415	13,090,711	17.75	9,649	747,064
Heifers	127,214	27,918,221	219.46	288,737	59,517,564	206.13	415,951	87,435,785	210.21	220	416,171
Steers	550,082	162,347,375	295.13	89,759	23,036,513	256.65	639,841	185,383,888	289.73	150	639,991
Cows	641,623	117,475,995	183.09	5,419	1,067,031	196.91	647,042	118,543,026	183.21	2,635	649,677
Bulls	449,751	127,139,114	282.69	589	152,074	258.19	450,340	127,291,188	282.66	152	450,492
Heifers & Cows	768,837	145,394,216	189.11	294,156	60,584,595	205.96	1,062,993	205,978,811	193.77	2,855	1,065,848
Steers & Bulls	999,833	289,486,489	289.53	90,348	23,188,587	256.66	1,090,181	312,675,076	286.81	302	1,090,483
Total Adult Cattle	1,768,670	434,880,705	245.88	384,504	83,773,182	217.87	2,153,174	518,653,887	240.88	3,157	2,156,331
Pigs (up to 50 kg)	312	12,684	40.65	206,781	8,607,003	41.62	207,093	8,619,687	41.62	390	207,483
Pigs (over 50 kg)	16,776	1,049,658	62.57	505,930	31,299,930	61.87	522,706	32,349,588	61.89	670	523,376
Choppers	-	-	-	17,808	2,142,045	120.29	17,808	2,142,045	120.29	169	17,977
Total Pigs	17,088	1,062,342	62.17	730,519	42,048,978	57.56	747,607	43,111,320	57.67	1,229	748,836
Goats	248,591	3,085,423	12.41	5,673	71,039	12.52	254,264	3,156,462	12.41	3,622	257,886
Horses	4,679	1,216,661	260.03	-	-	-	4,679	1,216,661	260.03	110	4,789

New Zealand **01/10/1991 - 30/09/1992** **Printed 10/05/1996**

	Graded for Export			Graded for Local			Graded Totals			Condemned	Total
Animal	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Kill**
Lambs	27,049,228	385,682,879	14.26	970,902	14,272,179	14.70	28,020,130	399,955,058	14.27	53,258	28,073,388
Hoggets	18,810	367,584	19.54	438,678	8,860,799	20.20	457,488	9,228,383	20.17	489	457,977
Rams	10,027	207,563	20.70	16,993	507,082	29.84	27,020	714,645	26.45	420	27,440
Other Adult Sheep	5,647,690	113,485,488	20.09	1,549,325	34,328,995	22.16	7,197,015	147,814,483	20.54	163,043	7,360,058
Total Adult Sheep	5,676,527	114,060,635	20.09	2,004,996	43,696,876	21.79	7,681,523	157,757,511	20.54	163,952	7,845,475
Calves	774,471	13,312,713	17.19	31	509	16.42	774,502	13,313,222	17.19	9,862	784,364
Vealers	291	24,140	82.96	4,810	612,804	127.40	5,101	636,944	124.87	20	5,121
Calves & Vealers	774,762	13,336,853	17.21	4,841	613,313	126.69	779,603	13,950,166	17.89	9,882	789,485
Heifers	137,327	30,107,140	219.24	281,159	58,219,084	207.07	418,486	88,326,224	211.06	269	418,755
Steers	532,910	159,172,970	298.69	84,649	22,281,423	263.22	617,559	181,454,393	293.83	188	617,747
Cows	600,452	111,942,438	186.43	5,427	1,103,023	203.25	605,879	113,045,461	186.58	2,638	608,517
Bulls	489,826	139,434,224	284.66	880	234,276	266.22	490,706	139,668,500	284.63	150	490,856
Heifers & Cows	737,779	142,049,578	192.54	286,586	59,322,107	207.00	1,024,365	201,371,685	196.58	2,907	1,027,272
Steers & Bulls	1,022,736	298,607,194	291.97	85,529	22,515,699	263.25	1,108,265	321,122,893	289.75	338	1,108,603
Total Adult Cattle	1,760,515	440,656,772	250.30	372,115	81,837,806	219.93	2,132,630	522,494,578	245.00	3,245	2,135,875
Pigs (up to 50 kg)	568	23,138	40.74	204,608	8,571,587	41.89	205,176	8,594,725	41.89	386	205,562
Pigs (over 50 kg)	11,605	715,828	61.68	569,454	35,407,630	62.18	581,059	36,123,458	62.17	751	581,810
Choppers	141	15,799	112.05	20,593	2,436,269	118.31	20,734	2,452,068	118.26	210	20,944
Total Pigs	12,314	754,765	61.29	794,655	46,415,486	58.41	806,969	47,170,251	58.45	1,347	808,316
Goats	175,239	2,048,655	11.69	6,948	80,923	11.65	182,187	2,129,578	11.69	2,038	184,225
Horses	5,635	1,443,026	256.08	2	464	232.00	5,637	1,443,490	256.07	95	5,732

New Zealand **01/10/1992 - 30/09/1993** **Printed 10/05/1996**

	Graded for Export			Graded for Local			Graded Totals			Condemned	Total
Animal	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Kill**
Lambs	22,869,154	344,488,943	15.06	473,296	7,304,834	15.43	23,342,450	351,793,777	15.07	37,349	23,379,799
Hoggets	72,060	1,428,251	19.82	314,492	6,378,323	20.28	386,552	7,806,574	20.20	829	387,381
Rams	20,770	431,468	20.77	13,325	401,744	30.15	34,095	833,212	24.44	529	34,624
Other Adult Sheep	5,362,723	108,608,701	20.25	780,757	17,249,070	22.09	6,143,480	125,857,771	20.49	127,348	6,270,828
Total Adult Sheep	5,455,553	110,468,420	20.25	1,108,574	24,029,137	21.68	6,564,127	134,497,557	20.49	128,706	6,692,833
Calves	786,772	13,547,595	17.22	1,517	27,542	18.16	788,289	13,575,137	17.22	8,704	796,993
Vealers	434	40,591	93.53	4,208	500,762	119.00	4,642	541,353	116.62	26	4,668
Calves & Vealers	787,206	13,588,186	17.26	5,725	528,304	92.28	792,931	14,116,490	17.80	8,730	801,661
Heifers	213,664	46,249,834	216.46	238,670	49,733,231	208.38	452,334	95,983,065	212.20	217	452,551
Steers	555,768	165,251,853	297.34	57,513	15,059,468	261.84	613,281	180,311,321	294.01	191	613,472
Cows	580,551	109,015,978	187.78	5,778	1,223,667	211.78	586,329	110,239,645	188.02	2,510	588,839
Bulls	607,286	171,286,173	282.05	1,200	301,077	250.90	608,486	171,587,250	281.99	196	608,682
Heifers & Cows	794,215	155,265,812	195.50	244,448	50,956,898	208.46	1,038,663	206,222,710	198.55	2,727	1,041,390
Steers & Bulls	1,163,054	336,538,026	289.36	58,713	15,360,545	261.62	1,221,767	351,898,571	288.02	387	1,222,154
Total Adult Cattle	1,957,269	491,803,838	251.27	303,161	66,317,443	218.75	2,260,430	558,121,281	246.91	3,114	2,263,544
Pigs (up to 50 kg)	179	7,329	40.94	201,457	8,616,191	42.77	201,636	8,623,520	42.77	447	202,083
Pigs (over 50 kg)	5,622	355,753	63.28	586,762	36,848,413	62.80	592,384	37,204,166	62.80	717	593,101
Choppers	61	5,849	95.89	22,886	2,734,273	119.47	22,947	2,740,122	119.41	217	23,164
Total Pigs	5,862	368,931	62.94	811,105	48,198,877	59.42	816,967	48,567,808	59.45	1,381	818,348
Goats	177,211	2,113,813	11.93	4,946	59,199	11.97	182,157	2,173,012	11.93	1,181	183,338
Horses	6,545	1,688,071	257.92	-	-	-	6,545	1,688,071	257.92	239	6,784

New Zealand **01/10/1993 - 30/09/1994** **Printed 10/05/1996**

	Graded for Export			Graded for Local			Graded Totals			Condemned	Total
Animal	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Kill**
Lambs	25,388,398	385,855,709	15.20	785,466	12,252,980	15.60	26,173,864	398,108,689	15.21	36,945	26,210,809
Hoggets	63,786	1,284,020	20.13	237,893	4,868,012	20.46	301,679	6,152,032	20.39	417	302,096
Rams	488	15,775	32.33	15,139	455,786	30.11	15,627	471,561	30.18	135	15,762
Other Adult Sheep	4,762,503	102,198,873	21.46	716,147	15,950,977	22.27	5,478,650	118,149,850	21.57	99,254	5,577,904
Total Adult Sheep	4,826,777	103,498,668	21.44	969,179	21,274,775	21.95	5,795,956	124,773,443	21.53	99,806	5,895,762
Calves	810,438	14,043,182	17.33	6	106	17.67	810,444	14,043,288	17.33	10,565	821,009
Vealers	243	26,455	108.87	3,334	383,278	114.96	3,577	409,733	114.55	33	3,610
Calves & Vealers	810,681	14,069,637	17.36	3,340	383,384	114.79	814,021	14,453,021	17.76	10,598	824,619
Heifers	172,128	39,000,997	226.58	245,330	52,427,414	213.70	417,458	91,428,411	219.01	203	417,661
Steers	510,077	157,156,468	308.10	66,312	18,270,589	275.52	576,389	175,427,057	304.36	229	576,618
Cows	521,674	100,320,574	192.31	5,961	1,280,563	214.82	527,635	101,601,137	192.56	2,421	530,056
Bulls	518,782	154,346,598	297.52	1,595	448,042	280.90	520,377	154,794,640	297.47	221	520,598
Heifers & Cows	693,802	139,321,571	200.81	251,291	53,707,977	213.73	945,093	193,029,548	204.24	2,624	947,717
Steers & Bulls	1,028,859	311,503,066	302.77	67,907	18,718,631	275.65	1,096,766	330,221,697	301.09	450	1,097,216
Total Adult Cattle	1,722,661	450,824,637	261.70	319,198	72,426,608	226.90	2,041,859	523,251,245	256.26	3,074	2,044,933
Pigs (up to 50 kg)	1,508	64,544	42.80	190,970	8,237,383	43.13	192,478	8,301,927	43.13	457	192,935
Pigs (over 50 kg)	5,606	359,633	64.15	602,121	37,977,985	63.07	607,727	38,337,618	63.08	755	608,482
Choppers	272	31,696	116.53	21,143	2,503,054	118.39	21,415	2,534,750	118.36	207	21,622
Total Pigs	7,386	455,873	61.72	814,234	48,718,422	59.83	821,620	49,174,295	59.85	1,419	823,039
Goats	156,008	1,789,580	11.47	5,301	60,918	11.49	161,309	1,850,498	11.47	1,348	162,657
Horses	7,168	1,863,549	259.98	76	19,265	253.49	7,244	1,882,814	259.91	122	7,366

New Zealand **01/10/1994 - 30/09/1995** **Printed 11/11/1996**

	Graded for Export			Graded for Local			Graded Totals			Condemned	Total
Animal	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Kill**
Lambs	25,413,266	370,169,823	14.57	1,232,899	19,039,564	15.44	26,646,165	389,209,387	14.61	37,449	26,683,614
Hoggets	107,096	1,923,972	17.96	296,305	5,952,406	20.09	403,401	7,876,378	19.52	336	403,737
Rams	17,767	394,790	22.22	21,879	596,626	27.27	39,646	991,416	25.01	458	40,104
Other Adult Sheep	5,317,222	111,400,440	20.95	1,063,458	23,660,520	22.25	6,380,680	135,060,960	21.17	126,778	6,507,458
Total Adult Sheep	5,442,085	113,719,202	20.90	1,381,642	30,209,552	21.86	6,823,727	143,928,754	21.09	127,572	6,951,299
Calves	1,225,844	22,258,226	18.16	1,892	34,574	18.27	1,227,736	22,292,800	18.16	16,262	1,243,998
Vealers	222	27,991	126.09	9,226	1,018,848	110.43	9,448	1,046,839	110.80	60	9,508
Calves & Vealers	1,226,066	22,286,217	18.18	11,118	1,053,422	94.75	1,237,184	23,339,639	18.87	16,322	1,253,506
Heifers	177,670	40,191,401	226.21	274,650	58,397,343	212.62	452,320	98,588,744	217.96	228	452,548
Steers	653,181	198,950,173	304.59	93,965	25,416,334	270.49	747,146	224,366,507	300.30	267	747,413
Cows	688,308	130,079,220	188.98	4,667	971,257	208.11	692,975	131,050,477	189.11	3,131	696,106
Bulls	515,695	151,442,062	293.67	1,477	410,178	277.71	517,172	151,852,240	293.62	186	517,358
Heifers & Cows	865,978	170,270,621	196.62	279,317	59,368,600	212.55	1,145,295	229,639,221	200.51	3,359	1,148,654
Steers & Bulls	1,168,876	350,392,235	299.77	95,442	25,826,512	270.60	1,264,318	376,218,747	297.57	453	1,264,771
Total Adult Cattle	2,034,854	520,662,856	255.87	374,759	85,195,112	227.33	2,409,613	605,857,968	251.43	3,812	2,413,425
Pigs (up to 50 kg)	-	-	-	179,328	7,682,825	42.84	179,328	7,682,825	42.84	318	179,646
Pigs (over 50 kg)	1,564	98,420	62.93	641,206	40,627,036	63.36	642,770	40,725,456	63.36	1,384	644,154
Choppers	-	-	-	24,346	2,828,440	116.18	24,346	2,828,440	116.18	338	24,684
Total Pigs	1,564	98,420	62.93	844,880	51,138,301	60.53	846,444	51,236,721	60.53	2,040	848,484
Goats	160,129	1,807,652	11.29	2,536	30,011	11.83	162,665	1,837,663	11.30	1,440	164,105
Horses	7,666	1,930,228	251.79	-	-	-	7,666	1,930,228	251.79	134	7,800

New Zealand **01/10/1995 - 30/09/1996** **Printed 03/11/1997**

	Graded for Export			Graded for Local			Graded Totals			Condemned	Total
Animal	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Kill**
Lambs	23,499,695	357,020,246	15.19	1,180,730	18,458,588	15.63	24,680,425	375,478,834	15.21	39,708	24,720,133
Hoggets	88,684	1,826,427	20.59	224,926	4,594,777	20.43	313,610	6,421,204	20.48	719	314,329
Rams	2,278	54,933	24.11	12,837	389,664	30.35	15,115	444,597	29.41	215	15,330
Other Adult Sheep	5,069,509	107,793,196	21.26	881,678	19,650,437	22.29	5,951,187	127,443,633	21.41	105,662	6,056,849
Total Adult Sheep	5,160,471	109,674,556	21.25	1,119,441	24,634,878	22.01	6,279,912	134,309,434	21.39	106,596	6,386,508
Calves	1,368,316	24,877,664	18.18	7,917	150,522	19.01	1,376,233	25,028,186	18.19	20,944	1,397,177
Vealers	577	73,373	127.16	12,253	1,424,283	116.24	12,830	1,497,656	116.73	30	12,860
Calves & Vealers	1,368,893	24,951,037	18.23	20,170	1,574,805	78.08	1,389,063	26,525,842	19.10	20,974	1,410,037
Heifers	186,354	41,979,186	225.27	306,638	64,989,160	211.94	492,992	106,968,346	216.98	184	493,176
Steers	681,436	204,998,634	300.83	100,652	26,811,492	266.38	782,088	231,810,126	296.40	181	782,269
Cows	705,057	135,468,251	192.14	5,338	1,094,934	205.12	710,395	136,563,185	192.24	2,833	713,228
Bulls	449,189	129,908,609	289.21	1,611	469,924	291.70	450,800	130,378,533	289.22	181	450,981
Heifers & Cows	891,411	177,447,437	199.06	311,976	66,084,094	211.82	1,203,387	243,531,531	202.37	3,017	1,206,404
Steers & Bulls	1,130,625	334,907,243	296.21	102,263	27,281,416	266.78	1,232,888	362,188,659	293.77	362	1,233,250
Total Adult Cattle	2,022,036	512,354,680	253.39	414,239	93,365,510	225.39	2,436,275	605,720,190	248.63	3,379	2,439,654
Pigs (up to 50 kg)	508	23,514	46.29	169,012	7,212,062	42.67	169,520	7,235,576	42.68	297	169,817
Pigs (over 50 kg)	1,140	75,495	66.22	619,256	39,940,588	64.50	620,396	40,016,083	64.50	890	621,286
Choppers	55	7,721	140.38	23,397	2,650,958	113.30	23,452	2,658,679	113.37	243	23,695
Total Pigs	1,703	106,730	62.67	811,665	49,803,608	61.36	813,368	49,910,338	61.36	1,430	814,798
Goats	112,654	1,257,157	11.16	2,845	32,621	11.47	115,499	1,289,778	11.17	1,648	117,147
Horses	5,382	1,433,686	266.39	43	12,238	284.60	5,425	1,445,924	266.53	51	5,476

New Zealand **01/10/1996 - 30/09/1997** **Printed 07/12/1998**

	Graded for Export			Graded for Local			Graded Totals			Condemned	Total
Animal	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Kill**
Lambs	25,319,674	401,478,000	15.86	1,082,359	17,614,840	16.27	26,402,033	419,092,840	15.87	38,565	26,440,598
Hoggets	89,482	1,912,094	21.37	195,137	4,038,019	20.69	284,619	5,950,113	20.91	832	285,451
Rams	26,012	564,207	21.69	15,485	463,196	29.91	41,497	1,027,403	24.76	830	42,327
Other Adult Sheep	4,666,914	103,694,073	22.22	561,711	12,870,289	22.91	5,228,625	116,564,362	22.29	92,617	5,321,242
Total Adult Sheep	4,782,408	106,170,374	22.20	772,333	17,371,504	22.49	5,554,741	123,541,878	22.24	94,279	5,649,020
Calves	1,367,508	24,456,252	17.88	5,809	106,109	18.27	1,373,317	24,562,361	17.89	20,576	1,393,893
Vealers	286	37,116	129.78	13,279	1,538,934	115.89	13,565	1,576,050	116.19	43	13,608
Calves & Vealers	1,367,794	24,493,368	17.91	19,088	1,645,043	86.18	1,386,882	26,138,411	18.85	20,619	1,407,501
Heifers	177,782	41,313,187	232.38	348,021	75,641,474	217.35	525,803	116,954,661	222.43	151	525,954
Steers	698,512	216,277,062	309.63	102,044	27,692,036	271.37	800,556	243,969,098	304.75	206	800,762
Cows	720,640	143,916,031	199.71	5,936	1,240,844	209.04	726,576	145,156,875	199.78	2,876	729,452
Bulls	369,441	113,701,985	307.77	1,290	382,659	296.63	370,731	114,084,644	307.73	195	370,926
Heifers & Cows	898,422	185,229,218	206.17	353,957	76,882,318	217.21	1,252,379	262,111,536	209.29	3,027	1,255,406
Steers & Bulls	1,067,953	329,979,047	308.98	103,334	28,074,695	271.69	1,171,287	358,053,742	305.69	401	1,171,688
Total Adult Cattle	1,966,375	515,208,265	262.01	457,291	104,957,013	229.52	2,423,666	620,165,278	255.88	3,428	2,427,094
Pigs (up to 50 kg)	-	-	-	153,378	6,637,262	43.27	153,378	6,637,262	43.27	307	153,685
Pigs (over 50 kg)	-	-	-	596,141	38,841,305	65.15	596,141	38,841,305	65.15	797	596,938
Choppers	-	-	-	22,688	2,486,968	109.62	22,688	2,486,968	109.62	188	22,876
Total Pigs	-	-	-	772,207	47,965,535	62.11	772,207	47,965,535	62.11	1,292	773,499
Goats	154,952	1,728,860	11.16	3,049	35,689	11.71	158,001	1,764,549	11.17	1,490	159,491
Horses	4,236	1,135,230	268.00	-	-	-	4,236	1,135,230	268.00	136	4,372

New Zealand **01/10/1997 - 30/09/1998** **Printed 07/12/1998**

	Graded for Export			Graded for Local			Graded Totals			Condemned	Total
Animal	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Weight**	**Mean**	**Kill**	**Kill**
Lambs	25,892,512	398,401,188	15.39	1,131,956	18,055,294	15.95	27,024,468	416,456,482	15.41	38,092	27,062,560
Hoggets	62,864	1,310,755	20.85	180,802	3,755,583	20.77	243,666	5,066,338	20.79	281	243,947
Rams	4,629	119,339	25.78	14,941	451,184	30.20	19,570	570,523	29.15	239	19,809
Other Adult Sheep	4,999,717	111,770,984	22.36	498,406	11,214,432	22.50	5,498,123	122,985,416	22.37	103,807	5,601,930
Total Adult Sheep	5,067,210	113,201,078	22.34	694,149	15,421,199	22.22	5,761,359	128,622,277	22.32	104,327	5,865,686
Calves	1,368,413	23,815,965	17.40	127	2,124	16.72	1,368,540	23,818,089	17.40	21,535	1,390,075
Vealers	722	83,982	116.32	11,868	1,375,207	115.88	12,590	1,459,189	115.90	24	12,614
Calves & Vealers	1,369,135	23,899,947	17.46	11,995	1,377,331	114.83	1,381,130	25,277,278	18.30	21,559	1,402,689
Heifers	173,395	39,110,506	225.56	317,902	68,172,528	214.45	491,297	107,283,034	218.37	169	491,466
Steers	649,905	198,115,277	304.84	102,591	27,420,373	267.28	752,496	225,535,650	299.72	199	752,695
Cows	869,796	170,789,653	196.36	4,543	941,585	207.26	874,339	171,731,238	196.41	3,549	877,888
Bulls	342,913	104,156,979	303.74	520	153,392	294.98	343,433	104,310,371	303.73	176	343,609
Heifers & Cows	1,043,191	209,900,159	201.21	322,445	69,114,113	214.34	1,365,636	279,014,272	204.31	3,718	1,369,354
Steers & Bulls	992,818	302,272,256	304.46	103,111	27,573,765	267.42	1,095,929	329,846,021	300.97	375	1,096,304
Total Adult Cattle	2,036,009	512,172,415	251.56	425,556	96,687,878	227.20	2,461,565	608,860,293	247.35	4,093	2,465,658
Pigs (up to 50 kg)	3,649	161,918	44.37	131,725	5,768,071	43.79	135,374	5,929,989	43.80	260	135,634
Pigs (over 50 kg)	31,416	2,157,590	68.68	589,156	37,945,880	64.41	620,572	40,103,470	64.62	660	621,232
Choppers	560	72,845	130.08	19,239	2,232,572	116.04	19,799	2,305,417	116.44	191	19,990
Total Pigs	35,625	2,392,353	67.15	740,120	45,946,523	62.08	775,745	48,338,876	62.31	1,111	776,856
Goats	120,396	1,369,918	11.38	23,095	277,568	12.02	143,491	1,647,486	11.48	1,156	144,647
Horses	4,171	1,080,055	258.94	-	-	-	4,171	1,080,055	258.94	75	4,246

Annex 2: Number of animals exported from New Zealand per importing country - 1993 to 1998

Animal Exports	***Africa***					
Species	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Cattle	0	0	0	0	0	0
Deer	0	0	0	0	0	0
Goats	0	0	0	0	0	0
Horses	8	11	4	28	62	23
Lamoids	0	0	0	0	0	0
Poultry	0	6864	0	0	0	0
Sheep	0	0	0	0	0	0

Animal Exports	***Asia***					
Species	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Cattle	3346	6714	4668	5968	2974	1215
Deer	806	0	0	0	0	0
Goats	25	0	1077	749	241	300
Horses	946	811	796	713	433	595
Lamoids	0	0	0	0	0	0
Poultry	0	0	1258605	128328	0	4725
Sheep	87	126	310	471	70	49

Animal Exports	***Australia***					
Species	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Cattle	37	19	9	0	0	0
Deer	0	0	0	0	0	0
Goats	0	359	437	137	60	1
Horses	2006	2334	2003	2008	2109	2477
Lamoids	14	16	20	0	0	0
Poultry	0	3000	0	0	0	0
Sheep	742	5	802	0	0	0

Animal Exports	***Canada***					
Species	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Cattle	0	0	0	7	0	3310
Deer	0	0	0	0	0	0
Goats	0	0	0	0	0	47
Horses	1	0	0	0	0	0
Lamoids	0	0	0	0	0	0
Poultry	0	0	0	0	0	0
Sheep	0	0	0	0	0	0

Animal Exports	***Middle East***					
Species	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Cattle	0	0	0	253	0	0
Deer	0	0	0	0	0	0
Goats	0	0	0	0	0	80
Horses	6	1	0	0	0	32
Lamoids	0	0	0	0	0	0
Poultry	0	0	0	0	0	0
Sheep	1355972	732992	689026	483026	118146	204622

Animal Exports	***Europe (except UK)***					
Species	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Cattle	12	93	0	0	0	0
Deer	0	0	0	0	0	0
Goats	21	206	30	0	0	0
Horses	29	1	8	6	25	37
Lamoids	0	0	0	0	0	0
Poultry	0	0	0	0	0	0
Sheep	0	0	0	0	10	0

Animal Exports	***Pacific Islands***					
Species	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Cattle	5	22	128	45	4	64
Deer	0	0	0	0	0	0
Goats	3	1	0	52	18	19
Horses	20	42	19	1	6	9
Lamoids	0	0	0	0	0	0
Poultry	5364639	3658918	2015018	5901189	7191738	345693
Sheep	743	4	5	2	0	14

Animal Exports	***South America***					
Species	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Cattle	4192	925	0	0	0	3783
Deer	0	908	10	8	12	6
Goats	40	4	22	115	225	289
Horses	0	0	6	0	10	11
Lamoids	0	0	0	0	0	0
Poultry	0	0	0	0	0	405
Sheep	179	9	10	5	152	114

Animal Exports	***United Kingdom***					
Species	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Cattle	5	0	0	6	0	0
Deer	0	0	0	0	0	0
Goats	0	0	0	0	0	0
Horses	97	99	155	81	147	217
Lamoids	0	0	0	0	0	0
Poultry	0	0	0	0	0	0
Sheep	3	43	1025	0	0	1050

Animal Exports	***USA***					
Species	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Cattle	0	0	0	0	0	0
Deer	0	0	0	0	0	0
Goats	134	2737	108	12	354	488
Horses	200	142	120	153	150	134
Lamoids	18	51	0	14	0	10
Poultry	0	0	0	0	0	0
Sheep	59	207	6	30	0	18

Annex 3: New Zealand laboratory standard for the diagnosis of transmissible spongiform encephalopathies of animals

Introduction

The OIE, Paris, May 1998, Appendix 4.5.1 *BSE surveillance and monitoring system* proposes that for a country to be considered free of BSE a minimum number of brains, from animals exhibiting nervous signs, need to be examined annually. For the cattle population (2 years of age and older) in New Zealand the number of brains is 300. The surveillance programme aims to examine and report on 300 cattle brains and as many brains from other species as is possible.

1.0 Purpose

To ensure adequate veterinary diagnostic laboratory procedures for the screening, diagnosis and reporting of the transmissible spongiform encephalopathies including; bovine spongiform encephalopathy (BSE), scrapie, transmissible spongiform encephalopathy of deer (SED), and feline spongiform encephalopathy (FSE).

2.0 Introduction

Laboratory screening and reporting of the transmissible spongiform encephalopathies:

The comprehensive screening programme for the transmissible spongiform encephalopathies (TSEs) comprises three components, which are as follows:

- screening, by laboratory veterinarians, of the case histories of all laboratory submissions with a clinical history of nervous disease, to exclude the diagnosis of a transmissible spongiform encephalopathy;
- screening, by veterinary histopathologists, of all brains from animals 2 years of age and older, with a clinical history of nervous disease to detect lesions of the transmissible spongiform encephalopathies; and
- investigation by MAF of cases where veterinary practitioners suspect a transmissible spongiform encephalopathy on the basis of clinical signs.

3.0 Scope

This procedure shall apply to all veterinary diagnostic laboratories and veterinary pathologists approved for performing TSE surveillance.

4.0 Definitions

Expert Pathologist: The histopathologist appointed by MAF to perform referral examinations.

Routine Screening: Actions undertaken at approved veterinary diagnostic laboratories.

Referral Actions: Actions undertaken by the Expert Pathologist (histological examination) and the NZAHRL (referral of material examinations for additional testing).

Veterinary Pathologist: The histopathologist responsible for routine screening procedures at an approved veterinary diagnostic laboratory.

5.0 Actions: Routine Screening

5.1 Intra-laboratory sample collection and preparation for suspect TSEs:

Brain shall be removed from skull as soon after death as possible, and fresh and fixed samples collected. At least 5 gm of fresh tissue shall be collected for fibril analysis or immunodiagnosis. It shall include anterior spinal cord posterior to obex and, if necessary to obtain the required weight a section of the medulla oblongata between obex and cerebellar peduncle. Tissue shall be saved frozen in the coldest freezer at the laboratory. The remainder of the brain shall be fixed in 10% formol saline.

For BSE and scrapie screening, the fixed brain shall be sectioned through the obex so as to include the solitary tract nucleus and the spinal tract nucleus of the trigeminal nerve. For suspected SED and FSE the range of sections that should be examined is larger, and includes sections through the obex, pons, anterior colliculus, thalamus, cerebral and cerebellar cortices.

5.2 Sample evaluation: histology

Sections shall be evaluated for lesions suggestive of a TSE and if changes are detected, all slides, blocks and residual fixed brain tissue shall be forwarded for second opinion to the Expert Pathologist. Guidelines for diagnostic criteria are currently as follows:

- Positive diagnosis for BSE: The presence of characteristic vacuolation (spongiform changes) of grey matter neuropil and/or neuronal perikarya, usually with a bilaterally symmetrical distribution. Vacuolation in either the solitary tract nucleus or the spinal tract nucleus of the trigeminal nerve with a bilaterally symmetrical distribution is sufficient for confirmation. In well preserved material a minimal lesion for a positive case should show more than three neuropil vacuoles per histology section. These cases shall be referred to the Expert Pathologist.
- Positive diagnosis for scrapie, SED and FSE: The lesions in these diseases tend to be more widely distributed, with the latter two conditions often showing the most severe changes in the thalamus. Spongiform change is usually more common than vacuolation of neuronal perikarya in BSE, SED and FSE and *vice versa* in scrapie. These cases shall be referred to the Expert Pathologist.
- Inconclusive diagnosis: Includes cases where the brain tissue submitted is not suitable for histological examination and a laboratory diagnosis which explains the clinical syndrome can not be made from the other tissues examined; and cases where the histopathology is suggestive but inconclusive. These cases shall be referred to the Expert Pathologist.
- Negative diagnosis: There is an absence of lesions in a representative range of target sites; or lesions indicate an alternative histopathological diagnosis and there is an absence of lesions in target sites.

- Unresolved case: Where a pathologist requests a second opinion before classifying the case into one of the other categories. These cases shall be sent to the expert Pathologist.

6.0 Referral Actions:

6.1 Histology

Where a second opinion is required, sections are re-examined by the Expert Pathologist. If suspicion of a TSE still exists following this examination, additional sections of fixed tissue will be prepared from a wider range of sites as recommended in the European Commission's Protocols for the *Laboratory Diagnosis and Confirmation of Bovine Spongiform Encephalopathy and Scrapie*, September 1994. If a TSE can not be ruled-out samples shall be referred for additional testing (section 6.2).

6.2 Additional testing

If the diagnosis of a TSE can not be ruled out by the Expert Pathologist, fixed and frozen tissue shall be forwarded to the Manager, NZAHRL, who organises its dispatch to the Ministry of Agriculture Fisheries and Food, Central Veterinary Laboratory, New Haw, Weybridge, Surrey, KT 153 NB, England for further testing.

7.0 Reporting:

7.1 Notification

TSEs are notifiable diseases as specified by The Biosecurity (Notifiable Organisms) Order 1993. Should a TSE be suspected on the basis of clinical history or laboratory examination, the EDRC (Freephone 0800 809 966) is to be informed on the same working day as the provisional diagnosis was made by the approved veterinary diagnostic laboratory.

Results of referral tests are reported to the EDRC by the Expert Pathologist on the same working day as the results are available.

Method of communication may be telephone, electronic mail or facsimile. In all cases a telephone notification shall be followed by notification by fax and the fax shall be kept on file.

7.2 Quarterly reporting requirements

The international reporting requirements for the TSEs necessitate the quarterly collation of the following laboratory information:

Table 1: The number of cases with a history of nervous disease submitted to the laboratories each quarter (all ages)

No. of submissions	**Cattle**	**Sheep**	**Farmed deer**	**Goats**	**Lamoids**
Quarterly					
Year-to-date					

Table II: Laboratory diagnosis for the cattle, sheep, deer and goat submissions that had a clinical history of nervous disease (animals 2 years of age and older)

Diagnosis	**Cattle**	**YTD**	**Sheep**	**YTD**	**Goats**	**YTD**	**Deer**	**YTD**
bacterial infection (excluding those listed)								
brain tumour								
enterotoxaemia/FSE								
hepatic encephalopathy								
inherited disease								
listeriosis								
malignant catarrh								
metabolic disease								
mineral toxicoses								
plant poisoning								
polioencephalomalacia								
spinal cord trauma								
List other diagnoses								
no diagnosis made Totals								

Table III: Number of brains from animals histologically screened for a transmissible spongiform encephalopathy (animals 2 years of age and older)

Species	**No. examined this quarter**	**No. examined year-to-date**	**No. referred overseas this quarter**	**No. referred overseas year-to-date**	**No. with $100 credit**
Cattle					
Sheep					
Goats					
Deer					
Lamoids					
Cats					
Ostrich					
List other species					

Table IV: Histopathological diagnoses/findings for the brains examined from animals 2 years of age and older*

Diagnosis	**Cattle**	**YTD**	**Sheep**	**YTD**	**Goats**	**YTD**	**Deer**	**YTD**
bacterial infection (excluding those listed)								
brain tumour								
enterotoxaemia/FSE								
hepatic encephalopathy								
inherited disease								
listeriosis								
malignant catarrh								
polioencephalomalacia								
List other diagnoses								
no histopath. lesions								
Total								

* This Table will contain the figures presented in Table II & V

Table V: Laboratory diagnoses for the brains received from animals 2 years of age and older exhibiting central nervous signs at slaughterhouse ante-mortem inspection

Diagnosis	**Cattle**	**YTD**	**Sheep**	**YTD**	**Goats**	**YTD**
hepatic encephalopathy						
listeriosis						
malignant catarrh						
List other diagnoses						
no histopath. lesions						
Total						

References

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5 Palmer AC. Distribution of vacuolated neurones in brains of sheep affected with scrapie. Journal of Neuropathology and Experimental Neurology 14, 102-9, 1960.

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Annex 4: BSE history of British herds from which cattle were imported into New Zealand during the 1980s.

Animal	D.O.B	Imported	Year of death	Age at death[1]	Cases UK herd[2]	Cases in animals sold off[3]	D.O.B. of UK confirmed case
Ayrshire bull	31.12.80	May-82	1989	8+	nil	nil	nil
Hereford bull	.	1984	Exported 1984	exported	nil	nil	nil
Ayrshire bull	25.3.82	Jan/Feb 1983	12.1.89	6+	2	nil	Oct 84 - Oct 88
Ayrshire bull	13.7.82	Apr-84	Dec-91	9+	1	nil	Sep-87
Jersey bull	1983	Aug-84	Mar-89	6[4]	11	nil	1982-84, 86-89 1 ?
Hereford bull	16.8.83	Nov-84	Jun-91	7+	1	nil	Aug-87
Hereford bull	2.5.84	Nov-84	Mar-89	4+	nil	1	Sep-86
Hereford bull	9.1.84	Nov-84	1994	9+	nil	1	Sep-85
4 Belgian blue heifers	23.7.86	Aug-87	1992,97,99, still alive	6,11,13, alive	nil	nil	nil
Hereford bull	19.8.83	Apr-84	1985	1+	nil	nil	nil

Notes
(1) Age at death of the animal imported into New Zealand.
(2) Cases of BSE in the herd of origin.
(3) Cases of BSE in animals sold from the herd of origin.
(4) Bull was clinically healthy at time he was slaughtered because he was infertile.

Annex 5: Age structure of New Zealand Dairy Herd - 1988 to 1998

New Zealand: Age structure of New Zealand Dairy Herd - 1988 to 1998

From Dairy Statistics, 1997/98 to 1988/89. Table 4.6. Cows herd tested

Complications 1. Herd testing figures, therefore change with demand - currently around 90% of herds

2. Efficiency of data extract was enhanced in 1996/97

	1997/98		1996/97		1995/96		1994/95		1993/94	
Age	Number	%	Number	%	Number	%	Number	%	Number	%
2	547,558	21.1%	547,520	21.7%	309,466	18.8%	276,327	17.4%	287,455	18.1%
3	476,794	18.4%	441,246	17.5%	263,670	16.0%	267,256	16.9%	268,596	17.0%
4	388,525	15.0%	361,833	14.3%	244,212	14.8%	238,380	15.0%	233,520	14.7%
5	314,793	12.1%	320,853	12.7%	215,588	13.1%	207,787	13.1%	191,980	12.1%
6	266,996	10.3%	261,377	10.3%	181,934	11.0%	163,553	10.3%	156,808	9.9%
7	206,402	8.0%	208,761	8.3%	135,790	8.2%	126,863	8.0%	136,667	8.6%
8	156,731	6.0%	142,123	5.6%	99,831	6.0%	105,371	6.6%	107,895	6.8%
9	98,698	3.8%	93,986	3.7%	77,958	4.7%	78,459	5.0%	79,211	5.0%
10	136,663	5.3%	150,867	6.0%	121,769	7.4%	121,006	7.6%	122,023	7.7%
Total	2,593,160		2,528,566		1,650,218		1,585,002		1,584,155	
Average Age	4.71		4.74		4.98		5.03		5.03	

	1992/93		1991/92		1990/91		1989/90		1988/89	
Age	Number	%	Number	%	Number	%	Number	%	Number	%
2	245,643	18.7%	184,078	18.6%	151,765	17.3%	144,131	15.5%	103,353	15.9%
3	221,003	16.8%	159,765	16.1%	134,551	15.3%	152,823	16.5%	109,478	16.8%
4	179,762	13.7%	131,689	13.3%	126,814	14.5%	137,262	14.8%	109,331	16.8%
5	153,393	11.7%	126,637	12.8%	115,090	13.1%	123,708	13.3%	94,388	14.5%
6	140,923	10.7%	108,622	11.0%	99,497	11.3%	118,714	12.8%	68,580	10.5%
7	115,246	8.8%	89,213	9.0%	90,162	10.3%	90,432	9.7%	52,771	8.1%
8	89,969	6.9%	76,813	7.8%	63,695	7.3%	59,572	6.4%	42,654	6.5%
9	73,560	5.6%	51,649	5.2%	39,258	4.5%	41,139	4.4%	27,188	4.2%
10	92,697	7.1%	62,103	6.3%	56,000	6.4%	60,573	6.5%	43,656	6.7%
Total	1,312,196		990,569		876,832		928,354		651,399	
Average Age	5.03		5.03		5.06		5.08		4.99	

Annex 6: New Zealand: Live deer imported into New Zealand from the United Kingdom and Canada, 1991-1998

Deer imports by year	United Kingdom	Canada
1991	0	0
1992	0	6
1993	29	0
1994	96	0
1995	24	0
1996	0	5
1997	24	0
1998	0	0

January 2001 Addendum
Annex a: Surveillance figures from 1 January 1999 to 30 September 2000

Table I: The number of cases from animals of all ages with a history of nervous disease submitted to New Zealand laboratories from 1 January 1999 to 30 September 2000

No. of submissions	Cattle	Sheep	Farmed Deer	Goats	Lamoids
1999	584	121	40	20	8
2000	231	62	16	16	6

Table II: Laboratory diagnoses for animals 2 years of age and older that had a clinical history of nervous disease from 1 January 1999 to 30 September 2000

Diagnosis	Cattle		Sheep		Goats		Deer	
Year	**1999**	**2000**	**1999**	**2000**	**1999**	**2000**	**1999**	**2000**
bacterial infection (excluding those listed)	4	2	1	1				
brain tumour	1	1						
enterotoxaemia/FSE		1						
hepatic encephalopathy	16	7	1			1		
inherited disease								
listeriosis	18	3	22	7	7			
malignant catarrharal fever	4	1					1	1
metabolic disease	68	42	2	5			1	
mineral toxicoses								
plant poisoning		2		2				
polioencephalomalacia	18	2	8	4	2	1	1	
spinal cord trauma	1							
bovine viral diarrhoea	1							
low copper	3						1	2
“colic”	1							
no diagnosis made	108	124	12	23	4	10	7	8
Totals	**243**	**185**	**46**	**42**	**13**	**12**	**11**	**11**

Table III: Number of brains from animals 2 years of age and older that were histologically screened for a TSE from 1 January 1999 to 30 September 2000

Species	No. examined by year		No. sent to Weybridge		No. positive for TSE	
	1999	2000	1999	2000	1999	2000
Cattle	78	41	1	0	0	0
Sheep	28	25	0	0	0	0
Goats	5	4	0	0	0	0
Deer	15	8	0	0	0	0

Table VII: The number of cases from animals of all ages with a history of nervous disease submitted to New Zealand laboratories from I January 1999 to 31 December 2000

No. of submissions	Cattle	Sheep	Farmed Deer	Goats	Lamoids
1999	553	123	30	14	3
2000	592	122	22	25	6

Table VIII: Laboratory diagnoses for animals 2 years of age and older that had a clinical history of nervous disease from I January 1999 to 31 December 2000

Diagnosis	**Cattle**		Sheep		**Goats**		**Deer**	
Year	**1999**	**2000**	**1999**	**2000**	**1999**	**2000**	**1999**	**2000**
Bacterial infection (excluding those listed)	1	3		1	1			
brain tumour	3	1						
Enterotoxaemia/FSE		2	2					
Hepatic encephalopathy	20	11	1			1		
Listeriosis	12	7	6	8				
Malignant catarrhal fever	4	2					3	1
Metabolic disease	37	58	2	3				1
Mineral toxicoses			1	1				
Plant poisoning	2	2		2				
Polioencephalomalacia	12	3	2	4		1		
low copper								4
Tetanus			1					
Cerebellar cortical abiotrophy	1							
Subacute encephalitis			1	1				
Myonecrosis		2						
Adenovirus		1						
no diagnosis made	223	153	32	25	7	10	11	7
Totals	**315**	**245**	**48**	**45**	**8**	**12**	**14**	**13**

Table IX: Number of brains from animals 2 years of age and older that were histologically screened for a TSE from I January 1999 to 31 December 2000

Species	No. examined by year		No. sent to Weybridge		No. positive for TSE	
	1999	2000	1999	2000	1999	2000
Cattle	97	310*	0	0	0	0
Sheep	17	22	0	0	0	0
Goats	2	4	0	0	0	0
Deer	12	6	0	0	0	0

* This total includes 264 brains from surveillance targeted at fallen stock, as per the revised recommendations for Appendix 3.8.3, Surveillance and Monitoring Systems for Bovine Spongiform Encephalopathy, contained in the September 2000 OIE draft International Animal Health Code.

Annex b: European Union Geographical BSE Risk Assessment.

The EU geographical BSE risk assessment of New Zealand concluded in July 2000 that New Zealand was a category one country. This was the highest possible rating. Category one is defined as the presence of one or more cattle clinically or pre-clinically infected with the BSE agent in a geographical region/country is highly unlikely.

Annex c: Biosecurity (Ruminant Protein) Regulations 1999

The following regulations prohibiting the feeding of ruminant protein to ruminants came into effect on 1 January 2000

SR 1999/410

MICHAEL HARDIE BOYS, Governor-General
ORDER IN COUNCIL
At Wellington this 22nd day of November 1999
Present:
THE RIGHT HON WYATT CREECH PRESIDING IN COUNCIL
PURSUANT to section 165 of the Biosecurity Act 1993, His Excellency the Governor-General, acting on the advice and with the consent of the Executive Council, makes the following regulations.

CONTENTS

REGULATIONS

1 TITLE AND COMMENCEMENT-
These regulations may be cited as the Biosecurity (Ruminant Protein) Regulations 1999.

(2) These regulations come into force on 1 January 2000.

INTERPRETATION AND PURPOSES

2 INTERPRETATION-

In these regulations, unless the context otherwise requires,--

"Act" means the Biosecurity Act 1993:

"Animal" means any living stage of any member of the animal kingdom except human beings:

"Feed" means any matter produced as, or as part of, food for animals in premises that render, produce, or utilise ruminant protein, but does not include-

(a) Tallow; or

(b) Pet food packaged for retail sale and labelled for feeding to dogs or cats:

"Feed supplier" means a person who produces, trades in, or distributes feed:

"Operator" means the occupier of premises where ruminant protein is rendered, used, or stored and where-

(a) Non-ruminant mammalian, avian, or fish tissue is rendered for feeding to ruminants; or

(b) Feed intended for ruminants is produced:

"Registered programme" means a ruminant protein control programme (as amended, if amended) registered by the Director-General under regulation 9 or 10:

"Rumen" means the first stomach of a ruminant:

"Ruminant" means an animal of the order Artiodactyla that chews the cud regurgitated from its rumen, for example, cattle, sheep, deer, alpacas, and goats:

"Ruminant protein" means protein derived from the tissue of a ruminant, except dairy produce; and for this purpose-

(a) "Tissue" includes blood; and

(b) "Dairy produce" has the same meaning as in section 2 of the Dairy Industry Act 1952.

3 PURPOSES OF REGULATIONS-

The purposes of these regulations are-

(a) To prohibit the feeding of ruminant protein in any form, composition, or admixture to ruminants because of the risk of amplifying and spreading transmissible spongiform encephalopathies by doing so; and

(b) To require operators to prepare, register, and implement ruminant protein control programmes; and

(c) Consequentially, to manage the risk to New Zealand of an outbreak of a transmissible spongiform encephalopathy.

PROHIBITION

4 OFFENCE TO FEED RUMINANT PROTEIN TO RUMINANTS-

(1) A person commits an offence if that person knowingly-

(a) Feeds ruminant protein in any form, composition, or admixture to a ruminant; or

(b) Allows, causes, or permits a ruminant to consume ruminant protein in any form, composition, or admixture; or

(c) Allows, causes, or permits other persons to feed ruminant protein in any form, composition, or admixture to a ruminant.

(2) A person who commits an offence under subclause (1) is liable to the penalty specified in regulation 18.

RUMINANT PROTEIN CONTROL PROGRAMMES

5 OPERATORS TO PREPARE RUMINANT PROTEIN CONTROL PROGRAMME-
(1) A person who is, and intends to remain, an operator on the date these regulations come into force must prepare a ruminant protein control programme and submit it to the Director-General, for registration, by 1 January 2001.
(2) A person who intends to become an operator, and a person referred to in subclause (4)(a) who intends to remain an operator, must prepare a ruminant protein control programme and submit it to the Director-General for registration.
(3) A ruminant protein control programme is not effective until it is registered under regulation 9.
(4) A person referred to in subclause (1)--
(a) Who does not submit a ruminant protein control programme under subclause (1) by 1 January 2001, must not produce feed intended for ruminants after that date; and
(b) Who has submitted a programme under subclause (1) by 1 January 2001 that is not registered, may produce feed intended for ruminants without a registered programme until 1 April 2001 but not after; and
(c) Must produce feed intended for ruminants according to the programme submitted, once it is registered.
(5) A person referred to in subclause (2) must not produce feed intended for ruminants without a registered programme.
(6) An operator or person who does not comply with subclauses (1), (2), (4), or (5) commits an offence and is liable to the penalty specified in regulation 18.
(7) An offence under subclauses (1), (2), (4), and (5) is an offence of absolute liability.

6 PROGRAMME AMENDMENT-
(1) An operator may amend or replace a registered programme at any time but must submit the documents effecting the amendment, or the replacement programme, to the Director-General for registration.
(2) An amendment or replacement of a registered programme is not effective until it is registered under regulation 10.

7 REQUIREMENTS FOR PROGRAMMES-
A ruminant protein control programme must-
(a) Specify how the operator will ensure that it does not commit an offence under these regulations; and
(b) Specify how the operator will manage and minimise the risk of contamination of feed intended for ruminants, by ruminant protein; and
(c) Specify how the operator will ensure that feed is labelled correctly; and
(d) Provide for, and specify the components of, regular internal reviews of the programme designed to identify programme features that could be improved; and
(e) Name an auditor, who is external to and independent of the operator, who agrees to undertake annual verification audits of the programme and to give a copy of each such audit to the Director-General; and
(f) Require the operator to notify the Director-General, in advance if possible, of any change in the auditor's independence; and

(g) State that the operator will co-operate with inspectors and authorised persons exercising their duties and powers, including their powers to-
(i) Inspect the records of the operator; and
(ii) Enter and inspect the premises of the operator; and
(h) Require the operator to notify the Director-General of any change in circumstance that would prevent or substantially hinder the operator from satisfying a requirement of the programme.

8 REGISTER OF PROGRAMMES-
(1) The Director-General must keep and maintain a register of ruminant protein control programmes and of their amendments or replacements registered under regulations 9 and 10.
(2) The register must include the following particulars for each ruminant protein control programme:
(a) The name and address of the operator of the programme:
(b) The name and address of the auditor responsible for the annual verification audits of the programme.

9 REGISTRATION OF PROGRAMMES-
(1) The Director-General must register a ruminant protein control programme submitted by an operator under regulation 5(1) or (2), and notify the operator of registration, if satisfied that the programme meets the requirements of regulation 7.
(2) If the Director-General declines to register a programme,--
(a) The Director-General must indicate the grounds on which registration is declined; and
(b) The Director-General must invite the operator to prepare and submit a revised programme; and
(c) The operator may submit a revised programme to the Director-General not later than 14 days after the date on which that approval is declined or such later date as the Director-General may allow in a particular case.

10 REGISTRATION OF PROGRAMME AMENDMENT OR REPLACEMENT-
(1) As soon as practicable after receiving the documents effecting the amendment or the replacement programme under regulation 6, the Director-General must-
(a) Register the programme as amended or the replacement programme, and notify the operator of registration, if satisfied that the programme as amended or the replacement programme meets the requirements of regulation 7; or
(b) If the Director-General considers that the programme as amended or the replacement programme requires amendment,--
(i) Make such amendments as the Director-General considers necessary; and
(ii) Register the amended or replacement programme (as amended by the Director-General) and send a copy of the registered document to the operator.
(2) The Director-General must advise the operator, before doing so, of the Director-General's intention to amend a programme and must give the operator a reasonable opportunity to make submissions about that.

11 REVIEW OF PROGRAMME BY DIRECTOR-GENERAL-
(1) The Director-General may review a registered programme at any time if the Director-General considers that to be necessary or desirable to achieve, or better achieve, the purposes of these regulations or the requirements of the registered programme.
(2) The Director-General must advise the operator of a registered programme that is to be

reviewed of the reasons for the review.
(3) The Director-General may suspend any or all of the operations under a registered programme before commencing, or during, a review under this regulation.
(4) The Director-General must advise the operator of an operation suspended under subclause (3) of the reasons for the suspension, and must give the operator a reasonable opportunity to be heard on the suspension.
(5) If operations are suspended under subclause (3) the review must be completed as soon as practicable.
(6) On completing a review, the Director-General may-
(a) Cancel registration of a programme, or part of it, with or without conditions; or
(b) Amend a programme as the Director-General considers necessary; or
(c) Take a combination of actions under paragraphs (a) and (b).
(7) The Director-General must advise the operator, before doing so, of the Director-General's intention to exercise a power under subclause (6), and must give the operator a reasonable opportunity to make submissions about that intention.
(8) The Director-General's powers in this regulation may be applied-
(a) To a single operator identified by the Director-General; or
(b) Collectively to the registered programmes of all operators in a category of operators identified by the Director-General.

12 INFORMATION-
(1) The Director-General may request an operator to supply information or to comment on particular matters concerning that operator's ruminant protein control programme (before or after its registration) or an amendment, replacement, or review of that programme.
(2) The Director-General is not required to make any decision under regulation 9, 10, or 11 until that information or comment is received.

LABELLING

13 OBLIGATION TO LABEL-
(1) A feed supplier must ensure that feed that may be fed lawfully to ruminants is labelled so as to include the most appropriate of the following notices:
"Notice: suitable for feeding to (insert ruminant species or type)":
"Notice: suitable for inclusion in feed intended for ruminant animals".
(2) A feed supplier must ensure that feed that may not be fed lawfully to ruminants is labelled as follows:
"Notice: not to be fed to sheep, cattle, deer, alpacas, goats, or other ruminant animals".
(3) A person who produces, trades in, or distributes fertiliser containing ruminant protein must label that fertiliser in the way specified in subclause (2).
(4) The persons to whom the obligations in subclauses (1) to (3) apply must satisfy the obligations in those subclauses by 1 May 2000.
(5) A feed supplier and a person referred to in subclause (3) commit an offence if that feed supplier or person fail to label, or mislabel, any feed or fertiliser under this regulation or fail to comply with regulation 14.
(6) A person commits an offence if the person, without reasonable excuse, defaces, removes, obscures, or alters a label affixed to feed or fertiliser under these regulations.
(7) A person who commits an offence under subclause (5) or (6) is liable to the penalty specified in regulation 18.

(8) An offence under subclause (5) is an offence of absolute liability.

14 LABELLING DETAILS-

Every label required by regulation 13 must-

(a) Be conspicuous and easily legible; and

(b) Occupy at least 5% of the total area covered by all labelling of the feed or fertiliser; and

(c) Be permanently stamped, affixed, or marked on-

(i) The package or container for the feed or fertiliser; or

(ii) The invoice, waybill, or similar document for feed or fertiliser supplied in bulk quantity; and

(d) Be of such a nature and material that it will not fade or become detached under normal conditions.

RECORDS

15 RECORDS BY FEED SUPPLIERS-

(1) The Director-General may, by notice in writing, require a feed supplier to complete and keep, for 2 years, records of matters that relate, in the Director-General's opinion, to the requirements of these regulations.

(2) The records required to be kept must-

(a) Be available for inspection within 5 working days of a request being made by the Director-General or by an inspector or authorised person; and

(b) Be kept in a manner and format from which they can be readily retrieved and made available for inspection.

(3) A person required to keep records must, at all reasonable times, allow any person authorised by the Director-General, or any inspector or authorised person, to inspect and make copies of the records.

(4) A person who breaches this regulation without reasonable excuse commits an offence and is liable to the penalty specified in regulation 18.

16 RECORDS BY RUMINANT PRODUCERS-

(1) This regulation applies to producers or farmers of ruminants.

(2) If the Director-General believes or suspects on reasonable grounds that a person to whom this regulation applies breaches, or may breach, these regulations, the Director-General may, by notice in writing, require that person to complete, and keep for 2 years, detailed records of the person's feed inventory and movements in that inventory.

(3) The records required to be kept must-

(a) Be available for inspection within 10 working days of a request being made by the Director-General or by an inspector or authorised person; and

(b) Be kept in a manner and format from which they can be readily retrieved and made available for inspection.

(4) A person required to keep records must, at all reasonable times, allow any person authorised by the Director-General, or any inspector or authorised person, to inspect and make copies of the records.

(5) A person who breaches this regulation without reasonable excuse commits an offence and is liable to the penalty specified in regulation 18.

DUTIES OF OPERATORS AND OTHER PERSONS

17 VIGILANCE BY AFFECTED PERSONS-

(1) Every person required to comply with these regulations must-

(a) Ensure that his, her or its staff are fully informed about the requirements of these regulations; and

(b) Remove any visible contaminants from vehicles, containers and other devices before using them for containment or transport of bulk feed intended for ruminants; and

(c) Store feed intended for ruminants in ways that avoid contamination with ruminant protein; and

(d) Prevent access by ruminants to-

(i) Feed not intended for ruminants; and

(ii) Ruminant protein; and

(e) Not include ruminant protein in feed intended for ruminants; and

(f) If necessary to achieve the purposes of these regulations, recall, relabel, reprocess, destroy, or treat feed; and

(g) Generally take all steps necessary to achieve the purposes of these regulations.

(2) A person who fails knowingly to comply with any of the obligations in subclause (1) commits an offence and is liable to the penalty specified in regulation 18.

OFFENCES

18 PROVISIONS APPLYING TO ALL OFFENCES-

(1) The penalties for all offences specified in these regulations are those set out in section 157(6) of the Act.

(2) The penalties are,--

(a) In the case of an individual, a fine not exceeding $5,000; and

(b) In the case of a corporation, a fine not exceeding $15,000.

(3) Section 156 of the Act (which concerns liability of principals, agents, and employees) applies to all offences under these regulations.

Penalty

MARIE SHROFF,

Clerk of the Executive Council.

EXPLANATORY NOTE

This note is not part of the regulations, but is intended to indicate their general effect.

These regulations which come into force on 1 January 2000, seek to ensure that New Zealand does not suffer an outbreak of a transmissible spongiform encephalopathy. Bovine spongiform encephalopathy is believed to have spread in the United Kingdom from feeding ruminant protein in feed supplements to ruminant animals. Ruminant animals are those that chew their own regurgitated cud such as cattle, sheep, deer, alpacas, and goats.

Clause 3 specifies the purposes of the regulations. The prohibition and other requirements of the regulations are designed to manage the risk to New Zealand of an outbreak of a transmissible spongiform encephalopathy.

Clause 4 prohibits the feeding of ruminant animals with ruminant protein.

Clauses 5 to 11 require operators to prepare, and have registered, ruminant protein control programmes designed to minimise the risk of a breach of the prohibition. The Director-General may review a programme at any time and may suspend operations or cancel

registration of a programme.

Clause 12 permits the Director-General to request information concerning a programme or an amendment or review of a programme.

Clauses 13 and 14 require persons who supply feed, and fertiliser containing ruminant protein, to label their products as suitable or not for feeding to ruminant animals. Blood and bone fertiliser would be labelled as unsuitable for feeding to ruminants, for example.

Clauses 15 and 16 permit the Director-General to require feed suppliers, ruminant farmers, and producers to maintain certain records.

Clause 17 places various obligations on persons who are subject to the regulations.

Clause 18 outlines the penalties attaching to the various offences created in the regulations.

Date of notification in Gazette: 25 November 1999.
Date laid before the House: 20 December 1999.

Issued under the authority of the Acts and Regulations Publication Act 1989.
The Biosecurity (Ruminant Protein) Regulations 1999 are administered in the Ministry of Agriculture and Forestry.