

# **Feeding of Food Waste to Pigs**

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The closing date for submissions is 31 January 2002.

A form to assist you in making a submission commences on page 28. Submissions do not need to use this format.

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## Summary

MAF Biosecurity is seeking the views of industry and the public on the need for controls over the feeding of food waste to pigs. This paper discusses the issues and invites feedback from interested parties.

The feeding of food waste to pigs is not regulated in New Zealand. The practice is sometimes referred to as “swill feeding” or “garbage feeding”. Operations that feed food waste to pigs vary greatly, from large well-managed piggeries to people who keep a pig in their backyard and feed it on table scraps.

MAF is reviewing the feeding of food waste to pigs because it can transmit livestock diseases. For example, if meat infected with a serious exotic disease such as foot and mouth disease was brought into New Zealand and fed to pigs in garbage, an outbreak of foot and mouth disease could result.

Until 1998, regulations controlled the feeding of food waste to pigs. Food waste fed to pigs was cooked where necessary to remove the risk of disease transmission. Following a review, the main part of which occurred in 1997, government decided in 1998 that:

- the controls in place until then were impossible to enforce, costly and achieved little to reduce biosecurity risks;
- the resources that had gone into regulating feeding would be better spent on strengthening border security, to prevent exotic diseases entering New Zealand in the first place.

The regulations over pig feeding were allowed to lapse, and MAF strengthened border security at that time and substantially enhanced it again in 2001.

The current outbreak of foot and mouth disease in the United Kingdom probably entered the UK livestock population through a poorly managed swill-feeding operation. This has focused attention on the lack of regulations in New Zealand to control feeding of food waste to pigs, although the risks to New Zealand are much different from those to the United Kingdom.

The risk of foot and mouth disease, or other serious exotic diseases, infecting New Zealand livestock through feeding of food waste to pigs is very small. Nevertheless, the consequences of an outbreak would be great, and would impact on the whole economy, not just on affected farmers. The New Zealand public and its industries may consider that the benefits of permitting unregulated swill feeding are not worth the risks.

Through this paper, MAF seeks feedback on a number of options for reducing the biosecurity risk associated with use of food waste for feeding to pigs. These options extend from completely prohibiting the practice, through to continuing the current system of no regulatory control, other than controls over the entry of diseases at the border.

Any decision to reintroduce controls should aim to identify systems that are more effective and less costly than the controls in place until 1998.

Any controls that might be introduced must be considered in terms of cultural suitability. Culturally appropriate measures are more likely to achieve active co-operation from Māori and Pacific Peoples. Targeted consultation with Māori has occurred during the development of this discussion paper and it is intended that further consultation will be undertaken before final decisions on controls over pig feeding are made.

Maintaining the current absence of direct controls over swill feeding may be judged to be unsatisfactory because of the severe consequences of an outbreak of foot and mouth disease. On the other hand, a total prohibition of feeding of food waste to pigs would also have significant disadvantages. For example, it would mean that large amounts of food waste generated by food manufacturers and presenting no disease risk would have to be dumped in landfills rather than fed to pigs. It is desirable for the community and the environment that this product becomes a resource rather than waste.

Rather than prohibit feeding of food waste to pigs, or continue with no direct controls, it may be preferable to implement systems to manage the biosecurity risks associated with feeding of food waste to pigs. Feeding of food waste to pigs could be permitted under arrangements that minimise the risk of disease transmission. In all these options, costs and benefits need to be considered.

Submissions on the issues covered by this paper are invited. Information on making submissions is on page 29 of this paper, and a form to assist you in making a submission commences on page 28. Submissions do not need to use this format.

# Introduction

## PURPOSE OF PAPER

The purpose of this paper is to invite submissions on whether feeding food waste to pigs should be controlled in order to manage biosecurity risks, primarily related to foot and mouth disease.

The paper does this by:

- raising issues for consideration by those with an interest in the New Zealand pig industry, related industries and the disposal of food wastes;
- presenting possible options for any future control of the practice.

## REASONS FOR REVIEW

Feeding of food waste to pigs has been implicated as the means of international transmission of major livestock diseases that are exotic to New Zealand, and of the spread of these diseases within infected countries. The diseases include foot and mouth disease (FMD), classical swine fever and African swine fever.

New Zealand currently has no regulations controlling feeding of food waste to pigs. Following a public consultation process that extended over several years (referred to in this document as the 1997 review) a decision was made in 1998 to allow regulations governing the feeding of food waste to pigs to lapse. Since then MAF has had no regulatory control over this practice. The recent outbreak of FMD in the United Kingdom, attributed to feeding infected garbage to pigs, has focused attention on the possible risks involved. The risks are now being reconsidered and balanced against the costs, benefits and effectiveness of regulatory approaches.

## THE ISSUE

The issue is:

*Has there been a significant change in the risk created by feeding food waste to pigs since the 1998 decision to allow controls to lapse? If there has, has this change been sufficient to justify the reimposition of control measures? If so, what control measures are most appropriate and are the costs justified by the benefits?*

## **SCOPE OF REVIEW**

Prior to 1998, the feeding of food waste to poultry was regulated in the same way as the feeding of food waste to pigs. The review that preceded the decision to allow regulations to lapse (the 1997 review) covered poultry and pig feeding practices. This discussion paper does not address the issue of feeding of food waste to poultry, as it has not been identified as an issue of current concern by government or by community or industry groups. The 1997 review is discussed on page 9.

## **PRINCIPLES OF DECISION-MAKING**

The following principles are set out to provide a framework in which decisions about controls over feeding of food waste to pigs can be considered. The principles may themselves be debated, and comment on their appropriateness is invited.

**1. Risks of entry of exotic disease into the New Zealand livestock population must be managed.**

Feeding of food waste to pigs is recognised as a pathway for establishment of exotic disease infection into countries. Border security cannot guarantee that all infected meat products will be detected at the border. However for disease to establish in a pig, an imported, infected piece of meat or meat product would have to be fed to a pig, without being sufficiently cooked to inactivate the virus, and in sufficient quantity to contain an infective dose.

**2. Profitable industries, and environmentally friendly industries, should be permitted as long as risks can be managed.**

An estimated 50,000 tonnes of food “waste” is created annually from food processing plants in the Auckland region alone. It is desirable for the community and the environment that this product becomes a resource rather than waste.

**3. Regulations should be enforceable. For some options, considerable additional resources would be required to ensure their enforceability.**

Unenforceable regulations often affect the behaviour of a large part of the population. The minority who ignore regulations often constitute the greatest risk.

**4. Regulation should be based on an objective expert assessment of risks, not on perceptions of risk.**

Regulatory decision-making should be based on a scientific assessment of risk, considered relative to community expectations as to the acceptable level of risk.

**5. The benefits of regulations should exceed the cost.**

Regulation is inappropriate if the total (economic, environmental, cultural and social) costs exceed the total benefits.

**6. Costs should be carried by those who benefit from regulation or those who exacerbate the problem which regulations set out to address.**

**7. For the purposes of this paper, legally imported goods are not considered to carry any significant risk of introducing FMD.**

Legally imported goods are permitted entry into New Zealand only after appropriate risk assessments are undertaken.

## **8. Any controls that might be introduced must be considered in terms of cultural suitability.**

### **TERMINOLOGY**

This paper discusses the possible options that could be taken to control the feeding of food waste to pigs in order to manage biosecurity risks. Food waste may take the form of

- edible **garbage** from households, restaurants, institutions, supermarkets and other retail outlets; or
- **industrial food waste**: edible industrial waste from manufacturing processes such as broken biscuits or surplus meat pies, or edible industrial by-products such as brewer's grain.

There is a continuum between these two categories of food waste.

In this paper “food waste” does not include waste produced by livestock, such as manure.

The practice of feeding food wastes to pigs is often described as swill feeding or garbage feeding. As these terms have their own specific meanings or connotations, the more generic words “feeding food waste to pigs” will generally be used in this document, rather than swill or garbage feeding. In some cases specific references are made to the feeding of garbage or industrial food waste.

- “FMD” is foot and mouth disease.
- “MAF” is the Ministry of Agriculture and Forestry.
- “meat” is used to include any part or product of an animal, apart from milk and dairy products.
- “the 1997 review” refers to the public review of the *Garbage (Feed for Swine or Poultry) Regulations 1980* carried out during 1996–98, but primarily in 1997.

For the purposes of this paper, and consistent with the 1997 review, the term “risk goods” refers to illegally imported (smuggled) goods, generally meat or meat products.

## **Background**

The uncontrolled feeding of food waste to pigs has been shown to be a significant disease risk in many countries. In New Zealand, the main risk associated with this practice is introduction into the national pig herd of exotic diseases such as FMD, the other vesicular diseases (swine vesicular disease, vesicular stomatitis and vesicular exanthema), classical swine fever, African swine fever and PRRS (porcine respiratory and reproductive syndrome). In the case of FMD, pigs could then spread the disease to other cloven-hoofed animals. The diseases of concern and their effects are listed in Appendix 1. The control measures for all these diseases include the suspension of food waste feeding.

Infected imported meat that has been included in food waste fed to pigs has often been implicated as the source of international transmission of FMD, and has been the cause of two outbreaks of classical swine fever in New Zealand, in 1937 and 1953.

Because FMD spreads more readily and affects a range of animal species, it would be more difficult to control and eradicate in New Zealand than the other diseases listed above. FMD infection in a country places major constraints over export in animal products. For these reasons, an outbreak of FMD in New Zealand would have a much greater impact on trade and on the New Zealand economy than an outbreak of any of the other diseases listed in Appendix 1. This paper therefore focuses on the biosecurity risks posed by the feeding of food waste to pigs, as they relate to FMD.

### **EXPERIENCE OF FMD WORLD-WIDE**

The 2001 UK outbreak of FMD originated in a piggery feeding food waste in northern England. The 2000 outbreak of FMD in South Africa was attributed to feeding of infected ship's waste to pigs. The 1967 outbreak in the UK was attributed to feeding of infected household scraps to pigs.

The recent UK outbreak has raised the issue of the appropriateness of the controls (or lack thereof) over food waste feeding in New Zealand.

The practice of feeding waste to pigs does not create the same risks in the New Zealand context as it does in the United Kingdom. This aspect is covered in more detail on page 10.

FMD is present in many countries across the world, particularly in Asia, Africa and South America. Appendix 2 provides details of countries that reported FMD outbreaks in 1980, and in each of the years from 1990 to 2001.

### **THE RISK OF FMD IN NEW ZEALAND**

The risk of an outbreak of FMD occurring in New Zealand was estimated in 1994 at about 1 in 50 years, and it is likely to have decreased since then (see pages 14-17 and Appendix 3). This small risk does not indicate any room for complacency. It demands high standards of border security, and must be balanced against the dramatic consequences of an outbreak on New Zealand's rural industries, its economy and the general community. These consequences are discussed later in this paper (see page 18).

## **PIG FEED AND FOOD WASTE IN NEW ZEALAND**

Feeding of food waste to pigs is not regulated in New Zealand. A small number of large commercial piggeries use garbage and food waste. A larger number of small, often backyard, operators collect garbage from restaurants, institutions, supermarkets and so on. In addition, it is not unusual for rural (and some non-rural) dwellers to keep a pig fed on household scraps.

Large volumes of *industrial food waste* are very unlikely to contain illegally imported material and will usually have been cooked, eliminating disease risk. Most industrial food wastes, such as brewer's grain, stale bread, fruit and vegetable waste from supermarkets or cooked food waste, are likely to present no risk in relation to FMD.

*Restaurant waste* is unlikely to contain illegally imported material (but this is possible) and will often include uncooked scraps. It is possible therefore that restaurant waste presents a marginally greater biosecurity risk than industrial food waste.

*Household garbage* is unlikely to contain illegally imported material (but this is possibly more likely than with the other 2 categories) and will usually include uncooked scraps.

The relative risks presented by these categories of waste are further discussed on pages 12-13.

## **HISTORY OF LEGISLATIVE CONTROL IN NEW ZEALAND**

An outbreak of classical swine fever occurred in New Zealand in 1937. A further outbreak in 1953, traced back to meat from a ship in Auckland, prompted the development of regulations to require that food waste from ships and airports be incinerated or sterilised.

The *Garbage (Feed for Swine or Poultry) Regulations 1980* controlled the feeding of food waste to pigs and poultry to prevent introduction of exotic animal diseases, including Newcastle disease of poultry, into New Zealand. These controls remained in force under the *Biosecurity Act 1993*, until 1998. They required operators who collected food waste for feeding to pigs (or who were located on the same property as an institution or manufacturing plant) to cook food waste. Cooking was the default condition, but most of the 685 permit holders in 1998 held a "no treatment required" permit.

The *Garbage (Feed for Swine or Poultry) Regulations 1980* were publicly reviewed during 1996–98, primarily in 1997. The regulations were considered unenforceable within MAF budgets at that time. It was decided that funds should be diverted from enforcement of these regulations into increased border security, to reduce the risks of exotic diseases entering New Zealand in the first place. The regulations were thus allowed to lapse.

The findings and outcome of the 1997 review are detailed in the next section of this paper.

Since 1998, cargo and passenger traffic into New Zealand has increased. Over the same period, border security has been enhanced, for example by the introduction of x-ray machines in 1998, and the range of measures (including additional x-ray machines) being introduced in 2001.

Even in the absence of controls over swill feeding, farmers (and any other people) must report signs of unusual disease or suspicions of exotic disease in animals, under the notifiable organisms provisions of the *Biosecurity Act 1993*.

In the event of an exotic disease occurring in New Zealand that could be spread by food waste feeding, MAF would immediately prohibit the practice.

## **FINDINGS & OUTCOME OF THE 1997 REVIEW**

The public discussion paper produced prior to the 1998 decision noted that the licensing and permitting system that was used to control food waste feeding to pigs was labour intensive and expensive. Because smaller piggeries and backyard operations, including “a large number of urban piggeries”, could not be located, they could not be monitored effectively. The need to give advance warning of inspections to ensure that cooking of feed could be inspected, and the inability to verify the duration of cooking, further hampered monitoring. It was considered that compliance with regulatory requirements was low, while costs of regulation were high.

The 1997 review found that:

- *Garbage feeding is an extensive sector of the pork industry – a sector that includes old-established as well as fringe operators. Permit holders value their resource and their relationship with MAF.*
- *Advances in quarantine and border security measures are acknowledged.*
- *The main stakeholders agree that shifting the direct regulatory focus from exotic disease control towards food safety and waste management objectives is likely to increase compliance with safe feeding practices among backyard pig and poultry operators without compromising the feeding practices maintained by the present permit holders.*

The outcome of the review was that MAF considered that “the feeding of collected organic waste should continue”, and suggested that:

“following the expiry of the *Garbage (Feed for Swine or Poultry) Regulations 1980* on 30 September 1998, organic waste feeding be conducted within the following broad framework:

- a) the continued adoption of registered food safety programmes by food manufacturers and retailers (*part 1A Food Act 1981*); and
- b) the active inclusion of pig and poultry producers within the scope of the territorial local authorities’ waste management plans (*section 537 Local Government Act 1974*), noting the priority given to the reuse of waste by the internationally recognised waste management hierarchy; and
- c) the integration of industry developed risk management protocols with the above developments in food safety and waste management; and
- d) the development of information management protocols between the business sectors supplying or practising organic waste feeding and the regulatory agencies involved in food safety or waste management.”

The above recommendations have been only partly implemented. The regulatory model described in a) above is government policy. In relation to b), local authorities have considered the role of piggeries in waste management but formal inclusion in waste management plans has been slow. Recommendation c) has been implemented, to the extent that progress in a) and b) permit, while d) has not.

## **LEGISLATIVE CONTROLS OVER FEEDING OF FOOD WASTE IN OTHER COUNTRIES**

Many of New Zealand's major trading partners, including the UK, USA, Canada and Australia, impose controls over feeding of food waste to pigs. Nevertheless, any decision to control this practice in New Zealand should be based on an objective assessment of risk, rather than on a wish to conform to international practice. The unique situation of New Zealand, in terms of isolation, strong border security and an objective methodology for regulatory decision-making, may mean that regulatory controls implemented in other countries may not be the most appropriate options in the New Zealand context.

Australia prohibits feeding of swill (there defined as mammalian waste) to any animals unless treated to a nationally approved standard, or unless state laws allow otherwise.

In Canada, licences are issued to feed "edible residual material" to pigs.

In the USA, swill feeding to pigs is permitted under licence in most of the 33 states where the practice is allowed.

In the UK, until the recent FMD outbreak, pig farmers could be licensed to use pig swill. Licensed swill feeders were required to cook waste. At the time of the 2001 outbreak, fewer than 100 farmers were licensed and about 80,000 pigs were fed on swill. The outbreak has been attributed to swill being fed uncooked, or inadequately cooked, to pigs. The source of the infection may have been illegally imported meat or legally imported meat.

The UK has imposed new controls over feeding of food waste to pigs, in the wake of the recent FMD outbreak. The new controls came into force on 24 May 2001. They prevent feeding of catering waste to any livestock, and movement of catering waste onto any premises where any livestock are kept. The material controlled is catering waste (other than used cooking oil) whether processed or unprocessed which may include meat, or may have come into contact with meat.

The UK controls do not prevent feeding of by-products from the dairy industry, the brewing industry, the frozen food industry, starch extraction from wheat or maize, or the human food industry, where these do not include meat and could not have come into contact with meat. Further information is available on the website of the UK Department of Environment, Food and Rural Affairs at [www.defra.gov.uk/animalh/by-prods/cater/swill.htm](http://www.defra.gov.uk/animalh/by-prods/cater/swill.htm)

## **COMPARING THE SITUATIONS OF NEW ZEALAND & OTHER COUNTRIES**

It should not be assumed that feeding food waste to pigs in New Zealand exposes New Zealand to the same level of risk that may exist in other countries. The differences are most easily demonstrated by comparing New Zealand's situation with that which existed in the UK at the time of the 2001 FMD outbreak.

Compared with the UK, the volume and complexity of traffic across the border is much less. Recent upgrades to New Zealand border security have resulted in all incoming passenger baggage being either searched or x-rayed specifically to detect quarantine risk goods. In addition, sniffer dogs, passenger profiling, signage and other strategies are used to further enhance the effectiveness of border controls over incoming passengers and their baggage.

By contrast, virtually none of the passenger baggage entering the UK undergoes quarantine examination. A recent media report in *The [UK] Veterinary Times* of 4 June 2001 cites the results of the limited checks undertaken by UK Quarantine:

- 5.5 tonnes of illegally imported bush meat and dried fish were detained from 14 Nigerian Airways flights over 8 months in 2000; and
- from October 2000 to April 2001, 8 (only) flights were checked, detecting about 2.5 tonnes of bush meat and dried fish; and
- in May 2001, 205 kg of this material was detained from one flight from Lagos.

Heathrow airport alone is reported to receive in the order of 250,000 flights annually. These figures indicate that the UK border presents little or no barrier to entry of potentially infected meat in passenger baggage. Organised smuggling may also occur, driven by higher prices for meat and by the demand from some ethnic groups for unusual types of meat.

In contrast, New Zealand border security is extremely effective, and there may be less incentive to smuggle meat into New Zealand. New Zealand's controls over waste from airports and ships are very effective. The risk of an exotic disease entering New Zealand and being transmitted into the livestock population by feeding of waste to pigs is therefore correspondingly much lower.

On the other hand, the consequences of an exotic disease outbreak on the New Zealand economy could be much greater than on the United Kingdom economy. In New Zealand's case, 40 percent of its export income could be immediately affected by a FMD outbreak, and over 90 percent of our dairy, meat and wool production that is normally exported could have no markets. Livestock exports and agricultural sector production are much more important to New Zealand's economy than is the case for the UK.

	United Kingdom	New Zealand
Value of livestock exports as a percentage of the total value of exports	0.6	40
Value of agricultural sector production as a percentage of GDP	0.7	6.1
Livestock revenue as a percentage of gross agricultural revenue %	64	74

The dependence of the New Zealand economy on animal product exports means that all New Zealanders would feel the impact of an outbreak of an exotic disease of livestock like FMD.

## Discussion

The issue on which MAF seeks to consult through this discussion paper is:

*Has there been a significant change in the risk created by feeding food waste to pigs since the 1998 decision to allow controls to lapse? If there has, has this change been sufficient to justify the reimposition of control measures? If so, what control measures are most appropriate and are the costs justified by the benefits?*

In seeking to address this issue, this paper will discuss the risks created by this practice, and will consider the advantages and disadvantages, including the costs, of different control measures.

### **PATHWAYS FOR INTRODUCING DISEASE TO NEW ZEALAND THROUGH FEEDING OF FOOD WASTE TO PIGS**

For an exotic disease to be introduced by feeding food waste, the disease organisms would first need to gain entry to New Zealand, either through legal or illegal importation of infected meat. These include:

- **legal importation of meat and meat products.** These products are subject to stringent import controls and are not imported from countries or regions with significant diseases exotic to New Zealand, except under measures to effectively manage the risks. Legally imported meat and meat products are considered to pose negligible disease risks.
- **waste food from ships and aircraft.** All airport and ship's waste must be incinerated or steam sterilised. Regular audits are conducted to monitor compliance. All facilities dealing with quarantine refuse are located in areas where there is a MAF presence, and most are visited and checked at least once a week by MAF inspectors. Compliance is excellent.
- **illegally imported raw meat.** Such meat is generally unlikely to find its way into waste fed to pigs.

Infected meat, if it were able to enter New Zealand, probably through an illegal importation, would then need to be fed to pigs in order to cause disease in pigs. The types of food waste that could include illegally imported meat include:

- **Waste from restaurants, hotels, institutions and food businesses.** Illegally imported meat is not an attractive proposition for restaurants and hotels to consider as a source of meat for their business because supplies would be irregular in terms of quantity, if not in quality and price. Most illegally imported meat and meat products could be expected to be cooked before or after smuggling thus probably rendering the disease agent non-viable. For uncooked cured meats such as salamis, the curing process kills FMD virus. In any case the majority would be eaten by the person(s) smuggling it into the country and their immediate associates.
- **Household waste.** Illegally imported meat is probably more likely to enter New Zealand in small amounts brought in by individuals, although the recent improvements in border security make this much less likely than previously. It is possible that illegally imported meat could find its way, uncooked, into household food waste. Most household food waste proceeds through the domestic refuse collection system, from which it would be unlikely to be fed to pigs. However where a pig is kept and fed on household scraps it is conceivable that it could be fed uncooked infected meat scraps from undeclared meat imported into New Zealand, providing a means of entry for FMD into the New Zealand livestock population. Because FMD transmits readily on the wind, and pigs generate huge

amounts of virus, its occurrence even in an isolated pig would threaten other livestock, unless they were many kilometres away.

- **Garbage from smaller accommodation facilities.** Garbage from homestay, farmstay, bed-and-breakfast, backpacker or youth hostel facilities in rural areas may be collected for feeding to pigs, and could contain scraps illegally brought into New Zealand by travellers. Again, the recent improvements in border security make it less likely that travellers will be able to enter New Zealand with infected meat, so the amount of uncooked imported meat in such garbage is likely to be minimal. Any risk created by collection of waste containing potentially infected material from these smaller accommodation facilities is largely eliminated if the illegally imported meat has been processed, such as salami, or cooked, or eaten before the scraps are fed to pigs.

Although the risks associated with each of the above sources of food waste are small, it is considered, because of the factors discussed above, that the greater risk is from travellers' garbage rather than garbage from food businesses. Infected travellers' garbage is likely to constitute the greatest risk when it is fed to backyard pigs, or very small pig herds. This is because food waste which is used in large piggeries is more likely to be cooked (the four large swill feeding operations in New Zealand all cook their food) and will be diluted with other non-infected garbage. It should be noted that the most difficult part of the pig sector to control is likely to be those who keep only a few pigs, particularly those with only one or a few pigs in their backyard, fed on scraps.

## **CONTROL MEASURES IN PLACE**

Systems are in place to detect animal products at the border, in cargo and with passengers.

The waybill description of each cargo consignment is checked on arrival in New Zealand. Where the consignment includes goods that may constitute a risk, the goods are inspected. A random sample of cargo is also inspected to gain information on the reliability of importers' descriptions, to identify categories of cargo that require inspection, and to measure the potential for risk goods to enter in uninspected cargo. About 20 percent of all consignments are physically inspected.

Risk profiling, quarantine awareness strategies, sniffer dogs and organic X-ray technology are used to reduce risks associated with incoming passengers. Sniffer dogs and X-ray systems have proven extremely valuable in increasing detection of risk items. In 2001, additional resources were put into these systems, and 100 percent of all incoming passenger baggage is now either X-rayed or searched.

These systems provide excellent, but not absolute, protection against illegal entry of meat and meat products in cargo and with passengers from overseas. To provide a higher level of security would require a substantial additional investment and impose considerable additional, probably unwarranted costs on importers and therefore on the New Zealand community.

## **CULTURAL CONSIDERATIONS**

The possibility of controls being introduced over the feeding of food waste to pigs raises issues for Māori and Pacific communities.

Targeted consultation with Māori, through a hui with Māori in the eastern Bay of plenty, has occurred during the development of this discussion paper. It is intended that further consultation will be undertaken before final decisions on controls over pig feeding are made.

Māori cultural practice utilises waste food products from marae hui to feed animals such as pigs. The pigs are in turn then used as koha (gift, non-profit) to the marae. The keeping of pigs by tangata whenua also flows over to the situation of those families who keep pigs in the back yard, to supplement their food intake and to provide pigs as koha for cultural and social events.

The possible requirement to separate meat food waste from other food waste, or to ensure that meat food waste is cooked, may cause practical difficulties to marae and whānau. Controls could discourage the keeping of pigs by marae and whānau units, potentially impacting on cultural, economic and nutritional well-being.

Controls over the keeping of backyard pigs, or the feeding of pigs, may also impact on Pacific Peoples, who may maintain backyard pigs more than other sections of the community. Measures that add to the cost of feeding these pigs, or make it uneconomic to keep them, could impact on the economic and nutritional well-being of these people.

Any controls that might be introduced must be considered in terms of cultural suitability. Culturally appropriate measures are more likely to achieve active co-operation from Māori and Pacific Peoples.

Rather than prohibit feeding of food waste to pigs, or continue with no direct controls, it may be preferable to implement systems to manage the biosecurity risks associated with feeding of food waste to pigs. Feeding of food waste to pigs could be permitted under arrangements that minimise the risk of disease transmission. In all these options, costs and benefits need to be considered.

To ensure that Māori and Pacific cultural issues are addressed it will be useful to seek views on the following questions:

- Are there effects on Māori tikanga/cultural practices in implementing feed waste controls?
- How could controls over feeding of food waste to pigs impact on Māori and Pacific cultural practices?
- What safeguards might be introduced to the feeding of pigs at marae, to prevent the possibility that uncooked infected meat might be fed to pigs, that would not impact significantly on cultural practices?
- What safeguards might be introduced to the feeding of backyard pigs, to prevent the possibility that uncooked infected meat might be fed to pigs, that would not impact on economic well-being of people who keep backyard pigs?

### **CHANGES IN THE LEVEL OF RISK SINCE THE 1998 DECISION**

Since the 1998 decision was made, the risk of a serious exotic disease entering New Zealand and being spread by pig feeding practices may have changed, due to:

- implementation of more stringent border security measures;
- increases in trade volumes and passenger numbers entering New Zealand;
- changes in the distribution of pig herds in New Zealand; and
- changes in the world-wide distribution of serious exotic diseases that may be spread by feeding of food waste to pigs.

## **Border security measures**

As mentioned elsewhere in this paper, border security measures were strengthened following the 1998 decision and substantially enhanced in 2001. Prior to installation of the first x-ray machines in 1997, MAF Quarantine Service estimates that about 50 percent of undeclared meat products passing through airports were detected. No outbreak of FMD occurred even in this situation. By the end of 1998, it was estimated that 85 percent of undeclared meat products passing through airports were being detected.

In 2001, additional resources permitted the searching or x-raying of all passenger baggage, with the expectation that this, and other enhancements such as more sniffer dogs, would bring the level of detection close to 100 percent. In other words, the current rate of “slippage” is likely to be as little as one-tenth or less of the 15 percent slippage estimated for 1998. While this figure relates to airline passenger baggage only, this is regarded as the highest-risk pathway for entry, so indicates a considerable reduction in risk due to stronger border security since 1998.

## **Passenger movements**

Over the same period, trade and passenger movements into New Zealand have increased. The number of New Zealanders returning from overseas trips has increased from 115,000 in 1997/98 to 131,000 in 2000/01, an increase of 13.7 percent over the 3 years. The only information collated on where these New Zealanders have been is a record of the port at which they boarded the flight or vessel which they arrive on. This gives little, if any, indication of the risk that they may be carrying relevant risk goods.

Figures on visitors from overseas countries, and permanent and long-term arrivals, provide more information as their country of origin is recorded. The number of overseas visitors and permanent and long-term arrivals increased by 28.6 percent from 1,519,639 in 1997/98 to 1,953,847 in 2000/01. The proportion of these from the areas of greatest concern for FMD – Asia, Africa and South America – gives a further indication of changes in risk. All declined or remained static.

The proportion from Asia fell slightly from 25.8 percent of all overseas visitors to 24.7 percent. While absolute numbers rose over this period from 391,687 in 1997/98 to 482,932 in 2000/01, this followed a period of sharp decline; and absolute numbers from Asia were lower in 2000/01 than in 1995/96 and in 1996/97. From Africa the proportion moved from 1.3 percent to 1.2 percent, while from South America it remained steady at 0.7%; in both cases absolute numbers were relatively low, with 24,227 from Africa and 13,255 from South America in 2000/01.

The number of overseas visitors and permanent and long-term arrivals from the UK is much lower than from Asia. The number from the UK rose from 161,949 (10.7 percent of the total) in 1997/98, to 223,925 (11.5 percent of the total) in 2000/01. The degree to which the UK works to eradicate FMD and swine fever outbreaks when they occur there, and the smaller numbers of overseas visitors from the UK compared to Asia, support the conclusion that the greater biosecurity risk to New Zealand is from Asia. The UK outbreak in 2001 would have added only marginally to the biosecurity risks already presented by trade and people movements from Asia.

## **Meat seizures at the border**

This conclusion is reinforced by statistics on seizures of meat at the border. Over the period 1997/98 to 2000/01, meat seized from Asian and Middle East origins made up 57.7 percent (range 43 to 76 percent) of total meat seized. This compares with 18.5 percent (10-36 percent)

from Europe including the UK, 19.4 percent (5-42 percent) from Africa and 4.4 percent (2-9 percent) from Central and South America. No trend is discernible in meat seizures, as large individual seizures make the figures very variable.

### **Legally imported goods**

Goods may only be imported into New Zealand following a thorough biosecurity risk assessment, so changes to the volume of goods legally imported into New Zealand should not impact on the risk of a serious exotic disease entering New Zealand. The following paragraphs on changes in imports into New Zealand are included for completeness only.

Imports of goods have increased in value from approximately \$21million in 1997/98 to approximately \$30m in 2000/01, an increase of some 42 percent. By value, imports from Asia increased from 31.0 percent of total imports in 1997/98 to 37 percent in 2000/01. Imports from South and Central America, and from Africa, increased in value over the period but made up only 1.1 percent and 0.9 percent of total imports respectively in 2000/01. Imports from the UK remained fairly steady by dollar value and therefore declined, as a proportion of the total, from 5.3 percent to 3.7 percent.

Meat imports roughly doubled in amount, from 11.820 tonnes in 1997/98 to 22.217 tonnes in 2000/01. This increase should not expose New Zealand to any increased exotic disease risk: no meat is imported from countries with FMD or swine fever, other than from countries that have internationally-recognised disease-free regions; and controls were recently imposed on pig meat from PRRS-infected countries to manage the risk of introduction of PRRS into New Zealand.

### **Numbers of pigs and pig herds in New Zealand**

Figures on changes in the number of pig herds in New Zealand over the period 1998-2001 are not available. The latest figures available indicate that in 1999 there were 369,000 pigs on 4,428 pig farms in New Zealand. The number of pigs slaughtered for meat production in 1998 was 776,856. This figure declined over the following two years to 713,853 in 2000, and is expected to decline further in 2001. Figures for the comparable period of 2000/01 are not yet available. These changes in the national pig herd are not likely to have any significant impact on the biosecurity risks associated with feeding of pigs.

### **FMD reports world-wide**

Over the period since 1998, the number of countries reporting FMD infection world-wide increased (see Appendix 2) from 44 to 50, reflecting the increased incidence of FMD, particularly in Europe, where the number of countries reporting infection grew from 3 in 1998 to 8 in 2001.

The PanAsia strain of FMD, first isolated from India in 1990, has since been detected in Middle East countries, China and mainland south-east Asia. It was the cause of the first FMD outbreak in South Korea since 1934 and in Japan since 1908, and is the cause of the recent outbreaks in South Africa and the UK.

South American countries including Argentina, Paraguay, Uruguay and Brazil made considerable progress with FMD control over the 1990s. However during the last few years this progress was reversed by major new outbreaks in Argentina, Brazil and Uruguay, among other South American countries. These have involved types A and O virus (but not the PanAsia strain of type O).

Because the increase in countries reporting FMD is largely due to new outbreaks in Europe, and these new outbreaks are now mostly eradicated or well under control, the greater number of countries reporting FMD does not indicate a substantial increase in risk to New Zealand.

Over the same period, there have not been major changes in the world-wide distribution of the swine fevers or PRRS that would impact significantly on the risks of these diseases entering New Zealand. Recent research on PRRS, establishing that the disease may be spread by infected meat, has resulted in controls over import of pig meat from PRRS-infected countries. This change was intended to reduce the risk of PRRS entering New Zealand.

To summarise, since the 1998 decision there have not been significant changes in international movement of goods and people, in the New Zealand pig herd, or in the world-wide distribution of FMD or the swine fevers, that would increase the biosecurity risks relating to feeding of pigs. However over the same period there has been a substantial improvement in border security, and the risks associated with feeding of food waste to pigs are likely to be less than they were in 1998.

### **LIKELIHOOD OF IMPORTED RISK MATERIAL REACHING FOOD WASTE ENTERPRISES**

Sources of food waste are typically kitchen scraps, excess or waste food from various institutions (such as hospitals or prisons), hotels, restaurants, cafeterias, supermarkets, bakeries and fast food outlets, and second-grade product from food manufacturing premises. Levels of meat in the food waste that is eventually fed to pigs vary widely. Virtually all such meat is either produced in New Zealand or has been imported legally and is therefore of negligible risk.

Feeding an untreated, illegally imported, infective animal product (most likely meat-based, but possibly dairy or egg products) is the risk of greatest significance. The chance of this happening depends on the following chain of pre-conditions:

- the meat must come from a country that has one or more exotic diseases of concern to New Zealand, and actually contain the disease agent(s) in an infective state and in sufficient quantity to be an infective dose; and
- the meat must successfully elude New Zealand's border control mechanisms; and
- sufficient of the infected meat to constitute an infective dose for one or more pigs must remain uneaten by the “importer”, the intended recipients and any other person; and
- the meat must find its way inside a food waste feeding operation; and
- the meat must be consumed by a pig without first being treated, or the disease agent becoming dissipated (i.e. several animals receive sub-infective doses), or inactivated by time, exposure to sunlight etc; and
- finally, the piece(s) of infected meat must be able to establish infection by the oral route, via the digestive tract.

The amount of potentially infected meat products entering New Zealand through the current stringent border control systems is minimal. This must be kept in mind when considering the risks discussed in the following paragraphs.

The limitations described above apply to further make it unlikely that exotic disease would enter the New Zealand livestock population by this route. The meat must contain sufficient infection to infect an animal, evade border controls, be uneaten and uncooked, and then an infectious dose must be eaten by a pig.

## **CONSEQUENCES OF AN OUTBREAK OF EXOTIC DISEASE IN NEW ZEALAND**

The most important exotic disease that could be introduced into the New Zealand livestock population by feeding of food waste to pigs is FMD.

Some nations choose to live with FMD. These are often countries less dependent on livestock exports than New Zealand, and often tropical countries – FMD spreads much more slowly in tropical climates. Livestock in these countries may be protected by vaccination (an ongoing cost) but where the disease is not completely controlled, livestock production and farm profitability are reduced as a result of FMD, and animals suffer from the effects of the disease.

More importantly from New Zealand's perspective, countries that tolerate FMD cannot export meat and dairy products to the major markets for these products.

Many countries have chosen not to live with FMD in their livestock populations. These countries have determined that the benefits of increased productivity and access to markets that are gained from FMD freedom outweigh the costs incurred in keeping the disease out and eradicating any outbreaks.

In New Zealand's case, an outbreak of FMD, even if it only occurred in one animal that was promptly slaughtered (an extremely unlikely hypothetical situation) would mean an immediate suspension of our dairy, meat and wool exports, as our trading partners would no longer accept our meat and dairy products or our wool. These exports constitute over 40 percent of New Zealand's export income. The impact on New Zealand's balance of trade could be disastrous.

The inability to export product would have an enormous impact on New Zealand agriculture. Ninety-five percent of the dairy industry's product is exported, as is over 90 percent of our meat production, so it would effectively close down most of these industries, at least in the short-term<sup>1</sup>. It has been estimated that there would be employment risks to over 100,000 New Zealanders.

Exports worth over \$10 billion dollars annually could be affected – although in the best case single-animal scenario, exports might resume 1-3 months after the animal was slaughtered.

The cost of eradicating an outbreak of FMD in New Zealand has been estimated to range from \$100–150 million or about 1 percent of the annual value of exports that could be lost if we decided to live with the virus. Even if the cost of eradication were substantially higher than this estimate, eradication would still be likely to be cost-effective and therefore would be pursued if it was judged to be possible.

If an outbreak was eradicated, access to markets could be restored 3 months after the last case was destroyed. Some importing countries might take substantially longer to recognise New Zealand's freedom. If vaccination were used as part of the eradication strategy, regaining access to markets would take a minimum of 12 months after the last case, unless all vaccinated animals were slaughtered.

Although the likelihood of an outbreak of FMD due to feeding of food waste to pigs is extremely low, the consequences in terms of damage to the affected livestock industries and to New Zealand's economy could be extreme.

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<sup>1</sup> Dairy industry exports might be able to resume under treatment regimes acceptable to importing countries.

## **ENVIRONMENTAL CONSIDERATIONS**

Increasingly government and the community are seeking ways to minimise waste, whether generated from households, commerce and industry or agriculture. By using waste safely for positive benefit, it is converted from waste or garbage into a useful commodity. For this reason, the phrase “feeding food waste to pigs” used in this paper is somewhat inaccurate, as food waste used in this manner is no longer “waste”.

MAF’s 1997 discussion paper *Feeding Food Waste to Pigs and Poultry* stated that:

Greater Auckland businesses send about 18,000 tonnes of commercial food waste to landfill every year, much of it identifiable and of relatively stable composition and volume. For Christchurch the equivalent figure is 15,000 tonnes. This food waste could potentially be considered for inclusion in feed rations – or other feed uses, or composting – in preference to dumping.

More recently it has been suggested that Auckland food manufacturing businesses produce some 50,000 tonnes of food waste annually.

Feeding this waste food to pigs is environmentally preferable to dumping, provided the exotic disease risks can be managed. Most waste food will present no exotic animal disease issues – for example, broken biscuits, stale bread or cakes, excess fruit and vegetables. Well-cooked meat products such as meat pies also present negligible exotic animal disease risks. It can be argued that waste products from manufacturing premises with robust quality assurance or risk-based management programs are unlikely to present a significant level of exotic animal disease risk, even if they contain raw meat, as the likelihood of illegally imported meat finding its way into this waste is negligible.

Food manufacturers and other food businesses can potentially reduce their waste disposal costs by having food waste collected for feeding to pigs. Where food businesses are disposing of waste that does not include meat, or where the only meat that could be included is thoroughly cooked, it may be that no further risk minimisation measures are required.

Where there is a possibility that uncooked meat or meat products may be included in food waste, the waste should, as a precaution, be cooked before feeding to pigs. The international standard for such cooking is to a temperature of 100°C for a minimum of 1 hour. Higher temperature pressure cooking systems require shorter cooking times.

## **OTHER RISKS ASSOCIATED WITH FEEDING FOOD WASTE TO PIGS**

Feeding of food waste to pigs may require management of risks other than biosecurity risks. Some of these risks are mentioned in Appendix 4. They will not be addressed any further in this discussion paper.

## **SUMMARY OF RISKS**

In summary, since 1998 there have not been significant changes in international movement of goods and people, in the New Zealand pig herd, or in the world-wide distribution of FMD or the swine fevers. There have been substantial improvements in border security, and the risks associated with feeding of food waste to pigs are likely to be less than they were in 1998. The consequences of an outbreak of FMD remain high for rural industries, tourism, employment and the national economy.

## Options for Managing Biosecurity Risks

This section of this discussion paper examines, without prejudice, options that might be taken in New Zealand to manage the biosecurity risks associated with the feeding of food waste to pigs.

### CONTROL OPTIONS

Alternative strategies to manage the biosecurity risks associated with feeding food waste to pigs range from no change (nothing additional to the border controls already in place), through to totally prohibiting all feeding of food waste to pigs. Between the two extremes there are various forms of control – for example, prohibiting feeding waste containing meat, or exemptions for feeding under approved cooking programs.

If controls are to be implemented then these could be implemented by:

- controls over people in charge of pigs;
- controls over disposal of food waste at its source, that is retail, wholesale or food manufacturing premises, and households; or
- combinations of the above.

Controls can be implemented under legislation, through industry Codes of Practice, or by voluntary or commercial means – for example by purchasers of pigs requiring that producers have in place appropriate risk-based management programs.

Some of the pieces of legislation that could provide mechanisms to regulate feeding of food waste to pigs are listed in Appendix 5.

### CONSIDERATION OF SPECIFIC CONTROL OPTIONS

Table 1 (page 25) assesses some of the specific control options against a range of criteria, these being:

- costs;
- impact on the pig industry;
- impact on the food industry;
- likely level of compliance;
- enforceability;
- environmental impact;
- effectiveness in reducing risk;
- equity in impact of costs; and
- social equity.

The options listed are not intended to be mutually exclusive – different options could be combined to form a package of control strategies. Nor is the list of options intended to be exhaustive – other strategies may be equally deserving of consideration.

The following notes list some considerations in respect of the specific control options.

### **1. No new controls (the *status quo*)**

- Having no direct regulatory controls would be consistent with the 1997 risk analysis and the subsequent 1998 decision.
- This option relies on the capability of border controls to minimise entry of risk goods and the effectiveness of New Zealand's systems to detect and respond to exotic disease incursions.
- Border security was enhanced in 2001 with the objective of achieving as close to 100 percent interception of undeclared risk goods as is possible.
- Government and/or industry could fund and implement an educational campaign to encourage industry and others to adopt safe practices.
- This option still leaves room for industry to introduce commercial mechanisms to encourage compliance. With co-operation from those who purchase pigs, commercial mechanisms could be used to encourage pig producers to implement risk management programs, including controls over feeding of food waste containing meat. Suitable mechanisms could be developed by a co-operative effort involving the production, processing, distribution and retail sectors.
- MAF's Biosecurity Awareness Programme should help heighten general awareness of the risks from illegal importations.

### **2. Use a voluntary Code of Practice to control feeding of food waste**

- A voluntary Code of Practice could be introduced, requiring treatment of waste containing meat before feeding to pigs.
- An educational campaign, funded by industry and/or government, to encourage uptake by industry would be important.
- Like all control options except for the *status quo* option, this would impose additional feed costs and waste disposal costs. Some pig owners will cease using food waste because of the costs of complying with the Code, while those who choose to comply with the Code requirements will incur those additional costs (such as cooking costs).
- The additional feed and compliance costs will impact on those piggeries currently creating a risk by feeding uncooked waste – but only if they choose to adopt the Code.
- Because compliance is voluntary, this option would not be enforceable except to the extent that peer pressure or commercial influence could encourage compliance. It would be effective in reducing the risk of entry of disease into pig population, but only to the extent that compliance occurs.
- This option encourages industry to introduce commercial mechanisms to encourage compliance. With co-operation from those who purchase pigs, commercial mechanisms could be used to encourage pig producers to adopt the Code of Practice requirements. Suitable mechanisms could be developed by a co-operative effort involving the production, processing, distribution and retail sectors.

### **3. Prohibit all feeding of food waste**

- A complete prohibition would be difficult to enforce, especially in regard to backyard operators – one of the highest risk areas.
- Regulatory action would need to be supplemented with an educational campaign – funded by industry and/or government.
- Compliance and educational costs could be met or subsidised by the other sectors receiving the primary benefits from regulation (the livestock industries) or by those exacerbating the problem (the food and pig industries).
- Promotion of the prohibition could be enough to change the behaviour of many operators and therefore render the measure at least partially effective.

- It is likely that a small group would continue to swill feed – many of these would be difficult to detect, as a total prohibition would tend to drive the practice underground.
- A total prohibition would make operations with well-managed cooking systems, which do not constitute a disease risk, illegal.
- A total prohibition would prevent the feeding of other non-risk materials, such as fruit and vegetables, industrial food waste not containing meat, and cooked industrial food waste.
- A total prohibition would prevent use of food waste for pig feed, increasing costs of disposal of waste for those food businesses currently supplying waste for pig feed. It would also preclude the environmental advantages and the waste disposal cost savings that could be realised by increased collection of food waste for pig feeding.

#### **4. Prohibit all feeding of food waste containing meat<sup>2</sup>**

- This option would be difficult to enforce, especially in regard to backyard operators.
- Regulatory action would need to be supplemented with an educational campaign – funded by industry and/or government.
- Compliance and educational costs could be met or subsidised by the other sectors receiving the primary benefits from regulation (the livestock industries) or by those exacerbating the problem (the food and pig industries).
- Promotion of the prohibition could be enough to change the behaviour of many operators and therefore render the measure at least partially effective.
- It is likely that a small group would continue to feed swill containing meat – many of these would be difficult to detect, as the prohibition would drive the practice underground.
- This option would permit feeding of fruit and vegetables, industrial waste not containing meat, and other non-risk materials – but would prohibit the feeding of cooked materials containing meat, which would constitute no risk.
- This option would prevent use of food waste containing meat for pig feed, increasing costs of disposal of waste for those food businesses currently supplying waste containing meat for pig feed. It would also limit the environmental advantages and the waste disposal cost savings that could be realised by increased collection of food waste for pig feeding.

#### **5. Prohibit all feeding of food waste containing meat, except under approved programs**

- This option would be difficult to enforce, especially in regard to backyard operators.
- Regulatory action would need to be supplemented with an educational campaign – funded by industry and/or government.
- Compliance and educational costs could be met or subsidised by the other sectors receiving the primary benefits from regulation (the livestock industries) or by those exacerbating the problem (the food and pig industries).
- Promotion of the prohibition could be enough to change the behaviour of many operators and therefore render the measure at least partially effective.
- If approvals were granted under a similar scheme to that which was in place until 1998, enforcement would be extremely difficult, due to the factors described on page 9. To assist in enforcement, approvals might only be granted to operations with approved, documented and audited risk management systems in place to control their pig feeding practices. These systems could be subject to independent external auditing, and incorporate automatic measuring of cooking temperatures and times to reliably validate compliance with required procedures.

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<sup>2</sup> note that in this document “meat” includes any part of an animal. For disease control purposes, any material coming into contact with meat could also be included.

- Under these circumstances, enforcement would be relatively practical in respect of commercial piggeries. The complexity and cost of developing and implementing robust systems would exclude most small to medium sized businesses. Because it is likely that only a relatively small number of operators would achieve approval, the status of all other operators would be known.
- Approval of programs could be by MAF or a third party. In either case, producers would be expected to pay for the service and for auditing of their programs by an independent auditor.
- Approved programs could be integrated into other risk management programs.

## **6. Prohibit disposal of food waste from commercial premises, except under approved programs**

- Under this option, food businesses which supply food waste containing meat for pig feed would be required to have an approved, audited risk management system to ensure that no risk was created by this arrangement. This could include confirmation that the farmer has a management system that ensures cooking of waste where appropriate.
- Promotion of the prohibition could be enough to change the behaviour of many operators and therefore render the measure at least partially effective.
- This would not manage the risk involved in feeding backyard pigs on household scraps.
- Regulatory action would need to be supplemented with an educational campaign – funded by industry and/or government.
- Approved programs could be integrated into other management programs.
- The very large number of food businesses in New Zealand (around 30,000) complicates monitoring and enforcement.

## **7. Prohibit keeping of pigs in non-rural areas**

- This option is mentioned because it could partly address the issue of reducing the risks caused by feeding of backyard pigs.
- It would need to be considered by local governments and regional councils.
- Effective enforcement of this requirement would reduce the risk of exotic disease transmission by targeting one of the highest risk areas, as uneaten, uncooked meat scraps from meat brought illegally into New Zealand could conceivably be fed to a single backyard pig.
- Such a prohibition would be difficult to enforce, especially with backyard operators – one of the highest risk areas. It is likely that many arrangements would continue but be driven underground.
- This option could be perceived as impacting unreasonably on particular ethnic groups.
- Territorial local authorities could enforce the prohibition.
- Apportionment of surveillance and compliance costs would be an issue.
- Regulatory action would need to be supplemented with educational campaign – funded by industry and/or government.
- This option could be modified to require registration of pigs in non-rural areas. This would be costly to administer and enforce. It could include restrictions on feeding practices and would allow inspection to ensure that illegal garbage or meat feeding was not occurring.

## **8. Prohibit keeping of small (non-commercial) pig herds**

- This option is mentioned because very small herds may constitute a greater risk than larger herds (see page 13).

- It would be difficult to enforce – definitional boundaries between very small, small and large, or commercial and non-commercial herds could be seen as arbitrary.
- This option could be seen as representing unreasonable interference with a generally harmless activity and could be perceived as impacting unreasonably on particular economically disadvantaged or ethnic groups.
- It requires co-operation of territorial local authority for enforcement.
- Apportionment of surveillance and compliance costs would be an issue.
- Regulatory action would need to be supplemented with an educational campaign – funded by industry and/or government.

**Table 1: Assessment of some specific control options against a range of criteria**

	Costs	Impact on pig industry	Impact on food industry	Compliance	Enforceability	Environmental impact	Effectiveness in reducing risk <sup>3</sup>	Equity in impact of costs	Social equity
<b>No new regulation</b>	education program	none	none	not required	not required	none	educational program could reduce risk	nil impact	nil impact
<b>Voluntary Code of Practice to require treatment of waste containing meat before feeding to pigs</b>	pig food waste disposal education cooking monitoring	additional feed costs for those pig owners who cease using food waste because they choose not to follow Code requirements additional compliance costs to implement Code requirements	additional waste disposal costs for those food businesses, currently disposing of waste food containing meat to swill feeders, who are unable to do so due to reduced number of swill feeders	compliance is voluntary some will not comply	not enforceable except by peer pressure or commercial influence	provides an avenue for safe use of food waste for pigs which avoids increased use of landfills	reduces risk of entry of disease into pig population – to the extent that compliance occurs little if any impact on backyard pigs	costs fall on piggeries and food businesses, not on others who benefit from freedom from disease (particularly other livestock industries) no enforcement costs added feed costs will impact on those piggeries currently creating a risk by feeding uncooked waste – but only if they choose to follow the Code	encourages industry to introduce commercial mechanisms to encourage compliance
<b>Prohibit all feeding of food waste</b>	pig food waste disposal education monitoring enforcement	additional feed costs for pig owners currently using food waste	additional waste disposal costs for food businesses currently disposing of waste food to swill feeders	some farmers will resist complying	considerable costs to locate and inspect piggeries impractical to enforce completely, especially with backyard pigs complete ban simplifies detection and enforcement	increased landfill costs	reduces risk of entry of disease into pig population but non-compliance is likely to be greatest in highest risk area – waste which may contain recently imported goods	costs fall on piggeries and food businesses and not on others who benefit from freedom from disease (particularly other livestock industries) monitoring costs could be levied on beneficiaries added feed costs impact on piggeries feeding safe food waste, or cooking waste to make it safe, for no benefit	discriminates against well managed, safe and environmentally responsible operations cultural impact on Māori and Pacific Peoples

<sup>3</sup> assuming that infected meat is imported into New Zealand and that there is a risk that this meat may be fed to pigs, uncooked and in sufficient quantity to cause disease.

	Costs	Impact on pig industry	Impact on food industry	Compliance	Enforceability	Environmental impact	Effectiveness in reducing risk <sup>3</sup>	Equity in impact of costs	Social equity
<b>Prohibit all feeding of food waste containing meat</b>	pig food waste disposal education monitoring enforcement	additional feed costs for pig owners currently using food waste containing meat	additional waste disposal costs for food businesses currently disposing of waste food containing meat to swill feeders	some farmers will resist complying	considerable costs to locate and inspect piggeries proof of offence requires evidence that meat is included	increased landfill costs	reduces risk of entry of disease into pig population but non-compliance is likely to be greatest in highest risk area	costs fall on piggeries and food businesses and not on others who benefit from freedom from disease (particularly other livestock industries) monitoring costs could be levied on beneficiaries those piggeries currently cooking waste to make it safe will incur added feed costs, for no benefit	discriminates against well managed, safe and environmentally responsible operations cultural impact on Māori and Pacific Peoples
<b>Prohibit all feeding of food waste containing meat, except under approved programs</b>	pig food waste disposal education cooking monitoring enforcement	additional feed costs for those pig owners currently using food waste containing meat who are not able to implement approved programs additional compliance costs to develop approved programs additional costs of operating under approved programs and for auditing	additional waste disposal costs for those food businesses, currently disposing of waste food containing meat to swill feeders, who are unable to do so due to reduced number of swill feeders	some farmers will resist complying	considerable costs to locate and inspect piggeries proof of offence requires evidence that meat is included	provides an avenue for safe use of food waste for pigs which avoids increased use of landfills	reduces risk of entry of disease into pig population but non-compliance is likely to be greatest in highest risk area	costs fall on piggeries and food businesses and not on others who benefit from freedom from disease (particularly other livestock industries) monitoring costs could be levied on beneficiaries added feed costs will impact on those piggeries currently creating a risk by feeding uncooked waste	creates minimal additional cost for well managed, safe, environmentally responsible operations cultural impact on Māori and Pacific Peoples
<b>Prohibit disposal of food waste containing meat from commercial food businesses, except under approved programs</b>	pig food waste disposal education cooking monitoring enforcement	additional feed costs for those pig owners currently using food waste containing meat who are not able to access waste from approved sources	additional waste disposal costs for those food businesses, now disposing of waste food containing meat to swill feeders, who do not implement approved programs additional compliance costs to develop, implement and audit approved programs	most will voluntarily comply others likely to comply if enforcement is actively policed	food businesses are relatively easy to locate but very large in number (30,000+)	provides an avenue for safe use of food waste for pigs which avoids increased use of landfills	reduces risk of entry of disease into pig population food businesses can only indirectly control the fate of their waste once it is picked up but has no impact on the highest risk area	costs fall on piggeries and food businesses and not on others who benefit from freedom from disease (particularly other livestock industries) monitoring costs could be levied on beneficiaries added feed costs will impact on those piggeries currently creating a risk by feeding uncooked waste	requires food businesses to take responsibility for use of waste after it leaves their control

	Costs	Impact on pig industry	Impact on food industry	Compliance	Enforceability	Environmental impact	Effectiveness in reducing risk <sup>3</sup>	Equity in impact of costs	Social equity
<b>Prohibit keeping of pigs in non-rural areas</b>	lost benefits of keeping pigs (low cost meat, waste disposal etc.)	nil	nil	compliance likely to require active policing	considerable costs to locate pigs in non-rural areas requires concerted effort by local authorities	likely to be generally seen as a positive improvement for urban and suburban environments	reduces risk of entry of disease into pig population – to the extent that compliance occurs	costs fall on owners of backyard pigs and not on others who benefit from freedom from disease (particularly other livestock industries) monitoring costs could be levied on beneficiaries	greatest impact may fall on particular ethnic groups such as Pacific Peoples
<b>Prohibit keeping of small (non-commercial) pig herds</b>	- ditto -	nil	nil	- ditto -	considerable costs to locate pigs in small herds requires concerted effort by local authorities	minimal	reduces risk of entry of disease into pig population – to the extent that compliance occurs	costs fall on owners of small herds when these have not been shown to present any greater risk than larger herds, and not on others who benefit from freedom from disease (particularly other livestock industries) monitoring costs could be levied on beneficiaries	unfairly targets small herds distinction between small herds and others may be seen as arbitrary

## Conclusion

In 1998, Government decided that the controls that had been in place until that time were impossible to enforce, costly and achieving little to increase biosecurity. Since then, the risk of entry of a serious exotic disease into New Zealand has been further reduced, in particular by the 2001 enhancements in border security. The potential consequences of an outbreak of a serious exotic disease such as FMD for New Zealand's economy have remained extreme.

Continuing to allow unregulated pig feeding creates a very small additional risk to New Zealand, through the possibility that it might be a means of entry or spread of a serious exotic disease such as FMD. Because the adverse impacts of an exotic disease outbreak could be great, controls may be warranted.

A total prohibition of feeding of food waste to pigs would also have disadvantages. For example, it would mean that large amounts of food waste generated by food manufacturers and presenting no disease risk would have to be dumped in landfills rather than fed to pigs. Feeding food waste to pigs has positive economic and environmental implications, and should be permitted provided any biosecurity risks can be effectively managed.

Any decision to reinstate controls over feeding of pigs, following this review, should aim for controls that are less costly to Government and more enforceable than the pre-1998 controls.

These two conditions might be partially satisfied by –

- i) using risk management systems to control pig feeding practices – systems subject to independent external auditing, and incorporating automatic measuring of cooking temperatures and times to permit tamper-proof validation that required procedures are followed;
- ii) implementing monitoring systems funded by the major beneficiaries of exotic disease control (this might imply a contribution from the other livestock industries that would be impacted by an outbreak of a serious exotic disease such as FMD; or taxpayer funding in recognition of the impact that such an outbreak would have on the entire New Zealand economy); and
- iii) using commercial mechanisms to encourage compliance – with the buyers of pigs requiring their suppliers have in place risk management systems appropriate to their production systems.

This approach would however tend to impact on commercial piggeries where risk is relatively low, and not address the highest risk area of backyard pigs. The detection of piggeries that continue to feed food waste without adopting appropriate risk management practices, and enforcement of controls on such premises, would be difficult and costly.

*Submissions on the issues covered by this paper are invited. Information on making submissions is on page 29.*

## Submission Form

**Office use only**

Submission number:

Date received:

This form is included to assist you. Submissions in another format are also welcome, as are any additional or general comments.

Please note that submissions may be the subject of requests for information made under the *Official Information Act 1982* (OIA). The OIA specifies that information is to be made available unless there are grounds for withholding it. Such grounds are set out in the OIA. Submitters may wish to indicate grounds for withholding specific information contained in their submission, such as that the information is commercially sensitive or they wish personal information (e.g. name and contact details) to be withheld. MAF will take such indications into account when determining whether or not to release information. Any decision to withhold information requested under the OIA is reviewable by the Ombudsman.

Name:

Organisation/Company:

Address:

Phone:

Fax:

E-mail:

Please send your submission to:

Dr Allen Bryce  
Ministry of Agriculture and Forestry  
PO Box 2526  
WELLINGTON

**Submissions close 5pm, Thursday 31 January 2002.**

### **Principles of decision-making**

1. What are your views on the appropriateness of the principles listed on page 5 as a basis for considering the need for controls over feeding of food waste to pigs?

### **Pathways for introducing disease to New Zealand through feeding food waste to pigs**

2. In your view and from your experience, what is the likelihood of a pig eating imported risk material through collection and feeding food waste?

### **Changes in the level of risk since the 1998 decision**

3. Do you believe that the likelihood of serious exotic disease entering New Zealand has increased, decreased or remained constant since 1998, and why?

### **Options for controlling disposal of food waste at its source (retail, wholesale, food manufacturing premises or households)**

4. What responsibility, if any, should suppliers of food waste have for identifying and addressing any biosecurity or exotic disease risks involved in feeding their waste to pigs?
  
5. Is there a need for suppliers of food waste to be satisfied that biosecurity or exotic disease risks associated with the food waste are being managed?

6. What would be the likely impact on waste producers of prohibiting the feeding of all garbage and scraps to pigs?
  
  
  
  
  
  
  
  
  
  
7. What responsibility, if any, should producers of food waste containing uncooked meat products have for identifying and addressing any biosecurity or exotic disease risks involved in feeding their waste to pigs?
  
  
  
  
  
  
  
  
  
  
8. In your view, what would be the likely impact of prohibiting disposal of all food waste from commercial premises except under approved programmes?
  
  
  
  
  
  
  
  
  
  
9. If food waste producers were required to dispose of waste only under approved programmes, how could this best be achieved?

**Controls over owners or people in charge of managing or feeding pigs**

10. What responsibility, if any, should piggery owners have for identifying and addressing any biosecurity or exotic disease risks involved in feeding food waste to pigs?
  
  
  
  
  
  
  
  
  
  
11. In your view, what would be the likely impact on piggery owners of prohibiting the feeding of all garbage and scraps to pigs?

12. In your view, what would be the likely impact on piggeries of prohibiting the feeding of garbage and scraps containing meat? For example, how would waste be sorted to exclude meat, and at what cost?
  
13. In your view, what would be the likely impact on piggeries of prohibiting the feeding of all food waste except under approved programmes?
  
14. If piggeries were permitted to use food waste for feeding pigs only under approved programmes, how could this best be achieved?
  
15. How should any of the above responsibilities be imposed on people in charge of the management of pigs? (Controls could include industry agreements, registration of places where pigs are kept, government regulation...)
  
16. How could controls over feeding of pigs be made more effective than those that were in place before 1998?
  
17. How could piggeries that fed food waste to pigs without following any required risk management practices be detected?

18. How could the costs of ensuring compliance with any new controls on pig feeding be funded without additional costs to government? Who should pay?

### **Controls on the locations where pigs are kept**

19. What controls, if any, should be considered in relation to location where pigs may be kept? Why?

20. What are your views on the keeping of pigs in non-rural areas? Why do you hold these views?

21. What are your views on the keeping of very small pig herds? Why do you hold these views?

22. If any of the suggested controls on the location where pigs are kept were implemented, how could compliance be best achieved?

### **Cultural considerations**

23. How could controls over feeding of food waste to pigs impact on Māori and Pacific cultural practices?

24. What safeguards might be introduced to the feeding of pigs at marae, to prevent the possibility that uncooked infected meat might be fed to pigs, that would not impact significantly on cultural practices?
25. What safeguards might be introduced to the feeding of backyard pigs, to prevent the possibility that uncooked infected meat might be fed to pigs, that would not impact on economic well-being of people who keep backyard pigs?

### **Allocation of costs**

26. Who should bear the costs of controls if these are mandated – for example the costs of developing, implementing, approving and auditing risk management on piggeries?
27. If controls are legislated, who should fund compliance costs – for example, should other livestock industries (such as dairy, sheep, cattle and deer) that benefit from exclusion of exotic diseases such as FMD help in funding regulatory costs? Should the waste producers pay, or should the waste users pay?

## **Other comments**

Please feel free to make any other comments here. You might like to comment further on the issues raised above, or on whether the options considered meet the objectives of the review, as outlined in the Introduction – see page 4. Things to keep in mind are whether each option for control would achieve a useful purpose, avoid conflict of interest and provide for flexibility to cater for changes in the market and the industry. You may wish to put forward a new option, or a proposal that combines components from different options.

**Note: Please continue on a separate page if necessary**

## Appendix 1: Diseases that could be introduced to New Zealand livestock by feeding food waste to pigs

Disease	Possible Effects of Disease Outbreak on New Zealand
Foot and mouth disease (FMD)	<p>Severe effects on the national economy. Even a single case would result in at least temporary closure of New Zealand's main export markets for meat, wool and dairy products, which make up 40 percent of New Zealand's export income. Over 90 percent of production from these industries is for these export markets, so impacts on these industries could be extreme. Exports could cease for 3–12 months following eradication of disease (dairy exports might resume sooner).</p> <p>Although the costs of control and eradication of an outbreak would be substantial, the cost would be likely to be much less than the costs of living with FMD. If FMD remained uncontrolled, there would be ongoing impacts on productivity of New Zealand's agricultural industries and on-going closure of export markets for livestock and animal products.</p>
Classical swine fever (CSF)	<p>If CSF were not contained and eradicated, it would cause substantial losses to owners of infected pig herds.</p> <p>Export income is not greatly affected, as very little pork (~0.2 percent of total domestic production) is exported. Pork prices in New Zealand could rise and more meat could be imported, impacting on New Zealand's balance of payments.</p> <p>Could impact on hunters through a reduction in wild pig numbers.</p>
African swine fever (ASF)	<p>Would affect owners of pig herds – causing very high mortalities of pigs.</p> <p>The small export market for New Zealand pigmeat would cease for approximately 12 months following eradication of disease. Pork prices could rise and more meat could be imported, impacting on the balance of payments.</p> <p>Could impact on hunters through a reduction in wild pig numbers.</p>
Porcine respiratory and reproductive syndrome (PRRS)	<p>Would reduce productivity of New Zealand pig herds.</p> <p>The role of swill feeding in transmitting PRRS is currently being evaluated.</p> <p>Access to export markets for New Zealand pork could be affected.</p>
Swine vesicular disease (SVD)	<p>Indistinguishable in the field from FMD, so exports of animal products and livestock would cease until FMD had been ruled out.</p> <p>The small export market for pigmeat would cease for approximately 6 months after SVD was eradicated.</p> <p>Some markets for sheep and sheepmeats may be affected (as the SVD virus may infect sheep).</p>
Vesicular exanthema (VE)	<p>Indistinguishable in the field from FMD, so exports of animal products and livestock would be halted until FMD ruled out.</p> <p>Markets would be reluctant to accept product unless VE was eradicated.</p>
Vesicular stomatitis (VS)	<p>Indistinguishable in the field from FMD, so all exports of animals and products would be halted until FMD ruled out.</p> <p>Markets would be reluctant to accept product unless VS was eradicated.</p>

In each case these diseases would be controlled by quarantining infected or suspect herds or flocks, controlling movements of livestock and other risk goods, destroying infected herds or flocks, and suspending feeding of food wastes.

## Appendix 2: Global Incidence of Foot & Mouth Disease

Source: Office International des Epizooties (World Organisation for Animal Health) reports

### Key:

#	incomplete total	+	disease present, number of new outbreaks unknown
...	no information available	0000	never reported
(year)	year of last incidence	number	number of new outbreaks
*	absence of FMD reported but full report period not covered		
+?	serological evidence and/or isolation of FMD virus, but no clinical disease		

No information on the disease is available for countries or territories not included in the following tables.

Country/Territory	Disease Status (see key above)												
	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001#
AFRICA													
Algeria	(1977)	498	129	30	0	0	0	0	0	0	165	0	0
Angola	(1974)	0	0	0	0	0	0	...	...	...	...	+	+
Botswana		21	0	0	0	0	0	0	0	0	0	0	0
Congo (Dem. Rep. of the)	(1953)	0	0	0	0	*	-	-	1	1	-	-	0
Côte d'Ivoire		1	15	32	1	0	0	5	7	7	...	1	3
Egypt		29	30	20	0	53	0	0	0	1	0	0	1
Eritrea		-	-	-	...	3	0	10	+	4	27	3	0
Ethiopia		4	7	3	11	10	12#	6	22	12	75	189	27
Ghana	(1975)	109	82	1	89	51	39	58	33	60	22	25	0
Guinea	0000	0000	0000	0000	0000	0000	0000	0000	...	0	9	...	0
Kenya		46	13	12	4	12	8	8	3	0	105	139	95
Lesotho	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0
Malawi	(1986)	0	0	0	0	0	0	0	0	1	...	3	1
Mali		1	1	38	13	0	0	0	8	3	9	18	0
Mauritania		-	0	0	-	-	...	0	+	+	+	+	1#
Morocco	(1977)	1	22	59	0	0	0	0	0	+	11	0	0
Mozambique	(1984)	0	0	0	0	0	0	0	0	0	0	0	0
Namibia		2	0	2	0	0	1	0	0	0	0	1	0
Senegal		8	1	+	+	+	0	0	5	28	7	8	15
Somalia	...	(1989)	0	0	0	0	0	0	0	0	0	0	0
South Africa		1	0	0	1	1	0	1	0	0	1	0	4
Sudan		+	3	0	0	0	0	0	0	0	0	0	0
Swaziland	(1969)	0	0	0	0	0	0	0	0	+	0	0	2
Tanzania		13	+	14	46	12	291#	40	105	55	19	291	113
Tunisia		24	343	30	16	0	3	0	0	0	4	0	0
Zimbabwe		3	0	3	0	0	0	0	0	1	0	2	0
AFRICA: number of countries reporting infection		12	12	13	11	8	6	7	9	11	12	14	12

Country/Territory	Disease Status (see key page 37)												
	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001#
AMERICAS													
Argentina	1,033	1,338	234	350	196	18	0	0	0	0	0	0	2123
Brazil	7,822	961	733	1,224	1,432	2,084	589	215	167	44	44	47	16
Canada	(1952)	0	0	0	0	0	0	0	0	0	0	0	0
Chile	(1978)	(1987)	0	0	0	0	0	0	0	0	0	0	0
Colombia	+	333	203	328	171	408	223	105	36	103	57	39	6
Costa Rica	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0
El Salvador	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0
Guatemala	0000	0000	#	*	0000	*	-	-	-	-	-	0	0
Jamaica	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0
Mexico	(1954)	0	0	0	0	0	0	0	0	0	0	0	0
Panama	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0
Paraguay	18	4	29	23	14	7	0	0	0	0	...	0	0
Peru	+	121	+	354	209	86	3	22	+	0	+	52	0
Trinidad and Tobago	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0
United States of America	(1929)	0	0	0	0	0	0	0	0	0	0	0	0
Uruguay	216	34	0	0	0	0	0	0	0	0	0	1	2040
Venezuela	+	13	136	8	48	69	82	1	3	18	4	4	2
AMERICAS: number of countries reporting infection	7	7	6	6	6	6	4	4	4	3	4	5	5

Country/Territory	Disease Status (see key page 37)												
	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001#
OCEANIA													
Australia	(1871)	0	0	0	0	0	0	0	0	0	0	0	0
Fiji	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0
French Polynesia	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0
Guam	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0
Kiribati	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0
New Caledonia	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0
New Zealand	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0
Northern Mariana Islands	-	-	-	-	-	-	-	*	-	0000	0000	0000	0
Palau	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0
Papua New Guinea	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0	0
Vanuatu	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0
Wallis and Futuna Islands	-	-	-	-	-	-	-	*	-	0000	0000	0000	0
OCEANIA: number of countries reporting infection	0	0	0	0	0	0	0	0	0	0	0	0	0

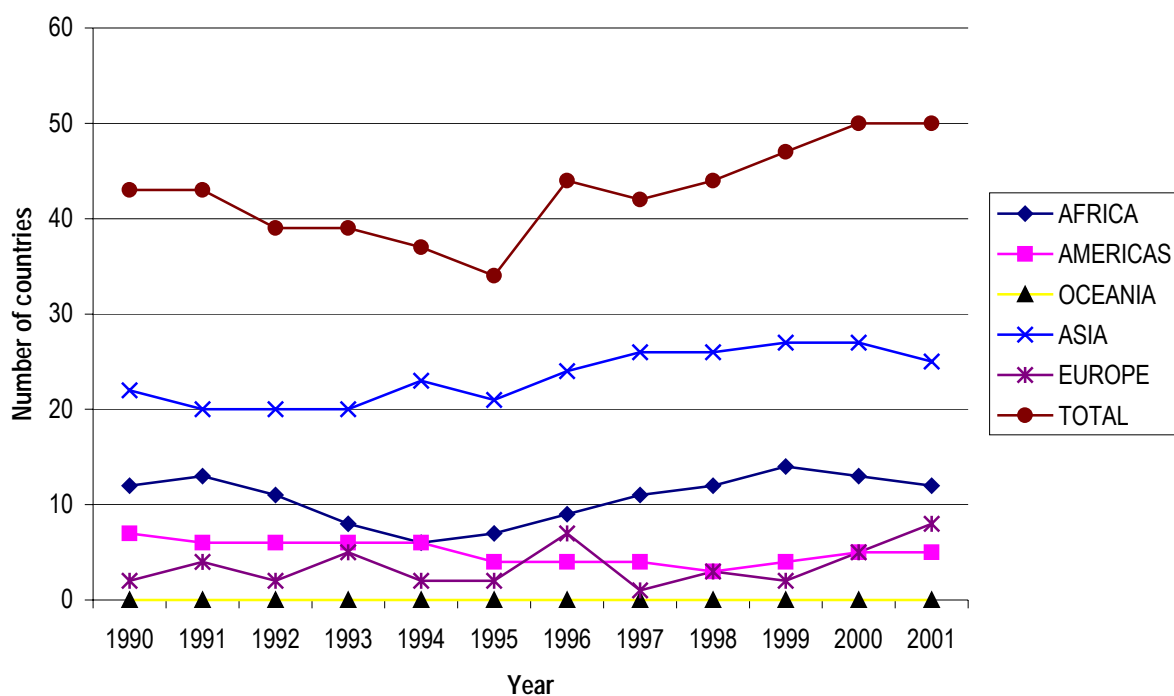
Country/Territory	Disease Status (see key page 37)												
	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001#
ASIA													
Bangladesh	+	525	431	+	31	0	+	+	+	+	+	13#	3
Bhutan	+	+	26	22	33	41	15	10	15	11	4	5	4
Cambodia		14	5	+	2	+	18	7#	+	+	+	32#	3
Hong Kong	23	13	9	13	9	5	6	17	+	7	+	13	14
India	1,331	8,692	1,373	1,409#	887	2,117	1,314	922	3,571	1,165	1,479	1,537	0†
Indonesia	0	(1983)	0	0	0	0	0	0	0	0	0	0	0
Iran	92	187	250	289	458	221	270	651	340	+	1,077	334	95
Iraq	-	-	-	+	+	+	+	+	+	+	+	+	0†
Israel	0	1	2	1	1	16	5	24	0	0	22	0	0
Japan	(1908)	0	0	0	0	0	0	0	0	0	0	3	0
Jordan	9	+	7	+	6	1	3	2	0	22	102	0	0
Kazakhstan	-	-	-	-	-	-	0	1#	0	+	4	12	2
Korea (Rep. Of)	(1934)	0	0	0	0	0	0	0	0	0	0	15	0
Lebanon	2	+	+	+	+	+	+	+	+	31	+	1	0
Kuwait	0	#	-	0	...	26	0	13	21	21	8	22	6
Kyrgyzstan	-	-	-	-	-	*	0	1#	6	4	0	0	3
Laos	-	1	7	10	+	+	+	3#	+	7	+	140#	51
Malaysia (Peninsular)	91	1	0	44	15	24	64	39	39	10	27	3	8
Mongolia	(1974)	0	0	0	0	0	0	0	0	0	0	26	17
Myanmar	-	21	78	13	24	15	43	29	19	53	21	12	24
Nepal	-	+	+	2,760	39	+	935	55#	482	447	203	836	917
Oman	+	173	371	194	104	187	146	23	249	176	+	151	158
Pakistan	8	14	27	10	18#	2#	164	219	40	55	52	35	+
Philippines	+	3	1	0	0	+	84#	348	421	449	464	328	77
Qatar	-	+	+	0	0	0	0	4	26	63	86	25	1
Saudi Arabia	3	6	10	3	14	59	64	+	+	13	+	+	46
Singapore	(1935)	0	0	0	0	0	0	0	0	0	0	0	0
Sri Lanka	1	17	62	120	18	5	2	0	+	122	166	30	10
Taipei China	(1930)	0	0	0	0	0	0	0	6,156	6	6	4	1
Tajikistan	-	-	-	#	0	4#	0	0	+	-	-	4	0
Thailand	129	81	124	197	133	84	88	21	+	33	+	103	89
Turkmenistan	-	-	-	-	-	+	0	0	4	0	+	0	0
Vietnam	-	21	2#	+	60	1	+	12	+	14	+	25	12
Yemen	+	270	-	-	-	-	-	-	+	+	+	...	+
ASIA: number of countries reporting infection	15	22	20	20	20	23	21	24	26	26	27	27	25†

† based on previous years' reports, India and Iraq have been counted as FMD-infected for 2001

Country/Territory	Disease Status (see key page 37)												
	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001#
EUROPE													
Andorra	(1969)	0	0	0	0	0	0	0	0	0	0	0	0
Armenia	-	-	-	-	-	-	-	+	0	2	-	12	0
Austria	0	(1981)	0	0	0	0	0	0	0	0	0	0	0
Azerbaijan	-	-	-	-	-	-	0	3	0	0	0	0	3
Belarus	-	(1982)	0	0	0	0	0	0	0	0	0	0	0
Belgium	(1976)	0	0	0	0	0	0	0	0	0	0	0	0
Bosnia and Herzegovina	(1968)	0	0	0	0	0	0	0	0	...	...	0	0
Bulgaria	(1973)	0	1	0	1	0	0	1	0	0		0	0
Croatia	(1978)	0	0	0	0	0	0	0	0	0	0	0	0
Cyprus	(1964)	0	0	0	0	0	0	0	0	0	0	0	0
Czech Republic	(1975)	0	0	0	0	0	0	0	0	0	0	0	0
Denmark	0	(1983)	0	0	0	0	0	0	0	0	0	0	0
Estonia		(1982)	0	0	0	0	0	0	0	0	0	0	0
Finland	(1959)	0	0	0	0	0	0	0	0	0	0	0	0
France	0	(1981)	0	0	0	0	0	0	0	0	0	0	2
Georgia	-	-	1	1	8	-	...	21	...	5	+	17	1
Germany	3	(1988)	0	0	0	0	0	0	0	0	0	0	
Greece	(1977)	(1981)	0	0	0	95	0	39	0	0	0	14	0
Hungary	(1973)	0	0	0	0	0	0	0	0	0	0	0	0
Iceland	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0
Ireland	(1941)	0	0	0	0	0	0	0	0	0	0	0	1
Italy	1	0	0	0	55	0	0	0	0	0	0	0	0
Latvia	-	(1987)	0	0	0	0	0	0	0	0	0	0	0
Lithuania	-	(1982)	0	0	0	0	0	0	0	0	0	0	0
Luxembourg	(1964)	0	0	0	0	0	0	0	0	0	0	0	0
Malta	(1978)	0	0	0	0	0	0	0	0	0	0	0	0
Moldavia	+	(1980)	0	0	0	0	0	0	0	0	0	0	0
Netherlands	(1977)	(1984)	0	0	0	0	0	0	0	0	0	0	26
Poland	(1971)	0	0	0	0	0	0	0	0	0	0	0	0
Portugal	519	0	0	0	0	0	0	0	0	0	0	0	0
Romania	(1973)	0	0	0	0	0	0	0	0	0	0	0	0
Russia	15	6	5	0	1	0	1	0	0	0	0	1	0
Slovakia	(1973)	0	0	0	0	0	0	0	0	0	0	0	0
Slovenia	(1968)	0	0	0	0	0	0	0	0	0	0	0	0
Spain	5	(1986)	0	0	0	0	0	0	0	0	0	0	0
Sweden	(1966)	0	0	0	0	0	0	0	0	0	0	0	0
Switzerland	1	(1980)	0	0	0	0	0	0	0	0	0	0	0
Turkey	856	490	771	278	221	158	108	133	56	75	62	177	77
U.K./Great Britain	(1968)	(1981)	0	0	0	0	0	0	0	0	0	0	1873
U.K./Northern Ireland	(1941)	0	0	0	0	0	0	0	0	0	0	0	4
Ukraine	-	(1988)	0	0	0	0	0	0	0	0	0	0	0
Yugoslavia	(1978)	0	0	0	0	0	0	1	0	0	0	0	0
EUROPE: number of countries reporting infection	8	2	4	2	5	2	2	7	1	3	2	5	8

Country/Territory	Number of countries reporting FMD in each year													
	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001#	
AFRICA	12	12	13	11	8	6	7	9	11	12	14	13	12	
AMERICAS	7	7	6	6	6	6	4	4	4	3	4	5	5	
OCEANIA	0	0	0	0	0	0	0	0	0	0	0	0	0	
ASIA	15	22	20	20	20	23	21	24	26	26	27	27	25	
EUROPE	8	2	4	2	5	2	2	7	1	3	2	5	8	
TOTAL	42	43	43	39	39	37	34	44	42	44	47	50	50	

## Number of countries reporting FMD outbreaks



### **Appendix 3: Estimation of the likelihood of entry of FMD into New Zealand**

In 1994, Forbes, Sanson and Morris published<sup>4</sup> an estimate of the probability of an outbreak of FMD in New Zealand. The estimate was derived subjectively, from questionnaires sent to animal health professionals, all of whom had “an epidemiological understanding of FMD” and “a thorough understanding of current EDPR [exotic disease and pest response] procedures in New Zealand” and a subsequent Delphi conference of ten selected participants.

The study estimated the probability of an outbreak was about once in 50 years (0.0199).

Since that study, border security measures were strengthened following the 1998 decision and substantially enhanced in 2001. Prior to installation of the first x-ray machines in 1997, MAF Quarantine Service estimates that about 50 percent of undeclared meat products passing through airports were detected. In 2001, additional resources permitted the searching or x-raying of all passenger baggage, with the expectation that this, and other enhancements such as more sniffer dogs, would bring the level of detection close to 100 percent.

The current rate of “slippage” may be as little as one-fiftieth of the 50 percent slippage estimated for 1997. While this figure relates to airline passenger baggage only, this is regarded as the highest-risk pathway for entry, so indicates a considerable reduction in risk due to stronger border security since 1998.

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<sup>4</sup> Forbes RN, Sanson RL & Morris RS (1994) Application of subjective methods to the determination of the likelihood and consequences of the entry of foot-and-mouth disease into New Zealand. *New Zealand Veterinary Journal* 42:81-88

## Appendix 4: Other risks associated with feeding food waste to pigs

Feeding of food waste to pigs may require management of risks other than the introduction and spread of exotic diseases.

These include:

- introduction of endemic diseases into piggeries and spread of disease within piggeries. Historically, the practice of feeding food waste to pigs has not been a cause of significant concern in this respect;
- transmission of food-borne diseases from spoiled food to pigs (and potentially back to humans in pigmeat products). There is potential for food poisoning organisms such as *Salmonella* species to infect and cause disease in pigs fed on spoiled food. This is not a problem generally associated with feeding of food waste to pigs. It can be effectively managed by ensuring that waste food is reasonably fresh when fed to pigs. Cooking of waste food to prevent transmission of exotic diseases will also minimise this risk;
- presence of mycotoxins in food waste that is cereal- or grain-based. Mycotoxins can impact on the health of pigs and potentially on consumers of pork products. Care must be taken to manage moisture content, storage and handling of such feeds to avoid mycotoxin build-up – as is required with commercially manufactured pig feeds;
- foreign objects. These must be excluded from feed for pigs.

Suppliers of food waste for feeding to pigs should ensure that the waste is “fit for purpose”. This requires that they identify risks involved in feeding their waste to pigs, and either manage each risk or satisfy themselves that the risk is being managed by the person collecting or using the waste.

These issues, not related to exotic disease risks, are addressed by the *Quality Assurance Programme for Feeding of Commercial Food By-Products to Pigs* developed by the New Zealand Pork Industry Board.

The New Zealand Pork Industry Board recommends that pigs not be fed on material that may contain pork or any components of pork, whether cooked or not. This is because of the association of “same-species feeding” with the outbreak of bovine spongiform encephalopathy (BSE) in the United Kingdom, and the negative image that accompanies any suggestion of cannibalism occurring in food production. Feeding of meat to pigs does not constitute a risk in regard to the spread of BSE (bovine spongiform encephalopathy or so-called “mad cow disease”) should it occur in New Zealand - current science has not implicated pigs in the epidemiology of BSE.

## **Appendix 5: Legislation that could be used to regulate pig feeding**

If it is decided that feeding of food waste to pigs should be regulated by use of legislation in order to reduce the risk of exotic disease entry or spread, the following pieces of legislation might provide the mechanisms for imposing controls:

- the *Biosecurity Act 1993*;
- the *Agricultural Compounds and Veterinary Medicines Act 1997*;
- the *Health Act 1956*, under which inspectors employed by territorial local authorities inspect food premises for hygiene standards;
- the *Resource Management Act 1991* which could be used to control disposal of waste, or the keeping of pigs;
- a National Pest Management Strategy which could be developed under the *Biosecurity Act 1993*.

## Appendix 6: Bibliography

- Animal Health Australia (online) Australian Veterinary Emergency Plan (AUSVETPLAN) 2001: Disease Strategy - Foot-and-mouth disease. [www.aahc.com.au/ausvetplan/fmdfinal.pdf](http://www.aahc.com.au/ausvetplan/fmdfinal.pdf)
- Department for Environment, Food and Rural Affairs (online) Foot and Mouth Disease [www.defra.gov.uk/footandmouth/](http://www.defra.gov.uk/footandmouth/)
- Forbes RN, Sanson RL & Morris RS (1994) Application of subjective methods to the determination of the likelihood and consequences of the entry of foot-and-mouth disease into New Zealand. *New Zealand Veterinary Journal* 42: 81-88
- Geering WA, Forman AJ & Nunn MJ (1995) *Exotic Diseases of Animals: a field guide for Australian veterinarians* Australian Government Publishing Service, Canberra.
- Kitching RP (1999) Foot-and-mouth disease: current world situation. *Vaccine* 17: 1772-1774
- Kitching RP (1998) A recent history of Foot-and-Mouth Disease. *J. Comp. Path.* 118: 89-108
- Knowles NJ, Samuel AR, Davies PR, Kitching RP, Donaldson AI (2001) Outbreak of foot-and-mouth disease virus serotype O in the UK caused by a pandemic strain. *Veterinary Record* 148: 258-259
- Ministry of Agriculture and Forestry (1997) Feeding Organic Waste to Pigs and Poultry: Public Discussion paper November 1997
- Ministry of Agriculture and Forestry (online) Statistics. [www.maf.govt.nz/statistics/](http://www.maf.govt.nz/statistics/)
- Ministry of Agriculture and Forestry (online) Animal Biosecurity Standards and Statements - Exotic Disease Information. [www.maf.govt.nz/Standards/anbio/#Standards for Transitional and Containment Facilities](http://www.maf.govt.nz/Standards/anbio/#Standards for Transitional and Containment Facilities)
- New Zealand Government (online) Foot and Mouth Disease. [www.footnmouth.govt.nz/](http://www.footnmouth.govt.nz/)
- New Zealand Pork Industry Board (1999) Quality Assurance Programme for Feeding Commercial Food By-Products to Pigs June 1999 (unpublished)
- Office International des Epizooties (online) Animal Health Status. [www.oie.int/eng/info/en\\_info.htm](http://www.oie.int/eng/info/en_info.htm)
- Pig Disease Information Centre Ltd (PDIC) (online) Foot and Mouth Disease (FMD) photos & resources. [www.pighealth.com/fmd.htm](http://www.pighealth.com/fmd.htm)
- Sanson RL (1994) The epidemiology of foot-and-mouth disease: Implications for New Zealand. *New Zealand Veterinary Journal* 42: 41-53
- The European Union (online) Foot-and-Mouth Disease - Overview of measures. [europa.eu.int/comm/food/fs/ah\\_pcad/ah\\_pcad\\_fmoverview\\_en.html](http://europa.eu.int/comm/food/fs/ah_pcad/ah_pcad_fmoverview_en.html)