



Ministry of Agriculture and Forestry
Te Manatu Ahuwhenua, Ngaherehere



Support information systems for animal tracing

Discussion document

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1 Introduction

1.1 Purpose of the document

The purpose of this discussion document is to seek comment, by Friday, 30 April 2004, on the proposed development path for support information systems for animal tracing. We describe in this document the systems that underpin the function of disease management, monitoring and traceback in the livestock production sector. We set out in this document the purpose of those systems, the nature of the systems as they currently stand, and the possible options and consequential implications as we move forward.

The primary issue that we focus on is what level of traceability is required, the appropriate division of roles and responsibilities and a possible set of next steps. We also discuss whether New Zealand needs to move to a system of electronic identification (alternatively called radio-frequency identification, radio tagging or electronic tagging), or whether the current system of optical tags and manual recording is appropriate and cost effective.

The perspective that we take in this document is the perspective of New Zealand Food Safety Authority (NZFSA) and Ministry of Agriculture and Forestry Biosecurity Authority (MAF Biosecurity). Through the process of this discussion document, we acknowledge other points of view and seek comment on how those points of view should be taken into account. We see this discussion document as part of a wider and related debate over the cost and access to new technologies, the commercial benefit of those technologies and anticipated future market and customer requirements for different sectors of the livestock industry.

Systems to manage export market access and biosecurity risks for plants or seafood are not considered in this paper.

1.2 Process to date

The discussion document was commissioned in September 2003 by the Livestock and Animal Tracing and Information System (LAPTYS) Committee and was paid for by the NZFSA and MAF Biosecurity.

MAF, the Animal Health Board (AHB) and AgriQuality NZ Ltd (AgriQuality) formed LAPTYS Committee in July 2002 in recognition of the need for accessible, accurate data, in the livestock production sector, to support a set of biosecurity and regulatory food safety requirements. The LAPTYS Committee is comprised as follows: John Hellstrom (Independent Chair), Tony Zohrab (New Zealand Food and Safety Authority), John Morgan (CEO AgriQuality), William McCook (CEO, Animal Health Board), and Derek Belton (Ministry of Agriculture and Forestry), with Terry Ryan (General Manager, Service Level Agreement) attending as an ex officio member.

The following organisations were interviewed in the course of preparing this document: AgriQuality, AHB, Dairy Insight, the Deer Industry Association, Federated Farmers, Fonterra Co-operative Group, Gallagher Group Limited, Landcorp Farming Limited, the Meat Industry Association, MAF Biosecurity, Meat NZ, NZFSA and New Zealand

Livestock Improvement Corporation (LIC). David Moore (Director, LECG) and Dr John Hellstrom (LAPTYS Chairman) authored the report. The authors acknowledge the support of Dr Terry Ryan in providing supporting narrative.

1.3 Submissions sought

Submissions and other comment are sought by the LAPTYS committee on the recommendations and options set out in this paper. The deadline for comment is 5pm on Friday, 30 April 2004. Please send your written comments or submission to Sally Lees, MAF Biosecurity Authority, PO Box 2526, Wellington, or via e-mail to sally.lees@maf.govt.nz.

In particular, we seek feedback on the following:

- Have we correctly identified the purpose of the system and the risks to be managed?
- Have we identified the correct level of protection or assurance required for biosecurity or market access?
- Have we fully identified system and organisation issues?
- What do you think about the proposed development steps?
- Are there any integration or standardisation issues that we have failed to address?
- Have we correctly assessed the position that it is appropriate for us to take in terms of electronic identification of animals?
- What do you think the optimal governance arrangements are and, consequently, do you agree with the proposed changes to the structure and operation of LAPTYS?
- We propose a shift to industry charging if necessary. What principles do you think should be applied to pricing and how should these be interpreted?
- What do you think of the overall package of recommendations?
- What other statements of policy need to be made?

We seek specific comment from the meat industry on the best way to manage the issues of identification of sheep balancing the relative low value of the animal with the need to achieve a suitable level of identification for biosecurity and market access purposes.

2 Summary of proposal

We summarise our proposal as follows (discussed in more detail later in the report):

1. We need to have a clear statement of objectives for traceability and mapping of those objectives to system performance;
2. Accountability and governance of the system needs to be improved and the role and make-up of LAPTYS need to be revisited;

3. Technology issues are consequential and the role of regulation is, at most, to facilitate development of an overall framework, but it is the role of industry to decide what technology to adopt;
4. We need to attend to the reach and completeness of the dataset; and
5. We need to ensure that funding of the infrastructure is secure.

3 Background and context

This discussion paper is focussed on information systems for traceability and disease management needs for biosecurity (including disease surveillance) and to maintain export market access for animal products. We describe the following in this section by way of background and context:

- The nature of risks (both biosecurity and food safety);
- Traceability and acceptable levels of protection; and
- Future drivers of traceability requirements.

3.1 Biosecurity risks

As referenced in the Biosecurity Strategy, biosecurity risks take many forms, from tiny microbes (such as the virus that causes Foot & Mouth disease (FMD)) through to the plants and animals in aquatic and terrestrial environments. We are concerned with a sub-set of those risks, namely those biosecurity risks that impact on our livestock based industries.

The diseases vary by type of animal and include, at one extreme, the very rare but potentially catastrophic FMD. The costs of FMD are extremely significant, and simulations indicate that real Gross Domestic Product would be reduced by 4 percent relative to its potential, with a cumulative loss of \$10 billion after two years, and with a recovery time of three to five years (Reserve Bank of New Zealand and the Treasury, Macroeconomic Impacts of a Foot-and-Mouth Disease Outbreak, 2003).

The occurrence of Bovine Spongiform Encephalopathy (BSE) in New Zealand could have a similar impact on the economy but could be regarded primarily as a food risk. A single case of BSE detected in Canada in May 2003 had cost the Canadian economy \$2 billion within 2 months and continues to have major effects on the Canadian beef industry.

An initial key step to respond to highly infectious, short incubation viral agents such as FMD is identification of high-risk animals, farms or groups of farms. Zones where there will be intensive inspection of all susceptible animals need to be defined. Restrictions on the movement of animal and animal products are introduced over a wider area. Clearly, underpinning this is an understanding of how the infectious agent behaves in the various animal populations exposed and external environmental/management factors. An essential backdrop to this whole process is comprehensive, up-to-date and accurate information on the animal populations at risk. For example, regulators need to know where large intensively farmed pig and cattle herds are located; the movements of susceptible stock on and off farms; dairy versus dry stock farms; feral animal populations; etc.

The recent FMD outbreak in the United Kingdom illustrates many of these points. Infection on a total of 2,025 farms resulted from disease in a single pig herd in the north of England. Wind borne spread from this farm resulted in the transmission of FMD virus to sheep nearby, and their subsequent sale through markets resulted in infection being widely disseminated to other parts of the country by animal or mechanical means. As a result of this, UK authorities were faced with a truly immense tracing task. In the early phases they were forced to impose a national standstill on susceptible stock. Multiple large-scale outbreaks throughout the country occurred. Market conditions in the UK lead to many more movements for livestock between farm of origin and final slaughter than occur in NZ, but rapid and accurate tracing of exposed animals is an equally critical part of the FMD management programme in this country.

Rapid control of the epidemic was hampered by a lack of accurate base data. For example, farm location maps showed many properties were offshore reducing confidence around the mapping of on-shore farms. The information held about stock movements was inadequate to rapidly trace the exposed livestock.

In New Zealand we currently have far more reliable information on where farms and animals are located and our husbandry practises involve much fewer lifetime movements of animals but stock movement information is incomplete and not rapidly available.

3.2 Food and trade-related risks

Food safety regulators carry the responsibility for ensuring that New Zealand's food risks are managed both within borders for human health purposes and to allow appropriate assurances for export purposes. The interests of regulators and its agents are diverse and include:

- Managing risks to human health such as from food deterioration and food borne illness (including zoonotic disease agents);
- Active surveillance and monitoring of microbiological and chemical hazards such as the level of pesticide residue in meat;
- Transmission of exotic and endemic human diseases by food;
- Transmission of animal diseases by exported food;
- Provision of accurate and timely information on the disease status of products and the country to overseas regulators.

The nature of risks of contaminants depends very much on the risk profile and the susceptibility of particular countries. The risks and associated costs of an incident can be very high.

3.2.1 International contaminant issues

We use the endosulfan story from Australia to illustrate the need for regulators to have 'tools' on hand (i.e. animal identification, movement and farm data) to manage contamination issues, possibly of some magnitude, to allow management of the

contamination and to provide evidence to regain access to domestic and, most crucially, export markets.

Endosulfan is an organochlorine insecticide and is commonly applied to cotton crops. Residue problems arose as a result of the expansion of cotton growing and short term increases in the use of the pesticide due to the local weather conditions. Spray drift led to contamination of pasture. It also occurred when farmers, in drought conditions, fed cotton gin trash to cattle. When residues in beef were detected some official agencies downplayed the problem but the residues were increasingly identified with carcinogenic effects.

There have been significant implications for trade. In the mid 1990s the United States, Canada, Japan, South Korea, Taiwan and Mexico imposed a freeze on imports of Australian beef. Last year there were warnings that Australia's A\$3.7 billion a year export trade could be lost if producers fed livestock with waste crops contaminated by chemical residues.

The response of food safety regulators was a classical traceback with follow-up quarantine and targeted monitoring. In 1996, 25 farms were placed in quarantine after levels of endosulfan above the maximum residue level were discovered in their beef cattle. The Australian National Residue Survey also identified 1,400 cattle farms that may be cotton/cattle farms or cattle farms adjacent to cotton farms and are therefore vulnerable to pesticide contamination from cotton spraying. Cattle on/from these farms were closely monitored for endosulfan residues.

3.2.2 Market assurance in New Zealand

Much food risk occurs during processing and at the point of consumption. NZFSA continues to put considerable effort into mitigating these risks. We are concerned with the subsets of risks that occur in the food chain prior to slaughter, which are disease and chemical residue risks that occur in livestock on the farm or in transit. These risks are well contained in New Zealand by a variety of proven quality assurance systems. In particular the NZFSA has been able to successfully convince trading partners that the animal identification and tracing requirements of the national bovine tuberculosis (Tb) control programme provide equivalent protection to their domestic programmes and that there is no justification for the implementation of a full livestock identification and traceback system at this time. There are less than 50 herds a year under active surveillance in New Zealand because of contamination problems.

New Zealand's major market access risk management programme is bovine tuberculosis (Tb) control; we currently spend \$80 million per annum on Tb control. The economic justification of the current scheme is based on the risk of loss of export markets and not on the effects of the disease on animal and human health. This programme has been the prime motivation for the development and maintenance of the current cattle and deer identification and tracing procedures, and the core animal identification systems.

3.3 Traceability

Traceability is the core process, or routine, that is undertaken to achieve the joint objectives of biosecurity and market access. Traceability is the ability to trace the movements of

animals and the products derived from them, from point of origin to point of consumption (e.g. from the supply chain from the farm yard, to the slaughterhouse, to the supermarket shelf).

Importing countries increasingly have regulatory requirements for traceability to manage biosecurity and food safety risks associated with imported products and New Zealand needs to provide core systems to meet them. Traceability may provide additional commercial benefits, such as the ability to meet customer quality requirements, but the nature of these benefits and the possible enhancements over the core system to obtain them are beyond the scope of this report, and are highly likely to be market, product or customer specific.

Effective traceability should identify, as quickly as possible, the source of a hazard, animals exposed to it and, in the case of an infectious disease, the points where there may have been further animals exposed to infection. Regulators and industry need to be able to identify contaminated livestock or produce back to the farm and the herd that it came from and, in some cases, all of the points (other farms, holding yards, slaughter houses) it has passed through. This activity is called traceback. The requirements for a full traceback are to be able to identify the animal, the originating farm and all points in between. These exercises can be extensive with the need for thousands of traces.

More general analytical techniques or processes back up tracing activities. General forecasting and prediction of disease or contamination spread is one such activity. The requirements for disease mapping are for much more accurate data on where animals are kept, how many, of what class and how farmed, and where disease vectors are centred. Incursion response planning needs information for logistical planning to ensure the location, tracking and management of at-risk stock. Finally, hazard control and monitoring may trigger activity around tracing the source of the risk (traceback) and identifying where other product may have gone (traceforward).

Beyond that are many more sophisticated applications for specific purposes such as the ability to trace animals' treatment, exposure and production performance details for quality assurance or production enhancement purposes.

3.4 Relative levels of protection and assurance

The extent of traceability can vary depending on the risks to be managed and the level of protection sought. Full traceability would track all movements and contacts for an animal and the products derived from it, from moment of birth to the point of consumption.

Those requirements for traceback can be satisfied by a fully electronic system, by a fully manual system, or by something in between. The cost of a manual system is less than the cost of an electronic system but there are implicit differences in the level of protection or assurance that is offered. For instance, an appropriately implemented and incentivised electronic system, with electronic identification of all animals and on-line recording of movements, clearly gives the highest level of assurance and the quickest response time, because of accuracy of identification and the full nature of the movement record. This additional information and quality of information greatly enhances the speed of a trace. However, the cost is high in part because of very high levels of data redundancy; most data recorded will never be used. Also the technologies and the implementation of the

technologies are emergent. The trade-offs between accuracy, ease of data handling, labour input and technology costs need to be examined very carefully to justify early adoption of any technical solution to meet regulatory or commercial needs.

3.5 Future drivers of standards for traceability

The major future drivers of market assurance will be requirements from export markets for increased levels of traceability.

European regulations are driven off the United Kingdom FMD event, BSE threats, and consumer pressure to regulate genetically modified substances and quality of food generally. The need to manage potential subsidy frauds under the Common Agricultural Policy has also been a strong motivator for European identification and tracing systems. These European regulations will be a significant driver for the development of industry systems in New Zealand if we wish to continue to have access to European markets. The draft regulations place specific obligations on business operators to transmit and retain information at each stage of the market distribution chain.

The United Kingdom and other European countries have given effect to the issue of traceability by implementing a passport based system. All animals travel with their passports, and movements are recorded (generally manually). Data capture and processing by regulators is labour-intensive and expensive, and data quality with the current systems has been low leading to calls to move to a compulsory tracing and identification programme which incorporates electronic identification technology.

There have been claims that New Zealand will be required to implement an enhanced national identification and tracing system to maintain European Union market access. However, to date, regulators here have continued to argue successfully that our current systems provide equivalent protection. The timing of a possible demand for New Zealand to replicate the European Union's identification and tracing programme remains unclear but is certainly still some years away.

In Asia the only country implementing a full cattle identification tracing system is Japan. It appears that these Japanese requirements may lead to equivalent systems for exporters to maintain their prime beef trade with Japan though it is unclear whether this will depend on the exporter's BSE status. New Zealand has minimal exposure in the Japanese market.

Finally, following recent cases of BSE in North America the United States cattle industry has indicated that it seeks to implement full nationwide traceability programme probably based on electronic identification). The extent and timing of implementing such a system is still emerging but it is likely to be underway soon. However, it is unclear to what extent such a system targeted at domestic United States biosecurity and food security would also be expected of BSE-free New Zealand, which participates as a supplier of boneless beef.

Paradoxically the regulatory requirements for our current limited systems of traceback are likely to become less as a result of changes in export market requirements and international standards for the use of growth promotants and Tb control. Our regulatory system and the more defined nature of contaminant risk means that we are able to manage market access risk through close identification and control of contaminated product.

In summary, while there is little doubt that NZ will have to implement a full traceability system to maintain market access at some point in the future, the exact timing of that requirement is still unclear. It is unlikely that New Zealand will come under much pressure to establish a full traceability system in the next two to three years given the status and reputation of our production systems. It is likely, however, that a system of full traceability will be required before the end of the decade. The strongest reason to implement now is the possibility of having to manage the market impacts of a BSE outbreak in NZ but, even in this most unlikely event, the amount of market protection provided by having a pre-existing lifetime traceability system in place is uncertain.

4 Existing systems

New Zealand uses various approved identification systems for tracking livestock such as cattle and deer from birth to slaughter. Other species such as pigs, some sheep and camelids are recorded in demographic databases. These systems are also used for biosecurity protection and export assurances when traceability is needed.

In this section, we:

- Set out existing systems for traceability in New Zealand; and
- Set out stakeholder perceptions of systems and system needs.

4.1 Development for the needs of the dairy industry

There have been two significant reasons for development of these systems. The first impetus was to establish animal identification for genetic improvement and supply chain management in the dairy industry. The Management Information System for Dairy Administration (MINDA) run by the Livestock Improvement Corporation (LIC) provides for the tracing of all movements of an individual dairy animal from the commencement of its first lactation (although the time and place of its death is not recorded).

MINDA has a large number of datasets including unique animal identifiers, and farm identifiers (including a herd identifier) linked to performance, feed and medical records. The database is very extensive and is linked closely with payment for milk, and therefore has a very accurate core. Any dairy animals that are not part of MINDA need to retain the same level of record keeping using equivalent systems. The database is up-to-date and is rigorously audited. For instance, there is significant external audit of traceability from United States and European regulators and by key customers such as the United States Army, Burger King and McDonald's. Performance to data collection standards is part of the supply contract for dairy suppliers. The data in the system is clearly owned by farmers. There is strict privacy protocol that only allows access to the data for public good reasons. A legislated Access Committee operates the protocols for the dairy industry.

MINDA is owned by its participants and the costs of operating it are covered by membership fees.

4.2 Other livestock management needs

The second major stream of activity in the livestock industry is centred on biosecurity and food safety management by AgriQuality on contract to various parties. AgriQuality was established as a State Owned Enterprise in 1998 as part of the reorganisation of the (then) Ministry of Agriculture (now the Ministry of Agriculture & Forestry, MAF). Significant operating aspects of biosecurity and food safety management were devolved to the State Owned Enterprise at that time. Prior to establishment of AgriQuality, management of the systems had been seen as a core Government responsibility.

4.2.1 Database of farms

AgriBase is a textual and geo-spatial database of farm positions, and farm owners and managers, including legal boundaries. The database includes the nature of the farm enterprise including livestock numbers and types. As such, the information is of particular use in most anticipated biosecurity responses when the latest data from AgriBase would be uplifted to incursion management application software. The coverage in AgriBase is currently good, and there is excellent coverage of commercial farms, with a record of the types of animals, and a good record of lifestyle properties.

Ownership of the AgriBase application was transferred to AgriQuality at the time of the SOE's establishment. Information in the database is collected from a number of sources including "casing"; specific enquiry for the purpose of maintaining the database. The information is collected for the specific purpose of biosecurity response, rural emergencies and disease and pest management.

AgriBase captures a wide range of farm enterprise information such as the nature of the farming operation and what types of animals are on farms. The database is used widely, including geo-mapping work such as productivity analyses, disease analysis or policy analysis. The database now records details of about 110,000 farm units.

4.2.2 Database of herds

The Ministry of Agriculture also developed a disease management programme called NLDB. AgriQuality was contracted as the host and maintainer of the programme. Subsequently, there has been significant modification to the programme and the manner in which data is reported and accessed as AgriQuality uses the system to assist with delivery to a range of public and private sector clients including different parts of the livestock industry.

NLDB was instituted in 1995 and now stores information on the Tb testing and histories of approximately 75,000 herds of dairy and beef cattle and deer, as well as information about other species.

The primary uses of NLDB are as follows: as a generic disease management tool, for biosecurity response and market access assurances, for bovine Tb management, for a Tb scheme for camelids, for Enzootic Bovine Leucosis for beef cattle, as an animal treatments information system, and as the Pork Industry Board herd register. MAF and other industry groups are currently discussing NLDB applications for other species and programmes.

Different information is captured in NLDB and AgriBase. NLDB contains additional information on herds and their history. Information in AgriBase is farm enterprise specific as described above. Thus, the herd identification is a component of NLDB but the farm identification is part of AgriBase. The owners and managers of herds are recorded in NLDB, but the owners and managers of farms are held in AgriBase. By way of example, NLDB would tell the enquirer about the nature and history of the herd but AgriBase would tell the enquirer what other species were maintained on the farm and provide a means to locate the farm.

4.2.3 The importance of Tb control and herd testing

The potential for biosecurity information collection evolved substantially with the implementation of tracing requirements for the national Tb control programme. In the Tb management programme, a key starting point was to establish (and have systems to maintain) an accurate register of the size and location of all cattle and deer herds.

There is a “tag registry”, which is a list of all the tag numbers that have been created against beef cattle and deer herds recorded in NLDB. (All dairy cattle have unique tag numbers separately recorded in MINDA in addition to being recorded in the tag registry.) Animals are identified at birth or within three months according to husbandry practices. Tag numbers are read for some movements, and at time of slaughter, but this additional information is not held in any database.

The very active management of Tb by the AHB has meant that the data in both AgriBase and in NLDB is both used and, to date has been actively updated.

4.2.4 Completeness of NLDB and AgriBase

AgriQuality has given an indication of the coverage of species with AgriBase and NLDB. The extent of coverage is set out in the table below.

| Species | Extent of coverage |
|-----------------|--|
| Cattle and deer | Close to 100% capture of information on all farms in both NLDB and AgriBase. |
| Pigs | 100% of all commercial farm information captured on NLDB and AgriBase; approximately 90% coverage of all pig farmers in AgriBase. |
| Horses | Approximately 90% coverage of all commercial operator information, stud owners etc in AgriBase. |
| Poultry | 100% of all commercial farms in AgriBase, although additional information is likely to be captured in NLDB shortly as well; unknown % of non-commercial operators although house poultry information is captured by AgriBase for surveyed farms. |

| Species | Extent of coverage |
|---------|---|
| Sheep | Approximately 90% of all sheep farmer information captured in AgriBase. |
| Goats | Approximately 90% of all goat farmer information captured in AgriBase. |

4.2.5 Funding of NLDB and AgriBase

NLDB and AgriBase have been developed by AgriQuality as assets core to its business interests in provision of biosecurity and food safety services. Funding of systems development, operating costs, hosting, etc and data services such as casing is complex but has fallen largely on AgriQuality (and prior to AgriQuality, on the Ministry of Agriculture and Forestry). Commercial users such as the AHB make a contribution where they purchase services.

4.2.6 LAPTYS

LAPTYS was formed to provide quasi governance oversight and a mechanism for integrating efforts to ensure that information systems met the needs of biosecurity and food safety. It has no particular decision rights vested in it but has been the catalyst for this report.

4.3 Stakeholder perspectives on the existing systems

Industry participants seek to be involved in decisions around future developments, particularly if large sums of money are needed to reach the desired standard. However, each part of the livestock industry is at a different stage of development, has different needs and sees possible further development from differing perspectives. We set out the stance of the various industry groups as we perceive them at the moment. We note that the interviews were selective and not all groups were able to give a representative stance at present.

4.3.1 Views of the industry

Following are the summary points that emerge from discussions with industry stakeholder groups. It is clear there are a range of commercial interests that influence livestock tracking needs and developments:

- First, after recent scares particularly in Europe, many commercial customers expect New Zealand to have a robust system of traceability, and take it as a given that there is full registration of livestock and full tracking from farm gate to supermarket shelf.
- Second, there is strong interest from meat processors who currently need to operate two or three reading systems, from manual, to optical, to (potentially) electronic.

Meat processors accept that there may be a range of technologies but would strongly prefer a standard for each technology.

- Third, there are a number of strongly complementary commercial activities that support the development of the necessary systems. The activities that we have identified are management of animal productivity through cataloguing of key information about production (in the case of the dairy industry) or yield and quality (in the case of the meat industry).
- Lastly, there are a number of strong commercial interests in the development of electronic animal tagging. Most obviously, there is interest from the suppliers of the tags. There is also interest from organisations that might implement the necessary systems developments, e.g. for data capture and management.

The tags on dairy cows are read frequently; about 20 times per year. There are significant handling benefits from upgraded technology and the industry would like to see standards that facilitate this happening. However, from an on-farm perspective, the reduction in handling costs offsets the system and implementation costs only on large farm units. There are relatively few large farm units (average herd size is 271 cows).

The dairy industry has a highly developed database that captures genetic linkages and productive data sets. There is also relatively well developed governance and control, and management of the data set. The dataset is relatively robust and up-to-date because of the link between payment and supply, and conditions of supply, which include compulsory detailing of some diseases and disease status such as for Enzootic Bovine Leucosis, a chronic disease of dairy cattle subject to an industry-run eradication programme. Farm supply agreements are contractually binding.

Finally, the full benefits of incremental steps in technology such as electronic identification are not likely to be accessible to the majority of dairy farms until bandwidth is available. At present, many farms have limited access to the internet, at relatively slow speeds. This will change in the next one to three years.

The deer industry is strongly supportive of a mandated system with electronic tags. Electronic tags are particularly useful as the tags resolve some deer handling issues, and the animals have a value that justifies the expense. Also, the industry has a more immediate threat than others with the possibility of Chronic Wasting Disease appearing from herds that may have been exposed to deer imported from North America.

The ability of the deer industry to manage its biosecurity risks is to some extent diminished by the interchange of farmed with feral stock. Some stock is released for recreational purposes or by accident and some feral stock is brought in to strengthen the genetic diversity of the herds.

The meat industry highlighted that there is a big difference between a steer worth \$700-1,200 versus a bobby calf worth significantly less, e.g. \$30-50. There is little argument that there can be investment in electronic tagging on the more expensive animals but there is debate as to the worth for animals that are shipped from farm to slaughter when very young, or for low yield animals such as sheep which tend to operate off a mob identifier.

A number of beef producers (those that are interested in progeny testing) may use the dairy industry management information system or a similar service. Most are unlikely to keep as full a record as is required by the dairy industry.

Meat processors bear the costs of handling non-tagged animals (they need to be sorted and product from them excluded from some markets) and lack of standardisation in systems. The additional costs are absorbed by meat processors currently as there is overcapacity in the system. The view is that \$0.30 per kg could be added to the value of a carcass if all requirements were met and marketing advantages could be gained. Full standardisation (i.e. to one system) is unlikely as there will be mob issues such as for sheep, or different tagging regimes for animals that go direct to slaughter (i.e. bobby calves), or for dairy meat. Meat processors do seek, however, standardisation of technologies to avoid proliferation of systems.

Other livestock industries have identified that animal tracing and animal identification systems could potentially be very useful. For instance, the equine industry sees some benefit in the systems for management of biosecurity risks.

4.4 Assessment of the system

The current system is not able to offer full traceability but operates at an accuracy level that is adequate for its intended uses. For example:

- MAF audit confirms that between 80 and 100% of cattle and deer arriving at slaughter are identified to farm of origin;
- Virtually 100% of dairy herds can be identified and located immediately as a consequence of the dairy industry's structure of supply contracts;
- LIC states that almost 100% of New Zealand dairy cattle are uniquely identified to farm of birth in MINDA, and that more than 80% of dairy cattle can be accurately traced to their dams;
- Audits carried out by or for the AHB indicate that almost 100% of cattle and deer herds have been correctly identified and geographically located during each testing cycle;
- AgriQuality states that more than 80% of small-holdings, which may run livestock, have been identified and geographically located;
- AHB estimates that 90% of animals found with Tb lesions at slaughter can be traced back to herd of origin;
- The NZFSA continues to satisfy European Union auditors that animals treated with growth hormones or exposed to pastures contaminated with prohibited chemicals are excluded from European markets;
- The ID and tracing requirements of the existing Tb control programme satisfy all the requirements of existing European Union legislation dating back to 1972;

- All cattle and deer passing through sale yards are identified to herd of origin; and
- Accurate and timely information was obtained when one component of New Zealand's traceback system, MINDA, was recently tested during a *Mycoplasma mycoides* disease investigation.

It has been also been sufficient, in combination with intensive manual follow-up, to allow adequate tracing for biosecurity and food safety investigations. Market access requirements can largely be addressed by a much more limited programme of targeting the very small numbers of at-risk herds and animals.

5 An economic perspective

Biosecurity and food safety is characterised by a mix of Government intervention and regulation, industry collective action and action by individuals and firms.

Individuals and firms act collectively for a range of reasons, the obvious, if trite, reason being that the benefit of collective action outweighs the costs relative to individual action. The reasons for Government regulation are more complex but largely come down to a discussion of whether or not society is better off from that intervention.

5.1 Where benefits exceed costs

The benefits of regulation or collective action are likely to outweigh the costs in a number of circumstances.

- Some events have significant costs for other, unrelated, parties. Some events have significant implications for others that are not easily registered in the costs and benefits faced by the individual or firm directly. Thus, in the event of a biosecurity incursion, the cost is felt by all of the industry, even though the exacerbator may not be bearing the full cost of event, or may not even be identifiable.
- Some goods/services have public good characteristics. Public goods have two key characteristics, first it is costly to exclude others from benefiting from the good, and second the good is non-rival in consumption (i.e. one persons consumption does not reduce the amount available to other consumers.) Goods with these characteristics are likely to be under provided because individuals or firms have limited incentives to provide the good because of the risk of free riding, or they might be over exploited because of the difficulties in excluding others. In the example of food safety, market access is a benefit to all firms and individuals, and access to a market does not reduce the fundamental value of that access.

5.2 Collective action

Regulatory action is one way that the Government intervenes to provide what is perceived as the correct level of protection or assurance. Collective action also provides a means of addressing the problem of the under provision of goods with public good characteristics.

Club goods are non-rival in consumption, but consumers can be excluded from using the good through collective action. The ability to exclude others through collective action addresses the risk of free riding and ensures that there is an incentive for the efficient provision of the good. Examples, of club goods include industry representative bodies, where no one firm, or one group of firms has a strong incentive to provide industry representative services because of the risk of free riding and the costs. Creating an industry representative club helps share the cost and reduce the risk of free riding.

Economies of scale and specialisation also provide an incentive for collective action. For example, both marketing and R&D are activities with strong economies of scale (i.e. the more the outputs, the lower the average cost) and economies of specialisation (i.e. the more specialised the providers are, the higher the productivity). This implies that it may not be economical for each firm to engage in these activities on their own. A more cost effective way of receiving these services may be through collective action to jointly provide the services.

Interacting with government is often more efficiently done collectively as it reduces the transaction costs for both industry participants and the Government.

Developing and implementing systems for traceability is clearly a complex good, with elements of specialisation, elements of economies of scale, a strong club aspect (in that those excluded may not attain export status) and major externalities if not undertaken to an appropriate level. We can draw some conclusions from this – for instance, the policy response will require elements of regulation, collective action, and individual action. The challenge will be to determine which combination is the most efficient. Our preliminary conclusion is that the complexity of traceability should provide a strong incentive for collective action at least, and that regulation is needed but only if collective action fails, or does not occur.

5.3 Current arrangements are a result of history

There are a number of observable features in biosecurity and food safety and those features, and the particular nature of firm and departmental activity, reflect on evolutionary steps in the industry.

The first is that there has been a close involvement between the Government and New Zealand's dairy and livestock industries. There is an important legacy for the sector; some of the activities in the sector were once part of core Government.

There has been a high degree of collective action in the dairy industry in a number of areas including research and science, management of productivity, co-operative production, and in gaining access to markets. LIC is a significant example of that collectivism. LIC undertakes most of the requirements for a traceability system as part of collective action with the dairy industry.

There has been a less high degree of collective action in the livestock industries but there are a number of "joined up" activities. One such activity is AHB. Other industry groups act collectively to deal with specific disease issues (such as Aujeszky's disease in pigs). Many of these activities are taken collectively by the industry but are contracted to AgriQuality. The livestock industries other than dairy largely contract their activities to suppliers of

biosecurity and food safety services, namely AgriQuality, and to a lesser extent Asure. These activities would have been undertaken by core Government prior to 1998.

Over time, generally, the industry and Government have moved to collaborative structures, and away from a model of strong provision of services by Government for industry. The residual role for Government is the provision of appropriate regulations for industry to operate under. On the other hand, the underlying dynamic may well remain that of regulator/industry split with relatively little real collective action, and an expectation that the government will continue to provide 'in the national interest'. Active industry involvement is more likely to lead to a better and more practical solution.

5.4 Key factors that need to be considered

There are a number of characteristics that need to be considered when considering joint action. These characteristics are a mix of guidance and an articulation of issues as follows:

- **Goals:** The goals of the project need to be clear. The greater the clarity, then the better the chance of success.
- **Characteristics and incentives of the participants:** The more homogenous the interest of the participants, the more likely collective action can be agreed. Heterogeneous competing and conflicting parties find it hard to agree to collective action. The incentives of different individuals and firms will vary significantly. For example, the incentives of the livestock industry will vary markedly from those of Government officials. Or the incentives on the poultry industry will vary from those of the deer industry.
- **Characteristics of the good/service:** The nature of the good/service provided through collective action will determine how best to manage the action, or indeed whether collective action is the most efficient approach to the provision of the service. Characteristics that need to be considered include: the costs of defining the good/service - complexity of the good/service, the costs of enforcement, the connection between the inputs, outputs and outcomes of the good/service, the extent of specific knowledge involved in the good/service and the information asymmetries. There is clearly a high degree of complexity in delivering some aspects of services in traceability, such as the core IT structure and the related epidemiological disciplines. Other aspects are more easily contracted for.
- **The value of expected gains and their distribution:** The larger the expected aggregate gains the easier it is likely to be to find agreement. However, this will be tempered by distribution of the gains/losses; very concentrated gains or losses are likely to make it difficult to agree on collective action. Biosecurity and food safety is particularly complex as the gains are more amorphous and may be about management of contingent and unpredictable, but potentially catastrophic loss situations.
- **The allocation of risks:** Action inevitably requires the allocation of risks between the parties. Risk should be allocated to those that are more willing and able to

manage risk. In this instance, management of biosecurity is left with Government because of an unwillingness of industry to take a collective responsibility.

- Governance of the collective action: Governance refers to the structures within which decisions are made. These structures include the rules, both formal and informal, that define the rights to participate in decisions, and the mechanisms by which these decisions are enforced. Different decision structures create different incentives and information flows for those involved in the process. Choices about governance structures (decision rules) are important, therefore, because they influence greatly the desired outcome. When thinking about allocating decision rights related to collective action, thought must be given to where there are advantages in carrying out three basic tasks: (1) specification of the appropriate levels of the variables in question, (2) monitoring or measurement of compliance with what has been specified and (3) enforcement, or assuring compliance with what has been specified. In making judgements about which layer in the hierarchy, and which entities, have advantages in carrying out each of these functions, particular consideration should be paid to the following three factors: (1) the information available to each party, (2) the incentives faced by each party and (3) the respective capabilities of each party.
- Asset specificity: The need to invest in assets or capabilities that are not readily transferable. Asset specificity, such as investment in core data registries, or development of significant capability, raises significant and complex contracting issues, and issues the risk of “hold up” by different parties.

The particular issues around traceability are challenging because of the multiple issues facing different livestock industries, including different markets, different cost structures, different collective decision making responsibilities and different cultures. Further, the debate is made more complex because of the specific information that is held within potential suppliers and providers, with a complex set of objectives around a facilitating network structure that may support other activity and commercial opportunity. Any regulatory system needs to be underpinned by commercial activity or is likely to fail.

6 Emerging issues and proposals

The following section is structured as follows:

- Emerging issues that we have identified to date;
- A cautionary note based on overseas experience; and
- A set of proposals to ensure that New Zealand’s systems of traceability remains appropriate and relevant.

6.1 Emerging issues

The issues that we have identified are as follows:

- Increasing expectation that New Zealand will have to move to a system of full traceability due to external regulatory pressure;
- A need to make explicit the acceptable level of protection and assurance;
- A strategic operational mapping of system performance;
- A need to clarify the monitoring arrangements for the system as a whole to ensure full and ongoing transparency and accountability;
- A need to clarify the future interaction between MAF, and systems providers such as AgriQuality and LIC;
- A need to revisit the role and make-up of LAPTYS;
- A need to clarify appropriate data protection;
- Possible fragmentation of databases;
- The risk that the expected fall-off in herd Tb testing in the medium to long term will reduce the drivers to keep accurate herd data;
- Appropriate systems configurations to ensure appropriate integration of data for the purpose of emergency response;
- Clarification of a stance on electronic ID;
- Issues of identification of lifestyle properties and of livestock on those properties;
- Cost inefficiencies as previous joint tasks are separated; and
- Uncertain funding of AgriBase : residual concerns about whether funding of the systems and related activities such as casing are secure.

Other issues we have identified have been excluded from this discussion. For instance, genetic links are crucial for stock management and enhancement purposes and possibly are important for biosecurity purposes. However, identification of maternity is difficult in practical farming situations (for instance, an average dairy farmer has to tag 100 to 200 calves accurately to their dams but there appears to be a 10 to 20 percent error rate in this process). Quick DNA testing is being developed and would address this issue but probably only has genetic performance applications or possibly high end added value for consumer choice but appears to have little regulatory use.

6.1.1 A need for a clear objective

Full traceability eventually

New Zealand's current tracing systems are adequate for current purposes. More than that, the systems are cost effective and very capable. Our systems do not offer a level of full traceability. Increasingly, major markets such as the European Union and the United States are moving to systems of full traceability. The discussion around when and how New Zealand will move to full traceability is volatile, and particularly depends on the currency of particular food or biosecurity scares, such as the recent BSE incident in the United States. It is likely that New Zealand will need to move to some system of full traceability in the medium term.

Need for an explicit statement on protection and assurance

Linked to the external pressure, is a need to have an explicit understanding of the level of protection and assurance that is currently offered by our traceability systems. That explicit understanding, and a clear expression of expectations, and of medium term goals, is essential to assist firms and individuals in planning for future enterprise level development.

Differing perspectives

Some industry groups are extremely proactive in managing issues of specific animal identification. The dairy industry is clearly in the lead. There is significantly less value and therefore less progress in other livestock industries. There is no easy common level of protection or assurance.

A strategic operational analysis of system performance

A strategic operational analysis, from desired tracing to actual tracing performance, possibly classified by disease or food risk, is needed to assist with full understanding of the level of protection or assurance that New Zealand is pursuing. From this, flows a set of issues around the need to identify individual animals.

6.1.2 Accountability and governance issues

A need to clarify the monitoring arrangements

The system is, at the moment, best described as opaque. Information is fragmented and difficult to verify. There are substantially different views about performance and robustness of key systems even amongst well-informed and significant participants. Linked with the need for clear strategic operational mapping is the need for the system as a whole to offer full and ongoing transparency and accountability.

A need to clarify the future interaction between MAF, and systems providers such as AgriQuality and LIC

Both AgriQuality and LIC operate with quite different relationships to the regulators and industry. The relationship with LIC could usefully be closer, with mutual benefit, as the next stages of systems development unfold. Of particular interest is LIC's development of a farm enterprise electronic information system.

AgriQuality was given rights to, and has continued to develop, key assets in management of traceability systems. The relationship with AgriQuality is a mix of public good (in terms of collecting information for biosecurity and food safety purposes) and commerce. The active commercial interests of AgriQuality are an important part of development of the systems but MAF Biosecurity and NZFSA, or industry could face hold up as traceability needs develop (this is true of any other participant, such as LIC, as well).

A need to revisit the role and make-up of LAPTYS

The major governance interaction is between regulators and one of the two major systems providers. This may be a relevant interaction, but there is much less integration with livestock industry interests. These industry interests represented through industry groups and collectives have a clear interest in some form of collective, cross species activity, particularly as the majority of any costs and benefits fall to those collectives and their members.

AHB is open to continuing with a role in LAPTYS but its major focus is, appropriately, on management of bovine Tb.

6.1.3 Technology and data management issues

Appropriate technology

There is an appropriate systems configuration depending on two factors; the level of desired traceability and the stage of evolution of the enterprise systems. There are discussions about moving to internet based tools for maintaining master indices and herd registration. These discussions are largely in isolation of the strategic operational requirements and therefore consideration of systems configurations is at present best left with the current systems operators.

The need for leadership on electronic ID

There is considerable interest in radio tags from a number of quarters, and most vociferously from tag suppliers. There are issues about high and low frequency tags. There is an expectation that regulators will give leadership on introduction of radio tags.

Currently the dominant technology is optically read tags utilising bar codes. These tags are read on-farm or at a meat processor manually or using bar code readers. Manual tagging and mob IDs are used for sheep and other low value livestock. Visually read tags have a read accuracy of about 90 to 95 percent. The tags are cheap at around 30 cents per tag.

Radio tags are more expensive (\$5 per tag plus the cost of readers and other related systems) but are more accurate and faster to read and have a lower loss rate. The cost of additional readers in stockyards and meat processing plants is in the \$50 to 100,000 range and portable readers are about \$1,500.

Proliferation of datasets

There has been, to date, a concentration of data storage in two systems. This will not necessarily be the situation in future. Alternative suppliers of information services may emerge. Proliferation of databases will require an upgrade in the ability of the different systems to integrate.

Privacy issues and the interplay with commercial use

LIC governs use of its data through a board established under statute. We have queried and have received assurances from AgriQuality about the manner in which it collects and uses data. The systems and, with appropriate consents, the data, are used commercially, which has given rise to a number of queries about possible unfair commercial advantage. This issue is clearly both sensitive and complex and needs to be explored further but, as a starting point, we would suggest some form of external validation or governance of the data, where it does not exist.

6.1.4 Reach and completeness of dataset

Commercial animals are with an exception discussed next, relatively well identified and tagged. However, there is a proliferation of lifestyle properties, and of livestock on those properties. Identifying and maintaining records is an increasingly difficult task.

The issues that we have identified include:

- **Enhanced control over tags:** There is a full list of tags that have been issued to herds (in the tag registry) but those tags may or may not be used. The issue here is that it will be very difficult to reconcile livestock numbers with a central registry unless missing and possibly unused tags can also be identified. There is also a risk of tag misuse.
- **Maintenance of transit records:** Gate to gate transfers are certified by the farmer who records the number of stock moving on “declaration cards” but not their tag numbers. However, the movement record is then not retained and can be destroyed. This puts a great deal of reliance on the records of the disposition of stock either at the processor or on the farm and leaves a gap in the nature of movements, both in numbers and by tag record.
- **No tags at point of slaughter:** Meat processors indicate that up to 30 percent of animals arrive for slaughter without the appropriate tags and documentation because animals have not been tagged or tags are being lost. The current exemption (till July 2004) for some classes of stock to be identified provides a loophole for non-compliance.

- The tag registry is not updated where there is data on slaughtered animals: There is a range of disparate issues around management of the information that links the different aspects of the database together. The first issue that we have identified is the lack of recording of tag numbers of slaughtered animals. Records of tag numbers of slaughtered animals are fed back to AgriQuality, but arrive in various formats, and are not currently reconciled in any database as not all companies are supplying data returns.
- No integration of unique identifiers: There are various databases with different tags and different identifiers. For instance, AHB uses a seven-digit alphanumeric herd number, sequentially generated, and an individual number in optional formats (for instance, with or without a year code). MINDA has a breeder code, the year, and a sequential number. The AHB herd identifier maps to a farm identifier that is maintained in AgriBase.
- No integration of farm identifiers: There needs to be an improved form of integration between MINDA and AgriBase, where there is a mechanism to verify the core dataset and avoid the duplication of data collection. Currently the match is 75% approximately with further manual reconciliation needed.

There are also issues that are very specific to the animal populations that are being managed. The major issue that we have identified relates to management of sheep. Sheep are not currently tagged although there is increasing pressure to tag and some talk of proceeding with flock identifiers. There appear to be few food safety risks in the New Zealand context but the biosecurity risk of unmonitored sheep movements could be substantial should disease affecting sheep such as FMD occur in New Zealand.

6.1.5 Costs and funding

Growing transparency of costs as Tb testing is separated out

As an example, casing was previously, partially, a joint activity with herd testing. The activity has been split out as AHB moves to competitive purchasing of herd testing and although AgriQuality also uses other methods to maintain AgriBase there is now a risk of rapid deterioration (although AgriBase believes that there are numerous, alternative means of casing) of the quality of the data held. The question remains as to whether rejoining the two activities is more efficient than the separation (we note in saying this that AHB contracts AgriQuality to provide specific casing for the Tb scheme). At present, AHB's single purpose focus on Tb may lead to a less efficient overall system.

It is possible that additional investment in casing may be needed. The Tb programme will on current forecasts reduce its current very high level of herd testing over the medium term. This herd testing has been a major driver of accurate herd data; over time, as negative herd tests are achieved, the disease status of each herd is progressively upgraded until there are sufficient results to lower the work effort (and the consequent cost to funders of the Tb eradication programme).

Financial security of AgriBase

AgriQuality has identified to us that it is a continuing issue having the funding to maintain the complex infrastructure of AgriBase. We are concerned particularly from a biosecurity perspective that this system is maintained at a suitably high level.

6.2 Learning from elsewhere

There are a number of lessons to be learnt from overseas that we note before moving on to make recommendations. We mention them as a cautionary note on the manner in which we need to move forward. The first and most important is that the data integrity of the traceability system is crucial. The UK foot and mouth experience demonstrated the importance of data integrity. Essential data was seriously flawed and had to be reconstructed delaying effective response actions.

The second lesson is that the systems in place need to be efficient and effective. For instance, the cost of a passport system now adopted in some countries is expensive and not particularly easy to manage. The infrastructure cost is very high and is, in effect, a form of subsidisation to the livestock industry.

The last lesson that we draw from overseas experience is from the Australian experience of implementing a fully electronic system of animal tagging. There was considerable initial support while the system was heavily subsidised and the potential benefits were pushed but now, during full implementation, support appears to be declining as real costs and actual benefits become apparent.

The general lesson is that the systems need to be able to work, but not be inefficient, and that implementation issues are extremely important. Also likely costs and benefits need to be identified with great care. Mandatory ID and traceability requirements are unlikely to reach the level of accuracy and compliance needed for biosecurity purposes; there need to be other incentives to ensure the level of accuracy required for those purposes.

The following proposals need to find sufficient resonance with industry groups to be sustainable.

6.3 Proposals

We set out, and seek feedback on, a number of proposals and conclusions. Those proposals and conclusions are as follows:

6.3.1 Current level of assurance is appropriate

The central question that we seek feedback on, from industry, is whether New Zealand is operating to the correct level of biosecurity protection and market assurance. Our view, based on a review of the available evidence is that the current level of protection is approximately correct, although there needs to be some refinement of the current system to facilitate commercial tracing developments, and to ensure the system can provide increased market assurance in the future.

6.3.2 Full traceability not needed today

There is value to a full system of traceability through an enhanced ability to respond to any major biosecurity emergencies and possibly a major food emergency. The difficulty lies in assessing the likely costs and benefits. The systems can be enhanced to meet the specifications of a full traceability system but this will require significant investment for upgrade and maintenance. These costs will fall largely on the productive units of the livestock industry, on farmers, meat processors, etc. If we consider the risks faced based on our experiences of the last 150 years, those additional costs cannot be justified i.e. no country with biosecurity controls remotely as strong as ours has experienced an outbreak of either FMD or BSE.

6.3.3 Agree concrete objectives

We propose two objectives for management of traceability as follows:

- Primary goal– keep improving the current infrastructure in a gradual manner in the expectation that full traceability will become a reality.
- Secondary goal– assume that full traceability will be required in five to seven years.

The current system offers a level of traceability that, with some attention to detail and increased rigour of implementation provides a platform for implementation of full traceability and for progressive introduction of electronic identification.

6.3.4 Recognise collective action and adopt an appropriate framework

Industry groups need to be given both greater responsibility and greater decision-making rights in the LAPTYS process in order to maximise the incentives for adoption of, and compliance with, a national ID and tracing programme. We propose that the makeup of LAPTYS is changed to include appropriate industry bodies. Suppliers of services, such as LIC and AgriQuality, could be integrated at another level. We recommend that AHB remains as part of that second level because of the joint nature of its activity. The terms of reference would remain broadly the same but would be widened to include the need for transparency around the capability and development path of the system.

MAF Biosecurity and NZFSA would clearly reserve their role and responsibility as regulators and would reserve the right to promulgate appropriate regulation. However, over time, regulators would expect to see industry coming to consensus views and implementing those views.

6.3.5 Clarify and publish strategic objectives and performance

The future LAPTYS needs some vehicle for bringing different sector interests together. We propose that the strategic operational plan is published (at a relevant level of detail) and that performance is measured against that plan.

6.3.6 Data capture issues

We propose the following improvements to record keeping:

- That the farmer be required to retain a full record of received tags and other tag transactions (for instance, replacement of a lost tag);
- That full records of stock transfers be retained for five years;
- That livestock is not accepted for slaughter unless there is appropriate identification and the obligation for sorting that out is with the farmer (we note that this should happen from June of this year);
- That NLDB (and MINDA) be updated for dead or slaughtered animals.

A policy stance needs to be developed around the food safety and biosecurity risks associated with life-style properties. We do not offer any proposals in this discussion paper.

There also appear to be opportunities to improve the efficiency of data capture by better aligning the three core systems, MINDA, NLDB and AgriBase. At present there is some duplication of data collection and some extra effort needed to validate the total data set. This could get worse if the AHB operates an independent Tb scheme management database without the appropriate arrangements in place to maintain overall data quality for a national ID and tracing programme.

6.3.7 Technology issues

There is a strong case for involvement in the common infrastructure of industry based systems both to ensure that those systems meet the needs of the regulator and because there are co-ordination problems between different parts of the livestock industry.

We make a number of suggestions that would lead to gradual improvement in the robustness of the systems supporting tracing. The suggestions are in the areas of process improvements, data set management and technical standards. The overall goal is to establish a set of standards and protocol that allow for easy interchange of data within distributed stores of data.

We recommend the following on data-standards:

- That there needs to be a set of standards that the system operates to unique identifiers for farms, owners and managers, livestock, flock and herd identifiers and physical locations and how they are described (GIS coordinates and boundaries of both productive units and boundaries of those productive units).

Standardisation around these core codes does not mean that these need to be the codes on animal tags. For instance, the dairy industry may continue to have its MINDA coding system on the tags but they would institute a map of codes back to these core registries.

We recommend the following on technical standards:

- That open system standards are adopted and that generally accepted practice such as XML, SOAP and security standards are implemented.

A few large farmers use electronic tags although uptake has not been as rapid as could be expected. Where they have, it is because of the need to use animal identity to automate or improve accuracy of farm stock management activities where visual tag reading is intensive and time consuming or not sufficiently accurate. Our view is that breeders are likely to benefit most from the introduction of electronic tags, followed by dairy farmers. Farmers with livestock that are difficult to manage such as deer are also likely to be able to benefit now. Farmers with low per unit value stock such as sheep will need a particular systems adaptation to provide sufficient benefit. At present, there appear to be significant implementation and cost issues that hinder rapid diffusion of this new and useful technology.

We believe that there is a weak case for regulators to insist on a faster introduction of radio tags and, as the costs fall on individuals and firms, and that adoption should be in line with commercial interests. We consider that it would be ill considered for the regulator to specify technology, particularly as the cost of the technology would either be borne directly by the industry or would be recharged to the industry as the prime beneficiary of the initiative. All up system costs including data verification, transfer analysis and storage activities are likely to be significant and likely to be justified only if there is significant enhancement of management and handling process leading to a reduction in labour units.

There is a stronger case for regulators being proactive in facilitation and specification of standards, both in terms of data and crucial aspects of systems. The principal co-ordination issue is clarification of the standards that apply to emerging technologies. There needs to be one standard for bar coding and there needs to be one standard for electronic identification. It is strongly preferred that the standards that are selected are not proprietary or the industry is likely to suffer capture from the owner of the standard with consequential costs and loss of opportunity to the livestock industry.

Standards can radically increase the entry barriers for new technologies and it is clear that technologies for electronic identification are still emerging e.g. hybrid low/ high frequency tags may emerge. We make the point that New Zealand needs to be careful to take full advantage of emerging technologies and be prepared to look at amendments to technical standards as and when needed.

We recommend:

- That New Zealand livestock industries adopt the international standard for animal electronic identification which is a low frequency tag operating at either full or half duplex but be willing to consider other technologies in future.

6.3.8 Clarify funding and apply appropriate funding principles

The principles for funding are well established and are set out in the Government's Biosecurity Strategy. In this instance, where exacerbators are clearly difficult to identify

and charge, costs would fall to either beneficiaries if practical and fair, and to taxpayers as a final resort.

At present, we do not believe that the relatively modest central costs of operating LAPTYS need to be recharged and ought to be borne within the existing institutional arrangements. We do, however, believe that it is appropriate to anticipate that there will be future funding needs for LAPTYS that are likely to be moderate, and therefore may justify the cost and effort of recharging to industry.

We are also concerned about the sustainability of existing systems. AgriBase is entirely dependent on commercial applications to maintain its cover and quality and at some point these uses might not deliver to the standards to meet biosecurity and trade needs. As discussed previously, the national ID and tracing requirements of the national Tb programme are likely to decline as the scheme moves towards completion. Additional funding specifically for biosecurity and trade purposes may be needed to maintain these systems and their interfaces to the required standards.

We therefore recommend on funding:

- That the funding needs for LAPTYS are identified and that an appropriate and fair basis of sourcing funds from industry and Government is identified based on the principles set out in the Government's Biosecurity Strategy.