

Electronic identification and information flow in the red meat supply chain.

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objectives

Animal Identification and Information Management

Technology

Traceability, Disease control and Herd improvement

Ireland

UK

Australia

New Zealand

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Denmark

Conclusions

The objectives of my study were to investigate the following areas:

- The technology to facilitate automatic data collection, particularly RFID.
 1. What is available and how is the technology being used?
 2. What research is going on and who is doing it?
 3. What technology transfer is happening and how?
- Data collection at the various points in the supply chain
 1. What are the pressure points for animal data collection?
 2. What data is required at each point?
- The value of data
 1. For disease control, traceability and marketing,
 2. for animal management/performance assessment?
- What Integration and co-operation exists, and is required, between organisations involved in the red meat supply chain with regard to animal data and how does, or could, EID play a role?
- What standards are in place for EID and data transfer and how they are interpreted and applied?
- What Opportunities/Threats are there from pending or possible legislation?
- How has government contributed to introduction of EID?

Animal Identification and Information Management.

While meeting many inspirational people and talking to leaders at all levels in the industry it is clear that farmers need to think about what influences them at many levels.

At global and national levels climate, food safety, food security, war, supermarket power, government policies on transport, energy, employment, education, animal welfare. etc, can all have an impact on what farmers have the power and freedom to do and achieve

At industry level, production systems, processing capacity, and efficiency, marketing power and marketing differentials, proximity to markets, access to markets and scale to supply are all issues.

At farm level scale, efficiency, technical competence, business acumen, location, natural resources all combine to determine how successful a farm business will be.

A common theme at farm level in all countries, is that successful farmers concentrate first and foremost on what they can actually control and manage at farm level.

In all cases control starts with having good information on which to base decisions. Good decisions need good information.

In all livestock enterprises, sucker cows, dairy cows, or sheep, the starting point for success is having the right breeding stock.

The question that stimulates most debate and argument amongst cattle and sheep producers is 'what is the ideal cow (or ewe)'.

My answer to this question has developed to be "better than the ones you have now"

In simple terms, there is no such thing as an ideal cow or ewe. Farmers must strive to improve breeding stock to suit the limitations and the potential of their own circumstances.

The main point is that criteria for selection must be first be objective. Secondly they must be based on sound, relevant science.

Visiting farms successfully producing pedigree stock, crossbred stock, composite stock and all variations between, the common thread in all systems is selection based on performance criteria. None of them ignore visual criteria (if it looks like a duck and walks like a duck it is unlikely to produce anything only ducks) but all

refine selection based on criteria they have objectively decided are relevant to them and their customers.

The debate then moves to which criteria are most important and how do you record performance data to produce indices that allow objective decisions

A great example of putting this into practice is in Western Australia, where two of the most knowledgeable and enthusiastic single breed farmers have recognised the strengths in the others breed and are collaborating to produce a hybrid or composite with the best characteristics of both for commercial customers. The result they hope will be long lived, prolific, parasite resistant, wool shedding, meat machine. They will succeed.

The value of data and information

I have given much thought to the concept of supply chains during the course of the last two years. It is another subject that many learned folks make a living observing, analysing, advising on and writing about.

Trying to think about new angles or new processes, or like many Nuffield scholars, looking for the Eureka or Halleluiah moment, I'm afraid that it didn't happen for me.

Some of my observations on supply chains:

What is the purpose of a supply chain? What does it mean to the customer? The producer? Who else is part of a supply chain? Is this different than a value chain?

I had to remind myself that I was looking at technology and about information flow.

Back to basics. What information is needed? Who needs it? When do they need it? Who verifies the information?

Again, back to basics and as far as agricultural supply goes it is easiest to think about each group separately. The information needs of each individual player in a chain are largely disconnected. This is not necessarily the way it should be, but the way it is.

In many cases, schemes which try to integrate supply chain information are as much about marketing as any real desire to improve the lot of farmers

The overriding conclusion from all these thoughts and discussions is that farmers should manage what they can actually control.

When I thought of this study I was conscious that with today's electronic data collection processes lots and lots and lots of data is collected at different points in the supply chain.

In red meat supply what is good information?

Information management in relation to the red meat supply chain is a complex issue.

This report is about information and technology.

Electronic identification is an enabling technology facilitating automatic animal identification for data collection and animal management. Good information needs good data. It is impossible to talk about the benefits of data collection without first being convinced of the benefits of good information

Traceability and quality assurance are two terms used frequently, particularly in Europe with regard to red meat. We are constantly told that consumers demand traceability. What does this mean for red meat supply, how can it be delivered, and how can farmers be rewarded for delivering what the consumer demands.

In red meat production systems, information is used for a number of purposes. The three main information demanding purposes are

Traceability and product quality assurance to consumer level
Animal disease control at national and international level
Animal management to the farm gate.

What information is required for each of these purposes?

Traceability and quality assurance.

Books have been written on information management in supply chains and the definition of traceability. We can take a simple definition to be that a consumer should be able to see information about anything that happened from an animal is born right through to the point when they have a piece of meat on a plate in front of them.

The information will include when and where an animal was born, who owned it, how was it raised (feeding, welfare, medicine

administration, movements), where and how it was slaughtered and how the carcass was processed, packaged, stored, distributed and eventually sold.

Disease control is a W5 (or at least a W4) issue.

Who are the animals and their parents (dam at least for BSE) and who owns them?

Where are they and where have they been?

When was the animal born, and when and where did it move (from, to, via)

What diagnostic tests have been carried out and with what results.

Why is a question asked by many. Ask any of the industry leaders and government officials in any country that has survived a significant animal disease or product contamination event and it becomes abundantly clear. (UK, BSE 1995, FMD 2001. Canada, BSE 2003. Australia, Cotton Trash 199?)

In the event of a disease outbreak the key to containment is finding where an animal is, where it has been, who might have been in contact with it, where other contact animals might be and where animals that have been in contact with them might be.

(PS the W5 exhibition centre in Belfast is well worth a visit if you are bringing children to the city <http://www.w5online.co.uk>)

Farm management

I always assume that one of the main reasons a farmer farms is to make money. Profitability in red meat production is a complex and multi-factorial issue, but many of the factors relate to animal performance, and these include (not exclusively or exhaustively)

Fertility – sexual maturity, prolificacy

maternal productivity – progeny size, vigour and survival, milking ability, longevity

Production efficiency – growth rate, feed conversion, foraging ability, temperament

Production value – meat/bone ratio, meat yield, fat cover, marbling, carcass conformation

There are a number of recent Nuffield reports all discussing factors affecting the farm gate profitability of beef and sheep enterprises. (see below)

The recurring theme through all of these is the ability of an individual farmer to select superior breeding stock based on objective criteria. There is an absolute need for good information about the value of the breeding stock in relation to the production objectives on an individual farm, or within a breeding population in a geographical area (or country).

Having the information is the first step. Acting on it, or making and following through with good decisions is the key to deriving benefit from the information.

Is there any thread through this information that might allow value to be derived?

In discussions with Brian Wickham and Andrew Cromie from the Irish Cattle Breeding Federation, they used a term that sums up the need to rationalise data collection, storage and sharing processes.

The "holy grail" for animal data management is

"ONE VERSION of the TRUTH"

Any piece of data should be collected ONCE (automatically), stored once in a SINGLE database and be accessible to ANYONE who has a legitimate purpose for using that data to produce information that will be of value.

Legitimate purpose and value are important concepts for discussion.

There are areas where the data required to produce this information overlap. These include data items such as the identity of individual, or batches of animals, animal movements, animal health treatments, post-mortem analysis for both disease status and carcass quality.

For traceability and quality assurance the value of the information is derived from what the consumer is prepared to pay for the product. In some cases a premium may be justified on the basis of an enhanced level of traceability. In today's world the minimum "bar"

is set high enough to mean premium is synonymous with niche. In any case, the information provides the processors and retailers with the tools to effectively market their produce and realise value.

In disease control, the value is derived in two main ways. The first is as above in providing assurance that products are of a minimum acceptable standard, allowing processors and retailers to sell the product.

The second is in the savings associated with not having to deal with the consequences a disease outbreak, or savings associated with the minimisation of costs associated with disease surveillance and control measures.

In farm management terms the value of information is derived from improvements in productivity and profitability through selection of more efficient breeding stock, as well as through improvements in management practices based on information gathered.

Generating information means collecting data. Collecting data means cost. Selling products is about generating value (money). If information supports or enhances the value, then it seems logical that the value should, as a minimum, be shared among those who incur cost to collect the data.

The concept of sharing the value in the chain and sharing the cost of producing the value is one area that will continue to be debated in all countries.

In principle it seems entirely reasonable that both costs and value are shared equitably. The debate in most countries is based on what equitable means.

If you can't measure it you can't manage it.

Measure, manage, monitor

Reference other reports

The Opportunity for Composite Flocks within the UK Sheep Industry,
Samuel Boon

Maximising Suckler Cow Profitability Using British Native Breeds,
Robert Parker

Easier managed sheep and beef cattle; simplified, profitable and
productive sheep and beef farming, Charley Walker

Objective measurement in the Australian Prime Lamb Industry,
Andrew Heinrich

How to Fully Utilise and Rapidly Improve the Australian Maternal
Ewe Flock (including Merinos) to Ensure Continuity of Supply Into
Our Valuable Meat and Wool Markets, Andrew Bouffler

Production verses Marketing: where should Australian wool
producers focus?, Robert Kelly

Technology

I started this study with a number of questions on RFID technology and how it might be used. The technology is important but some observations or conclusions are apparent from looking at how EID is used.

EID is an enabling technology. It allows animals to be identified automatically. This is only a small part in animal and information management systems.

The key to all of this is integration.

Animal Handling systems (physical infrastructure to make sure animals move through the facilities with minimum stress and maximum safety for both animal and operator), data collection processes, whether this is on a farm, in a market, in an abattoir, or wherever, data transfer processes and protocols, data storage infrastructure, data processing capability, data security procedures, reporting capability including processes to ensure the right people get the right reports at the right time, and that these people have the capacity to make decisions and follow through with appropriate action.

How it works

Radio Frequency IDentification (RFID technology) has been developed over a long period, but is really coming of age now.

The technology is about using automatic identification technology to identify objects to enable data to be collected and facilitate information management, automated process control and ultimately improve productivity through reduced labour, improved decision making through better and more timely management information or more efficient product handling.

The identification device can be passive or active, but the principle is the same. The identification device is a silicon microchip with an electronic number. The microchip is incorporated, with an antenna attached, in a medium that allows the device or "tag" to be attached to an object. In passive tags the device has no energy source incorporated and a reader will send a signal from which the tag absorbs enough energy to return a signal containing the coded number. For devices or tags with a power source (battery usually), a signal is usually broadcast continuously to be read by any reader in range.

The main discussion points for applications are the frequency used for transmission of read and respond signals, the strength of the signal and therefore the range at which tags may be read, the standards for coding of numbers to ensure that messages received are consistent and understandable, regardless of location and time and whether the tags can be read many at a time or one at a time.

Other areas of interest are whether information other than the number can be coded or "written" onto the silicon chip, whether this information, including the number can be overwritten or changed and how often can this be done and whether the number coded onto the chip is unique. The standards governing how all of this is administered are crucial to ensuring that systems can be implemented nationally and internationally and organisation can be assured quite simply that the systems will work.

Livestock EID

RFID or Electronic Identification (EID) as it relates to farm animal is simple.

A silicon microchip with a number programmed onto it is attached to an antenna and incorporated into a device that can be attached to an animal. This can be a tag, a rumen bolus, a necklace, a belt attached to a front or rear leg, a subcutaneous implant or a tail tag.

In all cases to date for national animal identification systems they are based on passive, low frequency (134.2 kHz) transponders,

The principle is that the tag will receive energy from a reader, absorb enough energy to return a signal that is picked up by the reader.

The unique number from the chip will be translated and be displayed and/or passed on to another system to allow an animal management task to be completed based on the identity of that animal. The task may be recording of a data item (weight, location, milk yield, drug treatment, blood sample), or a physical process such as milking or drafting.

Standards

The basis of all animal traceability systems, particularly cattle, is the unique, lifetime identity of the animal. It is essential that EID technology can deliver.

Since agriculture products are traded on a world wide basis, it is more than desirable that standards should be set at international level. The process for setting standards is important, as are the procedures for testing and approval of equipment against these

standards, the publication of results of these tests and subsequent approvals, auditing to ensure standards are maintained, and sanctions to ensure compliance.

There are a number of standards in place to govern the implementation of EID systems and the manufacture of the devices and equipment that make up these systems

The main standards in place are the ISO standards 11784, 11785, 24631 and 14223

- ISO 11784 represents the international standard for the structure of the data numeric architecture of the 64 bit code for Radio Frequency Identification of Animals.
- ISO 11785 represents the accepted protocol for transmission between the scanner/reader/interrogator and the transponder (tag). This standard defines the timing sequence for both HDX (half duplex) and FDX (full duplex) air interfaces.

The international standards organisation is responsible for defining and refining the standards.

This organisation has devolved responsibility for testing and approval, and maintenance of the standards to the International Committee for Animal Recording (ICAR)
ICARs primary mission is to standardize procedures and methods used in recording of livestock data and establish test procedures for the approval of equipment and methods for recording data. This remit is much wider than simply EID equipment testing and approval.

ICAR has in turn approved a number of laboratories to perform the tests on the equipment.

There are a number of serious flaws in both the standards, and in the way they are implemented.

The single biggest flaw is that the standards do not include any physical performance criteria for devices and equipment. A device may conform to the standard but not perform in an acceptable manner.

This can and has been overcome by introduction of national standards, for example MLA standards for NLIS devices, whereby national governments define further testing and approval processes to ensure equipment is acceptable to the industry using it.

Policing of standards is an issue, in that organisations may sell equipment as complying with the standard, without having any testing or approval done by the standards organisations. Again this can be overcome by national governments, or designated competent authorities within countries legislating to ensure that the standards are met. The debate moves then to deciding should the legislation dictate that equipment is tested through the recognised international body, or can it simply be tested to that standard by a competent, licensed body.

Integration of equipment

Equipment fit for purpose

What purpose?

Same question again "Technology must solve a problem. Technology should not be seeking a problem to solve".

Ireland

Traceability and disease control

CMMS – cattle movement monitoring system

Separate sheep systems

Herd improvement - ICBF

The United Kingdom

The structure of UK government has changed dramatically in the last 10 years with devolvement of some powers to the Scottish Parliament and the Northern Ireland and Welsh Assemblies. The structures and responsibilities for animal health and welfare are in turn difficult to explain.

In short summary, Northern Ireland, due to its geographical separation and historical governance issues, has always had a completely separate system for management of animal tracing and disease control measures and I will discuss that separately.

Great Britain

Traceability and Disease Control

In Great Britain (or England Scotland and Wales) animal birth and death registrations and allocation of tags is the responsibility of the Rural Payments agency through the British Cattle Movement Service. BCMS operates the Cattle Tracing System (CTS) BCMS maintains two Ear Tag Allocation Systems (ETAS). These two databases are accessed by tag suppliers to obtain unique tag numbers for cattle, sheep and goats.

BCMS are also responsible for approving official cattle, sheep and goat tags for sale in Great Britain.

Separate database are responsible for recording the allocation of identification devices for cattle and sheep, and for recording the births, deaths and movements.

BCMS database is a single species database.

Disease control and welfare is the responsibility of an executive agency of the Department of Environment Food and Rural Affairs, appropriately called Animal Health, but inappropriately created as a completely stand alone agency.

Carcase inspection is the responsibility of Local Authority Health inspectors, as is the welfare inspections at markets and abattoir lairages.

Although cooperation does exist between the organisations, each has its own separate database structures for collecting and collating information about the key elements of traceability.

Strengths

1. None

Weaknesses

1. No central database, no single point of contact
2. Single species and single function solutions
3. No links with herd improvement
4. Costs
5. no industry involvement or responsibility other than data input
6. no central database for sheep movements
7. getting devolved administrations moving together in the same direction

Herd improvement

In the UK for beef and sheep there are 2 main systems for obtaining breeding values for pedigree stock.

The Australian Breedplan programme is used by a number of cattle breeds (Charollais, Hereford, Angus and Simmental)

The Beef and Sheep Company (BASCo) system, designed in a partnership between some breed societies (Limousin, Texel and Suffolk), Signet and SAC through Egenes is used to provide breeding values for Limousin cattle and a number of sheep breeds.

At present there is no facility for comparing data across breeds or for analysis of crossbred breeding stock.

Dairy breeding values are provided through egenes, a subsidiary of the Scottish Agricultural College.

Northern Ireland

Traceability and disease control in Northern Ireland is the responsibility of the Department of Agriculture and Rural Development through its Veterinary Service.

All of the information requirements for these tasks are undertaken through the Animal and Public Health Information System (APHIS), managed by VS on behalf of DARD and the Industry.

The database holds details of the people who keep animals, identity of the animals, allocation of the identification devices (Tags), animal movements, disease testing

Strengths

1. Integrated system for all disease and traceability functions
2. data used for marketing

Weakness

1. Cost
2. industry involvement in management
3. links to herd improvement
4. policy dictated by UK

Herd Improvement.

There is no indigenous herd improvement system in Northern Ireland. Producers use systems available in the rest of the UK, i.e. BASCO/Signet and Breedplan.

Less than 10% of pedigree flocks are performance recorded.

Even dairy cows, less than 25% milk recorded.

A national I D and traceability system is the solution to a problem.

What is the Problem?

There isn't a simple answer to what appears to be a very simple problem.

In all of the countries the process of deciding what needs to be in place, how it should be implemented, who controls it, who contributes information and how, who owns information, who has access to that information, how is value attached to and derived from the information.

The National Livestock Identification System (www.nlis.com.au)

NLIS in Australia was introduced in 1999.

The initial driver was primarily the fallout of export and trading issues following dieldrin/DDT detection in carcasses sent to Japan in the 1995. Cattle imported into the state of Victoria had been fed cotton trash residue in NSW due to forage shortages as a result of drought. Although all traces were well below any recommended safety levels, trade was seriously affected.

The only solution was an effective cattle tracing system. Initial plans were developed in 1996, but it took to 1998 to convince an industry led committee to move forward.

Given the numbers of cattle in Australia and the numbers moving through saleyards and to abattoirs, it was clear that European style, passport and paper based systems for individual animals would be unworkable, both physically and financially.

A solution was tested in 1998/99 on a voluntary basis in the state of Victoria, heavily backed by state Government financial and political support, where it became compulsory in 2002.

During 2000-2005 the system was gradually accepted and adopted through Australia and management of the national database and technology standards was taken on by Meat and Livestock Australia.

It became compulsory on 01 July 2005 for all cattle to be identified with RFID tags and for all movements of cattle to be registered with NLIS.

NLIS is a very straight forward concept, which is one of it's primary strengths

It is about identifying the cattle with a unique, whole of life, identifier in the form of a radio frequency transponder in either a tag or a bolus. Farmers are identified and properties are identified with a Property Identification Code.

Tags are allocated to a farmer at a property, and any animals born on that property are tagged as they leave.

The movement recording is the responsibility of the receiving property (another farmer, a market or an abattoir). Details of the PICs (selling and receiving) and all the animals in the consignment must be registered.

Strengths

1. Industry led and owned.
2. Managed by industry with government support
3. simple concept
4. fully electronic
5. roll-out funded and supported by government with a clear focus on promotion of benefits to farmers.

Weakness

1. links to disease control systems
2. links to quarantine service
3. links to animal production or herd improvement systems
4. starts when an animal leaves a property, not when it is born or first handled.
5. although a national system, there is duplication in services offered at state level.

There are many issues that have been addressed by the Australians.

The first is technology.

MLA played a key role in taking the international standards from ISO and ICAR and adding performance criteria to these. They put in place clear testing and approval procedures to ensure that technology supplied to farmers, markets and abattoirs was acceptable. Technical support was and still is available to ensure all stakeholders know what to expect from the technology.

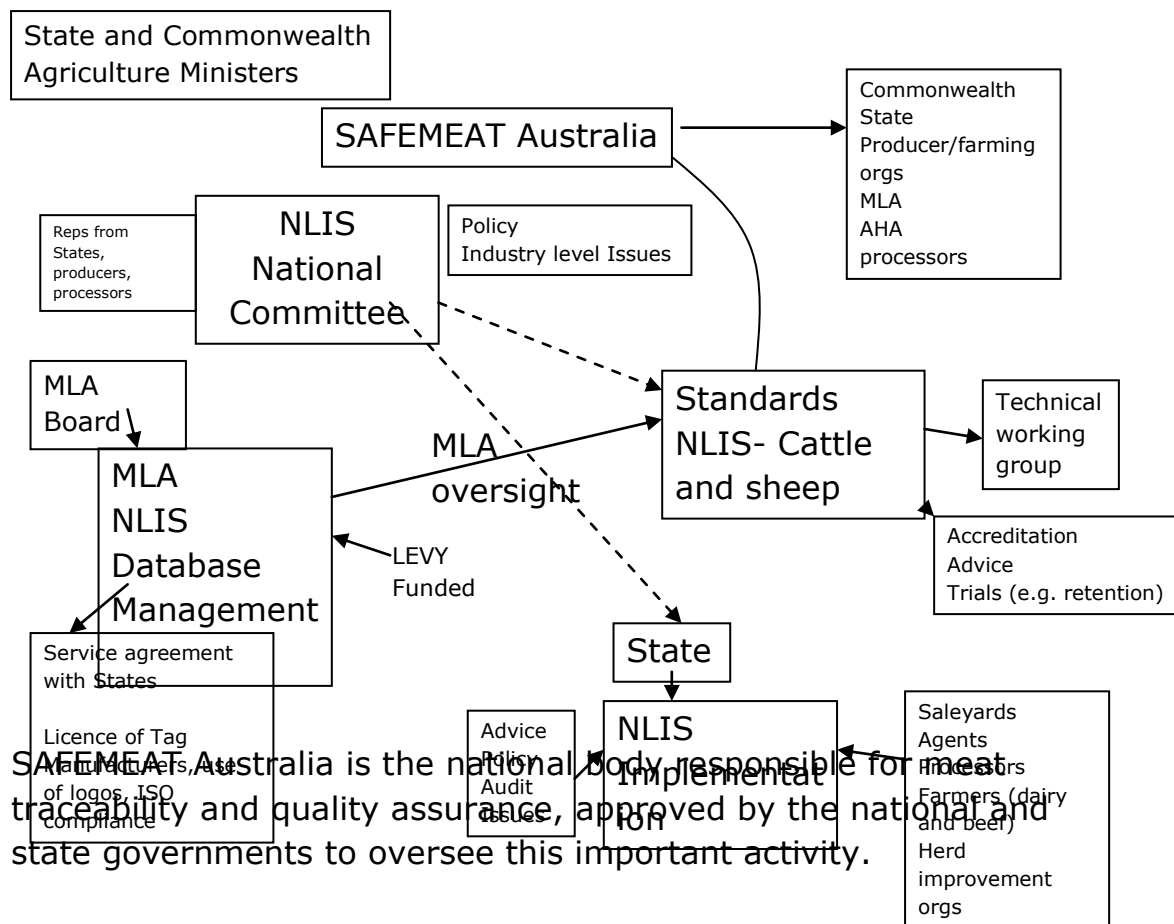
A methodical, logical approach, starting with abattoirs, then markets and then farmers, backed up by a central database and effective central services has delivered a system that simply works.

It may be something to do with Australian physce, but there was a very apparent acceptance of what the technology could or more importantly couldn't do, and a real drive to overcome problems and make it work.

Governance

While NLIS has a complicated management structure which I will attempt to convey, the single most important element of that structure is that primarily it is led by industry.

NLIS is an industry system providing services for the industry to ensure the industry can meet its obligations to consumers for the provision of traceability information.



SAFEMEAT Australia is the national body responsible for meat traceability and quality assurance, approved by the national and state governments to oversee this important activity.

A National NLIS committee, made up of representatives, at leadership level, of the members of Safemeat, oversee the policy and direction of NLIS. A number of subcommittees and working groups provide and advice and direction on various issues.

Meat and Livestock Australia is contracted to provide the database services, and administer the standards and device approvals process. MLA also undertake development and testing or proof of concept work.

Each state has an agreement with MLA to provide central database services and provide access to information relevant to transactions within that states control. Within each state local stakeholders manage how implementation and local adoption of the national standards and procedures is carried out.

Funding for NLIS comes from National Government, State governments and producer levies.

A national I D and traceability system is the solution to a problem.

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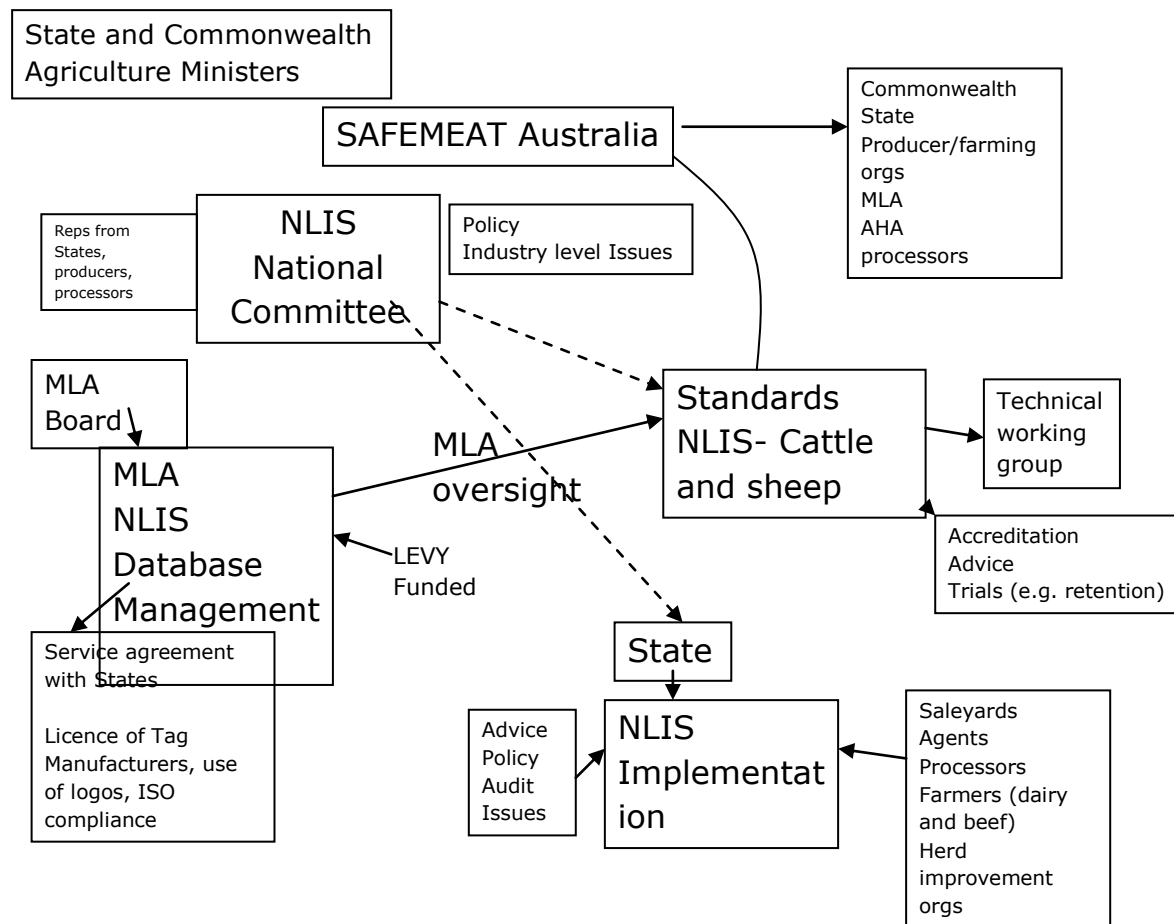
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National Animal Identification and Tracing (NAIT) system, New Zealand

Traceability and disease control.

New Zealand has a proud record as an exporting country, and is keen to promote the health and welfare of dairy, beef and lamb production systems.

It does have excellent disease control procedures in place, and IT systems to back that up.

It also has some of the very best scientists and research work with regard to genetic progress in dairy, beef and sheep production.

It does not as yet have a robust traceability system in place as Europeans would define one.

The NAIT system, when fully operational should deliver that. It is based like other systems on identifying cattle, identify the places cattle are kept (and from that the people responsible for managing them) and then tracking the movements of those animals.

The NAIT project was initiated in 2005. It is supported and managed in partnership by government and industry, overseen by a board chaired by a farmer.

The industry has a strong voice in how the system is being developed and in deciding how the system should be funded and managed.

Government fully support the system and have provided funding for research and development, and through negotiation will provide start up capital and a percentage of running costs for an initial period.

The business cases have been completed and in 2010 it will become mandatory to identify all cattle with an RFID tag as they leave the farm of birth.

New Zealand have accepted the large amount of effort expended in Australia to put in place testing procedures and adequate

conformance and performance standards and will therefore use NLIS approved tags and equipment for their implementation.

New Zealand are also clear that while the low frequency tags that are currently used may be the best available now, new technology may be developed and therefore the underlying principles of the ID and tracing system should be technology independent. This will ensure that new technology can be introduced, if and when it is proven, with minimal disruption and additional cost.

Technology trials are ongoing, looking at in particular, HF (13.7 GHz tags).

Strengths

- employ proven technology
- simple system
- industry controlled, government supported.

Weaknesses

- not yet in place (3 year phased implementation from 2010)
- integration with disease control systems
- need to ensure industry support does not fall away
- links to herd improvement not clear in specifications

New Zealand has never had an animal disease outbreak on the scale of national crisis as has happened in many, or most, other countries.

While a robust traceability system is seen as a prerequisite to international trade by most importing nations, having a system in place may be seen as an insurance policy. It is difficult to understand the need for insurance if you have never had a fire, and my experience from a farmers meeting is that there remains a cohort of farmers in New Zealand unconvinced of the need for improvements in how they track and trace cattle.

Herd Improvement and Farm Management

The New Zealand dairy industry is one of the most progressive in the world, being the largest exporter of milk powder.

Many Nuffield Scholars visit and write in detail about the industry and its structure.

My experience is that the support systems for farm management and herd improvement are second to none in the world. Almost all cows are milk record and the use of breeding values for selection of AI sires is almost universal.

On the farms I visited the use of management information for decision making was again universal, and the use of good information supported a range of decisions made by those I talked to, including expansion, consolidation, sell-out, conversion, irrigation.

Perhaps the most interesting use of data was a farm using information to support and justify the use of almost 2.5 tonnes per cow per year of concentrate feed to support the equivalent of about 8,500 litres per cow per year of milk production. This is almost heretical in the land of grass, but the figures back the policy.

The strategy employed did however highlight a message that I first became aware of in Melbourne on the Contemporary scholars course.

Successful businesses have simple systems, attention to detail is phenomenal, they work damned hard, and they reward people who share the workload.

For beef and sheep farmers, bulls and rams are bought based on how they can be expected to perform. There is still a need to ensure they are functionally sound, but stockmen want performance first, and if they look good that's ok.

Canada

Traceability and Disease Control:

This in Canada is the responsibility of the federal agency, the Canadian Food Inspection Agency (CFIA)

The Canadian Cattle Identification Program (CCIP) was introduced in 2001 through an amendment to the Health of Animals Regulations and is applicable to all cattle and bison. The Canadian Sheep Identification Program (CSIP) followed in 2004.

Both programs are mandatory in all provinces. These programs are administered, apart from in the province of Quebec, by the Canadian Cattle Identification Agency (CCIA)

Traceability is delivered through premises identification, animal identification and movement recording.

CFIA is also responsible for enforcement of the legislation.

The Canadian Cattle Identification Agency

The system was based on visual tags, with animals tagged on the farm of birth when they left.

The dairy industry, mainly for production monitoring and genetic gain reasons had an identification system in place for many years.

Following the BSE crisis in Canada in 2003 when exports to the United States were stopped for few months there were 2 major outcomes.

The first was the value that could be placed on a traceability system was realised, in that the system in place with farm of birth tagging meant that the crisis was limited to a certain extent.

The second was the exposure of many of the flaws in the system.

The introduction of RFID tags began in 2005.

Like Australia, Canada is a federated country, with each province having autonomy over animal tracing and animal health issues. One of the strengths of the CCIA and the system is that it is national but

despite the leadership of the CCIA, the province of Quebec moved forward with a mandatory RFID system before the rest of the country was in agreement with how RFID introduction would take place.

From Quebec's point of view, this was a bold step in leadership in support of its industry. From other province's point of view, Quebec acted too quickly and allowed provincial government too much control over the system design and administration.

Strengths

- national system
- simple concept
- industry led

Weaknesses

1. provinces can still act autonomously on implementation
2. links with dairy industry
3. links with animal health
4. industry relationship with government at federal and provincial levels is not always smooth
5. industry buy in, particularly abattoir and market sector is still not clear

Due to the climate in Canada, type is a very important factor in breeding beef cattle. In the seedstock industry, ebv figures are important and there appears to be an acceptance of science based selection procedures such as genomics to a greater extent than in the UK, and even than Australia or New Zealand.

In Canada the majority of dairy cows are milk recorded.

Denmark

Traceability, Disease Control and Herd Improvement

All undertaken on behalf of government and farmers by the Danish Agriculture Advisory Services

Farmer owned and controlled organisation.

Advice, Technology transfer, education and service.

Close links with the research organisations.

Denmark highly ordered and seems almost over-bureaucratic, for example a farmer is not allowed to administer medicine to a dairy cow. Medicines must be administered by a qualified vet.

Conclusions

The objectives of my study were to investigate the following areas:

- The technology to facilitate automatic data collection, particularly RFID.
 1. What is available and how is the technology being used?
 2. What research is going on and who is doing it?
 3. What technology transfer is happening and how?
- Data collection at the various points in the supply chain
 1. What are the pressure points for animal data collection?
 2. What data is required at each point?
- The value of data
 1. For disease control, traceability and marketing,
 2. for animal management/performance assessment?
- What Integration and co-operation exists, and is required, between organisations involved in the red meat supply chain with regard to animal data and how does, or could, EID play a role?
- What standards are in place for EID and data transfer and how they are interpreted and applied?
- What Opportunities/Threats are there from pending or possible legislation?
- How has government contributed to introduction of EID?

Technology.

The technology works. Manufacturers are innovating and improving applications constantly and there are applications available for all enterprises and all sizes of enterprise.

There is research going on around the world on the technology for data collection and on the use of data to provide information for decision support. Unfortunately little of that work is happening in the UK.

Technology transfer work is one of the key elements of success in countries which have successfully implemented traceability systems based on RFID. The structures in the UK do not make it easy to transfer the technology and to educate and train, and lack of adequate, targeted funding makes it difficult to see how this will change.

The standards for EID and data transfer are available, but as yet the understanding of what the standards mean and how they can be used is lacking in the UK and Ireland in general. Education and training and some technology transfer work, particularly with industry leaders, would facilitate a more structured debate on national contribution to the provision of standards, including the testing approval and policing procedures, for the good of all.

The best systems are put in place through cooperation and collaboration between government and all sectors of the industry. This is most evident in Denmark and Australia, where there seems to be an attitude that everything is done for the good of the industry and a spirit of openness that is sometimes absent in the UK.

It may be that both Australia and Denmark have greater proportions of products export and therefore have to work harder to maintain share, but Canada and New Zealand have to export as well, although in beef and lamb markets maybe don't as yet have to compete as vigorously for the market share.

Information about cattle and sheep to deliver traceability and disease control must be integrated.

The best traceability system in the world is the Animal and Public Health Information System (APHIS) in Northern Ireland. I did not do an in-depth economic analysis of the cost of administering the systems, but for what it does in an integrated manner, nothing available delivers more functionality.

If the object of traceability is to deliver information about who keeps animals, where they are kept, where and when they move and the disease status of those animals through rigorous testing and inspection processes then Northern Ireland and Denmark are the only countries I have found that achieve this through an integrated database system.

Value of data.

While the objective was not to do a comparative study of herd or flock improvement systems, but to look at what was possible, the conclusion is

- objective selection of breeding stock requires lots of data and a good system for processing that data to deliver usable, relevant and reliable breeding values
- the more data that can be integrated into genetic analyses, the better
- when data can be collected automatically at source that is better still
- when systems allow data to be integrated automatically from a variety of sources, wow.

The UK is not even reading the same book, let alone being on the same page, as the rest of the world when it comes to the use of science to select breeding stock. Without even doing an in-depth analysis it is clear that the proportion of breeding stock, dairy, beef or sheep, that are performance recorded is significantly lower than in almost any other country. While we have some of the best individual stockmen, some fantastic looking stock, the greatest range of genetic diversity in terms of breeds and traits, good universities, good agriculture colleges, intelligent and able farmers, we still lag behind in our ability to utilise these resources to their full extent.

The structure of the UK seedstock or pedigree industry for beef and sheep does not lend itself to making the sort of genetic selection decisions possible in larger scale operations in other countries. The relative strength of breed societies in relation to the herd and flock improvement organisations and the farmer representative organisations is a serious issue that must at least be considered. Breed societies by their nature are self interest groups, and it is not always clear that their self interest is aligned with the goals of the commercial beef and lamb sector.

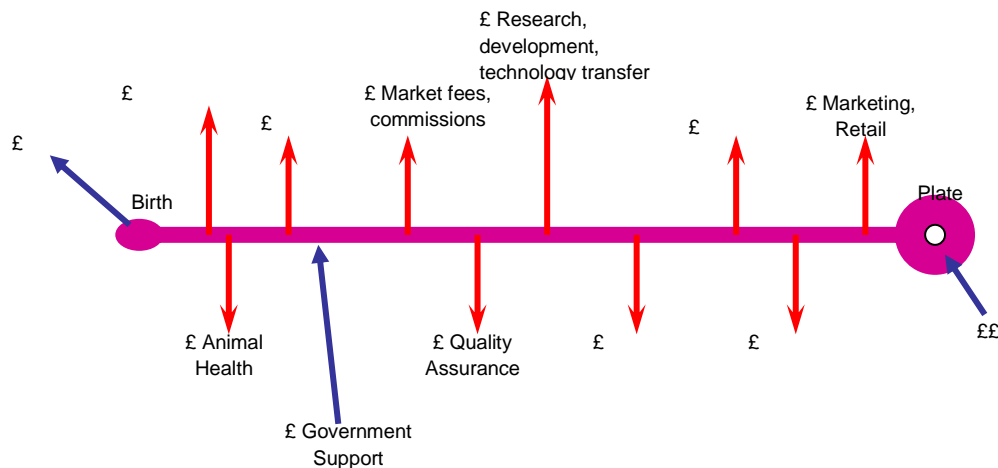
The best herd development services organisation is I believe in Ireland, with the Irish Cattle Breeding Federation. It may be because it is the most recently formed and has had an opportunity to learn from all of the others, but I believe it is a combination of industry leadership, government support, excellent employees, good business plans, a little bit of luck, and proof that the system will actually deliver real benefits that have made it a success. Starting with dairy cattle, proving the system worked, progressing to beef and then to sheep, is a strategy that appears to have succeeded.

Another reason for success is integration – they are closer to the "one version of the truth" model than any other nation.

The Danes could argue that their system has all of these elements, and I would be happy to listen to their case. I might even be convinced.

One thing that became clear while travelling and talking about red meat supply is the distribution of value with a supply process.

A diagram that sparked an idea was the NAIT information flow diagram, and I looked at this diagram from a financial stand point.



The seems to be only 2 ways for value to enter the process, either through what the consumer pays for the final product, or through some form of government support.

Every other element of the process takes out value through cost of activities. It could be argued that value is added through an increase in the amount paid by the customer for the product and that could well be the case.

What is clear is that the farmer is the last one in the chain to realise any value.

In modern supply chains the farmer is far removed from the consumer and has little or no control over the final price, and little, if any, control over how much each of the other contributors removes or adds before he or she gets what is left.

While benchmarking and information management at farm level can make a significant contribution to improved performance on farm, farmers can legitimately ask if all other contributors benchmark, share information, share value, encourage openness and collaboration and ultimately foster partnership and trust.

My sense is that moving forward with food production at international level, distribution will become a key topic. This will be at 2 levels. I firmly believe given the technology available and the research being done, capacity for food production will not be problem. Distribution of the food produced and distribution of the value created by food production is and will be an important subject for governments to grapple with.

Final word – three things that will make a difference

6. Performance record breeding stock, with clear objectives for on farm improvements
7. elect good leaders, educate them effectively to ensure negotiations with government are balanced.
8. Don't worry about the big picture too much until you have your own house in order – keep it simple!

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