

AUSTRALIAN NUFFIELD FARMING SCHOLARS ASSOCIATION



2001 SCHOLARSHIP REPORT

by

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Study Topic: Integrated Farm Management Information Systems.

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Contents:

Introduction:	3
Executive Summary:	4
Aims, Objectives and Study goals	7
Study Report	8
Conclusions	15
Acknowledgements:	17
Recommendations	18

Introduction:

My study topic has been an interest I have been pursuing for about four years. It began by becoming more proficient with our own family farming enterprise record keeping systems, and the benefits we were gaining including improved management practices and productivity, to name a few. In realizing that the average age of our farmer is about 57/58, and knowing that record keeping traditionally has not been high on the list of priorities, how can it be made easier, since there is becoming an ever increasing requirement for better record keeping.?

Some examples, include the introduction of the GST in 2000, the new Pesticide Act in NSW regulating Ag & Vet chemical usage, the increased pressures managing our own Natural Resources (NRM) and Environmental Management Systems (EMS), the multitude of Quality Assurance (QA) & ISO/SQF programs being introduced, e.g. Cattlecare, Graincare, Flock care, Fresh care, SQF9000, HACCP – (Hazard Analysis Critical Control Points), etc..., The growing of Genetically Modified Organisms (GMO's), and the most recent being on farm OH&S requirements to be introduced from September 2003.

I set about exploring ways how all this could be made easier for the farmer to comply and be involved in such systems. Firstly, find out who and what are the drivers for introducing such systems, what the limiting factors of involvement might be, the benefits of being involved, and any further opportunities that could be utilised by having an integrated and transparent information management system. Being awarded a Nuffield Scholarship to study this interest was truly a huge bonus.

The main task now was to find out if and where any such systems existed and how do they work. Some of my initial contacts were gained from the group study tour, where we only touched on businesses and topics that I wanted to find out more about. So I then pursued these on my private study tour.

Executive Summary:

Product integrity, a market driven imperative, is now a key driver for sustainable, competitive and commercially viable agricultural production. Buyers of produce, and ultimately the consumers, are increasingly demanding that producers demonstrate their produce is safe; that it is to specification; and that the management practices adopted are environmentally and socially responsible. Transparency of practice is becoming the norm requiring data to be collected, stored and exchanged between all the stakeholders from farm to supermarket (two-way).

There are also emerging legal requirements that will enforce farm and demand chain activity records (in particular for chemical usage to support product safety and integrity, and OH&S) to be kept.

Producers continue to struggle with record keeping systems – from software programs to paper. Traditionally they are difficult to use. There is enormous duplication in effort, particularly when the same (or similar data) must be supplied to multiples of users. There is generally no scope to “pool” data and benchmark performance, or use the data intelligently to flag exceptions and practices that may become issues further down the chain.

My Nuffield study project was aimed to research and explore, where in the more developed countries of the world does an Agricultural electronic business & IT mechanism exist which adds value to pooled data for multiple outcomes from a single data capture to then provide information to farmers, natural resource managers and commercial or regulatory bodies without the need for additional data input from farmers.

Study Project Objectives

The study project is expected to deliver outcomes including:

- An assessment of the commercial viability of a data repository for farm management information,
- An understanding of a possible framework infrastructure that could be developed to help underpin product safety and integrity, enhancing Australia’s competitiveness, and promotes our “clean and green” image.
- Reduced costs of data capture, greater data integrity, and improved information exchange.

Potential benefits (and issues to be addressed) from this study project include:

- a) A considerably easier, less stressful and hence rapid adoption pathway to farm wide data collection and storage (risk of loss in paper files, on PC hard disks or floppy disks).
- b) Reduces stress on family farms already operating under considerable economic pressures and existing data collection obligations.
- c) Major savings in the cost of data collection, compliance and robust storage, for farmers and other stakeholders.
- d) Increased opportunities for improved farm business performance through benchmarking and downloading to farm management software systems.
- e) Enhanced environmental and bio diversity management through comprehensive record keeping and aggregated data.
- f) Opportunity for efficiencies in delivery of services to farmers as well as further up the demand chain.
- g) Increased data available to support future industry research.
- h) Improvements in marketing and trade security through enhanced quality assurance.
- i) Ensuring farmers retain ownership of the system, ownership of their Intellectual Property and potential cashflow from their own individual and aggregated data.

Since returning home from my Nuffield Scholarship, and following up on other leads I made whilst away I have not yet come across a system that covers the objectives sought and that delivers the potential benefits we should be aiming for.

An initiative I was involved in prior to my Scholarship study tour was the formation of the National Agricultural Data Co-operative Limited or NADC. NADC is a “grass roots” and self-help initiative of farm business consultants and farm service providers, and their network of farmer clients. It is a new initiative and is currently undergoing a pilot phase where technology systems and principles that have been developed are being tested and fine tuned.

We believe it is quite a unique initiative demonstrating the willingness and intent of different groups in the supply chain to collaborate and establish a formal business entity that manages an e-business information bank, provides the toolsets to enable data to be uploaded and retrieved, and facilitates stakeholder ownership (on behalf of the members) over the collective data.

In Short, the NADC facilitates the capture of data at the source, and provides opportunity for a “data post office”, to turn primary data into secondary data through analysis and value adding the information collected. The next step is to then provide a platform to aid in the improvement of business management, profitability and agricultural and environmental practices.

Aims, Objectives and Study Goals

To research and explore if and where an Agricultural electronic business and IT mechanism exists which adds value to pooled data for multiple outcomes from a single data capture to then provide information to farmers, natural resource managers and commercial or regulatory bodies without the need for additional data input from farmers.

To Research and study the Integration of Farm Management Information Systems.

Particularly with regard to;

1. The introduction of Quality Assurance Systems (QA), Environmental Management Schemes (EMS) and impending Regulatory requirements on record keeping.
 - What/Who are the drivers introducing Better Management Practices for farmers?
 - At what level are they being introduced and are they working?
 - If not why not?
 - What incentives are there to motivate growers to become involved?
 - What is required for the grower to be involved? E.g.: \$\$\$, increased record keeping.
 - What are the benefits back to the grower? – (Paid a premium!! OR other)

2. Service Provider – Farmer Client Data Management
 - What/Who are the drivers introducing Better Management Practices?
 - What type of information is being collected about their farmer clients
 - How is this being collected and disseminated?
 - How is this information being passed back to the farmer (invoice, reports etc...)

3. Research Integrated Extension Services to improve Business Management & Performance.
 - Can the information being collected, provide the basis for further extension service opportunities: such as Profitability Analysis and Local Benchmarking services, and become transparent and integrated to satisfy QA, EMS, Regulatory requirements and other on farm management systems.

As you the reader may imagine a lot of the information collected by service providers is the same information required by the farmer to satisfy what he wants to do.

Study Report

From Day One of the Nuffield Tour I was exposed to businesses that were in desperate need for a better way to manage their information and provide a transparent system for giving feed back along the supply chain to all who required access to this information. The range of businesses visited on the South East Asia (SE Asia) leg of the tour were at best, keen in trying to introduce Best Management Practice, (BMP) but were not sure themselves exactly what it was.

Whilst touring SE Asia, I believe we were all exposed to the enormous opportunities that a population of such magnitude, and so close to our shores could provide. Unfortunately, I believe there is a range of obstacles in our path, to really take advantage of these opportunities. Being exposed to the political, social, economical, agricultural, and religious issues in the respective SE Asian countries was an absolute eye opener.

UK & Brussels

Consumers in Europe and more recently Japan have become increasingly concerned about food safety issues following the food safety scares relating to BSE and Foot and Mouth disease. The out break of BSE (Mad Cow Disease) strengthened the cause for the Agricultural industry to be more accountable and responsible for their actions. The public perception was that farmer management practices were to blame, where it was actually agricultural supply inputs. These highly public failures of intensive agricultural practices have resulted in a loss of trust by consumers in the product safety and integrity process for agricultural production.

As the consumer is becoming more aware of the issues surrounding safe food, the ability to have documented evidence along the supply chain is proving more and more valuable. These recent food scares have instigated major regulatory changes in Europe. A recent trend both in the US and Europe is to view the food chain process as a whole rather than individual components of the production process. The European Food Safety Agency and the UK Food Standards Agency have recently been given de facto authority to oversee the complete food chain.

Given the density of the population in the UK, having to document everything that is done on the land is rapidly becoming the norm, the Agribusinesses and farmers visited I would say were similar to Australian farmers in that, record keeping still does not rate high on the

list of priorities. Most understand the need for such information, but nobody likes actually recording it, and then having to provide the records to the respective authorities. Not only UK Farmers, but also all over the world, farmers stated that farm management information is highly regarded as private and confidential. The audit process requires livestock farmers to keep records of where their stock have come from, what has been fed to the animal over its life time, and a whole range of other details, that must be produced prior to slaughter. On average, UK farmers are being randomly audited up to six times per year.

The larger Supermarket Chains are attempting to implement their own and often more onerous requirements on agricultural producers to identify where their produce was coming from. The main drivers for the likes of Sainsbury's, Tesco's and Safeway Supermarket Chains were to show consumers they are being proactive in sourcing food products produced under Best Management Practices. However some farmers I visited stated that this could be dangerous as, market place controls for produce may not be based on science and/or backed up by product integrity documentation, rather than agribusiness relationships and preferential marketing of produce.

JSR Farming Group in East Yorkshire, is the largest privately owned farming group in the UK, made up of mixed cropping and livestock enterprises, including livestock genetics and food processing. A software package they use called FARMAGE seemed to be providing them with all the management information they required to manage their properties. They are also involved in the LEAF program (Linking Environment And Farming). One issue that they identified was that at the moment these two systems are not integrated. On visiting the office of the FARMAGE business, attempts had been made previously by IT businesses to integrate a management package for farmers, and their service providers. The main reason given for the failure of such programs, was that they all had separate agenda's as to the ownership and control of the data base holding the integrated information, as well as guaranteeing privacy, security and validity of the information being collected. Whereas the farmers visited, thought that a stakeholder owned and industry controlled system could be worth a try!

With the pending expansion of the European Union bringing in countries that previously have not been able to trade on a level field with the likes of Germany, France and the UK, the idea of food safety and producing food from environmental sustainable practices, has hardly been heard of. A mountain of paperwork and grower accreditation programs have

been trying to gain momentum such as EurepGAP, (European – Good Agricultural Practice)

The future opportunities for growth for EurepGAP, by attempting to provide an international verification framework across a wide range of agricultural products is seen as being quite ambitious. Already EurepGAP is tagged as being quite controversial as there is no common definition of Good Agricultural Practice. Retailers are rapidly resourcing produce globally and are facing increasing competition, pressure on profitability from countries that can produce more with less, and an ever tightening regulatory environment. Again food safety has lately become a top priority for many retailers. More emphasis is being placed on Quality Assurance Programs. At the same time producer organisations from a range of countries have applied for EurepGAP membership and look for integrated and cost effective solutions delivering reassurance on food safety.

Canada & North America.

North America lays claim to host the most technological advances in Agricultural Electronic Business applications and solutions in the world. (This is certainly debatable). Without a doubt, ALL the businesses I visited were attempting to be all things to all people. Some included:

- **EworldAG** Corporation provides growers and farmers quick access to the essential services necessary for agricultural operations. They say they connect the agribusiness community and provide online applications to make regulatory compliance easier and farm operations more efficient.
- Crop Data Management Service - **CDMS** software services have been designed to help the user address their everyday recommendations and regulatory compliance issues. Eg: the need for NOI¹ (Notice of Intent) forms.
- **Agvance** - is a leading supplier of integrated software products for agribusiness retailers and cooperatives throughout the US.

¹ In California farmers are required to fill out a Notice Of Intent form 24 hours prior to applying chemical or fertiliser to their fields. This NOI needs to be sent to the local regulatory body for authorisation. Once it has been approved the farmer can apply the product.

- **Croplands** – is an integrated business solution for the commercial agricultural industry. It is a modular based approach targeted to grain handling and logistics, crop inputs, and agricultural land use.
- **AgChem** – Onboard application control/management systems similar to some we have here in Australia.
- **Other IT businesses included** –
 - Cropverify.com
 - AgTrace
 - Integrated Crop Management Services
 - Soilteq.com
 - Agri-tek

Some of these IT systems had large-scale deployment into quite significant farmer owned Co-operatives. Two such Co-operatives, one in Southern Ontario, CA. Hensall Co-operative and the other, Effingham Co-operative in South central Illinois USA, both provided a full range of products and services to their farmer clients. From providing agronomists and farm consultants to make recommendations on applying chemicals and fertilisers, to then applying these products with large scale single and variable rate applicators, to finish the cycle by marketing their end produce. Although these businesses supported their own Quality Assurance schemes, they relied on the farmer for a lot of the information needed. Statements like, we're too busy, we don't have time, can't you do it, were common statements from their farmer clients. The IT systems that the co-operatives used could make this easier but most had to involve the software manufacturer as wanting to facilitate the information warehouse, OR a nominal royalty charge on a per acre basis was requested by the software manufacturer. Hence a third party becoming involved because they can see money in aggregated information, and "Information is Power".

In California along with five other states, farmers are required to fill out a Notice of Intent (NOI) form 24hrs prior to the application of chemical, or fertilisers. This makes the farmers we spoke to feel vulnerable by having to send in and have stored by the state government their chemical and pesticide usage reports. This has been in force for about six years. Had the agricultural industry been more proactive, instead of reactive, perhaps a system that the stakeholders of the respective agricultural industry associations could have had more control over, would have suited better. Similar to what you are trying to do in Australia!

These statements reinforced my desire to support and further develop the NADC back home.

Service providers such as:

- **NAAA US** – National Agricultural Aviation Association.
- **CAAR** – Canadian Association of Agri-Retailers,

were used to gain an appreciation of the service provider industry, and the contacts made became important for my private study.

Typically, in the US and Canada aerial operators were owned and operated by small business, on the other hand, ground rig operators tended to come under the control of local co-operative depots. In most cases the range of software systems was not fully utilised, as they required a designated office person to maximise the potential of the various programs.

Both Canada and North America seem to have a range of Quality Assurance (QA) and Environmental Management initiatives in various stages of industry roll out.

In Canada, the Ontario Environmental Farm Plan program is of world renown. Apparently the Work Booklet has been translated into numerous languages. It started with an incentive program of CA\$1500, although the subsidy was to be used in the application of the Farm Plan program. Maintaining membership has become a problem and has been gradually declining over time, as it is now largely up to the farmer to maintain efficient environmental management, and keep sufficient documentation of the process.

In the US, NOVECTA is being portrayed as the flagship model Quality Assurance scheme for the USDA. It is a joint project of the Illinois and Iowa Corn Growers Associations. “A producer-focused enterprise that creates positive economic returns for growers by assuring quality, managing production information, and maintaining the integrity and value of their products for current and emerging markets.” Source www.novecta.com

After a day with the Managing Director of Novecta, Chet Boruff, to find out why, who, what & how, it became evident that the initiative was mainly to secure access to markets, and attempt to gain a premium for accredited produce, although this had not yet happened. The process for the grower is based on a modular type, self-assessed training and certification process delivered over the Internet. Their idea was to get away from “Class room” type training, where each module lasted approx thirty minutes. Novecta’s

aim is to focus upon products and services that include: training, documentation, testing and auditing, and quality assurance systems. Within each of these components there are varying levels of system support available and growers will be able to select from a toolbox of protocols to meet end user or input supplier requirements.

From my visit, I understood that they were encouraging the more proactive farmers who want to participate in a process to value add their produce and take advantage of markets that value quality management. Although the membership is free, Novecta think it's possibly worth US\$200/pa for the grower to participate. The funding to date has come mainly as a levy funded project from the Iowa and Illinois corn growers association. The value proposition to all involved from growers to input suppliers and end users is still being identified.

Other drivers identified to introduce Best Management Practice (BMP):-

- The need to manage natural resources sustainably and efficiently
- Increasing legislative requirements and the need to demonstrate compliance with regulatory requirements
- Increasing risk of prosecution for causing pollution to neighbour and/or environmental damage
- Market demand for QA & trace ability to demonstrate use of resources both synthetic and natural on production
- The need to support claims of environmental friendliness or threats of litigation
- Support the development of industry codes of practice and stewardship programs.

Back in the early days the solution to pollution was dilution. In the Gulf of Mexico, an area of ocean that is labelled as being "DEAD" is being referred to as the Dia-Hypoxic Zone.

What is Hypoxia? – Seasonally low oxygen levels in water.

What causes Hypoxia? – Hypoxic Zones result from excessive nutrients, primarily nitrogen, carried to the Gulf by the Mississippi and surrounding catchment rivers.

Dead Zones are becoming more common worldwide in areas where coastal waters are swamped with Nutrients, particularly nitrogen, from sewage or fertiliser.

The Gulf of Mexico's dead zone swells each summer to about 18,000sq Kms. Researchers blame the 1.6 million tons of nitrogen, much of it from farm fields, that washes down the Mississippi River each year. The USDA and EPA set up a task force to find out why and where the pollution was coming from. They found that Agricultural practices contributed to 75% of the problem.

A program designed to reduce this total is being implemented by the USDA and EPA. It basically involves an education process, identifying the risks associated with excessive fertiliser usage, backed up by introducing new Nutrient Management Legislation, which includes record keeping requirements for Agribusiness and users of agricultural inputs.

Six years ago in a small town called Walkerton, in Northern Ontario-Canada, a waterborne disease outbreak occurred where seven people died and more than two thousand three hundred became ill from disease causing organisms called E-coli. The estimated cost of the Walkerton water contamination tragedy was more than \$64.5 million. Contrary to media reports, it began by a farmer spreading liquid manure on his fields, as he had done for the last thirty years. This one time, an unusual rain event occurred that washed most of the liquid manure into a small waterway, which led into a river, which was the town's water supply. Although this farmer was not prosecuted, it demonstrated the importance of providing safe drinking water. Nutrient Management Legislation has since been introduced into Ontario, which includes mandatory record keeping requirements.

Conclusions

If what is happening in the UK and North America regarding regulation of the use of agricultural inputs is setting a precedent, history has shown that Australia will soon follow. Consumer pressures, not only in response to food traceability supporting product and integrity, but the call to demonstrate environmentally sustainability farming practices, will ultimately enforce greater record keeping requirements on agricultural land managers.

In the light of the major shocks associated with BSE and foot and mouth disease in Western Europe and Japan in recent years, it cannot be ruled out that new shocks will have to be dealt with in the coming years.

Australia is a major exporter of agricultural products into world markets, and especially the markets in North America, Japan and Western Europe (close to half of Australian exports go to these markets), but it is not a member of either NAFTA or the EU, which means that Australia needs to be particularly sensitive to international changes in food safety and regulatory requirements.

Agricultural and veterinary chemicals play an important role in Australia's highly export oriented agricultural production sector, which in 2000/2001 exported goods worth A\$30 billion. The leading elements of the sector include grains, meat and dairy products.

Community attitudes to the use of agvet chemicals, particularly as they relate to food safety and the environment, are becoming increasingly important. With higher incomes and better education, consumers are demanding more information about the content of food products, assurances about the integrity of food chains, and where possible choice in the products that are available.

It is clear that regulation of agricultural and veterinary chemicals is still changing in North America and Western Europe in response to external drivers, such as community pressures associated with the demand for high levels of food safety and the desire for an environmentally sustainable approach to agriculture. Non-government organisations representing consumer groups and environmentalists are pursuing agendas that are likely to lead to more intense scrutiny of agricultural inputs such as chemicals and fertilisers.

Looking ahead for the next ten to fifteen years, it is likely that the approaches being followed by regulatory agencies in Europe and North America will be in the direction of increased and more sophisticated regulation. Technology can play a major part in supporting land managers with the tools needed to help comply. Consumers increasingly have a desire for greater information and transparency about risk factors and how they are being managed. Consumers are no longer willing to regard the food supply system as a black box – they want to look inside!

Acknowledgements:

I would first like to thank my wife and family for their support and encouragement whilst I was away for the group and individual study tours. The whole process is a joint commitment, the exciting challenge now lies in making something of it.

I am particularly grateful to the following organisations and people:

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- **The Australian Fertiliser Services Association (AFSA)**
- **Graeme Forsythe & Associates**

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Recommendations

- Regulation is coming.
- Farmers and industry need to maintain control over their own information, in time this may become a valuable resource.
- Critical success criteria for electronic business implementation.
 - Is there a **business need** that drives the electronic business system implementation
 - Who & What are the **driver/s** for the initiative
 - Are there **incentives** and value propositions to encourage supply chain members to use the e-business system
 - **Technology** needs to be **flexible** to allow for continually evolving and changing requirements
 - The information and process needs to be **secure**
 - The system introduced needs to be **simple** to cater for all types of users
 - The **cost** of usage should be **low** relative to the value offered
 - **Training and support** made easily available

My Nuffield study project was attempting to address the key information management issues that are increasingly challenging Australian farming businesses.

These issues include the capture, storage, use and exchange of information in ways that achieve improved farm business performance, safe food for consumers, resource protection and security, and the health and safety of the people in the industry. Today's technology allows innovative initiatives to be developed in concert with growers, and the opportunity to turn traditional approaches (such as benchmarking) that have operated in a passive and historical context, into active and current business improvement tools.

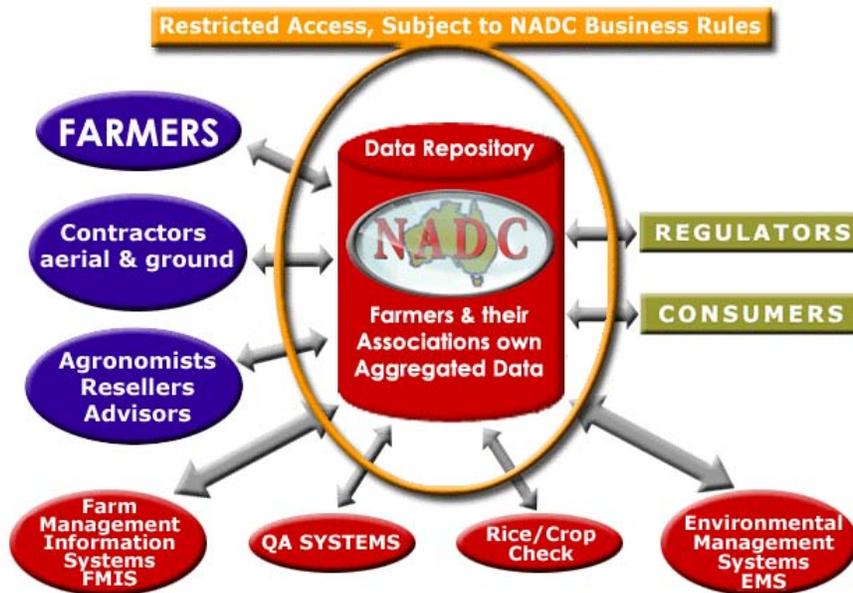
More and more, farmers are being encouraged and required by regulators, industry, demand chains (consumers, buyers etc) and natural resource managers to ensure and demonstrate that they are producing quality products in a proven, safe, environmentally sustainable, traceable and cost effective manner. This translates into significantly increased record keeping and documentation requirements, and requirements for the timely exchange of information particularly along demand chains.

The recommendation I would like to make for Australia's agricultural industry is for farm businesses to use an integrated management information system to meet their external information distribution requirements, and for the system itself to become a driver for farm business process improvement.

Record keeping, documentation and managing integrated information systems are not typical strengths of farm businesses. The tasks involved have usually been considered a burden, leaving farmers with less time to spend on the physical processes of producing quality grain. Many have ignored the need or resisted it. Where records have been kept, particularly for "applications" such as chemicals, data capture is often duplicated (being collected by both the farmer and the outsourced service providers). Key data such as this is often not available to support services such as agronomists who could use the information to add value to their client businesses if access could be facilitated once it was collected.

There is great scope to change the paradigm, and to introduce "smart" systems that streamline the data collection and exchange process and turn information into a business asset rather than a chore.

The National Agricultural Data Co-operative Limited (NADC - see diagram below), approach adds the concept of a data repository and information warehouse - collecting, storing and distributing data and records on behalf of and under instruction by its members either directly or via automated downloads from third party service providers (eg chemical spray data from systems run by aerial applicators).



In summary, the array of Farm Management Information Systems available, provides the intellectual information system framework; and the NADC provides the “data warehouse and post office” in a form that stakeholders will own.

The benefits of this project are expected to include:

1. Improved business performance through timely and efficient information made available at a range of levels from a farm to an industry scale.
2. Improved data collection efficiency and less duplication of data collection; resulting in lower business costs.
3. Reduced time requirements on farmers providing the same information to multiple users; resulting in lower business costs.
4. Reduced time requirement for information collectors, as they would have access to aggregated data from other collection and storage sites.
5. Improved ability of farmers to comply with regulatory, industry and market driven requirements for food safety, quality assurance, environmental management, employee safety programmes and declarations.