Farming for the Future

towards better information-based decision-making and communication

Phase I: Australasian stocktake of farm management tools used by farmers and rural professionals

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About the Centre of Excellence

The Centre of Excellence in Farm Business Management was launched during the last International Farm Management Conference in Methven, March 2011. The Centre aims to improve farmer's business management skills through education, research and knowledge dissemination. It is a joint initiative between Lincoln and Massey Universities and NZIPIM, initiative supported by Dairy NZ the MAF PGP fund. The underlying theme is to "*Improve farm management capability in New Zealand".*

Foreword

The Centre for Excellence has been created to improve the level of farm management capability in New Zealand. Before this can begin, one of the questions that must be answered is whether farm productivity is being limited by a lack of farm management skills, or a lack of tools and resources in which to apply those skills. This report is one of the first steps along this path – identifying the tools available to farm managers and farm management consultants. Throughout this process, due to the international experience of Sjaak Wolfert who was in New Zealand at the time of compiling this report, we also examined a concurrent issue relating to the integration or connectivity of such tools.

Acknowledgements

The authors would like to thank all interview and survey participants for their time and thoughtful contributions to this project.

Executive Summary

This report has been commissioned by the newly created Centre for Excellence in farm management. The purpose of this report is to compile a list of farm management tools available to farmers and farm consultants (rural professionals) in New Zealand.

There are a significant number of tools available to the New Zealand farmer and rural professional. The report compiled a list of 127 tools, but this number will continue to grow as new tools are developed and others that have been missed are added to the list. These tools are disproportionately represented in the more established areas of farm management (stock, feed, financial), and under-represented in newer areas of farm management (nutrient, labour).

It is suggested that the average farmer or farm consultant would not know of the complete range of tools that are at their disposal. While market forces will dictate that the more successful/useful tools will rise to prominence, there are nevertheless likely to be tools that would help a particular farmer/consultant that are not being used simply because they were not aware of them.

The general feeling is that the availability of farm management tools is not the limiting factor to lifting farm productivity. However new tools will need to be continually developed in order to adjust to a changing workplace.

The interconnectivity of tools and speed of internet connections is certainly an issue. These two problems result in lowered time efficiency through multiple re-entry of data and waiting for downloads/uploads. Recommendations from S Wolfert explored that good management information systems take place at operational, tactical and strategic levels, development of farm management tools requires relevant participants and ICT development to interact and that Cloud Computing is important for a shared vision.

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1 Introduction

1.1 Background and aim of the project

From recent research and observations it can be concluded that information management and the use of supporting farm management tools and ICT (Information & Communication Technology) is going to play a more important role in agri-food business, the added value chain from farm to consumer, at a global level (Wolfert *et al.*, 2010). This mainly concerns:

- management support to optimize process control and
- information sharing for communication purposes within the whole agri-food supply chain.

The picture in Figure 1 provides a simple overview of what information flows and related stakeholders are involved in this area. In reality, this picture is much more complex!

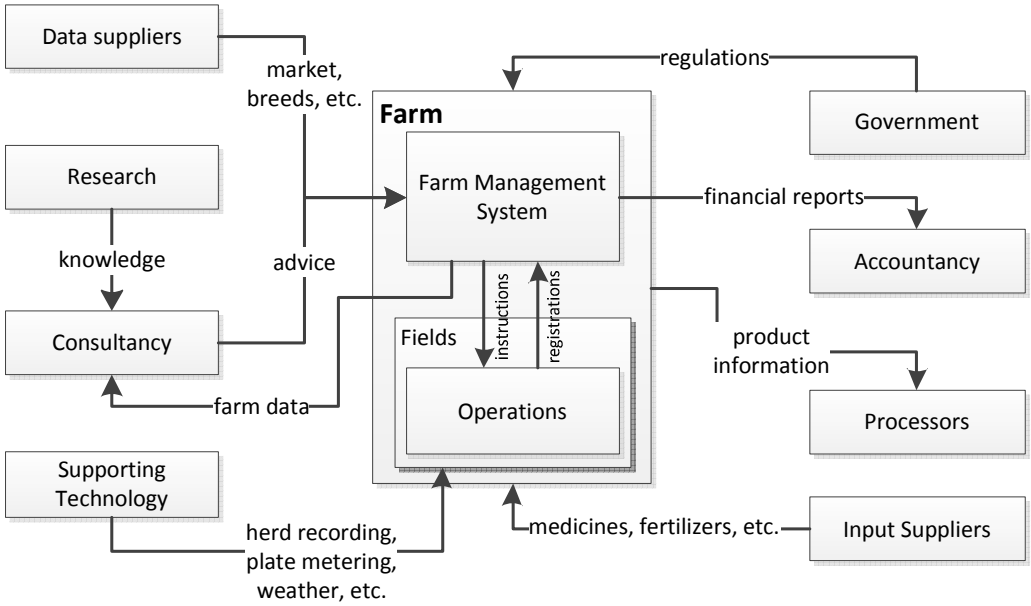


Figure 1 Simplified representation of some information flows within & around the farm. adapted from Wolfert (2008)

Ideally, these information flows should be supported by various farm management tools that seamlessly communicate with each other. However, this is often not the case. Therefore the Centre of Excellence has started a research project with the objective:

To identify the use of farm management tools and the future challenges for Australasian agri-food production in relation to information management and ICT.

The main research questions are:

- What is the current situation in information management in terms of use of farm management tools?
- What are the challenges for the agri-food sector in Australasia and what does this imply for the issue of information management and ICT?
- Can there be a gap identified between the current situation and what is needed to face the future challenges?
- If a gap is identified and the underlying issues are considered as trivial: what actions need to be taken to bridge this gap?

1.2 Scope and definitions

In this first phase, the research will be mainly limited to dairy farming, and predominantly in New Zealand. Later it could be extended to other sectors and the scope extended to include other countries, particularly Australia. From the perspective of the whole agri-food supply chain, the focus of this research project will be on the farmer and farm management professionals that interact with the farm (see Figure 2).

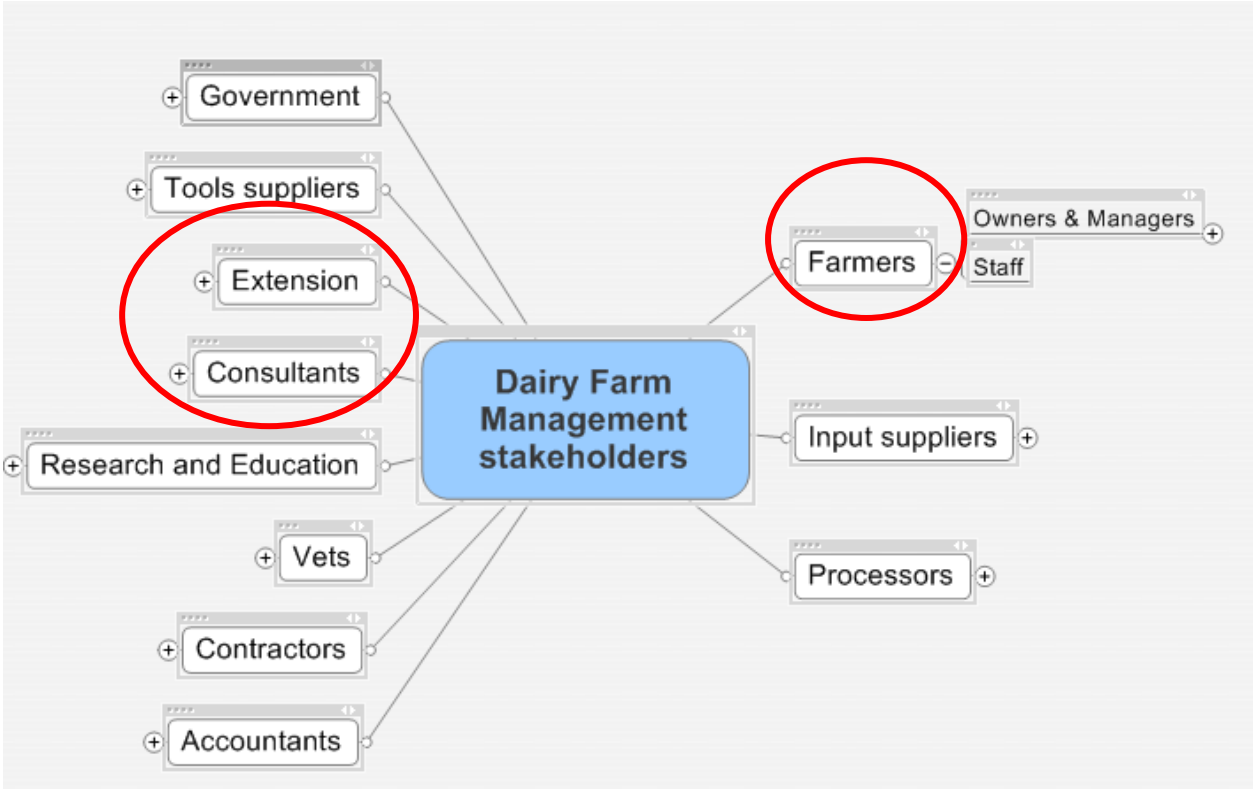


Figure 2. Scope of the research project

The focus is on dairy farm management with on the right hand side the usual three main actors in the supply chain and on the left hand side other relevant actors, usually indicated as 'rural professionals'

Definition of a farm management tool

A very basic definition of a tool is "a means to an end". However in this research we focus on tools in the context of dairy farm management and information sharing. This means that it is connected with one or more dairy farm management processes, which can usually be nested in a certain hierarchy (see Figure 3).

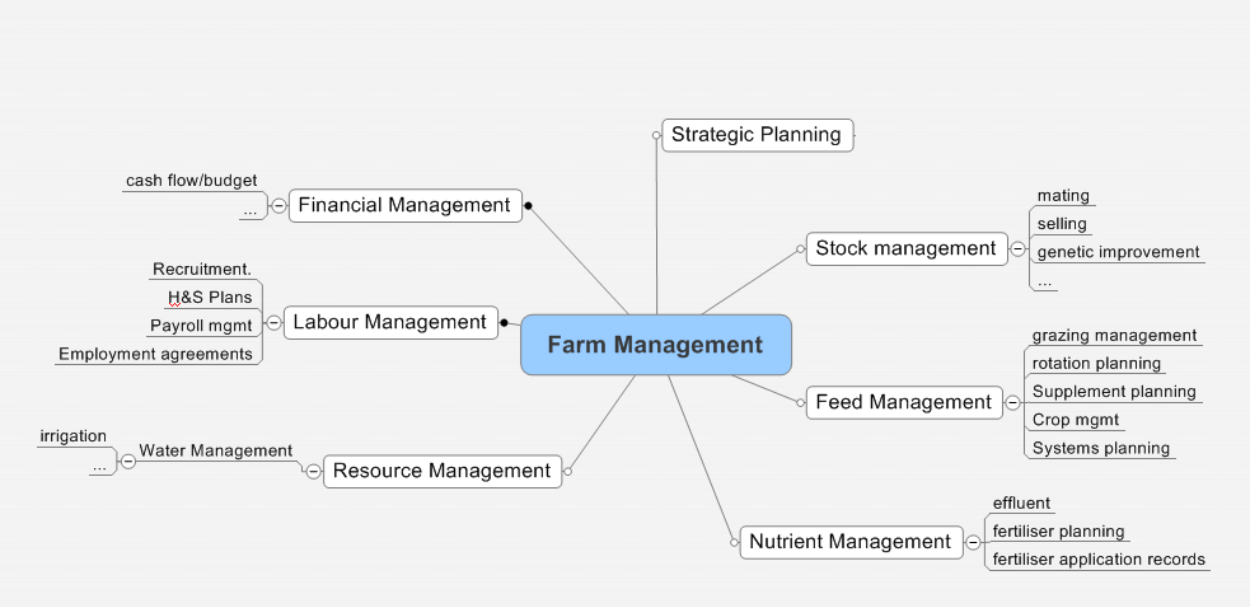


Figure 3. Several examples of management processes in dairy farming.

These tools can sometimes just be written material (e.g. a notebook, calendar), but with increasing complexity of data, it will usually be some kind of ICT tool. These tools can be used for:

- Decision making to optimize processes
- Communication with other actors in the network (e.g. for auditing)

In this research we will focus on these tools used by farm managers and farm management consultants (sometimes referred to as rural professionals).

2 Methodology

2.1 General approach

Figure 4 provides a graphical overview of the planned activities and how they are related.

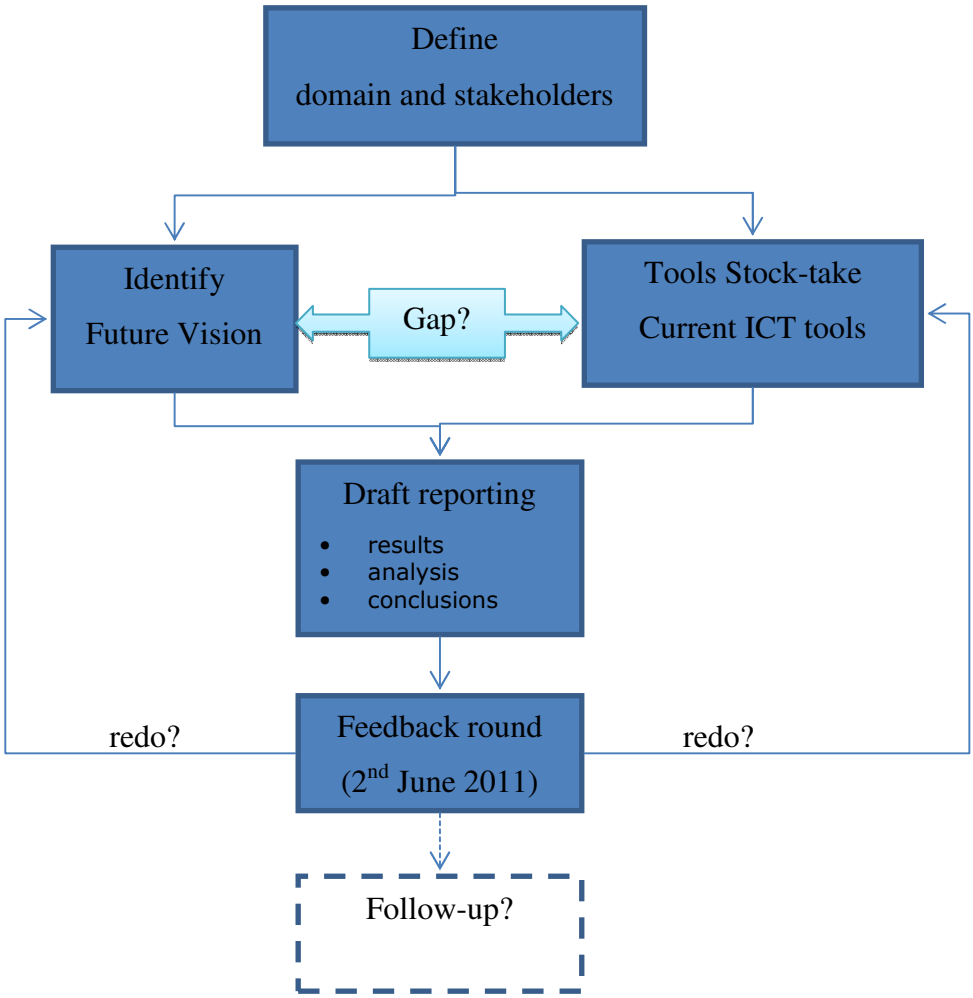


Figure 4. Graphical representation of the general approach of the project (based on Wolfert et al. (2005))

The domain and stakeholders were defined in the previous chapter. Then two parallel activities took place:

1) to identify the future vision and wishes in relation to information sharing and use of farm management tools and

2) a stocktake of farm management tools and possible related bottlenecks or problems in their use and/or adoption.

From these two activities a gap could be identified. This report will be the basis for a first feedback round with the client. Based on the outcome of this, it can be either decided to redo or extend the stocktaking activities, or to continue with a follow-up plan. The next sections will describe in more detail how these activities are conducted.

2.2 Identifying user wishes

To identify the future vision and wishes, in-depth interviews will take place with selected persons from the actor network that was identified in Figure 2. A list of organizations and persons that were interviewed is provided in annex 6.1. A questionnaire template as provided in annex 6.2 served as a basis for this activity.

2.3 Method for the tools stocktake

To identify the list of farm management tools used by farm managers and rural professionals a multi-layered approach was adopted. This included:

- **Individual Interviews** with farm consultants, famers, developers of farm management tools, industry associations, and various industry experts. These were semi-structured interviews, following a grounded theory strategy.
- **Farm Consultant survey.** The survey was emailed out via NZIPIM. There were 12 completed surveys returned. A copy of the survey is shown in the appendix. The survey investigated what tools farm consultants were using, how useful they thought the tools were, whether a lack of tools was limiting their performance, and what tools they thought would be needed in the future.
- **Farmer survey.** The farmer survey was very similar to the consultant survey. This survey was undertaken on a one-to-one basis with clients of a consultancy firm. It is not a statistically valid survey given the small number of responses and the inherent bias in the respondent selection. However it does provide a relatively good overview of tools used by farmers.
- **Website research.** To supplement the above approaches a website literature review was undertaken. This covered both websites in New Zealand and Australia. This information has been provided in the appendices.

- **Previous Research**. Several similar previous research papers were reviewed. In particular the report "Economic and Bio-Physical Models for New Zealand" by Samarasinghe, O., Greenhalgh S, from Landcare Research, provided useful comparisons, albeit from a slightly different angle

Through this combined approach a list of 'tools' was compiled and then categorised, based on:

- Farm management category
- Strategic, Operational or Tactical use
- User (farmer or rural professional)
- Expected frequency of use
- Complexity

The list and analysis of the tools is outlined in following sections.

2.4 Use of social media to enhance the results

Social media networks such as LinkedIn, Twitter and Facebook were used to enhance the results and to reach a larger target group. This included:

- making announcements of plans and activities
- present results immediately and provoke discussion
- asking people to fill in questionnaires by people themselves

The existing 'Farming in the Cloud' group on LinkedIn was mainly used for this.

3 Results

3.1 Interviews on future and roadmap

The results from the interviews can be subdivided into:

- Future trends and developments
- Problems and bottlenecks
- Possible business cases
- Tools used

3.1.1 Future trends and developments

The following trends and developments were identified:

1. The average farm size will increase and at the same time more farms will be part of multi-farm holdings. It therefore expected that:
    a. Farm profitability will become more important
    b. Higher need of reliable and accurate management information (see also Tocker *et al.* (2005))
2. Environmental compliance will become more pressing with an emphasis on nutrient and effluent management, and greenhouse gas emissions. This will vary between different regions with different environmental vulnerability. Reliable measuring and monitoring systems will be required for that.
3. Traceability is already well established but still needs to be further improved, especially in relation to bio-security (outbreak of diseases). Animal identification and registration is the main issue in this.
4. Although the global debate is still going on, it is expected that climatic changes with possibly more extreme weather conditions, will affect NZ agriculture. In relation to that risk management and supporting tools will become more important.
5. It is expected that the coming new generation of farmers will be higher educated and more computer-skilled.
6. In the total agri-food supply chain, e-commerce will become more important (especially in business-to-business) and subsequently the need for electronic transactions (invoices, banking, etc.).

7. In relation to point 1, there is a higher need for benchmarking between farm results. This can be between farms in a multi-farm holding situation or between farms at a regional/national level.
8. Cloud computing: farm management tools will consist of loosely coupled services that can be used at the internet. Hub-applications will take care of the right connections between data and different systems.
9. The use of on-farm high-tech (sensors, automatic weighing, etc.) and the related concept of precision agriculture has already made its entrance but much more development in this area can be expected.
10. Several of the previously mentioned developments will result in an increase of data and information exchange in the number of flows as the density (e.g. location-based data) of these flows.

3.1.2 Problems and bottlenecks

Comparing the trends and developments to the current situation, the following problems and bottlenecks can be identified:

1. Information
    a. accuracy – e.g. in relation to herd inventory it was mentioned that for many farm managers it is difficult to give information on the number of animals and where they are at a certain moment in time
    b. correctness – e.g. pasture cover: this is currently still based on rather qualitative methods (plate metering) and should be improved
    c. timeliness – e.g. transaction data: the financial data of a physical transaction (e.g. sale of animals) come sometimes much later with a large risk of inconsistencies
    d. historical time series – e.g. on soil and climate which is often needed for more long term decisions

    In relation to this issue it should be noted that when a farmer has a certain computer systems installed, it doesn't guarantee that it is actually used and that the four abovementioned aspects of information are covered; especially when much manual data entry is involved.

2. There are many instances where a farm manager is only managing a certain property for a year or two. In general, their interest for setting up a solid database of the farm history will be low. Much valuable information is just in their head and will leave the farm with them.
3. In cases of the farm manager not being the owner, there can be conflicts between their objectives for the farm. For example, as the owner usually wants to have the highest profit, a farm manager could be focused on animal breeding because he likes this, while it might not be the most profitable business for a particular farm.
4. There is a lack of information/data standards which hampers correct information exchange between different systems. For example, there is even no generally agreed definition of age-classes for animals.
5. Connectivity between different systems: two different hardware devices cannot simply be connected, but more important is the internet connectivity, especially fast broadband access.
6. Privacy and security of information and related to that distrust between different stakeholders. This could hamper the adoption of farm management tools. For example, farm mapping software could make it easy for regional councils to implement environmental compliance schemes.
7. In general, with lower farm profitability and high market volatility in recent years, this can result in farmers being reluctant to invest much money in software, especially when it is not very clear how software can improve profitability.
8. In relation to the previous point, it was mentioned that the value of information is often underappreciated by farm managers.
9. Currently, farm managers and rural professionals have often insufficient skills to handle information and computer systems.
10. Adoption and sense of urgency to use more advanced (automated) farm management tools is perceived to be low. This is confirmed by the stocktake activity in this project.
11. The number of users of ICT in New Zealand can be considered as low. General systems (e.g. for accountancy) can be relatively easy adapted for farm business management, so large ICT companies are willing to enter this market, because there are a high number of users. However for more farm business-specific functionalities

(e.g. field management, nutrient management, etc.) the size of the potential market is low, and therefore involvement of large ICT companies is low.

12. It could be observed that there is high protection of intellectual property between relatively small tool developers as well as larger players due to the costs associated with development. This results in connectivity problems between different information systems, hampering the easy integration or sharing of information between different systems and stakeholder organisation in the whole agri-food supply chain. There is also no agreed system in place to allow for connectivity.

3.1.3 Possible business cases

In relation to what was mentioned in the previous subsections, several business cases were provided that could help to overcome certain problems and bottlenecks moving into the direction of the desired future situation.

1. Training skills – this could be done by various general and more dedicated training courses. A major issue could be to raise awareness of the value of good information. In relation to this, it was mentioned that the accreditation of farm consultants could possibly be enhanced.
2. Integration/coupling of systems. Some major cases could be done on:
    a. Minda – Farmax – Farmworks – Cash Manager – Fencepost
    b. Seamless integration of all kind of on-farm sensoring/monitoring technologies

    Another case could focus on coupling between Farm Management Information Systems and research-based Decision Support Systems (e.g. Overseer).
3. Standardization.
    a. Development of commonly used information/data models (e.g. animal classification)
    b. Setup standardization authorities that officially issue and maintain standards and can help with appropriate implementation of standards

4. (Re-)develop farm management tools that account for strategic management and risk factors.
5. Real-time electronic invoicing. Setup a system and accompanying standards for fully electronic business transactions.
6. Livestock inventory and animal identification (this will probably be covered in the future by the NAIT system that is currently being developed).

3.2 Tools Stocktake

There are a large number of tools available to the NZ farmer and rural professional. This report has endeavoured to capture all these tools, but inevitably, due to the rapidly changing environment with regular emergence of new tools, there will be some tools that have not been included in this list.

The lists shown below are the combined results of the interviews, surveys and website searches. Further information is provided in the appendices.

The list of tools have been captured in an excel document. The following tables categorise the tools in the following manner

- Tools, listed by farm management category (eg Feed management, Financial Management)
- Tools listed by timeframe (Strategic, Tactical, Operational)
- Tools listed alphabetically, with a brief description

Additional fields that have been recorded in the spreadsheet (shown in the appendices) but not shown here include:

- User (either Farmer or Rural Professional or both)
- Source of tool
- Website for tool
- Tools listed by use (Monitoring/Compliance, or Planning/Analysis)
- Cost of tool (incomplete at this stage)

- Estimated frequency of use

Table 1 Farm Management Tools, listed by management category

Feed Management	Financial Management	Labour management
Ag-Hub	BankLink	Biz Start and Biz Grow
brassica growing guide	Cash Manager	Compliance toolkit (DNZ)
CamDairy	Cashflow budgeting Workshops	Employment handbook
DSM (Dairy System Monitoring)	Dairy Base	Example performance appraisal
Easy pasture cover assessment	DNZ annual cash budget	Fencepost/FarmWeb
Farmax Pro	DNZ quick cash budget	HR toolkit (DNZ)
Farmax Tools	FarmBiz Focus	Workplace seminars
FarmKeeper	Fencepost/FarmWeb	iPayroll
Farmworks	Land Mark Software	
Feed budgets - autumn/winter and summer (DNZ)	MG F@rm	
Feed Demand, feed budgeting	Monthly cashflow budget	
Feed wedges (Feed wedge ready reckoner)	Redsky	
Feedflo	Farmworks	
Feedpad QA	FieldLinx	
FeedPlan Pro (DNZ)	MYOB	
Grains2Milk	FAB (Financial Analysis Bearau)	
Massey pasture growth calculator		
Pasture and Crop eaten Ready reckoner (DNZ)		
Pasture Coach		
Pasture consumption and Feed conversion efficiency calculator		
Pasture Picker		
Pasture Plus Groups (DNZ)		
Pasture Pro		
Pasture/crop testing		
Post drill pasture care guide		
P-Plus		
Q-Graze		
Rainfall to pasture growth outlook		
Rising plate meter/tow behind/Cdax		
Rotation		
Spring rotation planner (DNZ)		
Udder		

Nutrient management	Stock Management	Strategic Planning
dairy effluent storage calculator	Beefspecs	Agribusiness Governance

DairySAT	Cool cows - actions generator	ifarm.co.nz
effluent application depth	Cost benefit calculator for heat stress mitigation	Mark and Measure
effluent application rate	Countdown Downunder	Rabobank Farm managers program
Effluent compliance checklist	Fit for transport booklet/poster	Agrifax
Effluent Management System	Healthy hoof program (DNZ)	
Farm Enviro Walk (DNZ)	Heifer Check	
Fertiliser recommendations	Heifer Graze	
Greenhouse Gas Calculator	Herd testing	
Land and environment planning toolkit	InCalf	
Nutrient management plans	InCalf - Body condition at calving	
Overseer	InCalf - Body condition loss in early lactation	
Whole farm plans	InCalf - bull management practices	
FarmSure	InCalf - Economics of reproductive performance	
	InCalf - length of mating period	
	InCalf - calving pattern	
	InCalf - heat detection	
	InCalf - individual cow calving health tool	
	InCalf- Heifer rearing	
	InCalf- non cycling tool	
	LambPlan	
	Milking Monitor	
	Milksmart	
	MINDA	
	Mistro	
	Promate	
	ProTrack	
	Selectabull	
	SmartSAMM	
	Temperature humidity index calculator	
	Weather Forecaster	
	AgTrac	
	MG F@rmCare	
	BSR	
	Drenchsmart	
	FecPak	
	SIL	
	Studfax	
	Sporpak	

Farm Management Tools, Listed by Planning Horizon

- Strategic = Planning/Monitoring between years
- Tactical = Planning/monitoring within a year
- Operational = frequent (daily/weekly) use

Table 2 Farm Management Tools, Listed by Planning Horizon

Strategic	**Tactical**	**Operational**
Agribusiness Governance	Ag-Hub	BankLink
Biz Start and Biz Grow	Beefspecs	brassica growing guide
Compliance toolkit (DNZ)	Countdown Downunder	Cash Manager
Cost benefit calculator for heat stress mitigation	Farm Water Calculator	Cashflow budgeting Workshops
Dairy Base	FarmKeeper	Cool cows - actions generator
dairy effluent storage calculator	Feed budgets - autumn/winter and summer (DNZ)	DNZ annual cash budget
DairySAT	Feed wedges (Feed wedge ready reckoner)	DNZ quick cash budget
Effluent compliance checklist	Feedflo	Easy pasture cover assessment
Employment handbook	FeedPlan Pro (DNZ)	effluent application depth
Farm Enviro Walk (DNZ)	Fencepost/FarmWeb	effluent application rate
Farmax Pro	Fertiliser recommendations	Effluent Management System
Farmax Tools	Healthy hoof program (DNZ)	Example performance appraisal
FarmBiz Focus	Heifer Graze	Fencepost/FarmWeb
Grains2Milk	Herd testing	Fit for transport booklet/poster
Greenhouse Gas Calculator	InCalf	Heifer Check
HR toolkit (DNZ)	Irrigation Water Calculator - Volume required	Irrigation efficiency course
ifarm.co.nz	Massey pasture growth calculator	Irrigation Evaluation
InCalf - Body condition at calving	Milking Monitor	Land Mark Software
InCalf - Body condition loss in early lactation	Milksmart	MG F@rm
InCalf - bull management practices	Mistro	MINDA
InCalf - Economics of reproductive performance	Overseer	Monthly cashflow budget
InCalf - length of mating period	Pasture consumption and Feed conversion efficiency calculator	Pasture and Crop eaten Ready reckoner (DNZ)
InCalf - calving pattern	P-Plus	Pasture Plus Groups (DNZ)
InCalf - heat detection	Rainfall to pasture growth outlook	Pasture/crop testing
InCalf - individual cow calving health tool	Smart water use - short form action plan	Post drill pasture care guide
InCalf- Heifer rearing	Smart water use on dairy farms - full resource pack	Promate
InCalf- non cycling tool	SmartSAMM	ProTrack
LambPlan	BSR	Rising plate meter/tow

		behind/Cdax
Land and environment planning toolkit	CamDairy	Selectabull
Mark and Measure	Drenchsmart	Soil moisture metering
Nutrient management plans	FecPak	HACCP
Rabobank Farm managers program	MYOB	PAM
Redsky	FAB (Financial Analysis Bureau)	Pasture Coach
Agrifax	Q-Graze	Rotation
FarmSure	Sporpak	AgTrac
Pasture Renewal Calculator		iPayroll
RAPS		Farmworks
SIL		Pasture Picker
Studfax		Feed Demand, feed budgeting
		MG F@rmCare
		Endeavour
		MapTrak
		Pasture Pro
		DSM (Dairy System Monitoring)

Table 3 Farm Management Tools – Listed Alphabetically with a brief description

Tool	Brief Description of Tool
Ag-Hub	online program
Agribusiness Governance	Workshop
Agrifax	Market information
AgTrac	Livestock recording/management . Not widely used?
BankLink	Cash management
Beefspecs	product/performance management
Biz Start and Biz Grow	Progression in the industry - strategic/financial/people management
brassica growing guide	Guide
BSR	Paraiste resistance test for sheep breeders
CamDairy	nutrition balancing programme
Cash Manager	computer program
Cashflow budgeting Workshops	Workshop
Climate Kelpie	Climate mgmt tool for Australian farmers
Compliance toolkit (DNZ)	Folder
Cool cows - actions generator	Animal Health online recommendation tool
Cost benefit calculator for heat stress mitigation	Animal Health online calculator
Countdown Downunder	Animal Health Farm manager - guidelines and fact sheets, RP - notes and FAQ sheets
Dairy Base	Database
dairy effluent storage calculator	Effluent pond storage calculator
DairySAT	questionnare style
DNZ annual cash budget	excel workbook
DNZ quick cash budget	excel workbook
Drenchsmart	Drench efficacy testing kit
Easy pasture cover assessment	Calculator
effluent application depth	online calculator
effluent application rate	online calculator
Effluent compliance checklist	resource based
Effluent Management System	Integrated into FarmNet computer program
Employment handbook	Handbook
Endeavour	Farm mapping
Example performance appraisal	Resource
Farm Enviro Walk (DNZ)	checklist and mitigation package
Farm Water Calculator	online calculator
Farmax Pro	Pasture & financial planning
Farmax Tools	Pasture & financial planning
FarmBiz Focus	computer program
FarmKeeper	farm mapping, paddock events, pasture records feed budget
FarmSure	Sustainable farming template/guide for S&B farmers

Farmworks	feed budgeting/pasture mgmt
Farmworks	computer program - budgeting
Farmworks	farm mapping
FecPak	Faecal Egg Count monitoring kit
Feed budgets - autumn/winter and summer (DNZ)	excel workbook or input form
Feed Demand, feed budgeting	Feed budget
Feed wedges (Feed wedge ready reckoner)	input form
Feedpad QA	Feed budgets, stock recs, breeding calendar
Feedflo	computer program
FeedPlan Pro (DNZ)	computer program
Fencepost/FarmWeb	Online
Fencepost/FarmWeb	online job position advertsising
Fertiliser recommendations	calculator/ computer program
FieldLinx	Business management tool for a consultancy business
Fit for transport booklet/poster	Animal health resource based
Grains2Milk	Feed & Financial mgmt resource and workshop based
Greenhouse Gas Calculator	excel spreadsheet/ program
HACCP	Food saftey/QA software. Mainly for horticulture? Australian/US based
Healthy hoof program (DNZ)	Adviser - workshop, farm manager - farm visits,on farm training
Heifer Check	online submission
Heifer Graze	excel calculator
Herd testing	
HR toolkit (DNZ)	Folder
ifarm.co.nz	Livestock market information
InCalf	Breeding - Training modules with a package of resources
InCalf - Body condition at calving	Breeding - calculator
InCalf - Body condition loss in early lactation	Breeding -calculator
InCalf - bull management practices	Breeding -calculator and risk assessment
InCalf - Economics of reproductive performance	Breeding -calculator
InCalf - length of mating period	Breeding -calculator
InCalf - calving pattern	Breeding -calculator
InCalf - heat detection	Breeding -calculator
InCalf - individual cow calving health tool	Breeding -calculator
InCalf- Heifer rearing	Breeding -calculator
InCalf- non cycling tool	Breeding -calculator
iPayroll	Online payroll mgmt tool
Irrigation efficiency course	Course
Irrigation Evaluation	input form
Irrigation Water Calculator - Volume required	Calculator
LambPlan	ram selection tool

Land and environment planning toolkit	resource based
Land Mark Software	computer program - budgeting, decision making
Mark and Measure	Seminar
Massey pasture growth calculator	Calculator
MapTrak	farm mapping service
MG F@rm	Farm & Industry information for MG suppliers (eg fencpost?)
MG F@rmCare	Compliance based software - livestock reporting, food safety etc
Milking Monitor	Herd mgmt online submission
Milksmart	Animal Healthwebsite resource and workshop series
MINDA	computer program
Mistro	Herd recording/Stock Management
Monthly cashflow budget	excel workbook
MYOB	Cash management and budgeting
Muddy Boots	Tracability/QA, used in Australia? More useful for horticulture?
Nutrient management plans	input form
Overseer	computer program
PAM	Paddock recording system, mainly for cropping?
Pasture and Crop eaten Ready reckoner (DNZ)	input form
Pasture Coach	Feed wedge, paddock growth data
Pasture consumption and Feed conversion efficiency calculator	computer program
Pasture Picker	Plant selection tool
Pasture Pro	Feed budget/management tool (S&B), using stockpol
DSM (Dairy System Monitoring)	Feed budget/management tool (dairy), using udder
FAB (Financial Analysis Bearau)	Benchmarking tool (S&B)
Pasture Plus Groups (DNZ)	workshops/field day
Pasture Renewal Calculator	Decision tool to evaluate benefits of regressing
Pasture/crop testing	
Post drill pasture care guide	Guide
P-Plus	Pasture mgmt - gorwth, feed wedge etc
Promate	Breeding -computer program
ProTrack	automated system
Q-Graze	Pasture quality management tool, sheep & Beef
Rabobank Farm managers program	Training course
Rainfall to pasture growth outlook	online weather stations
RAPS	Pastoral resource assessment tool
Redsky	computer program

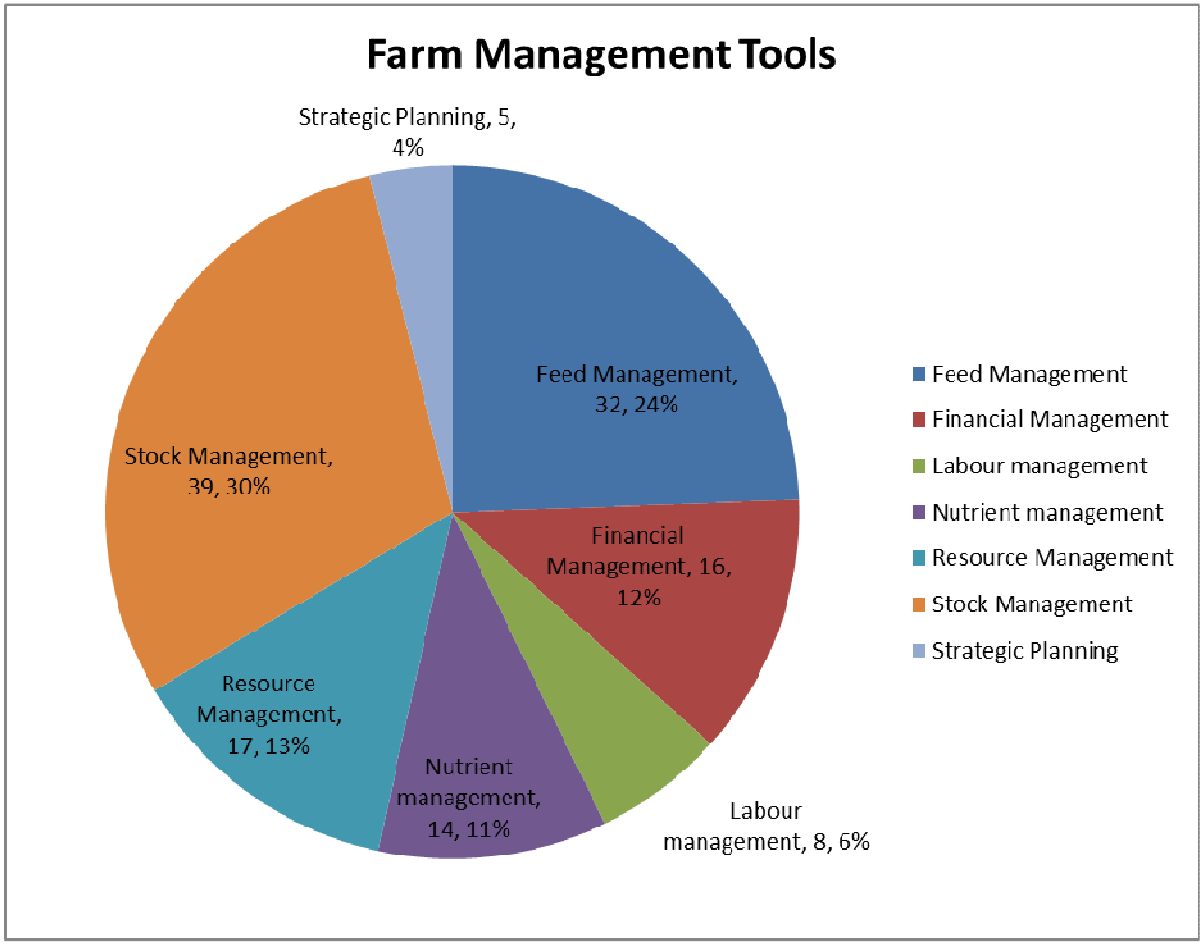
Rising plate meter/tow behind/Cdax	mechanical tool
Rotation	Pasture management software
Selectabull	Online program and workshops
Smart water use - short form action plan	checklist/ resource based
Smart water use on dairy farms - full resource pack	checklist/ resource based
SmartSAMM	Animal Health resource based
Soil moisture metering	mechanical tool
SIL	Genetic evaluation tool for Sheep
Studfax	Breeding Management, livestock performance, mainly for S&B
Sporpak	Facial Eczema monitoring kit
Spring rotation planner (DNZ)	excel workbook or input form
Temperature humidity index calculator	Animal Health calculator
Udder	Energy based feed budget software
Weather Forecaster	Animal Health graph of past THI
Wheresmy cows	farm mapping
Whole farm plans	input form
Workplace seminars	Seminar

Table 4: Number of tools available, listed by category

Category	Count of Strategic/Operational/Tactical
Feed Management	**31**
Operational	16
Strategic	3
Tactical	12
Financial Management	**15**
Operational	10
Strategic	3
Tactical	2
Labour management	**8**
Operational	2
Strategic	5
Tactical	1
Nutrient management	**14**
Operational	3
Strategic	9
Tactical	2
Resource Management	**15**
Operational	8
Strategic	2
Tactical	5
Stock Management	**39**
Operational	11

Strategic	14
Tactical	14
Strategic Planning	**5**
Strategic	5
Total	**127**

Figure 5: Farm Management tools, by Category



3.3 Farm Consultant Survey and Comments

Results from the NZIPIM survey:

In what areas do you feel a lack of 'tools' is limiting your ability?
Comments (verbatim)

- In the nutrient/resource management, labour management & strategic planning/risk management areas
- The wide variety of availability and access to tools means some get overlooked
- Timely farm sales information database
- Have tools in all areas that I need but all tools have some limitations and also better interaction between models
- Limited weather tools
- Definition and quantification of risk and a robust framework to assess and evaluate strategies
- Asset planning tools such as might be used for succession planning
- Report Writing - need to complete report ON FARM. It is too time consuming.
- Charge out/invoicing- time consuming for a sole operator

Are there any additional 'tools' you think you will need in the future?
Comment (Verbatim)

- Tools to aid in farm management succession
- Web based planning for individual business units. Google are getting close
- No
- Better pasture assessment so DM/digestibility can be done in field
- Mapping tools, Endeavour
- Tools for assessing the carbon account on properties and for assessing options for carbon trading

3.4 Farmer Survey and Comments

A brief survey was undertaken by a variety of AgFirst consultants over the past month, when on-farm. There is still more work to be done in this area. Questions asked:

1. What tools they (the farmer) were using
2. Usefulness of tools, comments on tool
3. *"What areas do you feel a lack of tools is limiting your ability?"*
4. *"What additional tools do you think you will need in the future?"*

Are there any additional 'tools' you think you will need in the future?
Comments (Verbatim)

- Discussion group attendance useful to assist farm decisions
- Simple Farmax
- Link all tools together- Cash Manager, Farmax, animal sales, banks ie sell animal, processed at works and indices entered (ie $/hd, $/kg, weight) into "Data Bank". Request then can be transferred back to Farmax file, bank etc
- Satellite for stock (EID)- ie $/hd, $/kg, weight) into a "data Bank".
- Satellite for pasture covers
- Weighing-run through gateway and get average weight of mobs
- Palm held (water and bullet proof)- with map so when moving stock enter number, the actual shift, residuals and cover of paddock entering. Good for when have staff out there doing the work and owner/manager can oversee what is happening
- No
- Better use of weather stations
- Things that link to make paper work easier especially for monitoring and forecasting
- Time. Attend extension/information where possible.

4 Discussion

To begin, let us summarise a few key findings from the research outlined in section three:

Trends:

- Increasing farm size
- Environmental compliance and monitoring becoming more important
- Traceability requirements increasing
- Significant potential in the future in utilising precision farming tools
- Each new generation of farmers are more computer savvy

Bottlenecks:

- Information: accuracy, timeliness, storage and recall of historical data
- Changes of farm manager mean data can be lost
- Lack of good data standards in some areas
- Connectivity between ICT systems
- Issues surrounding privacy of data
- Reluctance to invest in new software (and under-appreciation of value?)
- Low sense of urgency to adopt new tools
- Small size of market means ICT investment by large firms is less likely
- Protection of IP by tool developers is slowing down connectivity?
- Speed of internet connection is still an issue in many areas.

Tools Stocktake

There are 127 farm management tools listed. The majority of the tools are in the areas of stock management, feed management, and financial management. Labour management, resource management, nutrient management and strategic management are under-represented. Note that this is not necessarily an indication that there is a problem or lack of tools in these areas.

The variance in the numbers of tools in each farm management category may be a reflection of the length of time where farmers have been involved in each category. For example the areas of labour and nutrient management are relatively new.

It would be useful, as further research to evaluate the demographics of users of various tools. Are the younger generation of farmers using different tools?

Survey Comments

Some consultants noted that the lack of tools was a limiting factor in the areas of nutrient/resource management, labour management & strategic planning/risk management. Risk quantification tools were also limited

Another area identified was the availability/usefulness of tools for a consultant to run their own consultancy business

Many consultants have developed their own spread sheets and tools to suit their own needs. Others commented that there were so many tools available that sometimes tools got overlooked.

Connectivity of tools and management of large volumes of data is becoming an issue.

There was limited comment in the survey about future needs for tools. This may be as a result of the nature of the survey, ie limited timeframe to explore this issue in depth.

"As a general comment, through the process of compiling this report, and discussing this issue, the general comment has consistently been that the availability of farm management tools is not the limiting factor to lifting farm management productivity".
(pers. comm., J Allen)

5 Recommendations and Conclusions

5.1 Recommendations for follow-up activities

From experiences in Europe and especially The Netherlands (Wolfert *et al.*, 2010), it can be learned that development of farm management tools gets easily too focused on:

- software engineering
- database integration
- scientific modelling

This often led to low adoption of the developed solutions because the relevant participants in the actual agri-food business were not involved or less involved in the development. For the possible next step of this project is it therefore important to acknowledge that:

- information is generated by various business processes (e.g. maximize profit, minimize nitrate leaching, etc.);
- these business processes take place in a complex network of supply chain actors, which sometimes have different (sometimes even conflicting) perspectives on information and data (e.g. reducing pests (farmer) and minimize health risks (processor));
- there is an installed base of farm management tools that are sometimes favoured by a large group of users, but a favourite tool might not be the best tool, it will be difficult to abandon it while there is no suitable alternative available.

Taking this into account, it is important that for development of farm management tools the relevant participants are involved in the process with ICT development and to

- focus on the (agri-food) business processes

- keep the (agri-food) business in the lead of development

Concerning business processes, it is important to realize that many farm management tools usually focus on a single process (e.g. herd management, effluent management) and do not account for the daily, complex reality of a farm business. Many tools do not cover (or not appropriately cover) the full management cycle of a business process as presented in Figure 6.

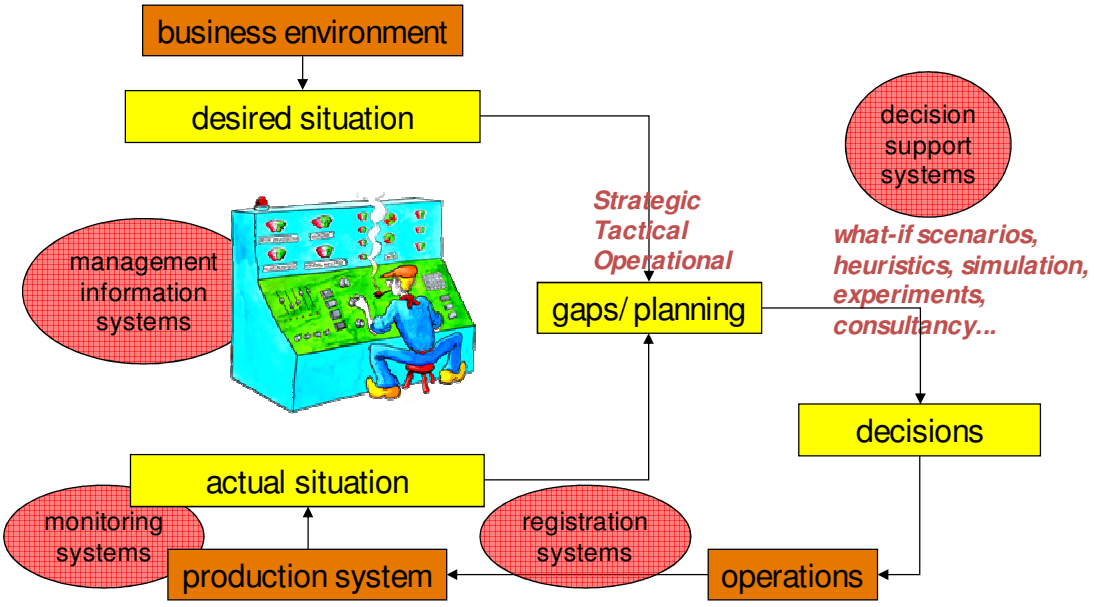


Figure 6 Management cycle and supporting systems.

Based on Wolfert (2002). Further explanation in text.

A good management information system is based on the planning or gaps between the desired and actual situation of a farm business, that takes place at an operational, tactical and strategic level. The desired situation is dependent on the business environment and personal objectives of the farmer. The actual situation is related to these goals and monitoring the right parameters. Decisions have to be made that can be supported by sophisticated decision support systems or experience. Actually carrying out the decided operation alters the production system and completes the management circle. It is important to have registration systems that log the actual operational activities so that those that were not executed can be used in future planning.

There is not much value in using a farm management tool that does not cover the full management cycle.

It was concluded that the current situation around farm management tools can be characterized as a situation of 'island automation' (different systems that hardly integrate with each other). To move away from this situation it is advisable to follow the current global trend in software development of *cloud computing*. This will skip the step that was made in the past in many other industries by Enterprise Resource Planning (ERP) software (see Figure 7). It means a situation of loosely coupled applications ('apps') that are connected through the internet (i.e. the cloud).

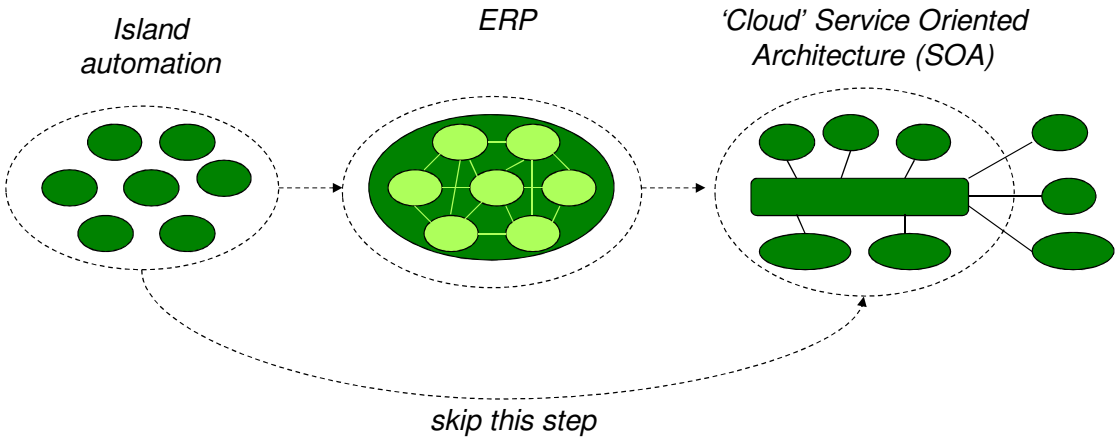


Figure 7. Desired path for software development
(skipping the development of monolithic ERP software towards an open 'cloud' service oriented architecture)

The computing cloud integrates different applications with business process as the driving factor (Figure 8). A more detailed explanation of this model is provided in Wolfert (2010). In the middle 'business service layer', standardization plays an important role.

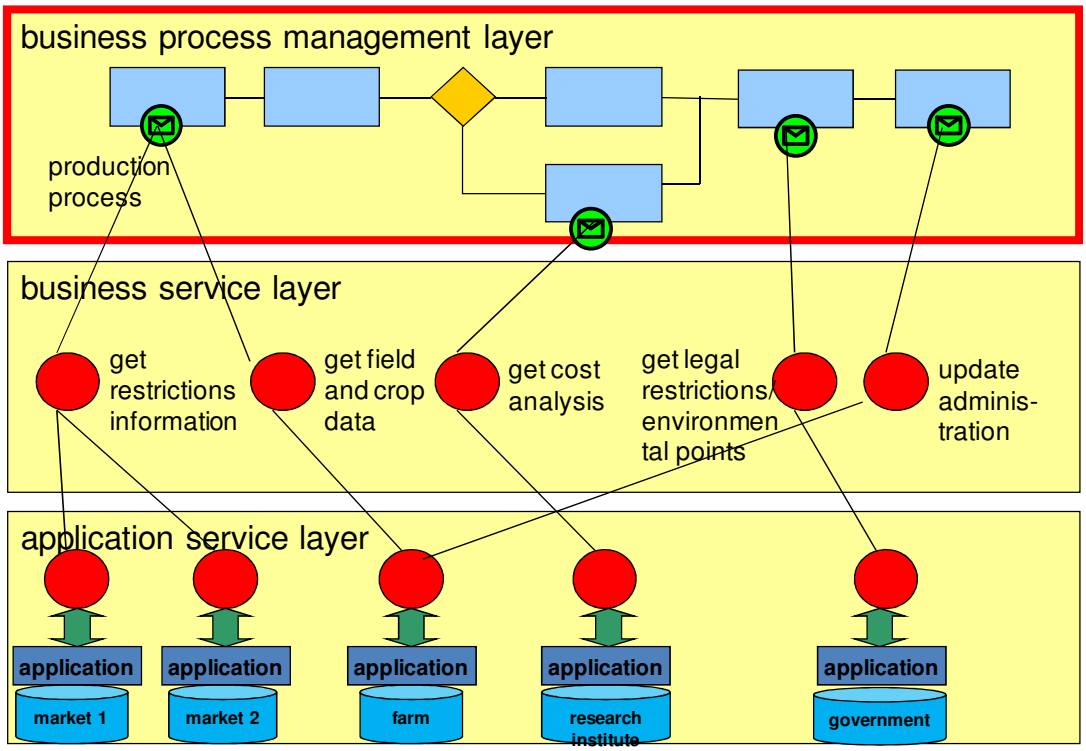


Figure 8 Three-layered SOA architecture with some illustrative examples of components from the arable farming sector (Wolfert *et al.*, 2010).

Technical development should have business process as the driving force with standardization playing an important role. Software engineering and database integration takes places in the bottom layer and are thus subject to the other two layers.

There is a need to create an architecture, infrastructure and standardisation organisation at the same time as developing business cases. First, you need to have a shared vision on where to go to in the future. The architecture, infrastructure and institutional arrangements (e.g. on standardization) need to be roughly depicted. Then business cases are executed, related to the vision. A business case can be development of a software app supporting a specific business process and connecting two different databases or other applications by a standardized component in between. In the next step this application can be extended by connecting more data sources or by linking it up with other business processes. This will require adaptation of components in all three layers of the SOA.

In this way, the agri-food business stays in the lead of development, and can directly benefit from the results that are established.

In the Netherlands experience was gained with setting up a project organization on top of these concepts. This is described in detail in Wolfert *et al.*(2009).
A recent enhancement of this approach is the development of the so-called Living Lab, in which an open innovation approach plays a central role. This was recently presented at the 18th IFMA-congress in New Zealand (Wolfert *et al.*, 2011). The core idea is indicated in Figure 9.

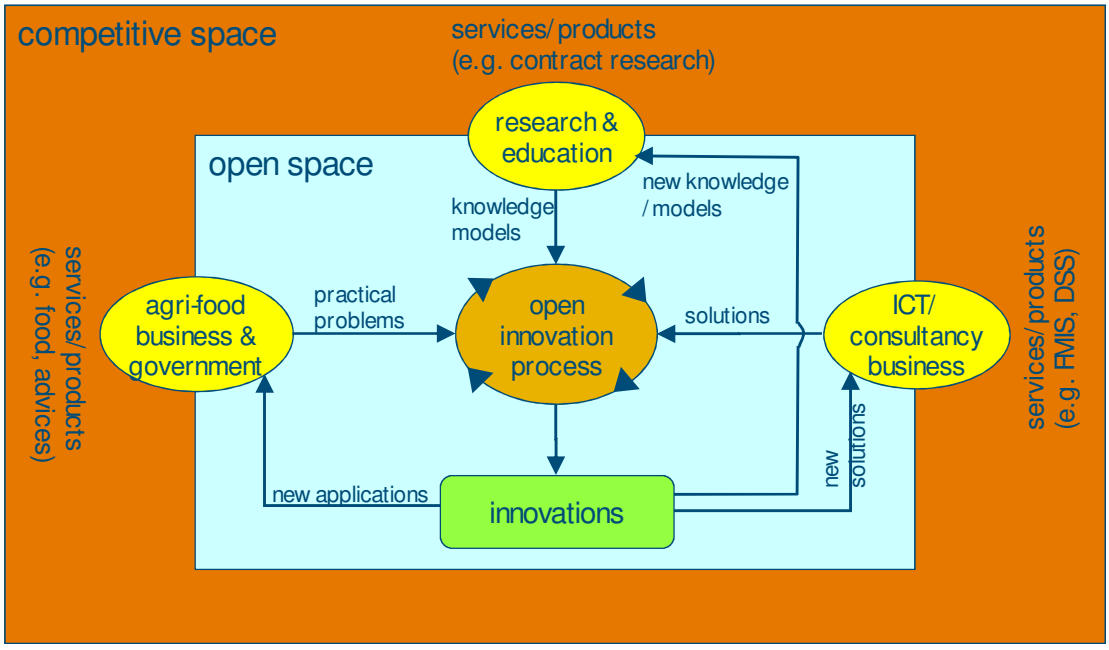


Figure 9 Schematic representation of the Agri-Food Living Lab
(Wolfert *et al.*, 2011).

Agri-food business and government are often the parties who bring in practical problems (e.g. in land registration, plant protection, precision fertilizer application, etc.). Research

and education bring in knowledge and models that are related to these problems. ICT business and consultants bring in existing business solutions. The open innovation process continuously generates new (partial) solutions and knowledge which is publicly available. These innovations can be constantly reused within the open innovation process. An important side-effect is that these (partial) solutions and knowledge can be picked up by others and be used for a different problem than intended (serendipity). All parties are free to share solutions or to keep them for themselves to serve as a base for commercial products or services. There is always an interaction between the competitive and open space and the players themselves decide in which space they develop. Because the open space is also a place for contacts with (potential) customers, it is expected that this is 'a-place-to-be' for vendors. Hence, it is expected that the open space is potentially a self-enhancing mechanism. Researchers, developers and users closely operate with each other and their roles have not been pinned down in advance. For example, a farmer can have a good idea about ICT-development and an ICT-expert can sometimes shed new light on the farmer's practice.

Based on this concept, a web portal was setup in the Netherlands (www.agrifoodlivinglab.nl) and on a European level (www.agrixchange.org). It is expected that knowledge and ICT components (webservices and information models) will be shared at a global level. It could therefore be a good idea to setup a similar Living Lab in New Zealand that functions as an open innovation environment at a national level with possible connections at an international level so that re-inventing the same wheel is avoided as much as possible.

5.2 Main Findings

There are a significant number of tools available to the New Zealand farmer and rural professional. These are disproportionately represented in the more established areas of farm management (stock, feed, financial), and under-represented in newer areas of farm management (nutrient, labour).

It is suggested that the average farmer or farm consultant would not know of the complete range of tools that are at their disposal. While market forces will dictate that the more successful/useful tools will rise to prominence, there are nevertheless likely to be tools that would help a particular farmer/consultant that are not being used simply because they were not aware of them.

There is no general feeling that a lack of farm management tools is limiting farm productivity. However new tools will need to be continually developed in order to adjust to a changing workplace.

The interconnectivity of tools and speed of internet connections is certainly an issue. These two problems result in lowered time efficiency through multiple re-entry of data and waiting for downloads/uploads. To further explore this issue S Wolfert has provided some recommendations in section 5.1.

6 References

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Appendices

6.1 List of organizations/persons that were interviewed

Actor group	Organization	Person(s)
Farmers	Federated Farmers	Conor English
Input suppliers		
Processors		
Consultants	Farmwise	Jon Nicholls
	Intelact	Chris Pyke
	AgFirst	Dave Miller
Extension	DairyNZ	Mark Paine, Charlotte Glass
Vets		
Research	AgResearch	Warren King, Keith Betteridge
Accountants	Xero	Hamish Edwards
Tool suppliers	Farmax	Jeremy Bryant
	CRS Software	Brian Eccles
	Rezare	Andrew Cooke
	Farmworks	Colin McFadzean
	Tru-Test	Brendan O'Connell
Government	MAF	John Doyle, Gerald Dreaver, Adrian Lill
Other	FarmIQ	Collier Isaacs, Mark Johnstone

http://www.nzarn.org/

6.2 Questionnaire for future vision and roadmap

This questionnaire is meant as a background template for the interviewers and is mainly intended as a kind of guide for the interviews and not as a blueprint for asking the questions.

A. Introduction to the interview	
1	Objective of the interview
2	Explanation of this survey (objective and approach)
B. Contact details interviewee	
3	Details of the person interviewed (function, role, responsibilities)
C. Vision for the future *Imagine the year 2020…*	
4	What are the requirements/preconditions from the *market* that farmers have to deal with?
5	What are the requirements/preconditions from the *government (public)* that farmers have to deal with?
6	In relation with the previous questions: what kind of *management skills* for the farmer are then needed?
7	How should the farmer ideally be supported to fulfil these requirements/preconditions?
8	What could be your own role in this future vision?
9	Which other actors in the network are needed and which role do they play?
D. Problems and bottlenecks *…on the road to the future vision…*	
10	What are major problems in realizing the vision for the future that was described? Why are we not that far as you wish?
11	Can you indicate specific trends or developments?
12	Are the problems of structural or temporary nature?
13	What's your attitude in relation to these problems?
14	What's your stake in solving these problems? What can be your role in this?
15	What should or could others do?

16	How do you currently deal with these problems?
17	Are you using any specific tools/instruments to deal with these problems?
E. Challenges *…to start with…*	
18	In what area should we start to take away the bottlenecks for the longer term?
19	Do we need new tools for that?
20	Do we need a different cooperation of different stakeholders?
21	Do we need more knowledge or should existing knowledge be better applied?
22	What are the key questions to be answered?
23	Do you have a step-by-step plan in mind?
24	What is your own role in that?
25	What could/should be the role of other stakeholders?
F. Other remarks	
26	Are there any other remarks that you would make that we did not yet discuss?

6.3 Website review of farm management tools

The website review is contained in a separate document to this report.

6.4 Excel list of management tools

Tool	Who is the tool available to ?	Source of Tool	website	Tool type - Category	Brief Description of Tool	Cost	Strategic/Operational/Tactical	Frequency of Use - Expected	Compliance/Monitoring or Planning/Analysis?
Ag-Hub	Farm Managers and RP's	Ballance Fertiliser?	www.aghub.co.nz	Feed Management	online program	$600-$3000/yr	Tactical	Medium	Compliance/Monitoring
AgTrac	Farm Managers and RP's	AgTrac	www.agtrac.co.nz/farmhq	Stock Management	Livestock recording/management . Not widely used?		Operational	Low	Compliance/Monitoring
BankLink	Farm Managers and RP's	Bank Link	www.banklink.co.nz	Financial Management	Cash management		Operational	High	Compliance/Monitoring
Beefspecs	Farm managers	Meat and livestock Australia	http://www.mla.com.au/Publications-tools-and-events/Tools-and-calculators	Stock Management	product/performance management		Tactical	Medium	Compliance/Monitoring
BSR	Farm Managers	Techion Group	http://www.techiongroup.co.nz/product_pages/bsr.aspx	Stock Management	Paraiste resistance test for sheep breeders		Tactical	Low	Compliance/Monitoring
CamDairy	RP's	CAM Software, via Massey	http://epicentre.massey.ac.nz/Default.aspx?tabid=189	Feed Management	nutrition balancing programme	$650/yr	Tactical	Medium	Compliance/Monitoring
Cash Manager	Farm Managers and RP's	CRS	www.crs.co.nz	Financial Management	computer program		Operational	High	Compliance/Monitoring
Compliance toolkit (DNZ)	Farm managers	DairyNZ	www.dairynz.co.nz	Labour management	folder		Strategic	Low	Compliance/Monitoring
Drenchsmart	Farm Managers	Techion Group	http://www.techiongroup.co.nz/product_pages/drenchsmart.aspx	Stock Management	Drench efficacy testing kit		Tactical	Low	Compliance/Monitoring
DSM (Dairy System Monitoring)	Farm managers	Baker Ag	http://www.bakerag.co.nz/	Feed Management	Feed budget/management tool (dairy), using udder		Operational	Medium	Compliance/Monitoring
Easy pasture cover assessment	farm managers	DairyNZ	www.dairynz.co.nz	Feed Management	calculator		Operational	High	Compliance/Monitoring
effluent application depth	Farm Managers and RP's	Waikato regional council	www.waikatoregion.govt.nz	Nutrient management	online calculator		Operational	Low	Compliance/Monitoring
effluent application rate	Farm Managers and RP's	Waikato regional council	www.waikatoregion.govt.nz	Nutrient management	online calculator		Operational	Low	Compliance/Monitoring
Effluent compliance checklist	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Nutrient management	resource based		Strategic	Low	Compliance/Monitoring
Effluent Management System	Farm managers	Farmworks	http://www.farmworkssystems.co.nz/	Nutrient management	Integrated into FarmNet computer program		Operational	High	Compliance/Monitoring
Employment handbook	Farm Managers and RP's	Victorian Farmers Federation		Labour management	handbook		Strategic	Low	Compliance/Monitoring
Example performance appraisal	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Labour management	resource		Operational	Medium	Compliance/Monitoring
Farm Enviro Walk (DNZ)	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Nutrient management	checklist and mitigation package		Strategic	Low	Compliance/Monitoring
Farm Water Calculator	Farm managers	Victoria Department of Primary Industries		Resource Management	online calculator		Tactical	Low	Compliance/Monitoring
Farmax Tools	Farm managers	Farmax	www.farmax.co.nz	Feed Management	Pasture & financial planning		Strategic	High	Compliance/Monitoring
FarmKeeper	Farm managers	LIC	http://www.lic.co.nz/lic_FarmKeeper.cfm	Feed Management	farm mapping, paddock events, pasture records feed budget		Tactical	High	Compliance/Monitoring
Farmworks	Farm Managers and RP's	Farmworks	http://www.farmworkssystems.co.nz/	Feed Management	feed budgeting/pasture mgmt		Operational	Medium	Compliance/Monitoring
Farmworks	Farm Managers and RP's	Farmworks	http://www.farmworkssystems.co.nz/	Financial Management	computer program - budgeting		Operational	High	Compliance/Monitoring
Farmworks	Farm Managers and RP's	Farmworks	http://www.farmworkssystems.co.nz/	Resource Management	farm mapping		Operational	Medium	Compliance/Monitoring

FecPak	Farm Managers	Techion Group	http://www.techiongroup.co.nz/product_pages/fecpak.aspx	Stock Management	Faecal Egg Count monitoring kit		Tactical	Low	Compliance/Monitoring
Feed budgets - autumn/winter and summer (DNZ)	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Feed Management	excel workbook or input form		Tactical	Medium	Compliance/Monitoring
Feed Demand, feed budgeting	Farm Managers and RP's	Meat and livestock Australia	http://www.mla.com.au/Publications-tools-and-events/Tools-and-calculators	Feed Management	Feed budget		Operational	Medium	Compliance/Monitoring
Feed wedges (Feed wedge ready reckoner)	farm managers and RP's	DairyNZ	www.dairynz.co.nz	Feed Management	input form		Tactical	High	Compliance/Monitoring
Feedflo	Farm Managers and RP's	Feed Flo	www.feedflo.co.nz	Feed Management	computer program		Tactical	Medium	Compliance/Monitoring
FeedPlan Pro (DNZ)	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Feed Management	computer program		Tactical	Medium	Compliance/Monitoring
Fencepost/FarmWeb	Farm Managers and RP's	Dairy supply companies	www.fonterra.com	Financial Management	online		Operational	High	Compliance/Monitoring
Fencepost/FarmWeb	Farm Managers and RP's	Dairy supply companies	www.fonterra.com	Labour management	online job position advertsising		Tactical	Infrequent	Compliance/Monitoring
FieldLinx	RP's	FieldLinx	http://web.fieldlinx.com/	Financial Management	Business management tool for a consultancy business				Compliance/Monitoring
HACCP	Farm Managers and RP's	HACCP	www.haccpmanagersoftware.com	Resource Management	Food saftey/QA software. Mainly for horticulture? Australian/US based		Operational	Medium	Compliance/Monitoring
Heifer Check	Farm Managers and RP's	New Zealand Grazing Company Ltd.		Stock Management	online submission		Operational	Medium	Compliance/Monitoring
Heifer Graze	Farm Managers and RP's	New Zealand Grazing Company Ltd.		Stock Management	excel calculator		Tactical	Low	Compliance/Monitoring
Herd testing			www.lic.co.nz	Stock Management			Tactical	Medium	Compliance/Monitoring
HR toolkit (DNZ)	Farmers (some RP's)	DairyNZ	www.dairynz.co.nz	Labour management	folder		Strategic	Low	Compliance/Monitoring
iPayroll	Farm Managers and RP's	Ipayroll	www.ipayroll.co.nz	Labour management	Online payroll mgmt tool	appr $35/mth + $1/user/pay period	Operational	High	Compliance/Monitoring
Land Mark Software	Farm Managers and RP's	iAgri Technology	http://www.iagri.com/	Financial Management	computer program - budgeting, decision making		Operational	High	Compliance/Monitoring
MapTrak	Farm managers	Map Trak	http://www.maptrak.co.nz/	Resource Management	farm mapping service	?	Operational	Medium	Compliance/Monitoring
MG F@rm	Farm managers	Murray Goulburn	http://www.mgc.com.au/index.php/about-us/field-services	Financial Management	Farm & Industry information for MG suppliers (eg fencpost?)		Operational	Medium	Compliance/Monitoring
MG F@rmCare	Farm managers	Murray Goulburn	http://www.mgc.com.au/index.php/about-us/field-services	Stock Management	Compliance based software - livestock reporting, food safety etc		Operational	Medium	Compliance/Monitoring
Milksmart	Farm managers	DairyNZ	www.dairynz.co.nz	Stock Management	Animal Healthwebsite resource and workshop series		Tactical	Low	Compliance/Monitoring
MINDA	Farm Managers	LIC	www.lic.co.nz	Stock Management	computer program		Operational	High	Compliance/Monitoring
Mistro	Farm Managers	Ambreed/CRV	http://www.mistro.ag/about/mistro-farm-5.html	Stock Management	Herd recording/Stock Management		Tactical	Medium	Compliance/Monitoring
Monthly cashflow budget	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Financial Management	excel workbook		Operational	Medium	Compliance/Monitoring
MYOB	Farm Managers and RP's	MYOB	www.myob.co.nz	Financial Management	Cash management and budgeting		Tactical	High	Compliance/Monitoring

PAM	Farm Managers and RP's	PAM	www.farmit.co.nz	Resource Management	Paddock recording system, mainly for cropping?		Operational	Medium	Compliance/Monitoring
Pasture Coach	Farm Managers and RP's	?	www.farmsoftware.co.nz	Feed Management	Feed wedge, paddock growth data	$295	Operational	High	Compliance/Monitoring
Pasture Pro	Farm managers	Baker Ag	http://www.bakerag.co.nz/pasturepro.php	Feed Management	Feed budget/management tool (S&B), using stockpol		Operational	Medium	Compliance/Monitoring
Pasture/crop testing	Farm Managers and RP's	RJ Hill, NZ Labs, etc	www.hill-laboratories.com	Feed Management			Operational	Medium	Compliance/Monitoring
P-Plus	Farm Managers and RP's	Farmworks	http://www.farmworkssystems.co.nz/	Feed Management	Pasture mgmt - gorwth, feed wedge etc		Tactical	High	Compliance/Monitoring
ProTrack	Farm managers	LIC	www.lic.co.nz	Stock Management	automated system		Operational	High	Compliance/Monitoring
Rainfall to pasture growth outlook	Farm managers	Meat and livestock Australia	http://www.mla.com.au/Publications-tools-and-events/Tools-and-calculators	Feed Management	online weather stations		Tactical	Medium	Compliance/Monitoring
Rising plate meter/tow behind/Cdax	Farmers and RP's	C-Dax	www.c-dax.co.nz	Feed Management	mechanical tool		Operational	High	Compliance/Monitoring
Rotation	Farm Managers and RP's	Rotation	www.grazingrotation.co.nz	Feed Management	Pasture management software		Operational	Medium	Compliance/Monitoring
Soil moisture metering	Farm Managers and RP's			Resource Management	mechanical tool		Operational	Medium	Compliance/Monitoring
Sporpak	Farm Managers	Techion Group	http://www.techiongroup.co.nz/product_pages/sporpak.aspx	Stock Management	Facial Eczema monitoring kit		Tactical	Low	Compliance/Monitoring
Spring rotation planner (DNZ)	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Feed Management	excel workbook or input form		Operational	Medium	Compliance/Monitoring
Temperature humidity index calculator	Farm managers	DairyNZ	www.dairynz.co.nz	Stock Management	Animal Health calculator		Operational	Low	Compliance/Monitoring
Agribusiness Governance	Farm Managers and RP's	BNZ bank		Strategic Planning	workshop		Strategic	Low	Planning/Analysis
Agrifax	Farm Managers and RP's	Agrifax	www.nzxagri.com/agrifax	Strategic Planning	Market information		strategic	Low	Planning/Analysis
Biz Start and Biz Grow	Farm Managers	DairyNZ		Labour management	Progression in the industry - strategic/financial/people management		Strategic	Low	Planning/Analysis
brassica growing guide	Farm Managers and RP's	Specialty seeds		Feed Management	guide		Operational	Low	Planning/Analysis
Cashflow budgeting Workshops	Farm Managers	DairyNZ	www.dairynz.co.nz	Financial Management	workshop		Operational	Low	Planning/Analysis
Climate Kelpie	Farm Managers	Climate Kelpie	http://www.climatekelpie.com.au/	Resource Management	Climate mgmt tool for Australian farmers				Planning/Analysis
Cool cows - actions generator	Farm Managers and RP's	Dairy Australia	www.dairyaustralia.com.au	Stock Management	Animal Health online recommendation tool		Operational	Low	Planning/Analysis
Cost benefit calculator for heat stress mitigation	Farm Managers and RP's	Dairy Australia	www.dairyaustralia.com.au	Stock Management	Animal Health online calculator		Strategic	Low	Planning/Analysis
Countdown Downunder	Farm Managers and RP's	Dairy Australia	http://www.countdown.org.au/	Stock Management	Animal Health Farm manager - guidelines and fact sheets, RP - notes and FAQ sheets		Tactical	Low	Planning/Analysis
Dairy Base	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Financial Management	database		Strategic	Low	Planning/Analysis
dairy effluent storage calculator	Farm Managers and RP's	Massey University		Nutrient management	Effluent pond storage calculator		Strategic	Low	Planning/Analysis
DairySAT	Farm Managers and RP's	Dairy Australia	www.dairyaustralia.com.au	Nutrient management	questionnare style		Strategic	Low	Planning/Analysis

DNZ annual cash budget	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Financial Management	excel workbook		Operational	Low	Planning/Analysis
DNZ quick cash budget	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Financial Management	excel workbook		Operational	Medium	Planning/Analysis
Endeavour	Farm Managers and RP's	Endeavour		Resource Management	Farm mapping		Operational	Low	Planning/Analysis
FAB (Financial Analysis Bearau)	Farm managers	Baker Ag	http://www.bakerag.co.nz/	Financial Management	Benchmarking tool (S&B)		Tactical	Low	Planning/Analysis
Farmax Pro	RP's	Farmax	www.farmax.co.nz	Feed Management	Pasture & financial planning		Strategic	Medium	Planning/Analysis
FarmBiz Focus	AgFirst and DairyNZ	DairyNZ	www.dairynz.co.nz	Financial Management	computer program		Strategic	Low	Planning/Analysis
FarmSure	Farm Managers and RP's		?	Nutrient management	Sustainable farming template/guide for S&B farmers		Strategic	Low	Planning/Analysis
Fertiliser recommendations	Farm Managers and RP's			Nutrient management	calculator/ computer program		Tactical	Low	Planning/Analysis
Fit for transport booklet/poster	Farm managers	DairyNZ	www.dairynz.co.nz	Stock Management	Animal health resource based		Operational	Low	Planning/Analysis
Grains2Milk	Farm managers	Dairy Australia	www.dairyaustralia.com.au	Feed Management	Feed & Financial mgmt resource and workshop based		Strategic	Low	Planning/Analysis
Greenhouse Gas Calculator	Farm Managers and RP's	Dairy Australia	www.dairyaustralia.com.au	Nutrient management	excel spreadsheet/ program		Strategic	Low	Planning/Analysis
Healthy hoof program (DNZ)	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Stock Management	Adviser - workshop, farm manager - farm visits,on farm training		Tactical	Low	Planning/Analysis
ifarm.co.nz	Farm Managers and RP's	Ifarm	www.ifarm.co.nz	Strategic Planning	Livestock market information		strategic	High	Planning/Analysis
InCalf	Farm Managers and RP's	DairyNZ and Dairy Australia	www.dairynz.co.nz	Stock Management	Breeding - Training modules with a package of resources		Tactical	Low	Planning/Analysis
InCalf - Body condition at calving	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Stock Management	Breeding - calculator		strategic	Low	Planning/Analysis
InCalf - Body condition loss in early lactation	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Stock Management	Breeding -calculator		strategic	Low	Planning/Analysis
InCalf - bull management practices	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Stock Management	Breeding -calculator and risk assessment		strategic	Low	Planning/Analysis
InCalf - Economics of reproductive performance	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Stock Management	Breeding -calculator		strategic	Low	Planning/Analysis
InCalf - length of mating period	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Stock Management	Breeding -calculator		strategic	Low	Planning/Analysis
InCalf - calving pattern	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Stock Management	Breeding -calculator		strategic	Low	Planning/Analysis
InCalf - heat detection	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Stock Management	Breeding -calculator		strategic	Low	Planning/Analysis
InCalf - individual cow calving health tool	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Stock Management	Breeding -calculator		strategic	Low	Planning/Analysis
InCalf- Heifer rearing	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Stock Management	Breeding -calculator		strategic	Low	Planning/Analysis
InCalf- non cycling tool	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Stock Management	Breeding -calculator		strategic	Low	Planning/Analysis
Irrigation efficiency course	Farm managers	Irrigation Australia		Resource Management	course		Operational	Low	Planning/Analysis

Irrigation Evaluation	Farm Managers and RP's	Irrigation New Zealand		Resource Management	input form		Operational	Low	Planning/Analysis
Irrigation Water Calculator - Volume required	Farm Managers and RP's	Irrigation New Zealand	http://www.irrigationnz.co.nz/publications/irricalc/	Resource Management	calculator		Tactical	Low	Planning/Analysis
LambPlan	Farm Managers and RP's	Meat and livestock Australia	http://www.mla.com.au/Publications-tools-and-events/Tools-and-calculators	Stock Management	ram selection tool		Strategic	Low	Planning/Analysis
Land and environment planning toolkit	farm managers	Beef+lamb NZ	www.beeflambnz.com	Nutrient management	resource based		Strategic	Low	Planning/Analysis
Mark and Measure	Farm Managers	DairyNZ	www.dairynz.co.nz	Strategic Planning	seminar		Strategic	Low	Planning/Analysis
Massey pasture growth calculator	Farm Managers and RP's	Massey University		Feed Management	calculator		Tactical	Low	Planning/Analysis
Milking Monitor	Farm Managers	Cow time		Stock Management	Herd mgmt online submission		Tactical	Medium	Planning/Analysis
Nutrient management plans	RP's			Nutrient management	input form		Strategic	Low	Planning/Analysis
Overseer	RP's	Overseer	www.overseer.org.nz	Nutrient management	computer program		Tactical	Low	Planning/Analysis
Pasture and Crop eaten Ready reckoner (DNZ)	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Feed Management	input form		Operational	Low	Planning/Analysis
Pasture consumption and Feed conversion efficiency calculator	Farm Managers and RP's	Dairy Australia	www.dairyaustralia.com.au	Feed Management	computer program		Tactical	Low	Planning/Analysis
Pasture Picker	Farm Managers and RP's	Meat and livestock Australia	http://www.mla.com.au/Publications-tools-and-events/Tools-and-calculators	Feed Management	Plant selection tool		Operational	Low	Planning/Analysis
Pasture Plus Groups (DNZ)	farm managers	DairyNZ	www.dairynz.co.nz	Feed Management	workshops/field day		Operational	Low	Planning/Analysis
Pasture Renewal Calculator	Farm Managers and RP's	Pasture Renewal Charitable Trust	http://www.pasturerenewal.org.nz/article/37.html	Resource Management	Decision tool to evaluate benefits of regrassing	nil	Strategic	Low	Planning/Analysis
Post drill pasture care guide	Farm Managers and RP's	Specialty seeds		Feed Management	guide		Operational	Low	Planning/Analysis
Promate	Semex/Breeding Companies			Stock Management	Breeding -computer program		Operational	Low	Planning/Analysis
Q-Graze	Farm Managers and RP's	Beef+lamb NZ	http://www.beeflambnz.com/main.cfm?id=396	Feed Management	Pasture quality management tool, sheep & Beef		Tactical	Low	Planning/Analysis
Rabobank Farm managers program	Farm managers	Rabobank		Strategic Planning	Training course		Strategic	Low	Planning/Analysis
RAPS	Farm managers	Pastoral Farming Resource Assessment	http://pastoralsystems.co.nz/?page_id=37	Resource Management	Pastoral resource assessment tool		Strategic	Low	Planning/Analysis
Redsky	Farm Managers and RP's	Redsky Agricultural Pty Ltd	http://redskyagri.com/	Financial Management	computer program		Strategic	Medium	Planning/Analysis
Selectabull	Farm Managers	Australian Dairy Herd Improvement		Stock Management	Online program and workshops		Operational	Low	Planning/Analysis
SIL	Farm Managers and RP's	Sheep Improvement Ltd	http://www.sil.co.nz/Home.aspx	Stock Management	Genetic evaluation tool for Sheep		Strategic	Low	Planning/Analysis
Smart water use - short form action plan	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Resource Management	checklist/ resource based		Tactical	Low	Planning/Analysis
Smart water use on dairy farms - full resource pack	Farm Managers and RP's	DairyNZ	www.dairynz.co.nz	Resource Management	checklist/ resource based		Tactical	Low	Planning/Analysis

SmartSAMM	Farm Managers			Stock Management	Animal Health resource based		Tactical	Low	Planning/Analysis
Studfax	Farm Managers	Studfax	http://www.studfax.com/	Stock Management	Breeding Management, livestock performance, mainly for S&B		Strategic	Low	Planning/Analysis
Udder	RP's	ABA	http://www.udder4win.com/	Feed Management	Energy based feed budget software		Operational	Medium	Planning/Analysis
Weather Forecaster	Farm Managers and RP's	Dairy Australia	www.dairyaustralia.com.au	Stock Management	Animal Health graph of past THI		Operational	Medium	Planning/Analysis
Wheresmy cows	Farm managers	Wheresmycows	http://www.wheresmycows.co.nz/	Resource Management	farm mapping		Tactical	Low	Planning/Analysis
Whole farm plans	RP's			Nutrient management	input form		Strategic	Low	Planning/Analysis
Workplace seminars	Farm managers	Victorian Farmers Federation		Labour management	seminar		Strategic	Low	Planning/Analysis
Feedpad QA		Livestock Targets	http://www.livestocktargets.com/	Feed Management	Feed budgets, stock recs, breeding calendar	$359			compliance/Monitoring
Muddy Boots	Farm Managers	Muddy Boots	http://en.muddyboots.com/	Resource Management	Tracability/QA, used in Australia? More useful for horticulture?				compliance/Monitoring