How systemised management of intensive mixed farms could assist expansion

A report for 

By Michael Chilvers

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Scholar Contact Details

Michael Chilvers

Winburn
1262 Nile Rd, Nile,
Tasmania, Australia. 7212

Mobile: 0409 974556
Email: fchilvers@bigpond.com

In submitting this report, the Scholar has agreed to Nuffield Australia publishing this material in its edited form.

NUFFIELD AUSTRALIA Contact Details

Nuffield AustraliaTelephone: (03) 54800755
Facsimile: (03) 54800233
Mobile: 0412696076
Email: enquiries@nuffield.com.au
586 Moama NSW 2731

Executive Summary

With each new generation the need for farmers to continue to maintain a dynamic and growing agricultural business is paramount. In the Tasmanian context, continually fluctuating local markets influence crop rotations, increasing the complexity of enterprise management. With a view to growing a farming business, this research sought to explore avenues for growth, with particular interest in the role of production management systems as a means of freeing up management time to focus on business development and expansion.

In some sectors within agriculture, systems and standard operating procedures (SOP) have been developed and implemented as a way of streamlining management. There are examples in the dairy industry where the replication of such systems has aided expansion without a proportional increase in management overheads. These systems can be reviewed and modified to reflect changing circumstances.

It is less common to find examples of systems and SOP being used in mixed farming, or cropping. This tends to apply even where a business packs or processes, under strict SOPs, product they grow within their own farming operation. In a mixed farming scenario, the case for their development exists as a strategy to share management load and crop production decisions, particularly where a business lacks scale sufficient to create additional layers of management, as incremental growth occurs.

Successfully implemented systems and SOP tend to come from needs identified within an organisation, are designed and developed largely from within the organisation to ensure relevance, and are implemented carefully by all levels involved, delivering a sense of ownership of the process and outcomes. Regular review, refinement and updating also needs to come from within the business.

Contents

Executive Summary 3

Contents 4

Foreword 5

Acknowledgments 8

Abbreviations 9

Objectives 10

Chapter 1: Introduction 11

Chapter 2: A Systems Approach 13

2.1 Benefits of a Systems Approach 13

2.2 Systems at Work 13

2.2.1 Intensive Dairying: Chile 15

2.3 Systems in Mixed Farming 16

Chapter 3: Simplification and Specialisation 18

3.1 Case study: PSI Farming, almond specialists 19

Chapter 4: Expansion and Diversification. 21

4.1 Case study: Capacity expansion, Black Earth Farming, Voronezh, Russia 21

4.2 Case study: Replication: PX Farms, Dry Drayton, Cambridgeshire 24

4.3 Case study: Diversification, Zuckerman Farms 25

4.4 Case study: Integration, Graham Forbes, East Coast Viners. 27

Chapter 5: Conclusions 30

Chapter 6: Recommendations 32

References 33

Plain English Compendium Summary 35

Foreword

This report is prepared against a background of increasingly intensive mixed farming across Northern Tasmania. Rapid growth of irrigation capacity and a wide range of relatively high-value crops has enabled producers to diversify away from traditional extensive grazing and dryland cropping during the past 15 to 20 years. Currently, crops range from fresh market and processing vegetables, through to high-yielding cereals, poppies for pharmaceutical use, pyrethrum, and pasture and vegetable seed production. Dairying and intensive livestock production are also becoming more prominent.

With added intensity comes increased complexity, and it is common for producers to manage multiple enterprises. Farmers in throughout northern Tasmania face this challenge, as they work to strengthen and grow their businesses in a changing economic climate. Often these enterprises are difficult to integrate without causing compromise. For example, the requirement for feed to finish livestock may delay termination of a fodder crop on land destined for a high-value crop sensitive to planting timing. In this instance, a benefit to the livestock enterprise could potentially reduce the yield of the following crop.

There are many reasons for this complexity. Some come from market forces around demand for product and the stability of processing companies, others from the variability and unpredictability of yield and quality. Coupled with highly variable soil types, drainage and topography, specialisation and economies of scale are difficult to achieve.

Interestingly, New Zealand's climate and agricultural intensity is similar in nature to northern Tasmania; particularly on the Canterbury Plains on the South Island. Yet New Zealand farmers diversify less than Tasmania farmers, tending to specialise in the production of a smaller range of products. It would seem that a greater degree of uniformity in soil type and drainage is a major factor behind this specialisation, as enterprise choices are similar.

When I consider the question of what is the main constraint to our business expanding, the conclusion centres around time required to effectively manage multiple enterprises. To limit production variability and improve the repeatability of the enterprises within a business such as ours, or to expand, locally or by diversifying into another geographic and hence climatic zone, there needs to be a way to manage this complexity and subsequent management inefficiency.

I have long considered the way in which manufacturing and processing companies have managed to systemise their production process and gain significant efficiencies and simplification throughout their businesses. The fundamental questions are:

- What is the role of systems within a business?

- Is there correlation between the use of systems and the potential for growth?
- Why do vertically-integrated production-focussed businesses commonly not employ systems before the packing/processing stage?
- When the opportunity to apply for a Nuffield Scholarship presented itself, it provided a chance for me to investigate the suitability of adapting a systems approach to agricultural production. Little did I appreciate the magnitude of the journey I would embark on, and the full extent of the experience I would gain.

During the 22 weeks I spent outside Australia, I travelled through 16 countries including Russia and the Ukraine. The agricultural potential of the vast Black Earth Region is massive, and the influence the Black Sea area could have on international grain markets in the future is well recognised. However, these are countries grappling with both their history and the version of democracy and capitalism they wish to follow. Investment in infrastructure and technology, production techniques and farming systems is needed to realise the huge potential that exists in this area. I was fortunate in 2013 to travel to Russia, and gain appreciation of the poor level of understanding of moisture-constrained farming techniques. The concept of water use efficiency was virtually unknown, however it must be one of the few places in the world where trials show no economic response to added nitrogen fertiliser (Black Earth Farming trials 2012).

Although I didn't visit Brazil or Argentina, I gained an insight into the economic strength of these two giants while in Chile and Uruguay. Having a deep-sea port and strong relations with both these massive neighboring countries, Uruguay is well placed to be a showcase and conduit for investment, technology and intellectual property for the entire region. The combined agricultural potential of Chile and Uruguay is both significant and exciting, however the large population and disparity of income and wealth will require strategic policy initiatives to ensure unity and order in these societies.

While every country I was fortunate enough to visit provided valuable learning experiences, China was definitely a highlight. The vast population and rapidly-growing middle class is likely to ensure strong trade with Australia in agricultural and food products into the future. The phrase often repeated was "in Asia for Asia". However, excess production and export will not be a lasting feature of Chinese agriculture without substantial and ongoing investment in agriculture and the supply of technology in order to satisfy future demand within the region.

Fruitful investment in agriculture is by no means easy, especially in the context of diverse cultures and societies. Whether in South America, China or the former Soviet states, the people, and the connection they hold with the landscape, has a huge influence on agriculture. I was advised that an investor would need to spend time and develop a deep understanding of the culture and people in order to gain their trust, and to appreciate the subtleties of doing business. It is easy for new investors to be viewed as gullible targets.

I would like to thank Nuffield Australia and the Grains Research and Development Corporation (GRDC) for giving me the chance to travel to such a wide variety of places, meet so many inspirational people, and develop networks worldwide. It is humbling to receive the opportunity to investigate leading agricultural practices on an international stage and be in a position to contribute to the future of Australian agriculture.

Acknowledgments

First and foremost, I would like to take the opportunity to thank Fiona for supporting and encouraging me throughout the process, from the application through to report writing. You have proved to be a highly effective business manager in my absence and working together with our employee, Josh, the farm was in excellent hands. I also must express gratitude to my two children who have accommodated my comings and goings, and waited so patiently to go climbing upon the completion of this report. Mention needs to be made of my family for the support they have given over the past 12 months, especially my parents for care given to Fiona and the children.

To the friends I made during our time together on the Global Focus Programme, a big thank you. The journey was certainly enriched by both the quality of discussion around issues affecting agriculture and the people we met along the way, and the humour and positive attitude with which we faced and overcame obstacles.

To the many people who opened up both their homes and businesses to me during my travels around the world, the Nuffield experience would not be possible without this generosity of both time and knowledge. There are simply too many people to name individually however I must mention the fellow scholars who shared their extensive networks to ensure a full and enriching programme, as well as their fine company and friendship.

Finally, a huge thank you to Nuffield Australia and in particular, Jim Geltch. Jim's energy and commitment to improving Australian agriculture and agricultural leadership through Nuffield is outstanding. I must express my gratitude to my sponsor, the GRDC. I found no examples of similar organisations delivering the quality, extent and accessibility of research and development activities where growers can have such input and influence on research priorities. That the GRDC contributes significantly to Nuffield by sponsoring a number of scholarships is testament to their commitment towards capacity building within the grains industry.

Abbreviations

BEF —Black Earth Farming: a publicly listed agribusiness company with operations in Eastern Europe and Russia

FTE — full time equivalent

GFC — global financial crisis

GPS — global positioning system

GRDC — Grains Research and Development Corporation

IPM — integrated pest management

ISO 9000 — family of standards related to quality management systems, published by the International Organisation for Standardisation.

WH&S — workplace health and safety

SME — small to medium enterprises

SOP — standard operating procedures

UHT — ultra high temperature

Objectives

The objective of this report is to outline the use and implementation of a systems approach, or regular or codified plan of procedures, in the management of agricultural production, and;

- To determine ways agricultural businesses can develop simplified management roles and leveraged management skill.
- To identify and explore the role of systems within agricultural businesses.
- To discover if there is a correlation between the use of systems and the potential for business growth in terms of diversification of enterprises, value adding existing production, expansion of current enterprises, or geographic diversity.

Chapter 1: Introduction

This report explores ways agricultural businesses grow and expand, particularly in the context of mixed cropping and livestock businesses. Initially an exploration of the use of systems in agriculture will highlight the benefits gained and challenges posed, as well as the circumstances in which they are most evident. This report also discusses the complementary issues of simplification of agribusiness through enterprise specialisation and the potential for growth and expansion as a result.

A definition of mixed farming is simply, "combined agriculture and pastoral farming" (The Macquarie Dictionary 2nd revised edition). Mixed farms in the context of this report, may be defined as businesses involved primarily in production agriculture, having a diverse and often unrelated range of enterprises using the same land, labour and management resource.

The concept of a system can carry varied definitions in different contexts. A standard dictionary definition, from The Macquarie Dictionary (2nd Revised Edition), describes systems as "a coordinated body of methods, or complex scheme or plan of procedure." Systems can be in the form of a written or codified, highly detailed description of all the steps or decision points along a production path, including the procedures and actions required. Alternatively, the system may be implied or tacit, such as having regular, informal conversations with staff discussing work priorities and upcoming tasks.

The term "farming system" has become more widely used in more recent times, and encompasses the whole farm business and the interactions between various enterprises. Two comprehensive definitions of farming systems are: "*1). The manner in which a particular set of farm resources is assembled within its environment, by means of technology, for the production of primary agricultural products. 2). A collection of distinct functional units, where crops, livestock, and marketing activities interact because of the joint inputs received from the environment and management personnel*" (International Rice Research Institute).

Tasmanian agriculture through the midlands and southern region has changed significantly during the past 15 to 20 years, from a largely extensive grazing system, to an intensive mixed production model. Drivers for this change include the collapse of the wool market and subsequent scrapping of the Wool Price Reserve Scheme in 1991. During the mid 1990s there was increased demand for alkaloid poppies and processing vegetables; especially potatoes. During more recent times however, the vegetable processing sector has contracted considerably due to rising costs of production, currency movements and the availability of cheaper imported product. Producers have searched for alternative crops to grow and have turned to, for example, hybrid seeds and fresh market vegetables, such as broccoli. The market for many of the specialist seed crops is limited and hence required areas are relatively small. As a result of these factors, producers in Tasmania are now combining crop and livestock enterprises

across their properties. It is not uncommon for farmers to be managing in excess of six different crops and more than one livestock enterprise.

"Intensification is one response to the challenges of declining farm terms of trade (changes in input prices relative to output prices) and the increasing demand for land that agricultural producers face. It reflects efforts to maintain or improve economic returns from each hectare through increasing concentrations of inputs, including nutrients, water, energy, and management effort" (Lesslie, 2011).

There are, of course, significant advantages to be found in mixed farming systems. These can come from the diversification of income streams, mitigation of production risks such as weather conditions, and agronomic factors including crop rotations involving pasture phases and non-chemical weed control by grazing livestock.

Reducing biomass and seed set of herbicide-resistant weed species is one of the key drivers for producers introducing livestock back into a cropping system, according to anecdotal evidence cited in the GRDC Fact Sheet (2011) "Mixed Farming". It goes on to discuss the benefits of increased biodiversity and the opportunity to use excess crop residues and failed crops in a mixed farming system. Along with the positive impact of integrated pest management (IPM), the use of pasture legumes also delivers associated increases in soil nitrogen levels and yields. There are however some negative impacts of mixed farming systems, namely decreased timeliness through conflict between livestock and crop operations, and greatly increased management complexity.

The inherent complexity of mixed farming systems is high in Tasmania due, in part, to the relatively small geographic area suitable for agricultural production. Only 1.65 million hectares (Mha), or 24% of the state's landmass is used for agriculture, equating to less than 2% of the 398.6 Mha devoted to agriculture nationally (Heap, 2012). Highly variable soil types and a small population further compound this issue. However, the strongest driver for increased complexity is the marketing arrangements for processing and seed crops, most of which are under contract to processors or cleaners, and market volumes vary widely from year to year. The fortunes of one particular crop can impact upon entire rotations as the competition for land influences returns offered by alternative enterprises.

Additionally, Australian producers face complexity and burdens from outside the farm business. Kingwell (2010) notes that "farmers' enterprise choices, although more and varied, are also constrained by the needs and actions of a greater range of stakeholders with diverse interests in quality assurance, occupational health and safety, marketing, animal welfare, and environmental protection. The traditional production focus of farming now additionally is required to encompass these concerns."

Chapter 2: A Systems Approach

2.1 Benefits of a Systems Approach

Increasingly businesses are using codified, or written systems and procedures to streamline management, production and product delivery. Using SOP leads to gains in quality, consistency and reliability of production, as well as providing routine for employees. These procedures can facilitate training, ensuring consistency of instruction, and serve as a point of reference in the case of employees filling in for jobs they do not perform on a regular basis. SOPs can be a simple instruction, for example, hand washing procedures in a packing facility, or describe the operation and maintenance of complex machines.

Having codified policies and procedures in place can benefit businesses in many ways according to the New South Wales advisory service (Small Business NSW).
"Benefits of a documented system are:

- Better succession options for the business, including saleability.
- Ensuring that record keeping, compliance and reporting obligations are met.
- Smooth running of the business.
- Effective training of new staff.
- Reduction of administrative time.
- Assists in reducing risk.
- Clear direction for employees on how to operate within the business.
- Consistency in product or service delivered.
- The business not totally dependent on the owners."

David Grusenmeyer, (2003) senior extension associate, Pro Dairy at Cornell University describes the benefits of SOPs in a dairy context. He points out "*animals thrive on consistency and perform much better when things are done correctly, on time, at the same time every time. SOPs will reduce variation, the enemy of production efficiency and quality control and having well defined SOPs, using them in training and insisting that they be followed can help in keeping employees safe at work and may provide some legal protection if an injury occurs*".

2.2 Systems at Work

Manufacturers and processors have used SOP successfully and have yielded significant improvements to consistency, quality and importantly, repeatability. "*The behaviour of manufacturing supply chains is different than agriculture for many reasons, but the issues are the same. The customer needs for*

quality must be expressed throughout the supply chain. There must be process control to meet those specifications" (Clause, 2003).

Focusing on agricultural businesses, it was more common to find systems and SOP in packing and processing facilities for farm produce. Businesses visited, using SOP included fruit sorting and packing entities in the Netherlands; South Basin Packing at Umatilla, Oregon, a fresh vegetable packing facility; and Brocke and Sons, Kendrick, Idaho, a grain processing and packing company. Reasons given for using systems centered around product traceability and food safety. Of particular interest was the South Basin Packing example, for whom the packing facility employed strict protocols and yet the production side of the business; growing crops such as corn, onions, potatoes and carrots, did not. Mike Massey (Manager, South Basin Packing) explained, for them, the high degree of variability involved in growing crops and the requirement for flexibility in crop production imposed significant challenges to the design and implementation of systems in the field.

The variables encountered through the packing and processing chain tend to be more easily defined and the activities are often repetitive in nature. When dealing with the complex matrix of crop production, especially in the context of mixed businesses involving a livestock enterprise, there are many factors outside the direct control of management, which influence decisions. These range from crop rotation and agronomic issues, weather conditions, machinery and labour capacity, and market requirements to name just a few.

Systems can be found working in intensive livestock businesses, where production is constant and repeatability needs to be high, for example, dairy farming and intensive piggeries. Gene Nemechek (2012) describes the development and increased uptake of SOP in the US pork industry in *The Jack and Pat Anderson Lecture* at the 2012 Kansas State University Swine Profitability Conference:

"The large production systems early on developed production standards that were used as guidelines for day after day production practices. These standards gave structure and consistency to the productions practices, which outlined how things were to be done on the farms. These standards were written down and used for training of new and existing employees…this systems approach accomplished a uniformity of production practices across numerous operations and employees, and produced a uniform consistent end product. These standards required a constant regular update process as well to keep up with improvement in technology and production practices."

2.2.1 Intensive Dairying: Chile

Chilean milk production totaled around 2.1 billion litres during 2011 (Dairy News Australia, July 13, 2012), from some 16,000 dairy farmers running 650,000 cows. Production has been growing at about 2.8 million litres year on year, with 75% processed into whole-milk powder. It forms the preference of many consumers as a large proportion of the population are unable to access refrigeration for ultra high temperature treated (UHT) milk once opened (USDA Global Agricultural Information Network, Oct. 2010).

During 2005 a group of dairy farmers and businessmen from New Zealand started buying land around Osorno, about 950 km south of Santiago, in Chile. During 2008 they bought part of one of Chile's largest farms, Hacienda Rupanco, and started converting it to dairy farming. This brought their holdings to 22,500 ha. Similar in climate to the South Island of New Zealand and at around the same latitude, the Chilean investment was suited to grass-based dairy production. Manuka SA is currently producing 110 million litres of milk per year, through 37 dairy sheds, milking across 8,000 ha of land. The aim is to milk 45,000 cows and produce 250 million litres by 2019.

Figure 1: Dairy farming, Osorno, Chile (September 2012). Source: Chilvers Collection

During 2012 milk was sold to processors on a “spot basis”, the decision was based around pricing, to the extent there may be a different destination for the morning and afternoon pickup. Among the 350 full time equivalent (FTE) employees, there was a position solely tracking milk price and deciding to whom the milk would be sold.

While a conversion on this scale seems at first glance to be a highly complex and intensive undertaking, Chris White, the development manager, described the system used and the desire to keep it as simple as possible. Each dairy unit consists of a herringbone shed, running 600 cows with three people on 200 ha. On some occasions the business had redeveloped existing infrastructure, however all new construction was from the same blue print ensuring consistency across the business (White, 2012). There was an emphasis on over-engineering to ensure long life of the infrastructure, and also a drive for uniformity and simplicity, as the abilities of individual managers varies.

Figure 2: Herringbone Dairy shed, Manuka SA. (September 2012). Source: Chilvers Collection

Management of production is carried out under similar strict protocols across all 37 dairies. The same manual is followed on all farms, the effect of individual ability, strengths and weaknesses of managers is reduced, however consistency of quality and production is maximised. In establishing dairies extensively, and employing local labour, set protocols and procedures help articulate clear expectations as well as providing a tool against which to measure production and identify focus areas.

One challenge identified by employers in emerging economies, such as Russia, Ukraine, and Chile, was how to effectively modernise farming practices where historically they have been executed differently. As an example, for Amber Farms in Ukraine, this included changing the sowing rate of wheat from 300 kg/ha, to less than 100 kg/ha, and ensuring old processes were not reinstated through "slippage". The use of SOP helps maintain consistency, be it in the field or dairy. Manuka SA certainly uses their protocols to establish standards and maintain uniform production.

2.3 Systems in Mixed Farming

Systems, or SOP have been introduced to many agricultural businesses in the form of workplace health and safety (WH&S) and quality assurance programmes. The benefits to smaller businesses are not always tangible, and some quality assurance schemes are more relevant to the buyer than the producer of the product in terms of marketing and market access. These schemes are often viewed as a box-ticking exercise by management within the business and the degree of ownership or buy-in from management and staff is consequently low. Complexity and time constraints mean small business may have to engage consultants to assist with implementation, further reducing the sense of ownership of changes required to production and record-keeping. In the case of ISO 9000 certification, Brown, Wiele and Loughton (1997) found "*it provided mixed experiences for small to medium enterprises*

(SMEs). For many it is a 'necessary evil', forced upon them largely by purchasers, particularly large organisations and government departments."

Rob (1991 Nuffield Scholar) and Kathy Henry, mixed farmers near Cressy, Tasmania, have had first-hand experience with ISO accreditation. Like many producers in the Northern Midlands area, the Henrys have been involved with numerous enterprises from processing vegetables, potatoes, buckwheat for a Japanese market, onions, pyrethrum, grains and poppies. During recent times Rob has simplified the farming business by reducing the number of enterprises, and concentrated his efforts on setting up a biofuel plant — converting extracted oil from poppy seed. During 2005 Rob thought accreditation would secure a positive position and differentiation within the supply chain for the highly diversified, intensive production business. He hoped they would become preferred suppliers, opening up opportunities for higher margins and volumes. Disappointingly, this turned out not to be the case and after considerable investment and five years in the scheme, it failed to deliver sufficient benefits to the business. Continued major updates to the manual and procedures, high annual compliance cost (about $6000 pa), and issues with the audit process around relevance to production agriculture have seen the programme discontinued. Some processes and procedures from the ISO 9000 manual were of use to their business, while others have been adapted to become practical and relevant to farming (Henry, 2013).

Rob is now operating a biofuel plant on his farm, extracting oil from poppy seed, formerly a wasted by-product of alkaloid production in Tasmania. He is developing SOP to assist with running the highly technical and complex facility. Employees are co-authoring the sections of the manual within their area of technical expertise even as the plant is being commissioned, and it is anticipated operators unfamiliar with the process will be in a position to operate the plant by following the prescribed steps in the manual.

Brown, Wiele and Loughton (1997) found in relation to the establishment of procedures for certification that internal drivers for compliance, such as working towards certification as a means of improving procedures, were far more likely to be successful than where application and design are enforced by an external body or organisation.

Chapter 3: Simplification and Specialisation

“Business complexity is seen as one of the world's top 10 business problems” (Kingwell 2010). In agriculture, McGuckian (2007) concluded from a survey of 50 mixed enterprise farms across Australia; *"Mixed farming systems are complex and require a high level of skill to run profitably"*. Kingwell (2010) also stated that “*complexity adds significantly to management load, especially in the case of mixed farming businesses. In a global survey of over 900 executives, nearly 70% admitted excessive complexity was raising their firm's costs and hindering profit growth. The same survey showed that some businesses in manufacturing, retail, services and fast food had benefited greatly from simplifying their operation.,”*

Agriculture in Tasmania is undergoing a period of rapid and forced change. The closure of the McCain vegetable processing plant at Smithton in Tasmania's north west during 2010, and the recent announcement by Simplot that the only remaining soft vegetable processing plant in Australia, at Devonport, also on the north west coast, is not viable and will face possible closure within three years, will have significant ramifications for producers throughout the state. Parallel to the decline of a sector that allowed producers some scope to grow relatively large areas of a single enterprise is the rapid increase in water available for irrigation, often in areas where cropping was formerly seen as an opportunity venture. The net result of these two factors will lead to producers seeking alternative enterprises, in some cases further increasing the number of enterprises with a subsequent increase in complexity. “*While increased diversity has many advantages, it can introduce a high degree of complexity and cost. Excessive complexity drives up operating costs and hampers business growth*.” (Kingwell 2010).

Simplification or rationalisation of the enterprise mix can make way for specialisation within a business. By specialising, management can be targeted on the key profit drivers in a particular enterprise and the compromise that can come from integrating competing production systems can be eliminated. John Francis, Director/consultant, Holmes Sackett, (2013) believes; "*attention to detail and timeliness are crucial to the success of farming businesses, plus, it makes good economic sense to play to the strengths of a manager or management team*". By focusing attention across fewer enterprises, management can be more thorough and product quality and production reliability will increase.

Francis further points out that specialisation can allow businesses to gain economies of scale within an enterprise, and, for example, invest in technologies and equipment that may be enterprise-specific delivering efficiencies and cost benefits. Specialisation leading to increased turnover within an

enterprise gives management a better position from which to negotiate with suppliers and service providers, and forge stronger relationships with customers.

3.1 Case study: PSI Farming, almond specialists

California's 6,000 almond growers produce about 80% of the world's supply from some 320,000 ha of orchards. The value of the edible portion of the crop was $USD 4.1 billion during 2012 (USDA National Agricultural statistics Survey, 2013 California Almond Forecast).

PSI Farming was formed during 1992, when Lane Parker went into business with Tim Sylvester. After working for a management company overseeing the management of 2,400 ha of almonds, citrus, grapes and olives, the two identified the opportunity for growth within the rapidly expanding almond industry. Production has increased rapidly and has been encouraged by correspondingly strong global demand.

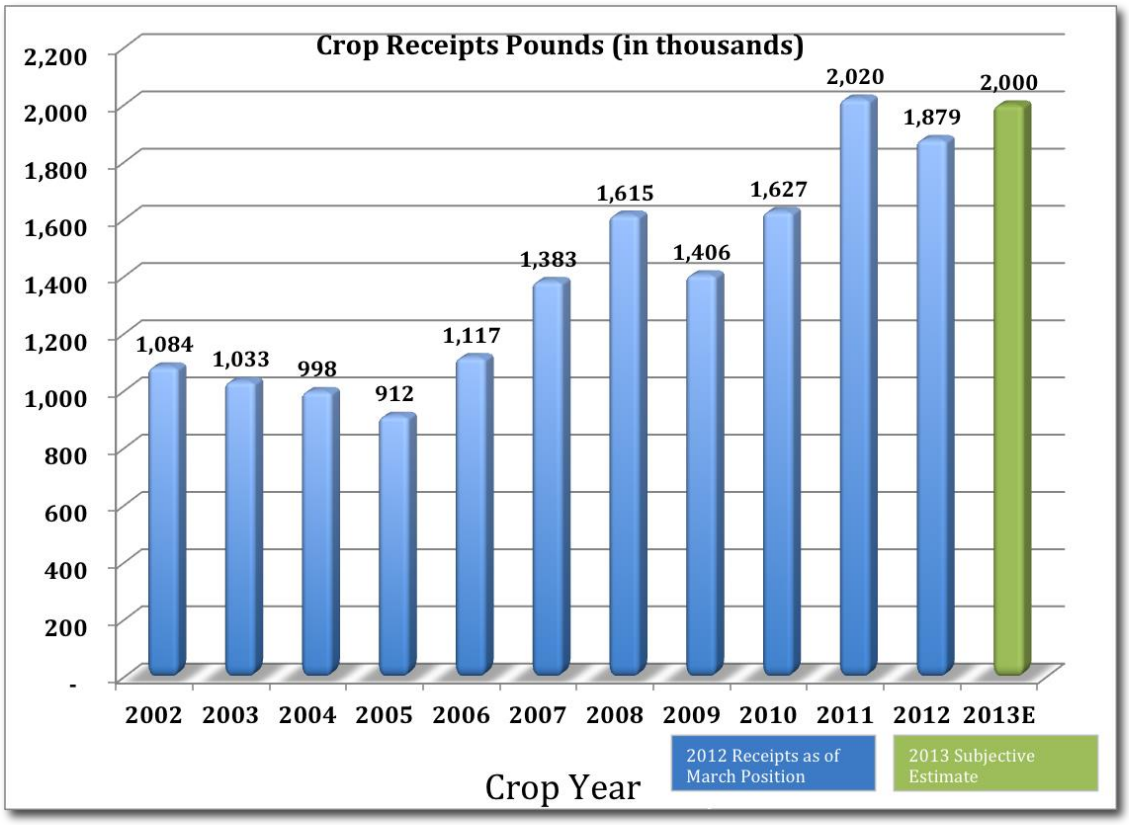

Figure 3: Californian almond production has doubled during the past 10 years. Source: National Agricultural Statistics Survey

PSI Farming has reaped the rewards offered in the almond industry during the past 10 years through specialising in almond production. The business has paid attention to every aspect of planning and developing new orchards, which take four years to reach production, to the ongoing care and

maintenance ensuring highly productive trees for up to 25 years. With only two other minor enterprises competing for attention, Lane can complete tasks accurately and on time.

Significant investment is required in order to establish almond orchards and the success of horticultural industries throughout the Central Valley in California has pushed land prices as high as US $40,000 per ha. During 2012 PSI Farming had a bountiful harvest with high prices, above-average yields and quality was high across the 250 ha under production. By maximising the area devoted to almonds, PSI Farming has been in a position to fully capitalise on the fortunes of the industry.

Figure 4: Almond Harvest, 2012. Source: Chilvers Collection

While a degree of diversification is an effective risk management strategy, too much diversity can reduce management's ability to take advantage of the upside of seasonal variability. It also adds to management load and leads to inefficiencies if the enterprises are not complimentary. In Tasmania, agriculture is carried out across a wide range of land capability classes and producers need to respond to change in land use and market signals. It is important to take into account the implications of added complexity on a business when considering further diversification.

Chapter 4: Expansion and Diversification.

There is currently much discussion around the ability of agriculture to feed an increasing population into the future and the opportunities this may present to farmers around the world. Indeed, as the population heads towards eight billion by 2030, the pressure on limited resources, such as water, land and energy, will increase and food prices are predicted to rise. Whether this will deliver increased returns and margins to producers is unclear; for example, energy costs and hence the prices of farm inputs also are predicted to continue to rise. "*Overall, the increasing scarcity of arable land, water constraints and rising input and energy costs in agriculture all serve to highlight the critical importance of achieving higher agricultural productivity in a more sustainable manner both at the farm level and upstream and downstream sectors of the food supply chain*" (OECD/Food and Agriculture Organisation, 2013). There is currently renewed interest in investment in agricultural land -worldwide, by individuals, fund managers and companies, as food security becomes a mainstream issue.

Businesses wishing to take advantage of potential opportunities from increased agricultural commodity prices, technology advances leading to higher productivity or, as is soon to be the case in some areas of Tasmania, change in land use and intensification, need to carefully consider the growth strategies to be pursued. As Hofstrand (2007) warns; "*your business strategy should create and sustain a competitive advantage that enables you to consistently earn above average returns*". Hofstrand goes on to identify common strategies used by businesses as a path to expansion, including capacity expansion, replication, diversification, specialisation, and integration. This provides a useful framework for examining businesses visited internationally, ranging from commodity farms to direct market growers and the strategies used to develop and expand their businesses.

4.1 Case study: Capacity expansion, Black Earth Farming, Voronezh, Russia

Capacity expansion is a strategy of expanding enterprises; in the way Manuka, described previously, is developing more dairies at Osorno, Chile. Manuka aims to take advantage of economies of scale and uses a grass-based production model to keep variable costs low. Similarly, Black Earth Farming (BEF) is seeking production efficiencies by growing large quantities of grains, while investing in storage and handling facilities to extend control along the value chain.

Kinnovik, a Swedish investment and funds management company, set up BEF during 2005. Political and economic changes in Russia allowed for foreign investment and BEF was one of the early large-scale investors in Russian agriculture. The acquisition process has been long and difficulties were

initially encountered gaining freehold title, however BEF currently owns about 250,000 ha of prime land, with an additional 40,000 ha under long-term lease. Investment occurred in four main clusters, Kursk, Lipetsk, Tambov and Voronezh, some 500 km south of Moscow. The initial cost of the land was low, less than US $300/ha, and has since risen to about US $600 currently. Capital gain is a key driver behind investment in the former Soviet states and Eastern Europe and the experience from Poland, where land is now valued at up to US $6300/ha, is confirmation of the strategy.

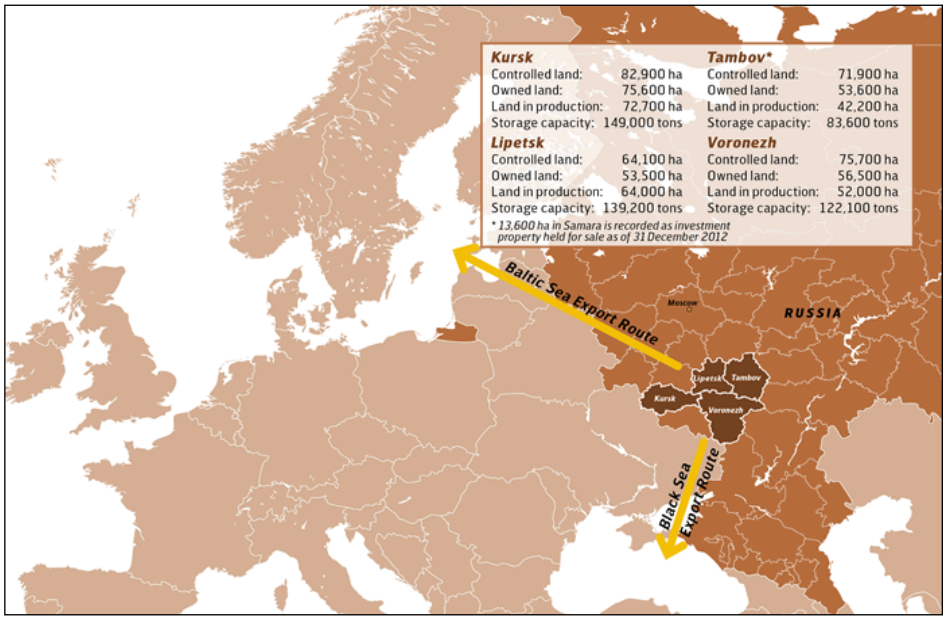

Figure 5: Black Earth Farming's location. Source: http://www.blackearthfarming.com/where.html

The Chernozem soils of the Black Earth Region are well recognised as being highly fertile, although they respond to lime application, they are generally high in phosphorus and nitrogen due to organic carbon levels from 2–8%. The topsoil more than one metre deep, with a high clay content. Moisture holding capacity is good, though it is prone to compaction in the absence of controlled traffic techniques; consequently a plan to deep rip every three years is under way.

The soils, combined with large areas of underutilised land, are a strong lure to foreign investment. However, the experience of BEF suggests that a long-term view needs to be taken toward the investment as it may take time to generate positive returns. Access to, and implementation of, leading dryland-farming technologies is limited and poorly understood, and management needs to be extremely vigilant in order to avoid employees reverting to old practices. David Cousins, Chief Operating Officer, KinnAgri, management consultants to BEF, explained how in the absence of commercial research and development in agriculture since the introduction of the Glasnost and Perestroika reforms during the late 1980s, there is a need to access better quality and higher yielding varieties of grains. BEF is currently carrying out its own research and development trials in partnership with the agribusiness company, BASF, each contributing one full-time person to run the

70 ha of trials. Private breeding and seed supply companies are reluctant to release material into Russia due to difficulties collecting royalties and controlling distribution (Cousins, November 2012).

BEF planted 220,000 ha of crop during 2012, of which, 75,000 ha was winter wheat, sown during mid to late September, which will be under snow for more than four months — the thaw occurring during mid to late March at Voronezh. The optimum sowing window for wheat is less than two weeks — too early and the plants are too large going into winter, and too late and they will not survive the cold. The logistics challenge of this operation is considerable. Fertiliser is delivered in bulk bags and the predominant wheat variety, Moscow 56, is sown at in excess of 200 kg/ha. The remaining 145,000 ha of corn, canola, sunflower, barley and soybeans are sown during a short period from mid-April to mid-May, a task requiring high investment in machinery and people.

BEF has a strategy to store the grain it produces, rather than sell into the state grain elevators. This approach aims to maximise export sales in order to secure premium prices and gain access to forward sales and hedging opportunities. Futures markets are not robust in Russia as all commercial trade is conducted "cash on delivery" due to the complete lack of counter party trust.

The use of large, modern farming plant has led to economies of scale and reduced labour input when compared with the traditional mixed farming model of Russian agriculture. The government actively encourages foreign investors to employ as many local people as possible as unemployment is high in the small rural towns and average wages are low. There is a sense of distrust toward large foreign-owned operations among the community and local employees. An agronomist expressed his feeling that as a Russian, there was little opportunity for career advancement within the company and limited professional development. This compounds the already considerable problem of theft and pilfering, which exists partly as a consequence of the communist history and also is considered a means of supplementing low wages. BEF employs some 2000 Russians, 700 of which are security guards. It is common for large businesses with mobile assets to fit global positioning system (GPS) trackers to machinery and BEF's equipment is stored in secure, guarded compounds whenever not in use.

While the scale at which BEF operates exceeds the likely realities and aspirations of the target audience of this study, it remains a business that illustrates capacity expansion, as it has remained largely focused on grain production. Eastern Europe and Russia may be viewed as ideal locations in which to pursue this strategy, as land values are relatively low and labour is cheap. As volumes increase, opportunities to grow through diversification and vertical integration can become apparent.

4.2 Case study: Replication: PX Farms, Dry Drayton, Cambridgeshire

Expanding business within an existing area of expertise is an obvious path to business growth. Risk is low, as production methods are already proven, marketing and supply channels established, and strategies and systems can be expanded as growth occurs. Overhead expenses can be spread across a greater production base and one of the key assets of a business, management skill, can be leveraged.

In the highly-developed and refined arable farming systems in the UK, PX Farms is located at Dry Drayton, Cambridgeshire, and owned and run by James Peck, (2010 Nuffield Scholar). PX Farms has been able to identify significant opportunity arising from replicating this profitable business. Starting from a position of limited capital during May 2003, PX Farms' strategy has been to contract farm other people's land using techniques and technologies which delivered cost savings that benefited both parties. Currently there are 2,100 ha under PX Farms management. Services offered are tailored to suit the landowner from a straight forward “stubble to stubble” farming agreement, to a full regulatory compliance and environmental accountability model. The scale of the business developed has facilitated a move into grain storage, handling and logistics, in partnership with a grain-trading firm, WellGrain. PX Farms runs nine semi trailers; eight are contracted to WellGrain and move product from PX Farm's 47,000 tonne grain storage site to destinations across the UK.

Figure 6: PX Farms has invested in grain logistics and storage. Brand recognition is important for growing businesses. Source: www.pxfarms.com/

PX Farms has been able to successfully use the available resources and has recognised its comparative advantage in terms of management skill and the ability to foster and form business relationships. This provides significant benefits to all parties involved. Employees are seen as a key strength within the business and their input is valued and recognised. Another key factor behind PX Farm’s ability to

replicate is the strategy of ensuring all equipment for grain production can fit on a semi-trailer and be moved quickly and safely anywhere, at minimal cost. The trucks are also an effective form of advertising and are maintained to a high standard — a reflection of the attention given to all aspects of the farming operation. Social media is also used extensively; film clips explaining the PX Farms history and systems can be found on social media sites.

PX Farms has also used a systems approach to the production side of the business as well as the grain handling and logistics end. While the system is not written in the form of a production manual, a uniform approach is taken to each field, from soil sampling strategies at the start of the season, to agronomy and crop monitoring and finally harvest, grain storage and marketing. It is possible codification of the system would further enhance the reputation PX Farms has achieved and give clients even more confidence through transparency and accountability.

Contract farming, leasing and sharefarming are methods of increasing production, using equipment and skills without requiring large amounts of capital. Exposure to risk can be shared with the landowner, commensurate to returns, and income can be structured around cash-flow requirements. There is no capacity to capture capital gain as land values appreciate, and most assets are depreciating, however a valuable brand can be established.

4.3 Case study: Diversification, Zuckerman Farms

Diversification has been discussed at length throughout this report, and the pros and cons explained. The addition of new enterprises can reduce production risk, expose businesses to unrelated markets and use under performing assets or seasonal capacity. If synergies between new and existing enterprises can be identified or developed, efficiencies can be gained.

Zuckerman Farms is a family-owned mixed farming business based on McDonald Island near Sacramento, US on the delta formed by the San Joaquin and Sacramento rivers. The island is 3.5–6 metres below sea level and is maintained by an impressive levee bank system. Although there is no livestock it can still be considered a diverse mixed farming business, as there are seven enterprises within the production system covering 3300 ha.

Enterprises include corn, asparagus, olives, grapes, processing tomatoes, potatoes, and turf sold under the Delta Bluegrass Company brand. Significant comparative advantage was identified in the production of turf, including large areas of level peat soils and the ability to flood fields for extended periods removing weed species, especially volunteer potatoes, which can cause issues when mowing the turf to create uniformity and thickness.

Diversifying into, and specialising in, the production of turf allowed Zuckerman Farms to develop techniques and invest in plant and equipment specifically for the production of high-quality turf. Freight and logistics is done in-house in order to maintain control of the product all the way to the purchaser. The company has become the largest northern Californian grower of sod.

Figure 7: Turf production, McDonald Island (October 2012). Source: Chilvers Collection

A large agricultural business, Zuckerman Farms employs 50 full-time and 250 seasonal workers, with three people managing the intensive and complex production system. The company's President, Eddie Zuckerman, and managers, Ken Jochimsen, and George Biagi, all have enterprise responsibility, which includes preparing financial budgets and all aspects of crop husbandry. It is worth emphasising that although there are a large number of crops being integrated on common land, each manager is responsible for a limited portfolio of enterprises, avoiding undue complexity.

While there are detailed WH&S systems in place, and food safety and quality assurance manuals referenced and updated regularly in the farm office, management has not developed a production manual or codified system for field operations. The need for flexibility and responsiveness outweighed the benefits that could come from such a scheme. In the case of possible absence of a member of the management team, managers have a sound understanding of each others' field of responsibility and major disruption can be avoided. Open and regular communication between the management team is a feature of the business, and a benefit of larger organisations is that a number of people can share the management burden.

Figure 8: George Biagi, Zuckerman Farms (October 2012). Source: Chilvers Collection

At the height of production Zuckerman Farms was producing about 75 million square feet of turf, supplying sports stadiums and housing developments. During 2012 this had fallen to around 45 million square feet due to the global financial crisis (GFC) and subsequent recession. While this reduction certainly impacted the business, other enterprises mitigated the full extent of the effect. The diversity of the enterprise mix has reduced both the production and market risk exposure of the business and the management structure provides insulation from key person absence or management turnover. However, being located on a river delta, below sea level, the threat from flooding is an area the company takes seriously. The last big flood was on 22 August 1982. It took six months to drain the Island and resume operations. Levee banks are inspected regularly and a major upgrade was underway during 2012.

4.4 Case study: Integration, Graham Forbes, East Coast Viners.

Integration, as a strategy for growth, involves a move either closer to the consumer in the value chain, or can be a move toward the input or supply side of the business. Hofstrand (2007) explains it may result in businesses within the supply chain forming joint ventures, or a group of similar producers working together to move up or down the chain. Vertical integration towards the market can add significant value to goods produced, while controlling costs is a motivation for integrating in the other direction.

Graham Forbes and his two brothers, Mike and John, own a diverse agricultural business at Tayside, on the East Coast of Scotland. They had been supplying peas and broad beans to the local processing and freezing plant, for about 35 years when during 2007, the opportunity arose to buy the Dundee Cold Stores, in partnership with rival grower, Bruce Farms. While the two businesses compete actively for land on which to produce peas and beans, they work together to run the processing

facility, Alpine Foods. After investing a considerable amount of money, 500–600 t of product can now be processed in a 24-hour period, to coincide with harvest capacity.

Figure 9: East Coast Viners pea harvesters at work, 2011 Source: www.eastcoastviners.co.uk

One person manages the 3300 ha pea and broad bean programme on land the Forbes family rent on an annual basis from about 6%200 farmers within a 40 km radius of the factory. Production is in the region of 8000 tonnes of peas, and 1500 tonnes of beans, supplying six percent of the UK market through the major supermarket chains, while export markets such as Spain, Portugal, Canada and Israel are also being pursued.

In another area of vertical integration, the Forbes additionally own one of Scotland's largest family-operated compound feed milling businesses, East Coast Viners Animal Nutrition. The facility can store and process around 50,000 t of grain per year, and they also offer a full range of storage and marketing options to grain growers. The various feed mixes and products are sold into the domestic livestock industries, the most profitable line being designed for game birds.

Bruce Farms, run by Bill and his son Geoff Bruce, produces a wide range of grains, soft fruits and black currants, and grows 10,000 t of potatoes packed for and sold through supermarkets. They also run a highly successful Charolais cattle stud. They grow a similar quantity of peas to East Coast Viners, both on their own land and land leased from 150 nearby farmers, primarily supplying the Birdseye brand for consumption within the UK. Neil Murray manages the pea and bean production business, and explained how Bruce Farms has developed a production manual, which covers all the steps from accessing and leasing suitable fields through crop husbandry to harvesting and transport. This document is held closely as it is of considerable commercial value.

By working together to secure the viability of the freezing plant, both East Coast Viners and Bruce Farms have been able to not only control their product further up the supply chain, they have maintained an industry that provides income to many farmers and a valuable rotation crop within the regional farming system. Vertical integration has given both businesses the ability and confidence to expand their farming operations while adding value to their product.

There are many paths to expansion and growth of a business, depending on the goals and visions of the people involved. Growth may come from utilising all the resources controlled by an entity, exploring opportunities within a supply chain, including forming relationships with buyers and consumers, or obtaining extra resources, such as securing more land on which to farm. While the later traditionally requires large amounts of capital, there are examples of businesses accessing outside funds and investing in their local area, as well as businesses investing in areas where land is less expensive and moving all or part of their operations.

Chapter 5: Conclusions

Some sectors within agriculture have been able to develop and implement production systems in order to simplify management input. Examples can be found in intensive livestock operations, such as dairy farms, which can be replicated in order to grow the overall business without needing to increase management overhead commensurate with the expansion. The system is effectively portable and can be modified to reflect local conditions, allowing for geographic diversity within the business. Certainly in the dairy industry replication as a mechanism for expansion has been aided by the use of production systems, as in the case of Manuka SA.

Packing and processing facilities use SOP extensively driven in part by WH&S requirements, but largely due to the need for consistent quality outcomes, food safety and product traceability. If systems and SOP are developed from inside the business they have a far greater chance of success than through an external pressure and the codification of implied systems or habits, encourages accountability within the organisation. Well-designed and implemented SOP that assist with production and risk management can, similar to brands, become valuable in their own right. The introduction of systems and SOP has led to benefits in many businesses, and can benefit intensive mixed farms, increasing reliability, consistency and the predictability of both production and quality.

While the use of systems to define and guide specific enterprise/crop production was not readily evident, there remains a case for their development in this segment. Where business growth occurs, these systems facilitate sharing management load as well as crop production decision-making. This is especially useful where a business is not of a size where layers of management expertise are possible and growth is incremental.

Mixed farming in Tasmania is highly diversified, with many enterprises competing for management time and attention. Diversification reduces production and market risk and can maximise efficient use of the land resource in a highly variable landscape. It does add considerable complexity, especially when the enterprises are not entirely complementary, and this complexity comes at a cost of both management time and the potential efficiencies gained through specialisation.

Global population growth estimates, combined with rising affluence and a fast growing middle class in developing nations, is changing diet and driving increased food demand worldwide. There is evidence to suggest soft commodity prices will remain above long-term averages (OECD/Food and Agriculture Organisation of the United Nations, 2013), resulting in agricultural land continuing to increase in value, giving well-managed agricultural production businesses opportunities for growth. The strategies for expansion chosen depend on many factors, from the wishes and aspirations of the people involved in the business, to the available land resource, and economic circumstances surrounding the business

and markets in which they operate. Having systems in place is not a pre-requisite for expansion, however they can assist with replication and simplify management.

Through this research, diverse expansion models have been observed, and it is possible to argue avenues to expanding and growing an agricultural business are largely driven by opportunities, which can always be found in agriculture. From the highly developed and efficient systems in the UK and North America, through to the developing economies, where land values and labour costs are still relatively low, skilled managers are expanding agricultural businesses. The requirement for technology and infrastructure, coupled with the need to understand and accept cultural differences make investment in developing areas challenging, though the potential for capital gain is high.

Chapter 6: Recommendations

For production consistency on farms, there is a place for, and benefits from, the development of a standardised system of production.

- The impetus for the design or implementation of any enterprise production system should come from within the business. The purpose for designing an SOP needs to be clearly understood, either as a risk management tool, an avenue for increased efficiency, or by enhancing the potential for growth through replication or transfer.
- The design of any system must to be relevant to a farm's context. Effective implementation of a production protocol most commonly occurs where it is not externally imposed but rather, refined and adopted within the business to accommodate geographic, climatic and soil variability, as well as interactions between enterprises.
- Where externally developed systems are considered for use as a model, modifications need to be made to fit local context and requirements. Input from other relevant producers and advisors who share similar growing conditions can provide insight.
- Initially, simple model systems should be developed for an enterprise, drawing on experienced growers, agronomists and industry. This can then be used as a reference for further development of protocols for other more complex enterprises.

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Plain English Compendium Summary

Project Title	How systemised management of intensive mixed farms could assist expansion
Nuffield Australia Project No.: 1208	
Scholar:	Michael Chilvers
Research Organisation:	Nuffield Australia
Phone:	0409 974 556
Email:	fchilvers@bigpond.com
Objectives	The objective of this report is to outline the use and implementation of a systems approach, or regular or codified plan of procedures, in the management of agricultural production, and: • To determine ways agricultural businesses have simplified management roles and leveraged management skill. • To identify and explore the role of systems within agricultural businesses. • To discover if there is a correlation between the use of systems and the potential for business growth in terms of diversification of enterprises, value adding existing production, expansion of current enterprises, or geographic diversity.
Background	This report is prepared against a background of an increasingly intensive mixed farming environment in Northern Tasmania. With added intensity comes increased complexity of farming systems as many producers are now managing multiple enterprises. When the question of limitations to business growth is asked, the conclusion often centres around constraints on management time.
Research	In excess of 22 weeks were spent traveling to North and South America, the UK, Western Europe, Ukraine and Russia. Visits to leading agricultural business of varying size, research and development organisations. Interviews and discussions provided information as the basis of the findings in this report
Outcomes	Some sectors within agriculture have been able to utilize a systems approach to gain management efficiencies and leverage skills. Examples can readily be found in packing and processing facilities, as well as some intensive livestock businesses. It is less common to find examples of their use in a crop and mixed farming context, however their implementation would benefit business expansion and would simplify management at many levels. It is important that the demand, design and implementation are driven from within the business to ensure commitment and a shared sense of ownership across all levels within the organisation.
Implications	Well-designed and implemented systems would simplify management of mixed farming and provide assistance to growth through the ability to replicate a production model. The system may become of value as part of the brand of a business.