UNIVERSITY OF SOUTHERN QUEENSLAND

Improving farm business skills amongst NSW Dairy Farmers

A report on a survey of dairy farmers and service providers

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Summary and recommendations

This project was a study of dairy farmers' attitudes and approaches to business management with the goal of informing the development and delivery of farm business skills programs. For this study, the key elements of farm business management included: business data management and analysis; strategic planning; intra-business communication; investment planning and analysis; and capital, resources and labour management.

Project summary

There were five sources of data for the project: interviews with 50 dairy farmers working in 44 dairy farm businesses in NSW; interviews with 8 people involved in farm service provision in regional areas; interviews with 13 people involved in the development or delivery of farm business management training;[1] a final workshop with program deliverers to review draft recommendations; and a review of literature on farm business decision-making. Interview data were analysed for themes and related insights into farm business management (FBM) programs. The interviews were conducted during an extremely severe drought, which could have affected attitudes, responses and interest in non-operational matters, though the overwhelming majority of respondents were positive about the future of the industry.

The sample of farmers had larger than (national) average herd sizes, with the overwhelming majority of businesses being partnerships or family farms, though some had corporate-like characteristics. There was a strong predisposition to naturalistic or intuitive management styles. Respondents generally recognised the importance of FBM but may not have given it commensurate attention. Comprehensive budgeting and formal business planning were rare, though there were signs of increasing use of computer-based, financial information systems. The information from these systems is however primarily used for checking cash flow, tax management and engagement with financial institutions and only rarely for examining underlying business trends. Investment decisions are generally analysed in terms of contribution to 'manageability' (of the farm operations), time to recoup money and very rarely, return on investment. There is very little use of formal decision-support tools developed by industry.[2]

There is a high reliance on own judgement, family knowledge or past practices, and what other farmers are doing. Farmer discussion groups or business networks work well for many people but these seem to have ceased to operate in some of the NSW dairy areas. These group activities seem to work best for people who: are comfortable in group situations; are able to take criticism (actual or implied); believe they are interacting with peers with comparable contexts and operations; and are willing to share financial information. Consultants are influential but may be used only occasionally and for major decisions or turning points. Some regions do not have easily accessible consultants.

[1] Seven of these were also consultants and provided insights into farm business management from that perspective as well.

[2] There is increasing recognition of DairyBase but its direct use for FBM is very limited.

Most farmer respondents and all of the advisors and program providers/developers, believe that the industry offers enough and appropriate programs to develop farm business skills. Areas for consideration for further development relate to improving links between FBM and other industry programs, developing mixed delivery methods (on-line and face-to-face) and combining workshops with on-farm or online follow-up. Those who attended programs generally found them to be useful. Interest in, and attention to FBM tends to vary over time, depending on stage of business, work demands, availability of labour, seasonal and multi-seasonal conditions and transition events such as major investments and business succession. Impediments to participation in FBM programs included: preference or time needed for farm work; distance to location of program offer;[3] inability to commit to sequential or follow-up program components; seasonal and work-related events; perceptions of the fit of own level of skill and knowledge with the content of the offering;[4] and lack of knowledge of offerings. FBM programs were seen to be most effective where participants could bring and work with their own financial information, though people involved in program delivery noted that this can be difficult to manage within a time-limited learning event.

A number of the industry respondents also noted the problem of proliferation of courses, including through commercial service providers and the finance industry. Efforts at coordination amongst providers may be difficult but could have benefits. Respondents working in the TAFE sector were keen to get alignment for full accreditation, so that either, current 'full' courses could be modularised into short courses, or current short courses could be aligned with full offerings so partial and cumulative credit would be possible. On balance, and again from tertiary program experience, such coordination can be extremely difficult.

Recommendations

- Key industry service providers should work to harmonize language around the importance and key aspects and principles of farm business management. Key messages and expressions could be discussed, agreed and used consistently. The aim should be to elevate FBM as a work priority. In addition, sharing and analyzing farm business information should be 'normalized'.[5]
- Support, enhance and link existing dairy farm management programs, as opposed to developing new programs. The core programs (as named at the time of the of the study) would be:
    - Our Farm, Our Plan (focusing on goals and strategy);
    - Farm Business Fundamentals; and
    - Dairy Farm business Analysis.

[3] This is particularly noticeable for those who are in areas of NSW where there are few or highly dispersed dairy operations.

[4] Many farm advisers noted that self-assessment of business skills may exceed actual skill.

[5] In this case normalizing means that: sharing information is treated as a routine activity; that diversity in business operations is accepted (different is not wrong); and that sharing information has both business and industry benefits.

- Introduce programs with discussion of intuitive decision-making, emphasizing how normal and understandable this is, but then reinforcing the overall message of the benefits of analysis and reflection.
- Explicitly link industry production programs (eg Feeding Pastures for Profit), employment programs (eg ESKi) and succession programs (eg Stepping up, Stepping Back) to the core FBM programs.
- Promote a framework that situates each program according to purposes such as:
    - Clarification of objectives;
    - Observation of key indicators;
    - Analysis of feedback; and
    - Anticipation of threats and opportunities.
- Programs should have an explicit skill target and a nominated output/outcome ('participants will be able to …').[6] There are two reasons for this:
    - So potential participants know what they are going to achieve; and
    - To allow for providers with certifications systems to recognize prior learning (RPL).
- At this stage it is not recommended that program offers are designed as modules of certified programs. The focus should be on highly targeted skill development.
- Extension staff should continue to use personal contact and relationships to promote and target business skills programs.
- Continue to encourage participation in DairyBase but work on making data entry to DairyBase easier. Promotion of DairyBase could include strategies around:
    - Aligning this with the common language around FBM;
    - Analysing long-term data; and
    - Informing annual budgeting.
- Facilitate business network groups, especially for more scattered farmers where these might be based on conference style engagement (maybe twice per year), rather than regular (monthly, bi-monthly). These could include FBM training components.
- Any potential industry investment in decision-support tools should be subject to rigorous analysis, to consider the target end-user and likely uptake. Tools to support FBM should be based on simple but important indicators or ratios.
- Continue to promote the adoption of the Dairy Chart of Accounts within and without those core programs.
- Consult within industry to decide or confirm program naming with a view to maintaining major program names over a long period and across regions and states.[7]
- Trial and review blended (face-to-face and online) learning for FBM programs.
- Develop strategies and incentives to broaden the intra-business[8] participation in FBM programs. These could include:
    - Different individuals from within the one enterprise doing different modules;

[6] This is not to imply that this is not already occurring but rather to support the practice.

[7] Content can evolve over time or can be varied for context, but naming and general orientation should be as consistent as possible.

[8] That is, try to get more people from the each business to participate.

    - Broader plenary or reporting back and discussion sessions with wider participation;
    - Social activities around the program delivery to bring in more people from each business; and/or
    - A field or farm get together to follow up on programs, perhaps with workshop participants doing some of the presenting.
- Continue to encourage learning through exercises that involve real farm data.
- As the program set develops, create supplementary/refresher modules for mid-career farmers with previous training.
- Using known presenters with industry credibility is important to encourage participation in FBM programs, however the selective introduction of people with other forms of expertise and perspectives should be considered.

For reasons discussed in the body of the report, considerable patience, persistence and constancy on the part of program funders and providers is needed to effect change. Improving FBM skills is a long-term project. There will be a need to encourage and support life-long learning and more specifically, to accept, encourage and support intermittent more intense learning. Given the current priority of FBM amongst farmers, the nature and complexity of dairy work and the effect of local and family cultures on priorities and practices, normalizing FBM will not be achieved through a time limited set of interventions, but will require sustained and coherent efforts.

Project Background and Description

Background and motivation

Participation in dairy farm business program offerings has been limited. Researchers have identified that business management has a low priority amongst farmers, relative to other work activities. In addition, when there is attention to the business side of things, farmers generally don't go beyond simple financial indicators, such as cash flow. Financial and service providers to the industry have however identified current levels of financial business management practices as a risk to the industry. A high level of business acumen is needed to deal with a range of business risks, such as price volatility, cost pressures and balancing levels of debt and equity. It is likely that pressures for adaptation in production systems and business management are often in excess of capacity and willingness to adapt. Business management acumen is particularly needed to assess opportunities such as technical and management innovations, business expansion and reinvestment.

Aims and objectives

The main aim of this project was to examine perceptions of on-farm business management practices, the context of business management and related training programs, in order to identify strategies and initiatives to build business management skill levels and ultimately increase business resilience.

The objectives were to:

1. Identify key issues and findings from relevant studies.
2. Identify and review past and especially current farm business programs in order to evaluate impacts and lessons from those.
3. Understand the dimensions of and reasons for current attitudes to farm business management amongst farmers from a sample survey and interviews with farm business advisers and service providers.
4. Identify influences on business operators' approaches to farm business management.
5. Identify reasons for, and barriers to, innovation in farm business management practices and systems.
6. Develop and promote recommendations for the design, adaptation and implementation of farm business management programs and decision support tools (DSTs).

Project activities

- Review literature on farm business management to provide base knowledge and to generate issues for further examination in the survey. Particularly influential was a study of dairy farmers in Victoria (Cockfield and Doran-Browne 2018, see Appendix 1 for an overview)
- Develop and implement surveys of up to 50 farm business managers and up to 10 service providers (see Appendices 2-5 for details of survey instruments).
- Analyse interview content for themes and issues.

- Review studies and evaluations of business management programs, especially those managed or recommended by Dairy Australia.
- Collate the findings, especially considering:
    - Factors identified as associated with the adoption/non-adoption of particular farm business management practices.
    - Outcomes in relation to project/program goals (effectiveness).
    - Relative costs of different forms of intervention (efficiency).
    - The effectiveness of marketing strategies.
- Conduct consultations for feedback on findings and recommendations.

Scope of the study

The study was primarily focussed on how and why farmers make business decisions in order to develop recommendations on how they might be better supported in coming to those decisions.

The geographical scope for the survey was the NSW dairy farming regions covered by Regional Development Programs (run by Dairy Australia). The regions were:

- The Riverina (covered by Murray Dairy);
- Wagga, Forbes and Cowra (Dairy NSW);
- The Far South Coast (Dairy NSW);
- The South Coast (Dairy NSW);
- The Hunter Region (Dairy NSW);
- The Mid-north Coast (Dairy NSW); and
- The North Coast (Sub-tropical Dairy).

Research Questions

- Do dairy farmers apply farm business management practices that are generally recognised by researchers, industry extension officers and consultants as likely to support profitable business outcomes?
- What level of priority do farmers allocate to farm business management?
- Do farmers positively associate the adoption of such farm business management practices with better financial outcomes?
- What are the reasons why farmers do or do not adopt these practices?
- What business programs have been effective/ineffective in influencing business management?
- What are the factors that contribute to the effectiveness or otherwise of farm business management programs?

Perspectives on farm business decision-making

In this section we review some of the literature on farm business decision-making. This review informed the development of survey questions and analysis of the resulting data. A key theme is that there is evidence from other studies that improvements in farm business management skill and increases in attention to business management are associated with better business performance and higher satisfaction with that performance. Furthermore, attention to business management is essential to business growth and for risk management. Finally, the willingness to innovate within a business is also associated with better financial outcomes and longevity of the farm business.

The importance of a business focus

As with all agricultural sectors, cost-price pressures and technical innovation contribute to structural change in the dairy industry. From 2000–01 to 2016–17: the number of dairy farms in Australia decreased by 42%; per farm total capital increased by 142%, largely due to increased farm sizes and land values; and the number of enterprises milking fewer than 200 cows a year declined by around 71% while those milking between 200 and 350 cows increased and the number milking more than 350 cows remained steady (DAWR 2018). In contrast to Victoria and Tasmania, NSW milk production declined by more than 15% (DAWR 2018). These trends are consistent with the 'treadmill effect' in agriculture (Levins & Cochrane, 1996), whereby competition between farmers, now including international competition, keeps downward pressure on prices. Technical and managerial innovations can offset cost pressures in the short run but once these innovations are widely adopted, the competition effect continues, exacerbated by the relatively weak market power of producers.[9] Hence, investment decisions, return on investments, cost management and income maximization become increasingly critical where cost and price margins are narrow.

Responses to downward price pressures include: technical and managerial innovation; and increasing scale. Sinnett *et al.* (2017), looking at Australian dairy farms, found however that expanding the farm size/business can increase financial risk, so business analysis of such major investments is especially important. Furthermore, larger farms have more capital and labour, so business complexity is higher. A survey of dairy farms found that larger farms (those milking >350 cows) on average, employed 5.6 FTE workers in 2015–16 whereas medium-sized farms (milking 200–350 cows) had 3.2 FTE and small farms (milking <200 cows) employed 2.2 FTE (DAWR 2018). Larger farms tend to employ more skilled workers, can offer more diverse and specialised roles and can achieve higher labour productivity in milking rates and lower labour costs for production (Dufty *et al.* 2018). The top three workforce difficulties dairy farmers are expected to experience in the future are: inadequate business profit to employ more workers (53% farms); negative perception of the jobs in the industry (31%); and

[9] The dairy industry tends towards a monopsony (many sellers and few buyers) and when combined with a perishable product and producers dependency on cash flow, market power is more towards buyers than sellers.

an ageing workforce (26%) (Dufty *et al.*, 2018).[10] Thus labour productivity and management are critical to the business. Complements or alternatives to labour inputs are expenditure on physical capital and technological or managerial innovation,[11] so that analysis of and planning for such investments are likely to make for better returns on investment.

Innovation in management may also be important. Leddin *et al.* (2011) compared the performance of a dairy farm business in south-west Victoria where the dominant farm management system had remained largely unchanged over 10 years with 'alternative futures' that involved modest changes to a farm management system. The results showed that if the farm remained operating under *status quo* conditions, profitability, liquidity and equity would decrease. The 'change' options involved improving pasture consumption by the milking herd and expanding the pastured milking area to reduce the need to purchase feed. The key measures used to assess business performance were annual operating profit, nominal internal rate of return (IRR), annual net cash flow and the value of the owners' capital in year 10. With such changes to the system, annual operating profit increased, on average, by at least 3 times, the nominal IRR increased 2.3 percent, annual, net cash flow increased $238,000 and owners wealth increased by $3 million for the alternative futures. Furthermore, these improved performances were achieved without markedly increasing overall risk.

Business operators are in a complex decision-making environment, managing multiple markets including those for milk and milk products, livestock (including for AI), feed, water and labour. Farmers have to manage price and income volatility, largely driven by world prices and the effects of varying seasonal conditions on milk production and costs of farm inputs. For example, average cash income of dairy farms declined from around $125,140 in 2015–16 to $89,600 in 2016–17 and the average farm business profits, including capital depreciation and family labour costs, were negative in both years (–$10,170/farm in 2015–16 to –$8,300/farm in 2016–17) (DAWR 2018). Consistently higher performing farms achieve better results through a combination of higher technical efficiency (producing more pasture/milk relative to resources and inputs), effective cost control (low cost of production) and tactical flexibility (maintaining high levels of performance in a volatile environment (ADIC 2015). Furthermore, the farmers in these businesses tended to: (1) have a clear understanding of their business; (2) seek information; (3) engage with clear managerial responsibilities; and (4) use service providers' information (ADIC 2015).

As observed in other studies, including in other parts of the world, maximising (economically) technical profit is not the only, or even a major motivation for dairy farmers (Henson *et al.* 2014; Long 2013). Farmers give high priority to 'terminal values' such as 'keeping up traditions' and 'doing interesting work'. These goals are important in that the more terminal values farmers have, the longer they continue dairy farming (Henson *et al.* 2014). Profit maximisation can therefore be seen as a means of generating money to meet other goals (Nuthall, 2009; ADIC, 2015), especially the goal of continuing to be a dairy farmer, which was a common goal for respondents in this study.

[10] From this and previous studies that some business operators' reluctance to employ more, or even any, paid labour is often cited as one reason for limiting business growth.

[11] Bigger dairies, automated milking, role specialisation and so on.

From a study of New York State dairy farmers, Gloy *et al.* (2003) found that the farmers who conducted detailed financial analyses were substantially more profitable than those farmers who performed the calculations "in their head" or did not make the calculations at all. Those who used some form of investment analysis—whether it be the payback period, cash flow analysis to assess repayment, or discounted cash flow analysis—were substantially more profitable than their peers. From a study of 204 NSW dairy farmers, Harrison (2006) found that a greater emphasis on financial management was associated with greater satisfaction with business performance. Appraisal practices, including calculating the payback period for investments and assessing the relevant costs and benefits of decision alternatives, were found to be particularly important in explaining satisfaction.

Farmers' stage of career (over a working life) also influences motivation and the decision-making process (Long 2013). Mishra *et al.* (2009) found an inverted U-shaped relationship between age of the farm operator and financial performance. That is, financial performance improves with age to a point but then declines. This could be a function of increasing and then decreasing cognitive and physical capacities, the level of pressure from financial and business or risk to the business, degree of personal engagement with the work and business and/or self-assessment of operational and business acumen. That is, farmers may assume they have sufficient experience and accumulated knowledge to run the farm without recourse to business analysis and more formal planning. Even if the overall attention to business management varies, Mishra *et al.* (2009) found that management strategies such as increasing the number of decision makers, engaging in value-added farming, and having a written business plan led to higher financial performance across all ages.

Given the complexity of the farm business environment, there is a need for a range of skills. Smith and Inglis (2013) proposed a set of skills required within the dairy industry (Table 1).

Table 1: Desirable skills for the Australian Dairy Industry by skill type

Business and Management Skills	Human skills	External environment skills
Business		
Computer	Succession planning	Communication
Analytical	Networking	Technology innovation
Researching	People management	Information management
Forecasting	Work life balancing	Corporate governance
Cost benefit analysis		

Source: Smith and Inglis, 2013

A study conducted in six European countries (Rudmann, 2008) identified five categories of farmers' skills that enhance managerial ability.

Table 2: Skills that contribute to managerial ability

Professional Skills	Management skills	Networking skills
Plant or animal production Technical	Financial management Human resource management Customer management General planning	Dealing with other farmers and corporations Team work Leadership
Strategic skills	**Opportunity skills**	
Using market information Reflection Monitoring and evaluation Conceptual Planning Decision-making	Recognising business opportunities Market and customer orientation Awareness of threats Innovation Risk management	

Source: Rudmann, 2008

It is highly unlikely that this range of skills, at least expressed at high levels, would be found within one individual so there may be benefits in specialisation within a multi-member farm enterprise. Farmers are however often strongly focussed on professional skills, these being seen as contributing to the most basic drivers of the farm business (production) and aligned with personal work preferences. The Australian dairy industry has traditionally provided extensive training in such skills. In regard to human resources management, farmers' attitudes vary markedly. Many find it a difficult and frustrating area, though, from this and a previous study (Cockfield and Doran-Browne 2018) there are dairy farmers who have developed systematic approaches to managing people and some actually like this part of management. The dairy industry has developed extensive offerings and tools around human resources management and raised awareness of its importance. While service providers in the industry have long sought to also develop farmers' financial management skills, behaviour has been slow to change. One Australian study found that less than 20% of dairy farm businesses run a formal cashflow budget, while less than 5% regularly update actuals against budget (ADIC, 2015). Furthermore, within this subset a significant portion have not completed the cashflow voluntarily, i.e. it has been done at the request of their bank manager or similar entity.

Service providers in the dairy industry recognise the importance of business skills but there can be a gap between farmers and research and extension (R&E) workers in attitudes to business skills. First, there are differences in priorities, with farmers having multiple goals, including those related to the terminal values (above), while R&E workers are much more focussed on technical and management innovation and economic profitability. Second, R&E workers are trained in and regularly use particular analytical techniques, whereas farmers may have limited experience with, and only intermittent exposure to these. Third, the R&E workers are more specialised in what they focus on, whereas the farm operator is more of a generalist, dealing with the complexity described above. Finally, business analysis can be very challenging, in that it might indicate the need for major change, which could include adopting unfamiliar or non-preferred modes of work or even reveal existential threats to the business. Hence, the messaging and narratives around FBM programs are very important.

Studying farm management decision-making

Farm management decision-making has been extensively studied to understand and anticipate farmers' actual or likely choices, to identify how to influence management decisions and to categorise management styles. Some studies focus on the nature of farm businesses, and in particular, whether or not farmers are 'entrepreneurs'. The relevance of an entrepreneurship orientation is that it can drive innovation and re-investment, both of which can contribute to long-term viability, as contended above.

An entrepreneurial orientation?

There is extensive research on farm entrepreneurship (Rudmann, 2008; McElwee, 2006; McElwee, 2006; Pyysiäinen, Anderson, McElwee,& Vesala, 2006; Giera, 1999) and entrepreneurial attributes have been identified as common (Dabson, 2011). Others are however more sceptical, or perhaps apply more restricted definitions and therefore see limited managerial and business capability (Borch & Forsman, 2001; McNally, 2001). The idea of entrepreneurial orientation (EO) is from strategic management literature and refers to the process, practices, and activities that lead an entrepreneur or firm to start and operate a new venture (Child, 1972; Lumpkin & Dess, 1996). Technically, there would be very few true entrepreneurs in the dairy industry, given that the overwhelming majority of operations are based on existing businesses, with many being multi-generational farms. EO has however been observed and 'measured' in agricultural industries (Mahindarathne, & Gunaratne, 2015). An entreprenural farm/farmer has been defined as someone 'who is able create and develop a profitable business in a changing environment' (de Wolf & Schoorlemmer, 2007). EO can be identified through 5 key characteristics: risk taking tendency; innovativeness; autonomous mindset; aggressiveness towards competitors; and proactiveness to market development (Lumpkin & Dess, 1996). EO can be evident in both individuals and 'firms'. Entrepreneurial skills are not fixed because they are affected by different firm and environmental factors (Lumpkin & Dess, 1996).

Miller (1983) proposed three types of entrepreneurship***: simple firms, planning firms,*** and ***organic firms.*** Simple firms "are small and their power is centralised at the top" and the nature of the entrepreneurship is determined by the **leadership imperative** (Miller, 1983), which would be typical of many dairy farms where there is a sole or clearly dominant decision maker. Planning firms are generally bigger and apply formal plans and controlling mechanisms for operational efficiency. More of these type of farms are likely with increasing scale and labour force. **Strategic imperatives** influence the entrepreneurial ability of the planning firms. Organic firms are adaptive and open to expert advice. Dairy farming is highly suited to adaptation, with the potential for incremental systemic change, such as through feed source selection, breeding programs and so on. McElwee and Annibal (2010), concluded however that farms are highly divergent in terms of their entrepreneurial and business capability.

Alsos, Ljunggren, and Pettersen (2003), in a Norwegian study, identified three types of entrepreneurial farms (see Table 3).

Table 3: Three types farm entrepreneurs

Key characteristics	Pluriactive	Resources exploiting	Portfolio
Motivation	Continuing farm operation	Best use of resources	Exploiting ideas
Goals	Fosusing on income generation	Utilizing own resoures	Exploiting new business ideas
Idea sources	Family/ farming commnity	Family/ other	Various
Relation to farm	Good farm life	Income and life quality	Farm as business
Capital requirements	Lower capital	More than pluriactive	Highest capital
Ownership and employment	Only household members	Usually family members	Internal and external members

Source: Alsos, Ljunggren, and Pettersen (2003)

Pyysiäinen, Anderson, McElwee, and Vesala (2006) then identified sets of entreprenural skills (Table 4), many of which overlap with the business management skills summarised above.

Table 4: Entrepreneurial skills

Personal skills	Interpersonal skills	Process skills
▪ Innovation and intiatives ▪ Risk taking ▪ Challenge acceptance ▪ Responsibility ▪ Dealing with uncertainties	▪ Communication ▪ Negotation ▪ Influencing ▪ Integration and Demonstration	▪ Planning and orgonising ▪ Evaluating and analysing ▪ Plan excution

In relation to innovation, comparative studies suggest that conservative 'firms', according to EO frameworks, tend to have poorer performance outcomes, than do entrepreneurial ones (Green, Covin, & Slevin, 2008; Rauch et al., 2009; Wiklund & Shepherd, 2005).

Other research has seen EO as a resource-centric strategic position (Covin & Slevin, 1991), as firms need plenty of resources to enact entrepreneurial strategies (Wiklund & Shepherd, 2005). Business management capability, or human capital, is one of the base layers of resources and then other forms of 'capital' deficiency may limit the quantity and quality of resources in firms (Dollinger, 2008). Entrepreneurial efforts and activities also positively influence firms' financing capacity and enable firms to create more resources and to utilize resources efficiently (Grande, Madsen, & Borch, 2011). There is however a long history of more conservatively managed farms being able to survive through generations, with cost management and asset accumulation strategies. It may however be the case that contemporary conditions require a much stronger entrepreneurship orientation. Some respondents to the farmer survey in this study expressed the ideas that: there was now little margin for error; farmers needed to get most things right; and 'you could not stand still' (adaptation and innovation). What can be done to encourage this orientation and equip farmers with the appropriate management skills?

Modelling farm management

In order to determine where, when and how farm management ability might be developed, researchers have modelled the factors that influence that ability (Nuthall, 2009) (Sumner & Leiby, 1987) (Nuthall, 2001). Muggen (1969) identified 61 variables that influence 'success' and Nuthall (2009) adapted those for a 'structural model of managerial ability' in farming (see Figure 1).

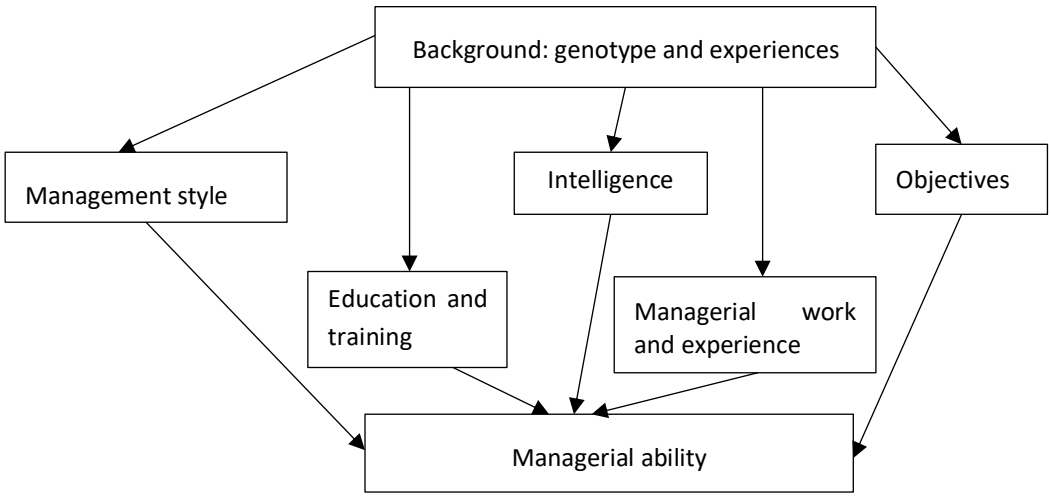

Figure 1: Structural model for farmer's managerial ability, adopted from

Source: Nuthall 2009

Nuthall and Old (2018) developed this further (see Figure 2) to propose three 'overarching abilities': application of intuition; formal planning ability; and the ability to implement the plans (Nuthall & Old, 2018). Farm managers' knowledge, including production, technical, and system knowledge, are directly influenced by intuition and planning. Personal background, genotype, and early environment affect intuition and farm business objectives. This suggests that some patterns of management, especially related to personality and the influence of family, could be quite difficult to change, though we will argue later that experiential learning can still be influential.

Assuming that technical knowledge is largely addressed in other industry programs, intelligence is difficult to directly influence and changing farm management style might be a difficult and lengthy process, then farm management programs in the shorter run might usefully encourage: *observation* of key indicators; the collection and analysis of *feedback* (from business performance, production data, consultants etc); the *anticipation* of threats and opportunities; and the clarification and review of *objectives*. Industry programs more generally can also contribute to *experience*, and it has been noted previously (Cockfield and Doran-Browne 2018) and in this study, that training programs, engagement with other farmers and other learning opportunities do lead to changes in practice and management. An important point from the model is that intuition is central to decision-making.

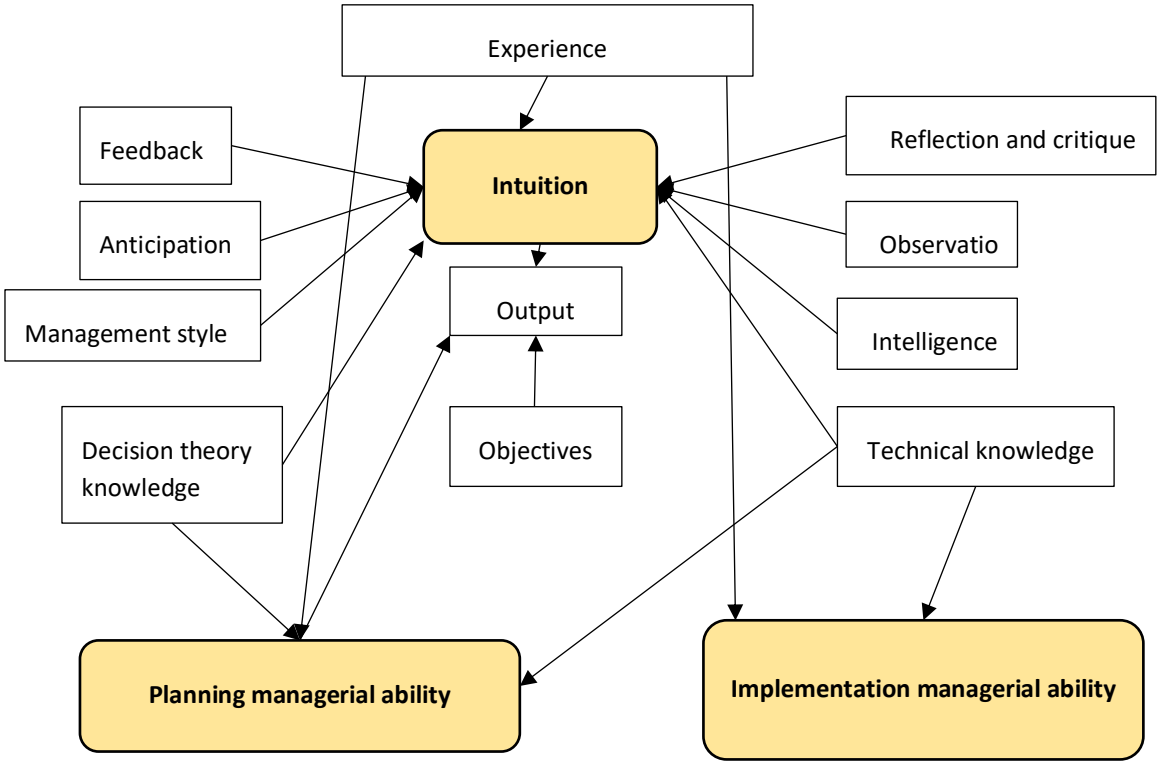

Figure 2: Farm decision making model based on intuition, planning and implementation

Source: Nuthall & Old 2018

Intuitive decision-making

Rational models of decision-making for personal, political and business decisions have been both dominant and persistent in the social sciences. For this discussion, rationality is taken to encompass:

- A conscious recognition and pursuit of one's own goals;
- A capacity to choose amongst options so as to more or less maximise personal/family benefits or utility;
- Decision-making based on some degree of reflection and analysis; and
- Capacity to formulate and enact plans to achieve goals or outcomes.

The implication is that in making decisions, reason will, at least over time, override emotion. Despite extensive criticisms and challenges, rational models of decision-making are remarkably persistent and there may be several reasons for this:

- The structures of reason, logic and evidence are reinforced through formal education;
- Discourses of science and extension are based on evidence and reason;

- Individuals generally prefer to see themselves as rational and/or making reasoned decisions; and
- It is difficult to derive causal relationships in alternative models of cognition.

There has however developed challenges to the rationalist models, for example through the work of Daniel Kahneman (2011). Kahneman argues that intuitive thinking is the dominant cognitive mode, with reflective, evidence-based thinking being rare and effortful. Farm managers, like managers of other businesses, rely heavily on intuition (McCown, Carberry, Dalgliesh, Foale, & Hochman, 2012; Nuthall, 2012; Nuthall & Old, 2018). Farmers use a heuristic decision model, where the farming practices are viewed as art rather than science (Eastwood & Kenny, 2009). Heuristics focus on approaches that are "simple", "cost effective" and consistent with a farm's "routines and goals" (Eastwood & Kenny, 2009). Some scholars argue that this rapid and intuitive thinking is based on experience and accumulated knowledge (Khatri & Ng, 2000; Nuthall, 2012), though Kahneman is much less convinced about this (2011). He sees much decision-making as highly subject to emotional responses – more about 'how do I feel about this', rather than 'what do I think about this?' Furthermore, people are very good at rationalising intuitive decisions after the fact.

Fast, intuitive thinking is practical for many aspects of life and management (Kahneman & Egan, 2011), enabling people to rapidly deal with many issues within complex and dynamic systems. Therefore it can work well in an unstable business environment where plans can become rapidly redundant (Khatri & Ng, 2000). Dairy farmers, for example are dealing with multiple systems, including dairy product markets, feed markets, feed production systems, animal management and health systems and so on. Extensive and continuous reflective thinking on all aspects of those would be paralysing. In addition, intuitive thinking may be a 'good enough' approach to decision-making. There may be a large margin for error around recommended practices and a 'failure to optimize the decision will not be costly unless the decision departs substantially from the optimum.' (Pannell 2006, 557). That is, 'payoff curves' from investment or allocation of resources can be relatively flat after early gains and so approximations may be sufficient and also enable farmers to spend time on other areas of management (Pannell 2006). It is also apparent that farmers can be quite successful without obvious reliance on formal, rational analyses. Effective farm decision-makers follow a pattern of: identifying and focusing on two or three critical variables; responding rapidly and decisively, even if the best option is not available; being prepared and proactive and; knowing that in hindsight some decisions will turn out to not be ideal.

The efficiency of intuitive decision making process may however, be augmented by recognising and addressing the limitations of intuition (Nuthall & Old, 2018) and selectively using decision-support tools (DSTs) based on expert systems (Nuthall, 2012) and artificial intelligence (Chase, Ely, & Hutjens, 2006), developing managerial skills and ability (Nuthall & Old, 2018), and using relevant data (Antle, et al., 2017; Antle, Jones, & Rosenzweig, 2017; Cabrera, 2018). Since the more farmers experience, read, discuss and think about a particular subject, the better their intuitive decisions (Long, 2013), extension activities can contribute in all those areas.

Key roles for extension are to stimulate *reflection and critique* (from Figure 2) and to enable business managers to decide on when and how they should make changes to production practices, infrastructure and management practices and systems (Klerkx & Nettle, 2013). As argued above, the

treadmill effect pushes farmers towards constant innovation, especially technological innovation to reduce costs so that medium to large scale farms tend to be more automated (Dufty *et al.*, 2018). In addition, with feedback and reflection, there is an increasing focus on data use and management for 'smart farming' (Wolfert, Ge, Verdouw, & Bogaardt, 2017). The management and application of data are seen as means of increasing farm management skills (Chen, Mao, & Liu, 2014) and decision-making and even changing management style (Janssen *et al.*, 2017). Wolfert, Sorensen, & Goense (2014) proposed a 'Cyber-Physical' farm management model, whereby, no matter the degree of automation and artificial intelligence, humans will always be in the management system. Le Gal, Dugué, Faure, & Novak (2011) see three main human functions in future systems: (1) farmers as decision makers, (2) advisors as support providers and (3) researchers as the 'prodders' through technical and methodological research.

Farm management and decision-support tools

Many studies (Cabrera, Jagtap, & Hildebrand, 2007; Giordano, Fricke, Wiltbank, & Cabrera, 2011) have concluded that decision support will help with dairy farming management and decision making. As an example of growth in this area, the University of Wisconsin-Madison provides around 40 computerised dairy farm decision tools (Cabrera, 2018) for aspects of dairy management, from feeding to genomics to finances and price risks. The two types of DST generally observed in farm and agricultural industry (Rose *et al.*, 2016) are: dynamic software tools; and sources of information. Dynamic software tools may include: computer software, mobile applications, and web-based as well as paper based interfaces (Dicks, Walsh, & Sutherland, 2014; Rose *et al.*, 2016). Software driven DSTs facilitate evidenced based farming decision, reduces production cost, increases the yields, and downgrades the environmental impacts (Rose *et al.*, 2018).

With the winding back of face-to-face extension services, alternative or supplementary pathways of influence include group-based extension, short-term project-based extension, private advisory services, computer-based and/or on-line decision-support systems (DSSs) or some combination of these. DSSs offer the prospect of low costs of delivery, time flexibility in terms of when users engage with them and learning opportunities. DSSs can support farm management through data management and forms of 'evidence-based recommendations' (Rose *et al.* 2016, 165). They are also a means of 'making agricultural systems science more accessible' (McCown 2002, 180). Applications can include benchmarking, scenario exploration, examining potential long term outcomes of actions (McCown et al. 2012) and using simulations to address uncertainty through 'what if' scenarios (McCown 2012).

The main industry investment for general management DSSs is now in DairyBase, which is more of the second type of DSS (source of information) which can include production and financial data and enable comparisons across time and farm businesses. Evidence to date (Cockfield and Doran-Browne 2018 and this study) suggests the direct use of DairyBase in farm management decision-making is limited. This accords with findings from reviews of DSSs across other agricultural industries in Australia, where there has been considerable non-adoption and 'dis-adoption'[12] (Donnelly *et al.* 2002, McCown 2012, McCown, Brennan, & Parton 2006, McCown & Parton 2006), something also observed in other

[12] Initial use and subsequent cessation of use of the DSS.

developed countries (Rose *et al.* 2016). There have been studies to understand factors of DSS 'acceptability' to farmers (Rose *et al.* 2016) and action research to understand adoption, non-adoption and dis-adoption (Donnelly *et al.* 2002, McCown 2002, 2012, McCown *et al.* 2012). There have also been efforts to examine the decision-maker in context, noting attitudes to risk and cognitive tendencies and constraints (McCown 2012, McCown *et al.* 2012).

Barriers to adoption include actual or perceived skills limitations (computing or mathematical), degree of difficulty in operating a system, the system not being seen as relevant to an individual farm or production system, low trust in the source of the system or data and scepticism about the benefit of the DSS to the business (Rose *et al.* 2016). These could be addressed through adjustments to system design, user training and support and extension messaging. There may however, be more fundamental issues to consider, relating to the cognitive incompatibility between DSSs and farmers' modes of decision-making.

McCown and Parton (2006) believe that some of the problems of DSS adoption stem from a paradigm shift within farm management scholarship or what they see as the triumph of 'theorists over pragmatists'. For them, the theory of the firm came to dominate the academy and the development of models and information for extension, even though this theory was really developed to explain the operation of markets, rather than particular firms or farms. Second, DSSs were originally designed to influence middle managers in larger corporations with structured decision-making systems, whereas farmers operate in a different context and decision-making is more intuitive, less rule-based and situational (McCown 2012, 17). In particular, there can be a mismatch between DSSs based on probabilistic thinking and farmers concern with 'uncertainty about uncertainty' (McCown 2012, 13). There is a difference between modelled simulations of risk and risk evaluation processes and actual expectations of outcomes and risk amongst farmers (McCown and Parton 2006).

A group of agricultural decision science scholars from Australia, USA, UK, Belgium and Italy demonstrated the use of DSSs in evidenced-based farming decision of various aspects of agriculture (Dicks, Walsh & Sutherland, 2014; Kerselaers, Rogge, Lauwers, & Van Huylenbroeck, 2015; Rose *et al.*, 2018; Rose *et al.*, 2016)). Others (Hochman & Carberry, 2011; McCown, 2012; Rose *et al.*, 2016), as noted in Rose *et al.* (2018), argued for better design of the DSS to increase its uptake.

Many of the Australian studies cited above, were based on long engagement with farmers presumably interested in improving production and willing to work with external agents and yet there was still significant dis-adoption (Donnelly *et al.* 2002, McCown 2012, McCown & Parton 2006). Dis-adoption is where the user of a DSS adapts it in such a way that is unlikely to produce the outcomes that would be generated when applied as intended. Some of this may be explained by adaptations of the original system to develop 'simpler' and 'cheaper' applications (McCown *et al.* 2012, 37). In particular, over time then, farmers moved from 'measurement' to 'estimation' (McCown 2012, 11) which reduces both the time commitment and data requirements of the user. Simulations were initially used in full and thereafter used to generate rules of thumb (heuristics) which were applied outside the DSS (McCown *et al.* 2012, 41). Thus, what might look like dis-adoption could be adaptation. These adaptations suggest a combination of intuition and more formal analyses. Rose *et al.* (2016) identified 15 factors for farmers and farm advisors to consider for the successful implementation of DSSs See appendix 10 for more on this.

Adoption of innovations

Adoption of recommended technologies and management practices is associated with farmer or farm business 'types', where those types are derived from some combination of personal and farm characteristics and personalities (see for examples Crawford and Nettle 2014; Jansen 2010; Kim and Cameron 2013). Hence for example, non-adoption is more likely amongst those who are more 'self-reliant' (less connection with industry and research organisations) (Jansen 2010) or are 'winding down' or more lifestyle than growth focussed (Crawford and Nettle 2014). Davis-Brown and Salamon (1987) developed the popular yeoman-entrepreneur typology which in Australia is usually thought of as the 'traditional' versus 'business-oriented' types of farming, which exhibit different production and management strategies. Traditional farming is usually associated with small farm scales, continuity of farm management style over generations and risk avoidance, whereas business-oriented farming is more aligned with scaling up to larger farms, maximising profit and a dependency on the market. There can however be transitions between the two styles of thinking (Niska *et al.* 2012). Farming styles may change through education or experience, potentially resulting in a conflict in management styles, for example with younger farmers advocating entrepreneurial management techniques to a parent with a traditional approach to farming (Davis-Brown and Salamon, 1987).

Table 5: Checklist for good design of decision support tools

Performance	Ensures the workability of the DST being used.
Ease of use	Implies the degree to which the DST are easy to use.
Peer recommendation	Ways to ensuring peer to peer exchange of knowledge
Trust	Whether the DST produces good evidence and is trusted by users
Cost	The cost-benefit analysis of the DST/ the initial cost of the users.
Habit	Degrees of usage of the DST by the farmers.
Relevance to user	If the DST are used by farms for relevant purposes.
Farmer-adviser compatibility	If the DST are equally familiar among farmers and advisors.
Age	Fitness of the DST among different farmers with different ages and skills.
Scale of business	Suitability of the DSTs to all farms irrespective of their skills.
Farming type	Appropriateness of the DST to farms irrespective of their nature of operations
IT education	Demand from DST for IT skills to use at farm level.
Facilitating condition	Availability of supporting know-how to use the DST at farm level.
Compliance	The legislative and market requirements of users to adopt the DSTs.
Level of marketing	Ways to inform the users regarding the DSTs.

Cabrera (2018) reviews the University of Wisconsin Madison DST offerings to identify six attributes of usability: (1) user friendliness; (2) updated technology; (3) individual user specificity; (4) grounded on best information; (5) relevancy of tools to time; and (6) fast and simple answers to complex dairy farm problem.

Implications for farm business management programs

It is well understood and observed that farmers, as with other people, make decisions under the influence of a range social, cultural and familial values. These values lead to preferences around types

of production systems, risk preferences and debt and equity structures. Surpluses (cash minus costs) are critical to being able to continue to farm but it is rare for farmers to pay attention to economic profit, marginal returns or return on assets or investment. Farmers have some entrepreneurial spirit, but it is not easy to be a true entrepreneur given: the majority of farm businesses involve heredity; delays in the transfer of full business responsibility from one generation to the next; the influence of peers and local and 'dairy' cultures on managers; and conservative tendencies in the agricultural finance sub-sector. On top of that, many dairy areas have high land prices, due to proximity to urban or lifestyle areas and so expansion costs through more land are extremely high. Therefore, there are likely to be many conservative 'firms' in farm business sectors due to history and context.

There is however plenty of evidence of diversity amongst farmers and farm businesses and there are a myriad of typologies to demonstrate this diversity. These typologies can be useful to highlight diversity when designing programs and communication strategies. It is however not clear that those typologies can be used to predict business outcomes at the individual level. This will be further discussed in the next section.

Similarly, while the attitudes, skills and behaviours required to sustain and grow a dairy business are well-understood in a general sense, we do not really know how these things come together in an individual, and especially within a collection individuals (the business partners). As in the diagrams above, logically beneficial attributes and behaviours (intelligence, acute observation, and informed reflection) are mediated through and interact with, personality and intuition to create something of a 'black box'. It is possible to explain particular cases of business growth and apparent success in relation to specific attributes and behaviours[13] but less easy to predict outcomes, based on those.

For the purposes of developing farm business management programs it would be time consuming and paralysing to spend too much effort on understanding individual 'black boxes' of decision-making. It may however be beneficial to give an overview of intuitive decision-making. There are three potential benefits from this.

- It would normalise intuitive decision-making so that people don't feel that they are necessarily 'deficient' or wrong relative to others;
- It would retain the importance of intuitive decision-making as one part of thinking; and
- Most importantly it would enable an explicit discussion of the limitations of, and risks in, an exclusive reliance on intuition, leading to the case for observation, analysis and structured reflection.

An implication of the prevalence of intuitive decision-making and limited interest in business analysis is however that expectations around the extent and rapidity of the impact of FBM programs may need to be modest. In any one period, there will be large numbers of business managers with low motivation to participate.

- Some people are contemplating industry exit, through financial pressure or retirement.

[13] Efforts to retrospectively explain business outcomes in this way needs to be treated with care anyway. It may be fitting outcomes to a set of factors, without considering if all those factors matter, there are different weightings for them or how they might interact.

- There is a significant number of people who are largely self-reliant and do not engage with industry programs, though they may still be indirectly influenced by what other more engaged farmers adopt or change.
- There are farm businesses, especially those run by early career farmers, where labour is limited, who find it difficult to get away from the farm. Again though, they may still be indirectly influenced by other farmers or consultants.
- There is a relatively low priority given to business management in relation to other farm activities.

Despite the difficult environment, there are good arguments for persevering with the development, refinement and delivery of FBM programs. First, an increase in FBM skills will better equip farmers to cope with the complexity and volatility described above. Second, industry development programs can and do build skills and change behaviours. Third, the dairy industry has an extension system that has reach and capacity sufficient to develop and deliver such programs.

Descriptions of the survey participants

The survey farms and on-farm respondents

For the on-farm survey, 50 famers were interviewed, representing 44 farm businesses. Some average farm business figures are in Table 6.

Table 6: Farm business sample averages

	Sample average	Range	National average	NSW average
Farm area (ha)	341	49-1214		
Milking platform (ha)	189	28-996		
Herd size	390[a]	65-1360		
Total milk production (ML)	3.1[a]	0.4-12.2	1.42[b]	1.59[c]
Per cow milk production (l/yr)	7,342	444-13,940		
Stocking rate hd/ha	2.7	1-8.6		1.62
Labour (people)	6.1[a]	2-25		5.6[d]

[a]Sample skewed by two large herds of more than 1200. [b]DAWR, 2018. [c]AgSurf, 2018. [d]Dufty *et al.*, 2018

About 90% of farmers said that dairying was their main source of income. As shown in Table 7, those businesses with a higher dependency on dairy income have larger farms, more cows and more people working in the business.

Table 7: Descriptive statistics of survey farms by dependence on dairy income

Is dairying your main source of income?		Herd size (milking cows)	Area of milking platform (ha)	Labour units
Yes	Mean	419	208	6.5
	Minimum	130	28	2.0
	Maximum	1360	996	25.0
	N	*37*	*27*	*35*
No	Mean	176	63	3.8
	Minimum	65	32	3.0
	Maximum	375	121	7.0
	N	*5*	*4*	*5*

About 69% of the surveyed farmers have been in the dairy industry for more than 10 years and another 17% for 6-10 years (Table 8). In general, and as expected, the longer the respondents' time in the industry, the larger the area of their milking platform, the larger the herd size, and the more people working in the business.

Table 8: Survey farms by time in the industry and production

How long have you been in dairy industry?		**Herd size (milking cows)**	**Area of milking platform (ha)**	**Total milk production (ML)**	**No of people employed**
1-5 years	Mean	124	79	0.7	2.8
	Minimum	65	39	0.4	2.0
	Maximum	170	121	1.0	3.0
	N	*6*	*5*	*6*	*4*
6-10 years	Mean	290	99	2.4	4.6
	Minimum	100	60	0.7	3.0
	Maximum	475	121	4.2	8.0
	N	*7*	*4*	*7*	*7*
>10 years	Mean	478	231	4.0	7.0
	Minimum	130	28	1.2	3.0
	Maximum	1360	996	12.2	25.0
	N	*29*	*22*	*25*	*29*

About 70% of the respondents have irrigation for feed pasture or crops. The majority of farmers (about 79%) participate or have participated in business networks or discussion groups. Farmers who participate in groups, on average, have higher herd sizes, milk production (both total and per cow) and more labour. There could be a number of relationships amongst these factors. The participants have more labour and could therefore have more time for off-farm activities; participants have been in the industry longer and developed more extensive networks; the participation in a group might be making a direct contribution to business growth; or the participation might be a proxy for particular personality and cognitive types that are predisposed to business growth. Significant work would be needed to confirm any of those propositions.

Table 9: Survey farms (whether they participate in business network group)

Do you participate in business network group?		**Herd size (milking cows)**	**Area of milking platform (ha)**	**Total milk production (ML)**	**Average milk production (L) per cow per year**	**Average milk production per milking platform (L/ha)**	**No of people employed**
Yes	Mean	396	180	3.3	7546	18768	6.6
	Minimum	65	28	0.4	5143	6612	2.0
	Maximum	1360	996	12.2	13938	71429	25.0
	N	33	24	31	31	22	31
No	Mean	385	220	2.5	6437	24889	4.8
	Minimum	90	32	0.4	4444	12658	3.0
	Maximum	800	550	5.7	7436	53125	7.0
	N	9	7	7	7	5	9

Table 10: Survey farms by experience (duration) in farm business and learning participation

How long have you been in farm business?			How many different courses/programs/field days?			Total
			None	1-2	≥ 3	
1-5 yr	Do you participate in business network group?	Yes		1	1	2
		No		1	0	1
	Total			2	1	3
6-10 yr	Do you participate in business network group?	Yes		2	3	5
		No		0	1	1
	Total			2	4	6
>10 yr	Do you participate in business network group?	Yes	2	8	10	20
		No		4	1	5
	Total		2	12	11	25

About 53% of farmers who responded clearly to this question, attended 1-2 different courses or programs and 42% farmers attended more than 2 (Table 10). Only two farmers did not participate in any course/program and one of them mentioned distance as a barrier to participation .

Finally, on-farm participants were asked a series of questions that are being used by Dairy Australia to categorise different types of farmers. Based on analysis of the responses to these questions, undertaken by Dairy Australia, we appear to have recruited two main types. There was one respondent classified as *Facing challenges*, with 46 percent being *Dairy enthusiasts* and 52 percent being *Progressive innovators*.[14] It is estimated that *Dairy enthusiasts* comprise about 26% of Australian dairy businesses and 20% of all production, while *Progressive innovators* comprise about 26% of businesses and 43% of production. Some characteristics of the attitudes and behaviours of each of categories represented in the survey are summarised in Table 11.

[14] The unrepresented groups are*: Committed traditionalists* and *Questioning involvement.* The former, perhaps about 16% of dairy farms, generally have a positive view of the industry, have relatively high investment but are low on R&D and medium on adoption. The latter, about 17% of businesses, have medium industry sentiment and low on growth, adoption, information-seeking and use of technology.

Table 11: Expected attitudes to aspects of the dairy business by types

	Attitudinal location by type		
	Facing challenges	**Dairy enthusiasts**	**Progressive innovators**
Industry sentiment	Low	High	High
Investment	Low	Medium	High
Risk	Low-medium	Medium-low	High
Research & Development	medium	Medium-high	High
Adoption/change	medium	Medium	High
Information seeking	Medium	Medium to high	Medium to high
Training participation	Low-medium	Medium	High
Technology/business sophistication	Medium	Medium	Medium to high
Business/career cycle	Exit to *status quo*	Predominant *status quo*	*Status quo* to growth

Source: Dairy Australia *nd*

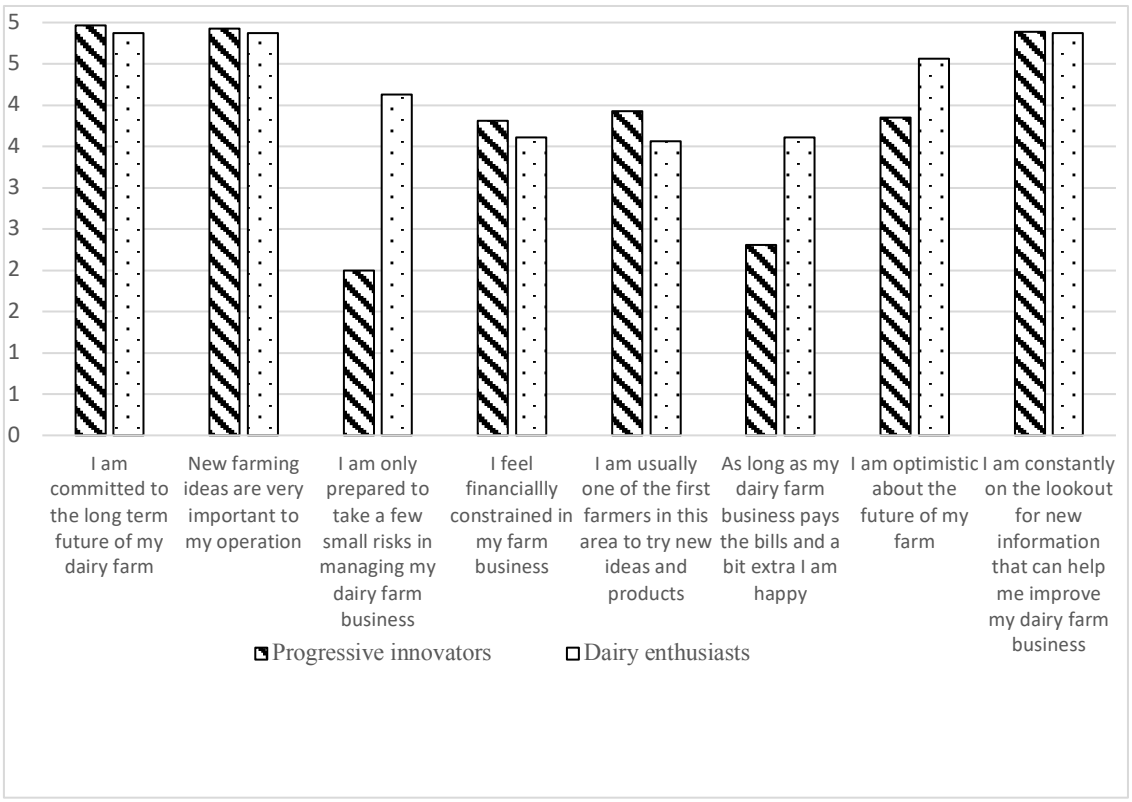

Figure 3: Mean ratings for statements by farmer type (scale of 1-5)

Figure 3 shows the relatively positive responses of the survey participants with high ratings for long-term commitment and optimism amongst both types. There appears to be two statements that discriminate between the groups. The *Progressive innovators* are more risk accepting and are less supportive of the statement on being *happy with paying the bills and having a bit extra*, which implies

a desire for a greater margin or profit. These results suggest the sample is skewed to those who are more positive about the industry and those more open to innovation.

At least 86% of the respondents "strongly agree" that they are: *committed to the long term future of dairy farms*; and *new farming ideas are very important* to them. While approximately 60% stated that they either agree "mildly" or "strongly" that they are financially constrained in their farm business, 77% (including all of those feeling constrained) either agree "mildly" or "strongly" that they are optimistic about the future of their farms. All respondents agreed that they are *constantly on the lookout for new information that can help them improve their dairy farm business*. The relative optimism and interest in innovation are somewhat expected given that people recruited for interviews are more likely to be engaged with personal and industry development and therefore more easily recruited and more used to participation in industry research. On the other hand, it could be argued that these are primary target groups for overall industry development, accounting for more than half of all businesses and 63% of production. In addition, they are the two groups with strong orientations towards investment.

In the sample, there was no dominant decision-making arrangements. The arrangements included:

- Predominantly primary operator (usually male);
- Primary operator with input from business and life partner;
- Primary operator with input from business partner;
- Primary operator with input from extended family;
- Joint life and business partners;
- Corporate-like family businesses; and
- Corporate structure (very small number).

These are self-reported patterns of interactions and actual decision-making may be different, with unacknowledged patterns of interaction and power. Decision-making was also sometimes split around role specialisation. For example, one partner would have more influence on machinery purchases while another would be more focussed on investments in the dairy.

Advisors and educators

We consulted a range of industry people with experience in providing advice and/or training to farmers. We were seeking:

- Third party perspectives on farmers' attitudes to business management;
- Reflection on experience with, and advice on, past and current industry training programs; and
- Reflection on experience with, and advice on, training and program needs.

Of the 13 respondents:

- 9 were primarily dairy industry consultants, with more than 10 years (more than 20 years in two cases) experience. Of those, 4 were based in NSW, one worked in a Victoria/NSW border region and the other two were primarily in Victoria but delivered industry programs into NSW. Most of the consultants have experience as state research and/or extension people, with one

having a university teaching and research background. One of this group worked from an accounting and business management consulting context.

- Two were involved in dairy training and education (vocational).
- Two worked on industry program development.

Results

Farmer perspectives on business management

Defining farm business management

As noted above, we started with a comprehensive definition of farm business management to include data management, data analysis, investment analysis, strategic planning and intra-business communication. Farmer respondents were also asked how they defined farm business management. Some did not seem to have thought about this to any great extent, while a few had very clear and accessible definitions. There was no common or widely used explanation of what farm business management was, but rather a number of themes were noted. These included that FBM was:

- a holistic view of the farm operation;
- the management of production activities;
- planning and strategy, especially in relation to the long-term outcomes (such as business transition and succession);
- management of resources, especially labour; and
- managing for cash flow and/or profit.

In the responses there was a strong focus on production matters and in a discussion of business management, many respondents quickly moved from talking about financial aspects back to production issues around the herd and feed. Though profit was sometimes mentioned, further discussion revealed that this meant a cash surplus, not an economic profit that would include opportunity cost and return on assets or investment.

Farm business management priorities

Interviewees were asked what they considered to be the two or three most important aspects of farm business management. The most frequently cited priorities were to do with cash flow and cost management, however even taken together these were not frequently cited priorities. The rest of the priorities were highly diverse, A few (16%) thought budgeting, as opposed to just monitoring cash flow, was important, while 13% opted for 'record keeping'. A few thought feed management was a priority and one thought fertility management was important. Other nominations included:

- Getting the 'system' right for the particular business/personal risk preference and farm type;
- Relationship management;
- Staff management;
- Forecasting and risk management;
- Data and trend analysis;
- Knowing market conditions; and
- Taking seasonal opportunities.

Very few (<7%) mentioned planning as a priority.

These results need to be treated with some care, given that respondents were asked to name priorities with only limited context provided and given more time and discussion they may have nominated other things. Nonetheless, an implication from these results is that there is no commonly held, dominant view of FBM priorities and a significant minority think of operational issues when asked about FBM. This supports the case for promoting a common understanding of FBM, perhaps around the activities of clarification, observation, analysis and anticipation as derived from the model above.

Time allocated to business management

Interviewees were asked: if they thought *enough time was allocated to the business*, as opposed to operational aspects; and whether or not there were formal meetings to discuss business. Key findings are:

- Only 7% of respondents (by business) thought enough time was allocated to business management, while 25% thought they allocated sufficient time, at least intermittently, with the remainder seeing an attention deficit.
- Reasons for this deficit, or only sporadic attention, included:
    - Time pressures of the whole operation (the most frequently cited reason);
    - The operational structure or requirements of the farm;
    - Limited labour; and
    - Seasonal conditions/issues.
- Specific meetings amongst business partners to discuss business matters are extremely rare, although some have or are developing a more a corporate-like approach, including getting an external person involved in business planning and management.

The most common approach is to discuss things in the course of work and home interactions (incidental conversational style). Sometimes more significant business discussions are driven by particular opportunities or events or crises.

The findings on time constraints should be interpreted against what is known about the preferences for particular forms of work. As in other surveys, overwhelmingly farmers have a preference, perhaps from personality, enculturation or a combination of the two, for production activities. There is a strong preference, especially amongst males, for the outdoor work. Many also like 'not having to deal with people', which works against the function of relationship building, noted earlier. Therefore, 'not having the time' might be reinforced by preferences for other forms of work. There is also a very strong view, quite understandable, that production issues, especially around feed management, herd health and reproduction and operation of the dairy, must have priority in the short run. The problem is that the cumulative effect of a series of short run demands is having little or no time for business management.

Dairy farmers, on average have long working days (Cockfield and Doran Browne 2018) but there can be periods of discretionary time (not allocated to immediate needs). Farmers will make calls and even read about dairy industry matters during these periods. Theoretically, they could be used for attention to business. There are likely three impediments to that: the short period of available time means that only simpler tasks might be completed (eg some data entry); those periods might be interrupted by operational demands; and farmers might be reluctant to give up those period of low cognitive

demand. As noted by Cockfield and Doran-Browne (2018), reflective and structured thinking, such as that required for business analysis, is effortful and humans cannot sustain this over time.

There is however evidence, when respondents were asked about management and business histories, that business management can assume a higher priority, at least for periods of time. This re-prioritisation seems to be associated with several factors:

- Task specialisation amongst the business partners, often where women take up the 'bookkeeping' role and men the paddock roles;
- A growth orientation, especially with debt, which drives more attention to financial matters;
- Participation in peer groups or networks that compare financial performance;
- Experience in another industry where analyses of financial performance are core practices;
- Financial pressure;
- Business transition or succession; and
- Learning experiences through formal education, industry programs, self-education or engagement with different production systems or industries.

More time allocated to business matters can come with business and career maturity, which is likely a function of labour availability, experience in managing production tasks, capital investment in production systems and recognising the importance of business for long-run sustainability.

While role specialisation may be technically efficient and ensures that at least someone is working on business management, it can lead to asymmetrical understandings of the state of the business. That is, one person understands the financial trends and issues for the business, while others may be more focussed on expenditure that supports production. This specialisation problem can also be reflected in training opportunities, where the 'finance' person attends a business management course, yet there might be an even greater benefit in others also attending.

In relation to debt as a driver of attention to business management, there can be a threshold effect, whereby excessive financial pressure on some personalities at particular career and business stages can lead to a reduction in strategic business management. What is 'excessive' pressure will vary according to age, personality and business structure. Finally, the diversity of definitions of FBM identified here, suggest that the importance of FBM skills, as set out above, have not gained common currency in the industry.

Investment decision-making

We asked respondents how they evaluated investments prior to particular spending commitments and then later compared responses with indicators used in conventional economic analyses, such as return on investment or assets and estimates of marginal costs and benefits. The scenarios to illustrate the question were drawn from their experience or intentions and were proposed as major investment (land, irrigation systems, dairies etc), minor or operational expenditure (bought feed, fencing, fertiliser etc) and implementing new technologies (robotics, irrigation or herd sensors, pasture measurement tools, etc).

For major investments, the main considerations by farmers were:

- Whether or not the investment improved the manageability of the system;
- The time taken to 'recover' the cost of investment;
- Peer experience with similar investments;
- Upfront cost; and
- Contribution to setting the farm up 'for the future', which especially applied in multi-generational settings.

There was no mention of formal analyses as economists would understand them, however the time taken to recover costs could be seen as a simple proxy for internal rate of return. Peer experiences are very important to farmers and are gathered to sit alongside other considerations. Setting the farm up for the future has two aspects. First there is an aim to increase the manageability of the system (as in the first consideration) and second, there is a goal of asset building. In this and the Gardiner study (Cockfield and Doran-Browne 2018), the asset-building orientation is apparent. For dairy farmers, assets include land, the herd and herd genetics, and in some cases access to irrigation water. Asset accumulation is a key issue because farmers may accept very modest economic profit, perhaps not even fully covering all implicit costs (opportunity costs), with an underlying and sometimes unarticulated assumption that net asset value is increasing. In addition, expected multi-generational farms may have a long time horizon (implicitly lower discount rate) for some investments, especially land, thus reducing interest in the returns time horizon. Furthermore, land and water do not depreciate in the same way as infrastructure and may therefore be considered as different asset classes.

Some considerations for the adoption of new technology were quite similar to other forms of investment, notably in relation to the return period and contribution to system manageability, but some additional considerations were noted. Peer experience was more frequently cited as a factor for this type of investment. Additional themes included:

- Long-run money saving;
- Labour impact;
- Local applicability; and
- Interest/stimulation, or did the proponent find it an attractive idea.

For operational investments there were again similar considerations, such as upfront cost and time for returns, but additional themes suggest more intuitive decision-making with the smaller outlays. These included:

- Avoiding stagnation, or the sense that lots of things needed to be kept up to keep the operation running;
- Gut feel/intuition; and
- Cash availability.

We also asked about what indicators were used to assess business health or position. Some respondents did not have a particular thing they paid attention to but the main responses, in order of citation were:

- Cash flow and/or availability;

- Ability to meet bills for inputs;
- Costs (especially for feed); and
- Profit (only just more than 10% of respondents).

In general, the higher the investment, the more respondents moved towards analytical indicators, whereas for the smaller expenditures, the gut feel became stronger. These findings were as expected based on previous studies. Cash flow and the ability to meet payments were very dominant themes. Full budgeting is rare, although an increasing use of accounting programs, based on recent adoptions, was noted. There are three drivers of this adoption: recognition of the need for better financial management within the business; accountants pushing the business to adopt the software; participating in business education or training; someone with greater computer familiarity taking a role in business management; and, somewhat related to the previous point, generational change within the business. The use of accounting programs does not necessarily mean that financial data are used for business analysis, the primary and initial role of such programs is for Business Activity Statements (BAS) and taxation compliance. Nonetheless, having such a program facilitates analysis when other drivers, such as contemplating major investments or participating in a business network, are present.

Interviewees were also asked who they consulted with on business decisions. Accountants were the most frequently cited sources of business advice, though this does not necessarily mean that they are highly influential as their advisory role might be quite restricted, for example to tax matters. For operational matters, nutritionists and agronomists are sources of advice. Consultants with an overall advisory role are rarely used as regular sources of advice, though they may have intermittent influence through a 'check-up' every few years or are brought in for large decisions. It seemed that the influence of consultants was somewhat less than in the three Victorian dairy regions (Cockfield and Doran-Browne 2018), which may be a function of business density and consequently where prominent consultants are located. The observations for this study may also understate consultant influence, which can also occur through the delivery of industry programs and *ad hoc* follow up engagements.

Other advice was seen to come from:

- Financial institutions;
- Technology providers or promoters; and
- Rural financial counsellors.

Participation in and perceptions of, industry training programs

Interviewees were asked about what programs they had participated in and what they thought of those. Almost all respondents had done some industry training (broadly defined), including those programs more focussed on production and labour management than financial management. A substantial minority have taken a specific business management course, and interest in those may be increasing. Again, this was probably a skewed sample, with higher than industry level participation rates. In particular, some interviewees were recruited via recent participation in business training. About one third have participated or do participate in discussion groups or business networks. Some

groups have however lapsed and contributing factors may be changes in the extension system, industry exits and seasonal conditions.[15]

Perceived barriers to participation in programs included:

- Lack of available time;
- Self-assessment of own skills and development needs;
- Difficulties in getting other business participants (children, husbands employees) along because of:
    - Perceptions of separation of roles within the business; and
    - Matching target group/individual to the right program;
- Lack of knowledge of programs;
- Personal issues with presenters or coordinators (a very rare problem); and
- The complexity of some industry systems (eg DairyBase).

The stated barriers should also be considered against other possible influences such as work preferences (as discussed earlier) and learning preferences. From this and other studies (especially the Gardiner study), dairy farmers have strong preferences for experiential and peer learning. That is, they like programs that have a 'paddock' aspect, which is visual, tactile and features a peer experience. There are some people who are averse to group learning, especially where that involves revealing business or personal information. Discussion and business groups, for example, may be more congenial for the more confident and outgoing and those with significant social capital.

The things that participants liked about industry programs included:

- The quality and reputation of renowned industry presenters;
- Being able to see other farms and see what other farmers were doing;
- Peer sharing of information;
- Getting together with industry people who have a positive view; and
- Particular tools (eg Rotation Right).

There is almost no demand for additional programs, with even those not participating in training and education believing there is, or is likely to be, sufficient breadth and content available. Respondents mentioned 41 different programs/training but this overstates the actual breadth of offerings.[16] Some of the responses to programs are set out in Figure 5. Essentially, those who have attended programs like what they get.

[15] There was interest in reviving them in some regions.

[16] Name recognition and recollection was quite poor, shortened titles were used and some also named according to sub-components of a single program. In addition, some programs may have been rebadged.

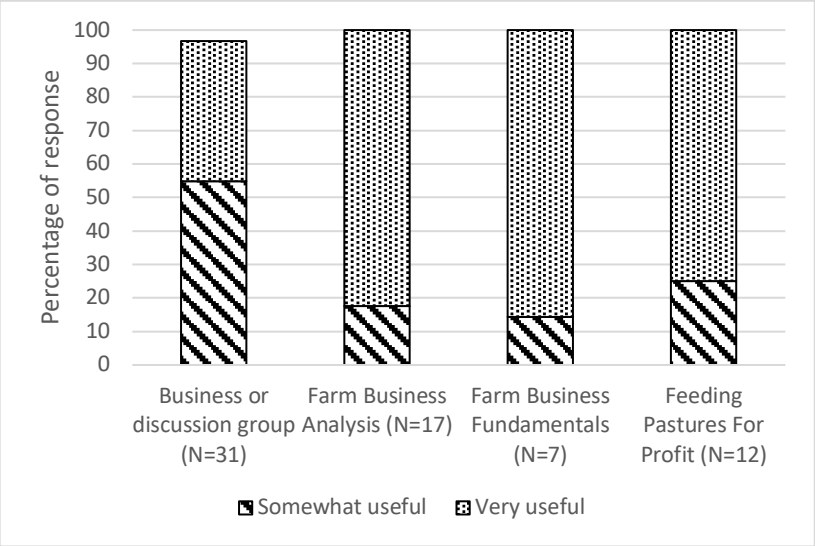

Table 12: Ratings for industry programs

Advisor and educator perspectives on business management and business management training and programs

Participating advisers and educators were asked a series of questions about how they saw dairy farm businesses and farm business management. Summary responses are reported by topic.

Context and farmers attitudes and preferences

What are the main and important changes in the industry over the last 10 to 20 years?

All respondents agreed that the number of dairy operations has declined and will continue to do so, with some acceleration in industry exit due to drought, low milk prices and (negative) sentiment about the industry. Overall milk production is however at least constant which means an increase in large farms. Industry entry is difficult, especially as NSW does not have a 'farm leasing culture' like that of southern Australia, though this culture could be changing. Other developments of note include:

- Improved feeding systems driven by the quantity and cost of bought feeds;
- Better budget planning than in the past;
- Rotational grazing management that better utilizes pasture;
- The use of internet/electronics; and
- The increasing importance of financial returns as a driver of management.

Supporting the results from the farmer interviews, some of the advisers also see an increasing use of accountants and developing business plans but those plans are often short-term, rather than for 5-10 years.

What contributes to the profitability/viability of dairy businesses?

The main nominated factors were:

- Understanding the farm. Each farm is unique and things cannot necessarily be directly copied from other farms;
- Understanding and working with income volatility;
- Understanding feed conversion efficiency, with the right proportion of supplements;
- Understanding marginal cost (MC) of inputs and marginal benefits (MBs);
- Not [entirely] relying on production based models and where used, linking them with financial models;
- Being flexible and able to move 'back' as well forward;
- A good succession plan;
- Understanding the rules and regulations of animal welfare;
- Management skills (time management, ethical knowledge; people management);
- A balance between capitalisation and profit maximisation;
- A capacity to work under lower wage rate (usually as a family farm);

- The right infrastructure (irrigation etc);
- The right stocking rates based on farm size, management ability;
- Operational efficiency; and
- The right mix of family labour and others.

What are the main threats to farm business profitability/viability?

- Climate change/extreme events;
- Increasing level of input costs and relatively constant prices;
- Over capitalisation;
- Relationships breakdowns;
- Succession problems;
- Land price too high, at least in many places;
- Stretching their facility beyond their ability;
- Not having a medium to long-term plan;
- Unwillingness to change; and
- Inability to accept the influence and benefits of new technology.

What are the types of business 'models' that are evident for dairy farms?

Themes or descriptions included:

- Owner/operator and family partnerships are still common.
- There is a strong focus on production.
- Management is overwhelmingly intuitive and the allocation of resources often reflects the preferences of the participants (eg around the work they like). One respondent described it as 'whimsical management'.

There was general agreement that scale of operation does not necessarily equate to profitability of business management style and ability. There may however be a threshold below which profitability is difficult to achieve (perhaps 200-300 milking cows). On the other hand, the majority of costs are variable and therefore, bigger is not better in a linear way. Larger farms are however, generally better at managing staff.

Where should dairy farmers allocate their time and attention (in order to sustain a business)?

- In the paddock much of the time, growing grass and increasing milking efficiency;
- Budgeting, planning and comparing budgets with actual costs/incomes;
- Benchmarking against themselves (historical performance) and with other farms;
- Using feed-input data to manage the home-grown and imported split and understanding the links between inputs and outputs;
- Looking at the big picture from time to time and maintaining operational matters at the same time. Thinking about the relations between the marginal milk production with changing size/feed/inputs etc;
- Making better use of service providers and professionals and using consultants to optimise profits; and

- Meeting regularly with the bank manager.

About farmers' business management

As observed from the farmer interviews, the advisers also see farmers as acknowledging the importance of farm business management but not allocating time to that. Also, their observations accord with our own on what financial indicators farmers use.

What are the main financial indicators that farmers use to monitor their business?

- Cash flow and/or cash in bank;
- Disposable income and the ability to do what they want;
- tax liability;
- Debt costs and ability to service debt;
- Milk production by time period (day/week/month);
- Direct costs, usually excluding family labour cost and almost always excluding opportunity cost of capital.

Some of the comments on this area were (paraphrased):

- *The production side comes naturally to farmers and this has been supported by agronomists.*
- *Finance management is considered as a burden.*
- *Finance for them is cost-cutting without seeing its implications.*
- *The concept of opportunity cost is more important when you plan to buy a machine, as it might be better to allocate resources to new feeds/fertilisers etc.*
- *Cash flow and production software are not integrated. If we can integrate management software with financial software that would be great.*

As observed previously (Cockfield and Doran-Browne 2018) and in the farm interviews in relation to business history, some advisers have also observed that farmers arrive at a scale (number of milking cows) by increasing and decreasing in an experimental way, rather than by analysing the optimum point of production.

Again supporting the observations from the farmer interviews, advisers do see cases where farm business management has changed. Such changes are seen to be influenced by:

- Cost-price pressures;
- Deregulation of the industry (to increase market pressures);
- Increasing use of internet/video/electronics (which brings other influences into the thinking);
- Changing priorities of bank;
- Succession; and
- Relationship changes/breakdowns.

What are the areas of greatest need to support farmers in their business management?

Generally speaking, the advisors saw the priorities for training farmers as being:

- Developing standard record keeping systems and basic balance sheets;

- Facilitating understanding of the differences between cash flows and profits;
- Linking production models with financial models;
- Providing tutorial (hands-on), cash flow training;
- Developing the ability to analyse profit;
- Developing understanding of the marginal benefit of upgrading capital; and
- Facilitating succession planning.

Some argued for prioritising women for training as they are the ones who mostly do the accounting type work. In line with the other studies on the influence of peer learning, case studies of other farmers were seen as important. Also, following the earlier point about parts of the day being available for reading and thinking, several respondents highlighted the potential for on-line 'mixed mode', learning resources.

> *The historical means of extension and communication resources does not work, especially for young/early career farmers. We need to use the latest and attractive technology.*

One respondent also argued for the need for programs that help to understand and support the psychological aspects of dairy work, including ensuring the availability of programs on relationship and stress management.

About farm business management programs

While most of the respondents saw value in the current portfolio of business programs, there were a number of areas for improvement.

> *There is overcrowding of farm business management programs in the dairy industry. There is no need to invent new ones but a need to refine the ones that are there.*

What are the main challenges to implementing or delivering FBM programs?

- Poor attendances are probably due to:
    - scattered farms (distance and density);
    - the reliance on and influence of, multiple/individual consultants (such as agronomists, accountants, nutritionist);
- Relatively low industry pay rates for trainers;
- Courses are designed/organised without a needs assessment; and
- Contrasting views of partners about business management practices and the importance of FBM.

What are the main elements for effective delivery of FBM programs?

- The need for influential trainers.
- Programs should be sequential and should have monitoring, reviewing and feedback components; 3-4 hours of training is too short.

  However, we need to be careful not to have too many follow-ups and monitoring as they feel that they are scrutinised and we need to protect their privacy.

- Breakup the learning spreadsheets into sub-components.

  One page and it is too big and complicated and difficult to workout. There should be separate cash flow balance sheet, pasture production balance sheet, feed related balance sheet etc and in the end they should link.

- Programs for mid-career farmers, where there is seen to be a greater need.
- Work with the farmers groups where those are available or can be developed.

  Ideally 10 farmers is about right. You need a good facilitator and the participants having some basic knowledge of farm business analysis. You have to be careful about privacy and confidentiality.

There was a lot of discussion of delivery methods and learning materials. Most respondents acknowledged the farmer preference for one-on-one delivery but saw the need for a mix of face-to-face and online. Key issues to address are however, poor internet service and the availability and perceived quality of who would engage with them in the online environment.

Reflections and recommendations

As has been observed in this and other studies, there is a strong predisposition to intuitive decision-making amongst farmers (and people generally). This does not necessarily mean that farmers are making decisions detrimental to the sustainability or expansion of the business. Intuitive decision-making enables people to operate in complex environments, deal with multiple social and economic systems and is informed by experience. In addition, there is very rarely a single optimum point of production as there are a number of systems and combinations of resources that can enable business growth. The choice of these will be influenced by risk, work and labour management preferences. Second, it is unrealistic to expect sustained, high level business management acumen in even the best managers. It would require a high cognitive load and consistent allocation of attention over time.

Related to that, it is also unrealistic to expect single FBM extension/training engagements to permanently elevate business management skills and attention. This is due to two factors. First, a training intervention or adoption of a decision-support tool (DST) will likely be used to develop some management rules of thumb (decision heuristics), rather than be consistently applied. This is practical and efficient but with tendencies to over-confidence, inaccurate recollection and changing variables (costs, prices, technology), there is a case for encouraging periodic reflection. Second, the various time pressures experienced by farmer respondents and observed by the advisers, will continue to compete with the allocation of time to FBM. One way to think about the tendency to analytical drift, or moving from formal analysis to heuristics, is to think in terms of a series of nested waves of attention operating in different time frames and cycles, as set out in illustrative form in Figure 4.

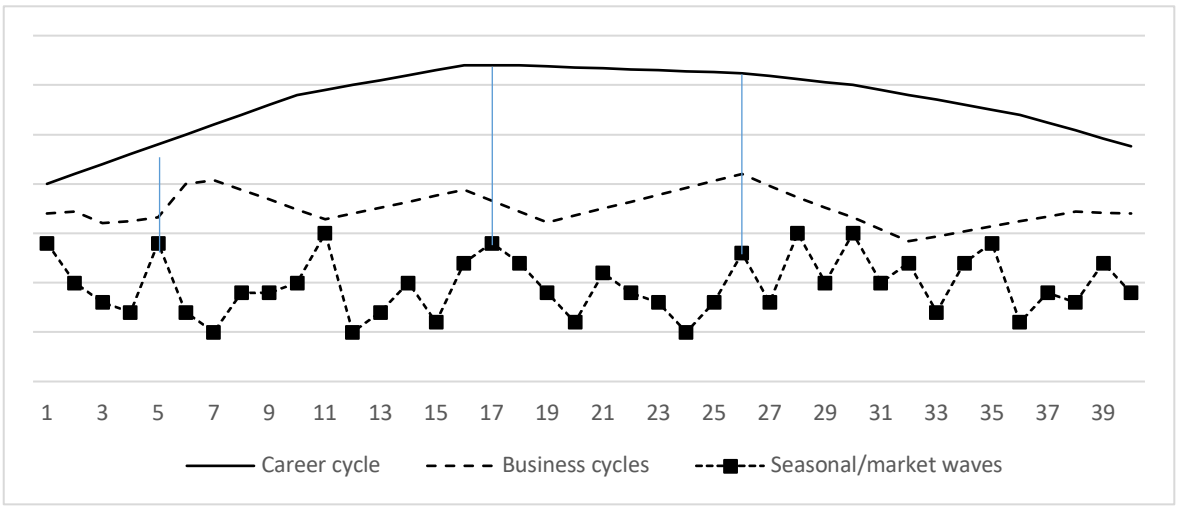

Figure 4: An illustrative depiction of cycles and waves that influence attention to FBM

- The **career cycle** would see FBM attention fluctuate according to stage of career and circumstances within those stages. The early career farmer will often have limited labour available and relatively limited experience to draw on for that intuitive decision-making. On the other hand, they are at higher financial risk and possibly more open to external influence. The mid-career dairy farmer, if open to external influences will have the experience to

recognise the importance of FBM and, assuming there has been business growth, will have labour sufficient to allow time for learning and paying attention to FBM. The later career dairy farmer will have extensive experience and perhaps not see the need for further self-development, especially if they are 'winding down'. The interest in FBM amongst later career farmers may however change with intentions around succession.

- **Business cycles** are about the stage or predominant intention of the business across time. Stages include business growth, when operators might be more interested in analysing potential investments, consolidation, when the focus is paying down debt or winding back for lifestyle or because of a focus on off-farm income.
- **Seasonal/market waves** (conditions), help to determine short-term priorities and available time. When prices are high (relative to costs), then there is interest in investment but there is also a sense of optimism that can work against attention to farm business analysis. The low point of the market wave can encourage greater attention to FBM basics but it can also mean that the manager is highly focussed on production and cost control. There may also be some reduction in available labour at these times, reducing the available time of the manager to attend, for example, training programs.

The difficulty for providers of FBM programs is that interest and attendance can be partly determined by favourable 'trends', leading to greater openness to FBM skill acquisition across the three different cycles/waves which might be a rare outcome, as suggested by the vertical lines in Figure 4. It might however be the case that two out of three in unison might be sufficient or that one trend, such as intended business growth might be heavily weighted. Nonetheless, extension workers could consider opportunistic recruiting based on knowledge of a farm business's current position and the operators' intentions. An important point here is for extension workers and the funders of FBM programs, to be realistic about what can be achieved. Improving FBM skills will be a long-term project, with occasionally low participation and a very slow ripple through the industry. There will be no rapid transformation of practices for all the reasons discussed above.

While respondents recognise the importance of FBM, they may not give it commensurate attention. Comprehensive budgeting and formal business planning were rare, though there are signs of increasing use of basic financial information systems. The information from these is used for checking cash flow, tax management and engagement with financial institutions and only rarely for examining underlying business trends. Investment decisions are more often analysed in terms of contribution to 'manageability', than return on outlay. There is very little use of formal decision-support tools developed by industry.[17] There is an increasing amount of data that is relatively easily accessible, with cloud-based accounting, bank records and systems and systems for managing input and production information but greater integration of these systems could contribute to increasing use of the data.

There is a high reliance on own judgement, family knowledge or past practices, and what other farmers do. Farmer discussion groups or business networks work well for many people but these seem to have broken down in some areas. These groups work best for people who: are comfortable in group

[17] There is increasing recognition of DairyBase but its use in FBM is very limited.

situations; are able to take criticism (actual or implied); believe they are interacting with appropriate peer comparators; and are willing to share financial information. Consultants are influential but may be used only occasionally and for major decisions or turning points. Some areas are not directly serviced by consultants.

Most farmer respondents and all of the advisors and program providers/developers, believe that the industry offers enough and appropriate programs to develop farm business skills. Those who have attended programs have generally found them to be useful. Impediments to participation include: preference for, or time needed for, farm work; distance to program offer;[18] inability to commit to sequential or follow-up program elements; seasonal and work-related events; perceptions of own level of skill and knowledge in relation to the offering;[19] and lack of knowledge of offerings. FBM programs were seen to be most effective where participants could bring and work with their financial information. Two commonly identified limitations were: a structure that enabled follow-up engagements or training; and coordination amongst programs. In particular, production-orientated programs were seen as good 'gateways' to FBM programs. What is not yet clear is if there are approaches to preparation and delivery that might reduce the need for follow-up. Based on experience of tertiary education, it is very difficult to get learners to do much advance preparation, so some experimentation might be useful here.

Recommendations

- Key industry service providers should work to harmonize language around the importance and key aspects and principles of farm business management. Key messages and expressions could be discussed, agreed and used consistently. The aim should be to elevate FBM as a work priority. In addition, sharing and analyzing farm business information should be 'normalized'.[20]
- Support, enhance and link existing dairy farm management programs, as opposed to developing new programs. The core programs (as named at the time of the of the study) would be:
    - Our Farm, Our Plan (focusing on goals and strategy);
    - Farm Business Fundamentals; and
    - Dairy Farm business Analysis.
- Introduce programs with discussion of intuitive decision-making, emphasizing how normal and understandable this is, but then reinforcing the overall message of the benefits of analysis and reflection.
- Explicitly link industry production programs (eg Feeding Pastures for Profit), employment programs (eg ESKi) and succession programs (eg Stepping up, Stepping Back) to the core FBM programs.
- Promote a framework that situates each program according to purposes such as:

[18] This is particularly noticeable for those who are in areas of NSW where there are only a few dairy farmers.

[19] Many farm advisers noted that self-assessment of business skills may exceed actual skill.

[20] In this case normalizing means that: sharing information is treated as a routine activity; that diversity in business operations is accepted (different is not wrong); and that sharing information has both business and industry benefits.

    - Clarification of objectives;
    - Observation of key indicators;
    - Analysis of feedback; and
    - Anticipation of threats and opportunities.
- Programs should have an explicit skill target and a nominated output/outcome ('participants will be able to …').[21] There are two reasons for this:
    - So potential participants know what they are going to achieve; and
    - To allow for providers with certifications systems to recognize prior learning (RPL).
- At this stage it is not recommended that program offers are designed as modules of certified programs. The focus should be on highly targeted skill development.
- Extension staff should continue to use personal contact and relationships to promote and target business skills programs.
- Continue to encourage participation in DairyBase but work on making data entry to DairyBase easier. Promotion of DairyBase could include strategies around:
    - Aligning this with the common language around FBM;
    - Analysing long-term data; and
    - Informing annual budgeting.
- Facilitate business network groups, especially for more scattered farmers where these might be based on conference style engagement (maybe twice per year), rather than regular (monthly, bi-monthly). These could include FBM training components.
- Any potential industry investment in decision-support tools should be subject to rigorous analysis, to consider the target end-user and likely uptake. Tools to support FBM should be based on simple but important indicators or ratios.
- Continue to promote the adoption of the Dairy Chart of Accounts within and without those core programs.
- Consult within industry to decide or confirm program naming with a view to maintaining major program names over a long period and across regions and states.[22]
- Trial and review blended (face-to-face and online) learning for FBM programs.
- Develop strategies and incentives to broaden the intra-business[23] participation in FBM programs. These could include:
    - Different individuals from within the one enterprise doing different modules;
    - Broader plenary or reporting back and discussion sessions with wider participation;
    - Social activities around the program delivery to bring in more people from each business; and/or
    - A field or farm get together to follow up on programs, perhaps with workshop participants doing some of the presenting.
- Continue to encourage learning through exercises that involve real farm data.

[21] This is not to imply that this is not already occurring but rather to support the practice.

[22] Content can evolve over time or can be varied for context, but naming and general orientation should be as consistent as possible.

[23] That is, try to get more people from the each business to participate.

- As the program set develops, create supplementary/refresher modules for mid-career farmers with previous training.
- Using known presenters with industry credibility is important to encourage participation in FBM programs, however the selective introduction of people with other forms of expertise and perspectives should be considered.

Appendices

1. A study of feedbase management amongst Victorian dairy farmers

This farm business project has some lineage in a study of feedbase management amongst Victorian dairy farmers (Cockfield and Doran-Browne 2018). That study was based on a survey of 153 farm businesses and 19 service providers. While focussed on feedbase management, the study was expanded to include questions on business planning and management. It was informed by both conventional economic concepts and assumptions and behavioural economics, considering especially the work of Daniel Kahneman (2011) and studies of the application of heuristics (rules of thumb) to farm management (Eastwood and Kenny 2009; Gibb and March 2015; Nuthall 2009). The study found widespread use of heuristics in making management decisions, as opposed to any obvious formal analysis for even major financial decisions.

Formal business plans were rare and goals were mostly very general. There was a strong emphasis on cash flow and it was very rare to find any consideration of return on asset. There was almost no use of industry decision support tools, although some respondents used tools and systems developed or adapted by consultants. Approximately 25 percent had some involvement with Dairybase, although this was often through consultants uploading data and undertaking analyses.

The researchers identified some constraints on adoption and adaptation of management and production systems (Cockfield and Doran-Browne 2018, 1), including:

- Cash flow and financial considerations;
- Time availability;
- Labour availability and quality;
- Concerns about seasonal and market conditions;
- Policy uncertainty;
- Farm layout and infrastructure;
- High self-reliance (on own, family or peer information and ideas);
- Social and learning preferences;
- Stage of life or achievement (winding down or contentment with current state);
- Being in a non-growth business stage of the farm business;
- Succession issues; and
- Risk averseness.

The first three were the top three that were cited.

Conversely, there were a number of factors that seemed to encourage greater reflection on, and changes to, management practices. These included:

- Seasonal conditions and climatic trends, which could include unfavourable conditions that lead to a change in the way things are done;
- Favourable financial positions and market signals (milk prices, water prices, debt levels and cash flow);
- Positive perceptions of the future of the industry;
- Being in, or considering a period of business growth;
- Generational change;
- The innovations of other farmers considered as exemplars;
- Education, training and exposure to other systems; and

- Benchmarking, which could include opportunities for comparisons in discussion groups, Dairy Monitor, Dairybase and informal discussions.

There were a number of recommendations relevant to farm business management (Cockfield and Doran-Browne 2018, 3-4).

Recommendation 2:

Industry bodies should continue to promote and where appropriate provide, opportunities for farmers to increase business and management skills. This could include through education, training and learning about other dairy and agricultural and business systems.

Recommendation 4:

Identify ways in which aspects of program elements could be, or continue to be, delivered through discussion groups. These program elements might best be tasters or introductions, rather than full programs, as it would be important not to overload discussion groups.

Recommendation 5:

RDPs could identify situations where additional discussion groups might be set up to fill gaps and increase participation. This might include creating groups for more reserved personalities, businesses at particular stages or creating or reviving particular types of engagements. There are different historical engagement models in regions and sub-regions that should be considered in developing these. RDPs were then working in such ways.

Recommendation 7:

Industry organisations could consider formal mentoring programs, which could include coordinating mentor/mentee engagements and training and support for potential mentors. In addition to a one-on-one mentor program there could also be an 'inventory' of farmers with specific skill sets who are willing to help other farmers and who could be contacted on an as-needs basis for peer support and information.

Recommendation 9:

Continue and if needed, develop labour programs to build industry skills. More and higher skilled labour availability will allow for greater specialisation of task management within the farm, which will in turn allow for greater attention to things such as feed production, grazing management and nutrition. In conjunction with labour availability, it is important for farmers to develop employee management skills in farmers to help manage and retain employees.

This was frequently nominated as an important area by respondents.

There were also some recommendations relevant to extension of business skills programs (Cockfield and Doran-Browne 2018, 4).

Recommendation 12:

Where farmers have a preference for the current operation and/or a high degree of self-reliance, then RDPs and other extension providers should adopt a 'keep in touch' approach. This would involve regular and low-key contact, occasional highly targeted information on matters of interest and checking on any changes of circumstance.

Recommendation 13:

Research presentations and training programs should routinely include, in addition to financial analyses, discussion of the potential impact of changes on:

- skill requirements;

- paddock availability;
- time requirements for the main business operator/s, both in the short and medium terms; and
- additional management requirements.

Recommendation 14:

Peer learning is a strong and enduring preference amongst farmers. Where possible, continue to provide peer interaction time as part of learning activities, especially by:

- Continuing to build paddock activities into industry programs;
- Working through, and if affordable expanding, the Focus Farms program;
- Working through existing discussion groups;
- Filling discussion group gaps with different types of groups appropriate to target groups, regions and sub-regions;
- Encouraging and facilitating mentoring; and
- Providing and highlighting case studies of successful practice change.

Recommendation 15:

Feedbase and other programs would benefit from industry-level coordination. The first form of coordination would be identifying the practices that, based on sound research will yield the most benefits. These would then become priorities that are promoted through the program and extension infrastructure, such as discussion groups, Focus Farms and so on.

Recommendation 16:

The second industry coordination role, most probably resting with DA and the RDPs, would be in managing the now very crowded dairy 'calendar' and prioritising programs and program foci according to: Industry extension priorities as above;

- Seasonal and market conditions;
- New research findings;
- Likely profit impact; and
- Particular regional issues.

Recommendation 18:

There is a case for integrating exercises in self-reflection into management programs. There would be three parts to this. First, showing that intuitive thinking is dominant, practical and generally effective but pointing out the limitations and risks. The second aspect, would be encouraging people to review their decision-making patterns to build awareness of their tendencies and the influence of 'biases'. Third, would be some reflection on their own objectives and preferences, since the business and farm systems need to be reasonably compatible with what people are comfortable doing.

2. Survey methodology

Approach

The survey work used the feedbase study (Cockfield and Doran-Browne 2018) as a starting framework. There were preliminary questions on farm size and operation and business origins and structure, on the assumption that there may be differences in approach to business management that relate to scale, labour availability and personal backgrounds.

Then, more specific questions were developed to examine approaches to financial and business management. We proposed a number of ideal decision-making tendencies or practices:

- Evidence of 'the economic way of thinking'[24] about decisions, for example considering:
  - Opportunity cost;
  - Marginal costs and benefits;
  - Economies and diseconomies of scale;
- Undertaking some form risk assessment and planning for risks;
- Monitoring and measurement of key performance indicators such as cash flow, profit, return on assets and specific performance or production indicators;
- The implementation, maintenance and regular use of information systems to support decision-making;
- The application of structured analyses to major investment decisions; and
- The development, application, updating and review of business goals or a business plan.

This was really constructing a 'straw person' decision-maker, considering our expectation from previous studies and especially the feedbase survey, that there would be limited application of many if not most of these things. The consequent questions were therefore more starting points for discussion than an expectation of what we would find.

The format of the survey was semi-structured interviews, with a common core of questions but considerable latitude for discussion and elaboration. This allowed for both quantitative and thematic analyses.

Survey Sample

Dairy farmers were recruited for interviews through the Regional Development Programs (RDPs): Murray Dairy, Dairy NSW and Sub-tropical Dairy, with the aim of achieving a sample that considered:

- Age;
- Farm scales (by cow numbers);
- Farm systems, for example from pasture-based production farms to total mixed rations (TMR); and
- Backgrounds, to include those on multi-generational farms and some early career dairy farmers (in the industry for less than five years).

The final sample was not formally stratified for a number of reasons. First, there is insufficient information about the total populations of dairy farmers in each region. Second, in relying on volunteer participants, some skewing is almost inevitable and third in spreading the study across seven regions, there was a relatively small number

[24] Did not necessarily have to manifest in the use of economic terminology but could be inferred from discussion of priorities and practices.

for each region. Most importantly, the RDP extension people were the primary recruiters so the sample is likely to favour those more engaged with dairy organisations.

Nonetheless we believe the samples covered a range of farm business types and scales (see Table 2), reasonable geographical distribution (see Figure 1), and varying levels of industry engagement from those farmers who had never been involved in industry activities, to those who were on the boards of various industry bodies. In addition, the sample also included a range of attitudes to farming, farm business management and pasture management.

It is important to note that the interviews were conducted in one of the most severe droughts on record which may have affected the availability of people and their attitudes to farm business management and the industry more generally.

3. Farmer questionnaire

About you and the farm

1. Your farm operation.
    a. What is your herd size (milking cows) at peak production?
    b. What is the total farm area?
    c. What is the area of the milking platform?
    d. What is your total milk production?
    e. Who do you supply milk to?
    f. Do you irrigate for feed production
    g. Is the dairy business your main source of income?
2. Who is involved in the farm business?
    a. In addition to those we have discussed, do you employ other people?
    b. What are the main tasks they undertake?
3. How long have you been working and/or managing the farm business?
4. How long have you been in the dairy industry?

About being a dairy farmer

5. What are your two or three favourite things to do on the farm?
6. What do you consider to be your two or three major achievements working in a dairy business?
7. What are the two or three main things a dairy farmer should focus their time and effort on?
8. How would you rate your own performance in comparing how you allocate your time and how you think you should allocate your time on these things?

About managing the farm business

9. How would you define farm business management?
10. What do you think are the two or three most important aspects of farm business management?
11. In your farm business, who is involved in making business management decisions?
12. Who has most of the responsibility for managing financial information for the business?
13. Do you get advice on business management from people other than those directly involved?
    a. If so, who is it that provides this advice?
    b. How often and for what reasons to you seek this additional advice?
14. Does your operational structure allow enough time for you to do the business management work?
15. Do you have some sort of system for storing, managing or analysing business information?
16. What are the main financial indicators used to see how the business is going?
17. Does information from these indicators feed into business management decisions?
18. Do you think much about long-term profitability?
    a. If so, how do you assess it?
19. Do you ever think about what else you might do with your money, other than investing in dairy farming?
20. How do you or would you assess possible major investment decisions (new dairy, additional land)?

21. What about smaller operational decisions, such as buying in feed herd management or increasing the herd size a bit? What do you consider in those decisions?
22. How do you assess possible investments in new technology or operational systems?
23. What are two or three main goals that you have for the farm or the farm business?
24. How far in advance are you planning or thinking about for the business?
25. How do you see debt in terms of business and financial management?
26. What do financial institutions most want to know about your business?

About getting and using information and advice

27. What are your main sources of information and advice in relation to managing the farm business?
28. Do you participate in discussion or business network groups?

    How useful do you find them?

    What was useful about them?
29. What courses, programs or field days run by the dairy industry have you participated in that relate to farm business management
30. If you had immediate access to accurate information to help you improve your farm, what information would you want?
    a. What would you use that information for?
    b. How do you think you could get this information?
    c. Are there things that make it difficult to get such information?
31. In relation to your farm and farm business, what are the learning priorities for you?
    a. What types of information would be most useful to you?
    b. What would you like to learn more about?
    c. How do you like to learn more about farm business management information or programs?
32. Think about the skills and knowledge you've developed to get you to where you are, do you recall any turning points or lightbulb moments?
    a. If so what was it that first prompted the change in practice or increased your knowledge?
33. Have you sought out information that has led to a change in thinking or practice?

Concluding

Are there any other points you would like to make about supporting farmers in farm business management?

Are there programs you would like to see the industry provide?

4. Farmer types questions

Using a scale of 1 to 5 where 1 is Strongly Disagree, 2 is Somewhat Disagree, 3 is Neither Agree nor Disagree, 4 is Somewhat Agree and 5 is Strongly Agree, please indicate how strongly you agree or disagree with each of the following statements.

	Strongly disagree	Disagree mildly	Neither agree nor disagree	Agree mildly	Strongly agree	Can't say
I am committed to the long term future of my dairy farm	1	2	3	4	5	6
New farming ideas are very important to my operation	1	2	3	4	5	6
I am only prepared to take a few small risks in managing my dairy farm business	1	2	3	4	5	6
I feel financially constrained in my farm business	1	2	3	4	5	6
I am usually one of the first farmers in this area to try out new ideas and products	1	2	3	4	5	6
As long as my dairy farm business pays the bills and a bit extra I'm happy	1	2	3	4	5	6
I am optimistic about the future of my farm	1	2	3	4	5	6

5. Service provider questionnaire

About your experience in the dairy industry

1. Could you tell me about the nature and extent of your work with dairy farmers?
2. How long have you been providing advice or support for dairy farmers?
3. How did you develop your expertise and sources of information about farm management and especially business management?
4. Where do you get most of your current information about dairy farming from?

About the farmers you deal with

5. What regions do you work in?
6. How would describe the farmers you mainly deal with, in terms of their approach to business management?
7. What do you think are the two or three main characteristics needed to be a successful dairy farmer?
8. What are the two or three main things a dairy farmer should focus their time and effort on to be successful?
9. Are these things that farmers actually focus their time and effort on?

About farm business management

10. How would you define farm business management?
11. What do you think are the two or three most important aspects of farm business management?
12. Other than those immediately involved in the farm business, who do you think most influences farmers' business management?
    a. Do people use external advice frequently, occasionally, in crises or not much at all?
13. From your knowledge, what are common means farmers use to manage financial information?
14. What do you think are the main financial indicators that farmers pay attention to?
15. Does information from these indicators feed into business management decisions?
16. Do farmers think much about long-term profitability? If so, how do they assess it?
17. How do farmers assess possible major investment decisions (new dairy, additional land)?
18. What about smaller operational decisions, such as buying in feed herd management or increasing the herd size a bit? What do they consider in those decisions?
19. How do they assess possible investments in new technology or operational systems?
20. Do farmers scenario plan for the coming season?
    a. What factors do they try to predict outcomes and what information do they use?
21. What do financial institutions most want to know about your business?

About getting and using information and advice

22. What do you think are the main sources of information and advice that farmers use in relation to managing the farm business?
23. What do you think have been some good programs or courses for farmers?

Prompt: If considered useful, what did you like about them?

24. Are there any additional types of information that industry could provide that would help farmers with business management?

Concluding

Are there any other points you would like to make about supporting farmers in farm business management?

Are there programs you would like to see the industry provide?

6. Program developers/managers/deliverers questionnaire

About your background and experience with farmers

1. Can you tell me a bit about your background and experience with dairy business management programs?
    a. How long have you worked with dairy farmers?
    b. What size of dairy farms do you work with?
        i. Do you think scale matters to farm management outcomes?
2. Have you noticed different models or types of business management in the Australian dairy farm industry?
    a. If so, what types are dominant amongst the people you deal with?
    b. Is that also the case for the dairy industry as a whole?
    c. What are the strengths/weaknesses of these current business management models?
3. What do you think are the (3 or more) characteristics, behaviours or factors that contribute to farmers being viable or profitable in the medium to long term? What is the order of importance of these?
4. What do you believe are the (3 or more) characteristics behaviours or factors that threaten medium to long term profitability or viability? What is the order of importance of these?
5. What do you think are the (3 or more) important things that dairy farmers should focus their time and attention on, in order to have a viable farm business? What is the order of importance of these?
    a. Have these priorities changed over time?
    b. Do these priorities need to change according to markets and seasons?
6. What do you believe are the areas of greatest need (3 or more) in extension programs to support dairy farmers? What is the order of importance of these?

About farmers' business management

7. What have you observed about how farmers rate the importance of business management?

Not important at all	Not very important	Neither important nor not important	Somewhat important	Very important
1	2	3	4	5

8. What are the main financial indicators that farmers use to monitor their business?

    Prompts:

    - *Production measures*
    - *Production and financial ratios*
    - *Types of financial analysis (cash flow vs return on asset/investment/equity*

    What are the benefits and limitations of using these indicators?
9. From your experience and observation, have you seen differences in how farmers manage the business side of things?

    Prompts:

    - *Use of accounting or financial systems*
    - *Business plans*
    - *Planning horizon (how long they look forward)*
    - *Communication and planning with all involved in the business*
    - *Others….*

    What are the reasons for these different approaches?

Prompts

- *Personality*
- *Family background*
- *Circumstances*
- *Level of education of exposure to industry extension*

10. Have you seen cases where farmers have changed their business management practices to the advantage of business operation, viability or profitability?
    a. Changed practice No 1…..what factors led to those changes?
    b. Changed practice No 1…..what factors led to those changes?
    c. Changed practice No 1…..what factors led to those changes?
11. What do you think are the areas of greatest need to support (3 or more) farmers in their business management? What is the order of importance of these?
    a. Why are these the important areas?
12. Do you have any thoughts on the length of time and level of support/effort required to provide an early career farmer with basic farm business management skills?
    a. What is required to get them from basic to competent?
    b. What is required to get them from competent to advanced business skills?

About farm business management programs

13. Can you tell me about your involvement in the development or delivery of any programs or training to support farm business programs?
14. Program details
    a. Program name
    b. Period of operation
    c. Who funded and managed it?
    d. Main goals or aims
    e. Main target group/s
    f. What worked well?
        i. Why do you think these aspects worked
    g. What were the limitations?
    h. How would you have improved it?
15. Is there anything unique in farm business training and support that you believe lends itself to either common extension approaches not being effective- or- certain approaches being more effective?
16. What challenges did you find in implementing or delivering these programs?

Other suggestions

17. Are there other platforms, delivery channels, methods, topics or tools that could be utilised to improve farm business management programs?
18. Do you have an idea for a program or initiative to support farm business management?
19. Do you see any limitations in how FBM programs are currently delivered?
20. What kinds of gap do you observe between the extension industry/ service providers and farms? How can this gap be minimised?
21. Are there things that we could learn from other countries or other Australian agricultural industries that you know about?
22. Do you have any other comments?

7. Perspectives on business transition and succession

The summary points are drawn from a focussed discussion with three rural financial counsellors who provided services to a program on transition and succession in the Murray Dairy Region. The resulting discussion summary data were collected by Murray Dairy employees, with the recorded consent of the counsellors. Counsellors' observations of farmers' behaviours and preferences were previously derived from their visits to farms as part of a project looking to facilitate successful successions and business transitions. Project activities were conducted in the context of a dry season with very limited water availability in some regions so this would have affected farmer responses and behaviours. Observations from the discussion data are re-organised under themes.

Counsellors' opinions on the role of farm business management in industry development

1. A healthy industry is built around good business management.
2. Management training and development should be a primary focus of developing dairy farmer skills.
3. There are farmers and multi-generational farms that routinely make profits and it would be good to analyse why they do.

Observations of farmer attitudes to business management

1. There is often a heavy reliance on accountants' figures for the farm business and little understanding of what those figures suggest. Budgets that could be used for management purposes are sometimes done, but rarely used. Budgets are used to engage with banks not for management. Strategies to counteract these factors could include:
    a. Encouraging farmers to sit with accountants and talking trends and issues, especially considering the opportunities from the quarterly review of the BAS.
    b. Not starting with the figures when talking budgets, but start with goals and actions and then scaffold/context for the numbers.
2. The focus on business management is often limited by procrastination, emotional responses, and busyness. Time is not allocated to financial issues.
    a. Farmers can often have large funding shortfalls which, with planning, can be worked through but many don't want to face it.
3. Farmers consider themselves as price takers, which leads to a degree of fatalism about prices and costs. They can gain control by understanding expenses and profit but many know their production but not margins. Consultants can often drive this focus on production.
4. Farmers have a strong focus on land ownership and this is not necessarily strongly linked to business management, and so return on assets or similar concepts are not widely considered.
5. Farmers often work off recollection, because key information is not documented, and this can be an unreliable basis for decision-making.
6. There can be a tendency to allocate blame to others people and factors, especially with media attention on difficulties in the industry, so works against re-focusing on factors that can be managed within the business.

Communication within, and governance of, the farm businesses

1. Communication and governance are often limited or entirely absent. 'The owner knows best and the rest do'. This affects succession planning.
2. There are differences in the perceived relative importance of production work and business management work. These roles can also be gendered, with women managing the 'books'. This book activity is seen as less important, while driving tractor is the priority. A problem is that the person doing the books may be much more aware of underlying trends and the overall business situation and yet has little or lesser say in management decisions, despite having more insight into cash flow and profitability.

3. There are deficiencies in employee management, such as missing inductions and safety requirements.
    a. Some farmers are uncertain about whether or not they are covering these bases, but are not always willing to address deficiencies.
4. Internal management systems could be improved with:
    a. The implementation of governance structures for the business, communications, and employee management.
    b. Regular structured meetings of participants. These would sometimes have more value than complex interventions.
    c. Simple management solutions, such as a white board of employees jobs in the dairy.

Issues around transition and succession

1. The conditions at the time of the counsellors undertaking their work did lead to spike in interest in industry exits. 'Let someone else deal with it'.
2. The time to prepare for and execute a transition is often way underestimated. It can take 7 years to get a business to saleable point, and 1-2 years for getting an incoming person ready.
3. Farmers have not necessarily concentrated on profitability, but rather concentrated on asset transfer and not on a profitable business that could remain profitable under new owners.
4. Inter-generational debt transfer is poorly understood, particularly those not on farm don't understand the effect of debt on the net value of the asset.
5. Many did not know what assets were worth, nor even consider all assets (eg water rights).
6. It is important to understand that successful transition requires risk management and this is often not well-understood. The business needs to have legal cover, employee cover and clarity of roles.
7. It can be hard for some farmers to transfer control and some often will hold on until late into, or at the end of life, which can then lead to legal issues.
8. There may be long-term misunderstandings about the plan for distribution and the cessation of the farming business. This may result from both mixed messages from the older generation and particular expectations from the younger ones.
9. Further to that, the wills are often very contradictory to what people want or wanted to do.
10. The exiting people may want money from the assets, but also want to be eligible for pension, even though these can be contradictory roles ?goals?.
11. There might also be some lack of confidence in the incoming people in regard to running the business successfully and this works against building competence.
12. Transition is more likely easier where, the business is well-established, there is a transition plan, there is training for the incoming person/s, and those transitioning out have some financial backing.

Comments on the transition and business mentoring program

1. Expectations or goals for participation in the program ranged from seeking help to design a budget, getting more from accountants to reviewing the whole system.
2. There are cases where people have previously got plenty of advice but continue 'shopping' for answer they want to hear.
3. Sometimes there were very specific requests, such as how to set up share farming. This makes it easy for consultant to do a specific analysis within the time.
4. There were some unrealistic expectations around the programs, which led to some criticisms. Issues included:
    a. The underestimation of time to effect a transition for a business (as above).
    b. Expecting rapid turn-arounds from the seminar sessions, which wasn't always practical.
    c. Expectations often too big for what could be achieved.
5. A half-day visit is not sufficient to cover such gaps.

6. Often participants came in to discuss a transition but needed a farm business management visit to get be better prepared.
7. Programs can more easily support those with a reasonable level of knowledge and thinking on the issues, but it is much harder to immediately deal with those starting from a much lower knowledge and strategy base.
    a. Those that went to workshops were well versed in some of the appropriate thinking and possibilities.
8. Those that had done *Taking Stock* and understood how to use the learnings had a great basis for the transition programs. Others may not have fully understood the value and jumped too quickly to actions.
9. Overall, the counsellors thought the transition program was very valuable, even for those that didn't appreciate it at the time. There needs to be follow-up to help with implementation. If participants are just left with a simple report and there is no scope for follow-up, there is no way to close the loop.
10. Often farmers are not sure what they want from programs once you engage with them. Some may have participated because the program was free.
11. The Dairy Farm Monitor Program provided a good baseline to look back on.
12. Transitions can occur in steps, starting with things like heifer transfer to build equity in business, then increasing herd ownership and then a transfer of plant and land, done so as to ensure affordability on one side and sufficient income on the other.
13. It helps when discussion focusses on more specific possibilities, for example, are you prepared to lose equity in the coming period?
14. There is a need to make sure all participants are committed to an intervention program.
15. It can be hard to balance the need to provide a lot of information against the program funding/time restrictions and participants' ability to implement change.
16. The counsellors also received requests to intercede between generations, whereas these are well out of program scope.
17. There is interest in farm business after visits, but the terminology is an issue. Transition might be a better concept than succession.

Improving farm business management programs

1. There would be advantages in developing a suite of industry development programs that contribute to over-arching training/education recognition or accreditation. These could have a connecting theme such as business profit.
2. There would be better coordination where the smaller elements of training and education build to well-rounded education in dairy that shows how elements can be stitched together to build qualification and understanding.
3. A process of review could be introduced to dairy farming through farm business management.
4. A farm business plan is a turn-off for many and these might be better considered as an outcome from other considering goals, not a goal in itself.
5. Profit can be a meaningless word to farmers. Profit is often discussed by an accountant/consultant as a goal/achievement but often farmers do not regard it as one- when cash flow is tight and debt not reduced but there appears to be a profit due to rearing young stock, stockpiling feed etc. So while the sustainability and capacity of the business has been improved things like money in the bank, money to spend, less debt are more tangible. For example, Cups on Cups off works because it makes sense as production activity.
6. Sustainability is the goal but it needs a better synonym, as this term has off-farm environmental or bureaucratic implications.

8. Insights and findings from a needs analysis for farm business management

The insights and findings below are drawn directly from a draft report commissioned by Dairy Australia. For full report, see *Intuitive Solutions. 2018. Farm Business Management 2018 Need Analysis, Dairy Australia, Melbourne.*

So who does what?

- There is a division of roles and responsibilities around farm business management activities; but that in almost all cases;
- the farm business management decisions are shared between male and female partners.

It was also clear that while the division of roles is perhaps consistent with perceptions of a traditional farm model, the back story is that in many cases this allocation of roles is as much about the skills and competencies of each of the partners. Female partners regularly bring previous training or workplace experience in organising and running an office, basic computer skills and an understanding of platforms and software solutions.

Input and impact of influencers

It was evident from the discussions that there are external advisers involved in the management of the farm business. What was clear however was that the role of these external influencers is in most cases minimal and more directly connected with compliance. That said, the framework for advisers to, at some point, have a deeper role in the management of the farm business exists but in most cases remains at arm's length to critical business decisions. One of the key take outs from this discussion was that with external advisers it is all about trust and less about independence.

The shapers of farmer attitudes and behaviours

A number of factors that look to shape farmers attitudes and behaviours around managing their farm business emerged during the discussions. These include:

- ground zero – the business management skills and competencies available on farm;
- the influence of the emerging generation of dairy farmers;
- the level and nature of farm debt;
- what success looks like and where that horizon sits;
- the challenge of acknowledging and recognition of the considerable 'real life' experience of farmers; and
- integrating solutions and support into the business as usual.

In most cases, the current behaviours and attitudes are shaped in a measurable way by some or all of these influencing factors. They then provide a valuable input into the guide for the future strategy and engagement models for Dairy Australia.

Budgeting

What emerged from the discussions was that:

- there is typically a budget 'in play' for almost all farms; but that
- in most cases this was informal, unwritten and unclear.

No one rejected the concept of running a farm budget. What there was however were four different postures on budgets, namely:

- Supporters – those farmers who saw value and benefits in running a formalised budget;
- the Motivators, for taking up and using farm budgets;

- a group who use proxies for the farm budget;
- the largest group of Rejecters – they had a preference for running budgets 'in their head' and were quick to challenge the value and utility in running a farm budget.

Looking ahead, the opportunities to reset farmers perceptions and behaviours on farm budgets will likely need to focus on:

- a stronger and clearer articulation of the value proposition of farm budgets;
- repositioning the farm budget to be more clearly seen as a:
  - tool, not a document;
  - an evolving and real time plan, not a static document;
  - part of how the farm business is run not an adjunct or nice to have; and
  - an acknowledgement that a farm budget acknowledges the unique differences of each farm
- resetting some views that it is an 'either or' situation – either a budget or use their collective experience and knowledge.
- thinking about if and how a dairy farm budget could be integrated into existing accounting software.

Tracking performance

Tracking business performance was typically done one of two ways:

- using a structured process to reviewing business performance; or
- having little or no structure to this process (informal, subjective and inconsistent).

The feedback indicated that:

- structure into tracking performance (time, approach and outcomes) will bring better dividends;
- scheduling reviews of business performance looks to be the most useful mechanism to achieving this;
- rethinking any assumptions that farmers know what and how to do a review; and
- showcasing the benefits of regular reviews of business performance using other farmers.

Business planning

Very few farmers have a formal business plan. The obstacles to doing one include:

- no clear value proposition in doing a business plan: for what purpose?
- no consistent trigger point to create a reason to do one. Succession planning looks to be the easier and most obvious trigger; and
- a lack of understanding about how to go about this process.

Risk management

Farmers are aware there are business risks, but their perception of what these are varies dramatically. There is no consistent framework farmers are using to assess which risks are active. There was a tendency in the discussions for farmers to describe risks in one of two 'buckets':

- the controllable risks; and the
- non-controllable risks.

Off the shelf: Dairy Australia training and tools

The feedback from the discussions suggests that: There is a high level of unfamiliarity with what's available. This looks to be an outcome of:

- in some cases just no awareness of what's on offer;
- low recognition of the training 'names'. Farmers were more likely to talk of content than the course name;

- being in a ‘competitive environment’ with opportunities available across a range of other service providers; and
- an effort required to identify where might be the most appropriate ‘entry’ and ‘exit’ points in the training opportunities available.

Some mixed views on the training experiences:

- some positive feedback around the content of the course (relevance), the format (the way it was delivered and the deliverer), the social dividends of being on-course with other farmers, and that the training enabled participants to ‘learn new things’.
- some critical feedback relating to logistics, the traditional training format (day sessions, long sessions, sit and learn format), that the content was too simple, and that the sessions were too slow paced.

The pathway forward may involve consideration of a less traditional training delivery model and consider (for example):

- demand driven training only;
- small group and localised training formats;
- benefit-led course descriptions;
- creating FBM training advocates;
- sequencing and connecting courses;
- enabling an entry in and exit out at any point during the course; and
- reviewing the basic requirements for involvement in these training opportunities and giving consideration to removing artificial barriers to involvement (for example lack of computer skills).

On Dairy Base, there was some specific feedback including that:

- there are still significant obstacles to farmers understanding the value of benchmarking and that the tool accommodates different farm operations, farm practices and operating environments;
- there is confusion over Dairy Base and other tools. This looks to have impacted the perceive utility of Dairy Base;
- there looks to be some opportunity to better showcase how and where farmers have used Dairy Base; and
- the need to be clearer about the time and resource investment required to input and then interpret information from Dairy Base.

8. Summaries of key issues and concepts from studies of farm business decision-making

Data driven farming: smart farming decision model (use of ICT and big data)

Next generation of agricultural system data, models, and knowledge	Private data vs public data, private decision makers' vs public decision makers, developing data and model, and developing knowledge product development. **Private data include:** Attributes of farm specific land, operations and management styles. **Public data include:** weather, climate, location, other publicly available economic data	(Antle, Basso, *et al.*, 2017; Antle, Jones, *et al.*, 2017; Capalbo, Antle, & Seavert, 2017)
Data chain for better farm management	Data chain refers to sequence of activities from data capture to decision making and data marketing. It consists **six sequential activities:** ▪ **Data capturing** (purpose, source, type, quality); ▪ **Data storage** (system, location and action); ▪ **Data transferring** (purpose, channels and condition); **Data transformation** (purpose and methods); ▪ **Data analytics** (purpose, methods and outputs); and **Data marketing** (market , value and strategy)	(Chen *et al.*, 2014; Wolfert *et al.*, 2017)
Key issues in smart farming	**Main idea:** cloud-based event, and data management; human will always in the system, but much reliance on machine, robots, and cloud data. **Three main elements:** ▪ smart analysis and planning, ▪ smart control, and ▪ Smart sensing and monitoring.	(Wolfert *et al.*, 2014)
Development of big data and smart farming	**Pull factors:** ▪ **Business drivers (intention** to lower cost and higher price**,** dealing with idiosyncratic risk, better decision making and management control); ▪ **Public drivers** (food security, safety and sustainability); and ▪ **Information drivers** **Push factors: (1)** general technological development, (2) emergence of sophisticated technology, (3) data generation and storage, (4) Digital connectivity, and (5) innovation possibilities	(Wolfert *et al.*, 2017; Wolfert *et al.*, 2014**)**
Knowledge chain (pyramid)	**Key focus:** linking data to information to knowledge to wisdom. **Data** is like raw materials; **Data includes:** ▪ experiential data, ▪ statistics, sensors, ▪ social networks, satellites, and	Janssen *et al.*; 2015

	▪ Citizen observation.	
Application chain for better farm decision	Ensuring infrastructure (hardware and software) in agricultural system model **for better information and knowledge**, for example; yield forecasts, policy effects, crop damage, for farmers. **Application chian include:** ▪ data access, ▪ extraction, ▪ transformation, , ▪ integration , and ▪ visualisation	(Janssen *et al.*, 2017)
Big data application in Smart Livestock farming	Biometric sensing and GPS tracking; Breeding monitoring, Milk robots and livestock movements	(Cole, Newman, Foertter, Aguilar, & Coffey, 2012; Faulkner & Cebul, 2014; Sonka & Ifamr, 2014)
Integrated farm management information system (FMIS)	**Four functional components of FMIS**: ▪ Internal data collection, ▪ External information collection, ▪ plan generation, and ▪ Report generation. **More specific components of FMIS:** farm activity monitoring, data acquisition, and, data transfer; data processing and internal repository; searching internal information and document generation; extracting to audit, automated validation, and searching external information; information filtration; operation plan generation, plan repository, and plan execution.	(Sorensen et al; 2010) (proposed conceptual model)
Designing innovative (process) for agricultural production system	**Innovative actors at the heart of the process:** (1) farmers as decision makers, (2) advisors as support providers , and (3) researchers as producer of technical and methodological research	Review of 80 articles in (Gal, Dugue, Faure, & Novak, 2011)

Research on dairy farm business management

DairyNZ Autumn management recourse for better decision making	Main idea - This resource is ▪ an energy based model , and ▪ Calculates profit from different farm management strategies in pasture based spring calving system.	Neal, Kay, Peel , & MacCarthy, 2017)
Using Life Cycle Assessment (LCA) for commercial decision at farm level (study in Finland)	Main idea: asses impact of environmental consequences of the measures taken to reduce environmental impact of livestock production. LCA is a decision support system for farmers and includes: ▪ Easy accessibility to farmers ▪ Farm data are readily available ▪ Farm advisors use the model ▪ Interaction between farms and advisors	Meul et al; 2014
Monitoring system at dairy farm using Oestrus detection system (ODS) (study in NZ)	Keeping profiles of three things: ▪ Concentration of progesterone in milk ▪ Artificial fertilization records ▪ Pregnancy diagnosis results	Rue, Kamphuis, Burke & Jago, 2014
Pasture Growth Simulation Using Small Talk (PGSUS) (study in NZ)	Main idea: test the herbage mass of an individual paddock level	Romera et al; 2012
Precision Dairy farming (PD) in Australia: Using ICT to gather information	'use of technologies to measure psychological , behavioural , and production indicators on individual animals to improve management strategies and farm performance' Five key issue for tapping PD in Australia: ▪ Industry good coordination and leadership in PD ▪ Defining on and off-farm value of PD ▪ improving the technology available to farmers ▪ integration of PD within farming system for improved management ▪ developing learning and training	(Jago, Eastwood, Kerrisk, & Yule, 2012)
Precession to Decision : Needs for Digital agriculture in Australia for better decision (Survey in Australian cross farming industry)	Investigated : current status of ICT, current adaptation and future application of ICT Main issues explored: ▪ adaptation is improving but at low rate ▪ Knowledge of ICT among producers is poor ▪ Concerns over data privacy	
Precision Diary farming in NZ : Usages and channellings	Three areas where PD used: ▪ Planning: historical information, futuristic information, predictive information modelling ▪ Implementation: using automation to execute the plan ▪ Control: real time monitoring of animal and plant resources, automated decision rules, use of data to measure farm performance	Eastwood & Yule, 2015 (Australian farm policy journal, 15)

9. Checklist for good design of decision support tools

Performance : usefulness of the tools to perform the intended functions
Ease of use: the degree to which the tools are easy to navigate and use
Peer recommendation: the exchangeability of the tools' knowledge to peer groups
Trustworthiness : the extent to which the tools are evidence based and is trusted by the users
Cost effectiveness : if the costs incurred for tools are effective in terms of benefits/ the size of initial cost
Habituation: users'[farmers'] behavioural tendency to use the tools
User relevancy: extent to which the tools are generating values for users [farmers]
Compatibility: whether the tools are in compatible with the skills and knowledge of tool users [farmers] and deliverers [advisers]
Age: if the tools satisfy the requirements of users [farmers] of different ages
Business size: whether the tools fit with the needs of farms of various sizes
User types: usefulness of the tools to different types of farm enterprises including family , corporate and partnership farmers
IT education: if the users [farmers] require education in ICT to use the tools
Supporting logistics: if the users [farmers] have the congenial workflows, tools and other devices/ services to use the tools
Compliance : if the legislatives and other market requirements facilitates to use the tools
Marketing: whether and how the tools are promoted to the market to the users [farmers]

10. Frequency and average rating of FBM and related trainings/workshops

FB workshop/trainings	Number of farmers attended	Average rating (1-5 scale)
Dairy Farm Business Analysis	17	4.8
Farm Business Fundamental	7	4.9
Feeding Pastures For Profit	12	4.8
Farm Household Support	1	NR
Farm Loan	1	NR
Stepping up Stepping Back	1	5.0
Focus Farm event	4	4.5
FertSmart	4	4.8
Cups on Cups Off	4	4.5
Small Business Course	1	5.0
Churn Milk into Money	2	5.0
Irrigation Training	1	5.0
BairyBase	3	5.0
Calf Rearing	2	5.0
Business Governance	3	5.0
DRF Symposium	2	5.0
Tactics for Tight Times	2	5.0
DAF Online Course	2	3.5
Financial Literacy Course	1	NR
Office Day Chart	1	NR
Farm Discussion Group	1	3.0
Staff Management Training	1	5.0
Euthanize Livestock training	2	5.0
Advance Nutrition Production Training	1	5.0
Farm Safety Training	1	5.0
Young Dairy Network (YDN)-Financials	2	5.0
Taking Stock	1	4.0
Rabobank Executive Training	1	5.0
Australian Dairy Conference	1	5.0
Genetic Australia Event	2	5.0
Dairy Milk Quality Training	2	NR
ESKI (Employment Smarter Kit Initiatives)	1	5.0
Australian Rural Leadership	1	5.0
Farm Monitor	1	5.0
Advance Nutrition and Business Elements	1	5.0
Australian Institute of Farm Management	2	5.0
Frontline Business Management	1	5.0

NR= no rating

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