

Using a 'levels of decision making' framework in extension

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Abstract. A new farming systems extension approach was developed as part of the dairy industry extension program in Victoria. This approach was the outcome of collaborative work undertaken by the Department of Primary Industries and The University of Melbourne, funded by Dairy Australia. The project was instigated in response to a growing concern that dairy farm businesses were confronting complex challenges which in turn challenged extension staff to use a systems approach when servicing these businesses. Challenges arose from the increasing need to adjust to changing terms of trade and also respond to the drought conditions. Together, this had farmers questioning their farming system. This paper focuses on one aspect of the project, the emergence of a decision-making framework that proved useful in understanding farm management issues, designing extension programs, and building staff capacity to support decisions around these issues. The decision-making framework is comprised of five levels that progressively encompass a more expansive scope of the farming system considerations. The decision levels are: 1. product choice decisions, 2. component decisions such as grazing management, 3. sub-system decisions, 4. farm system decisions and 5. beyond-farm decisions. Implications arising from the use of these levels relate to the focus of the extension approach, the associated methodology, and the skills required to deliver at different levels. An overview of contemporary developments in Victorian dairy extension strategy is provided, outlining the evolution from a single topic focused extension program such as grazing management 15 years ago, to now where a more integrated feedbase management approach is used. This shift in farmer needs over the past two decades has challenged the previously successful programmed learning approaches and called for a new extension approach. Three key lessons arising from this work are that the 'Levels of Decision Making' framework can improve:

1. the targeting of extension services to achieve desired outcomes.
2. the design of extension programs, activities and tools.
3. the planned approach to professional development of extension staff.

Introduction

Agricultural extension practitioners, working one-on-one with farmer clients or in broad-scale program delivery, deal with a wide range of enquiry extending from specific queries about a particular aspect of the farm operation to broader questions about the farm system as a whole. Driven by challenges associated with changing terms of trade, climatic fluctuation, and expectations from markets and community, farmers are seeking support for an increasingly diverse and complex range of decisions. This paper discusses the role that a 'levels of decision making' framework can play in understanding farm management issues, designing extension programs, and building staff capacity to support decisions around these issues.

The evolution of farm systems extension in Victorian dairy extension

Establishment of the dairy industry's grazing management project, Target 10, in 1992 signalled the introduction of a project-approach to Department of Primary Industries Victoria (DPIV) extension services, and was set up with regional delivery teams and with similar extension products delivered across all regions. The first Target 10 product was the grazing management program incorporating a three day training course, with several on farm discussion group meetings and an individual farm visit, all designed to support practice change in relation to grazing management. Evaluation of the program showed that it was highly successful in achieving its specific goals, but farmers recognised that many farm management issues were not being addressed in this single-issue program and, through their regional representatives, requested similar products to address feeding and fertiliser components of feedbase management. Like the grazing program, these new programs utilised a 'programmed learning approach' (Coutts et al. 2005), and also met with success and supported a similar degree of change.

Prior to this, much of the government extension in dairy involved district-based extension delivered one-to-one with farmers on an on-demand basis, and via discussion groups. Requests for fertiliser advice, feeding advice, or more specific information about chemicals or pasture species were common, as were discussions about the overall direction of the farming business,

and extension officers were free to address the issues they perceived as important using a one-to-one advisory approach.

During the mid 1990's Target 10's product offering expanded even further with the dairy version of the Farm\$mart/ national property management planning initiative, Dairy Business Focus (DBF), that focused on strategic business planning. Dairy Business Focus complemented the enterprise benchmarking product Dairy Farm Performance Analysis (DFPA) released a few years earlier to help farmers analyse and discuss whole farm performance issues. In contrast to the technical feedbase component, both DBF and DFPA utilised structured questioning more akin to a 'group facilitation/empowerment model' (Coutts et al. 2005). The business planning approach continued to be sought by investors leading up to dairy deregulation in 2000, resulting in the development and trialling of business improvement groups, and dairy learning groups called syndicates.

Since 2000 farmers have questioned their farming system due to changing terms of trade, concerns about water security and experiences in the drought. In response, a more practical and holistic feedbase management product, Feeding Pastures for Profit began as a programmed learning approach around activities to build skills and confidence, and is being delivered to provide integrated feedbase management solutions. However, the types of decisions required are at a whole of farm level, and it was considered that methodologies for this level of decision making needed to be reviewed.

Over the past two decades the DPIV dairy extension team has moved from ad hoc delivery to projects which support farmers across various topics and levels of decision making. This experience has shown that extension methodologies need to be tailored to each situation. Staff capacity was highlighted as a challenge, requiring the development and maintenance of skills that span discrete technical issues through to farm systems issues.

Farming systems action research

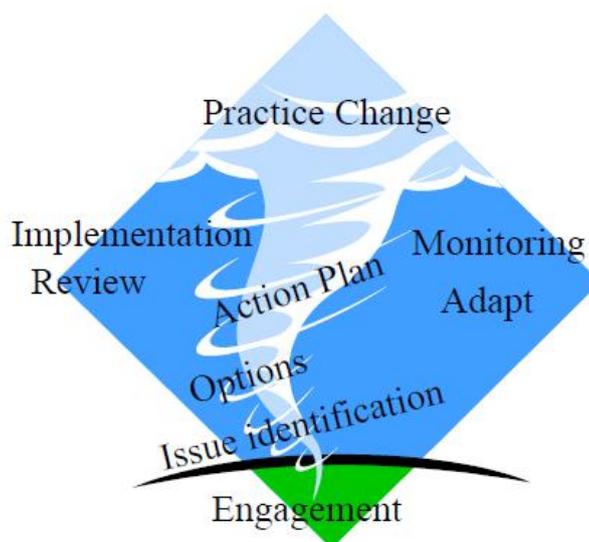
In 2004 the DPIV dairy extension team and researchers from The University of Melbourne began working together in an action learning approach on a pilot study to develop a new farming systems extension approach. Each of the seven DPIV advisors worked closely with a farm for the first twelve months to better understand the issues and decisions processes being used on farm and to offer advice. In the following year the advisors applied the techniques developed to a learning group model. Lessons from this practical 'in the field' experience were drawn out through facilitated group meetings on a bi-monthly basis.

During the first year of the research, four main stages in the advisory relationship were identified - engagement with the farmer client, identification of issues, assessment of options, and action plans with support for implementation. This was represented as a model that was termed the 'Vortex' (Markham et al. 2006) (Figure 1).

In addition, it was noted that the advisory relationship dealt with decisions that ranged from those relating to a product or cultivar choice, to single issue management decisions such as grazing, whereas other decisions were about integrating across issues, changing the whole farm system, and beyond the farm at times. So, in an attempt to more clearly articulate the range and scope of decisions being addressed, the 'levels of decision making framework' was conceived. The framework recognises that changes around one aspect of the farm are likely to have implications for other aspects. In addition to the 'level' aspect to this, indicating complexity and impact across the production, economic and social domains of the farm business, there is also a time dimension (Leeuwis 2004) whereby decisions can also be classified as 'operational', 'tactical' or 'strategic', which line up with short-term, medium-term or long-term consequences respectively.

This framework enabled the advisors to more clearly describe the decision being made, and consider which extension tools and processes would be most appropriate to assist the farmer. In some cases, however, it was recognised that staff did not have the particular capability, tools or processes to support a particular type of level of decision which highlighted the need to match methodologies and capabilities to different levels of decision making for the issue at hand.

Figure 1: The Vortex – a conceptual model for on-farm engagement and decision-making



Source: Markham et al. 2006

Description of the decision making framework

The 'Levels of Decision Making' framework created from the shared experiences arising from the farming systems case studies and pilot work, sought to describe and categorise the types of farm management decisions made by farmers, and create a platform upon which to plan extension delivery (Table 1). It contains five key levels of farmer decision making that can be targeted by extension services. Each level has different implications on the extension focus and methodology, particularly the balance of technical information versus the people and management aspects. At higher levels the decision has greater potential to impact on the business.

Table 1: Levels of Decision Making Framework

Levels of Decision Making	Description
Product choice decisions	Expert advice sought regarding product choice decisions, e.g. fertiliser blend.
Farm system components (e.g. feeding, grazing management)	Focus is on best management practice of a single component to achieve an improvement in profitability, e.g. cow nutrition.
Sub-system decisions (e.g. integrated grazing and supplements)	Focus is on managing the interactions between components to achieve an improvement in profitability, e.g. integrating fodder crops with pastures and grain.
Whole farm system decisions (involving significant resource management implications)	Involves significant change to the farm resource base to improve farm profitability and/or risk management.
Beyond farm decisions	Decisions extend beyond the farm enterprise and take into account the goals underpinning the entire financial portfolio.

The levels are now described in more detail:

Level 1. Product Choice decisions: this level of decision relates to product choice recommendations. Examples include: advice on pasture varieties and herbicide/pesticide chemical recommendations. Due to the commercial/privatisation of product development, this realm is now dominated by the commercial sector who service this area by providing one-to-one advice, published brochures and field day demonstrations.

Level 2. Components of the farm system: Level 2 decision making/knowledge is focused on the acquisition of best management practice of a particular skill (e.g. ration formulation, nutrient budgeting, feed budgeting, forage planning). For example the Target 10's 'Feeding Dairy Cows', program has been specifically designed to allow participants to develop a balanced diet which matches their production goals and source best value for money feeds, but does not extend to overall enterprise profitability .

Level 3. Farm sub-systems decisions: Level 3 decisions focus on managing the interactions between sub systems to achieve an improvement in profitability. 'Feeding Pastures for Profit' is an example of a DPIV feedbase program that provides farmers with the confidence to manage and change their feedbase as required because they understand the impact of their changes on the overall profitability of their dairy enterprise.

Level 4. Whole farm systems: Level 4 involves a substantial change to farm resources to improve the profitability and/or risk management of their business, either now or in the future. Level 4 decisions may involve buying additional land/water, investment in capital infrastructure, changes to stock policy, changes to labour availability etc. Due to the wide breadth and depth of knowledge, skill and experience required in assisting farmers making decisions at this level, this area of work has traditionally been supported by private farm consultants, working on a one-to-one basis.

Level 5. Beyond-farm decisions: Level 5 takes into account the entire financial portfolio and personal goals/aspirations of the individuals involved. Level 5 decisions may involve areas such as off farm investments/income, superannuation, taxation, debt level etc. This area extends beyond the expertise of most agricultural science graduates. Although the importance and impact of Level 5 decision making is acknowledged because of the impact on all 'lower order' decisions, it is not a direct focus/target area of our work. Decisions at/or impacting on Level 5 should be directed to financial and legal professionals with the appropriate expertise.

A strength of the framework lies in its ability to help extension staff and farmers to appreciate the linkages between specific technical enquiries and higher order whole farm or whole of business issues. For example, an initially straightforward nitrogen fertiliser decision is likely to have flow on implications to other aspects of the farm operation and needs to 'fit' with the whole farm system.

An initial Level 1 issue might involve an enquiry regarding the comparison between liquid nitrogen and urea based on price per unit, cost of application, management and outcome. Nitrogen as an issue would focus on the best management practice in regards to environment considerations and dry matter yields. Advice may cover the rate applied, timing of application, area to be applied, and/or animal health considerations. Implementation will involve minor disruption to farm management to accommodate the best management practice of nitrogen. Once the appropriate expertise is sought the answer is straight forward, the decision is clear and the best option is easy to implement with little disruption to the farm management.

A Level 2 enquiry about a how to graze and manage the pasture may also encompass the role of fertiliser, thus linking it to the Level 1 decision about the nitrogen fertiliser product. At the feeding sub-system Level 3 the role of nitrogen still has a part to play but now the challenge is to integrate pasture management, fodder conservation, and brought-in supplements into a cohesive management system. The role of nitrogen to boost silage harvest, to supply more supplements in autumn, in order to allow farmers to extend their autumn/winter pasture rotation is important, but only part of the picture at this level.

A Level 4 the feeding sub-system may be so successful that it may lead to a review of current stocking rate levels and intensification of the forage system, infrastructure consideration, consideration to the exposure to risk and the need for expansion of the business. Decisions at this level are likely to have a significant impact on farm management. At Level 5 the enquiry might extend to equity and taxation considerations, as potential changes to the resource base are further investigated. As alluded to earlier, this level of decision making is not currently serviced by government extension and therefore outside the scope of this study.

A single dairy farming issue can be analysed at different levels of the decision-making framework. The depth and breadth of the analysis really depends on the nature of the farmer's enquiry. The job of extension is to gauge and service the enquiry at the appropriate level.

Using the levels of decision making framework

In applying the decision framework to the design and delivery of extension we ask the following questions:

- What is the relationship between the decision framework and stages in the advisory relationship?
- What skills are required of the extension practitioner to deliver at each level?
- What are the attributes of effective extension methodologies to support decisions at each level?

We start with the advisory relationship and refer again to the Vortex work discussed earlier (Markham et al. 2006). In this paper we have simplified the four stages in the Vortex to three: identify issues, assess options and take action. This simplification focuses on tasks that are fundamental to decision making. The first stage in the Vortex (engagement) was critical to managing relationships but only indirectly related to decision making. By aligning the stages of the advisory relationship with the levels of decision making it becomes apparent that the relative emphasis on each stage in the relationship may differ with the level of decision being supported. For example, with product choice decisions the farmer client has already typically identified an issue and the main role for the extension operator is an advisory role to recommend options, perhaps with advice on a typically straightforward action plan. In contrast, with farm system decisions (Level 4), the problem definition or issue(s) needs a considerable degree of fleshing out, including generation of options, and formulation of action plans. We have represented this difference in task requirement in Figure 2. If we think of the effort to perform a task as some combination of time and intellectual effort then the bar graph is an attempt to show that little issue identification effort is required at Level 1 relative to Level 4. We can also see that the relative effort varies across the stages of the advisory relationship, with the higher level decisions requiring more effort in the issue and option exploration relative to taking action.

The extension skills needed to support each level of decision making also differ. For example, decisions involving farm systems issues require considerable engagement skills and processes around needs analysis, options selection perhaps with economic analysis, and planning processes to support actions by the management team on farm. These skills are more aligned with a coaching role as compared to technical expert. A learning coach becomes a confidant and co-developer with the decision maker, a valued partner with whom one can experiment with ideas and play with possible options before committing oneself to a particular course of action. This is a very different role to that of the technical expert who has minimised the effort that a farmer needs to expend to access relevant information. This is because the expert has already pre-processed much of the information the farmer requires and organised this in a way that is most amendable the issue at hand. To use a learning coach role at Level 1 would be highly inefficient and likely frustrate the farmer.

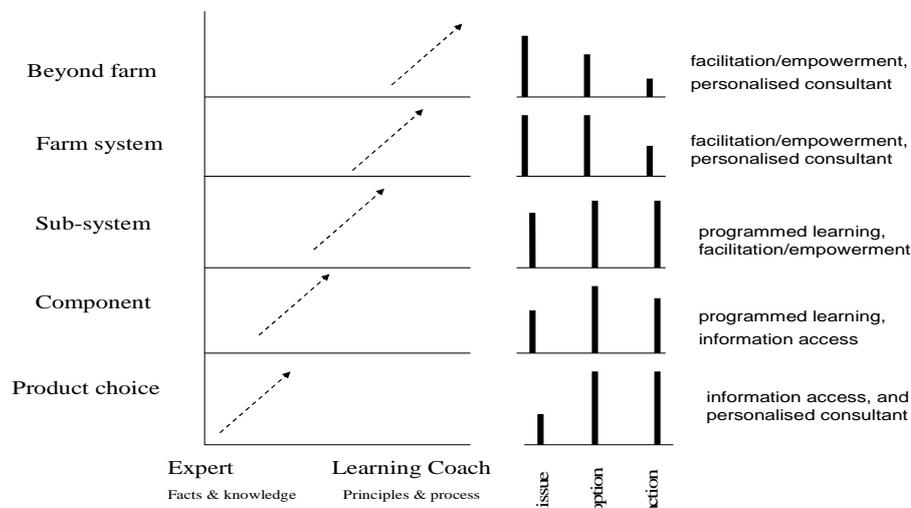
Conversely, the advisor who jumps immediately to a technical solution without adequately exploring the issues and options when dealing with Level 4 decisions will be perceived as 'a superficial salesperson' to discerning farmers. How often have we heard, 'I just want you to tell me answer!?' As higher level decisions are addressed it will be increasingly difficult for the advisor to possess all of the technical skills required to make the decision. To cope with this situation the advisor needs to draw on principles and processes to undertake a role more akin to coaching, forming a learning partnership with the farmer and perhaps collaborating with other service providers as well.

Pulling these ideas together in conjunction with the five extension delivery models (Coutts et al. 2005) assists us to understand the place of current products in the delivery range, including the capacity building required for staff, and appropriate sign-posting for farmers, illustrated in the following examples.

Historically, dairy program staff have provided support for product choice decisions via personalised consultancy as a farm visit or phone call, as agribusiness technical and sales staff now do. Product choice decisions also lend themselves to an information access model via the web or written materials.

Our experience suggests that the middle levels of farm decision making are extremely well suited to a programmed learning model. This model has been applied successfully with component (Level 2) decisions in areas of cow nutrition, soils and fertiliser, and pasture management, and with the Level 3 Feeding Pastures for Profit program which helps farmers integrate grazing and feeding management. In these programs, consultancy support has also provided useful assistance to help farmer clients incorporate these skills into their management routines.

Figure 2: Levels of decision making versus role of the extension practitioner, issues and options and actions decision steps, and the preferred extension delivery model



Not surprisingly, as the dairy extension effort has moved from support for product choice decisions to programs at component and sub-system level, so has staff capability. Preliminary results from a dairy team capability survey in 2009 (G Drysdale, pers. comm.) revealed that less than 40% of respondents believe they are competent to make product choice recommendations whereas around 60% rated themselves as competent to support component and sub-system decisions.

As the levels of decision making moves from a narrow to broader and higher level, the emphasis shifts from providing information as a technical expert to a role that is more akin to an learning coach focusing on process. Property Management Planning, operating at a strategic planning level for the whole farm (Level 4), and beyond farm (Level 5), focussed almost exclusively on working through issues and options, and used a process-driven facilitation/empowerment approach. Clearly staff needed high level facilitation skills to deliver this program. A personalised consultancy model is also used by private consultants to address these higher level business questions; however we would argue that the opportunity to address complex issues with support from a group can also be valuable. Within the dairy team less than one third of staff currently rate themselves as competent to support whole of business decisions, and only 45% believe they are competent to support whole farm decisions. Staff training and mentoring in business management, and support around understanding whole farm systems is being provided to address these gaps.

Summary and conclusions

The development and use of the 'Level of Decision Making Framework' has been useful in providing clarity around the focus of extension projects and the problems they aim to address. In particular it has highlighted the need to customise extension approaches to address problems at different levels, and raised challenges in building capability to deliver across different levels of decision making.

Three key lessons arising from this work are that the 'Levels of Decision Making' framework can be applied to:

1. improved targeting of extension services to achieved desired outcomes; it seems that participatory and collaborative approaches may be required to target complex whole farm and whole of business decisions which require appreciation of a range of issues and options
2. design of extension programs, activities and tools; it is our experience that lower levels of decision making can effectively be serviced through individual technical support or information access, whereas the middle levels of decision making lend themselves to programmed learning, and higher levels can benefit from a group facilitation/empowerment model. Personal consultancy is useful at all levels particularly in association with other extension approaches.
3. a planned approach to professional development of extension staff: the skills required to support higher level decisions are quite different to the more traditional technical role that

extension staff have played, leaning more to coaching and facilitation and requiring greater skills in business management

It is anticipated the 'Levels of Decision Making' framework will increasingly be used to focus project work, inform the design of interventions, and focus professional development and staff training. Initially this may involve its use as a mapping and explanation tool to describe to new staff where extension projects fit, and then allow new staff to design a training pathway in extension that is suited to their goals, and to know when to signpost and collaborate with others to address a complex issue which need solutions at a number of levels.

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