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BeefPlan Review

Northern Beef Program

Abstract

BeefPlan is one of several MLA initiatives designed to assist northern beef producers by improving their capacity to access, absorb and apply knowledge relevant to efficient beef production. Distinguishing features of BeefPlan include its reliance on self-empowerment and group dynamics to bring about useful outcomes. Outcomes are achieved in practice when group-generated strengths are systematically linked to the prerequisites of practice change such as identification of the need to change, information gathering and assessment.

For the purposes of evaluating BeefPlan and formulating recommendations regarding its future, the program's performance over the eight-year period from 1998/99 to 2005/06 has been subject to analyses focused on benefit cost relationships, cost effectiveness and management procedures. In the case of BeefPlan, benefit cost analysis was used to test the proposition that the program increases the individual member's capacity to absorb useful information and consequently make practice changes and ultimately increase net income. The possibility of BeefPlan groups generating secondary benefits associated with the natural environment and positively influencing local non-members was explored outside the quantitative analysis.

Based on records provided by MLA, the number of potential respondents was distilled to 127 businesses representing 177 individuals. A total of 92 businesses (72% of potential) agreed to participate in the survey while it proved impossible to contact 9% of the potential respondents. The data was analysed in terms of statistical profiles and associated economic impacts.

The study found that BeefPlan has been a viable investment in terms of the relationship between its total costs (over the eight years since 1998/99) and expected benefits (over a 15 year period from 1998/99). The benefit stream was based on the respondents' own assessment of income impacts due to BeefPlan. Over the eight years it has been funded, BeefPlan has cost MLA almost $1 million. The survey identified a range of qualitative TBL benefits to beef producers arising from their participation in BeefPlan. Based on participants own qualitative estimates of economic benefits from BeefPlan (percentage net income increase) MLA's investment could ultimately generate on-farm benefits of up to $3 million.

In terms of MLA outlays, BeefPlan has been high cost per producer, per hectare and per beast area compared to other extension programs. However, MLA's investment in BeefPlan has been effective on account of the returns it has generated for participants. The report makes several suggestions as to how BeefPlan can be better supported in the future and made to complement other MLA extension programs.

Executive Summary

This report evaluates BeefPlan for the purpose of revealing its associated economics and the linkage between improved economic performance and the adoption of new practices. A benefit cost analysis (BCA) was conducted that incorporated investment costs over an eight-year period and the associated benefits – expected to continue for seven years beyond 2005/06. An evaluation of this nature is necessary to provide reassurance that the beef industry's levy funds are being invested competitively relative to alternative uses of the funds. The current program was supported following a pilot program that ran from March 1998 to June 2001 (NAP3.319).

The evaluation has been based on data gathered from MLA and directly from cattle producers who participated in BeefPlan groups between 1998 and 2005. MLA has funded the major activities associated with BeefPlan and assisted with administration of the groups. Participation in BeefPlan activities caused group members to incur a relatively small proportion of the total cost. While BeefPlan costs are easy enough to identify and quantify, the same cannot be said of benefits because these are embedded in the producers' overall wealth stream, which is affected by multiple influences. Moreover, BeefPlan influences income through a complex sequence of events that commence with awareness of the need to change and flows through to acquisition of knowledge and skills before culminating in real practice change that lifts economic performance.

The evaluation uncovered several inherent problems with assessing the effectiveness of the BeefPlan model. In the first instance, 'experimental conditions' have not applied, making it necessary to rely on the participants' own estimates of the difference between 'with BeefPlan' and 'without BeefPlan'. Apart from the absence of 'experimental conditions' (that would measure the income response due to BeefPlan) and no purpose-built recording systems (that would capture BeefPlan impacts through time) the groups relied on self-direction from the outset and in several cases this caused delays in identifying worthwhile goals.

Measurement problems notwithstanding, the benefits and costs attributable to BeefPlan have been quantified to the greatest extent possible. A census of participating businesses generated representative and statistically valid data for determining:

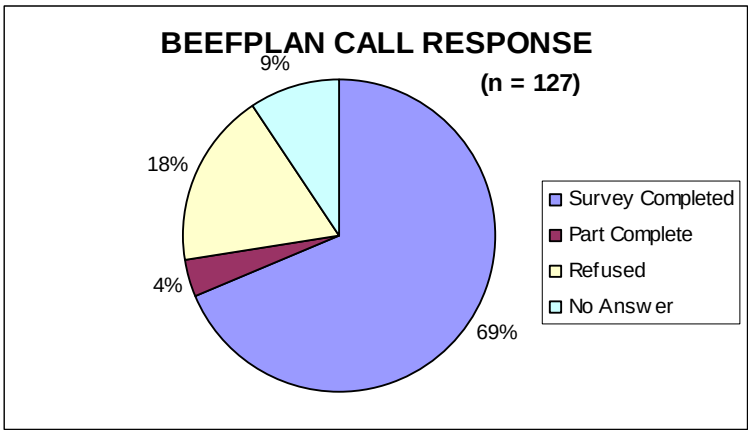
- The number of businesses participating in BeefPlan and using this participation to improve performance
- The most significant practice changes resulting from BeefPlan participation, the associated attribution to BeefPlan and the contribution of this combination to changes in average net profit
- The precise nature of the 3-way linkage between BeefPlan participation, subsequent practice change and improved profitability
- The proportion of participants that made additional profits
- The lag between BeefPlan participation and maximisation of additional profits
- The durability of the benefits generated by BeefPlan participation.

In completing the census, using the MLA Contact database, it was apparent that the database was not current, resulting in a relatively high proportion (19%) of 'dirty contacts'. The various causes of this situation are quantified in the table following:

Fault	Number of Businesses	Percent of total
No telephone number provided	7	4%
Wrong telephone number	8	5%
Disconnected telephone number	14	9%

After screening out the dirty contacts there were 127 family names, representing 177 individuals, as potential respondents.

The surveyors were able to contact 115 (90%) of these potential respondents, with 23 (18% of the total) refusing to participate in the survey, leaving a total of 92 respondents (72%) who fully or partially completed the questionnaire. Despite numerous attempts, we were unable to contact 12 (9%) of the potential respondents. The call response results are summarised below.



The quantitative relationship between practice change and improved profitability was validated by two methods. Firstly, respondents were asked to nominate and quantify the practices they adopted or changed as a result of their involvement in BeefPlan. This resulted in many examples of actual practice change being described with a lesser number being actually quantified (see section 4.2)[1]. Secondly, proof of the link between particular practice changes and increased profitability was validated from the literature. It was possible, for example, to demonstrate estimates of monetary gain from better pasture utilisation by extrapolating from R&D results published by CSIRO. The presumption that BeefPlan participants would have enjoyed returns due to practice changes similar to those reported in the literature is considered reasonable.

Following the validation exercise, the census data was used to construct aggregate cost and benefit streams applicable to the full life of BeefPlan. Thus a basis for quantifying the economic performance of the program was established. Apart from determining whether the benefits generated by BeefPlan have exceeded the costs, the evaluation also assessed whether the activities of the groups create a ripple effect whereby other producers, not belonging to a BeefPlan group, and the community at large, also reap a benefit. There is also the expectation

[1] An important finding was that very few of the producers surveyed were able to quantify the dollar impacts attached to particular practice changes. They justify most changes on the grounds of anecdotal proof, consistency with known principles of good practice and complementarity with existing practices. The producers we interviewed were far more comfortable with estimating the overall impact of BeefPlan participation.

that increased confidence and involvement of participants could lead to community and industry benefits.

The study found that BeefPlan is relatively high cost per business relative to other MLA extension programs. Despite this, and reliance on producer estimates, it has been economic in terms of its relationship between investment costs and expected benefits over a 15-year period[2]. Over the eight years it has been funded, BeefPlan has cost MLA almost $1 million but this investment is expected to generate additional on-farm benefits of almost $3 million (both in nominal dollars) over the project life (assumed to be 15 years). In view of BeefPlan's favourable economics, but high MLA cost per producer, scope exists to make the program more efficient from an industry perspective.

The following recommendations are offered for consideration:

- That MLA continues to support self-directed groups as a means of capacity building and stimulating practice change among beef producers. Such support is seen as necessary so that the potential economic gains possible through group dynamics are not lost from the industry, and MLA producer support systems are developed with the special needs of group formation and operation in mind.

- In the process of supporting producer group activities, MLA recognise the scope for collaborating with new and existing regional groups that might have similar objectives and employ similar methods. Natural resource management groups, for example, are well funded at this time and are expected to function more autonomously (along the lines already prescribed for BeefPlan) once capacity building systems have been fully implemented. Multi-lateral collaboration will save both investment and participation costs and thereby allow regional projects to enjoy viable levels of patronage.

- Where MLA continues to support the functioning of BeefPlan groups, greater emphasis should be placed on the amount of seed capital actually needed to initiate viable group activity, the rationale for creating the group and the management systems implemented to generate outputs and record outcomes. Consistent with this approach, there should be relatively more initial assistance for groups (that make a meritorious case) but less ongoing financial support. Thus MLA might consider funding professional assistance to establish beef producer groups[3] but set limits on the time a group can be funded (e.g. two years) and the minimum number of members.

[2] Cost effectiveness is a concept that requires explanation. An investment can be defined as cost effective when the dollar outlay per unit is low relative to other investments. MLA's investment in BeefPlan has been high per producer relative to other programs and from this perspective it has not been cost effective. When the term 'cost effectiveness' is used in this way, there is an un-stated presumption that the cost will be equally effective in generating returns. The error of this presumption is obvious since an investment can be said to be cost effective if it gives a positive or high return for the outlay. As both interpretations have been used in this study, we have been careful throughout to specify how the term 'cost effective' is actually intended.

[3] We suggest that this assistance take the form of attendance by a professional facilitator at two meetings. The facilitator would attend the foundation meeting to explain how group dynamics work and the responsibilities and rewards that go with BeefPlan membership. This would be followed up by a return visit where the facilitator checks on progress and offers advice on how to progress ideas, operating procedures and measurement of performance through time.

- That MLA monitor the life of BeefPlan groups after MLA funding has ceased. If it appears groups generally fail to remain active after MLA support is withdrawn, it could be concluded that groups are either not as viable or sustainable as suggested by the survey results or that most of the gains on offer can be reaped in the first few years after establishment.

- Better systems should be established to measure the economic impacts of groups supported by MLA. Unless undertaken regularly, surveys such the one used in this study are prone to measurement errors linked to self-assessment bias. Producers still belonging to BeefPlan groups have an obvious interest in judging their performance favourably and in seeing MLA support continue. This situation may upwardly bias their assessment of economic impacts. Acceptable and effective aids to objective evaluation are likely to be restricted to benchmarking and on-going monitoring by participants using a field diary that records events and outcomes specifically linked to BeefPlan involvement. The benchmarking should be done professionally with the emphasis on measuring performance before and after involvement with BeefPlan.

- While future evaluations might give consideration to periodic independent audits that have the ability to link funding of groups with incremental gains in revenue, we would caution against adopting any system with draconian overtones. In our opinion, auditing or anything similar, would only serve to alienate stakeholders.

Contents

1 Introduction

1.1 The emergence of industry led extension

Until recently, state governments throughout Australia were strongly committed to providing extension services for the purpose of assisting primary producers to maximise their potential and thereby remain competitive. These services took many forms but were focused on information transfer via technically qualified personnel, located in dominant primary production areas throughout the state. Often the extension officers were available to provide free advice on a one-to-one basis. Due to a plethora of influences including political dynamics, social priorities and micro-economic reform, the provision of such services has been gradually eroded leaving large gaps in the capacity of the institutions to transfer knowledge and skill to farmers. This situation has the potential to make primary producers perform sub-optimally.

In the meantime, the major primary industries have been vested with powers to implement levies and raise funds accordingly. This has allowed the industry corporations to take on responsibility for directing such basic determinants of performance as R&D, promotion and extension. A distinguishing feature of industry directed R&D and extension is that it can be tailored to the revealed preferences of stakeholders. Among Australia's primary industries, the red meat industry has become a leader in commercialisation of R&D results. It has done this by funding programs that assist producers to increase their capacity to take-up technology and embrace a culture of continuous improvement.

Throughout this decade, regional groups focused on natural resources management (NRM) issues, have also become important vehicles for capacity building in the regions. To date, these groups have been funded from the National Action Plan for Salinity and Water Quality and the Natural Heritage Trust, as well as from state governments. While not specific to beef production, these initiatives are acting to retain and enhance technical services in regional areas. Moreover, they provide a focal point for group activity with involvement generally open to all natural resource users.

In reality, the means by which knowledge and skills are transferred from 'sources' to primary producers have become more complex and numerous over the past decade. Information, for example, is effectively transferred via radio, television, newspapers, fact sheets, popular journals and various web sites. However, these pathways are typically 'shallow' and lack both learning and skilling dimensions[4]. Moreover, they lack capacity to assist with motivation, self-empowerment, follow-up and other elements of real practice change. Clearly the tools and systems that will propagate such outcomes as capacity building, adoption of improved practices and a culture of continuous improvement are more complex (than simply making information available) and must interface directly with producers.

Accordingly, MLA is now committed to providing assistance to its producer members by 'extending' the findings of its R&D through timely, structured and high quality delivery programs. It is perceived that without such intervention there would be substantial delays between the

[4] The distinction between learning and skilling is important. In the present context, 'learning' refers to the knowledge that has to be acquired to achieve practice change embodying innovation. 'Skilling' refers to proficiency in techniques that are part and parcel of operating a cattle business and takes in everything from fencing to financing. Where the total workforce comprises a 'husband / wife team' it is desirable that the team possesses all the skills needed to operate and manage a cattle business. Husband / wife teams new to cattle production are likely to be short on operational skills while older teams are likely to struggle with financial and administrative skills that now extend to everyday use the internet.

generation of useful R&D findings and application of practices. Indeed it is the speed and frequency at which Australian producers adopt innovation that gives them a competitive international advantage. This 'fact' notwithstanding, MLA remains challenged to settle upon an 'optimal extension model' that is demonstratively efficient and effective. Whilst the optimal model is still evolving, it is already clear that it will comprise a range of complementary programs that address all the geographic, social, economic and cultural differences that make up the Australian beef industry. The issue on this occasion is where and how BeefPlan should be applied to enhance MLA's overall extension effort[5].

1.2 The vision for BeefPlan

BeefPlan is a particular extension model where beef producers work as a self-managing group to improve the productivity, profitability and environmental and social performance of their own businesses. At the same time, the groups are expected to assist other beef producers to improve their performance by 'setting a good example'. MLA supports the groups financially but each develops its own strategic plan and works on issues identified as important to the individuals within the group.

Using self-directed groups to build practice-change capacity among cattle producers has great appeal because group dynamics have the ability to create the 'right' mind-set in individuals. Group dynamics have the potential to do this by several means:

- *Through recognition of the need to change*: Motivation to change comes in the first instance from recognition or admission that a practice change is essential. The recognition comes through group discussions that take into account relevant issues impinging on the business, family and community. The testing of concepts and ideas that occurs within groups acts to build self-confidence so that individual decision-making becomes purposeful and sustained. Acceptance of the need to change and the motivation this engenders, are the key ingredients often missing from one-dimensional technical presentations.

- *Exploration of feasible options*: Having convinced participants that change is essential, group dynamics can subsequently become an efficient means of searching out feasible options. Thus group members, with a clear objective in mind, are effective in searching out relevant information and applying this to an express need. Membership of BeefPlan ensures that members are kept informed regarding sources of information, while the funding provided to groups through BeefPlan has removed a barrier to attending user-pays workshops where options and solutions are made available.

- *Verification that action has occurred*: Group members act upon information more quickly due to regular interaction among members and scrutiny of one-another's performance. This interaction amounts to informal benchmarking and acts to ensure that group members behave according to the plan implicit in the initial activities (i.e. identification of needs and solutions). The capacity for rapid uptake of ideas and innovation is particularly strong in new members who might be young, new to agricultural or new to the district and therefore highly receptive to assistance.

[5] For the purposes of this study we have adopted the definition of 'extension' proposed by Coutts et al (2005) being "…the process of engaging with individuals, groups and communities so that people are more able to deal with issues affecting them and the opportunities open to them".

It is vital to understand the connection between group dynamics and improved economic performance. Clearly it is not the group dynamics themselves that increase participants' income; - rather the connection is via a 3-step process as shown in Figure 1.1.

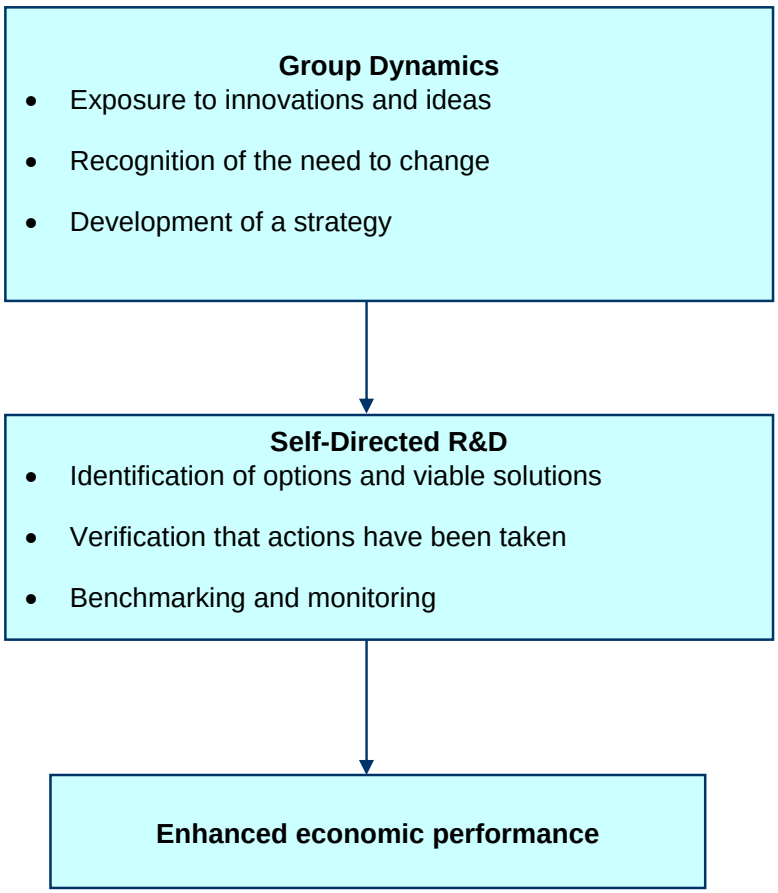


Figure 1.1: The causality between group dynamics and enhanced performance

The main objective of this study is to evaluate BeefPlan in terms of production, financial, social and environmental changes (see section 2). Figure 1.1 suggests how these performance variables are linked but it is possible to be more precise. In the first instance, BeefPlan groups are social systems where the interactions among individuals can give rise to an adoption process. Adoption and practice change leads to implications for production and subsequently impacts upon the natural environment – which can be positive, neutral or negative depending on whether likely impacts have been explicitly accounted for in the production process. Finally, the production outcomes flow through to financial outcomes in the form of benefits and costs that can be reduced to standard performance criteria -- to determine the overall economics of the sequence of events commencing with social interaction via BeefPlan. The full 'sequence of events' is shown in Figure 1.2.

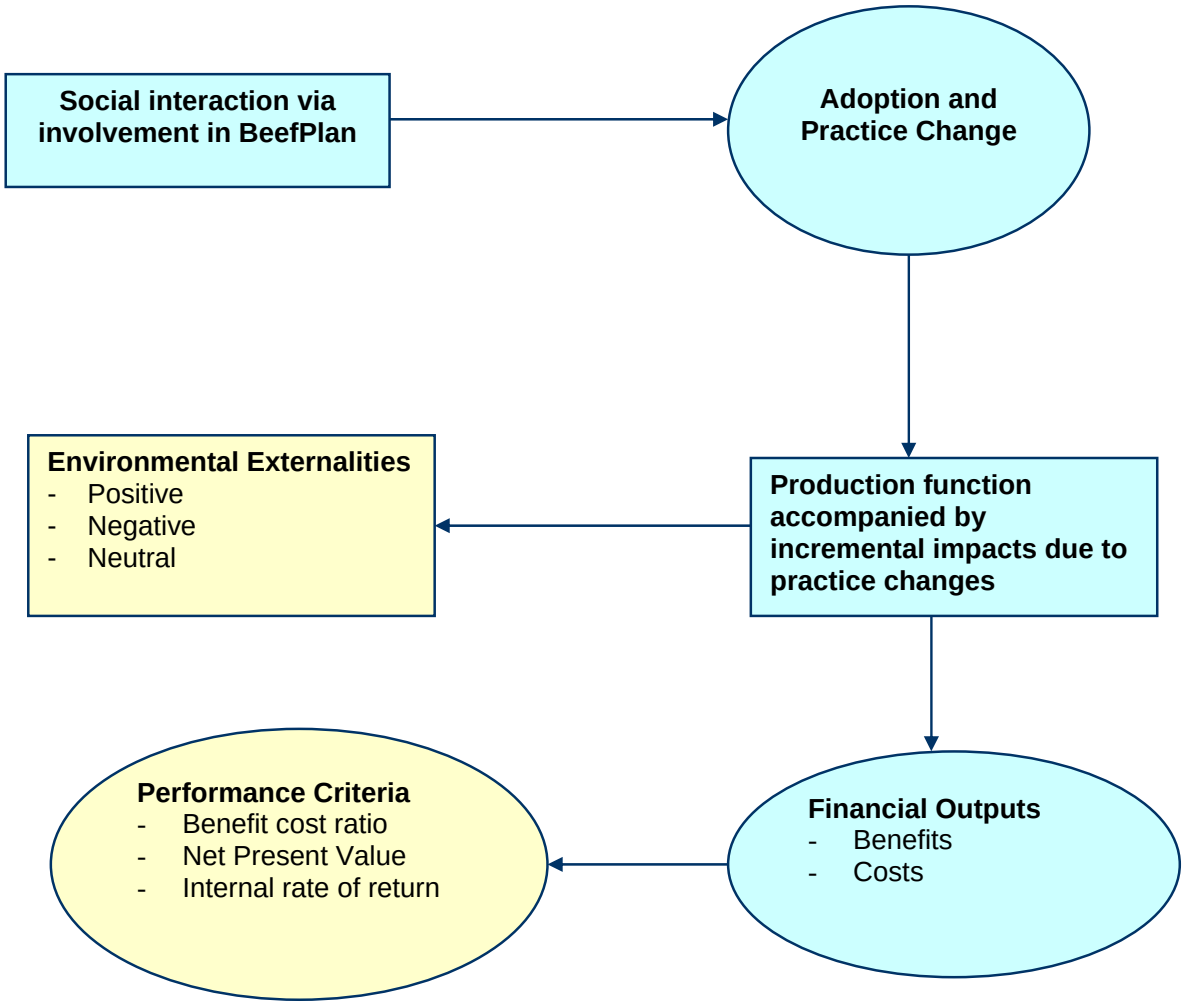


Figure 1.2: Social interaction via BeefPlan initiates a sequence of events and outcomes

BeefPlan is part of the Northern Beef Program's capacity building program. Since 1998/99, 14 groups have formed. While two of these groups stopped taking MLA funding after 2-3 years they are still operating as groups. Currently there are 12 funded BeefPlan groups, with 11 of these in Queensland and northern NSW and one in the Northern Territory. The total number of businesses and individuals currently involved in BeefPlan is around 127 and 177 respectively. These are small numbers that suggest problems for cost effectiveness and competitiveness, compared to other initiatives, which will only be countered by the 'discovery of exceptionally large benefits'. Indeed most MLA programs suffer large establishment and management costs that can only be offset by spreading them across many units of throughput – whether measured in terms of producers, hectares or cattle numbers. Since funds allocated to industry capacity building are limited, they should be directed to areas with the best prospects of a payoff. Implicitly, the results of this evaluation will allow MLA to allocate funds to maximise capacity building throughout the industry.

Producer participants have reported favourable social and economic benefits from their involvement in BeefPlan (see comments on previous reviews). But until now there has been no quantitative assessment of the triple-bottom-line benefits (economic, environmental and social) in relation to the cost of program delivery. Moreover, the formation of BeefPlan groups appears to have stalled with only one new group starting up in the past two years. This is a significant concern because an important yardstick for gauging the success of any program will always be producer participation.

In terms of generating identifiable and quantifiable benefits and garnering support from the industry generally, the current BeefPlan model faces several challenges as outlined below.

- *Identifying a goal and a method*: At formation, a BeefPlan group might have no firm ideas as to how it will set priorities, manage its time or generate useful outcomes. Groups that do not quickly hit upon a shared goal that lends itself to solution and application will struggle to deliver benefits. This problem is possibly inherent to 'self-directed' groups that form without the advantage of strong technical and economic imperatives.

- *Lag between costs and benefits*: In practice there is likely to be a significant delay between setting-up the group and identifying and structuring a program of activities that will generate benefits. For any investment, the longer the lag-time between suffering start-up costs and receipt of benefits, the harder it becomes to demonstrate viability. On the other hand, once an innovation or skill has been applied, it is likely to generate additional returns for many years, thereby making the initial investment viable. Also, some members of the group will realise benefits quickly through taking ideas from other members who are relatively better informed.

- *Variation in performance*: In the normal population of primary producers there are innovators, early adopters, later adopters and laggards, with all the adopters strongly influenced by the actions of the innovators (Rogers, 1995). The presence of innovators in BeefPlan groups will act as a catalyst for adoption throughout the group and beyond. Consequently there will be considerable variation in performance between groups and among members depending on the presence or absence of innovators within the group. For this study, the potential for between and within group variation has been addressed by surveying all BeefPlan groups and as many individuals as possible and reporting differences as detected.

- *Measurement of net effect*: Measurement of the impacts directly attributable to BeefPlan will always be difficult because 'experimental conditions' do not apply and reliance on self-assessment of income effects faces the problem of self-interest bias. The difference between 'with BeefPlan' and 'without BeefPlan' can only be approximated because the groups being surveyed are not being measured relative to similar groups that have not adopted BeefPlan. Apart from the absence of experimental conditions, the measurement of benefits has had to rely on participants' own estimates. In practice, few participants can be expected to have the records or skill to quantify the precise net dollar impact associated with their membership of a BeefPlan group[6]. Precise measurement of the net effects of programs such as BeefPlan would require a detailed independent audit that might be too expensive and odious to justify in practice.

[6] The survey was structured with this problem in mind. Accordingly, respondents were asked to indicate the percentage impact upon net returns due to their membership of a BeefPlan group. This resulted in a high response rate and data that we believe is sufficiently robust to permit an attempt at objective and quantitative analysis.

- *Lack of MLA mentoring*: Apart from financial assistance and some early guidance, BeefPlan groups are largely left to their own resources. It appears MLA staff personnel do not have sufficient time to do more than facilitate and guide the creation of groups and monitor their reporting obligations. This situation has put heavy reliance on the time resources and leadership skills of a few group members. .

- *Suspicions about groups:* The means by which group dynamics become functional and generate economic benefits are not well understood throughout the beef industry and we suspect that the BeefPlan program does not enjoy widespread political support among levy payers. Part of the problem lies with explaining the link between group dynamics, practice change and improved performance, as portrayed in Figure 1.1. Secondly, it might be argued that BeefPlan members are often minor levy payers but get a special benefit not generally available. However, returns to levy payers generally will always be a function of how vigorously individuals participate in MLA programs and utilise MLA products. Objective analyses (such as this one) that resolve the issues surrounding how and where BeefPlan generates economic benefits for producers should do much to allay concerns about the program.

- *Poor appreciation of social systems:* R&D corporations throughout rural Australia have traditionally focused on 'measures to increase production'. Only in recent times have they taken up the challenge of working with individual producers and groups for the purpose of assisting and expediting the uptake process so that technology will indeed be effective in keeping the nation's producers internationally competitive. The associated 'difficulty' is that primary producers operate within complex social systems that need to be understood before extension efforts can be made effective. An issue to resolve is whether BeefPlan groups represent an effective and efficient method of spreading information and assisting the adoption process.

It should be noted in passing that none of these 'challenges', taken individually or collectively, imply that BeefPlan cannot operate efficiently as a program and give participants and the industry a return on funds invested.

2 Objectives and methodology

2.1 Project objectives

The terms of reference specified for the study were as follows:

1. Complete an objective, quantitative and qualitative evaluation of the benefits and costs of MLA's BeefPlan to participants, MLA and the northern beef industry over the last five years in terms of production, financial, social and environmental changes.
2. On the basis of the evaluation, make meaningful comparisons with other existing capacity building projects within the Northern Beef Program, within MLA and other producer organisations in terms of cost-effectiveness of delivering outcomes per unit land area, head of cattle and producer.
3. Based on the findings of Objectives 1 and 2, identify a range of future options for BeefPlan, which may include internal methods to progressively and objectively measure the benefits and costs of BeefPlan and evaluate their strengths and weaknesses in terms of potential industry benefits and costs.
4. Identify successful components of the BeefPlan model that could be incorporated within existing training, communication and adoption activities to enhance their performance (for example as a formal 'post EDGEnetwork training' activity).

2.2 Methodology

The evaluation of BeefPlan poses some special challenges due to the absence of controlled conditions that would enable changes and improvements to be measured scientifically[7]. In the absence of strict experimental conditions, it is necessary to rely upon a survey of producers where they are asked to estimate what they think has been the dollar impact of having participated in a BeefPlan group. This approach will infer some variation in data accuracy but will still allow critical differences in performance between groups to be detected and the keys to success or failure identified.

To this end, BeefPlan has been evaluated using the following steps:

Step 1: *Mobilisation meeting and desktop research*
Following a meeting with MLA's Project Managers, the consultants undertook desktop research in order to develop a good understanding of the BeefPlan concept and the producer population belonging to both operating and defunct BeefPlan groups. Information on other capacity building programs funded by MLA and others was assembled in order to allow comparisons with BeefPlan and identify information from BeefPlan that would be useful in such comparisons.

Step 2: *Three focus group meetings*
This phase was commenced in March 2006 (with meetings at Crows Nest and Wandoan) and completed in April 2006 (with a meeting in Condamine). These were face-to-face meetings with BeefPlan groups that have operated with varying degrees of success since being established. The main aim of the focus group meetings was to identify the perceptions of BeefPlan participants and to document a range of perceived benefits. A secondary aim was to get advice regarding how best to structure the survey questionnaire to be applied to all BeefPlan participants. Each focus group was provided with a summary statement prior to the meetings so

[7] In this case 'experimental conditions' would allow a comparison of groups that are the same in all respects apart from involvement with BeefPlan. This would create with and without conditions. But clearly such conditions do not exist and therefore the evaluation has had to rely on producer estimates of the net gains made because of their involvement in BeefPlan.

that participants would have an opportunity to consider and reflect on BeefPlan benefits among themselves.

Step 3: *Design and testing of survey questionnaire*
After analysing the information gathered from the desk research and focus group phases, hypotheses were developed regarding the benefits of BeefPlan and a questionnaire developed (see Appendix 1). The questionnaire included quantitative questions with some open ended (qualitative) questions. Questions were designed to generate:

- A profile of the producers participating in BeefPlan
- Details of how the group operates
- Identification of the practice changes attributable to participation in BeefPlan
- An estimate of the net income stream stemming from BeefPlan induced changes.

For qualitative questions, respondents were asked to record their preferences on a five or seven point scale. A small sample of BeefPlan participants was used to test the efficacy of the survey questionnaire.

Step 4: *Survey delivery – finalisation of questionnaire and telephone survey*
The questionnaire was modified based on the results of the test survey. The survey endeavoured to get answers from every participant (i.e. a census) so did not require a sampling frame. The questionnaire was distributed to all BeefPlan participants in April 2006 via an email to their respective coordinators. After allowing three weeks for responses, with two reminder telephone calls to group co-ordinators, only 35 responses had been received. This necessitated a telephone survey of all those who had not responded by fax or email.

In completing the telephone census, using the MLA Contact database, it was apparent that the database was not current, resulting in a relatively high proportion (19%) of 'dirty contacts'. Specifically, these were due to:

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- The lag between BeefPlan participation and maximisation of additional profits
- The durability of the benefits generated by BeefPlan participation.

Details of the response rate are included in the next section.

Step 5: *Data analysis*
Data was analysed using SPSS, a statistical package specifically designed for conducting social and consumer research. Two analyses came out of the census data. The first was a profile of the participants and their various BeefPlan experiences (see section 3). The second analysis was a benefit cost analysis (reported in section 5). Section 6 of the report makes comparisons of the cost effectiveness of several MLA extension programs. Based on the results of the benefit cost and cost effectiveness analyses, section 7 considers ways in which BeefPlan might be made more efficient and effective. Conclusions and recommendations stemming from the study are presented in section 8.

Step 6: *Validation of survey findings*
Section 4 reports upon a follow-up survey of selected BeefPlan participants. This sub-survey sought details of practice changes participants had adopted as a result of belonging to a BeefPlan group. The details made it possible to quantify the relationship between particular practice changes and net economic gains. Also included in section 4 are examples and citations taken from the literature. These examples were used to further validate the link between practice changes and economic performance, albeit in a more general sense.

3 Profile of participants and operating systems

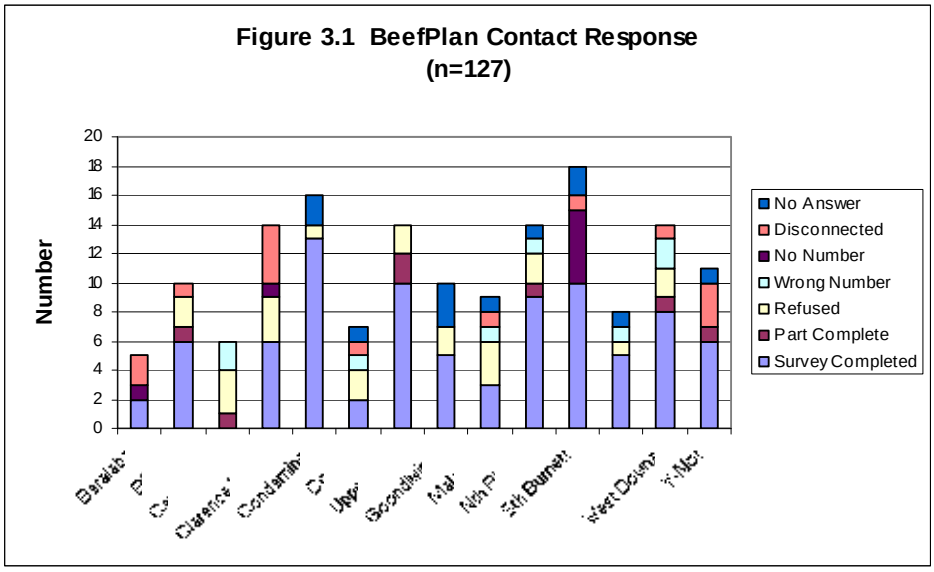
3.1 BeefPlan groups and participants

3.1.1 Response rate

After excluding four Kimberley and Pilbara respondents (who were never members of an active BeefPlan group) 92 responses were received representing 72% of potential respondents. The majority of responses were from members of the Condamine, Northern Rivers, Upper Brisbane, South Burnett and Western Downs groups (Figure 3.1). Despite the fact that the group disbanded several years ago, responses were received from 86% of current members of the Y-Not group (100% of those who could be contacted).

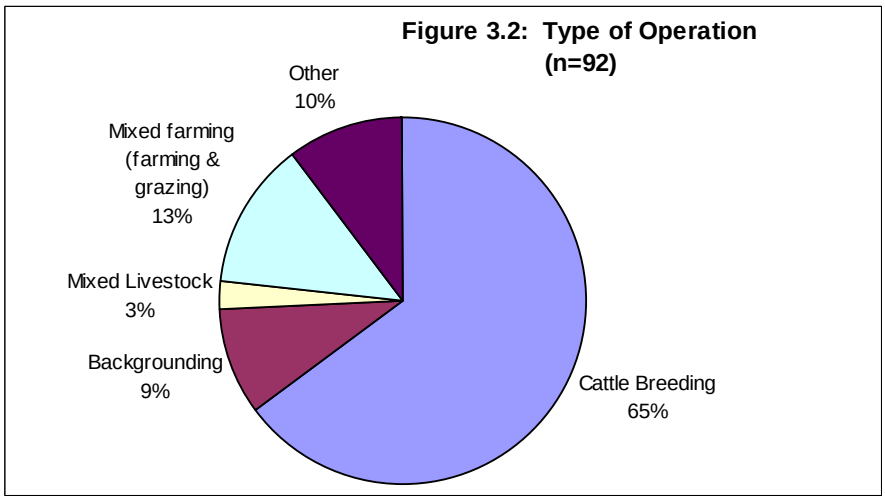
The only respondent from the Capricornia group is no longer a member of BeefPlan and only partially completed the survey.

Figure 3.1 BeefPlan Contact Response (n=127)

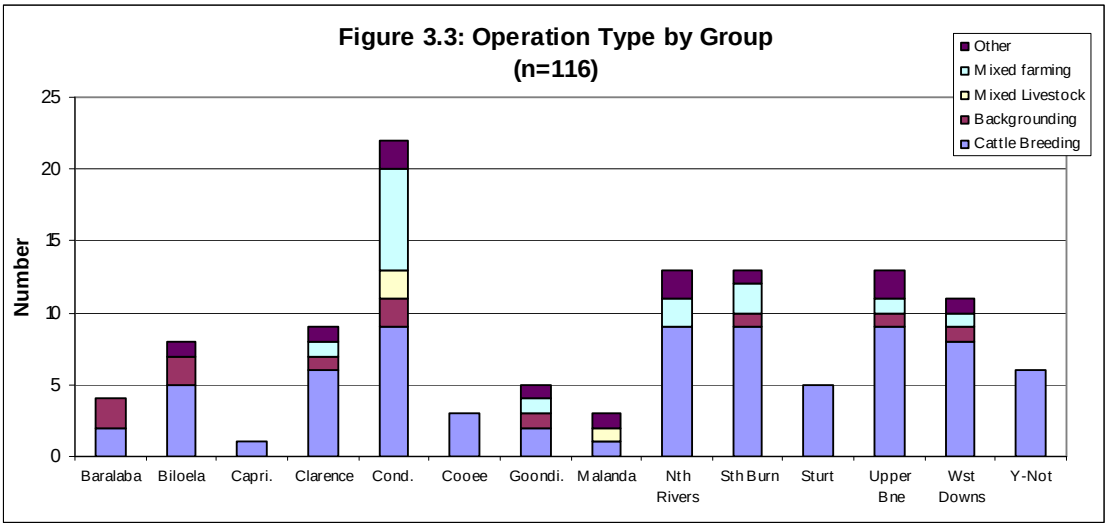


3.1.2 Property Details

Most respondents are involved in Cattle Breeding (65%), with a minority involved in Mixed Farming (13%), Backgrounding (9%) or Other (mostly Fattening or Trading). Only 3% of respondents are involved in a Mixed Livestock operation (Figure 3.2). Around 23% of respondents are involved in more than one type of agricultural operation (Q1).



As one might expect, respondents from the pastoral zone (Y-Not, Cooee, Capricornia, Sturt Plateau) are only involved in Breeding (Figure 3.3).



Respondents manage a total of around 1.2 million hectares, with each member managing an average of around 13,217 hectares (Q2). As would be expected, those with larger areas are in the pastoral zone (Table 3.1).

Because of the relatively small number of respondents in total, the group averages could be significantly influenced by a single large or small operation. For example, the average results for the Northern Rivers group were inflated by two relatively large operations, each with over 14,000 hectares.

Table 3.1: Land Area by Group (ha)

Group	Average	Median	Maximum	Minimum
Baralaba	4,450	4,450	5,600	3,300
Biloela	1,871	1,014	5,500	486
Capricornia	8,000	-	8,000	8,000
Clarence Valley	772	415	2,600	156
Condamine	4,415	4,000	10,000	1,417
Cooee	107,500	47,500	230,000	45,000
Goondiwindi	1,982	1,700	3,500	400
Malanda	37	40	50	20
Northern Rivers	3,405	516	14,980	157
South Burnett	776	566	2,250	120
Sturt Plateau	119,720	85,000	260,000	20,000
Upper Brisbane	902	528	2,200	110
Western Downs	4,409	2,145	16,100	1,600
Y-Not	20,104	15,000	33,000	11,873
TOTAL	**13,217**	**1,700**	**260,000**	**20**

Respondents manage a total of around 108,000 head of cattle (Q4), with each managing an average of around 1,171 head (Table 3.2).

Table 3.2: Cattle Number by Group (head)

Group	Average	Median	Maximum	Minimum
Baralaba	1,710	1,710	1,820	1,600
Biloela	570	600	1,000	200
Capricornia	2,200	-	2,200	2,200
Clarence Valley	378	200	1,200	50
Condamine	1,705	900	8,300	170
Cooee	4,500	5,000	5,000	3,500
Goondiwindi	790	600	1,700	150
Malanda	108	100	160	65
Northern Rivers	1,044	490	6,500	120
South Burnett	240	175	500	25
Sturt Plateau	4,300	3,500	11,000	1,000
Upper Brisbane	347	300	700	65
Western Downs	1,400	1,100	4,000	600
Y-Not	960	900	1,700	400
TOTAL	**1,171**	**568**	**11,000**	**25**

According to ABARE (2005), the beef industry has a large number of properties with small herds. Properties with herds of fewer than 300 head, and mainly reliant on the beef enterprise, generate relatively small net incomes from farming and often earn a large share of their total household income off farm, typically in the form of wages and salaries. Collectively, properties with fewer than 300 beef cattle account for almost 70% of beef properties and are substantial resource users but they account for only 17% of the beef herd and 21% of the gross value of beef production.

Only 25% of BeefPlan respondents fall into this category, suggesting that BeefPlan represents a relatively high proportion of full-time beef producers compared with the rest of the Australian industry. As demonstrated in Table 3.3, Groups in the more closely settled regions account for the majority of those who could be considered part-time beef producers. These include groups located in the Upper Brisbane Valley, Clarence Valley, Malanda and South Burnett.

Table 3.3: Proportion of Respondents by Cattle Number

Group	1-300	301-500	>500
Baralaba	-	-	100%
Biloela	14%	14%	72%
Capricornia	-	-	100%
Clarence Valley	66%	34%	-
Condamine	23%	8%	69%
Cooee	-	-	100%
Goondiwindi	40%	-	60%
Malanda	100%	-	-
Northern Rivers	20%	40%	40%
South Burnett	60%	40%	-
Sturt Plateau	-	-	100%
Upper Brisbane	58%	8%	34%
Western Downs	-	-	100%
Y-Not	-	20%	80%
TOTAL	**25%**	**22%**	**53%**

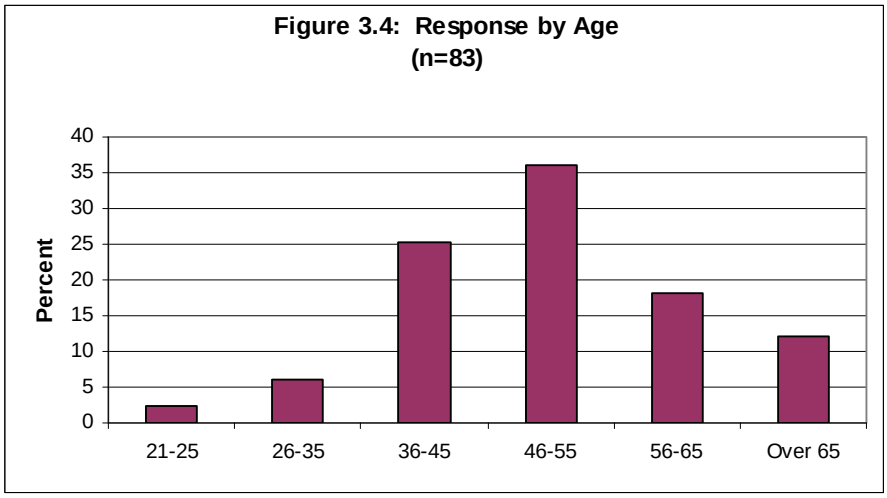
According to ABARE (2005), 'specialist beef producers' with more than 300 head of cattle had an average of 1,450 head of cattle in 2004-05. This was 24% more than the average for BeefPlan respondents.

On average, respondents have been involved in their current operation for 18 years (Q3). The longest period of operation was 50 years, with the shortest being two years.

3.1.3 Demographics

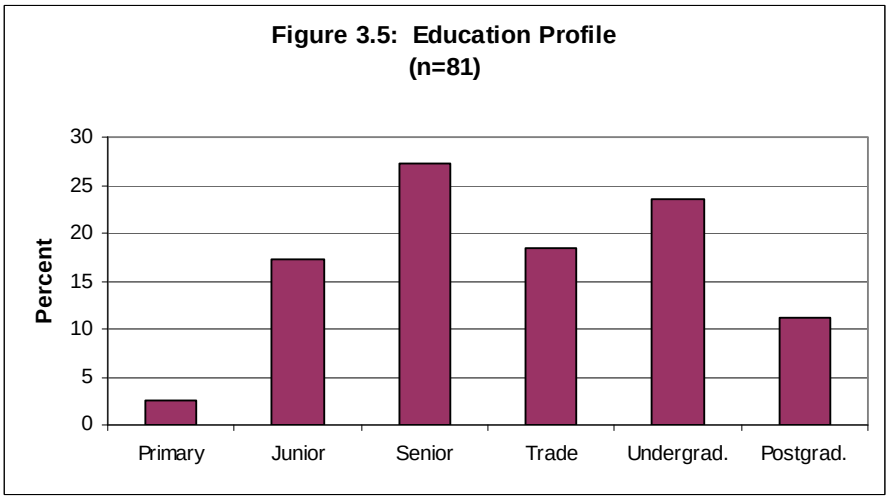
The respondents were predominantly male (86%) but based on the Contact database, females are active in many Groups. Most respondents are aged between 36 and 55 years, with the majority falling into the 46 - 55 age group (Figure 3.4).

Figure 3.4: Response by Age (n=83)



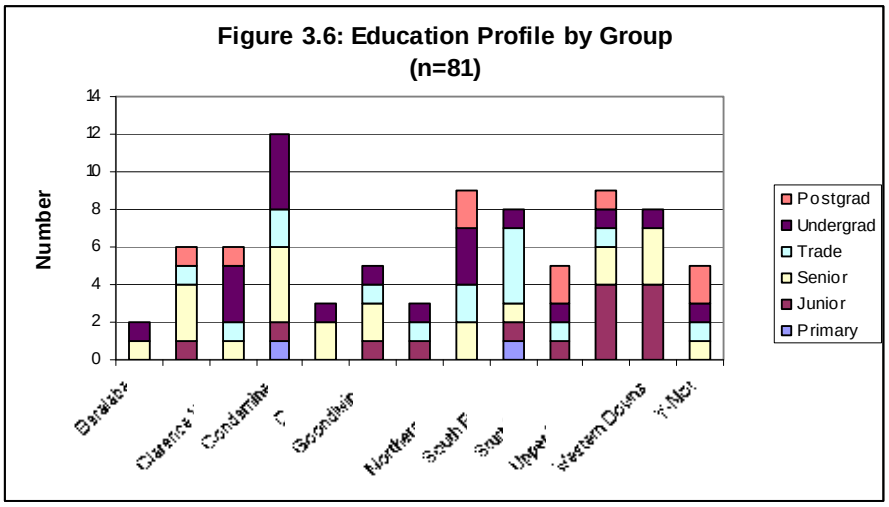
BeefPlan participants are well educated, with the majority of respondents having a post-secondary school qualification. Around 34% of respondents have a university education (11% postgraduate), and 18% have a trade qualification (Figure 3.5). This is significantly higher than the average for the general population.

Figure 3.5: Education Profile (n=81)



There was no significant difference in the education profile between the Groups (Figure 3.6).

Figure 3.6: Education Profile by Group (n=81)

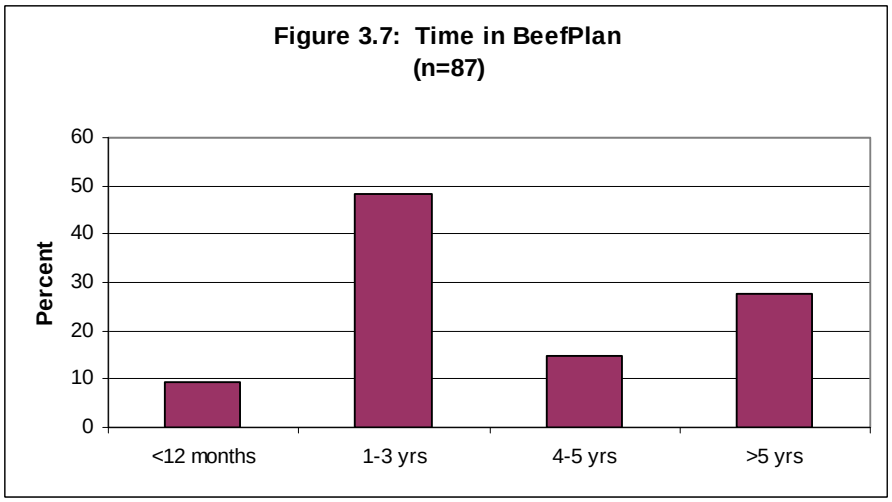


3.2 Group Operation

3.2.1 BeefPlan Groups

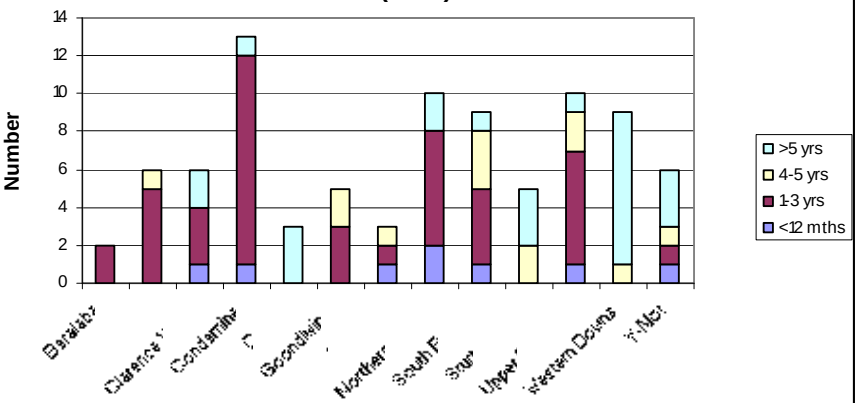
More than 45% of respondents have been involved in BeefPlan for 1-3 years, while around 28% have been involved for more than five years (Figure 3.7). Fewer than 10% have been involved for less than 12 months (Q7).

Figure 3.7: Time in BeefPlan (n=87)



Most groups have a mix of long standing and newer members, suggesting that there is at least some turnover and renewal of membership. Some 69% of groups have at least one member with more than five years involvement in BeefPlan (Figure 3.8).

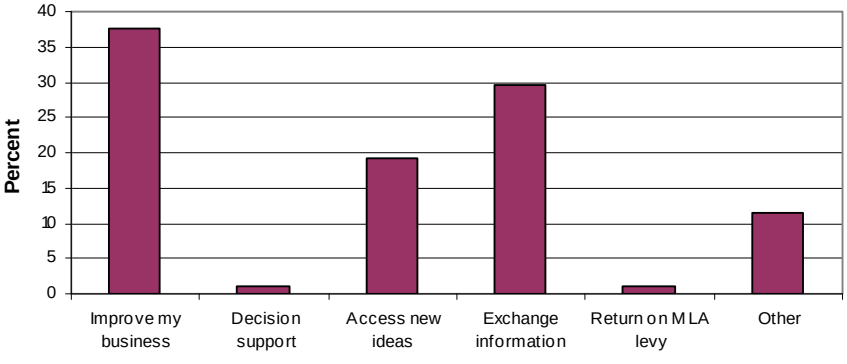
Figure 3.8: Time in BeefPlan by Group (n=87)



The majority of respondents joined BeefPlan (Q8), *'To improve my business'* (37%), to *'Exchange information with other beef producers'* (30%), or to *'Access new ideas'* (19%). One could argue that these reasons all contribute to, '*Improve my business*' and as such BeefPlan is a means to an end. 'Other' reasons include: '*Benchmarking business figures'*; '*to receive general knowledge on the industry'* and '*we were approached'* (Figure 3.9).

Three respondents claim to have never heard of BeefPlan, despite being on the contact database, while one had been a member for, '*many years*' but is no longer a member. This further highlights deficiencies in the contact database.

Figure 3.9: Main Reason for Joining BeefPlan (n=88)



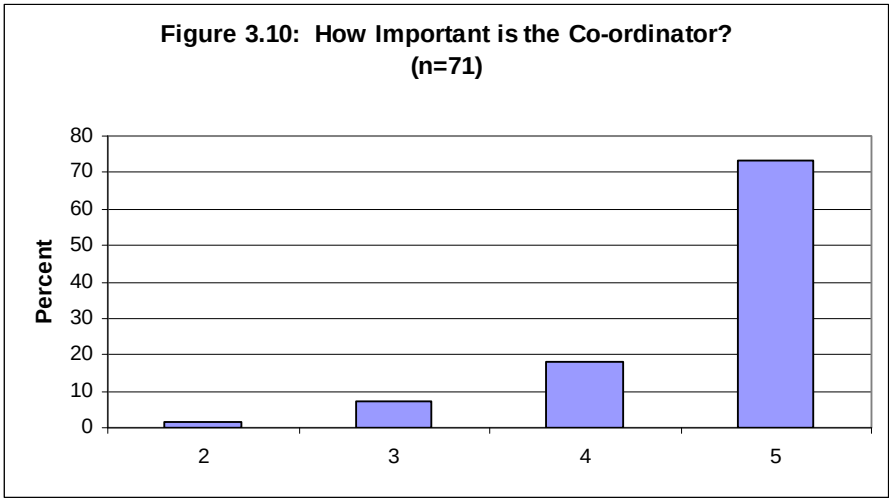
Respondents were asked to rate their response to a series of statements relating to the establishment of their group (Q9). Generally, respondents seemed satisfied with the process for establishing their group (Table 3.3), though the time taken for a group to 'get going' seems to be a source of concern for a significant proportion of respondents.

Table 3.3: Responses relating to Group establishment (frequency)

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	n	Mean	S.D.
MLA gave enough guidance to get going	5	4	21	39	18	87	3.7	1.04
My group had a clear direction	7	9	22	36	14	88	3.47	1.12
My group took a long time to get going	14	18	19	29	8	88	2.99	1.25
My group works very well	2	2	16	34	32	86	4.07	0.93

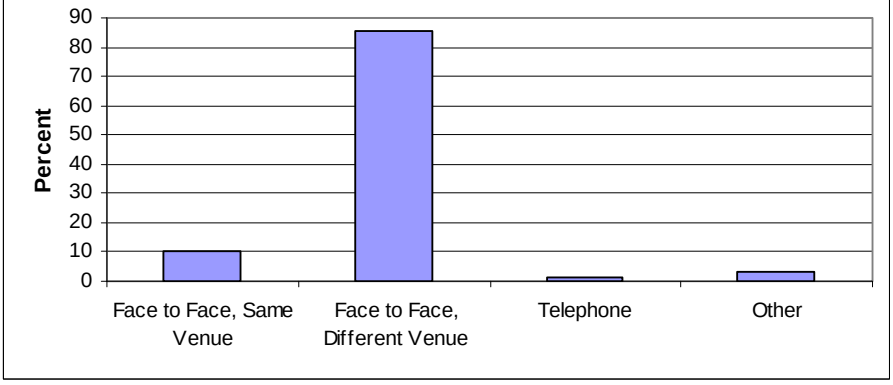
Around 81% of respondents state that their group has a dedicated co-ordinator, but only 36% of co-ordinators receive any remuneration for their efforts. This is despite the fact that 91% of respondents believe that the co-ordinator's role is 'Somewhat Important' or 'Very Important' (Figure 3.10).

Figure 3.10: How Important is the Co-ordinator? (n=71)



Groups mostly meet 'Face to Face' (Q14) at different venues (Figure 3.11). This is a critical element to the success of a group as it stimulates the diffusion of skills and practices throughout the group.

Figure 3.11: How Does Your Group Mostly Meet? (n=89)

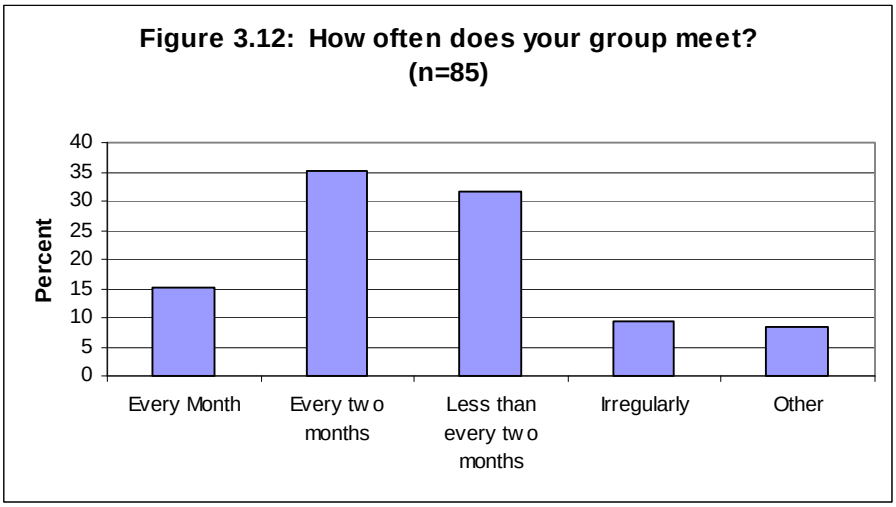


Around 50% of respondents meet every two months or every month (Q15). Around 10% meet 'Irregularly' (Figure 3.12). At least one group endeavours to involve members of the broader community in their activities by organising a range of events likely to have broad appeal.

'Other' responses include: *'once per year'*; *'three times per year'*; *'four times per year'*; *'don't' know'*.

Interestingly, in all except two groups, respondents from the same group gave a variety of answers to this question. In an extreme example, the five respondents from one group gave five different answers, suggesting that the communication processes within the group may not be effective.

Figure 3.12: How often does your group meet? (n=85)

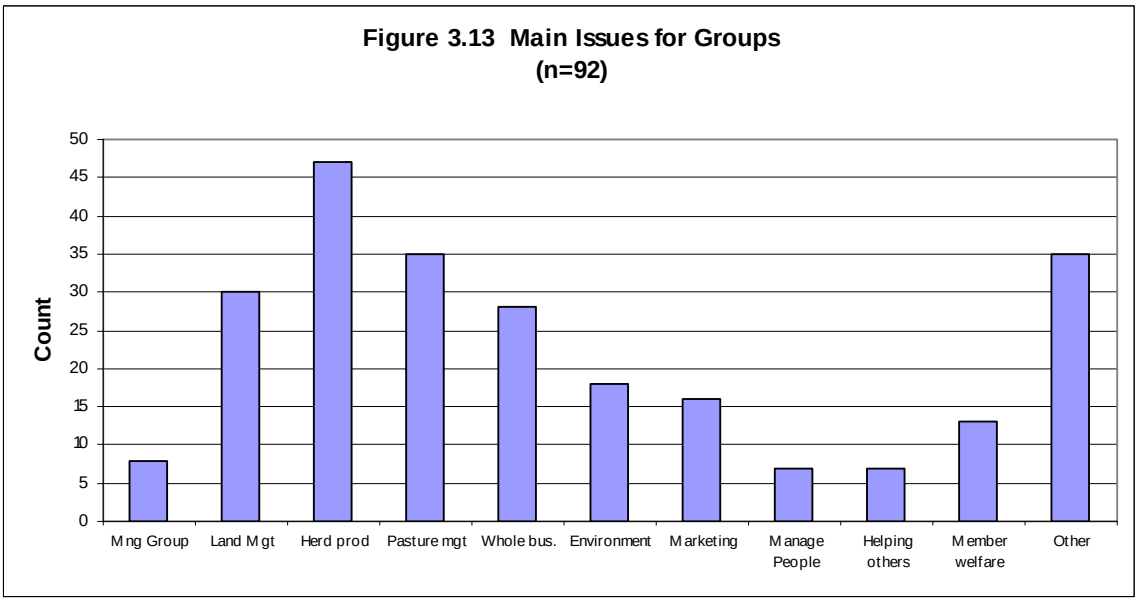


A chi-squares test indicates that there is a significant relationship between the frequency of meeting and the length of time that respondents have been involved in BeefPlan, with those involved for the longest period tending to meet most frequently.

Respondents were asked to identify the three main issues or subjects that their group focuses on (Q13). The three main issues are: 'Herd Productivity' (51%), 'Pasture Management' (38%), and 'Land Management' (33%). At a micro level, the main issues being addressed include animal nutrition, improving pasture utilisation, genetics and watering. 'Other' issues include: *'benchmarking'; 'nutrition'; 'genetics'; 'profitability and financial issues'*; *'men's' health'; 'sustainability'*.

'Helping other Local Graziers' is one of the lowest rating issues overall, but is seen as important by at least one respondent from seven (7) of the Groups. Those respondents who have been involved with BeefPlan for the longest time are most likely to consider this to be an important issue.

Figure 3.13 Main Issues for Groups (n=92)



Respondents were asked to rate their response to a series of statements relating to their group and broader issues. A rating above 3 indicates a positive response, while a rating below 3 indicates a negative response (Q16).

Overall, respondents were satisfied with the number of issues that their group tries to address, and they gain more from interaction with other group members than from formal training. Respondents regard their fellow group members as 'Innovators' and 'Thought Leaders' and as having the respect of other local graziers (Table 3.4).

From a social and personal perspective, members regard their colleagues as friends and are comfortable discussing personal and financial issues with other members.

The majority of respondents feel that their business is stronger financially due to their involvement in BeefPlan.

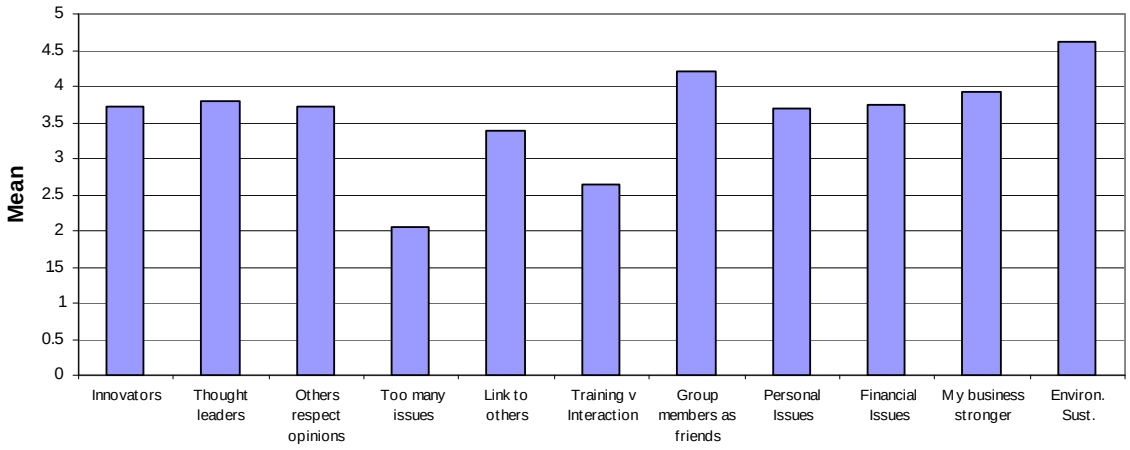
'Environmental Sustainability' was regarded as a critical issue for the beef industry to address but environmental concerns were not a high-ranking issue for individual groups. This suggests that respondents sense a dichotomy between the environmental agendas of government and the best interests of individuals within the industry.

Table 3.4: Responses relating to Perceptions of the Group (number)

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	n	Mean	S.D.
My fellow group members are innovators	0	8	18	47	11	84	3.73	0.81
My fellow group members are 'thought leaders' in the district	0	2	23	47	10	82	3.79	0.68
Local graziers respect the opinions of group members	0	1	34	35	13	83	3.72	0.74
My group has tried to address too many issues to be highly valuable to me	28	35	9	10	1	83	2.05	1.02
My group acts as a link to the grazing community in our district	3	12	27	32	9	83	3.39	0.99
I gained more benefit from attending courses and training than from the interaction with other group members	14	26	24	14	5	83	2.64	1.13
My fellow group members have become my friends	0	6	6	35	36	83	4.22	0.87
I feel comfortable discussing personal issues with group members	3	5	24	33	18	83	3.70	1.00
I feel comfortable discussing financial issues with group members	2	6	21	37	17	83	3.73	0.95
My business is financially stronger because of my participation in BeefPlan	0	7	18	32	25	82	3.91	0.93
Environmental sustainability is a critical issue for beef producers to address	0	0	5	21	56	82	4.62	0.60

Links to the broader grazing community are positive but are probably weaker than may be expected. Those groups that have been operating longest tend to have the stronger links with the local grazing community (Figure 3.14).

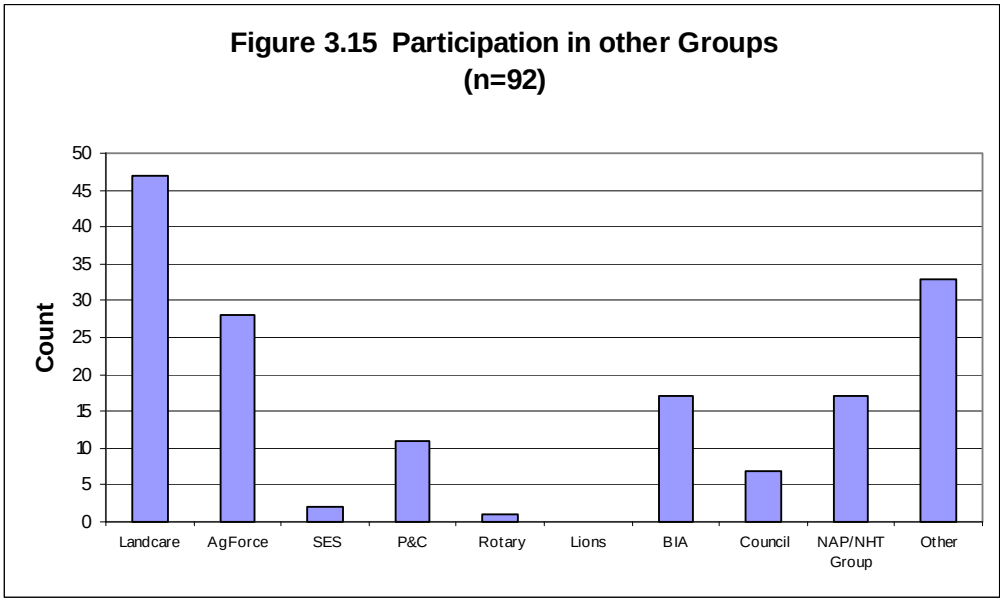
Figure 3.14: Perceptions of Group (n=92)



Respondents tend to be active in a range of organisations besides BeefPlan, including community and industry bodies (Figure 3.15). More than 50% of respondents are also members of Landcare, with 28% participating in Agforce, and 16% in the Beef Improvement Association and NHT/NAP programs.

This level of participation will ensure that BeefPlan members are in regular contact with other beef producers, thereby providing scope for diffusion of knowledge gained through BeefPlan, and equally for the acquisition of knowledge that may be useful for other BeefPlan members.

Figure 3.15 Participation in other Groups (n=92)



3.3 Outputs and outcomes

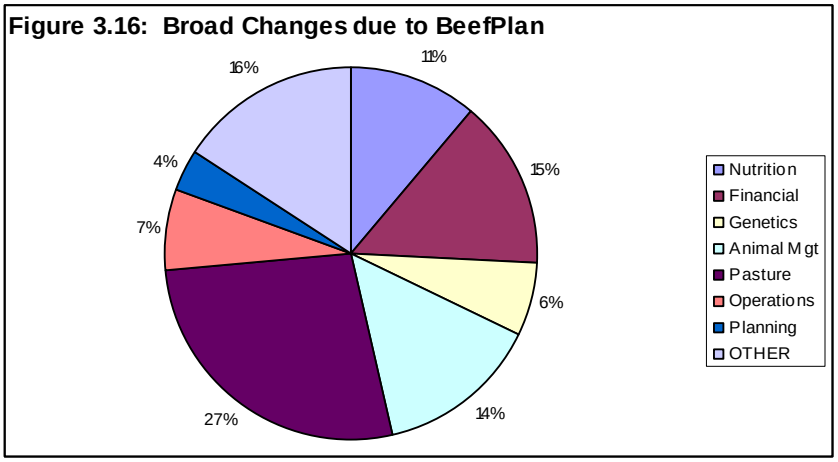
Around 73% of respondents stated that they have changed some of their management practices because of their involvement in BeefPlan (Q18).

These changes tend to relate to the major issues discussed by the Groups, and include (Q19):

- Improved nutritional management of cattle – supplementary feeding
- Improved stock handling practices – quieter cattle
- Pasture management – rotational grazing, stocking rates
- Greater emphasis on business management – financial analysis, budgeting
- Land management – improved watering facilities, strategic fencing.

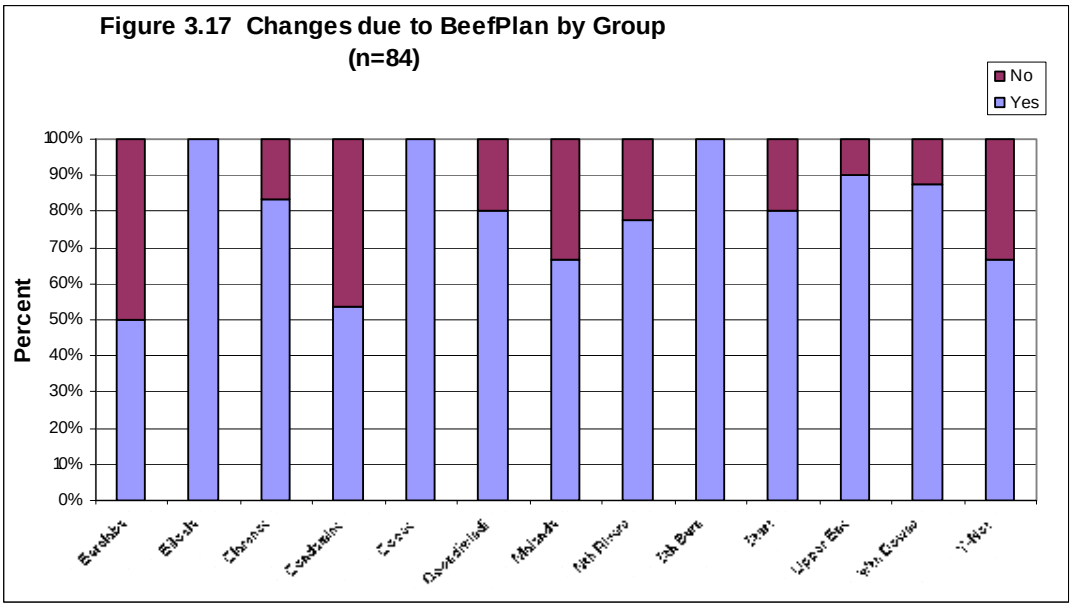
Respondents were asked to list the three most significant changes they have made due to BeefPlan. While many responses were quite generic, it is possible to group these into broad categories (Figure 3.16). Further detail is shown in Section 3.5 below, and in Appendix 2.

Figure 3.16: Broad Changes due to BeefPlan



The data showed no significant relationship between the length of involvement with BeefPlan and a respondents' modification of their management practices due to BeefPlan (Figure 3.17). Thus a member involved for a short time (e.g. 12 months) was just as likely to have changed his or her management practices as a member involved for a relatively long time (>5 years).

Figure 3.17 Changes due to BeefPlan by Group (n=84)



Details of some of the individual responses are shown below under the broad category headings (Table 3.5). Many of the changes have been implemented after a respondent has taken part in an MLA workshop (e.g. EDGE Nutrition) that formed a part of their Group's activities, suggesting that BeefPlan has helped to underpin the success of other MLA extension programs.

Table 3.5: Most Significant Management Changes due to BeefPlan

Nutrition	Financial	Genetics	Animal Mgt	Pasture Mgt	Operations	Planning	Other
Drought feeding	Economic analysis	Use DNA selection techniques	Better stock handling	Cell/rotational grazing	Changed from breeding to fattening	Succession planning	Marketing
Supplementary feeding	Better financial control	Better bull selection	Pregnancy testing	Fertiliser programme	Started trading more	Time planning	No Till farming
More understanding of nutrition	Benchmarking	Better female selection	Controlled joining	Better water point location	Expanded	Look at the overall picture	More confident in decision making
Reviewed supplementary feeding practices	Better understanding of costs		Better management of animal health – vaccination	Pasture budgeting		Have a clearer direction	More social activity
	Understanding production costs & returns		Aim for quieter cattle	Reduced stocking rate			
	Off farm investment			Improved pastures			

Respondents attribute around 63% of their decision to make management changes to their involvement in BeefPlan (Q20).

Overall, respondents indicated that (Table 3.6):

- They made the decision to change 'more quickly' due to their involvement in BeefPlan (mean rating 4.2)
- They were 'more confident' in making the change due to their involvement in BeefPlan (4.2)
- 'Group support' encouraged them to keep going with a change (4.0).

Table 3.6: Influence of BeefPlan on Management Changes (number)

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	n	Mean	S.D.
I made the decision to change MORE QUICKLY due to BeefPlan	0	1	12	28	25	66	4.17	0.78
Because of BeefPlan, I was MORE CONFIDENT in making the change	0	2	8	34	22	66	4.15	0.75
Group support has helped me to KEEP GOING with making a change	2	2	8	35	19	66	4.02	0.90

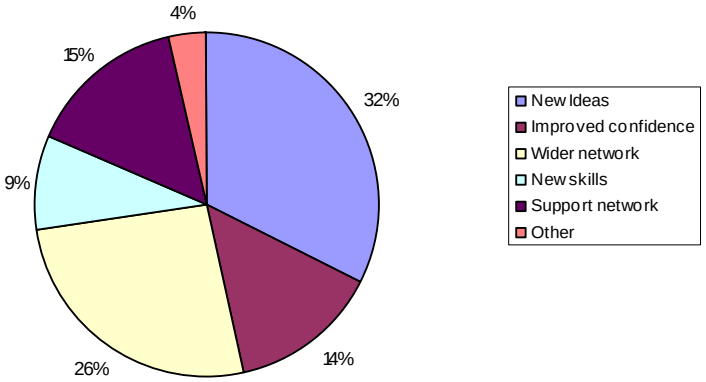
Of those who changed their practices, 79% received some benefit (e.g. increased revenue, decreased cost) from that change (Q21).

Of those who have not yet received a benefit, the majority (46%) expect to receive some benefit within 12 months, while on average all will receive some benefit within 1-2 years. Around 12.5% expect to have to wait more than five years before they receive any benefit from the changes they have made (Q22).

Respondents feel that the single greatest benefit of BeefPlan is their '*exposure to new ideas*' (32.5%), followed by the '*wider contact network*' (26.3%) they have developed (Figure 3.18) (Q30).

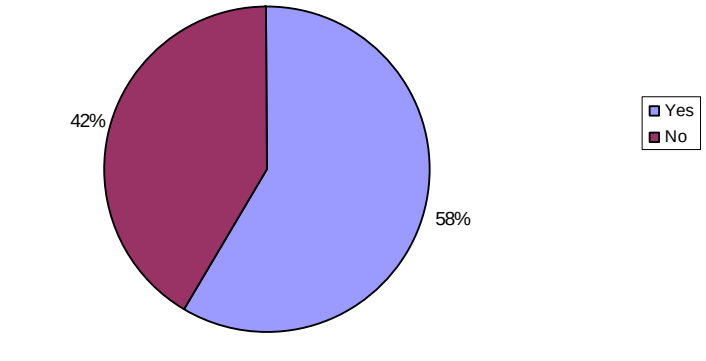
This is interesting as, '*Exposure to New Ideas*' is only the third most important reason given for respondents joining BeefPlan, suggesting that respondents may 'not know what they don't know' until they join a program such as BeefPlan.

Figure 3.18: Single Greatest benefit of BeefPlan (n=80)



Some 58% of respondents state that they would be involved in BeefPlan even if there were no MLA funding support for the program (Figure 3.19).

Figure 3.19: Would be involved in BeefPlan if there were no MLA Funding (n=79)

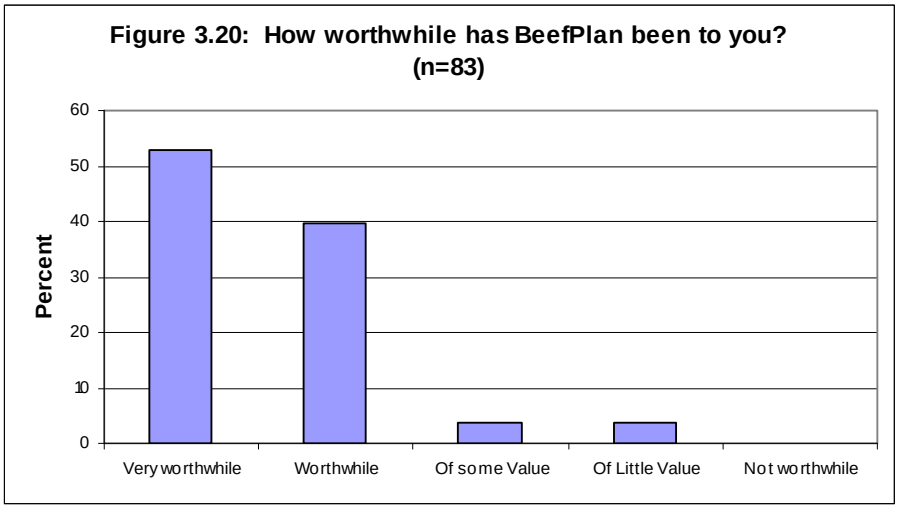


Overall, respondents were very positive about their future operations (Q31) as a result of their BeefPlan experience (Table 3.7). This is particularly so with regard to 'making important decisions' and 'being able to seek out information to improve my business'. This suggests that the benefits of BeefPlan extend well beyond immediate management and operational changes made during the BeefPlan process.

Table 3.7: Influence of BeefPlan on future operations (frequency)

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	n	Mean	S.D.
In future I will be better able to make important decisions because of my BeefPlan experience	1	4	10	39	27	81	4.07	0.88
In future I will be better able to seek out information that I need to improve my operations	1	3	13	41	23	81	4.01	0.84
In future I will be more confident in finding and attending training courses	3	7	15	33	23	81	3.81	1.06
In future I will be better able to identify the weaknesses in my business	2	3	11	42	20	78	3.96	0.89

Around 92% of respondents consider that BeefPlan has been 'Worthwhile' or 'Very Worthwhile' (Q32) (Figure 3.20). This response is consistent across all Groups, though members of the relatively new Condamine group are somewhat divided in their opinion of the value of BeefPlan.



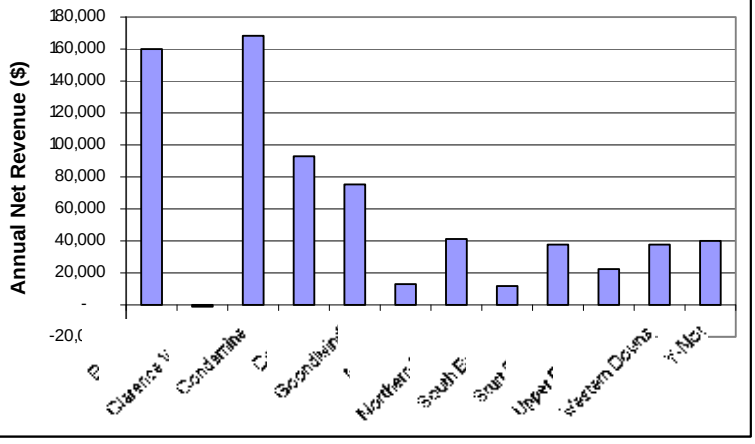
3.4 Economic Indicators

3.4.1 Average Net Revenue

Respondents reported average annual revenue over the last ten years of $232,560 (Q5), and average annual expenses of $173,870 (Q6), giving an average annual net revenue of $58,630. This figure is around 30% less than the ABARE (2005) estimate for average Farm Cash Income, in the three years ending June 2005, of $79,653 for Specialist Beef Producers.

The estimated average annual Net Revenue of groups varied from a high of $168,000 for the Condamine group, to a low of $1,750 for the Clarence Valley Group (Figure 3.21). As shown, 75% of groups estimate a group average annual Net Revenue less than the ABARE estimate cited above.

Figure 3.21: Estimated Annual Net Revenue by Group

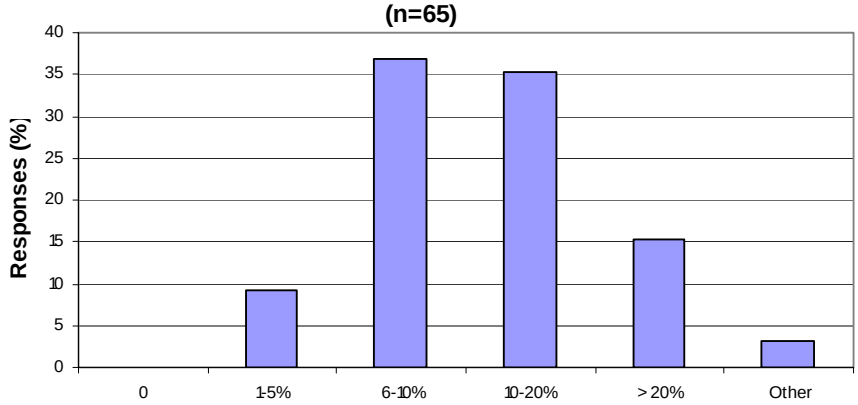


Note – significant 'outliers' are excluded from the above data.

3.4.2 Benefits due to BeefPlan

Respondents were asked to estimate the change in their Annual Net Farm Income as a result of the changes they have made due to BeefPlan (Q24). The mean rating is 3.7, with a Standard Deviation of 0.97.

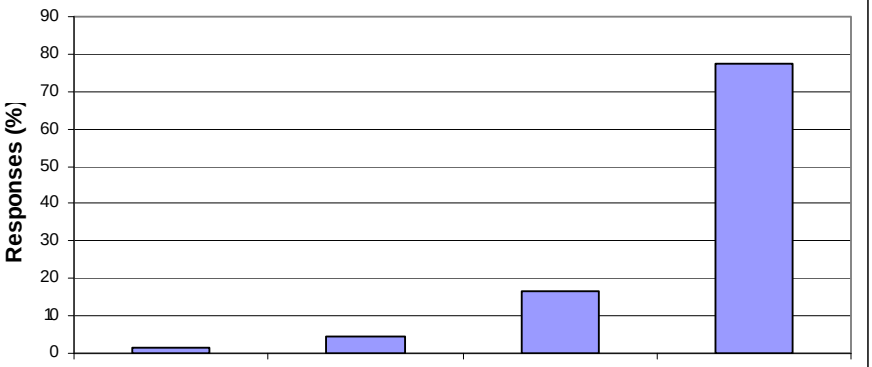
Figure 3.22: Estimated Increase in Annual Net Farm Income due to BeefPlan (n=65)



Because respondents were asked to select a range rather than a point estimate, the average estimated increase in Net Farm Income due to BeefPlan, will vary depending on the value attributed to each rating. In this analysis we have chosen the lower end of each range as the value attributed to each rating (i.e. a rating of '2', equates to an increase of 1%; '3' = 6%, etc). Using this approach, the average increase in Annual Net Farm Income due to management changes made as a result of BeefPlan was estimated to be 9.4%.

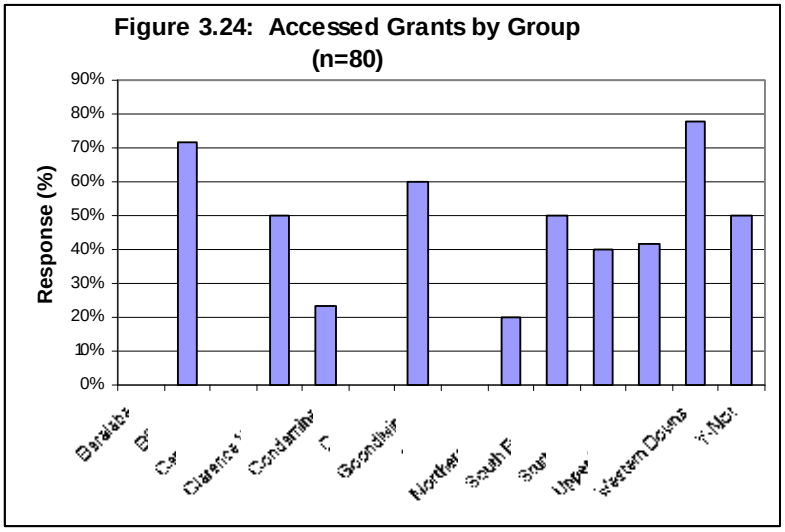
When asked to estimate how long these benefits will last (Q25) respondents overwhelmingly nominated 'more than 10 years' (Figure 3.23). There was little variation in the response between the groups.

Figure 3.23: How long do you expect these benefits to last? (n=66)



In addition to these benefits, some 48% of respondents have accessed subsidies or grants from a non-MLA source in the last five years (Q26). Respondents from Western Downs, Biloela and Goondiwindi have been most active in this regard, while those from Baralaba, Cooee and Malanda were least active (Figure 3.24).

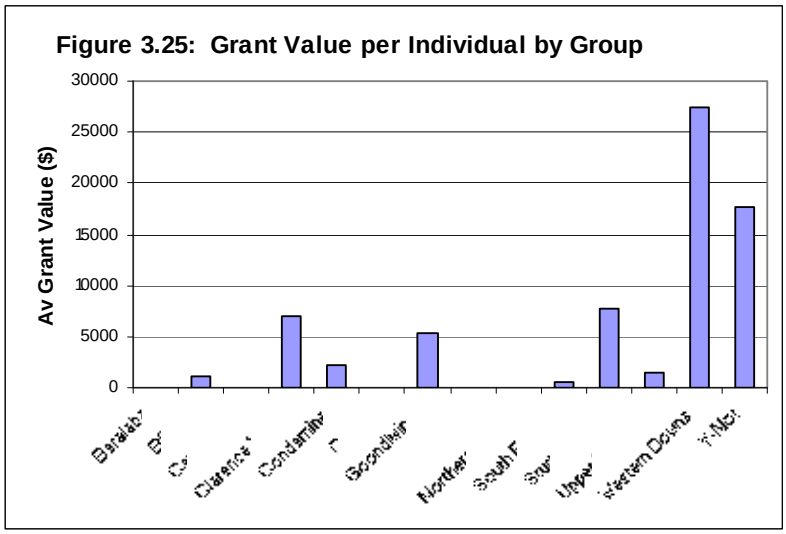
Figure 3.24: Accessed Grants by Group (n=80)



The average value of grants received was $10,573 per individual recipient (Q27), but this was largely due to the relatively high value of grants received by Western Downs and Y-Not respondents (Figure 3.25).

Overall, respondents credit BeefPlan with 57% of their success in receiving these grants (Q28).

Figure 3.25: Grant Value per Individual by Group



3.5 Summary of results

The majority of respondents indicated they have received significant benefit, both tangible and intangible, from their BeefPlan involvement. Respondents were particularly positive about their ability to make better decisions in the future due to their BeefPlan involvement. There was little variation in this response between groups or between those with a dedicated co-ordinator and those without.

All Groups seem to have an evolving membership base, with even the longest running groups (including one that is no longer funded by MLA) having members of less than 12 months standing. This suggests that the groups are working effectively, and continue to function even without the support of MLA. Indeed, both the Cooee and Y-Not groups continue to meet every two to three months.

While not a key reason for joining BeefPlan, 'exposure to new ideas' was the single greatest benefit that people take from BeefPlan, again demonstrating that BeefPlan groups serve an important function in allowing beef producers to learn from their peers.

On a similar note, a large proportion of respondents participate in other industry and/or community organisations, again potentially extending the influence of BeefPlan, while gaining new ideas/skills/contacts that they can bring back to their BeefPlan group.

Respondents were overwhelmingly positive about their BeefPlan involvement to the extent that 58 % would continue to be involved in BeefPlan if there was no MLA funding support.

Rogers (1995) describes the process by which good ideas get diffused or accepted. He recognises that there are individual differences in the level of acceptance and in the rate of acceptance within groups. As such, there are a small number of people in any population who will take up new ideas quickly and a larger proportion who take up the same ideas more slowly. According to Rogers, information about an innovation is often sought from near-peers, especially information about their subjective evaluations of the innovation. This information exchange about a new idea occurs through a convergence process involving interpersonal networks.

It is in this context that BeefPlan stands apart from most other extension programs.

4 Verification of survey responses

4.1 Case studies of practice changes

After completing the initial interview process, and in response to a request from MLA for additional information, a non-random sample of respondents was contacted by telephone to seek further detail about the changes made due to BeefPlan membership, and declared increases in net income. The quantification of practice change examples was to validate producer estiamtes of income benefits from BeefPlan participation.

Examples of practice change nomimated by BeefPlan member are presented in Table 4.1. In the process, respondents were asked to explain how BeefPlan led to such things as the identification of a need to change, identification of a solution and implementation of a particular practice that ultimately improved viability. It was found that BeefPlan heightens awareness of the need to change, assists with accessing high quality information and provides support for making changes. It also provided members with a 'critical peer group review' process that minimised the gap between planning to makes changes and implementing those changes (Table 4.1).

It is this 'peer review' process, which Rogers refers to, that encourages BeefPlan members to adopt changes much more quickly than they might otherwise have done. One long standing BeefPlan member expressed this by saying, *'…I probably would have made these changes anyway, it's just that it has happened much more quickly …. Instead of maybe taking 15 years, I've done it in three because of BeefPlan'.*

When asked the value of this accelerated adoption the respondent said, *'…well if I'd taken 15 years to do this I might not have remained viable'*.

Several specific comments are worth repeating for their relevance to BeefPlan as a vehicle of practice change. One respondent said that he was sceptical about BeefPlan to start with but has become more enthusiatic with the passing of time and is, *"…a better manager now than I was five years ago"*. This respondent said also that QDPI looks to the Group as a conduit for making contact with and disseminating information to the grazing community. Members of the Group have attended several RCS courses where the presenter, *"…put the wood on us"*. This was in reference to 'the cost per kg of weight gain' which is now a measurement tool used by all members of the group.

Another respondent said that RCS was, *"fairly challenging"* – perhaps implying that the advice was very direct.

Table 4.1: Supplementary Information Regarding Management Practice Changes Attributed to BeefPlan

Management Practice Change (Q19)	Detail
More confident in decision making	Before joining BeefPlan the property owner sold steers at an older age. Discussion with the other members gave him/her confidence to sell at a younger age as well as negotiating and selling in the paddock as opposed to saleyards. Paddock sales have been quite successful and contribute to additional income.
Accelerated adoption of new ideas	Discussing what other members have tried regarding spinifex management has resulted in a better understanding of resting periods and has resulted in healthier pastures and probably increased animal production.
Accessed grants	Became more knowledgeable about funding streams, more confident about applying and thinking through how to successfully apply. This resulted in an Envirofund grant for provision of water points closer to the sweeter country and the inclusion of a firebreak to separate the potential fire danger from wattle encroachment.
Better stock handling, improved yard construction and improved cattle temperament	All three management practice changes were driven in part by discussions within the group and bouncing ideas around. The three management practice changes are regarded as contributing to the same outcome which are quieter cattle leading to less risk of stock accidents, higher weight gains and higher meat quality, as illustrated by the strong demand by processors for cattle from the property.
Grazing management	Before BeefPlan the property was continuously grazed. After attending the RCS training course, rotational grazing was adopted. This has drought-proofed the property to a large extent and thereby avoided the opportunity costs of forced sales. Pastures are in better condition than otherwise and they expect a lift in calving now the seasons have improved. Without the BeefPlan group they may not have undertaken the RCS course.
Natural resource management	This benefit is linked to rotational grazing changes. They have seen an increase in health of native pastures (Spinifex and Desert Mitchell grass). Likely environmental benefits are associated with biodiversity and lower erosion risk.
Improved financial and business management	They undertook a course called “Finance for Business Advancement” given by Brian Costello. One of the key messages was to invest off-farm and they have done this with success. Also a new line of credit was explored and adopted with reduced interest rates and greater flexibility than their original loan facility.
Improved herd management	They undertook a course called “Supergene” given by Peter Chilcott. This assisted them to select for herd fertility. More latterly they have undertaken the Breeding EDGE course. Bulls have now been tested for fertility and a number sold due to low fertility. This has enabled them also to decide which animals to retain in the herd.
Herd management & clean water	Courses were the major driver of change in this area including those in nutrition (EDGE) and grazing management (Grazing for Profit). Specific changes included smaller paddocks (more fencing) and greater emphasis on rotational grazing. Increased troughing with pumping from dams and bores has replaced open dams. Overall, these changes have allowed a lower bull ratio, more controlled mating, and less mustering time. Animal productivity including calving rates has improved.
Stock handling for quiet cattle	This management practice change was attributed mainly to the BeefPlan inspired training course that the owners undertook in stock handling (Jim Lindsay workshop) as well as exchanging ideas with other members of the BeefPlan group, most of whom are into “quiet cattle”. The improved stock handling has resulted in no stressed cattle that save time, lower injury risk and improve the condition and quality of sale stock.
Grazing management	This subject was frequently nominated as the most important change induced by BeefPlan participation. The subject itself has many dimensions including maintenance of ground cover, maintenance of the more palatable species, control of weeds, quality and distribution of waters and the cost of weight gain. BeefPlan meetings of the Upper Brisbane Valley Group heightened awareness of grazing management issues. Problems that members tend to labour under include lack of scale (due the high cost of land in the Brisbane Valley), a tradition of set-stocking, endemic weeds such as

	lantana and a traditional reliance on dams that tend to silt-up or run dry during drought or become polluted. The group resolved to seek out the best information available through attending courses and going on field trips. Changes implemented have included rotational grazing, water reticulation to troughs, feed budgeting, more flexible turnoff regimes, off-farm options[8], effective weed control (using Grazon and quick sprayers) and early weaning.
Supplementary feeding	Exceptionally dry conditions over the decade have turned the spotlight on nutrition and supplementary feeding. Members report that in previous droughts they spent vast sums on molasses and cottonseed feeding with indifferent results. The group resolved to seek solutions and used BeefPlan funds to defray the cost of attending RCS and EDGE nutrition courses. This resulted in a superior understanding of how to feed cattle in relation to seasonal conditions, energy versus protein needs, availability of dry feed and costs. All members have now converted to loose licks resulting in large cost and labour savings, better utilisation of standing feed and enhanced cattle performance. Group activity also introduced the members to NRIS (near infra-red spectroscopy) for accurate determination of the herd's nutritional needs.
Breeder management	At meetings members identified temperament and breeder size as issues that they should investigate further. Temperament is relevant to safety and meat quality and has been shown to be heritable. A practical demonstration of the flight test and selection for temperament was witnessed during a group visit to Brian Pastures RS – made possible by BeefPlan funding. Frame size affects cow maintenance costs during drought and members are currently assessing the trade-off between costs of production, growth rates and meeting market needs.
Own time management	Several respondents would like to spend more time in the office but are frustrated by competing demands on their time, exhaustion and difficulties with staying abreast with 'office technology' – including computer usage, workplace, vegetation management and taxation compliance and money management generally. The group plans to address the issue of time management through courses dealing with office systems, but no progress has been recorded at this stage.
Pasture Management	Group discussion about pasture quality led the Group to engage an agronomist to visit members to assess their pastures. This has seen many establish improved pastures (Rhodes grass, lucerne, etc). The dry seasons have precluded any benefit from this practice so far.
No Till farming	Watching neighbours and discussing the benefits with BeefPlan members encouraged the adoption of this practice. After starting in a small way, 100% of the farm is now under a 'no-till' regime, saving approximately 70% in fuel costs, time, etc.
Cattle selection	Attending a training course organised through the BeefPlan group enlightened members to the importance of animal temperament in beef production. Now animals are selected for temperament, ensuring higher sale prices, less damage to equipment, people and animals and a better end product.
Herd management	Attending an EDGE course taught members about controlled joining – this has led to higher weaning rates, as well as reducing cattle handling costs and the stress associated with handling cattle.
Grazing land management	EGDE course taught the respondent the value of fire as a management tool and the importance of having a tree/grass balance. This has led to a more productive and more resilient pasture.

4.2 Quantification of practice changes

Not all the practice changes shown in Table 4.1 lend themselves to quantification. For example, it would be difficult to demonstrate how 'greater self confidence' or better 'own time management' might result in more dollars in the bank account. But clearly these things are important to the

[8] The Upper Brisbane Valley Group is currently considering joint ventures such as leasing a property where all members might grow-out their weaners. Another option up for consideration is contracting a Goondiwindi farmer to produce green crop that could be used to finish young cattle for the domestic market.

overall success of a cattle operation and we suspect that the estimates of the 'average net increase in income due to BeefPlan' submitted by some respondents include the intrinsic value of belonging to a BeefPlan group. In this case, it is correspondingly difficult to validate the results generated by a benefit cost analysis (with its power to place a value on both economic and social benefits) through simple case studies that consider only the change in income and/or costs due to a particular innovation. The problems of validating performance using different methodologies notwithstanding, it will be useful to consider how practice changes have generated margins for particular BeefPlan participants. This is done below for specific cases.

Case 1: Breed selection
Following BeefPlan participation, taking the form of workshop participation and within group mentoring, this part-time producer decided to intensify his breeding operation by switching into smaller frame cows and earlier turnoff. In 2002-03, large-frame Simbrah cows were replaced with smaller Belmont Red composites. Over the three years prior to 2002-03, the producer grossed an average of about $10,400 from cattle sales. Going to smaller-frame breeders allowed the herd size to be raised by 35% but feed was conserved by reducing the age at weaning and selling lighter weaners and more cull cows. Despite the operating costs and investment in breeders remaining relatively unchanged, gross income has increased steadily over four years since the change was implemented, as demonstrated below:

Year	Gross Sales
2003-04	$9,299
2004-05	$13,870
2005-06	$17,972
2006-07	$22,000 (estimate)

The strategy has clearly been successful. Although income was down in the first year following the practice change, it has ultimately led to a doubling in gross income compared to the 'before' situation.

Case 2: Supplementary feeding
Following group involvement with EDGE nutrition workshops, this producer was able to save about $36 per cow in feeding costs. Previously he has fed molasses for a four-month period from April. This cost $850 - $900 per week for 200 cows. Following workshop attendance he changed to a loose lick costing less than $450 per week. Loose licks are high in non-protein-nitrogen and stimulate the breeders' gut flora, allowing them to more fully utilise dry feed in the paddock and thereby satisfy their energy needs. Over a four-month period, the saving was about $7,200 or $36 per cow, without any change in capital outlay. Molasses is fed now only when the cows need more energy. This situation will arise if there is little or no green feed in the paddock at calving. In the future, the producer intends to fine-tune his supplementation program further with the aid of near infrared reflectance spectroscopy (NIRS). Furthermore, he is considering using the DPI&F's herd modelling software (Dynama) to determine his optimal herd structure in the face of increased climate variability.

Case 3: Feed mixes composition
Nutrition has been a hot topic of conversation at BeefPlan meetings in recent years. Thus a Condamine member queried the value of bentonite in the grain rations he was paddock feeding. This led to removal of bentonite from the ration and a saving of $7 per tonne of ration without any negative implications. For this producer, BeefPlan membership is invaluable for continuous fine-tuning of his production systems. He remarked that BeefPlan exposes knowledge very quickly because the group dynamics permit 'discovery and validation' to occur simultaneously.

Case 4: Intensive preparation of feeder cattle
Traditional grain growers in the Condamine district have swung into intensive cattle growing over recent years as a superior strategy for coping with highly variable climatic conditions. This producer buys-in Angus steers at 220 kg LW and grows them to about 500 kg LW before on selling to a feedlot. Seasons permitting, fodder crops are grown to expedite growth. Average daily weight gains (ADG) of up to 2.7 kg have been achieved off green oats while 1.5 kg ADG is a baseline target. For the purposes of intensifying the system, this producer has linked individual animal identification (using NLIS) with a computer-based program (Paddock Action Manager) that monitors performance during the growing period. The impetus and core ideas for the system stemmed from BeefPlan participation. Quantifiable gains derive from two main sources. Firstly, individual animals that fail to achieve target weight gains (linked to their cohort) are culled, leading to large opportunity savings. Secondly, the feeding regime is continuously fine tuned – using pasture supplementation – so that ADG targets are achieved at least cost. Since implementing the system, the producer's gross turnover from growing-out has increased by $100,000 per year. The net return, expressed as a return on the investment and operational costs of the system (software, supplementary feeding, intensive monitoring of each lot, culling of under-performers, additional time resources) has not yet been calculated by the producer but it is clearly large.

Case 5: Supplementary feeding (in the words of the producer)
"We run 200 breeders on 835 hectares in the Brisbane Valley and fatten the steer progeny on 1,100 hectares property at Johnstown in the South Burnett. These properties are typical coastal spear grass with small alluvial flats running back to iron bark ridges. The steers are moved to Johnstown after the first spring rain, usually in November.

After doing an EDGE Nutrition workshop in November 2004 we were keen to improve our nutrition practices particularly in the below average rainfall years that we had experienced in recent times. We expect the benefits will be incremental over several years and some actions will not contribute to profit margins for some time. Therefore it is difficult to put a present $ value on them.

The benefits we are aiming for are:

- Improved conception and weaning rates
- Tighter calving spread throughout the breeding herd
- Tighter gestation interval
- Higher weaning weights
- All cattle maintained in marketable condition so they can be sold should the need or opportunity arise
- Younger turnoff
- Better eating quality – aim for a weaner daily weight gain of 300 gm
- Eliminating nutritional stress in heifers to puberty allowing earlier joining
- Better weaner nutrition to mitigate against advanced eruption of adult teeth
- Less chemical usage due to reduced nutritional stress so natural resistance is not inhibited
- Better pasture – more sustainable production and nutrition by benchmarking against other paddocks on the property
- Regular opportunity to check the herd
- Pride and satisfaction in our product knowing we are doing the best job possible.

After an EDGE Nutrition workshop in late 2004 we decided to look at our herd performance and selected our poorest breeder group, comprising 25 head, for close attention to nutritional needs.

We began by feeding whole cottonseed on 1 June 2005 at 2 kg/day/cow ramping it up as pasture quality declined during winter. The cows calved in September at 92% of those joined to give us 23 calves. This compared to 72% or 18 calves in 2000 (before the changes were implemented).

Based on previous NIRS results, we felt that energy was limiting so we introduced grain at 1 kg/cow and reduced the whole cottonseed to 1kg/day/cow to provide more balance in the ration. Feeding was maintained until the end of October to take some pressure off the pasture and to keep the lactating cows in strong condition.

We fed for a total of 150 days at an average cost of 77c/day. In May 2006 these calves were weaned at an average 266 kg liveweight and the cows averaged 550 kg. The female progeny were sold at the local store sale for $440 per head average. At the same time the steer calves were worth $2/kg or $532 per head so the average value of steer and heifer weaners was $486 per head. Thus the gain in weaner weight compared to the 2000 year progeny was 45 kg @ $1.85/kg = $83/head for the 18 head + $486/head for the extra five head = $1,498.50 + $2,430 = $3,928.50.

The cost of supplement for this group was 77c/day for 150 days = $2,887. Assuming other variable costs – such as additional fuel – take this figure up to $3,000, the margin in the supplemented year compared to the un-supplemented year is $928. This is a 32% return on cash cost and in our opinion was a worthwhile project given the extra benefits that flowed on as a result". (*John Westaway, Upper Brisbane Valley BeefPlan Group, September 2006*).

Case 6: Breeding Strategy

The BeefPlan respondent from northern NSW had started to think about changing his breeding strategy in order to improve productivity. BeefPlan participation and completing an EDGEnetwork course encouraged him to move ahead with this more quickly than he might have otherwise. His new strategy now allows him to turn off cattle in better condition and gives him more flexibility in terms of marketing.

Under his old system he joined first-cross Brahman/Holstein cows to Charolais bulls to produce yearlings for the domestic trade. In good years he was able to produce good quality yearlings (280kg HSCW) but was finding that in poor years he lost money on his store cattle.

Under the new system he joins first-cross Murray-Grey/Holstein, and Angus/Holstein cows with Brahman or Charolais sires, turning off yearlings for the domestic trade, backgrounding or the feedlots, depending on the season.

Turning off around 200 head per year, the respondent now has much greater flexibility in marketing his product. In addition, he is achieving faster growth rates, allowing him to turn off animals that are around 5% heavier at the same age. He achieves this without having to feed large quantities of grain to achieve the desired weight.

In summary, the changes have:

- Generated a 5% increase in average carcase weight
- Reduced the cost of grain feeding by about $60 per head (7%)
- Reduced the proportion of 'below specification' animals, thus increasing the average value of turn-off
- Been achieved with little additional cost.

Case 7: Pasture Management

This northern NSW respondent uses whole farm planning to determine land capability and establish grass/legume pastures suited to the capabilities of the area. Under his old system, the producer relied on native pastures, with supplementary feeding of molasses and cottonseed meal during dry periods.

While only partly implemented at this stage, the higher quality pastures have led the following gains:

- Heifers can be brought into cycle quicker
- Breeders maintain weight with no supplementary feeding
- When opportune the producer can direct drill oats into his pastures to provide winter feed.

Capital costs to establish the program have been minimal so far (about $4,000) with average annual maintenance costs of less than $10 per hectare.

In summary, the changes have:

- Alleviated the need to supplement the 200-250 head breeding herd, saving around $90 per head over four months
- Allowed the producer to turn off cull heifers suitable for the domestic trade without grain feeding.

Case 8: Herd Nutrition

Prior to his involvement in BeefPlan, this southern Queensland respondent was haphazardly using AnaPro or whatever else was, *"…flavour of the month"*. After completing an EDGEnetwork course as a part of BeefPlan, he started using whole cottonseed (occasionally) and agistment to supplement his own pastures.

This change has allowed the producer to better manage his grass cover and to hang on to cattle that he would otherwise have to sell in store condition.

The agistment is close-by and costs $3 per head per week, providing a, *"…cheap form of supplementary feed for weaners and pregnant cows".* The stock can be grown on a bit and sold into the domestic trade at around 300 kg LW rather than going out as around 220 kg LW weaners. In addition, they return around $2.20 per kg on farm rather than around $2.00 that they may have achieved. After allowing for the cost of agistment, the net benefit is around $100 per head, around 20 – 25% more than may have been achieved as weaners.

In summary, the change has:

- Allowed the producer to sell yearlings that may otherwise have gone out as weaners
- Increased the gross return per head by around 25%
- Allowed him to maintain his breeders in good condition during calving.

Case 9: Breeding Strategy

Prior to BeefPlan, this producer used an unplanned cross breeding program combining numerous breeds. The result was sub-optimal performance and stagnation in genetic gain. After completing the EDGE Breeding course he is now using a defined cross breeding strategy based on Brahman/South Devon/Belmont Red genetics and a purebred Belmont Red line. He now breeds most of his own bulls.

The result has been a significant increase in ADG from 0.5 kg/day, to 0.8 or 0.9 kg/day with a negligible change in costs. At a price of $2 per kg LW, this equates to a benefit of around $0.60 - $0.80 per head per day.

In summary, the change:

- Has given the producer a 'genetics plan' that he has been able to refine and maintain
- The plan has generated a 60-80% improvement in ADG, which will be reflected in the net return when the cattle are sold.

Case 10: Land Management

By monitoring grass cover and better placement of watering points, this southern Queensland producer has improved the carrying capacity on one block by about 40%.

Rather than maintaining one, 283 ha paddock with a dam in one corner, he has sub-divided the block into three paddocks and installed watering points to optimise pasture utilisation.

After a capital outlay of around $20,000, and adopting cell-grazing principles, the producer has increased his carrying capacity from one animal per 4 ha, to around one animal per 2.7 ha. He now feels that the animals are getting more benefit out of the pasture.

In summary:

- The changes have allowed the producer to increase his carrying capacity by about 40%
- He now expects to achieve higher growth rates through adoption of cell grazing principles.

Table 4.2 identifies each of the case studies above and contrasts the results implicit in the results with those suggested by the cases taken from the literature.

Table 4.2: Comparison of rates of return reported by BeefPlan producers and the literature

Case	Practice Change	Respondent Result	Reference	Reference Estimate
1	Breed Selection	100%	Bertram, 1995, pp1	43%
2	Supplementary Feeding	50%	QDPI, 2006 pers. comm.	>10%
3	Feed Mix Composition	N/A	N/A	N/A
4	Intensive preparation of feeder cattle	N/A	N/A	N/A
5	Supplementary feeding	32%	Fordyce, 2006	33%[1]
6	Breeding strategy	16%	Bertram, 1995, pp1	43%
7	Pasture management	10%	Humphreys & Partridge, 1995, pp3	500%[1]
8	Herd nutrition	25%	N/A	N/A
9	Breeding Strategy	60%	Bertram, 1995, pp1	43%
10	Land Management	N/A	Humphreys & Partridge, 1995, pp3	Up to 500% [1]

1. Calculated from figures in the literature

4.3 Examples from the literature

For the purpose of validating the case studies presented above, the consultants sought to find analogous cases from the literature. This has only been possible in a general sense because most of the cases cited by producers are either specific to their situation or not otherwise reported in the literature. Below we present several relevant examples of how practice changes translate into economic gains.

4.3.1 Pasture Management

Efficient utilisation of feed resources is a major determinant of farm profitability in Australia's livestock industries but is made difficult by the seasonality of pasture production relative to the constant demands imposed by maintaining a cattle herd. In many years total pasture consumption can be as low as 20 to 30%, yet sustainable pasture utilisation of more than 50% is possible (CSIRO, 2006, Schulke, 2006). With limited information, many producers forego potential production through ineffective management of their feed resource.

Strategic rotational grazing is currently being advocated as the system that optimises pasture dry matter utilisation by animals in extensive grazing systems. CSIRO estimates through their Pastures from Space project that for every five percent increase in pasture utilisation, an increase of $10 per hectare in profits can be achieved. While this project is focused on temperate Australia, the principles apply to other areas.

The South Australian Research and Development Institute (SARDI) has evaluated high technology grazing systems that rely on the maximum utilisation of pasture. Such grazing systems are capable of running up to 50 DSE per hectare for most of the growing season under dry-land conditions. The "Technograzing^{TM} System" that has been installed by SARDI is an intensive stocking and grazing management concept developed in New Zealand for producing bull beef. This system differs from other rotational grazing systems and is claimed to increase production by 60% by improving labour efficiency and production per hectare.

Those BeefPlan participants who have changed their pasture management practices indicated that all the changes (i.e. not just those involving pasture management) they made due to BeefPlan increased their net farm income by between 1% and 20%, with an average of around 9%.

Using the estimated average annual net revenue of $58,630 for BeefPlan participants, and the average land area of 13,457 hectares, the annual net revenue is around $4.35 per ha. Thus a 9% improvement equates to 39 cents per ha increase in net revenue. This is an average of $5,268 per respondent, of which only a portion is ascribed to their involvement in BeefPlan. Based on the CSIRO estimates, even a slight improvement in pasture utilisation in northern Australia could generate the net farm income gains estimated by BeefPlan participants.

4.3.2 Supplementary Feeding

Supplementary feeding, where herds are supplied with phosphorous and proteins lacking in the native pastures, especially during dry years, increases the capacity of animals to consume and utilise available forage. This technology allows land to be effectively grazed that would have been useless in the past.

Seasonal under-nutrition is the primary reason for poor growth, low fertility and high death rates in north Queensland herds. Primary nutrient deficiencies are occur in nitrogen, sulphur, phosphorus and energy. A policy of conservative, flexible stocking rates improves nutrition and reduces supplementation requirements. The MLA publication Beef Cattle Nutrition (2006) shows

how to calculate the selling price that has to be achieved in order break even on the total costs of feeding a cull cow through to slaughter weight. The cost of feeding is based on a pasture and grains ration that gives an expected daily gain of 0.95 kg liveweight per day. Implicit in the calculation is application of supplementary feeding principles that BeefPlan members have adopted through attending EDGE nutrition and other workshops.

Anecdotal evidence suggests that sound supplementary feeding strategies should increase productivity by, "…at least 10%" (QDPI personal communication, 2006). Naturally, the base level of productivity is a major determinant of the gain that can be expected from any management change.

4.3.3 Genetics

It would be convenient if there were a breed that excelled in all traits related to profitability. In practice, however, some compromise between meat quality and environmental adaptation is often necessary (see Whan *et al*).

Archer *et al* (2004) compared a stud cattle herd and a commercial herd to evaluate the impact on genetic gain and profitability of incorporating feed intake measurements as an additional selection criterion in breeding programs. Costs incurred by the stud-breeding unit were compared with returns generated in the commercial unit, with bulls from the breeding unit being used as sires in the commercial unit. Two different market objectives were considered — a grass-fed product for the Australian domestic market, and a grain-fed product for the Japanese market. Breeding units utilising either artificial insemination or natural service were also considered.

A base scenario was modelled incorporating a range of criteria available to Australian cattle breeders. A second scenario incorporated selection of sires for the breeding unit using a 2-stage selection process, with a proportion of bulls selected after weaning for measurement of (residual) feed intake. Measurement of the feed intake of bulls improved accuracy of breeding unit sire selection by 14 - 50% over the equivalent base scenario, and genetic gain in the breeding objective was improved for all scenarios, with gains ranging from 8 to 38% over the base scenario. After accounting for the cost of measuring feed intake ($150 – $450), additional profit was generated from inclusion of feed intake measurement on a proportion of bulls for all breeding schemes considered. Profit was generally maximised where 10 - 20% of bulls were selected at weaning for measurement of intake, with improvement in profit ranging from 9 - 33% when optimal numbers of bulls were selected for intake measurement (Archer *et al*, 2004).

This example indicates the approximate increase in profit that a beef producer could expect from the adoption of this technology.

4.3.4 Faecal NIRS: A Tool for Predicting Diet Quality in Grazing Cattle

Near Infrared Reflectance Spectroscopy (NIRS) is an analytical technique where near infrared radiation is beamed onto a substance and the energy can be absorbed, transmitted or reflected. The amount reflected depends on the physical and chemical properties of the material being analysed. The reflectance of every second wavelength from 400 – 2500 nm within the near infrared band can be measured to produce a "reflectance spectrum" or NIR spectrum. Quantitative estimates or predictions of different attributes of interest (e.g. protein) can be derived from NIR spectra using calibration equations (Coates & Jackson, 2003).

Difficulty in estimating the intake of nutrients from pasture has been a limitation to applying nutritional science to the management of grazing cattle. Historically, producers have assessed animal condition to make decisions associated with supplementary feeding, paddock movements

and selling off stock.

Coates (2000) has described the practical applications and associated benefits of faecal NIRS. These are detailed below:

Cost-effective supplementation
Cost effectiveness in supplementation of cattle diets depends on knowledge of current diet quality combined with knowledge of nutrient requirements. This is in order that any supplementary nutrients needed to meet production targets can be determined at any point in time. Faecal NIRS allows for the provision of timely information on the protein and energy status of the diet so that producers can make decisions on when, what and how much supplement is needed.

Cattle movements
Faecal NIRS has the potential to provide decision support on current diet quality and growth rates in a particular paddock. If diet quality and growth rates are satisfactory it may be inopportune to move the cattle, conversely deteriorating diet quality and performance may require action to avoid production losses. This technology has advantages over weighing cattle as collecting faecal samples is simple and inexpensive compared with mustering and weighing. In addition NIRS predictions of growth rate provide estimates of tissue related growth rate that are not confounded by gut fill.

Weaning
Monitoring diet quality can provide quantitative information on dietary nutritive status to assist with decisions about timely weaning schedules. In general terms, weaning should be early in 'poor' seasons to avoid jeopardising future reproductive performance and/or cow survival, whereas weaning can be delayed in 'good' seasons without risk to the cow but with benefits to the weaners and to management.

Agistment
F.NIRS may assist producers make decisions on choosing between agistment alternatives or in negotiating appropriate agistment fees based on diet quality. The technology may also be used to assist owners to monitor the nutritional status and performance of agisted cattle remotely.

Forward marketing
Use of F.NIRS to regularly monitor cattle for diet quality and growth rate can allow producers to determine whether cattle are on track to meet target market specifications and turnoff dates. The producer can assess alternatives such as production feeding to ensure the target is achieved, or prepare the cattle for an alternative market if the target cannot be achieved.

The use of F.NIRS for any of the above purposes is likely to result in a more efficient and cost effective beef production system arising form improved nutritional management of grazing cattle.

Quantification of Benefits
For the purposes of this analysis, the only benefit quantified is the improved efficiency in the provision of diet supplements. It has been calculated by QDPI&F economists that the gross margin per adult equivalent will increase by $3.90 per annum with the adoption of the F.NIRS technology. A herd model was used to derive this figure by incorporating assumptions including:

- Costs incurred by adopters are estimated at $500 per annum for a typical cattle property ($45 per test, with four tests needed per season per major land type on the property).
- In the absence of F.NIRS, cattle managers would continue to use subjective assessments of the nutritional value of pastures.

- The size of the average adopting property is 3,000 adult equivalents and the type of property is an integrated beef property that breeds and fattens beef cattle.
- The breeder herd would normally be fed supplements six years out of ten without the F.NIRS technology. With the technology, supplement costs are reduced by 75% in one of those six years. This equals a cost saving of 12.5% per annum on average in breeder supplements.
- Replacement livestock and other livestock are normally fed supplements in four years out of ten without the application of F. NIRS technology. With the application of the technology, supplement costs are reduced by 75% in one of those four years. This equals a cost saving of 18.75% per annum on average in replacement and other livestock supplements.

It might be more accurate to assume that the breeder herd would normally be fed supplements nine years out of ten without the F.NIRS technology, and that with the technology, supplement costs are reduced by 20% in seven of those nine years. This would equal a cost saving of 15.6% per annum on average in breeder supplements, as opposed to the 12.5% assumed in this analysis.

4.4 Conclusions

It is apparent from the above discussion that BeefPlan involvement has helped individuals to implement relatively simple management practices more quickly, more completely and with greater enthusiasm than would otherwise be the case. Apparently BeefPlan does this through group dynamics that fuel motivation, assist the discovery of relevant knowledge and skills and implicitly benchmark the ongoing performance of fellow members.

The niche that BeefPlan may be addressing is those producers who are not doing the simple things already – they may not be the innovators already, but they are actively seeking new ideas and some of them could become innovators due to BeefPlan.

A high proportion of the BeefPlan practice changes have been driven by group membership and undergoing training courses. It would be of considerable interest to assess the relative impacts of training *per se* and BeefPlan membership and whether the relationship between these two factors is complementary, additive or competitive. This hypothesis could be tested through a follow up survey of EDGE participants comprising both BeefPlan and non-BeefPlan groups. MLA might already have data on this issue that coud be analysed.

5 Benefit cost analysis of BeefPlan

5.1 Introduction

Benefit cost methodology differs from the partial budgeting methodology (used in section 4.2) in several ways. Some of the more important differences are outlined below:

- Benefit costs analyses (BCA) tend to be more holistic than partial budgets. This means BCA can include both tangible and intangible benefits and may include both private and social impacts, depending on the investor perspective adopted (see further comments below). Partial budgets, on the other hand, tend to be highly focused.
- BCA is designed to capture economic impacts over the full life of the project. It is reasonable to expect that some practice changes (initiated by BeefPlan participation) will generate benefits for many years into the future. This possibility has been captured below by projecting income and cost streams into the future and then discounting these streams to arrive at a net present value. Partial budgeting usually adopts a relatively short time frame.
- BC analyses of industry projects always include the industry's investment as well as any linked investment by participants. Depending on the ratio of industry to private investment, this will mean a difference in returns, with participants reaping a higher return than the industry in general. The results generated by partial budgets will tend to reflect the individual perspective but will vary widely depending on the particular practice change examined.
- The BCA on this occasion has been structured to arrive at an average result across all groups and all participants. The results from this exercise will clearly be different to the analysis that considers a particular practice change adopted and applied by a particular producer.

Accordingly, the results of a particular benefit cost analysis depend on whether the perspective is narrow (because it only takes into accounts the individual's interests) or broad (because it takes into account the interests of the whole industry)[9]. From the perspective of an individual participating in BeefPlan, the cost can be significant since it includes a co-payment and incidental costs associated with attending meetings and other activities. While these costs vary substantially between groups, the analysis assumed that the average annual participation cost has been $800 per business. Under these circumstances, participation in BeefPlan should be attractive from an individual perspective provided positive benefits can be generated. However, the more relevant perspective to consider is the 'whole industry' because MLA meets most of the costs. Thus ongoing support for BeefPlan will only be generally acceptable if the total benefits generated by participants can be shown to exceed the total costs incurred by the industry.

The benefits flowing to individuals and attributable to BeefPlan participation were quantified from the survey responses relating to important practice changes and net revenue effects. Where respondents indicated that BeefPlan participation had lifted their income, the consultants made follow-up phone calls to develop confidence ratings about the strength and persistency of the benefits.

Because it is interested in the welfare of all levy payers, MLA prefers to foster programs that generate significant primary and/or secondary benefits. The potential for a program to generate direct benefits will be tied in the first instance to its participation rate because high participation rates will act to defray overhead costs and increase the probability of secondary diffusion. Thus

[9] This dichotomy corresponds with the financial and economic distinction used in benefit cost analysis. Thus financial analysis considers the situation from the perspective of the individual business whereas economic analysis goes broader by considering the interests of whole industry or society. The primary focus of this evaluation is 'economic' because we are concerned with the best use of industry funds.

low participation programs will only be viable if they can generate relatively large benefits per participant that are sufficient to counteract high overhead costs. Apart from this, the viability of low participation programs will be assisted by flow-on benefits to non-participants and/or significant environmental benefits.

Since we already know that the total number of producers involved in BeefPlan is low (currently less than 200) the analysis will look at both the magnitude of benefits flowing directly to participants and for evidence of flow-on benefits beyond the groups. The means by which the latter might occur includes the following:

- Additional demand for MLA's mainstream extension products and other professional services
- Strong demonstration effects or diffusion effects (exhibited by BeefPlan participants) that result in behaviour change among non-participants
- Interactions with producers in own and other districts with cross-fertilisation effects
- Active recruitment of new members that will act to improve cost effectiveness (since MLA costs per group are essentially fixed).

5.2 Application of benefit cost analysis

Benefit-cost analysis is designed to quantify the relationship between benefits and costs over the life of a project. Once this relationship is distilled into a result, it is possible to draw some objective conclusions about the economic viability of the project. For the purposes of this study, the following performance criteria were employed:

Net Present Value (NPV): This is a dollar figure given by the present value of benefits (or income) less the present value of associated costs. The present values are derived by applying a discount rate to the streams of income and costs related to the project. The appropriate discount rate reflects the safe return on funds invested elsewhere. A rate of 5% was used as the standard for this analysis but it is always possible to test the responsiveness to higher rates. For this purpose a rate of 10% was also applied.

Benefit-cost ratio: This is the numeric relationship between total discounted benefits and total discounted costs.

Internal rate of return (IRR): This is the rate of interest that forces the net present value to zero.

Quantification of the benefits flowing from BeefPlan relied on participants' own estimates as recorded in the questionnaire. A series of questions were structured to ascertain the financial impact associated with BeefPlan participation. Thus participants were asked whether they had made management changes because of involvement with BeefPlan and if they had, what proportion of the decision to change could be attributed to BeefPlan. Related questions concerned the impact of the changes on average annual net income and when the benefits occurred or are expected to occur and for how long they are expected to persist. All these responses were incorporated into the annual cost and benefit streams. Thus it was possible to quantify in dollar terms the impact of BeefPlan membership.

As with most surveys, there were some 'problems' with the quality of the data. In the case of obvious errors or omissions, adjustments were made to retain the representative nature of the data. For example, in one of the groups there was a single respondent who declared a relatively

high income but no costs. A second group with seven respondents declared an average cost of production figure that was less than 10% of gross income. The data for both of these groups was judged to be faulty and were omitted from the economic analysis.

The assumptions used to generate the cost and benefit streams are detailed in Table 4.1.

Table 4.1: Assumptions used to quantify BeefPlan costs and benefits

Variable	Assumption	Source
1. MLA payments to BeefPlan between 1998/99 and 2005/06	MLA has outlaid $992,340 over eight years since 1998/99.	Data provided by MLA
2. Producer payments associated with participation in BeefPlan	The annual cost of BeefPlan membership was assumed to be $800 per business, split between co-payments and attendance costs. The gross annual outlay by producers was given by the number of participants in each year since 1998/99 (range from 50 businesses in 1998/99 to 127 in 2005/06)	Consultant's estimate based on discussions with Project Coordinators and survey data
3. Additional profit generated by participation in BeefPlan	This figure was given by the respondents' net income, the attribution of important practice changes to BeefPlan and the increase in average annual net income due to BeefPlan induced practice change. Net income was increased by $3,472* per year across all businesses that changed practices as a result of BeefPlan participation. Only 27% did not change their management practices as a result of BeefPlan involvement.	Survey participants attributed 63% of their decision to make practice changes to BeefPlan and the associated practices increased average annual net farm income by 9.4%. After allowing for the proportion of producers who did not make management change as a result of BeefPlan, the net effect on farm income was $2,535 per year.
4. Proportion of members who made additional profits	73% of businesses changed their management practices because of involvement in BeefPlan	Results of survey of BeefPlan participants
5. Lag between joining a BeefPlan group and generating additional profits	Adoption lags were short. 56% of businesses reported that they have already received benefits following BeefPlan induced changes. Of those who have not yet received benefits, 14% expect benefits within 5 years. A three-year lag was assumed for all adoptions.	Results of survey of BeefPlan participants
6. The durability of the benefits initiated by BeefPlan participation	53% of respondents indicated that BeefPlan induced benefits will persist for more than 10 years. The maximum life of benefits was assumed to be 15 years.	Results of survey of BeefPlan participants. Note that practice change and other innovations will commonly induce net benefits for much longer than 15 years.
7. Access to non-MLA grants	Between them, the 14 groups received $269,000 of non-MLA funds. While these funds could conceivably be attributed to BeefPlan participation, the analysis did not incorporate any benefit due to grants.	The survey of BeefPlan participants revealed grant funds secured but these were not included in the benefit cost analysis.
5. Discount rate	5% with the sensitivity of results tested for a 10% rate; all costs and benefits discounted to 2005/06 dollars.	Standard approach for benefit-cost analysis

*The average farm cash income (after total cash costs) reported by the respondents was $58,630 after taking out one large producer who was not representative of the membership. This figure is considered

comparable to, but somewhat less, than the analogous figure reported by ABARE of $98,499. The ABARE figure refers to Queensland beef producers for a five year period 2000/04.

All the financial data relevant to a benefit-cost analysis were entered into an excel spreadsheet and results developed as shown in Table 4.2.

Table 4.2: Results of the discounted cash flow analysis

	Discount rate	
	5%	10%
Total discounted benefits	$3.1m	$2.9m
Total discounted costs	$2.0m	$2.3m
Net present value	$1.1m	$600,000
Benefit cost ratio	1.6 to 1	1.6 to 1
Internal rate of return	15%	

The results shown in Table 4.2 indicate that MLA's investment in BeefPlan has provided strong positive returns. Thus the direct benefits that are being generated by the program are a primary defence of its existence. The net cash flow was negative from 1998/99 to 2001/02, while the foundation groups were being established, but positive benefits have flowed from this time. Even if program funding was to cease immediately, the flow of benefits should be sustained for at least another 7-8 years because participants have made permanent practice changes. The analysis suggests that the BeefPlan investment has left behind it an enduring pattern of enhanced economic performance. The key to the strong economics of BeefPlan has been initiation of practice change leading to increases in income. The principal reported changes in practices that gave rise to the incremental lift in farm income included herd productivity, pasture management and land management as reported in section 3.6.

The above analysis has quantified the benefits going directly to BeefPlan members but has not yet demonstrated how benefits might flow beyond the groups to the wider community and the natural environment. Generation of secondary benefits of this nature were envisaged when BeefPlan was first conceived. Below we discuss the prospects of secondary benefits flowing from BeefPlan.

Additional demand for MLA extension products: Nearly all of the groups reported that they had attended EDGE workshops to acquire knowledge and skills. This additional consumption of MLA products will have increased the products' viability and in the process helped to ensure that they will continue to be offered and their quality enhanced. Thus patronage of EDGE and other workshops by BeefPlan groups is seen to result in a significant secondary benefit.

Positive influence on other beef producers: A secondary benefit would be claimed for BeefPlan if it could be demonstrated that non-members (able to observe the activities of their local BeefPlan group) are positively influenced to emulate particular practices. While it is difficult to prove a benefit of this nature, it is the outcome predicted by researchers of adoption practices. As noted in section 1, Rogers (1995) has linked adoption habits among primary producers to the influence of innovators – as might be represented by BeefPlan groups or found amongst BeefPlan members.

Better care of the environment: Environmental issues often have a regional focus due to the efficiencies of controlling weeds and soil erosion, etc on a catchment basis. The implication is

that neighbours and the local community have to work together to achieve cost effective results. This imperative would seem to suit the structure of BeefPlan but some producers perceive there are conflicts and trade-offs between production and environmental imperatives. As it turns out, conflict within groups gives rise to tension and disfunctionality. It would not be surprising therefore, if BeefPlan groups turn out not to be efficient at addressing environmental issues, or indeed any other issue that could be viewed as inherently divisive. The more general observation is that groups cannot be prescribed as a panacea for addressing all the issues that confront beef producers and beef production. In practice, self-managed groups are likely to work most effectively where the group itself identifies the issues and formulates its own strategies for achieving outcomes. The corollary is that issues identified by group consensus are likely to be 'friendly' and fall mainly into the area of production and economics.

Environmental enhancement appears at this time to be the domain of governments, with an accent on regulation supplemented by fiscal incentives and landholder awareness campaigns. In the longer term, we would expect devolution of responsibilities to the regions and a heavier reliance on the goodwill and common sense of producers and other landholders. When this transition comes to pass, it would be reasonable to expect BeefPlan groups to play a leadership role in environmental enhancement.

6 Comparison with other capacity building programs

6.1 Capacity Building

The literature reveals that 'capacity building' is often a vaguely defined concept that is subject to verbose explanation and many qualifications (see Growing the Capacity of Rural Australia – the Task of Capacity Building Coutts 2005). This situation makes it desirable to come up with a definition that is specific to the beef industry. For the purpose of this study, capacity building refers to a structured process designed to help groups of beef producers to respond positively to changing circumstances. In this case, a positive response is presumed to include such actions as a willingness to experiment, take decisions, manage risk and implement changes that fall outside the individual's normal comfort zone. So whilst capacity building can be distinguished by the heavy emphasis it places on processes that foster psychological gains such as empowerment, confidence building and motivation, we contend that to be beneficial enough it must also generate material outcomes that are measurable. Where structured capacity building generates multiple outputs, it can be thought of as a higher-order form of behaviour change compared to forms that produce simple and single-dimensional outcomes. Table 5.1 classifies several MLA producer programs in terms of their state of development and their range of outputs. In practice, there might not be the sharp dichotomy between 'products' implied in the table, but the concept of higher and lower orders of development is still seen to be real and useful.

Table 5.1: Classification of producer enhancement products according to evolutionary status

Classification of product	Defining characteristics	Examples
Simple	Prescriptive information focused on a single outcome. Thus producers are told what they must do to achieve a particular outcome without reference to the need, context, capacity or circumstances.	Typified by Farm Notes and field days lectures, etc. Basically a hit & miss approach
Evolving	A combination of knowledge transfer and demonstration taking into account local conditions. Inputs and outputs relatively easy to measure but assumes that attendees are receptive and have the capacity to follow through with implementation.	EDGEnetwork where the presenter delivers a prescribed course but gives attendees supporting notes that allow applications to be tailored. Suitability analysis and follow-up not integral.
Complex	Self-directed learning that recognises the special needs of group members. The group is 'directed' by a vision and strategy and chooses the subject matter and delivery methods according to recognised needs. Implied is a superior capacity to gain from the more directed forms of extension such as EDGE. Positive linkages between leadership and group preferences.	BeefPlan where the group has complete sovereignty over its learning agenda. It might exist for years and generate multiple outputs for members.

The comparative advantage of the 'complex' or higher order products lies in their ability to derive benefits from direct and indirect sources. BeefPlan, for example, might exhibit a capacity to both motivate members and increase their utilisation of lower order products such as EDGEnetwork (with allocation of the credit between the two products). Figure 5.1 has been developed to assist our understanding of the complementary relationship between higher and lower order extension products.

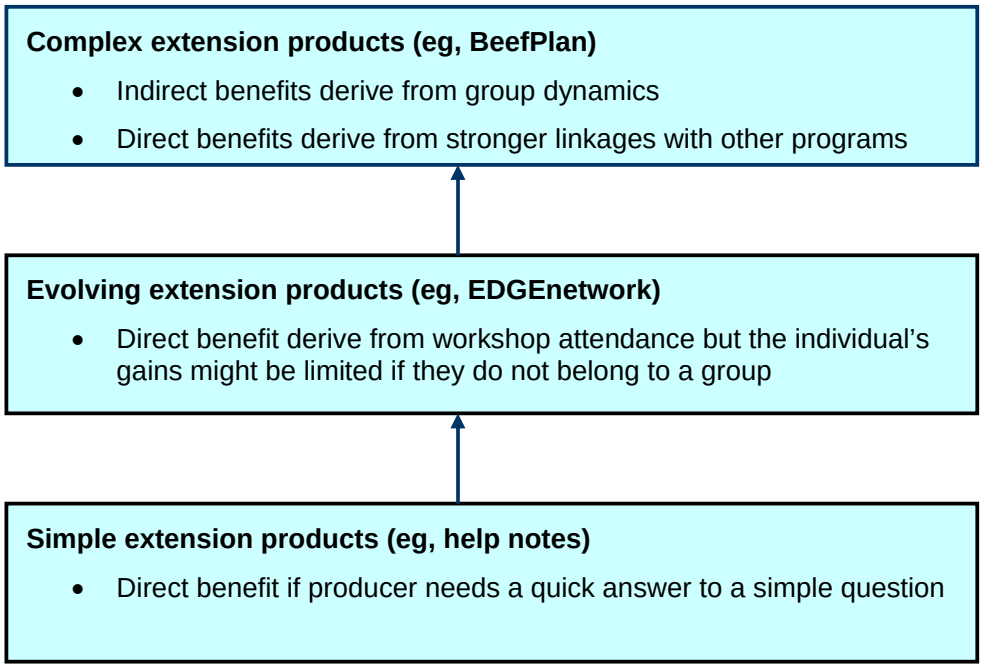


Figure 5.2: Complex extension products can make superior use of simpler products

Highly evolved extension products, such as BeefPlan, are not automatically competitive for MLA funds. Indeed it is possible to identify inherent weaknesses with such products that might threaten their viability from a funding perspective. Several potential weaknesses are identified below.

- *High variability between groups*: Because each group is empowered to decide why and how it will function, performance in terms of bringing about beneficial change is likely to vary. Providing the group directs its learning activities to bring about 'ongoing practice change', it can be judged to be effective and worthy of MLA support. But if a particular group cannot point to a link between its activities and beneficial change (sooner or later) then a case for MLA support becomes harder to make. The evaluation attempted to identify the critical differences between groups that induce 'practice change' among its members and those that failed to bring about useful change.

- *Characteristics of successful groups*: In the context of this study, successful groups are those that diffuse innovations among members and beyond. Clearly, MLA will be better placed to strengthen BeefPlan if it possesses prior knowledge of the human, biographical and psychological characteristics that differentiate innovative groups from non-innovative groups. As it turns out, the literature provides some useful guidelines regarding the defining characteristics of successful groups. Thus Plowman, Ashkanasy, Gardner and Letts, (2004), indicated that a willingness to share leadership among members differentiates more innovative industry groups from less innovative industry groups.

- *Establishment and continuity barriers*: BeefPlan groups are meant to emerge and operate through the efforts of group members. Accordingly, there is high reliance on members stepping forward to take on their 'turn' at the leadership and administrative roles that might

otherwise have been filled by an extension officer or a consultant. To the extent this situation leads to group disintegration, or limits the number and size of groups that form in the first place, BeefPlan will under-perform and be interpreted as having limited appeal. As noted above, learning how to 'pass the baton' is important to successful operation of as group.

- *Measurement difficulties*: BeefPlan performance is dependent on MLA inputs to become established but once this is achieved the group's performance is dependent on its own functionality. Since BeefPlan's initially function as a social system, with mixed outputs, they may not lend themselves to quantification and could be at a disadvantage when evaluated against different programs. But if particular BeefPlan groups have a low reliance on MLA funds or have no effective access to other programs, they will tend to exhibit a competitive advantage.

- *Competition among local groups for patronage*: There is a limit to the time that cattle producers can allocate to off-farm activities designed to enhance their capacity and knowledge. This means that creation of BeefPlan groups has to be especially attractive in regions where community based groups compete for the time of a relatively small pool of people. The corollary is that producers must identify and actively support those community-based activities that they perceive to be most valuable to their livelihoods and general wellbeing.

The discussion above leads us to hypothesise that BeefPlan is appealing on account of its ability to keep groups of producers engaged in continuous improvement according to their express needs and preferences.

6.2 Effectiveness of similar producer programs

6.2.1 Measuring Management and Profit Changes

MLA has invested in various programs to change behaviour of producers so that their business operations can be made more profitable and sustainable. These initiatives include strongly targeted initiatives such as Prime Time through to loosely structured initiatives such as BeefPlan where producers decide on the issues and actions required without approval from MLA. Lying between these two extremes are initiatives such as Producer Initiated Research and Development (PIRD). The latter are producer driven but have a relatively narrow focus (e.g. a specified R&D project) and MLA approves topics and plans and monitors outcomes.

Capacity building is likely to be promoted by the whole spectrum of initiatives. It could be argued that the prospects for capacity building are strongest for the more loosely structured approaches such as BeefPlan where producers are responsible for defining problems and identifying opportunities and for developing the approach to be used.

It is also apparent that all such initiatives that MLA undertakes are not mutually exclusive. Indeed some can be complementary to one another depending on the circumstances.

While participation is an important step in the change cycle and may lead to improved confidence and well-being it does not, by itself, necessarily lead to changed management practices, enhanced productivity or increased profitability. It is likely that a proportion of participants involved in any initiative will proceed further within the change cycle and this may lead to one or more management practice changes. Such changes may, in turn, lead to enhanced productivity and increased profitability.

However, the translation of one or more changes in management practices into productivity or profitability improvements is difficult to validate and the information that would be needed to prove a link in the case of specific programs is usually patchy and sparse. Table 5.2 provides some information about changed practices and reported benefits derived from change. This is then contrasted with the findings from the BeefPlan evaluation.

Table 5.2: Information Regarding Management Practice Changes and Benefits

Project or initiative	Number of participants	Number of participants reported as making change or intending to make changes as a result of participation	Estimate of value of changes made per producer ($ per annum)
PIRDs	7,458 between 1998 and 2005 (a)	67% = 4,997 (a)	0.5% of $45,266 = $226 (b)
BeefCheque (via EDGE)	1,292 (c)	55% indicated that BeefCheque had contributed to a positive business output or had a management or technical impact on their farm business (d)	$4,650 (e)
BeefNet	2,000 (f)	58% = 1,160 (g)	33% of 2,000 (660) reported profit increases (g)
EDGEnetwork	9,500 (h)	78% changed at least one practice = 7,410 (h)	Short term productivity increases 4.5%; long term productivity increases 12%(h)
Prime Time	18,000 (i)	Exit surveys from Forums showed that a high proportion (e.g. 80%) of attendees would change management practices as a result of attendance (j)	
BestPrac	287 (k)	34% had changed management practices as a result of BestPrac (k)	Strong evidence to suggest 5% profit increase has been met by 36% of participants (approximately $1,697 pa) (k,l)
BeefPlan	127	73% reported they had changed management practices, at least partly as a result of their involvement in BeefPlan (m)	Additional net farm income of $2,535 per annum (4%) from direct question in BeefPlan evaluation survey) (m)

Sources:

(a) MLA Outcomes Report, 2005
(b) Assumption by Hassall and Associates, Triple Bottom Line Report, 2004
(c) Estimate based on BeefCheque as contributing 21% of participants in the Feedbase and Pastures area of EDGE. In turn the Feedbase and Pastures area contributed 65% of all EDGE participants (MLA, EDGE and MBfP Survey, 2005). Hence 13.6% of 9,500 producers undertaking EDGE courses (Outcomes Report, 2005) were involved in BeefCheque.
(d) Howard et al (2004)
(e) MLA Outcomes Report, 2005, p 46, based on McCausland and Associates Evaluation Report (2002)
(f) MLA Outcomes Report, 2005, p 26
(g) MLA Outcomes Report, 2005, p 27

(h) MLA Outcomes Report, 2005, p 45
(i) MLA Outcomes Report, 2005, p 44
(j) Currie Prime Time Evaluation reports 2004, 2005
(k) BestPrac Impact Evaluation Report 2005 (Draft and confidential) and AWI Insight on Bestprac
(l) Source: ABARE Pastoral Zone average farm business profit is $33,932; 5% is $1,697
(m) BeefPlan Survey 2006

In attempting to synthesise this table, a lack of consistency in the methods of obtaining the data was evident. Hence the figures in Table 5.2 should be treated with some caution and comparisons may not be entirely realistic. MLA is currently aware of the difficulty in assembling data for evaluation.

Participation is obviously a key feature of any program. While it may be expected that the smaller the number of participants, the greater the proportion that will make management changes, this relationship was not supported by the data in columns 2 and 3 of Table 5.2.

The information contained in Table 5.2 suggests, in general terms, that changed management practices lead to increases in profits, but only for a proportion of those changing management practices. Excluding BeefPlan, the estimates of the magnitude of the net profit increase are at best approximate and range between an average of $266 and $4,650 for each producer who reported an increase. It should be noted that the profit estimate of $266 for PIRDs was an estimate by the analyst and not based on survey data. The other two estimates were for BeefCheque ($4,650) and BestPrac ($1,697). The BeefCheque estimate was derived from records kept by producers and the BestPrac estimate based on "strong evidence the 5% profit increase was achieved by 36% of participants". Flow-on of benefits to other producers (non-direct participants) has rarely been reported in the above sources.

Most of the information in Table 5.2 was gathered from surveys of participants without audit or independent inspection. The exception was for BeefCheque where data was collected from benchmarking and record keeping. Survey methods were undoubtedly different between larger participant groups and the smaller groups of participants. For example, the Prime Time data was based on Forum exit surveys and the changes reported were 'intentions' rather than actual.

The linkage between a program impact and its outcomes and benefits is initially likely to be assembled from some form of participant survey as has been achieved for BeefPlan. Methods for improving data on management practice changes and associated profit impacts could include:

(i) Standardising survey questions to elicit comparative data from different MLA investments
(ii) Requesting respondents to nominate the net gains due to innovations in actual dollar terms – rather than %ages. The current survey permitted respondents to nominate a %age impact (due to BeefPlan involvement) and we suspect that this might have contributed to crude approximations[10].
(iii) Insisting or encouraging participants to keep records or diaries that can be periodically checked – providing there is prior agreement from the producer. The results may or may not include benchmarking
(iv) Supplementing survey information (exit, written, telephone, email) with follow up on-farm visits to a sample of participants
(v) Developing and applying standardised values of the benefits from the more common management changes reported from each initiative

[10] The 'percentage approach' was adopted following discussions at the Pilot meetings where those present indicated it would be 'too hard' to come up with actual dollar figures.

(vi) Carrying out longitudinal studies of a stratified sample of participants from different programs say two and five years after their participation in the program.

The last method identified would be useful in terms of understanding the capacity building impacts of one or more MLA initiatives. For example, do some programs or program combinations and their sequences, lead to:

- Increasing interest in seeking out research results,
- Trying new approaches,
- Stimulating the undertaking of training courses,
- Identifying win-win profit and sustainability actions, or
- Thinking in terms of holistic farm management?

It is apparent that most project data do not yet adequately capture differences in any long-term impacts of a range of programs.

Some estimate of attribution to specific programs can be captured through surveys of program participants. This will be important as other ongoing surveys of management practices (e.g. ABARE) will mainly capture productivity gains and profit changes at an aggregate level and may not satisfactorily probe into the benefits from individual programs. In fact surveys at both program level and at industry level would be complementary and enhance explanations of both industry and program performance.

The specification of the management changes occurring, the number of participants who undertake the changes, and the level of profit increase attained are key features of the success of each investment. However, the relative costs to MLA of achieving such changes and profit increases are also important. This leads to the consideration of cost per participant.

6.2.2 Cost Per Participant

Table 5.3 has been constructed by way of example to allow cost comparisons between a range of MLA initiatives aimed at facilitating changed management practices and increased profit. The estimates do not include the costs of other funding partners or the time and resources contributed by participants.

Table 5.3: Estimated Total and Unit Cost of a Range of Initiatives Supported by MLA

Project or initiative	Total cost MLA ($)	Number of participants	Investment Cost		
			$/participant	Cents/beast	Cents/ha
PIRDs	$997,000 over five years (a)	7,458 from 1998 to 2005 (b) (assumed 5,327 over five years)	$187	35 (c)	2.1 (d)
BeefCheque (via EDGE)	$1,180,000 over five years (e)	1,292 over five years (f)	$913	171 (c)	10 (d)
BeefNet	$2,243,000 over five years (g)	2,000 over five years (h)	$1,121	210 (c)	13 (d)
EDGEnetwork	$8,410,000 over five years; may exclude development costs in first two years (i)	9,500 since 1998, say 9,500 in past five years (j)	$885	165 (c)	10 (d)
Grain and Graze	$6,300,000 over five years (k)	15,000 over five years (l)	$420	78 (c)	5 (d)
Prime Time	$2,000,000 over three years	18,000 over three years (m)	$111	n.a.	n.a.
BestPrac	$333,000 over three years (n)	287 members since 1998 (o)	$1,160	n.a.	n.a.
BeefPlan	*$992,341 (p)*	*127 (q)*	*$7,693*	*587 (r)*	*38 (s)*

(a) Total cost to MLA over five years to June 2003 was $997,000 (nominal dollar terms). (Hassall and Associates, 2004).
(b) Source: MLA Outcomes Report, 2005
(c) Assumes average herd size is 535 (average of beef and sheep-beef farms) (ABARE Farm Survey, 2002/03 and 2003/04)
(d) Assumes average farm per producer is 8,849 ha (average of beef and sheep–beef farms) (ABARE Farm Survey, 2002/03 and 2003/04)
(e) Estimate based on BeefCheque as contributing 14% to EDGE costs (MLA, EDGE and MBfP Survey, 2005).
(f) Estimate based on BeefCheque as contributing 21% of participants in the Feedbase and Pastures area of EDGE. In turn the Feedbase and Pastures area contributed 65% of all EDGE participants (MLA, EDGE and MBfP Survey, 2005). Hence 13.6% of 9,500 producers undertaking EDGE courses (Outcomes Report, 2005) were involved in BeefCheque.
(g) Total cost to MLA over five years to June 2003 was $2,243,000 (Source: Hassall and Associates, 2005)
(h) MLA Outcomes Report, 2005, p 26
(i) Total cost to MLA over five years to June 2003 was $8,410,000 (Hassall and Associates, 2005).
(j) MLA Outcomes Report, 2005, p 45
(k) Total cost to MLA over five years to 2006/07 will be approximately $6,300,000 (Agtrans, 2005)
(l) 15,000 producers expected to participate; actual participants are likely to be less over the five years making the per participant cost higher than estimated here.
(m) Based on estimate of 18,000 participants (Source: MLA Outcomes Report, 2005).
(n) Based on equivalent AWI contribution of $1,028,174 over three years (Source: Wythes, AWI, pers comm, 2006) (Assumes MLA same contribution as AWI).
(o) BestPrac Impact Evaluation Report 2005 (Draft and confidential) and AWI Insight on Bestprac
(p) Estimated from MLA budgets over eight years from 1998/99 to 2005/06

(q) Estimate of 127 businesses (excluding the 'dirty contacts') involved over the eight years (from MLA contact list).
(r) Based on average of 1,300 head per BeefPlan business (Source: MLA BeefPlan survey, 2003)
(s) Based on average of 20,000 ha per BeefPlan business (Source: MLA BeefPlan survey, 2003)
n.a. Not applicable as orientated to sheep industry

The conclusion from Table 5.3 is that BeefPlan is characterised by a high cost per participant relative to other programs. This is still the case on a per head or per hectare basis although the BeefPlan participants on average are more than double herd size and area used for the other programs. This difference is basically a function of the BeefPlan Program being located in the northern part of Australia.

This finding of high cost per participant is largely the result of both the small numbers of producers that have participated in BeefPlan compared to its total costs of support. One feature that should be noted is that the BeefPlan costs include all set up and establishment costs, forum facilitations etc. whereas this may not be the case for the MLA costs used for the other programs. Even so, if the MLA costs per participant in BeefPlan were halved, BeefPlan would still exhibit higher relative costs per participant.

It is stressed that the costs in Table 5.2 are only approximate estimates using a range of information sources and refer only to costs borne by MLA.

6.2.3 General

It could be argued that BeefPlan is about building the people-qualities that in turn bring about practice change while most of the other initiatives are more clearly associated with technology transfer and are not truly capacity building (except perhaps for PIRDs and Beefnet). If human and social capacity can be built generically via BeefPlan, then it is reasonable to imagine that adoption of other MLA extension products will be quicker than would be the case without BeefPlan. In this event, BeefPlan would be complementary to other initiatives by impacting on general awareness, knowledge appreciation and ability to seek out relevant information and acquire specific skills, motivation and commitment, and confidence in overall decision-making and ability. In order to be cost effective, however, BeefPlan still has to reach more people and generate more flow-on benefits from participant to non-participants/communities. Below we outline the 'chain of adoption' as set-out by Plowman *et al* (2004) but taken originally from Rogers (1995).

According to Rogers (1995) information about an innovation is often sought from peers, especially their subjective evaluation of the innovation. The information exchange about a new idea occurs through a convergence process involving interpersonal networks. There are four distinct groups in the interpersonal networks:

- *The Innovator*: These people comprise about 3% of the population and include those who are creative or import someone else's creativity into the social system. These people are described as venturesome, having a desire to take on the risky and uncertain challenge. Often they are cosmopolitan and gain their ideas by scanning the broader world.

- *The Early Adopter*: These comprise about 13% of the population and are often opinion leaders who are well respected in their industry. They tend to be mainstream, locally orientated and gain their ideas from the innovators.

- *The Early Majority*: These comprise 33% of the population and interact frequently with peers but seldom hold positions of high influence. They follow with deliberate willingness but seldom take the lead.

- *The Late Majority*: These comprise about one third of the population and they are typically sceptical and cautious. Adoption is often the result of peer pressure and they are only pursued when most the uncertainty has been removed.

- *The Laggard*: These comprise 16% of the population and are the last of the social system to adopt. People in this group are suspicious of innovation and change agents and have very limited social and economic resources, causing them to be extremely cautious.

The research indicates that the personalities within a stable group are likely to be relatively homogeneous. Therefore large numbers of successful and stable BeefPlan groups are not likely to emerge and the original goal for BeefPlan of 20 groups is likely to remain a somewhat optimistic, but not unachievable target.

7 Future options for BeefPlan

7.1 Ongoing monitoring

Based on the objective analysis of the proceeding sections, the study is required to assess methods for ongoing monitoring and evaluation of future BeefPlan groups for the purpose of induced better performance. To be acceptable, monitoring systems have to be simple but effective. Possible methods for improving data collection on management practice changes and associated profit impacts are discussed below.

Seeking answers to routine questions: MLA could put to members of all on-going programs a set of 2-3 routine questions aimed at eliciting critical performance data. Thus once a year, members would be asked to nominate the two main practice changes they had undertaken as a result of MLA program participation and indicate what proportion of the change they attributed to involvement in the program (in this case BeefPlan). MLA might also ask what impact the two changes had on the participant's average annual net income. The associate data would provide ongoing and standardised reference points for monitoring across different MLA investments.

Encouraging participants to keep records: Participants could be issued with purpose-built diaries that would be used to record program-specific inputs, outputs and outcomes. Given prior agreement, the diaries could be periodically checked to monitor activity and results. To make this system effective, MLA would have to invest more resources in performance monitoring generally, along the lines suggested in section 6.2.3.

Dedicated support staff: As MLA gets in place more dedicated extension resources it will become feasible to monitor the various ongoing programs through regular contact. This will allow a much more hands-on approach than is possible at this time and will generate performance information (via exit questionnaires and telephone and email contact) with follow up on-farm visits to a sample of participants.

Publication of benchmarks: A culture of monitoring and reporting will be assisted by publication of benchmark values for management changes associated with particular programs and practices. This is another role that could be filled by dedicated extension staff.

Periodic reviews: A role for reviews of the current type will continue for the purpose of making fundamental changes. Such studies will be assisted by periodic sampling of participants from different programs (eg, every two and five years after their involvement in the program).

7.2 Better performance

BeefPlan's relatively high cost per participant (compared to other MLA initiatives) but even higher benefits, suggests a clear course of action. The options considered below tend to support continuation of BeefPlan but attempt to control MLA outlays. Contrasting options that might be applied to BeefPlan in the future include the following:

- *Phase down*. Given the results above, this option is only explored for the sake of contingent and strategic planning.

- *Retain key features of BeefPlan but limit MLA's financial and administrative exposure*. The results indicate that producers get a positive dividend from BeefPlan membership and should

therefore meet most of the costs themselves. The critical issue concerns getting the groups established and then maintaining sufficient support to keep them functional.

The relative strengths and weaknesses of these options are discussed in section 6.2.1 and 6.2.2 respectively. The final objective of the study calls for incorporation of successful elements of BeefPlan into MLA's existing training, communication and adoption activities. This task is completed in section 6.2.3.

7.2.1 Phase down

Phasing out BeefPlan is not supported by the findings of this study. Indeed high participant costs to MLA but solid returns on the funds invested suggests a need for greater cost control and a more strategic approach to management by MLA. Moreover, BeefPlan is very popular with the individual producers still belonging to groups and it is not difficult to point to the benefits of group learning and support. However, it is possible to identify near substitutes for BeefPlan that could be used to avoid duplication and waste.

Over the past decade, the commonwealth and state governments have poured vast sums into natural resource management (NRM) projects such as the National Action Plan for Salinity and Water Quality and the Natural Heritage Trust (1, 2 and 3). A significant proportion of these funds are being directed into on-ground projects aimed at benefiting primary producers and other landholders[11]. It is apparent that overlap exists between superior management of natural resources and lifting cattle herd productivity. If MLA were to reduce its support for BeefPlan, northern beef producers might increase their direct involvement in complementary NRM projects provided the levels of management/intervention by state agencies was perceived to be small.

It is unlikely, however, that NRM groups, as currently structured, would offer producers the same scope to 'set the agenda' and choose among priorities according to perceived need, as is possible with BeefPlan. This might cause some producers to view NRM groups as too general and too process-driven to be useful. On the other hand, NRM groups should still generate benefits through group dynamics and over time they are certain to focus on many subjects of relevance to beef producers. Moreover, we suspect that regional NRM groups will be handed more autonomy as they mature and develop skills in self-governance and project identification and management.

We believe a good indicator of producer commitment to the concept of BeefPlan lies in whether groups continue to function despite losing MLA funding. Since group dynamics apparently act to improve profitability, members should be prepared to carry on without any outside assistance. But if this fails to happen, it becomes difficult to avoid the conclusion that membership of a group was actually presaged on receipt of outside funding rather than the flow-on benefits to the business of beef production. We know that two groups have in fact continued to function, albeit at lower intensity, without MLA funding.

In the meantime, strategies that might be adopted by MLA to make BeefPlan more acceptable from a corporate perspective are outlined in section 6.2.3.

[11] Implicit in the original design of NRM projects was re-investment in the social and intellectual infrastructure of rural areas following the withdrawal of DPI personnel by state governments throughout the 1980s and 90s. The success of current NRM projects will be heavily reliant on them attracting and holding a client base from among landholders. Thus a mutual dependency exists that could be 'acted upon' by cattle producers.

7.2.2 Retain but revamp

Options that should make BeefPlan lower cost to MLA include those outlined below.

- *Fund groups that tender according to pre-set performance standards*. MLA would call for expression of interest based on a prescribed terms of reference. Thus tenders would be awarded on the basis of merit linked to declaration of group aims, budget, milestone reporting, systems, etc. Rather than touting for more groups, the process might deliberately limit the number of groups that can be assisted by setting prescribed standards. This would allow groups that are demonstratively functional to continue but with strings attached[12]. As such, consideration has been given to the use of diaries and reporting against strategic plans or some other form of written plans that might have been declared when a particular funding agreement was established. The plan would need to specify the information the group intends to collect as well as the inputs and expected benefits, including productivity changes and income benefits.

- *Rationalise funding per group:* During NAP3 (the BeefPlan pilot project from 1998/99 to 2001/02), some of the groups received much larger grants than during the current program (NAP.418 since 2002/03). This situation allowed a comparison to be made of returns according to different levels of investments by MLA. While the number of cases that could be tested is small, the results suggest that groups granted $10,000 p.a. generated better investment returns than groups granted much larger sums. The implication is that large grants may not be able to be used effectively via BeefPlan activities and there is an optimal investment per group per annum that does not exceed $10,000 p.a.

- *Funding of professional assistance*: While implying a watering down of BeefPlan's original charter of autonomy and self-determination, there could be merit in linking groups to a rural consultant for the purpose of providing more direction and professionalism. Under this arrangement, new BeefPlan groups would meet free of charge with an approved consultant for 2 - 3 meetings within six months. This would allow individuals to join and assess the suitability of belonging to a BeefPlan group at a low cost to MLA. If members found the approach attractive they would enter into a commercial relationship with the consultant while retaining the original group membership. The critical feature of this option is the use of (MLA) funds to initiate a group that can graduate to a commercial footing (with a consultant) or revert to self-determinant arrangements that afford the group greater freedom to 'set its own agenda'.

- *BeefPlan for remote areas*: It is tempting to make a special case for assisting remote area producers given the fact that they are often substantial levy payers but miss out on many of the benefits enjoyed by producers in more populated areas. In addition, remote area producers are generally not confronted with a plethora of industry and community activities seeking clients and members. As such, remote area producers might be more receptive towards joining a group. However, we suspect that the solution does not lie with BeefPlan – at least in its current form. Past attempts to establish BeefPlan groups in the Pilbara and Kimberley regions were not successful and it remains a fact that group performance relies heavily on regular in-person meetings and access to the internet[13]. While internet access has

[12] We are strongly of the opinion that there will be a trade-off between the original charter for BeefPlan (of self determination) and the optimal level of MLA intervention. Beyond a critical level of intervention and compulsion, the BeefPlan concept is likely to lose its integrity and become unpopular with producers.
[13] Various working examples already exist. MLA has supported the development and adoption of the bovine syndromic surveillance system (BOSSS), which is a web-based system for monitoring whole of herd health in remote areas. The system could easily be expanded to include a raft of management tools.

become a common feature on corporate stations, it is not yet universal across the north. Accordingly we would recommend that MLA use traditional forms of communication for servicing the extension needs of remote areas until internet access does become commonplace.

7.2.3 Incorporate in other MLA activities

Previous studies[14] have identified the need for on-the-ground support services that would complement EDGE workshops and provide follow-up to those producers wanting to act on ideas and technical advice. BeefPlan has some capacity to meet this need by acting through its group dynamics. Thus inter-property benchmarking could be adopted as a follow-up activity and any progress made by individuals could be monitored as a group activity. However, a particular group might be short on technical knowledge relating to the subject itself and follow-up under such circumstances could be inefficient and ultimately ineffective. The ideal follow-up mechanism is likely to be some form of professional services as found in a regional consultant or government agency.

MLA does not currently have sufficient staff resources to mentor producer groups along the lines suggested in section 6.1. But with the appointment of a national coordinator to handle the administration of the EDGEnetwork program, it would seem logical to extend the coordinator's role to include assistance to some of MLA's other extension programs. The EDGE coordinator is likely to have strong credentials in extension methodology and will have a complete knowledge of the industry. We suspect that annual in-person visits to BeefPlan groups to assess progress and offer suggestions would be much appreciated by participants.

Despite the failure of BeefPlan to attract new groups, the study has demonstrated that self-directed groups are popular with those producers who have tried the concept. Moreover, there is evidence that BeefPlan is effective in increasing producer participation in other MLA programs such as EDGE courses. In view of this situation, MLA might look more broadly at the opportunities for creation of new beef producer groups. This would mean collaborating with several community groups with the aim of placing fewer demands on the producer's time while still achieving specific outcomes.

[14] See for example, EDGE.2.078 "Evaluation of the EDGEnetwork Business Model" Dec 2005.

8 Conclusions and Recommendations

8.1 Conclusions

This report has evaluated BeefPlan for the purpose of revealing its associated benefits and costs over its life. An evaluation of this nature is necessary to provide reassurance that the beef industry's levy funds are being invested efficiently relative to alternative uses of the funds. The current program was supported following a pilot program that ran from March 1998 to June 2001 (NAP3.309-311).

The evaluation has been based on data gathered from MLA and directly from cattle producers who have participated in BeefPlan groups since 1998 and more recently. MLA has funded the major activities associated with BeefPlan and assisted with administration of the groups. Participation in BeefPlan activities has caused group members to incur a smaller but still significant proportion of the total costs. Regardless of whether members have made co-payments to assist with the operation of their BeefPlan group, they have all outlaid 'participation fees' in the form of travel expenses and time away from their properties to attend meetings.

While BeefPlan's costs are easy enough to quantify, the same could not be said of benefits. In the first instance 'experimental conditions' have not applied and the manner in which BeefPlan was set-up and operated has meant there were many uncontrolled influences that make it difficult to measure the net differences that could be attributed to the program. Retrospective evaluation of a program, where no measurement systems have been embedded from the outset, must rely on participant cooperation to assess historical events and goodwill to reveal financially sensitive information. Under these circumstances, the response of BeefPlan members to our survey was judged to be exceptionally good.

Measurement problems notwithstanding, the benefits and costs attributable to BeefPlan have been quantified to the greatest extent possible. Participating businesses were surveyed to generate representative and statistically valid data for determining:

- The number of businesses that participated in BeefPlan, their characteristics and methods of operation
- The proportion of members who changed their management practices due to BeefPlan participation
- In the case of those producers who did make changes on account of BeefPlan membership, the proportion of the change that could be attributed to BeefPlan
- The additional average annual net income due to BeefPlan participation
- The lag between BeefPlan participation and maximisation of additional profits
- The durability of the benefits initiated by BeefPlan participation. The benefit cost analysis assumed that benefits would continue to flow for several years into the future.

These data were used to construct aggregate cost and benefit streams applicable to the full life of BeefPlan – including benefits that will continue to flow into the future. Thus an objective basis for quantifying the economic performance of the program was established.

Apart from determining whether the benefits generated by BeefPlan have exceeded the costs the evaluation also assessed whether the activities of the groups created a ripple effect whereby other producers, not belonging to a BeefPlan group, and community at large, also reap a benefit. Survey respondents reported that they considered their fellow members as 'innovators', 'thought leaders' and 'respected members of the grazing community'. On balance, such strong commendations would suggest some flow-on of benefits to the broader community but we are not able to offer direct proof. Indeed such proof would have to come from producers who are not members of a BeefPlan group. As it turns out, several BeefPlan groups held field days and training courses that other producers could attend. In addition, the Western Downs group has produced a booklet titled "Managing for a future in Beef" that has been published and distributed by QDPI&F. Given that primary producers have always been strongly influenced by the actions of their peers and neighbours, it is reasonable to presume that BeefPlan members do exert a beneficial influence on their communities.

Based on the survey data and subsequent analysis, BeefPlan appears to be a high return investment. Against MLA costs of about $1m over 8 years and total (present day discounted at 5%) costs of about $2m, BeefPlan is expected to generate benefits for its members of over $3m in space of 15 years. In terms of critical performance criteria this meant a Net Present Value (NPV) of over $1m, a benefit cost ratio of 1.6 to one and an Internal Rate of Return of 15%.

The potency of BeefPlan relative to other MLA capacity building programs was also considered since funds are scarce and programs have to be viable in a relative sense as well as in an absolute sense. The evaluation found that the cost per participant of BeefPlan was high relative to other MLA extension programs. The cost to MLA per participant was estimated at $7,693, compared to a range for other programs of $111 to $1,160 per participant. The cost per beast and per ha was also at least 2 to 3 times that for other programs. This situation suggests that BeefPlan is not equitable in terms of the distribution of MLA assistance among producers.

However, the results of the survey regarding income increases due to BeefPlan means the program can be considered cost effective from a producer perspective. The estimated average income increments due to BeefPlan were over $2,500 per annum for the majority of participants[15]. The findings of the cost analysis suggest that steps should be taken to limit MLA's investment in individual groups whilst maintaining a policy of supporting the creation and operation of groups. Measures that should serve to limit MLA's investment in individual BeefPlan groups include the following:

- Re-development of the BeefPlan contract for the purpose of containing costs beyond some establishment phase. The consultants have not considered this issue in depth but feel that a term of two years should be sufficient for groups to establish management systems and then be in a position to decide whether they can continue on an unassisted basis.

- The contract should also provide firm guidelines on how groups might identify and pursue issues of common interest – that are likely to generate positive economic outcomes. Also, guidelines and systems should be installed that will assist with identification and measurement of BeefPlan impacts through time.

- The notion of cost sharing should be explicit in the contract without specifying the size or frequency of co-payments. The contract should stress that past analysis has shown that the benefits largely fall to members of the group and that once established they are on their own.

[15] $2,500 is the net increase in annual income due to BeefPlan participation reported by respondents and is not the same as the program's NPV spread across the total number of businesses and expected life of the BeefPlan investment.

The main conclusion stemming from this study is that creation of producer-directed groups should be retained as one of MLA's extension programs for fostering technology uptake and practice change. BeefPlan performs this efficiently because of its membership and methods of operation. The membership is characterised by innovators and early adopters while the self-empowerment method of operation means that the subject matter is always pertinent to the needs of the region. From within the constructs of BeefPlan, members become effective ambassadors for diffusion of R&D findings and the fundamentals of practice change.

The issue of high cost per participant is acknowledged as a 'problem' but it is not one that defies remedy, particularly given the magnitude of the apparent benefits. Scope exists to share group-creation costs with other regional initiatives and to limit cost per group by imposing various limits. The core issue for MLA is its need for a range of extension programs that can address the vast array of circumstances and challenges that confront beef producers. BeefPlan already gives MLA the flexibility to assist capacity building and practice change in particular rural communities where there are no other community based groups in existence.

8.2 Recommendations

Based on the foregoing analysis and conclusions, several recommendations are offered.

- That MLA continues to recognise the value of self-directed groups as an efficient means of capacity building and practice change among Australian beef producers. Such recognition is seen as necessary so that the economic gains possible through group dynamics are not lost and MLA producer support systems are subsequently developed with the special needs of group formation and operation used as guiding principles.

- In the process of supporting producer group activities, MLA recognise the scope for collaborating with new and existing regional groups that might have similar objectives and employ similar methods. Natural resource management groups, for example, are well funded at this time and in due course are expected to function more autonomously, along the lines already prescribed for BeefPlan. Multi-lateral collaboration will save both investment and participation costs and thereby allow regional projects to enjoy viable levels of patronage.

- That MLA monitors BeefPlan groups after MLA funding has ceased to determine whether or not they remain active as a group. If it appears groups generally fail to remain active after MLA support is withdrawn, it could be concluded that particular groups might not be as viable or sustainable as suggested by the survey results.

- Where MLA continues to support the functioning of BeefPlan groups, greater emphasis should be placed on the rationale for creating the group and the management systems that would be put in place to foster diffusion and record outcomes. Consistent with this approach, there should be relatively more assistance for establishing groups (that make a meritorious case) but less long-term support. MLA might consider funding professional assistance to create beef producer groups but set limits on the time a group can be funded. MLA's should leverage the expertise it is currently building in national coordination of extension to include assistance to several programs including BeefPlan. Intensive assistance during group establishment is certain to provide large dividends in terms of functionality and useful long-term outcomes.

- Better systems should be put in place for measuring the economic impacts of groups supported by MLA. Surveys such the one used by this study are prone to measurement errors linked to self-assessment bias. Acceptable and effective aids to objective evaluation

are likely to be restricted to benchmarking and on-going monitoring by participants using a field diary that records events and outcomes specifically linked to BeefPlan involvement. The benchmarking should be done professionally with the emphasis on measuring performance before and after involvement with BeefPlan. While future evaluations might give consideration to periodic independent audits that have the ability to link funding of groups with incremental gains in revenue, we would caution against adoption of any system with draconian overtones. In our opinion, auditing or anything similar, would only serve to alienate stakeholders.

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Appendices

Appendix 1: Participant survey

Appendix 2: Most significant practice changes due to BeefPlan

Nutrition	Financial	Genetics	Animal Mgt	Pasture	Operations	Planning	OTHER
Cattle nutrition	Economic Analysis	DNA selection of breeding	Animal handling	Rotational/cell grazing	Reshuffling of all operations	Time planning	Marketing
Drought feeding	Financial controlling	Selection of bulls	Stock handling	Rotational grazing	Changed from breeding to fattening	Look at the overall picture more	Application of NLIS devices
Nutrition	More economic analysis	Breeding programme	Stock handling	Fertilizer programs	Diversifying more	Succession	Fine tuning only
Nutrition	Financial management	Genetics	Herd management	Grazing management	Sold property.	Succession plain in place	Changed banks
Nutrition	Grow capital	Changed breed	Pregnancy testing	To Cell Grazing	Expanded	Clearer Direction	Non till farming
Nutrition	More willing to take on debt	Selection of females	Better stock handling	Water point location	Enterprise mix- more trading operations	Succession planning	Secure water
Production	Money being spent	Breeding management	Herd management	Grazing	Steers to bullocks		Staff management
Supplementary feeding	More aware of outgoings	Genetics	Vaccination	pasture management			Became more confident in decision making
Supplementary feeding	Off farm income	Genetic evaluation	Stock Handling	Pasture Rotation			Aiming to do trials backed up by credible data
Grain feeding	Lowering overheads	Cattle selection	Better yard handling	More regular soil tests	Property planning		Tractor
Nutrition	Understanding books	Genetics	Livestock management	Rotational grazing	Farm planning		Marketing
Nutrition	Bench marking		Semen testing	Better pasture improvement	Improved planning		More concerned about human resource aspect
Nutrition	Understanding financial position		Clean water	Rotational grazing	Breeding to backgrounding		Environment
Nutrition	financial management		Stock handling	Pasture management	Improvement in buying store cattle		No till farming
Nutrition	Business and financial management		Herd behaviour	reduced cattle numbers			Marketing

Nutrition	Financial	Genetics	Animal Mgt	Pasture	Operations	Planning	OTHER
Supplementary feeding	Aiming to be more cost effective		Animal health	Pasture management			Developing marketing
More understanding in terms of nutrition	Conscious of benchmarking		Breeder management	Pasture management			Sourcing markets
Reviewed supplementary feeding practices	Benchmarking		Tick vaccination	reduced stocking rate.			more aware of effects
Supplementing	Lowering cost of production		Stock handling	Land Management			Accelerated adoption of new ideas
	Production costs and returns		Temperament	More cattle			Yard Construction
	Much more profitable		Stock handling for quiet cattle	Pasture Management			Marketing research
	Record keeping		Fertility management	Grazing & NRM management			Social activity
	Better financial planning		Cattle Temperament	Sustainability			Crank up
	Off Farm investments		Herd management	Land management, vegetation, fencing, water			Marketing strategies
	More aware of outgoings			Land management			Broad education
				Pasture research			Accessed grants
				Rotational grazing			
				Pasture development			
				Pasture management			
				Rotational grazing			
				Improved pastures			
				Moisture retention			
				Rotational grazing system			
				More up to speed with grazing principles			

Nutrition	Financial	Genetics	Animal Mgt	Pasture	Operations	Planning	OTHER
				Pasture management			
				Fire & land management			
				Use more dams			
				Rotational grazing			
				Grazing management			
				Grazing Management			
				Paddock size			
				Grazing management			
				Pasture management			
				Woody/Weed Management			
				Fencing off specific areas			
				Dry weather strategies			
				Grazing management			
				Land management			
				Targeting fertilizer input			
				Improvement of pasture			
				Grazing land management			
				Pasture assessment			
				Water supply			
				General - water			
				Pasture budgeting			