MEAT & LIVESTOCK
AUSTRALIA

On farm

Financial, Environmental and Social Evaluation of Ten On-Farm Research Projects

Project number COMP.041
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1. SUMMARY

The purpose of this study was to assess the value of the investment by MLA in research by determining the overall benefit to producers of a selection of recently completed projects. The evaluation includes not only immediate financial benefit, but also environmental, social and long term gains for producers.

Projects selected for inclusion in this study had to have been completed within the past three years and have sufficient data available to allow quantitative analysis of the on-farm benefits. The ten projects for evaluation were selected by MLA staff from among the most successful in this group. Therefore, the results of this study cannot be extrapolated to the whole on-farm portfolio.

All ten projects evaluated had considerable merit and all fulfilled or surpassed the main objectives they had originally set out to achieve. Six of the ten projects were regarded by participating producers to be of high or very high value. The on-farm financial benefit, as determined using actual adoption rates in the MLA Average Farm Model, was positive in nine of the projects, with the remaining one being too difficult to quantify. Direct benefits to the environment were identified in six projects and there were social or community benefits derived from five projects. These results are summarised in Table 1.1.

More detailed financial results are provided in Table 1.2, using current adoption rates and 1.3 using projected maximum adoption rates.

Four projects which involved producer groups as an integral part of their implementation (SWAMP, Beefcheque, *Prograze*®, Q Lamb Alliance) delivered non quantified benefits greatly valued by producers, as well as financial benefits. These non quantified benefits included:

- A new confidence to make rational decisions, based on the principles learnt and applied to their own situation.
- A new network of trusted, experienced people facing similar situations and ready to share highly relevant information in confidence.
- The realisation of a new partnership with the 'experts' from the Department of Agriculture (or equivalent).

Projects which producers ranked as low or medium benefit were still valued by producers for their potential importance:

- In keeping the industry at the 'cutting edge' (eg, Net Feed Intake, Beef Marbling).
- In establishing facts to change industry attitudes and practice (eg, Maternal CPT).
- In providing well researched practical options in a constantly changing industry (eg, Molasses, Lamb Silage).

Two of the projects examined (Tagasaste and Molasses) show how skilled and experienced researchers who work closely with the local industry can provide uniquely Australian solutions to local problems. In both cases researchers used their

understanding of the nutritional requirements of beef cattle to employ locally available nutrients in new ways to overcome regular seasonal feed shortages

Finally, the study illustrated the need to consider a range of factors in assessing project value, rather than a benefit : cost ratio result alone. The 10 projects evaluated range in character from those involving 'cutting edge' research (eg, Beef Marbling, NFI) through to those applying existing knowledge in a new way (eg, Q Lamb, Prograze). Producers interviewed saw value in MLA supporting the Beef Marbling and NFI projects because of their enormous potential importance to the beef industry, even though neither project has delivered much tangible benefit to date. By contrast, both Q Lamb and Prograze are already delivering substantial benefits, but both are in an advanced stage of delivery and both rely on use of existing knowledge. Consideration of the benefit : cost ratio alone would give a misleading view of the comparative value of these four projects.

In conclusion, the study has shown that:

1. All 10 projects selected for evaluation have achieved their main objectives and are valued by producers.

2. Producers directly involved in projects see personal benefits from their participation.

3. Producers value projects which do not offer immediate financial gain, but promise future benefits to them and/or their industry.

4. Assessment of a project's value needs to be broader than consideration of a benefit : cost ratio alone.

Specific results are provided in the Conclusions at the end of each project evaluation.

TABLE 1.1 - SUMMARY OF PROJECT BENEFITS

Project Name	Producer Assessment of Value	Technical Objectives Achieved	On-Farm Financial Benefits	Environment Benefits	Social Benefits
SWAMP	√√	√√√	√√	√√	√
Q Lamb	√√	√√√	√√√	na	√
BeefCheque	√√√	√√√	√√	√√	√√
Lamb Silage	√	√√√	√	√	na
Molasses	√√	√√√	√	na	na
Beef Marbling	√	√√√	na	na	√
Tagasaste	√√√	√√√	√√	√	na
Maternal CPT	√√	√√	√	na	na
***Prograze*®**	√√√	√√√	√√√	√√	√
Net Feed Intake	√	√√√	na	√	na

Scale: √ = low, √√ = medium, √√√ = high, √√√√ = very high, na = not applicable.

TABLE 1.2 - SUMMARY OF FINANCIAL BENEFITS – CURRENT ADOPTION RATE

Project	*Increased annual farm cost per DSE or AE*	*Increased annual farm profit per DSE or AE*	*Net annual benefit per farm*	*No of farms that adopt*	*Total MLA cost ($m)*	*MLA cost per farm that adopts*	*Total R&D cost ($m)*	*NPV ($m)*	*B/C ratio*	*IRR (%)*
SWAMP	*$5.35/AE*	*$18.41/AE*	*$34,196*	*40*	*0.106*	*$2,646*	*0.746*	*3.8*	*5:1*	*64*
Q Lamb	*$0.21/dse*	*$1.87/dse*	*$6,300*	*151*	*0.075*	*$500*	*0.230*	*7.7*	*33:1*	*900*
BeefCheque	*$1.15*	*$1.36*	*$4,650*	*419*	*0.920*	*$2,198*	*1.32*	*11.0*	*8:1*	*46*
Lamb Silage	*$6.05/dse*	$2.13/dse	$9,787	*26*	*0.140*	*$5,400*	*0.440*	*0.2*	*0.5:1*	*9*
Molasses	*$25.08/AE*	*16.17/AE*	*$29,500*	*10*	*0.175*	*$18,159*	*0.494*	*0.9*	*2:1*	*13*
Beef Marbling	*na*									
Tagasaste	*$3.33/dse*	*$1.60/dse*	*$7,000*	*101*	*0.400*	*$4,000*	*1.8*	*2.8*	*2:1*	*18*
Maternal CPT	*$1.00/dse*	*$4.64/dse*	*$27,000*	*100*	*0.500*	*$5,000*	*1.98*	*8.8*	*4:1*	*27*
Prograze®	*$0*	*$1.40/dse*	*$3,000*	*6,432*	*1.800*	*$580*	*9.8*	*147*	*15:1*	*200*
Net Feed Intake	*-$0.29/dse*	*$0.29/dse*	*$630*	*200*	*1.65*	*$8,039*	*3.32*	*-1.3*	*-*	*2*

na= Data not available because the technology has not yet been transferred from studs to commercial properties.

TABLE 1.3 - SUMMARY OF FINANCIAL BENEFITS – PROJECTED ADOPTION RATE

Project	*Increased annual farm cost per DSE or AE*	*Increased annual farm profit per DSE or AE*	*Net annual benefit per farm*	*No of farms that adopt*	*Total MLA cost ($m)*	*MLA cost per farm that adopts*	*Total R&D cost ($m)*	*NPV ($m)*	*B/C ratio*	*IRR (%)*
SWAMP	*$5.35/AE*	*$18.41/AE*	*$34,196*	*275*	*0.106*	*$408*	*0.746*	*30*	*40:1*	*189*
Q Lamb	*$0.21/dse*	*$1.8/dse7*	*$6,300*	*1,700*	*0.075*	*$45*	*0.230*	*88*	*382:1*	*3,000*
BeefCheque	*$1.15dse*	*$1.36/dse*	*$4,650*	*1,000*	*0.920*	*$920*	*1.32*	*27*	*20:1*	*60*
Lamb Silage	*na*									
Molasses	*$25.08/AE*	*16.17/AE*	*$29,500*	*50*	*0.175*	*$3,507*	*0.494*	*4.5*	*9:1*	*24*
Beef Marbling	*na*									
Tagasaste	*$3.33/dse*	*$1.60/dse*	*$7,000*	*260*	*0.400*	*$1,600*	*1.80*	*9.7*	*5:1*	*27*
Maternal CPT	*$1.00/dse*	*$4.64/dse*	*$27,000*	*2,600*	*0.500*	*$207*	*1.98*	*147*	*74:1*	*74*
Prograze®	*$0*	*$1.40/dse*	*$3,000*	*18,000*	*1.800*	*$200*	*9.8*	*580*	*59:1*	*500*
Net Feed Intake	*-$0.29/dse*	*$0.29/dse*	*$630*	*12,660*	*1.65*	*$130*	*3.32*	*12.2*	*4:1*	*20*

na = data not available

2. INTRODUCTION

Dr Len Stephens
General Manager, Livestock Production Innovation

Each year MLA invests approximately $20 million in research projects that benefit the on-farm sector of the beef and sheepmeat industry. The aim of this research is to create opportunities for producers to improve their businesses. Specifically any research project must aim to achieve one or more of the following outcomes for producers:

- Increased price per kg of meat produced
- Increased efficiency by reducing cost per kg of meat produced
- Maintenance of natural resources
- Social or community benefits
- Preservation of markets for Australian beef and sheepmeat

The purpose of this study was to evaluate the value of the investment by MLA in research by determining the overall benefit to producers of a selection of projects recently completed by MLA. The evaluation includes financial, environmental and social benefits. Lessons learned from the evaluation will be applied to management of future projects.

Project Selection

Projects were not selected randomly for this study. In order to be included, projects had to have been completed within the past three years and be likely to have sufficient data available to allow quantitative analysis of the on-farm benefit achieved by producers that had adopted the technology. From this group of projects, MLA staff selected ten which they considered to be successful. Therefore, the results of this study cannot be extrapolated to the whole on-farm portfolio.

Terms of Reference

The terms of reference were as follows:

To review ten on-farm R&D projects that have been completed within the past three years, to determine:

- Technical success
- Level of uptake of the technology
- Financial benefits to producers who use the technology
- Environmental and social benefits of the projects.

Reviewers

Dr Ian McCausland of McCausland Associates Pty Ltd was the principal reviewer and Mr Rob Rendell of Rendell McGuckian Agricultural Consultants conducted the analyses using the MLA Average Farm Model (AFM). Input data for the AFM was collected from interviewees by Dr McCausland using a standard set of questions. These data were discussed with Mr Rendell, who made additions and/or adjustments to fully reflect farm costs and practices, and who provided the final results of his analyses for inclusion in this document.

Notes on the MLA Average Farm Model (AFM)

The AFM was developed for MLA by Rendell McGuckian Agricultural Consultants. It is a spread-sheet that models the finances of three "virtual" farms. These are a cattle property in the tropical north, a cattle property in the temperate or subtropical zone and a prime lamb property in the temperate zone. All the financial measures of these farms are set in the spreadsheet as "average" for the sector. Figures from *Bizcheck* and other benchmarking systems were used to determine the averages.

The AFM calculates costs and prices per Adult Equivalent (AE) in the North, and Dry Sheep Equivalent (DSE) in the south. The average farm in the north is assumed to have a carrying capacity of 1,800 AE and the average southern farm is assumed to have a carrying capacity of 7,000 DSE. An owner/operator allowance of $36,000 per annum is included for each 1,800 AE or 7,000 DSE.

The affect of each research project is calculated by changing costs, prices, stocking rate, etc, according to results discovered in the project. . A new enterprise profit is then calculated. The default enterprise profits for each virtual farm are:

- Northern beef: $18.58 per AE,
- Southern beef: $0.79 per DSE,
- Prime Lamb: $1.85 per DSE.

The benefits from each project to producers are then presented as the net annual benefit to the average farm. The costs of implementing the research on farm, annualised over the period of introduction are also given.

It is important to note that costs or benefits per dse must be interpreted carefully and cannot be equated costs and benefits per hectare. For example, a technology that increases stocking rate will reduce all costs proportionately while the income per dse will remain the same.

The value of the investment by MLA in each project is measured by the total cost incurred by MLA per farm that has adopted the technology. This is a once only cost, as compared to the annual benefit achieved by the average farm.

The benefits of the project to the on-farm sector overall are shown as the Net Present Value and Internal Rate of Return. The discount rate used is 7% over a period of

twenty years. These values also include an estimate of the inputs to the project by other participating research agencies.

All estimates of the value of a project are significantly influenced by the level of adoption by producers of the project results. Therefore, the analysis uses two adoption rates. The first is the number of farm businesses that are known to have adopted the technology to date. In most cases, this is accurately known. The second is the estimated maximum adoption rate.

The AFM does not attempt to deal with elasticity of supply and demand occurring as a result of the project. Benefits in processing, wholesale and retail sectors are not calculated.

3. RESULTS

3.1 Speargrass, Wiregrass, Animal Management Project (SWAMP)

Project: NAP3.209

Introduction

The purpose of this study is to review the economic, environmental and social impacts of the Project NAP3.209 "Restoring the condition of degraded black speargrass pastures in the southern speargrass zone", also called the Speargrass, Wiregrass, Animal Management Project (SWAMP). The project was conducted by the Queensland Department of Primary Industries.

A 1996 Queensland Department of Primary Industry press release described the purpose of the project as 'to demonstrate how annual burning and light stocking could improve the condition of degraded black speargrass pastures dominated by wiregrass, an unproductive grass usually left ungrazed by cattle'……. 'It evolved from detailed experiments at Brian Pastures Research Station, Gayndah, that showed annual spring burning for 3 years, coupled with summer destocking for 4 to 6 months or reduced stocking rate by half, would restore pastures to a better composition of less wiregrass and more black speargrass'.

A feature of the project was the strong producer involvement, both through the location of the demonstrations on commercial properties, and through the producer group involved in each demonstration having control over the management of one of the three treatment regimes employed.

Project Objectives

Objectives for the project, as set in 1996, were:

1. By the year 2000, develop cost efficient whole property management principles that will enable individual landholders to transform wiregrass infested pastures into productive speargrass pastures.

2. To demonstrate those management principles and encourage their adoption through a planned communication strategy.

3. By the year 2000 have producers in the Burnett armed with the knowledge of these management principles and how to apply them as part of their whole property management.

Review Approach

The approach taken has been to:

- Read relevant literature on SWAMP, including the 1996 Interim Final Technical Report, the August 1997 Milestone Report, the 1998,1999 and 2000 Annual Reports, and an MRC Research Impact Assessment entitled Attachment A, Cost/Benefit Justification for Project.
- Discuss the project results by phone with the Project Leader, beef producers and others as required. A list of those interviewed is shown at the end.

- Conduct a financial analysis using the MLA Average Farm Model

Results

Technical Success

The project has been successful in achieving its objectives and in particular:

- Has enabled producers to make better decisions about their pasture and stock management through the knowledge they have acquired of the principles involved.

- Has shown that restoration of degraded speargrass pasture to a sustainable speargrass pasture is practically feasible on commercial properties, and quantified the cost and time to do so.

- Has demonstrated that producers and researchers/extension staff can form a dynamic partnership when each group has a key role in the conduct of the project at hand.

Level of Uptake of the Technology

Current
Uptake is very high among the 41 producers who participated in the project at the time of the survey. A QDPI survey of these producers, with 22 replies, showed that they had learnt about pasture management. Interviews with participating producers as part of this study indicated that they have learnt the principles involved in management of speargrass pastures, and used them to confidently make decisions which suit their particular circumstances.

There is little evidence that this excellent level of uptake has spread to producers outside the project, although some of those interviewed thought that more producers were burning than was the case before the project results were known.

Future
The model used, of producers involved in a commercial property demonstration trial on an equal footing with QDPI experts and with QDPI administrative support, has proven very effective in transferring knowledge about speargrass management. While it is unlikely that a high percentage of producers will want to be involved at this level of

intensity, the technology can certainly be spread further if funds are available for additional demonstration trials and producers are keen to participate in them.

The model has been so effective in forming a productive relationship between QDPI experts and the participating producers that it is worthy of consideration for wider use in dissemination of other technologies.

Financial Benefits

Benefit/Cost Analysis by Researchers
QDPI used the old MRC Research Impact Assessment (RIA) model to determine the Net Present Value (NPV) of the project, comparing a control property with increasing proportions of wiregrass infested pastures with a property where stocking rate was reduced and paddocks were burnt each spring to restore the pasture. Gross margins for both properties started at $10.32/hectare/year. After 25 years the gross margin for the control had reduced to $6.14 compared with $13.43 for the other property.

Based on these figures, which were derived from the results obtained in the SWAMP project and the original research on which it was based, the NPV was $80 million at a discount rate of 5% and $37 million at a 10% discount rate. However the estimated adoption rate among producers was not quoted.

Average Farm Model Results
The assumptions used in the model are:

- The “without project” stocking rate assumes a decline in stocking rate over twenty years of 12.5%.
- The “with project” assumes a 50% reduction in breeding stock combined with keeping stock longer (45% increase) and increasing the average selling weight of steers/heifers by 35%. Therefore the overall stocking rate is reduced by only 25%.
- Therefore, the net stocking rate change was assumed to be 17% decrease.
- Financial benefits, other than from sale of livestock, do not accumulate until the sixth year after adoption.

The specific projects costs and benefits are:

- 16% more sales per breeder
- 35% more kg per sale
- 14.6% increase in price received per kg
- 5% increase in costs
- 17% decrease in stocking rate

On-Farm Costs and Benefits

Increased annual cost per AE	*Net annual benefit per AE*	*Net annual benefit per farm*
$5.35	*$18.41*	*$34,196*

Comment: the benefits are substantially less if the stocking rate decline does not occur (almost break even).

Benefit/Cost Analysis

Adoption rate	*No of farms that adopt*	*Total MLA cost*	*MLA cost per farm that adopts*	*Total R&D cost*	*NPV*	*B/C ratio*	*IRR*
Current	*40*	*$106,000*	*$2,646*	*$746,000*	*$3.8m*	*5:1*	*64%*
Projected	*275*	*$106,000*	*$408*	*$746,000*	*$30m*	*40:1*	*189%*

Environmental Benefits

The environmental benefits are considerable and of great importance. The project has demonstrated, on commercial properties, how a degraded native speargrass pasture can be restored to a sustainable and much more productive state at a defined cost and a defined time period. It provides a practical solution for those producers caught in a downward spiral of overstocking and increasing pasture degradation.

Social Benefits

Producers spoke of the value of the group in learning how other producers manage in situations common to them.

Industry Comment on SWAMP

The Project Structure

Producers were very positive in their praise of the way the project was organised, particularly in relation to:

- producers having real influence,
- input from QDPI and other experts
- administrative support from QDPI.

Comments included:

It's a good way to do it and we needed DPI – they were always asking for our comments – we definitely need DPI involved. It's a good system where producers decide what they want to do.

It was a great aspect that the producer felt it wasn't something coming down from on high….we wouldn't have had the ownership if we hadn't been influential

We guided the department with some facts. It was a two way street in exchange of information.

Benefits
Producers commented on the their greatly increased knowledge of pasture related matters as a result of the project and the fact that they can now adapt this knowledge to their situation.

Comments included:

It vindicated what we were doing on some country and caused us to change our practices on other country. It has had quite a dramatic impact and has had an effect on dollars.

I am now more focussed on observing the state of pastures and grazing pressure…I used to not burn until October and now burn much earlier and have cooler fires.

I found that the country needs a spell after burning and the project helped producers make better decisions about the timing.

Sustainability
Producers gained confidence that they could manage speargrass pastures sustainably.

Comments included:

From a productivity and a sustainability point of view it has been good for my business….I found out how to maintain speargrass and get the best out of that species.

I can see long term benefits in sustainability and get better productivity too.

It is real that you can restore pasture on a heavily stocked property.

Duration of Producer Groups
Several producers commented that it should be recognised that producer groups have a limited life.

Comments included:

One negative is that commercial producers can't take the losses from the control for too long.

Six years is long enough to do the trial.

It has contributed to expanding the possibilities of management but it would be stale to keep on with the same team. But the benefit will continue by having done it.

Conclusions

Through this study it is concluded that:

The project has achieved its stated objectives and has been able to demonstrate practical ways for managers to restore degraded speargrass pastures.

The project has been effective in achieving real change among and benefit to the participating producers, but has not had much effect to date on other producers.

The model of producer participation with QDPI experts in a commercial property trial, where producers have a real influence on project decisions, resulted in a real partnership of value to both groups. It is a model worthy of consideration for transfer of other technology to producers.

From the perspective of a triple bottom line assessment, it is concluded that the SWAMP project has had:

- A definite and quantifiable economic benefit to industry individuals and the industry generally.

- A very important environmental benefit by showing how degraded speargrass pastures can be restored with an economic benefit to individual producers.

- A beneficial social effect, by providing a vehicle for farmers to gain support from other producers and the community of experts who are able to assist them.

People Interviewed

Shane Blakely,	MLA Northern Beef Coordinator, Toowoomba
Pat Connolly,	Beef Producer, Eidsvold
Richard Grimes,	Beef Producer, Proston
Col Paton,	QDPI, Brian Pastures
Rob Rendell,	Rendell McGuckian Agricultural Consultants
Col Seiler,	Beef Producer, West Boondooma
Shane Walsh,	Beef Producer, Toowoomba

3.2 The Q Lamb Alliance

Project No. M.784k

Introduction

The purpose of this study is to review the economic, environmental and social impacts of the Q Lamb Alliance Project, M.784k which ran from 1996 to 1998.

West Australian lamb producers and Hillside abattoirs in conjunction with Agriculture W A initiated the alliance. It has grown substantially such that it now markets around 140,000 lambs annually, and has approximately 140 producer members. The lambs are supplied to the Action supermarket chain in Western Australia and are exported to Queensland, South Australia and New South Wales.

Project Objectives

The objectives, which included measurable targets as the project progressed, were:

To establish a supply alliance which provides carcases to supermarkets to predetermined specifications.

To increase the numbers of lambs supplied and meeting specifications.

To increase sales of and consumer satisfaction with branded lamb products.

Review Approach

The approach taken has been to:

- Read the project's Final Report and subsequent progress reports relating to the Alliance.
- Discuss the project results by phone with the project manager, lamb producers, processor and others as required. All the producers interviewed were members of the Q Lamb Board.
- Conduct a financial analysis using the MLA Average Farm Model.

Results

Success in Meeting Objectives

The project, through the Alliance, has been highly successful in achieving and surpassing its overall objectives. The Alliance has:

- Produced a highly consistent lamb product all year round. A full 98% of Alliance lambs sent to the abattoir meet specifications on a year round basis.

- Supported members in developing from inconsistent suppliers of approximately 15 - 16 kg lamb carcases (pre Q Lamb), to highly consistent suppliers of 18 – 24 kg, fat score 2 –3 carcases.

- Increased lamb sales by the Alliance processor by 30% a year for the last 3 years, while providing an average premium to supplier members around 12%.

- Developed principles and practices for management of the Alliance, which recognise and respect the needs of producers, processor and retailer members and encourages a spirit of trust and understanding between them.

- Developed trace back systems which track lamb carcases back to the farm of origin.

Level of Adoption

Current
The number of producer members of Q Lamb has increased steadily to a present level of around 140. There is very little turnover of members. Each new member has to be approved by the Q Lamb Board, made up of producers only, which also decides on expulsion of members due to lack of performance.

Q Lamb has no present intention to increase its membership, except out of season, but may seek to increase lamb numbers among present members.

Future
The value of the project is that, through the Q Lamb Alliance, it has helped to provide a vertical alliance of excellence and professionalism which consistently produces lamb that consumers and the food service sector want to buy at premium prices.

Q Lamb Alliance is an example worthy of study to promote the benefits of vertical alliances to other prime lamb producers.

Financial Benefits

Premiums for Producers
All those interviewed were asked to estimate the average premium for Q Lambs versus similar lambs, taken over a one to two year period. Most replies varied between 8-15% and hence an average 12% premium has been determined for the purposes of this study.

Just as importantly, most of those interviewed believe that the presence of the Q Lamb Alliance has stabilised and underpinned lamb prices for all West Australian producers.

Average Farm Model Results
The assumptions used in the model are:

- The product is better (12% premium) for the same weight by better management and strategic feeding.
- The project is only applicable to large/medium producers where lamb is the dominant income.
- Only 50% of the product could be sold through the alliance.

The specific projects costs and benefits are:

- The overall net benefit $1.87 per dse
- The overall net cost $0.21¢ per dse
- 10% increase in fodder costs
- 2% more time for owner

On-Farm Costs and Benefits

Increased annual cost per dse	*Net annual benefit per dse*	*Net annual benefit per farm*
$0.21	*$1.87*	*$6,300*

Benefit/Cost Analysis

Adoption rate	*No of farms that adopt*	*Total MLA cost*	*MLA cost per farm that adopts*	*Total R&D cost*	*NPV*	*B/C ratio*	*IRR*
Current	*151*	*$75,000*	*$500*	*$230,000*	*$7.7m*	*33:1*	*900%*
Projected	*1,700*	*$75,000*	*$45*	*$230,000*	*$88m*	*382:1*	*3,000%*

Environmental Benefits

No environmental benefits are apparent from the project.

Social Benefits

Producer members of the Alliance frequently spoke of a new pride in their product, that they now feel they are an integral and important part of their industry, and that they have more knowledge and control of their business and of what happens to the lambs they produce.

Industry Comment

Benefits

Alliance members spoke most frequently of the benefits they receive in addition to the price premiums. Most felt the premiums are small, but will increase now that the Q Lamb product is established. Comments included:

We've been able to work with other bodies who are keen to improve and had pride in our product.

The most pleasing thing is that the product is well received. People are coming to us to get the product.

Pride in our product is very important. I walk into the Action stores and see our product in the supermarket.

Our presence is now felt because the processor keeps the price up and doesn't drop it at the drop of a hat to make a profit. Because Q Lamb product is good, others have to be good.

One of the real benefits is to be able to produce quality product consistently 365 days of the year.

Even when the price of Q Lamb is very high, people will still buy it over other lamb selling for much less.

We are working with a lot of food service people where we can guarantee that all the portions are the same because of consistency.

Key Elements

Those interviewed spoke repeatedly of trust and commitment from all sectors as the key elements of the success of Q Lamb. There was also repeated reference to the importance of having an abattoir owner who is committed to Q Lamb, of the feedback systems, and of the visits producers make to the supermarket and supermarket butchers make to member's farms. Comments included:

The crux of the matter is total trust between members.

The key factor is trust between all the players – that's always been a gap in the industry, that producers can't trust anyone further up the line.

The feedback is the key to success. The Field Development Officer is quick to give you the problem and the answer and the uniformity of quality and weight is important.

It is not a 'feel good' group, it is a business group. A lot of groups just have 'feel good' days – they get speakers but there are no dollars and cents in their pockets.

Conclusions

Through this study it is concluded that:

1. The project has surpassed its stated objectives.

2. Through good management practices and commitment of key people in the Alliance, a high level of trust has developed between producers, the processor and the retailer.

3. The Alliance delivers a high quality consistent lamb product throughout the year and achieves a premium retail price which benefits all three parties.

4. The Alliance is a model for other parts of the industry, both in the results it has achieved and in the way it operates.

From the perspective of a triple bottom line assessment, it is concluded that the project has had:

- A considerable economic benefit to the Alliance members and to the WA lamb industry generally. The Alliance claims success in raising WA lamb prices generally and in lessening their seasonal fluctuation.

- No apparent environmental benefit.

- A social benefit in giving Alliance members pride in what they do, and a feeling of being an integral part of a now successful industry.

People Interviewed

David Carter	Lamb Producer, Williams, WA
Reg Crabb	Q Lamb Field Development Officer, Perth
Allan Duff	Lamb Producer, Williams, WA
Deborah Pitter	Q Lamb Market Development Officer, Perth
Jeniffer Shearer	Lamb Producer, Albany, WA
Graham Sutherland	Lamb Producer, Badgingara; Chairman, Q Lamb Board
Peter Trefort	Managing Director, Hillside Meats, Narrogin, WA

3.3 BeefCheque

Project No M.728

Introduction

The purpose of this study is to review the economic, environmental and social impacts of the BeefCheque Project, M.728.

BeefCheque was initiated by a group of Gippsland beef producers who wanted a program which would 'provide information and develop their skills in grazing management practices'. They had observed the success of the Target 10 project for dairy farmers conducted by the Victorian Department of Natural Resources and Environment (DNRE). After discussions with the producer group, DNRE made a successful application to MLA for funding of BeefCheque. Part of the contractual arrangement was that the Beef Improvement Association (BIA) provided administrative services to the project.

BeefCheque was proposed as 15 groups of 15 producers. Each group centres around a 'focus farm' owned by one of the producers. Each meets once per month, usually at the focus farm and, led by an expert consultant and supported by DNRE, carries out a farm walk and discussion. The group decides what is to be done on the focus farm, as long as the owner consents, and results of their decision are examined at future meetings.

A key feature of BeefCheque is that producers retain control of the agenda. It is in keeping with this philosophy that BIA, a producer organisation, represented producers as a cosignatory of the contract with MLA, that a producer was employed as project manager, and that producers sit on the BeefCheque Board of Management.

Project Objectives

The project has a long list of stated objectives which include quantified targets. The list below is an abbreviated version which covers most of the objectives:

1. Develop and field trial an innovative cooperative extension program for beef producers.

2. Use and grow more pasture, produce more beef, and make more dollars.

3. Establish pasture growth parameters as a base for developing practical, integrated cattle and pasture management systems that implement the principles of optimum pasture utilisation and livestock productivity.

Review Approach

The approach taken has been to:

- Read the BeefCheque Final Report (1995-2000).

- Discuss the project results by phone with the project manager, beef producers and others as required. A list of those interviewed is shown at Attachment 1.

- Conduct a financial analysis using the MLA Average Farm Model.

Results

Technical Success

The project has been successful in achieving its objectives and in particular:

- Has involved the active participation of approximately 350 producers, representing 14% of Gippsland beef producers.
- Has resulted in the participating producers gaining an average of 18% in liveweight output per hectare.
- Has given the participating producers a set of principles to apply and the confidence to use them according to their particular circumstances.
- Has assisted producers to survive the hard drought years of 1997/98 through the support of others facing the same situation.
- Has taught the producers how to access and use expert advice.
- Has demonstrated a valuable model for technology transfer.

Level of Uptake of the Technology

Current
The uptake is very high among the 420 producers who participated in BeefCheque groups, and because the main benefits are associated with the learning process which takes place in the group discussions and experiences, it is not surprising that the main benefits are attained by these producers.

Some benefits are evident outside the group participants. The project manager believes a big increase in fencing sales and nitrogen fertiliser to Gippsland beef producers is because many producers are taking up the methods of employed by BeefCheque producers. And the farm walk system has extended to MLA's Sustainable Grazing Systems Program.

The project has spun off another 13 BeefCheque groups in the rest of Victoria, funded outside the MLA. This is a strong confirmation of the value placed on it by the producer community, who created the demand for these new groups.

Future
The success of BeefCheque has been widely publicised in Gippsland and producers interviewed in this study expressed the view that those who want to join groups have

had plenty of opportunity to do so. Hence the Gippsland participation rate of 14% of producers is probably close to a saturation level for this type of group based technology transfer.

The success of BeefCheque in Gippsland has provided a valuable model of participative technology transfer which really works. It is worthy of consideration for expansion into other parts of the red meat industry and for other technologies.

Financial Benefits

Analysis of BeefCheque Records

While there has not to date been a cost/benefit analysis, many of the participating producers kept records of production which were analysed by DNRE. This analysis showed an average 18% increase in farm operating surplus by participating producers, despite including three years of exceptionally dry conditions.

Average Farm Model Results

The assumptions used in the model are:

- Selling weight increases by 18% at the same age running the same number of stock.
- Overall net benefit $1.36/dse.
- The total extra costs are $1.15/dse comprising:
    - 25% fertiliser increase
    - 25% animal husbandry decrease
    - 10% repairs and maintenance increase
    - 5% other operating costs increase
    - 10% labour efficiency reduction (extra works)

On-Farm Costs and Benefits

Increased annual cost per dse	*Net annual benefit per dse*	*Net annual benefit per farm*
$1.15	*$1.36*	*$4,650*

Benefit/Cost Analysis

Adoption rate	*No of farms that adopt*	*Total MLA cost*	*MLA cost per farm that adopts*	*Total R&D cost*	*NPV*	*B/C ratio*	*IRR*
Current	*419*	*$920,000*	*$2,198*	*$1.32m*	*$11m*	*8:1*	*46%*
Projected	*1,000*	*$920,000*	*$920*	*$1.32m*	*$27m*	*20:1*	*60%*

Environmental Benefits

The rotational grazing system, which is a central part of the management system adopted by the producers involved, is effective in minimising the area of a property that is exposed to poor ground cover. Avoidance of poor ground cover is effective in reducing weed invasion and soil erosion and in making better use of water.

Other environmental benefits are probably not very significant, but do include the maintenance of healthy pastures, and knowledge of the effect of fertilisers and herbicides which ensures their appropriate use.

Social Benefits

Producers spoke of the value of the group in providing a network of people with whom they can be open about their problems and said that this was of particular value to them during the drought years soon after BeefCheque started. The project manager reported that some group members maintain this issue has been the most important to them.

Industry Comment on BeefCheque

The Benefits
Producers were quite certain that BeefCheque had delivered considerable benefits to them and agreed that the average of 18% increase in beef liveweight/hectare was correct.

Comments included:

> *BeefCheque is the best thing I have ever done. My wife and the bloke who works for me convinced me to be in it – my accountant told me he wouldn't do that…. A lot of producers, the farm runs them, but I run the farm here.*
>
> *The ability to adapt information to suit yourself, even if you get less than the full benefit. If I can get 70-80% of the benefit with 50% of the effort, that's good.*
>
> *Now I can expect how they will perform, for Jap ox or Woollies. I can be confident of reaching target specifications.*

The BeefCheque Group
Producers valued both the information they received about how other producers do things, and the support they received from group members when they were all having difficulties with drought.

Comments included:

> *In the drought all in the group were thinking of options on how to feed stock an work out the cost of each and you feel that you are not alone.*

Particularly in the difficult times in recent years it was a great help to talk to others, even someone to ring in the group, including the consultants.

The best thing about the way our group works is how open everyone is about how everyone runs their business and how they do it and why they do it. If they don't think you are doing it right they'll tell you. This makes you think about what you are doing.

Need for Expert Input

A frequently made comment was the critical need for input from outside experts, and the need for administrative support.

Comments included:

Departmental staff dispel the myths and we have consultants and a range of speakers, so there is lots of information on an invitation basis.

The biggest thing is the support from DNRE. They have the contacts, they reinforce what is being said, they give scientific feedback and they are there to facilitate….In the past producers couldn't see the relevance of departmental advice, but via the farm walks the department officer's advice suddenly becomes relevant and wanted.

I did find that when the consultant first started he motivated the group, and when he left the group faded away.

Conclusions

Through this study it is concluded that:

1. The project has achieved and surpassed its stated objectives, and, in particular been instrumental in assisting beef producers to become more competent and confident, and their businesses more profitable.

2. The project is a very fine example of effective technology transfer and the establishment of an effective partnership between producers and expert advisers.

3. The strong influence of producers in project management, focus farms and group decisions seems to be a critical factor in the project's success.

4. The first six years of BeefCheque in Gippsland, where it has now involved some 14% of beef producers, has provided a good model for extension to other parts of the red meat industry.

From the perspective of a triple bottom line assessment, it is concluded that the BeefCheque project has had:

- A definite and quantifiable economic benefit to industry individuals and the industry generally.

- A small environmental effect by improving pastures and the informed use of fertilisers and herbicides.

- A very positive social effect in providing much needed support for producers suffering difficult conditions.

People Interviewed

Kevin Bishop,	Beef Producer, Longford, Vic
Graeme Box,	Beef Producer, Tarwin Lower, Vic
Max Grenda,	Beef Producer, Westernport, Vic
Geoff Jennings,	Beef Producer, Bruthen, Vic
Ken Lamb,	Project Manager and Beef Producer, Heyfield, Vic
Col Stothers,	Beef Producer, Stratford, Vic

3.4 Silage Feeding Systems for Prime Lambs

Project No. LAMB.373

Introduction

The purpose of this study is to review the economic, environmental and social impacts of the project , "Increasing usage of silage by the development of efficient silage production and feeding systems for lambs" (LAMB.373). The project was conducted at the NSW Agriculture Research and Advisory Station, Cowra. Lambs were slaughtered at Cowra or Burrangong abattoirs and carcase data collected. The project was carried out during 1997-99.

Extension, which was funded only at the margins by MLA, included:

- a workshop with silage contractors at the beginning of the project and their involvement in the silage making process.
- Field days/seminars, attended by a total of 600 producers, at Cowra (2), Cootamundra, Wagga Wagga and Griffith in NSW, and Saddleworth and Willalooka in South Australia.

Project Objectives

Overall Objective:

To define the principles of feeding silage to lambs and develop extension programs which increase the profitable use of silage on sheep throughout Southern Australia.

Specific Objectives:

To develop silage based feeding systems which:

1. a) Result in lamb growth of 100g/day on pure silage diets during autumn and winter, and
   b) Result in lamb growth of over 180g/day in autumn and winter when fed in conjunction with grain.

2. a) Determine the best chop length for lambs.
   b) Determine the optimal system for feeding out silage under various conditions.

3. Calculate the costs of feeding silage per unit of liveweight gain under a range of production assumptions, and compare this to other supplements.

Review Approach

The approach taken has been to:

- Read the project's Final Report and the two publications, prepared by the project leaders, entitled *Silage for Finishing Lamb'* and *Economics of Feeding Silage to Lambs*.

- Discuss the project results by phone with the project manager, silage contractors, lamb producers and others as required. A list of those interviewed is shown in Attachment 1.

- Conduct a financial analysis using the MLA Average Farm Model.

Results

Technical Success

The project has been successful in achieving its overall objective and most of its specific objectives. In particular:

- The goals of achieving liveweight gains of 100g and 180g/day in lambs fed exclusively on silage and on silage/grain rations were surpassed

- The project found silage to be a palatable, safe, nutritious forage for lambs.

- Meat quality was found to be normal in lambs fed on lucerne or oaten silage with grain.

The one objective not achieved was that relating to chop length. Results were inconclusive on this subject.

Level of Uptake of the Technology

Current
Despite good attendance at field days/seminars and the provision of brief, well illustrated papers detailing the results in a practical and easily understood format, there has been little uptake of the technology to date. It is conservatively estimated that around 25 lamb producers have significantly changed their practices as a direct result of the project.

An example provided in the Final Report of the project suggests the reason for the lack of uptake by lamb finishers is insufficient profit margin to warrant silage use unless lamb prices stabilise at higher levels, or grain prices rise further.

The example shows that the cost of labour and feeding to add 10kg liveweight to a store lamb was as high as $12.24 for a high silage/low grain ration and $12.70 for low silage/high grain ration. This equates to $1.22 and $1.27/kg liveweight, leaving little or no profit margin on either ration.

The report states that, with this information, 'a producer knows that the cost of finishing a lamb is expensive and that profits are illusionary unless managed well'.

Future
The value of the project is that it has provided the information and know-how to give lamb producers confidence that they can make and use silage to finish lambs with varying amounts of grain supplementation.

In the paper *Economics of Feeding Silage to Lambs* producers are provided with a number of options for proportionate usage of grain and silage depending on:

- their relative costs.
- the number of days needed to increase liveweight by 10kg.

With the benefit of this and other information provided by this project, producers have the flexibility to use silage for finishing lambs if prices rise and stay high, or if they are unable to obtain appropriate grain at an economical price.

While communication of results has been well received at field days and seminars, these have apparently been confined to several areas of NSW and South Australia. If economic conditions develop which favours greater use of silage, it may be worth repeating these communications, and extending them to other lamb producing areas.

Financial Benefits

Analysis by the Researchers
The paper *Economics of Feeding Silage to Lambs* did not attempt a cost:benefit analysis based on a particular snapshot of the costs of silage vs alternative feeds at a particular time, but instead provided enough information for producers to calculate the economics of silage feeding for a range of different circumstances.

The authors concluded that production and use of silage:

- Offers practical usage for surplus forage that would otherwise have no direct use.
- Encourages the planting of specialist crops for livestock production and survival.
- Allows for forward planning and opportunistic finishing because of its ability to retain quality over long periods.
- Represents a stable cost in contrast to the unstable grain market.

Average Farm Model Results

This analysis is based on a comparison of silage feeding to extend the lamb growth period by 25% versus no supplementary feeding on the 26 properties that adopted the

technology. However this benefit could be achieved by using other supplementary feeding systems besides silage. . Silage may or may not be the best method, dependent on cost of grains or other supplements, price received for lambs and availability of silage contractors. Therefore, no attempt is made to analyse predicted adoption rates. The paper *Economics of Feeding Silage to Lambs* includes information which allows producers to select the most economical proportions of grain and silage, depending on the price of each.

The specific costs are:

- The net overall increased cost is $6.05/dse
- 50% increase in pasture fertiliser
- cost of silage is based on contract rates, equivalent to $12/lamb including feeding out.
- Additional cost of shearing lambs.

The benefits are:

- 5% increase in lamb sales per ewe.
- 27% increase in carcase weight.
- 5% increase in price/kg received for meat.
- Increased skin value of $7.00/lamb.
- The net benefit is $2.13/dse.

On-Farm Costs and Benefits

Increased annual cost per dse	***Net annual benefit per dse***	***Net annual benefit per farm***
$6.05	*$2.13*	*$9,787*

Benefit/Cost Analysis

Adoption rate	***No of farms that adopt***	***Total MLA cost***	***MLA cost per farm that adopts***	***Total R&D cost***	***NPV***	***B/C ratio***	***IRR***
Current	*26*	*$140,000*	*$5,400*	*$440,000*	*$0.2m*	*0.5:1*	*9%*
Projected	*na*						

na – see above

Environmental Benefits

Silage production has real benefits in maintenance of quality pasture by reducing weed infestation because:

- It can be cut before most weeds have seeded
- Weed seeds do not normally survive the fermentation process

Social Benefits

No social benefits are apparent.

Industry Comment on the Lamb Silage Project

Through phone interviews with lamb producers, silage contractors and research and extension officers in NSW and South Australia, it became evident that silage production and use for lamb finishing has increased very little, if at all, as a result of the project.

The following comments are from producers and silage contractors, most or all of whom were using silage before the time of the project. Some have clearly benefited from the project results; others have not changed their practices but may do so if use of silage becomes more economically attractive.

Benefits
Producers and contractors said that, as a result of the project, they know more about the optimal time for cutting silage, and its role in weed control.

Comments included:

I learnt that the quality must be good and I have changed my practices in this way.

I have more confidence in making silage from cereal and legume based crops. They gave me the timing of the cut…..and all seeds are killed and you can feed back into the paddock with the certainty that you will not be sending out weed seeds.

Communication of Results
Producers who had been to field days/seminars or had other contact with the research and extension officers felt the messages were delivered well in language they could understand.

Comments included:

The people at Cowra spoke well and in simple terms……the scientists were very helpful.

It was put over pretty simply and was pretty good.

There is exposure to it for producers but the benefit may be better if there were demonstrations on commercial properties.

Potential for Increased Use

Interviewees felt that there are barriers to increased usage of silage for lamb finishing and that they include:

- a perception that expensive machinery will be needed.
- insufficient profit margin.
- inability to get contractors when the time is right to cut silage.

Comments included:

I can see, as a hay contractor for some other farmers, that silage would be better than hay for some crops – but when I suggest it I am nearly run off the property.

If producers were sure of a sustainable rise in lamb prices they would do it.

The barrier is in machinery but big hay bales need front end loaders anyway.

You need good contractors and this is a constraint – you can't get them when you need them. Blokes aren't making silage just to feed out to lambs.

Conclusions

Through this study it is concluded that:

1. The project has achieved, and in some cases surpassed, its stated objectives.

2. The results have been well communicated but need wider exposure if the economics improve for the use of silage.

3. The uptake of the technology is small because of perceived difficulties associated with silage and the financial risks associated with finishing lambs.

4. The project's main value is that it delivers the facts for producers to consider silage as an option for finishing lambs under different economic and management conditions.

From the perspective of a triple bottom line assessment, it is concluded that the Lamb Silage project has had:

- A very small economic benefit to date, but the potential to have a much greater benefit if economic parameters favour its use.

- An environmental benefit, associated generally with silage making, of reducing the proliferation, seeding and reintroduction of weeds.

- No apparent social benefit.

People Interviewed

Jonathon Carroll,	Lamb Producer, Cargo, NSW
Janet Hall,	Lamb Producer, Manoora, SA
Bruce Hancock,	Product Development Officer, Lamb, PIRSA, SA
Peter Holst,	Project Leader, NSW Agriculture, Cowra, NSW
Steve Madge,	Silage Contractor, Eugowra, NSW
Malcolm Plum,	Lamb Producer, Tarcutta, NSW
Tim Prance,	Pasture Specialist, PIRSA Rural Solutions, SA
Elke Stephens,	Product Development Officer, PIRSA, SA
Ashley White,	Livestock Officer, NSW Agriculture, Cowra, NSW
Mick Wilson,	Lamb Producer, Morongla, NSW
Jason Wright,	Lamb Producer, Wallamandara, NSW

3.5 Expanded Use of Molasses for Feeder Cattle

Project No: NAP3.106

Introduction

The purpose of this study is to review the economic, environmental and social impacts of MLA project NAP3.106 “Expanded use of molasses for feeder cattle”.

The project was carried out at the CSIRO Tropical Beef Centre, Rockhampton, over the period 1998 to 2000. It was initiated because researchers and industry people in North Queensland recognised the opportunity presented by vast quantities of molasses produced as a by-product of the local sugar industry just as the local cattle are entering the dry period and need feed supplementation. The fibre component of such rations is made up of bagasse, the residue of sugar cane when the juice has been extracted.

CSIRO in Townsville and Rockhampton have long studied the workings of the cattle rumen and applied their knowledge to ensure a suitable ration, even when the diet for one of the trial groups included as much as 72.5% molasses on a dry matter basis.

Project Objectives

The objectives of project NAP3.106 were as follows:

1. To formulate cost-effective diets, based on molasses, and including other agricultural by-products and co-products that allow intensive finishing of beef cattle in northern Australia.

2. To achieve liveweight gains in excess of 1 kg/day at acceptable feed conversion efficiencies.

3. To add to existing knowledge on maximum inclusion rates of specific nutrients, notably combinations of soluble sugars, fats and oils, so that productive diets, based on molasses, can be formulated using different companion feedstuffs without the need for further research.

4. To determine the effect of high molasses diets on carcase composition and some objective measures of meat quality.

Review Approach

The approach taken has been to:

- Read relevant literature on the project, including the project proposal; a paper in preparation entitled 'High Molasses Diets for Intensive Feeding of Cattle' by R A Hunter and S K Blakely; and a paper entitled 'Economic Analysis of High Molasses Feeding Technology in Beef Cattle Production Systems' by G Bortolussi and R A Hunter, published in the Proceedings of the 2000 ASAP Conference.

- Discuss the project results by phone with the project leader, a feedlotter, a sugar miller, and others as required.

- Conduct a financial analysis using the MLA Average Farm Model.

Results

Technical Success

The project has been successful and exceeded its stated objectives. In particular:

- Liveweight gains of greater than 1.2 kg/day were achieved with diets containing up to 62% molasses. To date, rations fed to commercial feedlot cattle have included only 7-11% molasses.

- No molasses toxicity was observed.

- No dark cutting meat was found and meat pH levels were normal, even in cattle fed a diet of 72.5% molasses.

- Consumer taste panels verified normal eating quality.

Level of Uptake of the Technology

Current
The technology has been directly incorporated into a commercial high energy ration containing bagasse and 50% molasses. The ration, called Fibremax Plus, is currently being sold to opportunity feedlotters and finishers. To date approximately 500 tonnes has been sold without advertising, and demand is apparently increasing. It is estimated from the tonnage that approximately 10 producers have made significant use of Fibremax Plus.

The project leader is receiving a steady number of enquiries about the wider use of high levels of molasses, but is unwilling to encourage its use before trials are completed in a commercial feedlot. Such trials are to begin early next year.

Future
The combination of local availability of both molasses and bagasse, and the likelihood that a molasses/bagasse based ration will remain cheaper than alternative, grain based diets, suggests that high level molasses rations will become increasingly popular for opportunity feedlotting and supplementary feeding of cattle in the areas within 300 to 500kms of sugar mills.

High molasses rations are also likely to be used in some feedlots and the technology could stimulate a larger feedlot industry in northern Australia.

Growth in feedlot use may however be constrained by an inability of cattle fed high molasses diets to qualify for premiums accorded to grain fed cattle. At present the Ausmeat standard for grain fed beef requires that grain is the 'highest single component' of the diet.

Growth in use of molasses could also be limited by its availability. During the past two seasons supply has been less than normal because of drought and a fungal disease of the sugar cane. While new strains are being planted which are resistant to this disease, the recent problems indicate that supply may not always be assured.

Financial Benefits

Analysis by the Researchers:
The economic analysis published by G Bortolussi and R A Hunter at the Tropical Beef Centre assessed the benefit of moving a hypothetical 2,500 adult equivalents herd from a 3-4 year old grass finishing system to an intensive molasses feeding system producing 2 year old steers. Breeder numbers could be increased by 20% because of the shorter grow out time of the slaughter cattle.

Depending on liveweight performance, and with molasses prices up to $150/tonne landed on farm, herd gross margin was up to 11.9% higher than the 3-4 year old grass fed system.

MLA Average Farm Model
The model was used to assess the benefit of moving a herd from a 3-4 year old finishing system to intensive finishing at 2 years by feeding a 50% molasses ration.

The assumptions used were:

- The same number of cattle are turned off each year
- Numbers of breeders increase because of the younger turnoff
- Total liveweight of turned off cattle increases by 2.5%

- Liveweight price increases by 5%
- Paid labour increases by 15%
- The 50% molasses ration costs $180/tonne DM
- Owner labour input increases by 20%
- Equipment costs increase by 40%

On-Farm Costs and Benefits

Increased annual cost per dse	*Net annual benefit per dse*	*Net annual benefit per farm*
$25.08/AE	*$16.17*	*$29,500*

Benefit/Cost Analysis

Adoption rate	*No of farms that adopt*	*Total MLA cost*	*MLA cost per farm that adopts*	*Total R&D cost*	*NPV*	*B/C ratio*	*IRR*
Current	*10*	*$175,000*	$18,159	*$494,000*	$0.9m	1.8:1	13%
Projected	*50*	*$175,000*	$3,507	*$494,000*	$4.5m	9:1	24%

It should be noted that a similar benefit could be obtained using a conventional feedlot ration. The relative benefit for the 50% molasses ration would then depend on the relative prices of grain and molasses at the time.

Environmental Benefits

Environmental benefits will be achieved by much greater use of molasses as an energy source for cattle entering the dry period. Currently large quantities of molasses are exported overseas. Greater local use will both reduce the need for molasses to be transported out of the local area, and for grain to be brought into it.

Social Benefits

Increases use of molasses locally will help local communities to be more self sufficient. Molasses is generally exported because of lack of local demand, and communities which depend on the sugar industry are likely to benefit from higher prices for molasses to supply increased requirements for cattle feeding.

Industry Comment

Comments below were made by industry people and MLA Coordinators familiar with the Northern industry. Most were part of an industry reference group formed to advise on the project.

Application of the Technology
All those who knew of the project were in no doubt that the technology is of great potential benefit to that part of the northern cattle industry which is within around 400 kms from a sugar mill.

Comments included:

I was a sceptic but I'm not a sceptic now. A benefit will be reducing reliance on grain and this could also be true for southern feeders.

I don't think it is fair that Livecorp and MLA are not picking this and pushing it enough – it's so valuable.

Opportunity feedlots will be the main use, in troughs with full ration for 100 to 1000 head. It will be used to get cattle to specification for live export.

Possible Constraints to Adoption
Those interviewed suggested that some constraints will need to be overcome if there is to be substantially increased usage.

Comments included:

We don't have to worry about the price of molasses but the supply – not that there won't be enough, but not enough storage, and that's why the mills sell for export.

Putting in storage at mills is not likely – it's a fair way down the priority list. It will be better to encourage producers to put in storage.

To get a purple certification under Ausmeat grain has to be the highest composition of the ration. So if molasses is highest I won't get accreditation and I'll have to go into the grass fed market.

Conclusions

Through this study it is concluded that:

1. The objectives of the project have been well and truly achieved.

2. The project has already resulted in release of a high molasses content ration commercially.

3. Usage of high content molasses rations is probably going to increase dramatically as long as appropriate storage facilities are built by millers and/or producers.

From the perspective of a triple bottom line assessment, it is concluded that the project has:

- Delivered to date a small economic benefit which is likely to grow substantially in the next several years.

- The potential for an environmental benefit in reducing the outward transportation of molasses and the inward transportation of grain.

- The potential for a social benefit in making districts which share sugar cane farming and cattle production more self sufficient and prosperous.

People Interviewed

Shane Blakeley	MLA North Australia Program Coordinator, Toowoomba
Denis Brett	General Manager, Standards Group, Ausmeat, Brisbane
Bob Conaghan	Barmount Station Feedlot, Marlborough
Jim Duncan	Managing Director, Fibretech Development Ltd, Gold Coast
Bob Hunter	Project Leader, CSIRO, Rockhampton
John King	Manager, Factory Operations, Mackay Sugar
Des Rinehart	MLA Feedlot Program Coordinator, Brisbane

3.6 The Beef Marbling Gene Marker Projects CS.254 and SBEF.018

Introduction

The purpose of this study is to review the economic, environmental and social impacts of the Beef Marbling Gene Marker Projects, CS.254 and SBEF.018. CSIRO Livestock Industries Division conducted these projects over the period 1995 to 1999.

Australian scientists, in part through these projects, have become leaders in identifying DNA markers for marbling in beef cattle. The first DNA test for marbling has now been licensed to GeneSTAR Pty Ltd and marketed as GeneSTAR Marbling.

The gene identified by the GeneSTAR Marbling test accounts for only a small part (6.9% according to the project leader) of the phenotypic variance in marbling. Markers have been found for at least three more genomic regions known to control marbling and tests for them are currently being developed under a new MLA contract with CSIRO Livestock Industries.

Project Objectives

The objectives of SBEF.018, which was a follow on project to CS.254, are abbreviated to the following:

1. To use DNA markers to test 4 genomic regions associated with marbling to determine if there is a commercially useful level of population association between these DNA markers and marbling.

2. To derive new, more specific markers from candidate marbling genes.

3. To develop a commercialisation strategy for these markers.

Review Approach

The approach taken has been to:

- Read the ‘Final Scientific Report for Project SBEF.018’, 2 December 1999; the ‘Review of Beef CRC Molecular Genetics Projects’, 15 May 1998; ‘Assessment of the CSIRO/MLA DNA Markers for Marbling’, Genetics Solutions, November 1999; the GeneSTAR web site; and the paper ‘Industry Application of Marbling Genetics’ presented by Peter Parnell to the Beef CRC Marbling Symposium, 9-10 October, 2001.

- Discuss the project results by phone with the project leader, research personnel, seedstock producers and others as required.

- Examine the feasibility of conducting a financial analysis using the MLA Average Farm Model.

Results

Technical Success

The project has been successful in achieving its objectives and in particular has:

- Tested on average more than 3000 chromosomes per DNA marker, at the time making it the largest study of its kind in any livestock species.
- Confirmed four genetic factors or quantitative trait loci (QTL) for marbling.
- Identified DNA markers for each of these genetic factors or QTLs.
- Developed a test for one of these markers, which has since been licensed to GeneSTAR Pty Ltd. This is the first commercial gene marker test for a production trait in beef cattle.

Level of Uptake of the Technology

Current
The GeneSTAR test identifies the presence of one or two copies of one of the four or more genes which control marbling. It is necessary to have two copies of the gene to gain the full marbling benefit, but there is evidence to show some benefit in animals with one copy. Even in animals with two copies it accounts for only 18% of the genetic variance and less than 7% of the phenotypic variation in marbling. By comparison, Breedplan estimated breeding values (EBVs) can account for up to 100% of the genetic variation between animals.

Hence, used in isolation, the GeneSTAR test is not accurate in selecting individual animals which will have a high marbling score. In fact some of the Angus bulls with the highest marbling EBVs have tested negative in the GeneSTAR test, and some with low EBVs have tested positive. However presence of the gene will cause an approximately 11% shift in the average marbling score in a population of animals.

At least one seedstock producer is selecting for animals which have two copies of the marbling gene and high marbling EBVs. Others have used the test and now believe it to be misleading because of the lack of correlation they have observed between the presence of two copies of the gene and high marbling, as evidenced by EBVs, ultrasound and carcase results.

For the reasons given above, adoption of the technology is fairly low to date. GeneSTAR reports the following test statistics to date:

- Over 2,700 tests done on Australian cattle, representing over 130 beef cattle businesses.
- Most business tested 1-10 cattle; thirteen tested more than 50.

- The most frequently tested breed is Wagyu (1129 animals), followed by Angus (863 including Red Angus), Shorthorn (584) and Santa Cruz (305).
- The Genestar web site records 16 Angus, 15 Wagyu and 6 Shorthorn bulls with two copies of the marbling gene.

Generally, the seedstock producers see the possible benefit of using the currently available test for selecting cattle with a double copy of the single marbling gene so that they have this genetic base on which they can build when tests for the other marbling genes become available. They also see the marketing advantage of being recognised as one of the first to take up cutting edge technology.

Future
Seedstock producers and scientists spoken to recognise that the technology is a highly significant scientific development which can realise its full adoption potential when commercial tests are available for more of the marbling genes.

When this occurs testing will be useful as a selection tool in its own right in high marbling breeds such as Wagyu which do not have marbling EBVs or access to accurate ultrasound technology. It will also be valuable in even further increasing the accuracy of marbling EBVs in breeds such as Angus.

It may become commercially attractive to use gene testing to draft cattle going into feedlots to be long fed for the high marbling Japanese market. This is likely to happen only when a high proportion of the cattle which enter the feedlot have the marbling genes and the testing costs are reduced through economy of scale.

Initial test results suggest that there is a low percentage of Angus cattle with two copies of the gene identified in the GeneSTAR test but a higher proportion of Japanese Black Wagyus. It is likely to take some years to achieve a high frequency in feeder steers entering feedlots.

Financial Benefits

Until there are commercial tests available for more of the genes which control marbling, there is no measurable financial benefit attributable to this technology, apart from the possibility of higher prices for bulls tested positive for two copies of the gene identified by the GeneSTAR test. One seedstock producer whose EBV marbling positive bull tested positive for two copies of the marbling gene said he was offered about four times the price he would have expected if the bull did not have the test result.

MLA Average Farm Model
Since the GeneSTAR technology has not yet penetrated to a large number of commercial properties there is insufficient data to calculate benefits using the model.

While no financial analysis has been attempted in this case, there could be merit in a small, separate study to assess the dynamics and likely cost of achieving a considerable increase in the frequency of double copies of a the gene through the Australian beef industry.

Environmental Benefits

There are no apparent environmental benefits arising from this technology.

Social Benefits

The GeneSTAR marbling test is the first commercially available gene marker test for a production trait in beef cattle worldwide. It therefore places Australian industry as a market leader in this technology, which will assist in attracting further investment.

Industry Comment

Comments below were made by seedstock producers and scientists who are familiar with the industry and the technology.

The Significance of the Technology
Most of those interviewed were in no doubt about the importance of the technology to the future of the Australian beef industry.

Comments included:

> *It is significant because it teaches the industry to come to grips with this new technology. It should be one of MLA's top projects because of its vanguard nature.*
>
> *Gene technology is vital for us and we will find more marbling genes.*
>
> *Without technology of this kind, we will only ever be producing below the Japanese B3 market and this is the category where Australian producers can get a premium for their product.*

Application of the Technology
There were mixed feelings among both producers and scientists about how the technology can be applied. While all agreed that the real value would be realised when more genes could be identified by commercially available tests, some believed that use of the current test could be misleading in selecting for marbling. Others said that the owners of the test should insist that all results are made public, as is the case with EBV results.

Comments included:

> *We really need a second test which will, added to this one, give feedlotters and seedstock producers the information they need - then it will really take off.*
>
> *If you are going to try and characterise stock for marbling you can do it with ultrasound.*

There is little information on which bulls have been tested. Only 20% of results are in the public domain but if this is a technique that is developed through industry funding there needs to be care to maximise the benefits.

Because it sends out false signals it is dangerous in the market place. I have grave reservations about it being used as more than a very slight tool. It could even be detrimental because some high marbling cattle may not be used because of the test, and vica versa.

I select for double copy and high EBV so that I am using all the possible tools. When the new tests come I will be ready and they will be complementary to the double copy.

Conclusions

Through this study it is concluded that:

1. The objectives of the two projects have been achieved.
2. Australia is a world leader in the science of identifying genes for marbling and in commercialising tests to identify them.
3. The single gene test which is available is insufficient by itself to be of much value to the industry, and can be misleading if wrongly interpreted.
4. The real benefits of this technology can be realised when commercial tests are available for more of the genes which control marbling.

From the perspective of a triple bottom line assessment, it is concluded that the two projects have had:

- A small economic benefit to date. A very large economic benefit could result from this work when more of the genes responsible for marbling can be identified by commercial testing.
- No environmental effect.
- A community benefit by positioning Australia as a world leader in this field.

People Interviewed

Bill Barendse	Project Leader, CSIRO Livestock Industries, Brisbane
Bernie Bindon	CEO, CRC for Cattle and Beef Quality, Armidale
Ed Blackadder	Wallaroy Angus, Roslyn, NSW
David Blackmore	Wagyu Breeder, nr Melbourne, Victoria
Malcolm Foster	Rangers Valley Cattle Station, Glen Innes, NSW
Tom Gubbins	Te Mania Angus, Colac, NSW
Keith Hammond	Wagyu Seedstock Producer, Smithton, Tasmania
Don Nicol	Marketing Director, GeneSTAR Pty Ltd, Queensland
Peter Parnell	Director, Beef Centre, NSW Agriculture, Armidale, NSW
Sam White	Bald Blair Angus, Guyra, NSW

3.7 Intake Studies and Supplementary Feeding in Tagasaste Browsing Systems

Project No: SBEF.015

Introduction

The purpose of this study is to review the economic, environmental and social impacts of MLA project SBEF.015 entitled 'Intake Studies and Supplementary Feeding in Tagasaste Browsing Systems'.

Agriculture WA carried out the project between 1997 and 2000 with cooperation from scientists at Murdoch University and CSIRO. It originated because cattle feeding on tagasaste, a perennial shrub that had been planted on poor sandy country in the West Midland and Esperance areas of Western Australia, were failing to gain weight during late summer and autumn, even though the foliage was still green and leafy.

Planting of tagasaste had started in the mid 1980's and had been responsible a three to five fold increase in carrying capacity in the areas where it was planted, but producers were unable to finish cattle when livestock exporters required them in late summer and autumn.

Project Objectives

The overall objective of project SBEF.015 was as follows:

> By 31 December 2000, to develop grazing and supplementary feeding strategies which overcome the reduction in growth rate that occurs in cattle when grazing tagasaste in late summer and autumn.

Review Approach

The approach taken has been to:

- Read relevant literature on the project, including the project proposal; various milestone reports; an 'Ex Post Benefit Cost Analysis' by Jason Kelly and Geoff Tudor; and a paper being prepared for publication *Improving the Flexibility of Producing Beef in a Tagasaste Production System*.

- Discuss the project results by phone with the project leader, producers and others as required.

- Conduct a financial analysis using the MLA Average Farm Model.

Results

Technical Success

The project has been successful and fulfilled its overall objectives. In particular:

- The project has shown that cattle on tagasaste gain weight at over 1kg/head/day when supplemented with lupin grain during late summer and autumn.

- The researchers found good evidence that branch chain volatile fatty acids (VFAs) may be a limiting factor for microbial protein supply in cattle browsing tagasaste in late summer and autumn. Branch chain fatty acids arise from protein fermentation and lupins contain the correct amino acid profile such that supplementation with them overcomes this limiting factor.

- The results have been quickly adopted by industry because:
  - the results are easy to adopt and lupins are plentiful in WA.
  - the trials were done on commercial tagasaste properties, with strong producer involvement.
  - communication of the results has been excellent.

Level of Uptake of the Technology

Current
It is estimated by the project leader that up to 50% (est. 100) of the beef businesses using tagasaste have adopted the technology to the extent that they are now using lupins as supplements when they need to meet particular market weights and times.

Lupin supplementation is seen by producers as a proven tool to overcome the lack of weight gain in late summer and autumn. Those interviewed who have not used it indicated that they would adopt the technology when the need arose.

Future
Adoption by up to half the beef producers with tagasaste so soon after the project results were available indicates that the project provided a simple and economically viable solution to a real need. Hence it is likely that usage will increase to an even higher percentage.

In addition, the project may encourage more planting of tagasaste because it has successfully provided the solution to one of the main problems associated with the shrub's use as a cattle feed. At present only 100,000 hectares have been planted with tagasaste in WA, whereas an estimated 1.5 million hectares are considered suitable for the shrub.

Financial Benefits

Analysis by the Researchers

The researchers have done a benefit cost analysis on the project, assuming the opportunity cost of running an enterprise where beef were fed on tagasaste and supplemented with lupins was to be unable to run a sheep enterprise on the same land without tagasaste. The analysis included the total cost of the project at $1.35 million and found a moderate return to investment with a NPV of $1.6 million, a BCR of 2.8 and an IRR of 16%. The discount rate used was 7%.

MLA Average Farm Model

Assumptions used in the model:

As a result of this research steers reach sale weight at 17 months instead of 22 months, ie a feed efficiency gain. The benefit is that more breeders can be run and that steers are turned off quicker (same stocking rate but different mix of stock). The model looks at self-replacing system so it really is two businesses (producers of stores and finisher), however the benefits only apply to the 'finishing' component. Therefore the results are applicable to just a finishing business.

The specific projects costs and benefits are:

- The overall net benefit is $1.60/dse
- The increase cost is $3.33/dse
- 10% increase in animal husbandry
- $60/head of steers for lupins feed
- $2.40/head of steers for labour
- extra $6,000/business feeding equipment
- increased price of 14% due to different market.

On-Farm Costs and Benefits

Increased annual cost per dse	*Net annual benefit per dse*	*Net annual benefit per farm*
$3.33	*$1.60*	*$7,000*

Benefit/Cost Analysis

Adoption rate	*No of farms that adopt*	*Total MLA cost*	*MLA cost per farm that adopts*	*Total R&D cost*	*NPV*	*B/C ratio*	*IRR*
Current	*101*	*$400,000*	*$4,000*	*$1.80m*	*$2.8m*	*1.6:1*	*18%*
Projected	*260*	*$400,000*	*$1,600*	*$1.80m*	*$9.7m*	*5.4:1*	*27%*

Environmental Benefits

Tagasaste is considered to be beneficial environmentally in that it lowers the water table and provides erosion control. This project is likely to stimulate more tagasaste planting, but any environmental benefit would need to take into account the considerable increase in numbers of beef cattle associated with it.

Social Benefits

No social benefits are apparent.

Industry Comment

Benefits
Producers were clearly pleased to have this simple, practical and now proven way to overcome the lack of weight gain over the late summer and autumn period. Some gave clear examples of the financial gain they had already experienced, while others indicated they would be using lupin supplementation soon.

Comments included:

> *If I hadn't had the supplementary feeding I wouldn't have got any on the boat.*
>
> *When we found out we could overcome the problem by using lupins it was dramatic really. Such a simple solution – immediate, no questions.*
>
> *A boat was coming in February and some lighter steers weren't going to get there. I got them to 360 kgs by February and so got them off 9 months earlier.*
>
> *The project has given confidence to use lupins. Instead of having to theorise about it we can go straight in and use it.*

Producer Participation
Producers appreciated that the trials were done on commercial properties and that they were involved in the research, some as part of an MLA TTAG group overseeing the project with the researchers.

Comments included:

> *Researchers have been strong in getting producers to participate and the project was the one everyone wanted to see done.*
>
> *Being associated with the TTAG was very rewarding and there was good interaction with the researchers…..I'm a great fan of TTAGs for all research – it has to happen – it's a vital principle.*

Communication
Those interviewed spoke highly of the communication about this project to producers with tagasaste, through the Departmental publication Tag Talk and other means.

Comments included:

> *A lot of messages only get to the top 5% of operators. In this case it got to 75 to 80%.*
>
> *There's no arms length stuff and they did a pretty good job on this one. They had a lupin forum 12 – 24 months ago and I was impressed with the whole partnership thing.*

More to Learn about Tagasaste
Most made unsolicited comments about the continuing need to learn more about how to use tagasaste to maximum advantage.

Comments included:

> *Tagasaste is still developing in ways to use it.*
>
> *There is still a lot to learn about tagasaste.*
>
> *There is still a lot more R&D to be done on tagasaste.*

Conclusions

Through this study it is concluded that:

1. The project has fully met its overall objectives.

2. Producers with tagasaste consider the results to be of direct relevance to their operation and have quickly adopted lupin supplementation.

3. Lupin supplementation, fed at levels determined in the project, has resulted in producers meeting premium livestock export markets and turning cattle off 6-9 months earlier.

4. Researchers on the project were very well integrated with the producers who grow tagasaste, and communication of the results has been excellent.

From the perspective of a triple bottom line assessment, it is concluded that the project has had:

- A considerable economic benefit in that it has provided a highly cost effective and simple way to overcome the lack of growth in cattle browsing tagasaste in late summer and autumn.

- A minimal environmental effect date. In as much as it stimulates more tagasaste plantings in the future, it may have a beneficial effect by lowering the water table and reducing erosion. However the effect of greater cattle numbers would also need to be considered.

- No apparent social benefit, apart from strengthening the local economy.

People Interviewed

Dave Brindal	Beef Producer, Mingenew, WA
Nick Costa	Associate Professor, Murdoch University, WA
Emma Davey	Beef Development Officer, Gingin, Agriculture WA
Craig Forsyth	Beef Producer, Mingenew, WA
Jason Kelly	Agricultural Economist, Agriculture WA
Greg Kleinig	Beef Producer, Esperance, WA
Ivan Rogers	Beef Producer, Tammin, WA
Geoff Tudor	Project Leader, Agriculture WA
Bob Wilson	Beef Producer, Lancelin, WA

3.8 Maternal Sire Genotype Evaluation

Project No: Lamb.325

Introduction

The purpose of this study is to review the economic, environmental and social impacts of MLA project Lamb.325 entitled 'Maternal Sire Genotype Evaluation'.

The maternal sire referred to is the sire of first cross ewes which, when mated to terminal sires, produce prime lambs for meat production. While much attention has been given to the genetic make-up of terminal sires, relatively little attention has been given to the genetics of the maternal sire, even though the maternal sire leaves more progeny and so there is a greater multiplier effect of his genes compared to the terminal sire.

This project was designed to show the benefits of superior genetics in maternal sires for prime lamb production, and has compared the genetic merit of 91 maternal sires from all major sheepmeat breeds. All sires in the trial have Lambplan EBVs, and the trial has allowed the first comparisons of EBVs across breeds that are relevant to prime lamb production.

The project was conducted at State Department of Agriculture research stations at Cowra, NSW, Hamilton and Rutherglen, Vic, and Struan, SA over the period 1997 to 2001.

Project Objectives

The overall objective of project LAMB.325 was as follows:

To increase the average genetic merit in prime lamb maternal sires by at least 1% per annum through:

a) Increasing the number of maternal and dual purpose seedstock breeders using Lambplan by 100, and

b) Increasing the number of lambs tested in maternal and dual purpose breeds from 11,000 in 1997 to 30,000 by June 2001.

Review Approach

The approach taken has been to:

- Read relevant literature on the project, including the project contract; the Final Report of the project, dated September 2001; and a paper presented to the

November 2001 Sheep and Wool Conference entitled *Successful Meatsheep Enterprises in the 21st Century* by Neal Fogarty.

- Discuss the project results by phone with the project leader and producers associated with the prime lamb industry.

- Conduct a financial analysis using the MLA Average Farm Model.

Results

Technical Success

The project has been largely successful in achieving its overall objectives, although definitive figures are not yet available from Lambplan. In particular:

- The genetic trend for maternal tested flocks is apparently increasing at more than 1%/annum.

- The number of maternal and dual purpose seedstock breeders using Lambplan has increased by about 70. This is less than the 100 in the objectives, but there are now fewer large seedstock breeders.

- The project has demonstrated considerable sire variation for growth, carcass traits, and ewe lambing rates in their crossbred progeny

- The project has shown that the best genes for prime lamb production are spread across a number of the breeds tested

- The project has shown that high lambing rate in the first cross ewes is the most important economic trait for prime lamb production. This emphasises the importance of selecting maternal sires with high EBVs for this trait.

Level of Uptake of the Technology

Current
The increase of 70 maternal sire seedstock producers involved in Lambplan can be attributed in part to the project, and the project leader estimates that at least 100 prime lamb producers are now selecting first cross ewes from maternal sires with superior EBVs. As with the other examples of uptake given below, it is difficult to separate the influence of this project from that of Lambplan itself, since both work together for the same end.

The project leader estimates that, as a result of the information the project has generated about the importance of the maternal sire in prime lamb production, many more prime lamb producers are employing maternal sire EBVs when purchasing first cross ewes. At the start of the project the number using EBVs in this way was probably less than 10, and is now estimated to be over 100.

A group of Border Leicester seedstock breeders who specialise in maternal sires have formed a group entitled $uperBorder$. Rams released for sale under this brand must have key prime lamb EBVs above a certain level. These rams are apparently attracting a 25-30% premium over other the other rams from these seedstock breeders.

Another positive recent development is that there have been an estimated 10 cases of contract mating with selected maternal sires. Prime lamb producers select maternal rams with appropriate EBVs and have them contract mated to produce first cross ewes of high genetic merit.

Castricums, a Victorian processor, is concerned about continuity of supply of prime lambs to specification and has created a demand for first cross ewes from rams with superior EBVs.

Future
The project represents an essential building block in achieving recognition of the importance of the maternal sire in the modern prime lamb industry, and this is the way it is seen by the industry people interviewed.

Because desirable genes reside in a number of breeds, as has been shown by this project, demand and premiums for maternal sires with high EBVs for prime lamb production is expected to increase considerably when across breed EBVs become more widely available.

Financial Benefits

Analysis by the Researchers
The researchers have analysed the additional value of a Border Leicester ram with EBVs of + 1 kg for weight, + 0.01 for number of lambs weaned and + 0.1 kg for wool production. The benefits were assessed for 3 years for the first cross flock and five years for the second cross flock. Benefits which could be attributed to the additional genetic merit of the ram were $30 for the first cross flock and $279 for the second cross flock, a total of $309.

Assessment of the results from the maternal sires tested at Cowra showed lamb weaning percentage ranging from 81 to 167% from adult ewes and total returns varying by $35/ewe/year. A range of this magnitude represents a difference in lifetime returns of $13,125 from first cross ewe progeny per maternal sire.

MLA Average Farm Model
The assumptions used in the model are:

- Lamb sales per ewe increase by 10% and average sale liveweight increases 10%. It is assumed that half of this gain is better feed efficiency and half is that the lambs eat more.

The specific projects costs and benefits are:

- $5/head extra replacement ewe cost, ie $1.67/ewe or .83¢/dse/annum
- The overall net benefit is $4.64/dse
- Extra feed purchase cost of 20%.

On-Farm Costs and Benefits

Increased annual cost per dse	*Net annual benefit per dse*	*Net annual benefit per farm*
$1.00	*$4.64*	*$27,000*

Benefit/Cost Analysis

Adoption rate	*No of farms that adopt*	*Total MLA cost*	*MLA cost per farm that adopts*	*Total R&D cost*	*NPV*	*B/C ratio*	*IRR*
Current	*100*	*$500,000*	*$5,000*	*$1.98m*	*$8.8m*	*4:1*	*27%*
Projected	*2,600*	*$500,000*	*$207*	*$1.98*	*$147m*	*74:1*	*74%*

Environmental and Social Benefits

No environmental or social benefits are apparent.

Industry Comment

Importance of the Project:
All the producers interviewed spoke of the importance of the project in revealing the importance of maternal sires, and the fact that there is good genetic value in many breeds.

Comments included:

A highly important project in showing that there is a big range between rams in dollar terms and that selecting the individual ram is more important than choosing the breed. And that you have to choose the first cross ewes and not treat them as a commodity.

It's raising the profile of maternal genetics. First cross ewe users are realising they are missing out on dollar returns by having an ad hoc approach to ewe purchases out of saleyards.

Most breeds can go form the ordinary to the exceptional and unless you have a trial to show you this is the way it is, you are only guessing. The trial has unlocked a lot of this knowledge.

It's of tremendous value to the industry and if it was to continue it would be of even greater value.

Need for Across Breed Lambplan EBVs:
Several producers indicated the importance of entering more data into Lambplan which will in future allow across breed comparisons of EBVs.

Comments included:

An urgent need is to get the MCPT data related to the Lambplan data so that we can use Lambplan EBVs across breeds.
I take a long term view of the industry and one of the underlying aims of MCPT is to develop good genetic links between the different maternal breed groups we have in Lambplan.

Indications of Demand
Producers spoke of their belief that demand will soon increase for good maternal sires.

Comments included:

I have had two first cross ewe breeders ask for rams with EBVs because prime lamb breeders have asked for them.

The next step is to get a premium. The premium will supply the demand much more than the knowledge will, but the knowledge is necessary to create the premium.

Conclusions

Through this study it is concluded that:

1. The project has generally met its overall objectives.

2. The project represents a key building block in demonstrating the importance of maternal sire genetics in prime lamb production.

3. The prime lamb industry is, as a result of the study, now realising that maternal sire genetics are of critical importance in prime lamb production, and that the best genes are found in a range of breeds.

4. The project's main effect to date has been to change industry attitudes by providing factual information about the genetic importance of the maternal sire. However changes in practice are now beginning to take place, as can be seen by the formation of the $uperBorder$ group.

From the perspective of a triple bottom line assessment, it is concluded that the project has had:

- A minor economic benefit to date.
- No apparent environmental or social benefit.

People Interviewed

John Dowdy	Producer, Naracoorte, SA
Neal Fogarty	Project Leader, NSW Agriculture, Orange, NSW
John Gubbins	Producer, Willaura , Victoria
John Keiller	Producer, Portland, Victoria
Robert Mortimer	Producer, Tullamore, NSW
Allan Wilson	Producer, Deniliquin, NSW

3.9 Prograze®

Introduction

The purpose of this study is to review the economic, environmental and social impacts of the Prograze® project.

Prograze® was first proposed to MLA by NSW Agriculture as a method for producers to learn the fundamentals of pasture and animal assessment to assist in grazing management. From the beginning it was recognised that the success of Prograze® would rely on participative group learning where producers shared their skills with other producers and Departmental staff, and vica versa.

Prograze® was first conducted from 1994 to 1996, first in NSW and then in NSW, Victoria, South Australia and Tasmania. A 1996 review by Coutts and Daniel of the Rural Extension Centre, Gatton, Queensland, was very positive in its assessment.

The review concluded that 'there was strong evidence that Prograze® is successful in improving knowledge and understanding of improved pasture and animal management amongst producer participants, resulting in changes in attitude. Changes in farm practice appeared to result from a changed attitude to decision making rather than the adoption of specific technologies or techniques'.

The next phase of Prograze® ran from 1997 to 2000 and included Western Australia. As in the first phase, the project was primarily conducted in each State by the relevant State Department.

Project Objectives

The overall objectives of Prograze® were as follows:

1. To develop the skills of producers in pasture and animal management assessment and have producers using these skill in day to day management; and

2. To have producers better understand and use results requiring such knowledge and skills emerging from research.

In addition to these overall objectives, there were objectives for each State which specified target numbers of producers participating in Prograze® courses and targets for the numbers who changed practices as a result of their participation.

Review Approach

The approach taken has been to:

- Read relevant literature on the project, including the Review of Prograze® , May 1996, by J Coutts and J Daniels; the National Prograze® Coordinator's Report, October 2001; and Final Reports from the NSW and Victorian Prograze® Coordinators for the period 1997 to 2000.

- Discuss the project results by phone with the National, NSW and Victorian Coordinators, a number of producers who have undertaken the course, and others as required.

- Conduct a financial analysis using the MLA Average Farm Model.

Results

Technical Success

The project has been highly successful in meeting all its objectives and has become a model for future extension programs. In particular it has:

- Changed the attitude and practice of most producer participants towards pasture management and sustainability. For example, about 50% of participants replying to surveys have adopted rotational grazing since attending Prograze®..

- Been exemplary in getting participants' feed back, both immediately on their completion of the course, and some time thereafter.

- Influenced participants to make changes which they believe will benefit them financially (89% of respondents), and improve the productivity and sustainability of their grazing enterprise (95% of respondents).

- Provided a practically oriented, adult learning environment where producers are able to determine principles of grazing management which they can then apply to their particular situation.

Level of Uptake

Current
Prograze® records show that there have now been 8,500 participants, representing about 6,400 farm businesses. This is an excellent result by any standard, but particularly when participants speak so highly of the benefits they have attained.

Producers interviewed in this study were just as positive about Prograze® as has been reported in the 1996 review and in all subsequent feedback reported by the State and National Coordinators.
Further evidence of the benefits of Prograze® is provided by the fact that it has become a part of, or prerequisite for, further participative learning programs, such as BeefCheque, Woolmark's PPP Program, and PROGRAZE Plus.

Future
The National Coordinator has estimated that 20% of high rainfall zone producers have now participated in Prograze® and that over 60% of the producers who might take the course are aware of it.

While this is a very high level of participation compared to most previous extension programs for the beef and sheepmeat industry, the National Coordinator sees evidence that demand will continue. He believes that Prograze® has developed such momentum that producers now see that they should participate 'because everyone else has'. However the characteristics of the next 40% who may do Prograze® will probably be different to the first 20% and the course content may need to change to suit this group's needs.

Given the high level of benefits attributed by past participants, it does seem likely that the program will attract even more participants while it continues to be available and relevant.

Financial Benefits

Analysis by Interview
Since no economic analysis has yet been attempted on the benefits of Prograze®, producers interviewed were asked to crystallise all the benefits in the % additional liveweight their stock have achieved as a result of the knowledge and skills they have gained, without any additional inputs such as fertiliser or fencing.

All readily accepted a figure of a 5% increase in liveweight gain without any additional inputs. In five of the interviews producers were asked to rate the improvement they had gained. They were asked to indicate which was the correct figure for them in a scale of 0% to 5%, but four of the five answered that the gain has definitely been 10% or more.

MLA Average Farm Model
The assumptions used in the model are:

- The producers lift the meat production by 5% with no additional costs with the same number of stock.
- The overall benefit is $1.40 per dse per annum.

On-Farm Costs and Benefits

Increased annual cost per dse	*Net annual benefit per dse*	*Net annual benefit per farm*
$0	*$1.40*	*$3,000*

Benefit/Cost Analysis

Adoption rate	*No of farms that adopt*	*Total MLA cost*	*MLA cost per farm that adopts*	*Total R&D cost*	*NPV*	*B/C ratio*	*IRR*
Current	*6,432*	*$1.8m*	*$580*	*$9.8m*	*$147m*	*15:1*	*200%*
Projected	*18,000*	*$1.8m*	*$200*	*$9.8m*	*$580m*	*59:1*	*500%*

Environmental Benefits

Considerable environmental benefits have been demonstrated by participants. Some 95% of respondent participants consider that the knowledge and skill they have gained results in more sustainable pastures. The benefits from the course are likely to include improved management of perennial pastures, better water usage and less opportunity for weed development.

Social Benefits

The Prograze® groups provide a supportive environment for producers, who report having much more confidence in their management decisions.

Industry Comment

Many supportive comments from participants have been recorded in previous reports on Prograze® and several are shown here which indicate the same result from this review. Participants clearly value the program very highly and speak freely of the changes it has made in the way they think and act.

Comments included:

> *It is interesting that our language has changed since doing the course. We used to kick the ground and say Bill's running out of feed. Now we talk about kilograms of dry matter per hectare.*
>
> *Prograze® has been pretty good. It laid the facts on the table. It's up to you how you follow them.*

It was very valuable. It's the first time I've ever been involved in a quasi government operation that was alright. It gave me a different perspective on the drivers of livestock production.

Conclusions

Through this study it is concluded that Prograze® has:

- Been a highly successful extension program which has set the standard in the beef and sheepmeat industries.

- Been successful in having producers learn principles of productivity and natural resource sustainability which they then use to make decisions in their own environment.

- Forged new and productive linkages between producers and extension officers.

From the perspective of a triple bottom line assessment, it is concluded that Prograze® has had:

- A large economic benefit in that participants claim significant financial benefits accrue from their participation.

- A significant, if unquantifiable environmental effect in that participants learn the principles of pasture sustainability, and put them into practice.

- An important social benefit in giving farmers, who are often isolated on their properties, a network of support and more confidence in their decision making.

People Interviewed

Cameron Allan	National Prograze® Coordinator
Alan Bell	Prograze® Coordinator, NSW Agriculture
Richard Bell	Producer, Taralga, NSW
Duncan Coleman	Producer, Currabubula, NSW
Ian Collett	District Agronomist, NSW Agriculture, Tamworth, NSW
Sue Griffiths	Producer, Kyneton, Vic
Reg Hill	Prograze® Coordinator, Vic
James Luckock	Producer, Darlington, Vic
Graeme Matthews	Producer, Navigator, Vic
David Moore	Producer, Niangala, NSW
Tom Rummery	Producer, Bendemeer, NSW
Chris Wallace-Smith	Producer, Jarklin, Vic

3.10 Net Feed Intake

Project No DAN.075

Introduction

The purpose of this study is to review the economic, environmental and social impacts of the MLA Project DAN.075, "Reducing the Cost of Beef Production through Genetic Improvement of Net Feed Efficiency".

This project, conducted at NSW Agriculture's Agricultural Research Centre at Trangie from 1993 to 2001, has shown that there is considerable genetic variation in net feed intake (NFI) in beef cattle.

The experimental herd at Trangie represents the only herd world-wide where extensive feed intake records are available on a large number of fully pedigreed animals which have been subjected to divergent selection for NFI.

Project Objectives

The objectives were:

To investigate and demonstrate the economic benefits of reducing the costs of beef production through the genetic improvement of net feed conversion efficiency.

Review Approach

The approach taken has been to:

- Read relevant literature on DAN 75, including relevant papers in the May 2000 *'Proceedings of the Feed Efficiency Workshop'* published by the CRC for Cattle and Beef Quality.

- Discuss the project results with MLA, the Project Leader, industry and other people as required.

- Conduct a financial analysis using the MLA Average Farm Model.

Results

Technical Success

DAN 75 is undoubtedly a technical success. It has demonstrated that beef cattle vary in Net Feed Intake (NFI) and that:

- NFI is heritable
- NFI can be measured in individuals by testing in feedlot feeding trials
- There is strongly favourable genetic correlation between post weaning NFI and mature cow NFI (Arthur, personal communication, 2001)
- NFI on pasture is directly related to that measured in feedlot feeding trials
- Feeding trials can potentially be reduced from a current 70 days to 49 days
- There is a variation of from –10% to +10% of daily feed intake between tested bulls

Many of these findings have been published and are unique in world literature.

Level of Uptake of the Technology

Current
Uptake by the seedstock sector to date is probably as good as can be expected given the high cost and complexity of testing for NFI.

Leading British breed seed stock producers are either feed testing bulls or are interested in doing so. A major progeny test exercise, including NFI testing is being done by Lawsons, Ythanbrae, with MLA donor company support. Furthermore, the Angus Society and NSW Agriculture are requesting MLA funding for a large central progeny test using semen from sires which are in the top range for all other EBVs.

Commercial sector uptake of the technology is limited so far, with about 200 bulls with within herd NFI EBVs being offered to this sector in 2001. According to Arthur Rickards (*Breedplan Newsletter No 11, 2001*) 100,000 new bulls are introduced into the national bull battery each year, so those with NFI EBVs account for 0.2% of available bulls in 2001.

Future
Uptake by the seedstock sector, and therefore the commercial sector, is expected to be slow until a cheaper and less complex test for NFI can be developed.

Between-herd NFI EBVs are expected to begin to be available in 2002 and this will start to drive demand for them. However it is unlikely that testing for NFI will be done by many outside the largest and most progressive seedstock producers unless the cost and complexity of testing can be greatly reduced. The Angus Society's Peter Parnell has listed these and other barriers to adoption in his article *'Barriers to adoption of selection for improved feed conversion efficiency in the beef industry'* published in the May 2000 Proceedings of the Feed Efficiency Workshop.

Gene markers that reliably measured NFI would be an excellent solution, but these are not expected in the short term.

Financial Benefits

Cost Benefit Analysis by Researchers

A paper presented to the 2000 ASAP Conference by Exton et al. *'Commercial Benefits to the Beef Industry from Genetic Improvement in Net Feed Efficiency'* gives a good picture of the benefits to a 100 breeder commercial producer who set out to improve the herd's NFI. The assumptions on which the calculations are made appear realistic. The benefits equated to an annual benefit of $6.95/cow, with the herd size expanding to 110 cows after 25 years, with no additional feed requirement. A feedlot supplied with more NFI efficient cattle from this herd would have feed savings of $8.08/head in the first year, rising to $35 after 25 years.

Average Farm Model (AFM) Results

The assumptions used in the model are as follows:

- Only the benefit to southern commercial beef properties is considered. Benefits to studs and feedlots are not included.
- Over the next decade sufficient bulls with NFI EBVs will become available.
- At the end of 10 years, 20% of beef businesses will use bulls with high NFI resulting in a 2% increase in stocking rate on those properties.
- A bull with a good NFI EBV is assumed to cost an extra $150.
- The benefit of $0.29/dse is primarily derived from the increased stocking rate, which reduces cost per dse proportionately.

On-Farm Costs and Benefits

Increased annual cost per AE	***Net annual benefit per AE***	***Net annual benefit per farm***
-$0.29/dse	*$0.29/dse*	*$630*

Benefit/Cost Analysis

Adoption rate	***No of farms that adopt***	***Total MLA cost***	***MLA cost per farm that adopts***	***Total R&D cost***	***NPV***	***B/C ratio***	***IRR***
Current	*200*	*$1.65m*	*$8.039*	*$3.32m*	*-$1.3m*	*-*	*2%*
Projected	*12,660*	*$1.65m*	*$130*	*$3.32m*	*$12.2m*		*20%*

Industry Comments on NFI

The industry people interviewed (by phone) are included in the list of people interviewed shown below. The main issues resulting from these discussions are as follows.

Demand

While some seedstock producers indicated a high degree of interest from their more innovative and efficient commercial clients, particularly those with cow/calf and finishing operations, most believed that demand will be driven by the seedstock producers. Seedstock producers indicated that they:

- Are concerned by the high cost of testing for NFI
- Recognise they have a leadership role in introducing NFI to the industry
- Need to be involved to keep a marketing edge over their competitors
- Believe demand will follow the publication of EBVs

Typical comments were:

> *I don't see how ordinary commercial people will pay for it, so it will be whether the seedstock people see it as important to them.*
>
> *It's a way of maintaining a marketing edge. If we can demonstrate a degree of feed efficiency it's got to be a benefit to us.*
>
> *There is a demand for the genetics from the feedlot industry, but it will be 5-10 years before premiums are offered because before that there won't be a critical mass.*
>
> *The Northern breeds are probably never going to take on NFI - the studs there concentrate on weight traits - but the big pastoral companies sometimes demand certain EBVs.*
>
> *There is a leadership role in this. Once you put it in a catalogue people start to say 'this is great'. It starts to take off and all of a sudden it's a wave of enthusiasm. But we haven't got the first wave yet.*

Importance

All those interviewed considered NFI to be a very important trait, and most regarded it as about on a par with carcase and growth EBVs. All considered fertility to be the most important EBV.

Typical comments were:

> *On a rating of 1 to 5 (five being most important), I think the likely impact on industry will be 2, but the importance is 3-4 because of the impact on profitability.*
>
> *Fertility is the top rating. I would put NFI on a par with growth EBVs and above carcase EBVs.*
>
> *The dairy industry has been reducing production costs for many year; it's about time we caught up.*

Rate of Adoption

All those interviewed see that the rate of adoption will be slow because of the difficulty of testing and the nature of the flow of genes through the beef industry. Few see an increase in the use of AI in the industry. Most supported the following to encourage adoption

- more progeny testing
- development of more information generally about how animals selected for NFI will perform in the industry
- more promotion of the nature and likely benefits of NFI

Typical comments were:

> *I believe the only way ahead for this trait, in the absence of genetic markers, is if we can select elite young bulls good for all other traits and then progeny test them under a two stage selection.*
>
> *The more progeny testing and trait observations we can do the better for everyone.*
>
> *It's all new ground so we have to get all the data and work out what it means.*
>
> *Progeny testing is needed because we need to have cold hard facts, and we need to have the critical mass available to the market.*

Conclusions

Through this study it is concluded that:

- NFI is an important new trait which has the potential to be of great benefit to the industry

- A very good start has been made in introducing the trait to the industry in that large and influential seedstock producers are either involved in testing or very interested in doing so.

- Adoption through the industry will be slow, because of :
  - the traditional way genetics flow through the beef industry
  - the expense and complexity of testing for the trait
  - the absence of an immediately recognisable benefit for the commercial sector

- MLA has had and can continue to have a key role in facilitating adoption by working with the industry in lowering the cost of testing, by supporting progeny testing, and by publicising the benefits of NFI.

From a 'triple bottom line' assessment, it can be concluded that the NFI research has:

- a definite and quantifiable economic benefit to industry individuals and the industry generally.

- a potential environmental benefit if it is assumed that some farmers will use the benefit of greater feed efficiency to reduce pressure on their pastures rather than to increase stocking rates.

- a neutral social effect.

People Interviewed

Paul Arthur	Agricultural Research Centre, Trangie, NSW
Laurie Donoghue	Pastoral Company, Tambar Springs, NSW
Steve Exton	Agricultural Research Centre, Trangie, NSW
Lucy Gubbins	Te Mania Angus, Colac, NSW
Harry Lawson	Ythanbrae Angus, Yea, Victoria
Jim Litchfield	Hazeldean Pastoral Company, Cooma, NSW
Peter Parnell	Angus Society of Australia, Armidale, NSW
Duncan Rowlands	DNRE, Rutherglen, Victoria
Steve Skinner	Agricultural Business Research Institute, Armidale, NSW
Ian Watson	Forest Vale, Holbrook, NSW / Hereford Prime