



final report

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Prepared by: Dr Maree Bowen and Kylie Hopkins
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Report on extension activities for project 'High-output forage systems for meeting beef markets – Phase 2'

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Executive Summary

This report provides the details of all extension and communication activities conducted during the life of project B.NBP.0636, 'High-output forage systems for meeting beef markets – Phase 2'. The project examined the relative production and profitability of key alternative forage options for backgrounding or finishing cattle in the Fitzroy River catchment of Queensland. The results provided a better understanding of the expected forage, animal and economic performance from key forage options under commercial management conditions. The applied, multidisciplinary nature of the project resulted in many recommendations for beef producers. Extension products were developed to support informed decision making with regard to forage use. These included a producer guide to forage use, '*Feeding Forages in the Fitzroy*', and gross margin spreadsheets for forages grown in three sub-regions of the Fitzroy River catchment. Significant interest from beef producers in the project results, and requests for further information sessions, resulted in an extension of the project, and carry-over of nominal funds, to allow additional extension activities to occur. The objective of these extension activities was to support adoption of practices which will result in optimal productivity and profitability of high output forage systems for beef producers in northern Australia.

The communication of key messages and recommendations from Project B.NBP.0636 has been extensive with a total of 2144 people receiving direct information about the project at 121 events/contacts, including 29 field days or workshops. The overall acceptance and rating of project messages was high, with an average approval rating of 85% across all surveyed events and of 88% across the seven dedicated extension events held after the finalisation of the project results. The intended level of practice change as a result of project messages and recommendations was 66% across all surveyed events and 87% for attendees of the six full day workshops held after finalisation of project results. Key aspects contributing to the effectiveness of these extension activities included: 1) involvement of beef producer co-operators in the project; 2) the multidisciplinary project team which included technical, extension and economist expertise; 3) demonstration of the financial implications of recommended practice change; and 4) providing a pathway to adoption, including development and demonstration of extension tools. The high level of industry approval and intended adoption of project messages, demonstrates the positive outcomes for industry from multidisciplinary, regional project teams with a strong focus on applied research and on the financial implications for producers.

Key recommendations

- Extension of project messages and recommendations should be continued through ongoing extension activities, including the FutureBeef and Grazing Best Management Practice (BMP) programs.
- A detailed survey of producers in the Fitzroy River catchment should be conducted to quantify intended and actual practice change occurring as a result of project messages.
- Further research is required to develop and evaluate accelerated cattle growth paths achieved through optimising production from the feed-base. This work should address the question: 'What is the most productive and profitable way to use a limited resource of high quality forage or concentrate supplement to meet high value market targets for finished or live export cattle in northern Australia?'

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1 Background

Project B.NBP.0636, 'High-output forage systems for meeting beef markets – Phase 2', examined the relative production and profitability of key alternative forage options for backgrounding or finishing cattle in the Fitzroy River catchment of Queensland (Bowen *et al.* 2015b). Six forage options were studied at 24 forage sites across 12 commercial beef properties during 2011-2014 (31 individual data sets in total). The forages studied included oats, forage sorghum, lablab, leucaena-grass and butterfly pea-grass as well as perennial grass-only pasture as a baseline for comparison. Forage and beef production as well as paddock gross margins were documented at each site. In addition, whole-farm economic case studies were developed with five beef producers to give insights into the effect of sown forages on overall farm profitability. The factors affecting profitability were further investigated through constructed, or modelled, forage scenarios. In these scenarios, standard management practices were assumed and the performance of forages was modelled over a longer time-frame, therefore reducing the variation due to management, seasonal and market fluctuations.

The results from this project provided a better understanding of the expected forage, animal and economic performance from key forage options under commercial management conditions. Extension products were developed to support informed decision making with regard to forage use. These included a producer guide to forage use (Bowen *et al.* 2015a), and gross margin spreadsheets for forages grown in three sub-regions of the Fitzroy River catchment (Chudleigh *et al.* 2015).

The applied, multidisciplinary nature of this project resulted in many recommendations for beef producers. Significant interest from beef producers in the project results, and requests for further information sessions, resulted in an extension of the project, and carry-over of nominal funds, to allow additional extension activities to occur. The objective of these extension activities was to support adoption of practices, which will result in optimal productivity and profitability of high output forage systems for beef producers in northern Australia.

The final report for project B.NBP.0636 (Bowen *et al.* 2015b) was accepted by MLA in June 2015. This current report provides the details of all extension and communication activities conducted during the life of this project.

2 Project Objectives

The project objectives were as set out below.

1. Validated through producer co-operator and demonstration sites, the expected forage, animal and economic performance reported in the desk-top study of Phase 1.
2. Produced a revised version of the 'Best-practice guide to forage use for growing and finishing beef cattle', incorporating the new information from Phase 2 of the project (in booklet and CD format), for use by producers and agricultural advisors. The guide will include an up-dated and revised 'spreadsheet calculator' to allow partial budgeting of forage options, as well as example whole-farm economic analyses based on real data from the co-operator sites.

3. Used real data collected on the co-operator properties to test, evaluate and help validate three approaches to incorporating animal production simulation capabilities within the APSIM framework.
4. Used the most appropriate model from step 3 to develop a decision support tool (similar to the existing cropping simulation tool 'Whopper Cropper') to allow comparison of forage options for beef producers.

The final report for B.NBP.0636, addressed the objectives above. This current report relates to the extension activities conducted, to extend key project messages.

3 Methodology and Results

Promotion of the key project messages and the extension tools produced as part of this project has occurred through a number of avenues:

- Direct involvement of 12 commercial beef businesses as co-operators in the project.
- Dedicated project field days or workshops for producers.
- Webinars.
- Presentation to the MLA Central Queensland Beef Research Committee (CQBRC).
- Internal presentation to Department of Agriculture and Fisheries (DAF) staff to facilitate integration of project messages in the wider FutureBeef extension program.
- Promotion of project messages and tools through the DAF FutureBeef and Grazing Best Management Practice (Grazing BMP) programs.
- Responding to direct enquiries.
- Media articles.
- Conference presentations.
- Scientific journal paper.

The majority of the extension activities occurred post 31 March 2015, which was the original end date of project B.NBP.0636. An additional 12-month period was negotiated to accelerate adoption of project results, using nominal funds remaining in the project budget and DAF staff resources.

3.1 Direct involvement of producer co-operators, 2011-2014

A total of 12 commercial beef businesses were directly involved in the project as co-operators. The 24 forage paddocks (sites) that were monitored as part of the project were spread across these properties and received detailed information about their businesses as a result of project measurements and analyses. This information was provided to the co-operators, as it became available throughout the project, using same format as that in Appendix 1 of the final report. Wherever possible, a member of the project team discussed and explained the summarised data and results with the relevant producer. Additionally, detailed whole farm economic case studies were developed with five of these 12 co-operators. This process involved the project economist spending a day with each co-operator to gather the data and information required to develop a detailed business analysis. The detailed analysis and conclusions were provided directly to each individual co-operator and discussion with the project economist occurred where requested.

By the end of the 3-year data collection phase of the project in March 2014, at least 5 of the 12 producer co-operators engaged in the project indicated that they had begun to make significant changes to their business as a result of the project findings. Some examples of the practice change intended or underway include:

- One producer has ceased his practice of grazing weaners on oats forage and then returning them to perennial grass pasture. This producer is now using oats to finish older cattle for immediate sale, and hence avoiding the issue of eroded production and profitability due to compensatory gain effects.
- This same producer has also commenced a program of converting old cultivation paddocks, previously used for annual forage cropping, to leucaena-grass pastures due to the greater contribution of the latter system to business profitability.
- At least one producer is now intending to fertilise their leucaena as a result of soil test, forage and animal production data.
- Another producer has advised that the project results have confirmed their suspicions that annual forage crops are not as profitable as the perennial legume-grass options and have, as a result, accelerated their program to return cultivation paddocks to butterfly pea-grass or leucaena-grass pastures.
- A producer with dual grain cropping and cattle production enterprises has indicated that he intends to increase the area sown to grain crops and correspondingly reduce the area sown to annual forage crops due to the higher profitability of the former.
- Finally, another producer who chooses to grow lablab prior to subsequent grain crops has indicated that rather than utilising lablab as a grazed forage it will now be used for seed production. The reason for this practice change is again due to a better understanding of the contribution of grazed annual forages to whole farm profitability.

3.2 Dedicated project field days and workshops, 2014-2016

A total of nine dedicated, full-day, information days were held across the Fitzroy River catchment target area during 2014-2016. In 2014, prior to the completion of data analysis and the final report, three field days were held on producer properties, on consecutive days. After finalisation of project results, a further six workshops (three over consecutive days in each of 2015 and 2016) were held in regional towns. In each year, the three consecutive information days were spread as widely as possible across the catchment area. A selection of photographs taken at these events is presented in Appendix 8.2 (Fig. 6-19).

3.2.1 Three field days across central Queensland, April 2014

Three consecutive, full day, field days to present preliminary project results were held on each of three producer properties near Capella, Rolleston and Taroom on 1st, 2nd, and 3rd April 2014, respectively. These field days included presentations by all key members of the project team, including sown pasture agronomist, Stuart Buck; the project technical officer involved in all data collection, Kylie Hopkins; ruminant nutritionist, Maree Bowen; economist, Fred Chudleigh; and the programmer responsible for developing a prototype 'decision support tool', Jason Brider. In addition, each host producer spoke about their grazing operation and the value of the project to their business. The host producer also facilitated a

tour of paddocks which had been monitored as part of the project. Each field day was facilitated by the local DAF beef industry development officer involved in the project (Byrony Daniels or Tim Emery). Attendees were provided with a printed copy of all presentations as well as contact details of key staff members, if follow-up information was required.

A total of 97 producers and industry representatives attended the three field days. Details of the categories of participants are given in Table 1. The most successful means of promoting of the event was the flyer received by email (39% of respondents found out this way) while 'word of mouth' was the next most successful means of promotion (17%; Fig. 1). There was very active discussion and participation from attendees at each of the three field days. The feedback sheet was completed by 55 attendees (57% of total). Feedback was very positive with an overall approval rating of 82%. Some examples of comments provided in the evaluation include:

- "Information delivered by real pros – could answer all questions".
- "Very informative. Staff were informative and engaging".
- "Great summary points of what appears to be a large project. Keen to hear more and read final report".

There were a large number of comments highlighting the value of the economics results because they were based on real data from producer properties; 74% of respondents indicated that they believed the economics section was the most valuable part of the day (Table 2). The full list of comments is provided in Table 2 (responses to 'most valuable part of the day?') and Table 3 (responses to 'general comments?'). A significant number of respondents (31%) indicated that they intended to make changes to their operations as a result of the information presented. Comments indicating the changes that would be made are listed in Table 4. The intended areas of practice change included forage agronomy, grazing management, forage selection, and consideration and analysis of the economic implications and profitability of growing forages. Following the field days there were 20 requests for information from people who had been unable to attend the event. Additionally, interest was registered from producer groups, facilitated by DAF staff, for additional field days.

Table 1. Categories of attendees – April 2014 field days

	Gordon Downs (near Capella)	Albinia Downs (near Rolleston)	Cattle Downs (near Taroom)	Total numbers
Total participants	34	20	43	97
Beef businesses	22	10	25	57
Individual producers	26	17	34	77
Government officers	4	0	2	6
Catchment group officers	0	0	2	2
Private advisors, consultants and sales representatives	4	3	5	12

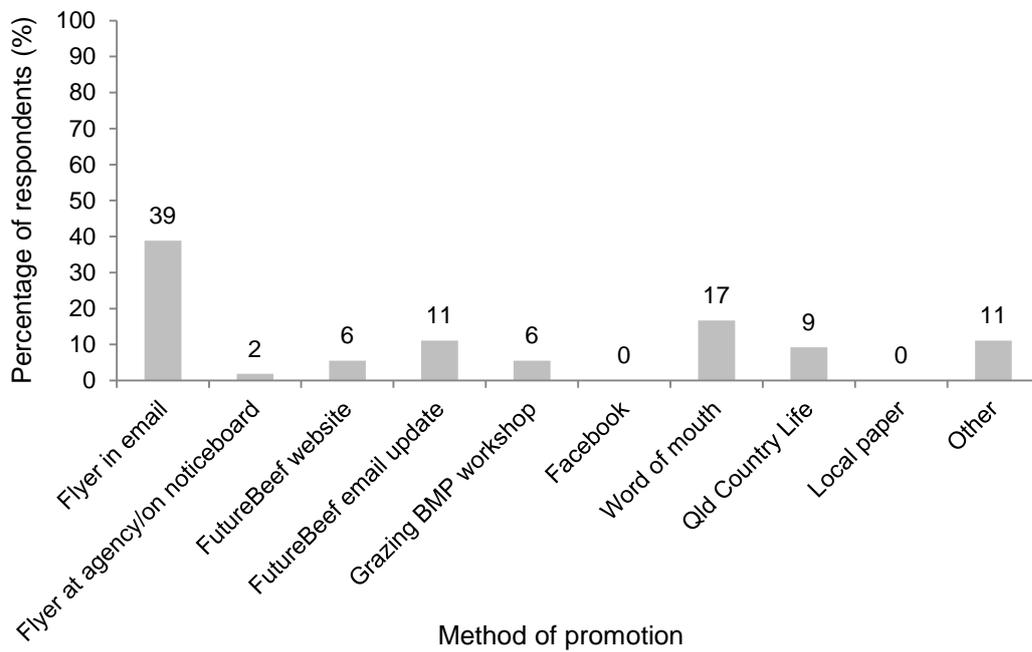


Fig. 1. Method by which attendees found out about the April 2014 field days.

Table 2. List of comments from respondents, indicating the 'most valuable part of the day' – April 2014 field days

<p>Economics. Very informative. Economics. Leucaena production compared to annual forage. Personally, I found the economics the most valuable. Highlights the fact that good agronomy etc. doesn't always mean good gross margin. Economics. Interesting to see true costs of production. Profitability of growing forage. Info on leucaena. Forage comparisons - the economics of forages. Gross margins on different forages - economics presentation. Fred (economics section). Gross margins. Economics and best practice tips (grazing before forage is too stinky etc.). Gross margins. Comparing costs for different forages. Costs of production, impact of cattle prices on profitability, importance of feeding forages at the correct time for maximum weight gain. The gross margins on forages grown under different conditions. Everything. Cost comparisons between annual forage, leucaena & grass. Gross margins, cost of production. How to utilise different forages, the economic suitability of the forages in a production system. Economics of forages. Economics talk by Fred. Trial results. Fred's piece on the numbers. Actual data. Telling it how it is supported by facts. Confirmed view that oats and sorghum are not always worth doing. Economics analysis of forage options. Need for a legume in pasture to combat decline in pasture quality. The economic information. Learning about cost of establishing/growing forages vs actual economic benefits, also fertilisers. I am a trainee nutritionist. Coming from South Australia it was great to hear more about tropical pastures. Trying to understand gross margins on the different forages. Financials/economics, 'what if' scenarios. Some understanding of gross margins & economics of production, importance of phosphorous for legumes pastures, comparative worth of forage crops and buffel pastures. Economics. Economics & data sets & leucaena. Economics - short term vs long term perennial. Importance of phosphorus. Management of forages. Results on crop data.</p>

Table 3. List of general comments from respondents – April 2014 field days

<p>Very good. Very informative and very well organised. Well done. Benefit from forages depends on rain, so results can vary. Great summary points of what appears to be a large project. Keen to hear more and read final report. Valuable education on legumes in general. Presentations were great, data relevant. Pretty good day. Great day. Very informative day, thank you. Good day. Fantastic information session, thank you. Informative and interesting. Good help. Great project. A very good day. Great workshop. I thank Kylie for the chance to participate in the project as a co-operator and would do it again. Very informative, staff were informative and engaging. Would like to have seen more on the leucaena/grass outcomes. Appreciate this information will be in the final report. Interested to know where to from here? What will happen with the final report? Good all round day. Thanks to all from DAF. Great day. Good day. Enjoyed the day, handout useful for reflection. Thank you. Good day. Main message was that there is no lazy man's way of making it happen. Information delivered by real pros - could answer all questions. Informative speakers. Questions handled well. Good call printing out the resources. Thanks for a good day. Thank you. Speakers were easily understood.</p>

Table 4. List of comments from respondents, indicating what change/s they intended to make – April 2014 field days

More soil tests.
 Hope to grow more leucaena if season allows.
 Reduce stocking rate.
 Study what is most economic option.
 Utilise forages to maximum potential, better rotations, closer look at management.
 Yes, looking at growing leucaena.
 Grow different forages.
 Keep growing leucaena, maybe more oats.
 Think about economics and reasons for planting forage/oats/lablab.
 Timing of grazing to maximise weight gains.
 I will be changing my stocking rate and using a higher weight class of cattle.
 Less forage sorghum, more butterfly pea and Dolichos.
 Look at growing leucaena.
 Yes try to utilise forages for different reasons.
 Could change the way we background our cattle for feedlot.
 Look to plant small area of lablab to compliment current buffel & buffel/leucaena paddocks.
 Soil tests prior to future crop plantings/leucaena.
 Grow forages to increase stocking rate.
 Investigate leucaena potential to background lambs.
 Soil test, look at improving current buffel grass pasture, plant or work up a seed bed for forage (not leucaena).
 Do analysis of my situation before making decisions.
 Probably grow different forages & timing of grazing. Consider costs of production of perennial legumes.
 Possibly take more concern.
 Don't own my own primary production business but this info is useful in discussions with producers - can refer to tools resources etc.
 Not automatically plant oats if the weather permits. Plant old cultivation with legume and grass and move onto new country.
 Undertake further research before planting anything.
 Use the gross margin calculator.

3.2.2 Three workshops across central Queensland, June 2015

Three consecutive, full day, workshops to present final project results, key messages and products were held in Clermont, Moura and Taroom on 2nd, 3rd and 4th June 2015, respectively. These workshops included presentations by key members of the project team, including economist, Fred Chudleigh; sown pasture agronomist, Stuart Buck; the project technical officer involved in all data collection, Kylie Hopkins; and ruminant nutritionist, Maree Bowen. Each workshop was facilitated by the local DAF beef industry development officer (Jim Fletcher, Byrony Daniels or Tim Emery). Attendees were provided with:

- A booklet containing a printed copy of all presentations and contact details of key staff members, if follow-up information was required.
- A copy of the producer guide '*Feeding Forages in the Fitzroy*'.
- A USB stick containing the three forage gross margin spreadsheets developed as part of the project as well as an electronic copy of the booklet and producer guide.

A total of 47 producers and industry representatives attended the three workshops. Details of the categories of participants are given in Table 5. As for the 2014 field days, the most successful means of promoting the event was the flyer received by email (30% of

respondents found out this way), while a flyer mailed via Australia Post was the next most successful means of promotion (19%; Fig. 2). While 19% of respondents (8 individuals) indicated that they found out about the field days via the mailed flyer, the cost was high relative to the response (3379 flyers delivered to mail addresses at a cost of \$926, plus printing and folding costs). The feedback sheet was completed by 40 attendees (85% of total). Excellent feedback was received with an overall score of 86% for usefulness of the event. Some examples of comments provided in the evaluation include:

- “Very informative. Probably the best field day I’ve been to”.
- “Thank you for this opportunity to fast-track my management practices and knowledge base”.
- “Very well informed and researched presenters. A very informative field day which will benefit my business”.

There were a wide range of comments made to indicate the ‘most valuable part of the day’. Once again, the value of the economics data rated highly with 38% of respondents indicating that they believed this information was most valuable. The full list of comments is provided in Table 6 (responses to ‘most valuable part of the day?’) and Table 7 (responses to ‘general comments?’). A very high proportion of respondents (85%) indicated that they intended to make at least one change to their business as a result of the information presented. Fig. 3 shows the proportion of respondents indicating their intention to make a change in each of 10 key areas. The three top-ranked areas of intended practice change were 1) best practice agronomy, 2) grazing management, and 3) conducting a whole farm economic analysis. The most poorly accepted extension message related to the importance of selling cattle at the completion of grazing high quality forages so as to avoid compensatory gain effects (only 55% of respondents indicated that they would make a change in this area). This statistic was supported by general comments and discussion during the workshops where many participants indicated they did not understand or believe the ‘compensatory gain’ message and the economic implications. Comments indicating the changes that would be made are listed in Table 8. The intended areas of practice change again covered the whole range of key message areas presented, including forage selection and agronomy, grazing management, and consideration and analysis of the economic implications and profitability of growing forages.

Table 5. Categories of attendees – June 2015 workshops

	Clermont	Moura	Taroom	Total numbers
Total participants	9	18	20	47
Beef businesses	7	10	13	30
Individual producers	7	12	19	38
Government officers	1	0	1	2
Catchment group officers	1	2	0	3
Private advisors, consultants and sales representatives	0	4	0	4

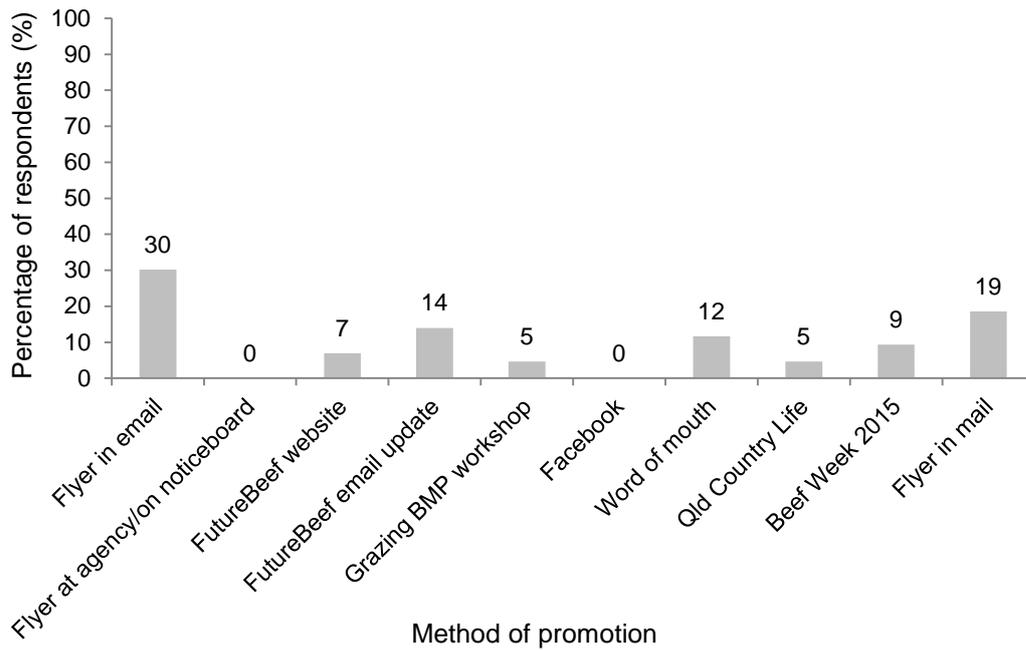


Fig. 2. Method by which attendees found out about the June 2015 workshops.

Table 6. List of comments from respondents, indicating the 'most valuable part of the day' – June 2015 workshops

Economics.

Awareness of systems and process that I have experienced growing forages. A better understanding will allow me to maximise productivity.

New information based on case study properties with objective measurements. Well done!

Agronomy by S. Buck including caatinga and desmanthus.

This has broadened my knowledge and capacity to provide extension particularly around grazing management and maximising production off high-output forages.

Economic focus – need to consider if it is worth growing forages. Agronomy top tips.

The economics of each crop and how it all comes down to price and timing.

Considering the amount of producers who grow some type of forage crop, I was surprised that there is very little gross margin and profitability. Slide handouts are very handy to refer back to in the future; it's a lot of information to take on board!

It was all good. We are in the early stages of a whole-farm development plan; moving from naturalised grass pasture to improved pasture. All of the key messages will be valuable.

Interpretation of trial results.

Supplementary feeding is not always necessary. Different legume options.

Learning about the relationships between leaf quality, diet quality and the make-up of C3 species in the diet.

Personally getting a further understanding about the different forages suitable for this area.

Knowing the true outcomes from forages.

Beef cattle production from forages.

All the content.

Discussing leucaena planting and costs.

Considering which forages, and how to use them, in my production system. Leucaena knowledge gained before planting.

Cost-benefit analysis of various crops and alternatives.

Very good information about all the forage options available. Excellent day to take home knowledge.

Wide range of presenters with good knowledge.

All.

Using full cost analysis before deciding to plant forage. Considering compensatory gains.

Soil test N+P for forages. Compensatory growth occurs so don't feed too early. CP + DMD of forages and kg/ha beef produced etc. and the reality that gross margins are also affected by markets and rain.

Information comparing crops.

Gross profit discussion.

Table 7. List of general comments from respondents – June 2015 workshops

Very informative. Probably the best field day I've been to.
Very well informed and researched presenters. A very informative Field Day which will benefit my business.
Well presented by all DAF staff.
1) Machinery and machinery knowledge is major factor. 2) Starting on virgin country e.g. Brigalow suckers changes everything. 3) Good to hear new developments.
I really enjoyed the short yet detailed sections which made it very interesting yet all tied in together.
The changing of presenters was good to keep our attention for quite a heavy topic.
Great venue.
A well put together day. Thank-you.
Fantastic, informative day. Well done!
Really good day. Very enjoyable and informative.
A good presentation of results from what was a good project.
Great wrap up of project. Interesting data/results (keeping in mind the relatively small data set).
Question whether using market value at the time of analysis was best way to compare/calculate gross margins. Is this meaningful? We can't compare apples to apples.
All comes back to the price we get for our cattle at market which we can't change.
Thank-you for this opportunity to fast track my management practices and knowledge base.
Top presentation - great day.
A lot of data. All about price margins as much as high quality forage.
Good day. Thanks.
Good talks.
Good back up of trial with solid data and outcomes.
An informative and enjoyable day.
Excellent and very relevant day. - Nothing to change.
Hard to improve.

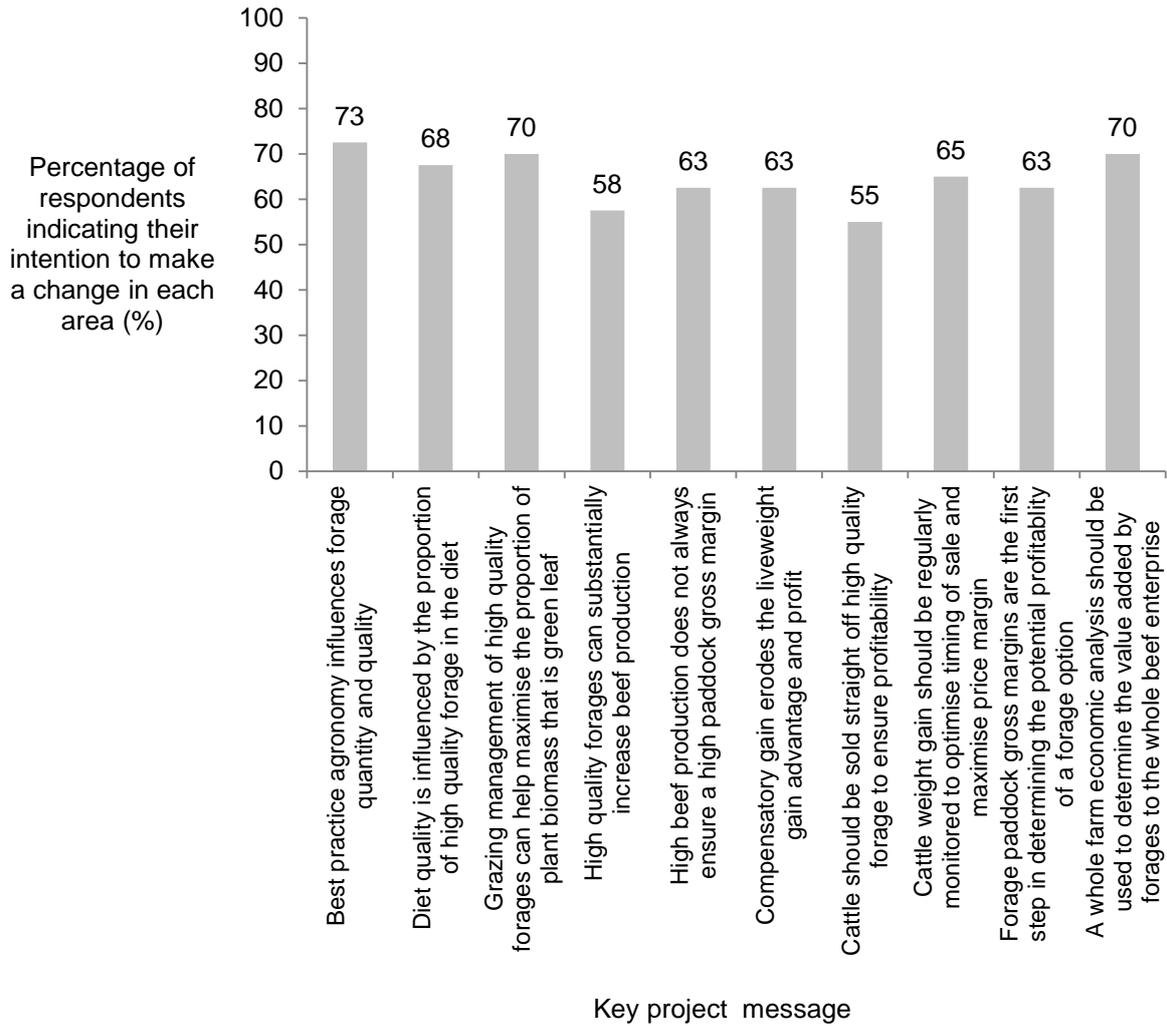


Fig. 3. Percentage of respondents indicating their intention to make a change to their operation as a result of each of 10 key project messages.

Table 8. List of comments from respondents, indicating what change/s they intended to make – June 2015 workshops

<p>S. Buck's information on desmanthus and stylos. Time grazing of forage to turn-off time. Intend to weight cattle more regularly but hard to do with limited resources. Already commencing gross margin analysis. Already starting a whole farm economic analysis to look at value of forages. Will use the '5 top tips' when beginning our assessment of what forages to use. Will do a soil test. Sell cattle straight off leucaena rather than put back on to grass. Weigh cattle more. Try to do a whole farm economic analysis. These messages will influence the advice I give producers. More frequent rotations of mobs through paddocks. Planting a different variety of, and more, legumes. Will change timing of when livestock are put on grass. Monitoring weight gain/loss to determine what is best for us. Some soil testing. Adjustment of stocking rates/ha. More frequent weighing of cattle. Encourage soil testing. Soil testing. Soil testing. Check grass quality in leucaena paddocks. Monitor plant growth for correct grazing times. Monitor weight gain of bullocks. Soil testing. Will look at whole farm economic analysis as this day has definitely changed my thoughts about forages. Weigh cattle more often to pick up non-performers. Improve grazing management of sorghum. Sell cattle straight off oats. Better manage grass with leucaena. Plant more leucaena. Will put finisher cattle on leucaena rather than backgrounding cattle. Will consider putting leucaena where oats is grown. Soil testing. Make sure cattle are put into forage sorghum paddock early. Soil test and monitor forage to ensure we keep on top of it. Will look at gross margin spreadsheets. Will consider compensatory gain effects. Further investigation of leucaena. Timeliness of grazing. Will calculate more accurate gross margins. Establish some leucaena. Going to sell cattle at end of grazing on high quality forage. Do more monitoring.</p>
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3.2.3 Three workshops across central Queensland, April 2016

This final series of workshops to extend project messages was scheduled as a result of the high level of interest registered through feedback obtained at Grazing BMP workshops, where the project summary webinar had been presented. Three consecutive, full day, workshops to present project results, key messages and products were held in Wandoan, Biloela and Emerald on 19th, 20th and 21st April 2016, respectively. These workshops included presentations by key members of the project team, including sown pasture

agronomist, Stuart Buck; the project technical officer involved in all data collection, Kylie Hopkins; ruminant nutritionist, Maree Bowen; and economist, Fred Chudleigh. Each workshop was facilitated by the local DAF beef industry development officer involved in the project (Tim Emery, Kylie Hopkins or Byrony Daniels). Attendees were provided with:

- A booklet containing a printed copy of all presentations and contact details of key staff members, if follow-up information was required.
- A copy of the producer guide '*Feeding Forages in the Fitzroy*'.
- A USB stick containing the three forage gross margin spreadsheets developed as part of the project, an electronic copy of the booklet and producer guide, a suite of spreadsheets developed as 'business tools' by DAF economists, and information on how to become involved in the Grazing BMP program.

Several additions and modifications were made to the content presented at the 2015 workshops, as a result of feedback obtained, and to facilitate practice change. These included:

- The agronomy section was expanded to include additional, complementary information on pasture rundown, pasture legume options, and establishment methods. This information was drawn from complementary DAF projects.
- An interactive session using laptops was introduced, where workshop attendees were guided through gross margin scenarios in Microsoft Excel.
- Additional time was spent explaining and demonstrating one of the key project messages relating to erosion of production gains and profitability due to compensatory gain effects of cattle. This concept had proved challenging to explain and feedback from previous extension activities had indicated a relatively low level of acceptance of this concept by producers. In preparation for these workshops, an additional series of detailed economic scenarios was developed to demonstrate the effects of returning cattle to perennial grass pastures after grazing forage oats. The same concept applies to any cattle grazing high quality forages over the dry season and then returning to perennial grass pastures over the wet season.

A total of 34 producers and industry professionals attended the three workshops. Details of the categories of participants are given in Table 9. As for the 2014 field days and 2015 workshops, the most successful means of promoting the event was the flyer received by email (51% of respondents found out this way), while the FutureBeef email update was the next most successful means of promotion (14%; Fig. 4). The feedback sheet was completed by 29 attendees (85% of the total). Feedback was again very positive with an overall rating of 86% for value of the event. Some examples of comments provided in the evaluation included:

- "Some fantastic and relevant information condensed into a ready to understand format".
- "This was excellent - location, delivery, catering, materials supplied - very professional and pleasant, interactive delivery".
- "Really enjoyed the interactive session with the calculators. The hands on approach made it easier to understand".

A total of 100% of respondents learnt something new, whilst 88% of respondents indicated that they intended to make a change to their business operations as a result of the

information presented with 84% of respondents 'likely' or 'very likely' to make this change. A total of 92% of respondents intended to make a change within the next 2 years; and 29% indicated they would make a change within the next 6 months. The new information included in the 2016 workshop was received very well with a large number of comments indicating the value of the information provided on legume options and establishment techniques, on avoiding compensatory gain issues, and on the value of the interactive session with gross margin spreadsheets. The full list of comments is provided in Table 10 (responses to 'did you learn anything new today?'), Table 11 (responses to 'most valuable part of the day?'), Table 12 (responses to 'general comments?') and Table 13 (responses indicating what changes would be made).

Table 9. Categories of attendees – April 2016 workshops

	Wandoan	Biloela	Emerald	Total numbers
Total participants	10	13	11	34
Beef businesses	8	10	9	27
Individual producers	8	11	10	29
Government officers	0	2	0	2
Catchment group officers	0	0	0	0
Private advisors, consultants and sales representatives	2	0	1	3

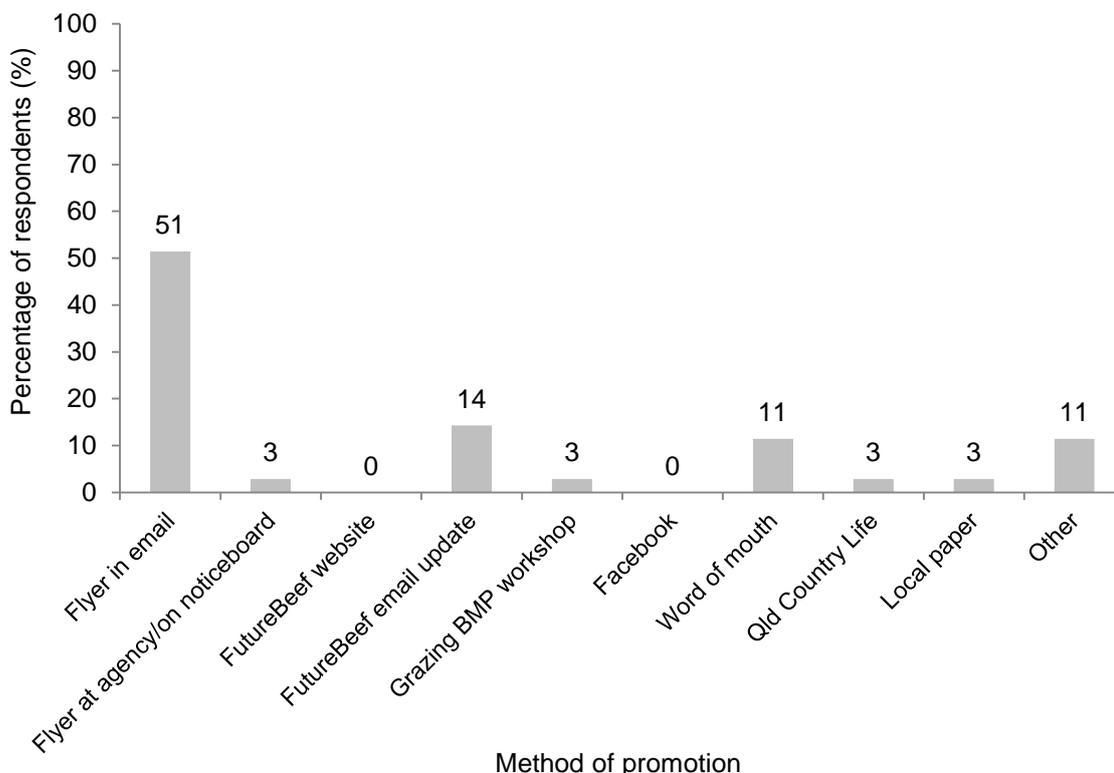


Fig. 4. Method by which attendees found out about the April 2016 workshops.

Table 10. List of comments from respondents, indicating the 'new information they learned from the day' – April 2016 workshops

I knew very little about forages before today. Economic analysis was interesting.
Good info.
There was a lot of information to help build on what I already know.
Knew or heard of a lot of the information but had forgotten about it.
Compensatory gain - not worth feeding cattle not for sale.
Effects of compensatory gains. Putting an actual cost value to leucaena compared to other legumes.
Gross margin calculators and compensatory weight gain.
Useful contacts.
Yes lots of things.
Nitrogen cycle.
Leucaena bug. Collect information to allow analysis.
Value of feeding oats (or lack of) early. Establishing leucaena/legume using chemical sprays. Very well targeted information, very relevant.
Wonderful, loved the analysis and economics.
How to introduce legumes.
Economics of different forage systems.
Very good, different ideas.
Establishment of leucaena and doing the numbers on a crop before planting it.
A lot - especially about forages type advantages/disadvantages and good info re gross margins involved.
Thank you for a very informative day. A lot to think about.
How to successfully plant legumes into pastures. Spreadsheet extremely valuable tool.
Extra reasons for crop failure.

Table 11. List of comments from respondents, indicating the 'most valuable part of the day' – April 2016 workshops

<p>Information booklets. Different ways of analysing pros and cons of forages. Gross margins very good. It was all valuable. The most valuable parts were seeing a detailed analysis of the cost breakdown and gross margins. Fred's spreadsheets. Figures to compare. Spreadsheets. The returns made from leucaena. I hope desmanthus is similar. Decision of implementing leucaena instead of stylo/pea. Learning and understanding the gross margin tools and the weight gains with adding forage to make your business more sustainable. Compensatory gain. Everything. Economics. Legumes. Practical establishment tips. Highlighting value of legume/pasture mix. Highlighting financial considerations. Stu's presentation on the basic establishment processes. Recommendations on viability of including forages in grazing system. Perennial legumes into pasture. Establishment techniques. Economics. Forage agronomy was most valuable to me; however, it was all very interesting and important to making improvements. The USB stick will be very useful. Learning how to plant legumes. Forage costs and economics. Legumes. Spreadsheets and USB. Looking at the different forage options. Preparation of seedbeds (spraying cultivation etc.). Full day. Tools given on USB stick as well as benefiting from whole research program. Now aware of best forages to gain maximum efficiencies - need to do soil test. Managing forage. More costing out of options and analysis. Legume planting. Spreadsheet. Comparing different land use. Pasture preparation. Agronomy of forages. Learning how easy it is to lose money with forages. Information on forage and diet quality. Learning about the importance of doing the sums before and after planting forages. Learning what we need to analyse to calculate profit. Grazing management and compensatory gain.</p>
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Table 12. List of general comments from respondents – April 2016 workshops

Good workshop.
 A very good day.
 Questions answered.
 Very good workshop.
 Great day.
 Really enjoyed the interactive session with the calculators. The hands on approach made it easier to understand.
 Found day enjoyable.
 I found the day very useful and I look forward to the next training day.
 Very good - thanks.
 Some fantastic and relevant information condensed into a ready to understand format.
 Would love to see a workshop on legumes for this environment. Need to get funding to analyse margins for perennial shrub legumes e.g. desmanthus, compared to tree legume (leucaena).
 I'd like to learn specifically how to select legumes/grasses that will grow well in my soil.
 Well run, good facilities and pleasant company and great food and drinks.
 Bloody good.
 Thank you!!!
 Well worthwhile. Would like more family members to have been here.
 Enjoyable, interesting topics. Keep up the great workshops.
 I have had a lot of problem with leucaena dieback. To have a realistic presentation I think this needs to be mentioned in the presentations. I also would think this problem needs looking at in more detail. I am happy to help if you need any help looking at this.
 It was a really well though and put together day - thoroughly enjoyable.
 Would like more workshops so more funding is needed.
 Would like a legume workshop as a follow-on from this.
 I would love a follow-up day focused just on establishing leucaena and other legumes.
 Would like to attend another workshop on perennial legume choices and establishment techniques.
 Excellent.
 This was excellent - location, delivery, catering, materials supplied - very professional and pleasant, interactive delivery. Great start to our quest for knowledge.
 More research is needed on long term viability of new perennial forages - leucaena, desmanthus, caatinga.

Table 13. List of comments from respondents, indicating what change/s they intended to make – April 2016 workshops

Investigate legumes for our property. More work involved with them than I expected! Unpredictability of rainfall will be problematic for planting.
 Plan to look into legumes in the future to address pasture rundown.
 As a manager, all the decisions aren't mine but I will make recommendations.
 Introduce leucaena to existing pasture on approximately 100 acres.
 Be mindful of compensatory gain effect.
 Will try small steps.
 Experiment.
 Check rumen bug levels.
 Change establishment methodology for forages. Look at alternative legumes. Put smaller number of weaners on crop.
 More legumes. Adjust planting regime.
 Introduce legumes.
 Use forages to their full extent.
 Plant leucaena and stop farming (annual forage cropping).
 Will look at viability of developing country versus buying developed country that has healthy pastures. Need to analyse our situation before proceeding further.
 Going to try planting other legumes besides leucaena in a small paddock.
 Better pasture preparation.
 Follow up on desmanthus and caatinga.

3.3 BeefConnect webinar, May 2015

A 1 hour Webinar presentation (30 minutes presentation and 30 minutes questions) was conducted as part of the BeefConnect series on 22nd May 2015. A recording of the webinar can be viewed, or the presentation slides downloaded,

at: <https://www.youtube.com/watch?v=BdLL813ne1c>. A total of 200 people registered, 72 people attended the live event, and 541 views had been recorded on the YouTube link by 12th May 2016. Details of the categories of the participants who attended the live event are given in Table 14. Attendees found out about the webinar via FutureBeef email (53%), an email from Beef Central (42%) or from Western Australia government staff (5%). The feedback survey was completed by 20 of the 72 attendees (28%). Excellent comments and feedback were received. A detailed evaluation indicated that the participants found the information useful (average rating of 90%), that it improved their knowledge (average rating 90%) and that participants were satisfied overall with the event (average rating of 92%). Some examples of comments provided in the evaluation include:

- “Very valuable webinar”.
- “Excellent, so wonderful that I could be involved in this from home”.
- “Your post webinar information is also very good. Well done once again”.

The full list of comments is provided in Table 15 (responses to ‘the three most important facts that were learnt?’), Table 16 (responses to ‘general comments?’) and Table 17 (responses to ‘what changes are you going to make as a result of this information?’).

Table 14. Categories of attendees – BeefConnect webinar

	Percentage (%)
Beef businesses	60
Government officers	20
Catchment group officers	5
Private advisors, consultants and sales representatives	15

Table 15. List of comments from respondents, indicating the ‘three most important facts learnt’ – BeefConnect webinar

-
1. Forage was not profitable.
 Importance of a high quality component (leucaena) in the diet - even when a comparative small % of overall intake.
 Options available.
 Value of crops is lost if put back on pasture due to the compensatory growth of non-crop fed animals.
 Gross margins on different crops or pastures.
 Difference between pasture and grain crops. Rate of cattle growth.
 The margins are tight.
 Significant difference between returns from different forages.
 High quality forages could be used in beef production systems in this part of Qld and had been extensively researched.
 Quantify value of grass-legume combination under poor soils.
 Leucaena and grass mix excelled.
 Leucaena as leader.
 Leucaena is the best forage.
 Relative benefits of annual and perennial forages.
 Economic analysis of the forage options.
 Importance of a wider feed selection than just grasses to provide an effective production feed.
 Leucaena is the stand-out.
 Forage sorghum produced most bulk but less gain due to waste.
 Eating quality of forage oats.
-
2. Confirmation that leucaena is a more profitable option.
 Modelling under-estimated animal production.
 Possible sale of cattle twelve months earlier.
 Graze sorghum earlier and harder, to increase value.
 Volume doesn't necessarily mean high returns.
 Pasture is cheaper and better over sorghum. Need to look long term.
 If cropping for grain is an option, think twice about planting forages.
 Wide options for forage types.
 Management was a major factor in optimising the cattle growth benefit from these forages.
 Leucaena importance still relevant despite criticism over the years.
 Weight gain and benefits are lost once feeding stopped.
 Legume importance.
 Don't waste forage on young stock.
 Climate and range of forages suitable.
 Variability of production and quality within forage types.
 Importance of doing the job right agronomically.
 Lush annual crops are not necessarily your best gross margin producers.
 Oats did well,
 Disappointing quality of sorghum and perennial pasture.
-
3. This research is very valuable and so I have followed up by obtaining the printed reports.
 Accumulation of fodder.
 Grazfeed model under-predicted animal liveweight gain.
 Lablab is probably under-rated.
 The need for detailed economic study of these enterprises.
 A number of education materials and support tools have been produced for other producers to benefit from this project.
 Importance of food quality for gain independent of age.
 Better to feed for fattening than growing out.
 Don't return cattle to grass after grazing on high quality forage.
 Prepare, manage and realise how important data is.
 Importance of management in maximising benefits.
 Importance of getting everything right management-wise to get optimum results.
 Utilisation benefits of forage at different time of the year, e.g., leucaena better when grass drops in value.
 Leucaena best.
-

Table 16. List of general comments from respondents – BeefConnect webinar

Love these webinars as we are in the outback and they help us heaps.
 Keep up the good work with this type of applied research. The webinar format is an outstanding extension method. Means presenters must have accurate and relevant data and attendees benefit from the concentration of information and timely presentation.
 Excellent - technology worked very well.
 Very valuable webinar.
 Time is limited in the webinar and therefore more information could have been provided if it went longer; even an extra 1/2 hour could help.
 Include desmanthus in future trials.
 Webinar was very easy to view without any technical problems and well presented. Thank you.
 Excellent, so wonderful that I could be involved in this from home.
 Your post webinar information is also very good. Well done once again.

Table 17. List of comments from respondents, indicating what change/s they intended to make – BeefConnect webinar

Provide better/more informed advice to producers in the Kimberley.
 Use these messages in extension.
 Plant more oats and leucaena.
 Get an agronomist over to look over our pastures and to tell us how to best run them.
 Better understanding of the role of high quality home-grown forages in cattle back-grounding and finishing - using/promoting the tools and knowledge generated from this project to producers and other researchers.
 Very little changes as webinar has confirmed the use of improved feed.
 Look into establishing leucaena/grass forage system.
 Look at better management of the land we have.
 Will need to look closer at the results but appears to support our intention of introducing legumes into buffel grass pastures to increase animal production and maintain or improve soil fertility.
 Make sure my animals have access to both metabolisable energy, suitable protein source and secondary compounds.
 Want to plant leucaena sooner rather than later.
 Change recommendations to producers.

3.4 Presentation to the MLA CQBRC, April 2015

The project technical officer represented the project team in making a presentation to the CQBRC at their April 2015 meeting. The purpose was to update the group on the project activities, outcomes, industry benefits, and planned extension activities. This included providing a summary of project results and outputs as well as copies of the major extension products and tools.

3.5 Internal presentation to FutureBeef extension staff, March 2015

A 45 minute presentation was made to 21 FutureBeef staff from across the state to summarise the outcomes of the project and highlight the extension messages and products with the objective that these then be incorporated into the wider FutureBeef extension program, particularly within the Grazing BMP program.

3.6 Promotion of project messages through DAF FutureBeef and Grazing BMP extension programs, 2014-2016

In July 2015, a four-page summary detailing key project results and messages (Appendix 8.1), the producer guide '*Feeding Forages in the Fitzroy*', and a USB stick providing the three, region-specific, Microsoft Excel forage gross margin spreadsheets as well as electronic copies of additional project resources, were prepared for inclusion in the resource pack provided to all Grazing BMP workshop participants. Furthermore, a 15 minute summary presentation was recorded for use at 'Accelerated' Grazing BMP workshops when none of the project team could be available to present in person. These resources were also made available more widely to the FutureBeef extension team for use where relevant. This 15 minute webinar recording was also made available on YouTube (<https://www.youtube.com/watch?v=VQmegCLQW1Q>) where it has received 127 views as of 12th May 2016.

Since finalisation of the project results, project messages have been presented to producers and industry representatives at 20 events, with a total of 477 attendees including 338 beef businesses. The details of these events are summarised in Table 18. Feedback was collected at nine of these events held from October 2015 to March 2016. The inclusion of the forage gross margin spreadsheets and forage-related economic information in the two Breedcow Dynama workshops received an average rating for usefulness of 85% (13 respondents out of 28 total participants). A total of 77% of survey respondents indicated that they intended to use either the gross margin calculators or the forage guide '*Feeding Forages in the Fitzroy*' to assist in their business decision making in the future. For the seven Accelerated Grazing BMP workshops where feedback was obtained, the overall rating for 'usefulness to your business' of the project messages was 80% (74 survey respondents out of 150 total participants). A total of 59% of respondents indicated that they intended to make a change in their operation that related to the project information presented. The comments made to indicate what changes would be made are listed in Table 19.

At Accelerated Grazing BMP workshops, attendees had the opportunity to nominate topics on which they would like to receive more detailed information in a follow-up, dedicated technical session. Between March 2015 and March 2016, 44 participants expressed interest in a 'high output forages' workshop. The significant interest in our project registered at these events led to the scheduling of the final series of three dedicated project workshops run in April 2016.

Table 18. Extension events at which FutureBeef staff presented project messages

Event and topic	Date	Location	Total attendees	Beef businesses	Project material presented
Total number		20 events	477	338	
Roma stakeholder forum – nutrition and economics	26/08/14	Roma	60	17	Summary presentation
Landcare day – nutrition and grazing management	28/05/15	Yamison	20	20	Summary presentation
Grazing BMP	18/08/15	Gympie	11	10	Summary presentation
Grazing BMP	19/08/15	Gin Gin	15	10	Summary presentation
Grazing BMP	20/08/15	Kingaroy	11	10	Summary presentation
Grazing BMP	25/08/15	Eidsvold	14	9	Summary presentation
NIRS day – nutrition, supplementation, breeder management	19/09/15	Wycarbah	18	15	NIRS results, diet quality implications
Landcare day – nutrition and grazing management	22/09/15	Chinchilla	22	22	Summary presentation
Accelerated Grazing BMP	28/09/16	Taroom	8	8	Summary presentation
Breedcow Dynama – herd modelling	14/10/15	Biloela	16	8	Forage gross margin spreadsheets
Accelerated Grazing BMP	19/10/15	Biloela	34	22	Summary presentation
Accelerated Grazing BMP	21/10/15	Theodore	33	14	Summary presentation
Accelerated Grazing BMP	24/10/15	Alton Downs	34	23	Summary presentation
Accelerated Grazing BMP	04/11/15	Emerald	18	8	Summary presentation
Breedcow Dynama – herd modelling	01/12/15	Taroom	12	6	Forage gross margin spreadsheets
Accelerated Grazing BMP	09/12/15	Moranbah	12	9	Summary presentation
Accelerated Grazing BMP	02/02/16	Rockhampton	14	14	Summary presentation
Accelerated Grazing BMP	02/03/16	Clermont	5	5	Summary presentation
Indonesian livestock policy delegation	09/03/16	Roma	17	20	Summary presentation
AgForce R&D field day	14/04/16	Roma	90	100	Summary presentation

Table 19. List of comments from respondents, indicating what change/s they intended to make – Accelerated Grazing BMP workshops

<p>To gain more experience with leucaena. Investigate fertiliser application on leucaena. Will investigate further our forage options. Yes keep better records. Look more seriously into leucaena. Use more forages, learn more. Analyse our profit from our forage crop and compare it to grain growing. Probably have to increase our area of leucaena, maybe also more butterfly pea. We have leucaena/grass established in 3 paddocks currently and after listening to your report I think we may plan to plant more leucaena. Thank you for your time and effort. Will grow more forage in good black soil due to lack of grass growth. Yes record keeping. Looking at planting 120 acres of leucaena as a trial and then potentially expanding the area of leucaena to other paddocks. Yes we are considering seriously investing in planting leucaena. Keep better grass coverage. Yes. More legume/grass pasture. Sell straight off forages where possible. Work out gross margins. Was good to see figures regarding leucaena. Will continue planting it. Plant more leucaena. Leucaena is the best option. Keep grazing charts to evaluate production on forages compared to pastures. Yes - grow forage with irrigation. Yes!! Lots of changes. Have grown forage sorghum in the past. Will look at it again to get more out of it. Try not to lose liveweight gain through compensatory gain. Maybe try and get a farm economic analysis done. We will start with finding out what soils we are dealing with and go forward from there. Yes grow suitable feed for stock. This gave me a better understanding of my options in the future. Well done, good presentation. Yes in the future. Butterfly pea used as a rotational green manure/grazing on cropping country. Grow lablab on its own to manage more profitably (currently grow lablab and forage sorghum together). Look at whether forage sorghum should be put back to grain crop or to leucaena in other areas. N/A to my operation. Whole farm economic analysis to determine value add of forage crops. Continue to research. Focus on compensatory gain. Improve records for future reference. Update record keeping and start new records. Implement different management strategies. We have been considering introducing leucaena so it was useful to see the results of the research. Gain better control over measures which improve daily weight gain. Rearrange paddock sizes and type of soils. Sell cattle straight after they've been fattened so they don't lose weight advantage. Time leucaena grazing to turn-off market target. Review cost of production of silage and quality. Looking at leucaena. Continually looking for management improvements. Consider planting leucaena and more butterfly pea. Continue with planned leucaena expansion.</p>
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3.7 Response to direct enquiries

The promotion of the project and its results through the field days, workshops, conferences and media releases resulted in a large number of enquiries directed to members of the project team. These enquiries were responded to by telephone or email and usually included provision of the project tools and products in either hard or electronic form. The number of enquires recorded since the initial project field days held in 2014 is 66. However, the total number of enquiries would likely exceed this figure due to the difficulty in capturing this information from a large project team.

3.8 Media articles

A list of media publications during the life of the project is as follows:

- Queensland Country Life newspaper, CQBeef (central Queensland) FutureBeef feature, September 2013: project update.
- Queensland Country Life newspaper, CQBeef (central Queensland) and Beeftalk (southern Queensland) FutureBeef features, 27 March 2014: project up-date and promotion of the 2014 field days.
- MLA Feedback article, June 2014 edition, p. 20-23. This article was comprised of three sections:
 - 'Forage for thought', p. 20, described the background of the project and gave a project update.
 - 'Pushing production with pasture', p. 21, was a producer profile on producer co-operator, David Thornberry, manager of Gordon Downs near Emerald.
 - 'A high-output field day', p. 22-23, summarised the key messages presented at the April 2014 field days.
- Queensland Country Life newspaper, CQBeef (central Queensland) and Beeftalk (southern Queensland) FutureBeef features, 27 November 2014: 'Top tips for forage in summer 2014-15'.
- Beef Bites – A taste of Queensland Innovation, The State of Queensland, May 2015. This article promoted the project tools and future information sessions and workshops.
- Queensland Country Life newspaper, CQBeef (central Queensland) and Beeftalk (southern Queensland) FutureBeef features, 30 July, 2015, pp. 33-34 and p. 35, respectively. These articles presented a summary of key project messages and results, and promoted the tools and products produced as part of the project as well as the availability of future information sessions.
- MLA Feedback article, July/August 2015 edition, p. 16-18, 38. This article was comprised of four sections:
 - 'Crunch time: do forages pay in the Fitzroy?', p. 16, summarised the results and key conclusions from the product as well as the tools produced.
 - 'Feeding forages for the long-term, p. 17, was a producer profile on project producer co-operator, Alan Austin, near Baralba.
 - 'Value adding with forages', p. 18, was a producer profile on project producer co-operator, Andrew Patterson, near Rolleston.
 - 'In the field: Queensland high output forages field days and workshops', p. 38, summarised the attendance at, and feedback from, the June 2015 project field days.

- Queensland Country Life newspaper, CQBeef (central Queensland) FutureBeef feature, 31 March, 2016, p. 32. This article promoted the tools and products produced as part of the project as well as the final series of three field days held in April 2016.

3.9 Conferences

3.9.1 Presentations at Beef Australia, Rockhampton, May 2015

Project results and products were presented at Beef Australia 2015 in a DAF Campfire Session and in a Leucaena Network Seminar. The DAF Campfire Session attracted 25 attendees while the Leucaena Network Seminar attracted 100 attendees.

3.9.2 Key note speaker at the Australian Association of Ruminant Nutrition (AARN) seminar, Brisbane, August 2015

Project results and products were presented at the AARN Queensland Seminar in Brisbane in a 50 minute presentation. A presentation was made to 75 attendees, including interstate and international delegates, the majority being representatives of commercial feed supplement or consulting businesses. Six attendees subsequently requested hard copies of the project tools and products while others may have downloaded electronic copies from the FutureBeef website.

3.9.3 Presentation at the Tropical Agriculture conference (TropAg2015), Brisbane, November 2015

Project results and products were presented at the TropAg2015 Conference in Brisbane on 16-18 November 2015 in a poster presentation. Over 470 delegates attended the conference which focussed on key issues in tropical production systems and global agricultural innovations.

3.9.4 Presentation at the Leucaena Network annual conference, Atherton, May 2016

A 30 minute presentation was delivered at the Leucaena Network annual conference on 12 May 2016 summarising the nutritive value, forage, cattle and economic production from leucaena forage systems as compared to that from alternative forages. A total of 40 delegates attended.

3.9.5 Future events

Papers and presentations summarising key project results and messages have been prepared for two additional conferences to be held during 2016:

- Animal Production 2016, Adelaide, July 2016:
 - One-page paper and oral presentation.
- Northern Beef Research Update Conference, Rockhampton, August 2016:
 - Three, one-page papers
 - One poster
 - Two oral presentations.

3.10 Scientific journal paper

A scientific paper presenting key data measured on the co-operator properties has been accepted by the journal *Animal Production Science*:

Bowen, M.K., Chudleigh, F., Buck, S., Hopkins, K. (Accepted April 2016). The profitability of forage options for beef production in the subtropics of northern Australia. *Animal Production Science* (In press).

3.11 Summary of extension activities and level of achievement

A summary of all extension activities (excluding media articles and scientific papers) and achievement levels for each are detailed in Table 20.

Table 20. Summary of all extension activities in which project messages were promoted

	Level of achievement
Number of events or contact with project staff	121
Field day/workshop	29
Webinar	2
Conference/meeting	7
Property visit	17
Telephone or email enquiry	66
Number of participants receiving direct contact	2144
All events:	
Approval rating of project messages	85%
Survey respondents intending to make practice change	66%
Dedicated extension events after finalisation of project results:	
Approval rating of project messages ^A	88%
Survey respondents intending to make practice change ^B	87%

^AThese events were the June 2015 and April 2016 workshops (6 events in total) and the BeefConnect webinar run in May 2016.

^BThese events were the June 2015 and April 2016 workshops (6 events in total).

4 Discussion

The applied nature of the research project B.NBP.0636 has resulted in many practical recommendations for beef producers in relation to improving productivity and business profitability. To facilitate communication of these messages, to beef producers and industry professionals, extension products were developed and a program of extension activities was undertaken, as described in this report. The high level of interest and enquiries relating to project results justified a 12-month extension to the project end date to allow additional extension activities to occur. The objective of these extension activities was to support adoption of practices which will result in optimal productivity and profitability of high output forage systems for beef producers in northern Australia.

During the life of the project, a total of 2144 people received direct information summarising project key messages. These people either attended one of 38 events or received a property visit, telephone or email response to a direct enquiry. While the overall approval rating from all events was 85%, the approval rating was even higher at the seven dedicated extension events held post finalisation of the project results: 88%. Similarly, the number of survey respondents indicating their intention to make a change to their business as a result of project messages rose from 66% across all surveyed events to 87% for attendees of the six dedicated, full-day project workshops in 2015 and 2016.

While dedicated full day workshops allow a better understanding of project messages to be acquired, and for trust in the project team and the results to be developed, these events are expensive and labour intensive to run. The 1 hour BeefConnect webinar was a low-cost, highly successful way of promoting the project and its messages to a wide audience, including interstate viewers. The number of views on YouTube of this webinar, and the 15 minute webinar, has continued to rise over time (541 and 127 views, respectively, as of 12th May 2016). Feedback from those who attended the live BeefConnect webinar was excellent with an overall approval rating of 92%, the highest of any of the extension activities. The embedding of project messages within other, existing DAF FutureBeef extension programs, particularly Grazing BMP, has provided a very cost-effective means of continuing the communication of project key messages and has still proved effective in creating intended practice change. The proportion of respondents intending to make a practice change after viewing a short 15 minute presentation at Accelerated Grazing BMP events was 59%, which is still relatively high given the amount of time dedicated to the project messages.

The proportion of participants across all events who have actually undertaken practice change, cf. stating their intention, is unknown. A detailed survey to obtain this information was outside the scope and resources of this project. However, we believe that the 'intended' practice change as a result of project messages is highly likely to occur, for the following reasons:

- The majority of project recommendations relate to changes in management (i.e. agronomy, grazing management, monitoring and data collection, selection of alternative forage options) rather than adoption of a novel technology.
- A pathway to facilitate adoption has been provided.
 - Extension tools to support decision making have been produced, including the producer guide '*Feeding Forages in the Fitzroy*' and the series of forage gross margin spreadsheets.

- The extension tools, particularly the gross margin spreadsheets, have been demonstrated in workshops to facilitate understanding and familiarity.
- Detailed recommendations have been made about how to proceed if undertaking practice change, including:
 - Seeking professional assistance to undertake a whole farm economic analysis (net profit budget) to assess forage options.
 - Seeking further advice on forage selection for land type and associated establishment techniques. The DAF pasture agronomy team have been promoted to support this process.

We believe that the effectiveness of the communication and extension activities conducted as part of this project has in large part been due to the multidisciplinary, systems approach achieved through a project team drawn from a range of key disciplines, i.e. agronomy, animal nutrition, economics, and extension specialists. The high level of industry acceptance and intended adoption of project messages demonstrates the significant synergies and positive outcomes for industry from accessing multidisciplinary, regional teams with a strong focus on applied research. Another key aspect which contributed to industry engagement was the involvement of beef producer co-operators in the project, enabling commercially relevant data to be collected that producers could relate to and have confidence in.

The economic analysis component of the project was essential in giving producers the 'bottom-line' answers they were looking for. To facilitate understanding of the economic results, amortised gross margins were used in paddock-level comparisons rather than net present value (NPV) measures, which had proved difficult to explain in Phase 1 of this project (B.NBP.0496; Bowen *et al.* 2010). Furthermore, a series of whole farm analyses (net profit budgets) were conducted to provide a deeper understanding of the comparative effect of forage options on business profitability. The value of these analyses was not lost on beef producers as is demonstrated in the high number of comments nominating this information as the most valuable aspect of the project.

It can be difficult to attract time-poor, producers to full day extension events, even when these events are provided at no cost. A total of 178 people attended the nine dedicated full day extension events held for this project. These numbers were greatest when held on producer properties with an included paddock tour (97 attendees across three field days) than for workshops held in regional towns (81 attendees across six workshops). A variety of methods were used to promote these events including email, websites and Facebook in addition to more traditional methods such as newspapers and flyers on noticeboards or in mail-outs. For promotion of the nine full day information days, emailed notifications proved very cost effective and successful with the 44-65% of attendees nominating this method as how they found out about the event. Interestingly, a significant proportion of attendees still found out about the event via word of mouth (11-17%). The mail-out of flyers which was undertaken prior to the three workshops conducted in 2015 resulted in 19% of the attendees. However, given the expense of this strategy, a higher response rate was expected.

The importance of monitoring and evaluating the extension activities was not initially realised by the project team. The focus was primarily on delivering quality events and messages rather than on gathering feedback to demonstrate effectiveness. As a result, the format of the feedback gathered over the course of the project was not consistent. Better insights into

the impact of the extension activities and adoption levels could have been obtained with a more rigorous and consistent approach to monitoring and evaluation.

5 Conclusions/Recommendations

5.1 Conclusions

- i. The communication of key messages and recommendations from Project B.NBP.0636 has been extensive with a total of 2144 people receiving direct information about the project at 121 events/contacts, including 29 field days or workshops.
- ii. The overall acceptance and rating of project messages has been high with an average approval rating of 85% across all surveyed events and of 88% across the seven dedicated extension events held after finalisation of the project results.
- iii. The intended level of practice change as a result of project messages and recommendations was 66% across all surveyed events and 87% for the six full day workshops held after finalisation of project results. The intention to make practice change indicated by 59% of participants at Grazing BMP workshops indicates the value to be gained from this low-input extension strategy of embedding messages within existing FutureBeef extension programs.

5.2 Recommendations

- i. That the extension of project messages and recommendations be continued through ongoing extension activities, including the FutureBeef and Grazing BMP programs.
- ii. That a detailed survey of producers in the Fitzroy River catchment be conducted to quantify intended and actual practice change occurring as a result of project messages.
- iii. That further research be carried out to develop and evaluate accelerated cattle growth paths achieved through optimising production from the feed-base. Scientific and economic analysis is required to determine the most productive and profitable growth path options and nutritional interventions (either forage or supplement) for meeting beef markets in northern Australia. The current project (B.NPB.0636) has compared forage productivity and profitability at discrete points in the growth path of cattle. Better information is now required to fine-tune management of these forage systems and to answer the question: 'What is the most productive and profitable way to use a limited resource of high quality forage or concentrate supplement to meet high value market targets for finished or live export stock in northern Australia?'. Or, more specifically, 'At what age and stage of the growth path, from weaning to slaughter, should beef cattle receive access to high quality forages or concentrate supplement in order to maximise productivity and profitability?'

6 Key Messages

- i. Key aspects contributing to the effectiveness of communication and extension activities for applied research projects include:
 - Involvement of beef producer co-operators in the project.
 - Bringing together a multidisciplinary project team to facilitate a 'systems approach'.
 - Embedding extension officers within the project team to facilitate producer engagement and create a focus on industry-relevant outcomes and messages.
 - Including economist expertise in the project team to allow the financial implications of recommended practice change to be determined and demonstrated.
 - Providing a pathway to adoption, i.e.
 - Producing extension products and tools to support decision making, such as the producer guide and gross margin spreadsheets produced in this project.
 - Demonstrating how to use the tools and how to undertake recommended practice change, at workshops or other dedicated extension events.
 - Providing detailed recommendations about how to proceed, i.e. where to seek additional advice, and on what specific areas, to ensure a successful outcome.
- ii. Effective monitoring and evaluation programs allow the effectiveness of extension programs to be demonstrated.

7 Bibliography

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8 Appendix

8.1 Four-page project Summary: *'Maximising beef production and profits using high quality forages'*

This document is provided separately. This summary was prepared for inclusion in the resource pack provided to all Grazing BMP workshop participants but has also been used more widely as a summary of the project key results and messages.

8.2 A selection of photographs taken during extension events

Fig. 5-19 show a range of extension activities, but primarily the nine dedicated, full day information days held over 2014-2016.



Fig. 5. Members of the project team, Stuart Buck, Maree Bowen and Kylie Hopkins, at the launch of the *'Feeding Forages in the Fitzroy'* book at Beef Australia, Rockhampton, May 2015.



Fig. 6. Members of the project team: Tim Emery (beef extension officer), Stuart Buck (sown pasture agronomist), Kylie Hopkins (beef technical officer), Jason Brider (programmer), Maree Bowen (project leader and ruminant nutritionist), Fred Chudleigh (economist) and Byrony Daniels (beef extension officer). (Photograph contributed by Paula Heelan).



Fig. 7. The four presenters at the nine project information days held over 2014-2016, clockwise from top left: Fred Chudleigh, economist; Stuart Buck, sown pasture agronomist; Kylie Hopkins, project technical officer; Maree Bowen, project leader and ruminant nutritionist.



Fig. 8. Host producer, David Thornberry of Gordon Downs (near Capella), speaking at the April 2014 project field day.



Fig. 9. Host producer, David Thornberry of Gordon Downs (near Capella), giving a property tour as part of the April 2014 project field day. (Photograph contributed by Paula Heelan).



Fig. 10. Maree Bowen presenting at the 2014 project field day at Albinia, near Rolleston.



Fig. 11. Host producer, Andrew Patterson of Albinia (near Rolleston), giving a paddock tour as part of the 2014 project field day.



Fig. 12. Host producer, Ted Perrett of Bottle Tree Hills, speaking at the 2014 project field day at Cattle Downs near Taroom.



Fig. 13. Host producer, Ted Perrett of Bottle Tree Hills, giving a paddock tour at the 2014 project field day at Cattle Downs near Taroom.



Fig. 14. Fred Chudleigh presenting at the 2015 project workshop in Clermont.



Fig. 15. Kylie Hopkins presenting at the 2015 project workshop in Moura.



Fig. 16. Maree Bowen presenting at the 2015 project workshop in Taroom.



Fig. 17. Maree Bowen presenting at the 2016 project workshop in Wandoan.



Fig. 18. Stuart Buck presenting at the 2016 project workshop in Biloela.



Fig. 19. Maree Bowen presenting at the 2016 project workshop in Emerald.