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Review and update of the FutureBeef extension training packages

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Abstract

The EDGE*network* (EDGE) offers practical learning opportunities to help beef cattle and sheep producers in northern Australia gain knowledge and develop skills necessary to improve their livestock enterprises. There are currently four EDGE training packages being delivered by Meat and Livestock (MLA)–accredited public and private sector extension providers: *Breeding EDGE*, *Business EDGE*, *Grazing land management EDGE* and *Nutrition EDGE*. These packages have been delivered successfully for over ten years but required updating and repackaging to better meet evolving industry needs.

A significant amount of research and development (R&D), technological advancement and delivery expertise has occurred since these packages were developed. The aim of the *Review and update of FutureBeef extension training packages* project was to review existing specified training materials, identifying gaps and integrate R&D outcomes within a new livestock business context. It also incorporated new technology and tools, considered flexible and alternate delivery options by extension providers, developed business, vocational education and training, and monitoring and evaluation plans, to ultimately improve training delivery and the adoption of management practices to lift business and industry performance.

As a result of this collaborative FutureBeef for Northern Australia Program (FutureBeef) project, training participants and deliverers will benefit from updated, integrated and more flexible *Breeding EDGE*, *Grazing land management EDGE, Nutrition EDGE packages,* and the *Northern livestock transporters course*. These have been complemented further by a new *Grazing fundamentals* module and *Planning book*. Recommendations outlined in this report will require further consideration by FutureBeef partners, MLA, Department of Agriculture and Fisheries (DAF), Northern Territory Department of Primary Industry and Fisheries (NTDPIF) and the Western Australia Department of Food and Agriculture (DAFWA), particularly around the capacity building of public and private sector workshop deliverers.

Executive summary

This project was developed to review and update, within a livestock business context, specified extension training packages. These training courses are primary vehicles for delivering key research and development messages, technologies and tools to industry, as part of the FutureBeef Program for Northern Australia. The project also investigated more flexible, learner–orientated delivery options to suit the changing context of training package demand, delivery and follow–up by the northern Australia livestock industry. Another project component was to develop processes for continual improvement of technical content, monitoring and evaluation, and consistency and quality assurance across the packages.

The project successfully:

1. Updated the technical content in the Breeding EDGE, *Grazing land management* EDGE and *Nutrition EDGE* packages, identified gaps and linked the three packages more closely together within a business context, with consistent language terminology and key messages for these packages.
2. Updated the technical content in the *Northern livestock transporters course*.
3. Developed a new *Grazing fundamentals* module (and associated materials) that integrates the *Grazing land management EDGE* and *Nutrition EDGE* packages.
4. Developed a new *Planning book* for use with each workshop and across all packages.
5. Identified new specialist modules and frameworks that will further enhance participant knowledge about concepts, technologies and associated management practices, introduced in the existing EDGE packages.
6. Identified the need for and outlined an introductory, *Business planning and productivity analysis* module, also referred to as *Launch pad*.
7. Developed key extension messages for each of the FutureBeef Program priority areas (breeding, grazing land management, nutrition, weaner management, whole of business management).
8. Updated and collated associated package resources, e.g. workshop manuals, PowerPoint presentations, references, workshop delivery material (templates, forms, process notes, etc.) on the FutureBeef intranet.
9. Developed a process for future package updates.
10. Developed a monitoring, evaluation and reporting process, including data management recommendations.
11. Developed business and operational plans for consideration by Meat & Livestock Australia and FutureBeef partner organisations, including:
    a. Alternative or complementary delivery models
    b. Vocational Education and Training (VET) accreditation
    c. Train–the–trainer requirements
    d. Pricing guidelines

Once the updated packages are reviewed technically by MLA, professionally edited and designed, they will be available to public and private extension deliverers through MLA licensing arrangements, for delivery to industry. The materials will also be beneficial to extension professionals, agricultural and scientific students, and others in extension roles.

The results of this project have already and will continue to benefit individual agriculture businesses, research and extension staff in both direct learning and in wider exposure of past and ongoing research.

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1. Background

Targeting training to northern Australian beef business owners and managers is very challenging as not only does the beef industry have the largest agricultural footprint in extensive grazing lands; it is also the most geographically dispersed. Over 18,000 beef businesses produce around 59% of the nation's cattle herd across 250 million hectares of land across Queensland, the Northern Territory and the Kimberly and Pilbara regions of Western Australia. The beef industry is high value, with a gross value of production of over $3 billion (farm–gate). It also provides regional and urban employment along the supply chain including production, transport, processing and retail. As critical suppliers of high quality, sustainably–produced live and processed products for global and domestic markets, northern beef businesses need to invest time and funds into professional development and training opportunities. This will allow them to take commercial advantage of well–known and new research and development (R&D) outcomes and integrate these into their businesses.

Running profitable and sustainable beef businesses in the current global environment is difficult, whether businesses are large–scale, multi–property corporates, and larger family–owned or smaller operations. Recent studies into the performance of the northern beef industry over the past 12 years shows the majority of beef businesses are unsustainable, with high debt and operating costs, and sub–optimal production performance, resulting in a very low return on investment. However, the top 25% producers who are prospering are 'business–minded' and adopt management practices on key performance drivers such as improving reproductive rates, decreasing mortality rates and lowering production costs.

Meat & Livestock Australia (MLA) manages a suite of specialised EDGE*network*® (EDGE) training workshops that have been developed and targeted primarily to northern Australian beef producers to improve beef production and enterprise profitability and sustainability. These workshops have been used for more than a decade to lift the awareness of MLA and collaborator–funded research and development outcomes and to accelerate the adoption of best management practices. The workshops, *Nutrition EDGE*, *Breeding EDGE* and *Grazing land management EDGE* are delivered by accredited public and private sector training deliverers, traditionally, in a three-day face–to–face format. A more recent addition, a two-day *Business EDGE* workshop, is delivered by private providers.

Despite the successful engagement and widespread delivery of EDGE workshops in the early 2000s, the loss of government training subsidies coupled with the financial and emotional impact of extended drought and poor business profitability, significantly reduced producer participation. Despite these conditions, industry training and extension follow–up continues to be critical to lift business performance and there is recognition from RD&E funders that the provision of training at no or very low cost to the producer is unsustainable and also erodes private extension capacity. Public sector extension delivery has also been contracting across northern Australia. Given the dynamic and global environmental, operational and production pressures beef businesses must face, MLA and collaborators recognised that training workshop materials and the delivery framework needed to be updated. EDGE and other workshops under this project can be delivered as 'stand–alone' training events, or as part of projects funded by other organisations such as the Grazing Best Management Practices (BMP) program conducted in Queensland.

This project reviewed and updated the workshop materials for five workshops (including state department workshops), developed monitoring and evaluation recommendations, and developed business and operational plans with recommendations to inform future delivery options, including trainer accreditation and train–the–trainer. Significant effort was made to integrate business and production themes and consistent key messages across all of workshop materials. The materials have also been designed around 'modules' that can be 'cherry–picked' by trainers to maximise relevance to local training needs and provide for

greater delivery flexibility. Training delivery in the beef industry needs to shift from ‘static’ single delivery events, like a single workshop, to a more dynamic framework that supports an enterprise improvement pathway (EIP) approach. That is, training that integrates local and individual business training needs, individual learning styles, and new and emerging technology in linked training events, over a period of time. Supporting beef businesses along a ‘learning journey’ with further engagement around the desired behaviour changes is more likely to result in on–farm practice change, than participation at one–off events with no follow–up.

The project was supported by MLA, the Queensland Department of Agriculture and Fisheries (DAF), the Northern Territory Department of Primary Industry and Fisheries (NTDPIF) and the Western Australia Department of Agriculture and Food (DAFWA), as part of the FutureBeef Program for Northern Australia.

1.1 Brief history of EDGE

Meat & Livestock Australia and its predecessor, the Meat Research Corporation (MRC), over the ten years up to 1998, contributed in excess of $20 million to funding research and development activities in the cattle industry in northern Australia. This funding was leveraged by other agencies by a factor of between three and five times, equating to an R&D spend approaching $100 million. This spending enabled the conduct of excellent science and the development of an impressive array of technologies and processes, which, if applied, would have significant beneficial impact on productivity and resource sustainability. However, adoption of these was disappointing. It can be argued that there was not effective packaging and promotion of those R&D outputs in a format where their application is clearly explained, their likely benefits defined and their impact, both positive and negative, on other elements of the management mix highlighted.

In response to this perceived weakness in adoption, MLA’s North Australia Program (NAP) initiated the BeefPlan project in order to generate and document appropriate strategic and tactical management systems as they apply to successful northern livestock enterprises. Critically, this work was contracted to five groups of active livestock producers in order to maximise the relevance and practicality of the management plans developed. One application of this work was to enable MLA to better position its activities within a meaningful management context. NAP also undertook extensive market research across its geography to ascertain the needs of livestock producers with regard to training in certain discipline areas. This research clearly indicated a demand among producers for education and training and, furthermore, a willingness to pay for that training. At the same time, the FarmBis program flagged its financial support for producers undertaking training that leads to sounder management, especially at the strategic level.

Meat & Livestock Australia recognised that there were a large number of very good, stand–alone training products available to producers but these products were not coordinated or subject to ongoing quality assurance. A 1998 forum, sponsored by NAP and attended by producers and extension personnel, was held to discuss education and training in northern Australia. This forum highlighted the fragmentation and confusion that existed in the minds of producers and among deliverers and called for a mechanism to bring a level of coordination and simplification to the area. Around that time, MLA was also investigating the development of an integrated training and education process for livestock producers in southern Australia. This process was reworked and refined and was launched in southern Australia as EDGE*network*. The aim of this program was to provide ongoing education and training that would contribute to an improved management capability and practice among participants.

1.2 The development of EDGE for northern Australia

Following the 1998 NAP forum, 'MLA and the Queensland Beef Industry Institute (QBII) used the marketing process *Quality function deployment* (QFD) to determine the education needs of beef producers in northern Australia with regards to beef cattle nutrition management.

Quality function deployment (QFD) is a customer focussed market analysis tool. It is "…a methodology for building the voice of the customer into product and service designs. It is a team tool, which captures customer requirements and translates those needs into characteristics about a product or service. QFD is a systematic means of ensuring that customer requirements are accurately translated into relevant technical descriptors throughout each stage of product development. Meeting or exceeding customer demands means more than just maintaining or improving product performance. It means building products that delight customers and fulfil their unarticulated desires" (Becker Associates 1998).

The QFD project team was comprised of twelve representatives from a range of stakeholder organisations and disciplines. The main steps of the process were the conduct of:

1. Project brief workshop
2. Qualitative outcome research
3. Outcome research results workshop
4. Quantitative research
5. Internal and unspoken outcomes workshop
6. Positioning workshop
7. Enabling strategies workshop
8. Deployment workshop

In summary, the process used to develop *Nutrition EDGE* involved:

- Extensive customer research and consultation of beef producers (external customers) to ascertain the outcomes or benefits of a product that they hold as valuable or desirable.
- Developing a questionnaire based on these outcomes and benefits.
- Surveying producers using this questionnaire.
- Gaining an appreciation of what producers think of competing products and where ours sits by comparison.
- Repeating this process with potential deliverers and other stakeholders (internal customers) of the package.
- Assimilating the feedback from producers and potential deliverers to specify product design characteristics (McIntosh *et al* 2000).

This was the first time that such a process had been conducted in this sector of the industry. Two hundred and ninety producers from across Queensland, the Northern Territory and Western Australia were interviewed. The results of this process provided considerable insights into issues of concern to northern producers in terms of beef cattle nutrition and how education, extension and research organisations could ensure that they meet the needs of their target audience' (McIntosh et al 2000). The results of this work led to the development of the *Northern nutritional update workshop* and the associated *Northern nutritional update workshop technical manual* for advisors (public and private) and also to the *Northern Nutrition* (subsequently the *Nutrition EDGE*) package for producers.

Consequently, the QFD process was used by 'MLA, in cooperation with the QBII, NTDPI&F, CSIRO Tropical Agriculture, and the Tropical Savannas Cooperative Research Council (CRC), to assess the market requirements for grazing land management education within the beef production sector in northern Australia. This project followed on from, and

complemented, the assessment of market requirements for beef cattle nutrition education' (MLA 2014). This resulted in the development of the *Grazing land management EDGE* package.

Market research that led to the development of the *Breeding EDGE* package was also conducted using QFD. 'In total, 142 producers were surveyed across three zones of Queensland (endowed, intermediate and harsh) and a fourth region comprised of the Northern Territory and Western Australia. The project team consisted of: Mick Tierney, Geoffry Fordyce, Andrew Phillips and John Bertram (DAF); Peter Dundon (Beef CRC); Peter Loneragan, Shane Blakeley and Ian McLean (MLA); Richard Apps, Jay Simms and Anne Stunzer (Producers),' (Blakeley 2001).

Nutrition EDGE (or *Northern Nutrition* as it started out) was rolled out in 2000, with *Breeding EDGE* in 2001, the first *Grazing land management EDGE* in 2002 and *Business EDGE* in 2013.

EDGE was coordinated nationally by a full–time MLA national manager and a full–time project officer, with dedicated administrative support, as well as legal and contracting support as required. There were over 40 EDGE packages available to livestock producers at the time, five of which were developed specifically for northern Australia (*Breeding EDGE*, *Grazing land management EDGE*, *Marketing EDGE*, *Nutrition EDGE* and *Selling EDGE*). The southern Australian EDGE packages for beef producers were eventually incorporated into the *More beef from pastures* (MBfP) program. An EDGE web site and email, i.e. www.edgenetwork.com.au and edgenetwork@mla.com.au were also developed.

1.3 Current EDGE program delivery in northern Australia

EDGE training workshops are a key training strategy under the FutureBeef Program for Northern Australia. FutureBeef is an extension and communication collaboration between MLA, DAF, NTDPIF and DAFWA between 2012 and June 2016. This project was the first significant, collaborative co–invested project within the program.

Meat & Livestock Australia contracts public and private sector providers to provide the workshop delivery services on the basis of it having met MLA's requirements for method and standard of delivery. It also has EDGE delivery coordination contracts (delivery deeds) with each of the three partner state agencies to coordinate the marketing, delivery and administration of EDGE workshops. The EDGE coordinators are responsible for ensuring that agency staff adhere to the contractual requirements, including how promotions, workshop delivery, and monitoring and evaluation are conducted. Meat & Livestock Australia manages the deeds for private providers directly. At times, depending on capacity, agency staff can also subcontract partner or private deliverers, where this is part of a contracted project. Private providers can also organise and conduct EDGE training, separate to the public sector delivery.

The current EDGE contacts and support for northern Australia are:

- National EDGE coordinator: Charlotte Fox, R&D Extension Manager – Beef, MLA
- Western Australia EDGE coordinator: Manus Stockdale, Development Officer / Project Manager, DAFWA
- Northern Territory EDGE coordinator: Trudi Oxley, Beef Industry Development Officer, NTDPIF
- Queensland EDGE coordinator: Jenny Milson, Rangelands Scientist, DAF

Meat & Livestock Australia no longer has a full–time program manager, project officer and administration support specifically dedicated to the program.

1.4 Project background

The project was developed to review and update four training packages which are one of the FutureBeef Program's primary vehicles for delivering key R&D messages, technologies and tools to industry. The project also investigated more flexible, learner–orientated delivery options to suit the changing context of training package demand, delivery and follow–up. Another project component was to develop a process for continual improvement of technical content, monitoring and evaluation, and consistency and quality assurance across the packages.

Each EDGE package was originally comprised of:

Breeding EDGE

- Workshop notes (212 pages)
- Presentation slides (203 slides)
- Facilitators notes (104 pages)
- Delivery tools, including: annual production calendar, breeding plan template, case study, options analysis spreadsheet, pro–forma template, roadmap poster, generic marketing poster and a marketing brochure.

Grazing land management EDGE

- Workshop notes (214 pages)
- Planning book (29 pages)
- Presentation slides (490 slides)
- Technical manual (189 pages)
- Facilitators notes (158 pages)
- Participants tool kit, including: calico bag, shears, quadrat, weed identification book, Prime Notes CD, plant identification book for the region, CD of handy tools (now available on the internet), pasture yield photo standards, land type sheets, pasture growth tables, property maps, pasture management book for the region (i.e. Ian Partridge's series)
- Delivery tools, including: roadmap poster, generic marketing poster, and a marketing brochure.

Nutrition EDGE

- Workshop notes (195 pages)
- Workshop notes handy guide (24 pages)
- Presentation slides (212 slides)
- Technical manual (195 pages)
- Facilitators notes (172 pages)
- Delivery tools, including: acronyms poster, bionic cow presentation, blank poster (i.e. for recording issues), roadmap poster, macro– and micro–minerals poster, generic marketing poster, and a marketing brochure.

These EDGE packages have not been formally reviewed since their development, although informally they were updated by accredited presenters to meet local training needs and incorporate current R&D information and tools. Following the initial, or first, *Grazing land management EDGE* package, MLA contracted the development of an additional 18 regional versions (of which 16 are currently available):

1. Pilbara – 2014
2. Barkly – 2011
3. Border Rivers – 2011
4. Indigenous – 2009
5. Kimberley – 2009
6. Fitzroy Basin – 2006
7. Northern Gulf – 2006
8. Queensland Murray–Darling Basin – 2006
9. Southern Gulf – 2007
10. Desert Uplands – 2007
11. Channel Country – 2007
12. Central Australia – 2005
13. Mulga – 2005
14. South East Queensland – 2005
15. Katherine – 2004
16. Mitchell Grass Downs – 2004
17. Burdekin – 2003
18. Mackay Whitsundays – 2002

1.4.1 The project team

A multi–disciplinary project team across northern Australia was established and included technical experts in beef nutrition, breeding and grazing land management from the public and private sectors, as well as individuals who had been instrumental in the development and production of the original EDGE training workshops. There were also a number of members with education, communications and marketing backgrounds, and the majority were extension professionals. This expertise and experience fast–tracked the understanding, context and learnings from the original training course development and allowed far more comprehensive integration of the business principles and key messages had this experience not been available. Similarly, due to this knowledge, the project team was able to effectively draw upon other technical expertise in the private and public sector for the technical reviews.

The project team was comprised of:

- Jane Pryor, DAF Rockhampton (first project leader)
- Désirée Jackson, DAF Longreach (second project leader and *Breeding EDGE* and *Nutrition EDGE* technical editor team leader), then Désirée Jackson, Désirée Jackson Livestock Management
- Felicity McIntosh, DAF Brisbane (final project leader)
- Jenny Milson, DAF Longreach (*Grazing land management EDGE* technical team leader)
- Trudi Oxley, NTDPIF Katherine
- Rebecca Farrell, DAF Brisbane
- Krista Cavallaro, DAF Brisbane
- Kiri Broad, DAF Roma

Liz Allen was the first MLA project liaison, followed by Charlotte Fox.

Since project commencement in December 2012, DAF project leadership changed on three occasions, with two DAF staff exiting temporarily or permanently. A number of key DAF staff also unexpectedly exited the department, leaving considerable gaps in project team delivery. This created a very high contractual workload managing the project team of seven agency staff, 10 technical providers, two MLA staff and 25 external contracts, and delays to contract processes due to government changes.

MLA also experienced program management changes that impacted on this project, with Liz Allen (duties included National EDGE Program Coordinator) and Jane Weatherly exiting or moving within the organisation, and Charlotte Fox who will also leave at the end of this project.

As a result, a higher level of detail is being provided in this report as background for incoming staff who may be responsible for progressing recommendations in this report. To maintain the integrity and effectiveness of programs like EDGE, it is crucial to develop and formally document business and operational strategies to assist current and future staff. This will also help to improve the efficiency of staff handovers and improve continuity to clients in terms of service provision.

This project has developed business and operational plans, including monitoring, evaluation and reporting recommendations, for the consideration of MLA and FutureBeef partners. Key 'historical' references relating to EDGE and its evolution have also been collated in the bibliography of this report.

1.4.2 The review process

EDGE review workshops for each package were held to discuss proposed changes in terms of technical upgrades, as well as modes of delivery. The technical editor teams were then formed to incorporate these changes into the packages.

The *Breeding EDGE* review workshop participants were:

1. Désirée Jackson, DAF Longreach – Project leader
2. Jane Pryor, DAF Rockhampton – Project leader
3. Gerry Roberts, GR Consulting, Longreach – Facilitator
4. Trisha Cowley, DPIF Katherine
5. Mick Sullivan, DAF Rockhampton
6. Krista Cavallaro, DAF Brisbane
7. Lauren Williams, DAF Mackay
8. Rebecca Farrell, DAF Brisbane
9. John Bertram, Beef Management & Production Advisor, Mount Sylvia
10. Alan Laing, DAF Ayr Research Station
11. Diana Leemon, DAF Brisbane
12. Geoffry Fordyce, Queensland Alliance for Agriculture & Food Innovation (QAAFI) Charters Towers (via telephone)

Apologies: Geoff Niethe (Niethe Consultancies) and Ken Murphy and Tim Emery (DAF).

The *Grazing land management EDGE* review workshop participants were:

1. Jane Pryor, DAF Rockhampton – Project leader
2. Gerry Roberts, GR Consulting, Longreach – Facilitator
3. Jenny Milson, DAF Longreach
4. David Phelps, DAF Longreach
5. Bob Shepherd, DAF Charters Towers
6. Megan Willis, DAF Charters Towers
7. Trudi Oxley, DPIF Katherine
8. Anne–Marie Huey, DAFWA Cable Beach
9. Jill Alexander, Applied Ag, Dalby
10. Col Paton, EcoRich Grazing, Roma
11. Mick Quirk, MLA Brisbane
12. Krista Cavallaro, DAF Brisbane
13. Felicity McIntosh, DAF Brisbane
14. Diana Leemon, DAF Brisbane

Apologies: Joe Rolfe (DAF).

The *Nutrition EDGE* review workshop participants were:

1. Désirée Jackson, DAF Longreach – Project leader
2. Jane Pryor, DAF Rockhampton – Project leader
3. Gerry Roberts, GR Consulting, Longreach – Facilitator
4. Roger Sneath, DAF Toowoomba
5. Bernie English, DAF Mareeba
6. Jenny Milson, DAF Longreach
7. Peter Smith, DAFWA–DAF Charters Towers
8. Kiri Broad, DAF Roma
9. Russ Tyler, Tyler Rural Consulting, Gayndah
10. Felicity Hamlyn–Hill, Beef Enterprise Advisory Services, Nebo
11. Felicity McIntosh, DAF Brisbane
12. Diana Leemon, DAF Brisbane
13. Trudi Oxley, NTDPIF

Apologies: Trudi Oxley and Kieren McCosker (NTDPIF), Anne Marie Huey (DAFWA), Krista Cavallaro and Emma Hegarty (DAF).

The outcomes for each of the EDGE review workshops are detailed in Appendix 6.2.

EDGE review teleconferences (5 February 2013) were also held for *Business EDGE* and monitoring and evaluation.

The *Business EDGE* review teleconference participants were:

- David Hickey, DAF Rockhampton
- Désirée Jackson, DAF Longreach
- Jane Pryor, DAF Rockhampton – project leader
- Felicity McIntosh, DAF Brisbane
- Kiri Broad, DAF Mareeba
- Krista Cavallaro, DAF Brisbane
- Rebecca Farrell, DAF Brisbane
- Roger Sneath, DAF Toowoomba
- David Counsell, Bush Agribusiness
- Steve Petty, Northern Development Co.
- Gerry Roberts, GR Consulting, Longreach – facilitator

Apologies: Liz Allen (MLA), Ian McLean (Bush Agribusiness) and Phil Holmes (Holmes & Co.).

The monitoring and evaluation review teleconference participants were:

- Brigid Nelson, DAF Charters Towers
- Désirée Jackson, DAF Longreach
- Felicity McIntosh, DAF Brisbane
- Jane Pryor, DAF Rockhampton – project leader
- Krista Cavallaro, DAF Brisbane
- Rebecca Farrell, DAF Brisbane
- Jackie Kyte, JK Connections
- Gerry Roberts, GR Consulting, Longreach – facilitator

Apologies: Liz Allen and Jane Weatherley (MLA).

1.4.3 Technical editors

Three technical editor teams, one for each package, reviewed and updated package content and associated materials and made recommendations regarding delivery options based on their experience and also the outcomes from the *FutureBeef training packages content review* (Appendix 6.1) and the *EDGE workshop review workshops* (Appendix 6.2).

The technical editors for *Breeding EDGE* were: Désirée Jackson, Désirée Jackson Livestock Management; Rebecca Farrell, DAF; Geoff Niethe, Niethe Consultancies; Felicity Hamlyn–Hill, Beef Enterprise Advisory Services, and; Paul Williams, Tropical Beef Technology Services.

The technical editors for *Grazing land management EDGE* and *Grazing fundamentals* were: Jenny Milson, DAF; Jillian Alexander, Applied Ag; Colin Paton, EcoRich Grazing; Megan Willis, DAF; Bob Shepherd, DAF; David Phelps, DAF, and Kiri Broad, DAF.

The *Nutrition EDGE* technical editors were: Désirée Jackson, Désirée Jackson Livestock Management; Roger Sneath, DAF; Russell Tyler, Tyler Rural Consulting, and; Felicity McIntosh, DAF.

The technical editors for the *Northern livestock transporters course* were Trudi Oxley and Trisha Cowley, NTDPIF.

Ian McLean, Bush Agribusiness, provided input across *Breeding EDGE*, *Grazing fundamentals*, *Grazing land management EDGE*, *Nutrition EDGE* and the *Planning book*.

2. Project objectives

The five project objectives were:

1. By 1 May 2015 review and update current workshops including review and update key extension messages and current underpinning evidence around production areas that are critical profit drivers for the beef industry. Workshops to be included: *Breeding EDGE*, *Nutrition EDGE*, *Business EDGE**, *Grazing land management EDGE*, *Marketing and Selling EDGE*, *Stocktake**, *Testing management options** and the *Northern livestock transporter course*. Courses marked with an asterisk (*) will not be technically updated, only reviewed for consistency of key messages and business and operational planning.

2. Resources from existing workshop materials (including presenter PowerPoint slides, notes and teaching materials) updated and consolidated on the FutureBeef website (staff intranet).

3. Continual content update process across the workshop suite developed.

4. Recommendations for a monitoring and evaluation (M&E) and data management process developed in conjunction with the existing FutureBeef M&E plans and systems.

5. Business and operational plans developed that include consideration of the following:
   a. Delivery models based on existing market research and extension/adult learning trends
   b. Integrated and consistent communication of key messages across workshops, magazines, newsletters, forums, eBulletins and the time and reach of these across northern Australia
   c. VET accreditation path options around workshops/training packages
   d. Train–the–trainer needs for building capacity of deliverers
   e. Pricing guidelines for participants and deliverers.

3. Methodology

The project consisted of four sequential components:

- Component 1—Project team and advisor planning and preparation
- Component 2—Training package structure and templates
- Component 3—Update training packages
- Component 4—Business and operational planning

Within these were 16 steps, as outlined in the project contract, to achieve the project objectives, with progress as follows:

3.1 Component 1—Project team and advisor planning and preparation

1. Existing five training packages reviewed. Including a SWOT analysis of current training package content, delivery style(s), support materials and available deliverers. It included a summary of current monitoring and evaluation tools (and processes) and results to

date. Previous reviews (both internal and external) were the starting point for this brief desktop study.

2. Existing training package materials audited and located centrally, including PowerPoint presentations and notes, tailored for specific regions. These were collated to determine the key messages that are relevant across all areas; supplemented by key messages reflecting local environments.

3. Training materials currently collated on the FutureBeef staff intranet. These materials can be promoted to all extension officers, particularly newer staff, to support technical development. Given the need for private and public provider access, refer to recommendations.

4. Key messages for each FutureBeef Program Priority Area and 'key profit driver' content areas were identified and incorporated the latest R&D.

5. Extension and adoption trends identified, including learning preferences or methods, and barriers to these from existing or new market research.

6. Business and operational plans developed.

3.2 Component 2—Training package structure and templates

7. Existing training package content, delivery, field sessions, support material, follow–up support and the level of trainer skill [required] reviewed.

8. Alternative delivery models for workshops and integrated follow–up activities reviewed and scoped, including:

    a. Identifying what aspects of the training packages are best delivered: by a trainer in a classroom; by a trainer in the field; remotely with support from a trainer or as a self–paced learning activity.

    b. Potential roles, pros and cons for use of communication technologies such as webinars, blogs, learning labs, podcasts, video clips and DVDs.

    c. Cost of development and maintenance of delivery options.

9. Strategic fit and links between other workshops and events, particularly with respect to *Business EDGE*, Beef Up forums and other activities such as Producer Demonstration Site (PDS) projects reviewed. Opportunities for improved integration and/or linkages identified.

10. New research and best practice information investigated and documented allowing consistent incorporation into workshops, webinars, slide casts and other extension material.

11. Suitable Registered Training Organisations (RTOs) consulted on the cost–benefit of aligning FutureBeef training packages with Vocational and Training (VET) units and packages.

12. Processes for: monitoring and evaluation; data management, and reporting recommended, in conjunction with the broader FutureBeef [Program] monitoring and evaluation plans. This included where data, including feedback, can be stored and

processed at a central location. For example, data collected electronically on site to avoid double handling.

13. Guidelines and templates for training package updates developed.

3.3 Component 3—Update training packages

14. Training packages updated in line with the proposed structure and templates identified in Component 2. The materials were updated by people with package specific expertise. DAF managed and was the lead editor for this process. FutureBeef extension officers were required to review updated training packages.

3.4 Component 4—Business and operational planning

15. Train–the–trainer requirements for government and private training package deliverers were determined. This included drafting a mutually agreed accreditation and licensing process. (Trainers potentially may be accredited for individual modules and/or whole training packages.)

16. Business and operational plans finalised and submitted for consideration and implementation.

4. Results and discussion

Results are reported against each of the five project objectives.

4.1 Objective 1

By 1 May 2015 review and update current workshops including review and update key extension messages and current underpinning evidence around production areas that are critical profit drivers for the beef industry. Workshops to be included:

- Breeding EDGE
- Nutrition EDGE
- Grazing land management EDGE
- Northern livestock transporters course
- Marketing and selling EDGE*
- Business EDGE*
- Stocktake*
- Testing management options*

*Courses marked with an asterisk (*) will not be technically updated only reviewed for consistency of key messages and business and operational planning.

Table 1 summarises the progress made against each of the training packages.

Table 1 Progress towards reviewing and updating the training packages identified in Objective 1

Training package	Status
1. Breeding EDGE	**Update completed**
2. Nutrition EDGE	**Update completed**
3. Business EDGE	Reviewed for consistency of key messages and business and operational planning
4. Grazing land management EDGE	**Update completed**
5. Marketing and selling EDGE	Reviewed for consistency of key messages and business and operational planning
6. Stocktake	Reviewed for consistency of key messages and business and operational planning
7. Testing management options	Reviewed for consistency of key messages and business and operational planning
8. Northern livestock transporters course	**Updated completed**

Similarly Figure 1 summarises the key steps (i.e. leading to the results) in the review and updating process undertaken.

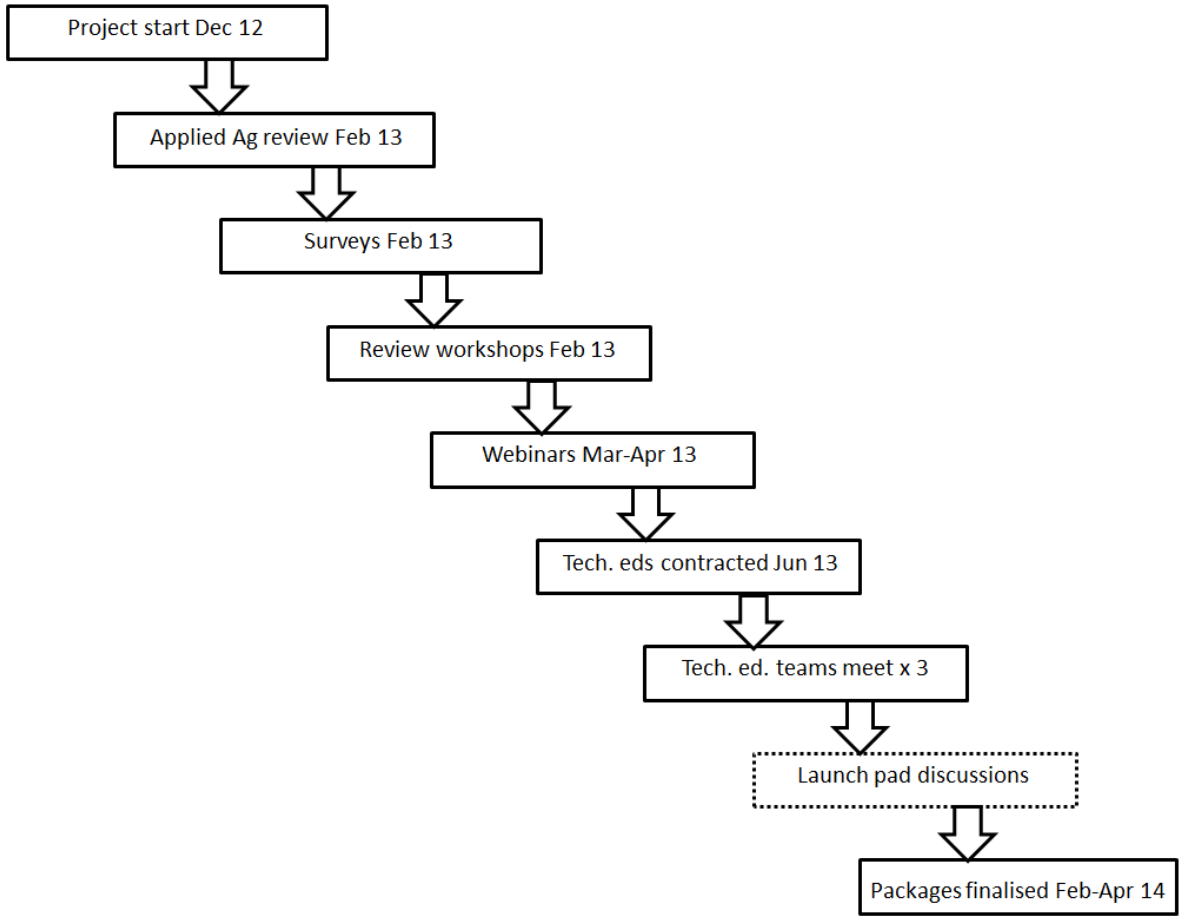


Figure 1 Summary of the key steps in EDGE package review and update process

4.1.1 FutureBeef training packages content review, Applied Ag

Jillian Alexander, Director, Applied Ag, was contracted to review the content and learning outcomes of six training packages managed by the FutureBeef extension team, that is *Nutrition EDGE*, *Breeding EDGE*, *GLM EDGE*, *Northern livestock transporters course*, *Stocktake* and *Testing management options*. The three EDGE packages are owned by MLA while the other three were independently developed by Queensland and Northern Territory extension staff. The full report is provided in Appendix 6.1.

The seven recommendations from this review were:
1. Finish standardising content across training packages
2. Establish a content pool for each industry discipline
3. Link workshop content directly to learning outcomes
4. Identify core training units and specialist modules
5. Develop regional case study properties that can be used across workshops
6. Review content regularly
7. Develop a consistent approach to business review and planning

This report and the recommendations were used and incorporated by participants at the EDGE workshop review workshops and also the technical editorial teams.

4.1.2 EDGE deliverer surveys

Under Component 1, Step 1 the project team conducted internal and external surveys of government and private accredited deliverers, as well as private consultants and government beef extension staff and agronomists, to complete a SWOT analysis of relevant EDGE packages. The survey results were reviewed at, and informed, the EDGE workshop review workshops (Appendix 6.2).

4.1.3 EDGE workshop review workshops

Independent workshops were held in Brisbane in February 2013 to discuss the proposed changes to *Breeding EDGE*, *GLM EDGE* and *Nutrition EDGE* in terms of technical upgrades as well as modes of delivery. An intensive SWOT analysis was conducted at each workshop with weightings placed on those issues that were deemed to be most important by workshop participants. These were used to make changes to the content and delivery of the packages. Teams were formed to incorporate these changes for each of the three packages.

Copies of the stakeholder feedback for each of the three training packages review workshops (*Breeding EDGE*, *Nutrition EDGE* and *GLM EDGE*) held in February 2013 are provided in Appendix 6.2. These reports contain detailed:
- SWOT analyses
- Additional, i.e. new and emerging, R&D
- Monitoring and evaluation suggestions
- Suggestions for alternative delivery approaches

The key outputs and outcomes from these workshops were:

1. **Key messages** for each of the FutureBeef Program Priority Areas and ‘key profit driver’ content areas incorporating the latest R&D relevant across all areas and regions were developed (Appendix 6.4).

2. Separate to this project, but using the key messages resulting from it, a ***FutureBeef communications calendar*** (planner) was developed and is being used to focus FutureBeef social media, eBulletin and newsletter delivery. It summarises on–farm

activities by season, month and region and links these to the key messages and FutureBeef and related activities that complement them. Copies of the key messages and the *FutureBeef communications calendar* are available from the FutureBeef intranet (www.intranet.futurebeef.com.au/direction/plans).

3. **Detailed SWOT analyses** were used by the technical editor teams used to update each of the EDGE packages. The top responses for each of the packages are summarised below:

Strengths
- Extremely comprehensive package
- Best tool (north and south) – complete national package
- Impartiality of the packages, i.e. selling facts or evidence–based and reliable
- Scientific–based knowledge, good principles supported by local information
- eTechnology capacity to support the packages
- Credibility of deliverers within industry

Weaknesses
- Lots of information – information overload
- Lack of experienced deliverers
- Need to market cost–benefit to participants
- No formal technical updating for deliverers
- Limited time for participants to make (or work on) their own plans
- Participants don't leave with formalised action plans
- Unnecessary detail in some areas

Opportunities
- One–on–one follow–up with participants to develop breeding objectives and breeding plan
- Reinforce post–workshop participant learning
- eTechnology for exploring greater flexibility of options to access the program
- Introduce more tools to help with calculations, e.g. Ration Calc or Feed Calc
- Better economics, i.e. linking what's delivered in the packages back to participants' bottom line
- Participants leaving with a developed plan for their business
- Incorporating some delivery outside of the workshop, e.g. pre–workshop, webinar series, etc.
- Linking with other packages
- Technical updates for deliverers
- Resources available on the internet, e.g. template for a nutrition plan
- Focus on the 'doing', i.e. adoption
- Allow participants to share their knowledge, experience, skills and innovative solutions
- Allow flexibility depending on the participant group
- Have a range of delivery modes
- Develop streamlined planning to encourage ongoing planning at home, on–property
- Simplify mathematical equations

Threats
- Lack of a departmental succession plan
- Lack of experienced deliverers
- Conflicting messages or information that may not be based on rigorous R&D
- Time constraints of the modern beef business

The project endeavoured to capitalise on, meet or address the majority of these SWOT analyses observations.

4. Recommendations of **additional R&D** outcomes, tools, courses, consultants and/or contacts related to each package to be included, or incorporated, as appropriate into each of the packages. These have been incorporated by the technical editors wherever possible and appropriate.

5. List of **resources** to be used for updating the packages and where to source them from. As per the additional R&D recommendations the Technical editors have used these in the packages wherever possible and appropriate.

6. Suggestions for improving **monitoring and evaluation** (M&E) were grouped under 'What M&E has had a big impact on the package?' and 'What M&E could have a big impact on the future success of the package?' The responses included:

What M&E has had a big impact on the package?

- Using evaluation feedback to develop the workbook calculations together
- Using the 'Things people liked and things they would like changed' process daily
- Skill updated for deliverers
- Using the 'What will you stop, continue or start to do' process at the end of the workshop
- Review all the M&E data collected to date
- Quiz questions at the end of the day
- Spatial mapping of properties that attend workshops
- Having an interactive, internal review to identify what has or hasn't worked process wise that can be improved next time
- Using independent reviews and reviewers
- Six month follow–ups on–farm give a good indication of changes made
- Casual conversations and contact post–workshop
- Word of mouth – talk to people about what they and other participants have done
- Maintaining contact with people and seeing the changes they've made
- Reef Catchments longitudinal grazing practice survey
- Case studies about property changes

What M&E could have a big impact on the future success of the package?

- Use the follow–up workshop to monitor and evaluate practice change
- MLA to conduct surveys with participants 6–12 month's post–workshop using an independent evaluator. Northern Gulf Regional Management Group do this well.
- Time–related footprint, i.e. spatial mapping of properties a few years apart
- Remove M&E done in the past that wasn't used, e.g. the evaluation sheets
- Collate, distribute and use M&E data that is collected
- Use the ORID (Objective Reflective Interpretive Decisional) process
- Incorporate a *Business EDGE*–like skills audit
- Pre–workshop survey tied in with post–workshop survey
- Good process that looks at both modules and workshops and the impact(s) on practices
- Process that captures post–contact changes in actions, use of tools that will give us an indication of possible long–term impacts
- Capturing anecdotal stories of change (narratives)
- Case studies focused on what participants did on–property
- Success stories
- Less time between workshop and seeking participant feedback

- Track changes through VegMachine over time
- Tie M&E timing to the practice

These suggestions have been considered in the development of the monitoring, evaluation and reporting strategy and incorporated where applicable.

7. **Alternative delivery** suggestions included:

- Combining shorter face–to–face activities with eLearning and webinars instead of three day face–to–face workshops
- Use more goal–focussed learning as the starting point
- Do follow–up workshops or activities on–property
- Have electronic calculation options available
- Less detail on subjects
- Target workshop to participants' needs more by having pre–workshop telephone (teleconference), email and/or webinar contact
- Use video presentations for some sections
- Use the first session to establish production goals and constraints
- Make templates available on a web site
- Pre–workshop activities and 'priming' to be able to do, or get more out of, workshop activities
- Build in opportunities to demonstrate concepts through the web site

There were significantly more suggestions for alternative delivery options than listed above. The complete responses can be found in the appendices. These have been incorporated into, or are covered by, the alternative delivery options detailed in Section 4.10.2.

4.1.4 EDGE webinars

Accredited deliverers and other key people were invited to webinars for each of the three EDGE packages held in March and April 2014. The webinars were held to identify people who were likely to become involved in the review team and those who could provide technical expertise. The group comprised people who:

- Were experienced EDGE deliverers
- Had been involved with the EDGE in some capacity
- Were involved in research and may provide knowledge/expertise/input as the package is reviewed
- Who may be asked to review the upgraded EDGE package
- Were on the project team and needed to stay informed and may be involved in other aspects of the project such as M&E, VET accreditation, or alternative pathways delivery

4.1.5 EDGE technical editorial teams and team review meetings

The people who were part of the three EDGE technical editorial teams met at least four out of the five criteria below:

1. Technical expertise in the EDGE package they are involved with
2. Accredited EDGE deliverer
3. Team player
4. Good communicator and negotiator
5. Available to complete the work

Each private consultant involved in the technical editorial teams was contracted by DAF.

Meetings were held in Brisbane for each of the three EDGE packages, in May and June. The review teams included people who were contracted to modify and update the EDGE packages, or who could provide valuable technical input at the meetings.

Ian McLean, Bush Agribusiness, a key *Business EDGE* deliverer, attended each of the three EDGE meetings (nutrition, grazing land management and breeding) to help develop financial links between the three EDGE workshops and further develop the framework for the preliminary business and production analysis one–day workshop, and the pasture and production technical workshop.

The purpose of the technical meetings (i.e. review guidelines) was to:

1. Identify and address technical gaps and to update information and materials in the *EDGE* training packages using the *Summary of stakeholder feedback*, and the *FutureBeef training packages content review.*
2. Ensure that the key messages that were identified and updated from stakeholder feedback, were appropriately incorporated across all packages.
3. Review, modify and/or address current recommendations from the review for specific packages where appropriate.
4. Identify core training units and specialist modules.
5. Develop a framework for an animal behaviour, health and welfare module.
6. Work closely with the *Business EDGE* deliverer to develop a consistent, practical business plan template to integrate all three EDGE packages.
7. Recommend train–the–trainer requirements for deliverers, including an accreditation and licensing process.
8. Suggest possible alternative or complimentary delivery pathways to the current EDGE delivery model.

Each team member was contracted or tasked with specific jobs and each of the EDGE technical editor teams convened in May–June 2014 to make what was envisaged to be final changes to the packages.

At these meetings the teams identified that significantly more effort (time and funds) were required to complete the technical updates due to operational delays to the contracting process for the consultants (around 12 being employed in this project) and the gaps and issues they identified which had become apparent as they ‘unpacked’ each package.

Twelve years of R&D across northern Australia had occurred since the packages were developed, in particular the following projects and their outcomes: Bull Power, Beef CRC, Growth pathways, Weaner management, Heifer management, Phosphorus supplementation, Cattle nutritional requirements (CSIRO), Northern Grazing Systems and Climate Clever Beef, etc. As well as, significant technical developments, e.g. in BREEDPLAN, MateSel, BreedObject, Body condition score (BCS), Bull breeding and soundness evaluation (BBSE), Meat Standards Australia (MS), Hormonal growth promotants (HGPs), rumen modifiers, Faecal near infra–red reflectance spectroscopy (F.NIRS), using fire in pasture management, satellite data, land condition guides, etc.

During the technical editors’ first round of meetings the concept of an introductory, *Business planning and productivity analysis* module (*Launch pad*) to help producers and EDGE participants identify what motivates them and the key profit drivers of their businesses. Consequently, this impacts which areas they need to target to enhance the effectiveness of subsequent training they undertook, increasing the success of the adoption of technologies and management practices delivered in EDGE workshops. Informal conversations between project team members, MLA and the FutureBeef Program Committee endorsed the interest in the need for such a package. The project team spent two days on this, including preparing

a preliminary project application for scoping the development of 'Launch pad' (as it was outside the scope of the project). This was submitted to MLA in December 2014 but was unsuccessful.

The technical editor teams met again in September 2014 to continue updating the packages and progressing specific technical issues and gaps identified previously. One of the issues being: how to successfully integrate the new adult equivalent methodology as reported by Ian McLean and Shane Blakeley in January 2014. While out of the scope of the project, it was identified as a critical issue to address.

Following Ian and Shane's webinar introducing the adult equivalent methodology on the 19 June 2014 a teleconference was coordinated by DAF with Mick Quirk and Geoff Niethe from MLA, and technical editor team members to discuss questions and implications for updating the EDGE packages in September 2014.

In light of these findings, an extension of project time and funds was sought from MLA in November 2014 from which the project time was extended to 1 May 2015, with no extension of funds. To complete the project to a high standard, DAF invested $60,000 plus additional in–kind to fund additional expenditure to the end of the project.

In February 2014, technical editor teams met again to go through the draft packages to collectively:

1. Ensure linkages within and across these three packages (and *Business EDGE*) were consistent.
2. Cross–check linkages with related/complementary, non–EDGE packages, e.g. *Stocktake*, *Northern livestock transporters course*, *Confident livestock marketing*, *Testing management options*, etc.
3. Ensure the *Planning book* can be used as one document for all EDGE packages and is consistent with *Business EDGE.*

Also in February, MLA coordinated a meeting to further work through any issues there may with integrating the new adult equivalent methodology and impact(s) on the EDGE materials. This meeting was attended by Mick Quirk, Wayne Hall, Bob Karfs, Désirée Jackson, Jenny Milson, Felicity McIntosh, Roger Sneath, Stuart McLennan, Ian McLean, Jill Alexander, Col Paton and Mick Sullivan (via phone). As a result of this meeting, MLA contracted Stuart McLennan to review and update the nutritional requirement tables and diagrams, and began discussions with Col Paton regarding how to incorporate the new adult equivalent methodology into the forage budget calculations currently used in the EDGE packages. Mick Quirk was also charged with doing a 'stock take' of all the publications, products and projects that the new AE would impact, so that strategies for updating could be developed. Mr Quirk has since departed MLA and the progress of this work is unknown at this point in time.

Following this last face–to–face meeting, technical editorial teams continued to liaise to finalise the package updates in May for submission to MLA.

4.1.6 EDGE coordinators and deliverers

A list of current EDGE coordinators and deliverers in northern Australia was compiled and is provided in Appendix 6.3. There are currently four *Breeding EDGE*, five *Business EDGE*, 11 *Grazing land management EDGE* and nine *Nutrition EDGE* accredited deliverers.

There is significant opportunity to train new deliverers from both the state and territory departments and the private sector once the train–the–trainer and deliverer accreditation processes are in place. This needs to be given high priority.

4.1.7 Review and update workshops

This was by far the most challenging and time consuming component of the project.

In line with the outcomes and recommendations from Components 1 and 2 the *Breeding EDGE*, *Grazing land management EDGE*, *Northern livestock transporters course* and *Nutrition EDGE* packages have been updated through the efforts of the project team, technical editorial teams, everyone who participated in the review workshops and everyone who provided the administrative support for this to happen.

Also as a result of the project a new, complementary *Grazing fundamentals* package and a new *Planning book* were created.

Hardcopies and electronic versions of these packages have been provided separately to MLA in preparation for professional editing and creative digital design.

4.1.8 Common package framework

The overall structure, or framework, of the *Breeding EDGE*, *Grazing fundamentals*, *Grazing land management EDGE* and *Nutrition EDGE* workshop manual includes:

1. Cover page
2. Publication details, i.e. ISBN/ISSN, citing, copyright, disclaimer
3. Acknowledgements
4. About EDGE
    a. Its value to you and your business
    b. How EDGE fits together and complements other packages
    c. Specialist modules and complementary existing packages
5. Table of contents
6. Table of figures
7. Introduction
    a. Workshop overview
    b. Group introductions and expectations
    c. Workshop notes
    d. Planning book
    e. Issues box
    f. Agenda and roadmap
    g. Housekeeping
    h. The importance of this particular package
8. Modules 1—…
    a. Overview
    b. Learning outcome(s)
    c. Content
    d. Activities
    e. Review: group and individual
9. Appendices
10. Acronyms
11. Glossary
12. References
13. Further reading

Sections 1 to 6 are publication details and general introductory information about EDGE.

Section 4 is also new to all packages. It is designed to help put EDGE, EDGE packages and other available packages into perspective. That is, illustrate available options that complement participants' learning needs. This material is not designed to be delivered.

Section 7 is the workshop introduction, Section 8 are the individual package modules (i.e. material to be delivered), Sections 9 to 13 are package specific resources, e.g. further reading are suggested publications, websites, etc. that participants can access for more information on topics covered in the packages if required.

The acknowledgements section is new to *Breeding EDGE* and *Nutrition EDGE*. The table of contents and table of figures are new to all three packages.

Sections 10 to 12 have been updated significantly in light of new R&D and associated publications have become available (or are no longer in print) since the packages were first developed. The referencing has been tightened up so that deliverers, participants and future package reviewers can readily access the original material.

The acronyms and glossary are consistent across all packages and can be used for EDGE and other FutureBeef publications or resources, e.g. the FutureBeef website. Similarly, the recommended further reading lists (which includes FutureBeef partner resources) can be used in other contexts, e.g. the FutureBeef website, to cross promote the resources as well as EDGE.

4.1.9 Planning book

A new planning book was developed to:

- encourage participants to objectively assess their current operation and identify priorities for management within the scope of the workshop they are currently attending;
- provide context to what is learned at the workshop and how they may use the information to make management decisions for their property(s);
- record basic data and information for their property(s) in relation to natural resources, pastures and animal inventories and performance, which will allow them to measure changes in pasture health, animal productivity and business performance as a result of implementing new strategies developed from what they learn at the workshop(s);
- allow participants to take a holistic approach to establishing management priorities;
- link the disciplines of grazing land management, animal breeding and nutrition and business management in one document which can be used and updated at each subsequent workshop they attend

4.1.10 New information and tools developed to meet identified gaps

As a consequence of reviewing the EDGE packages the following information and tools were compiled and developed to fill essential gaps that were identified.

Seasonal calendar profile activity

This is a simple questionnaire that guides participants through the Bureau of Meteorology web site to develop a basic seasonal profile for their own location. The aim of this is to help people make conscious decisions about when their growing and non–growing seasons are likely to commence and finish, when they can usually expect new season pasture growth, when that growth is significant enough for stock to gain weight, and when pasture growth is likely to become inhibited.

From this, participants can set various management decision dates across disciplines and around expected pasture response and quality. Setting these dates encourages timely forage budgeting and encourages early adjustment of stock numbers in a failed season. Although a simple activity, it is locally relevant and links all EDGE packages together.

Carrying capacity calculator

A new *Carrying capacity calculator* spreadsheet was developed by Col Paton, EcoRich Grazing. The need for this was identified in the review of *Grazing land management EDGE*.

The spreadsheet was developed so that workshop participants have the opportunity to use a spreadsheet during the workshop to easily calculate long–term carrying capacities. This makes it more likely that participants will complete these long term carrying capacity calculations for at least a few paddocks, if not the whole property, during the workshop.

It was also developed to give the manual (paper) calculator and the spreadsheet the same look so the transition from a paper–based system to an electronic spreadsheet was as seamless as possible.

Land condition spreadsheet

This simple yet powerful spreadsheet developed by Ian McLean, Bush Agribusiness, demonstrates the actual cost of reduced land condition by illustrating the change in gross margins that are likely with a decline in land condition.

The spreadsheet takes into consideration the run–down in carrying capacity as land condition declines. This example uses carrying capacity figures for Mitchell grass country in A, B, C and D condition at Longreach. The gross margins are based on the average for the Longreach area as identified in *The Northern beef report: 2013 Northern beef situation analysis*.

The spreadsheet can be adapted for different land types in different locations as required.

Nutrient requirement tables and dry matter intake estimation

After the release of the *Adult equivalent methodology: a methodology to accurately and consistently calculate cattle grazing loads in northern Australia* final report in January 2014 and the introductory BeefConnect webinar on 19 June 2014 DAF coordinated a teleconference with Mick Quirk and Geoff Niethe (MLA) and technical editors to discuss questions and implications for including the methodology in the EDGE packages.

Meat & Livestock Australia convened a second meeting on 10 February 2015 to further explore questions, issues and potential impacts with integrating the new methodology into the EDGE packages. This was additional to and out of the scope of the project contract. This meeting was attended by Mick Quirk, Wayne Hall, Bob Karfs, Désirée Jackson, Jenny Milson, Felicity McIntosh, Roger Sneath, Stuart McLennan, Ian McLean, Jill Alexander, Col Paton and Mick Sullivan (via phone). As a result of this meeting MLA contracted Stuart McLennan (QAAFI) to review and update the nutritional requirement tables and diagrams, and began discussions with Col Paton regarding how to incorporate the new adult equivalent methodology into forage budget calculations currently used in the EDGE packages.

The updated beef cattle nutrient requirement tables and dry matter intake graphs developed by Dr McLennan are included in Appendix 6.11, along with comprehensive explanations of how these tables and figures were derived and how they should be used by deliverers and participants (i.e. as guides and estimations only given the complexity of the system).

The new adult equivalent tables and the updated nutrient requirement tables and dry matter intake graphs have been incorporated into EDGE packages where appropriate, however the nutrient requirement tables and dry matter intake estimation graphs for sheep (for both meat and wool breeds) on tropical and subtropical pastures still need to be updated which is outside the scope of this project.

Similarly, dry matter intake estimates for beef cattle breeders need to be developed in alignment with the new dry matter intake estimates for dry stock. Additional energy and protein requirement tables need to be developed for:

1. Wet cows that are back in calf, especially those in their second trimester.
2. Heifers that weigh 300 kg (many British breeds and some *Bos indicus*).
3. Lactating cows with calves over four months of age; this is especially important because it highlights the difference in requirements between cows in early lactation and those in late lactation.

Stocktake and Grazing land management EDGE

Stocktake is a DAF publication and workshop that complements *Grazing land management EDGE* and vice versa. For example, *Stocktake* is the practical application of pasture monitoring, forage budgeting and field assessment that is key in grazing land management. Where *Grazing land management EDGE* looks at the means for managing to optimise pasture health, yield and quality over time, *Stocktake* ensures that the theory is practically applied.

The *Stocktake* and *Grazing land management EDGE* technical editor teams collaborated closely to ensure improved linkages and consistency between the two packages. This collaboration ensured that the workshops will complement each other rather than overlap which was an issue for some participants in the past.

4.1.11 *Breeding EDGE*

The previous version of *Breeding EDGE* had a considerably strong focus on bull fertility and genetics, which are two of the biggest influencers on improving herd productivity and kilograms of calf weaned per cow exposed to the bull. However, the package was less balanced in delivery of information on improving overall breeder herd management, and more specifically, as it relates to nutrition and breeder condition score, as well as identifying aspects of breeder herd management which require the most attention and will result in the biggest return on investment.

The new version acknowledges the significant impact of putting effort into bull management on breeder herd productivity. While the key aspects of bull management have been retained in the *Breeding EDGE* package, a specialised bull fertility and management specialist modules have been recommended for further development and delivery for producers who are interested in further exploring and improving this aspect of their herd management. This will provide businesses such as seedstock producers to achieve a higher level of knowledge and skills in this area to better service their clients.

By relegating some of the bull fertility information to its own specialised module, it allows for the incorporation of more information on breeder herd management, setting breeding goals based on the key factors driving profit and enabling each property, with the assistance of the planning book, to identify which aspects of current herd management are a priority for increasing breeder herd fertility and weaning weight.

***Breeding EDGE* before**	***Breeding EDGE* now**
Module 1 Current operation • Resource inventory • Performance levels • Target markets • Breeding program • Business aims and objectives	**Module 1 Current operation** • My operation • Introduction to the case study • Resource inventory • Performance • Markets • Current breeding program • Compliance to market specifications • Current performance levels • Breeding goals • Breeding program • Key factors driving profit • Measuring performance • Factors influencing animal production traits • Basic reproduction principles
Module 2 Reproduction • Basic reproduction principles • Male reproduction - The importance of the bull herd - Bull cost per calf weaned - Key components of bull fertility - Other factors affecting bull fertility - Bull wastage • Female reproduction - The importance of female reproduction - Key components of female fertility - Stages of the reproductive cycle in the cow - Other factors affecting female fertility • Annual reproduction cycle	**Module 2 Male reproduction** • The importance of the bull herd • Bull cost per calf weaned • Key components of bull fertility - Physical (structural) soundness - Reproductive structures - Libido and serving ability • Other factors affecting bull fertility - Sexual maturity - Disease - Nutrition • Bull wastage
Module 3 Genetics • The value of genetics • Basic genetic principles • Methods and tools for genetic improvement • Breeding systems • Breed selection	**Module 3 Female reproduction** • The importance of female reproduction • Key components of female fertility • Stages of the reproductive cycle in the cow - Hormones - Sexual maturity - Oestrus and ovulation - Pregnancy - Foetal growth - Calving - Lactation - Calf growth and survival through to weaning • Other factors affecting female fertility - Disease - Nutrition • Annual reproduction cycle

***Breeding EDGE* before**	***Breeding EDGE* now**

Module 4 Breeding objective
• Developing a breeding objective
• Traits of economic importance
• Breeding goals
• Selection criteria
• Identifying animals to meet the breeding objective
	Module 4 Selection and genetics
	• Genetic selection of desired characteristics – what tools are available?
	  • Value of genetics
	  • Basic genetic principles
	  • Methods and tools for genetic improvement
	  • Breeding systems
	  • Selecting the breed(s)

Module 5 Selection
• Selection of desired characteristics
  - Environmental adaption
  - Fertility
  - Growth
  - Carcase attributes
  - Temperament
  - Structural soundness
• Sourcing replacements
	Module 5 Breeding objectives and genetic management of the herd
	• Developing a breeding objective
	• Selecting for environmental adaptation
	• Selecting for fertility
	• Selecting for growth
	• Selecting for carcase attributes
	• Selecting for temperament
	• Selecting for structural soundness

Module 6 Managing the herd to capture the benefits
• Recognising the resources
• Managing the breeding herd
• Management of replacement breeders
• Maximising the value of surplus females
• Managing the bulls
• Identification and herd recording
• Evaluation of options and production systems
• Putting the plan into action
	Module 6 Managing the breeding herd
	• Managing the breeding herd
	  - Nutrition and body condition scores
	  - Identify the nutrient requirements of the animal
	  - Assess the quality and intake of pasture available
	  - Identify possible deficiencies
	  - The best time to join
	  - Body condition
	  - Mating
	  - Pregnancy diagnosis
	  - Weaning
	  - Weaner management
	  - Early weaning
	  - Investigating poor reproductive performance
	  - Interpretation of pregnancy diagnosis results
	• Managing replacement breeders and heifers
	  - Definitions
	  - Steps to success
	  - Genetic improvement
	  - Other considerations
	  - Calendar of events

4.1.12 *Grazing land management EDGE*

The *Grazing land management EDGE* workshop has gone through significant changes during the process of this review. The material from the previous versions has been well – received and workshops have been run extensively and with excellent results. However, review of the packages was necessary for a number of reasons.

Sixteen different versions had been developed over time. Most of these versions were, understandably, put together using a previous version as a template. While this was logical, it did result in some loss of consistency across the suite of *Grazing land management EDGE* packages. This was further exacerbated by the fact that it was usually different individuals who were involved in the regionalisation. Some other inconsistencies also resulted with regions having different priorities and issues so that the order of modules between versions were changed, and sometimes combined.

It was decided to use one version, the Burdekin, to focus on in the review. This was one of the first two original regional versions developed. It is also an area where there is current funding support for Reef projects and is also the home of long–term grazing research (e.g. Wambiana) to provide excellent research results as examples. Examples from different regions are included where possible and relevant.

The workshop material is now focused in three main areas, and the information strongly principle–based. The core principles presented are relevant across all northern Australia locations, although basing on the Burdekin version, there is obviously a Queensland focus. There is a considerable reduction in the amount of regionalising that needs to occur. There is still some localising that needs to happen, such as with climate data, land type sheets, land condition photos and weed lists. These will add considerable value for specific participant groups.

Even with the previous regionalised versions of *Grazing land management EDGE*, there was still a certain amount of immediate local customisation that was required wherever a workshop was held. For example, running a Mitchell grass downs *Grazing land management EDGE* workshop at Julia Creek or Tambo still required a certain amount of local information to be included e.g. historical rainfall data, as well as local examples. This was necessary even though the same regional version was being used.

It is envisaged that the new *Grazing land management EDGE* will only require similar local customisation at workshop location and shouldn't require extensive regionalisation. We have aimed for a workshop that you can 'get away with' running at any location if it is for participants from varying backgrounds and locations.

Much of the core material from the previous versions is still included with a shift in emphasis and detail. There are different priorities in each of the closely–linked but separate workshops of *Grazing fundamentals*, *Grazing land management EDGE* and *Stocktake*. While not part of the EDGE suite of workshops, *Stocktake* ties in closely with *Grazing land management EDGE* and it has worked very well to review it at the same time as the EDGE packages.

The *Grazing land management EDGE* workshop is now split into three modules, not eight (including planning) as was previously the case.

Module 1—Grazing land ecosystems

In previous versions of *Grazing land management EDGE*, the focus was on a number of aspects such as pasture, utilisation and land condition. There was some information on ecosystem processes but from a deliverer viewpoint, this was not delivering the message that land managers needed.

The new version adds depth to illustrate how the ecosystem impacts land condition, pasture growth and productivity. It highlights that what is happening with pasture is a visual symptom only of everything else that is happening in the ecosystem.

This module focusses on addressing the cause of reduced productivity rather than the symptom; that land condition is actually a measure of how the grazing land ecosystem is functioning and that the ability of land to grow forage is about the efficient functioning and health of ecosystems.

With this understanding, participants will be better positioned to appreciate the significance of their management decisions and adjust so that their country can reach its potential capacity at all times rather than just in good seasons. There is also greater emphasis on perennial pastures.

Module 2—Land management strategies

This module includes summaries and core principles (without regionally specific detail) of the previous modules of tree–grass balance, fire, sown pastures and weeds. These modules previously differed greatly between regions due to variation in their application and contributed strongly to the necessity for the large number of regional versions of *Grazing land management EDGE*.

It is still considered important to include the core principles of these topics. However, it is seen to be more beneficial that independent specialist modules be designed on each topic for regional use. This allows more detail and relevant information to be delivered to those needing more than the core information. It also means that dynamic content is more easily and regularly reviewed to ensure the most up–to–date information is presented.

Module 3—Grazing management

This module has been updated to include more standardisation of definitions within the package and across packages. Concepts that may have been briefly mentioned in previous versions are now more comprehensively explained.

One discrepancy across packages previously was the forage budget. This has now been updated to ensure consistency across *Grazing land management EDGE*, *Stocktake* and *Grazing fundamentals*. A spreadsheet for use in the *Grazing land management EDGE* workshop has also been developed.

A carrying capacity spreadsheet for use in the *Grazing land management EDGE* workshop has also been developed and includes a simpler, research–supported distance to water discount calculation.

Additional sections on diet quality and sward structure ensure consistency with the *Grazing fundamentals* package and therefore the information being presented to *Nutrition EDGE* participants.

Follow–up day

At the end of the previous *Grazing land management EDGE* workshops, participants committed to doing something when they went home. Then, part of the follow–up was about seeing how they went with that commitment and discussing any issues they had confronted in implementing their plan. This way, other participants learnt issues of implementation in a practical sense. This still has strong merit and will be included in the future. If extensive distances are travelled and participants wish to add more value while they are together, the follow–up is an ideal time to add a *Stocktake* workshop (which reinforces much of what has been learnt in *Grazing land management EDGE* in a practical and applied way) or a specialist workshop.

Other variations

The 'Jim and Sandy' case study examples were a prominent feature throughout the *Grazing land management EDGE* workshops. These examples were often long and complex and have been retired in this version. In its place are case studies of actual data and information from key areas.

Also, where case study exercises were previously worked through, they have now been replaced with planning book exercises that relate directly to participants' own situation and contribute to building up their own property profile.
An introductory half–day or evening was held previously; this no longer occurs.

***Grazing land management EDGE* before**	***Grazing land management EDGE* now**
Module 1 Welcome and introduction • Welcome • The *Gateways model* • Introducing case study property – Bluewater Creek	**Introductory session** • Focus on how grazing land management fits within EDGE and how managing the resource base underpins the success of a grazing business
Module 2 Understanding the grazing ecosystem • Introducing the grazing land ecosystem • Climate • Land types • Land condition • Energy flow, nutrient cycling and water cycling • Effect of land condition on finances • Monitoring land condition	**Module 1 Grazing land ecosystems** • How climate influences plant growth (particularly relative to understanding local influences, productive potential, decision dates and preparedness) • Land types including planning book exercise so it is participant–relevant • Soils relative to pasture growth and land condition • Vegetation – Trees and pasture – Pasture physiology with respect to perennials versus annuals, C3 versus C4 – Profile a perennial • Land condition – 3Ps – the key to land condition • Ecosystem processes – Energy flow – Carbon cycle – Nutrient cycle – Water cycle • Wambiana case study and research examples throughout
See below for corresponding modules 4, 5, 6 and 7.	**Module 2 Management strategies** • Managing tree–grass balance • Using fire • Sown pastures • Managing weeds
Module 3 Managing grazing • Improving land condition by managing grazing • Utilisation rate • Phases of pasture growth • Forage demand	**Module 3 Grazing management** • Improving land condition – managing grazing • Utilisation rates • Effects of stocking strategies from Wambiana • Influence on liveweight gain

<table>
<tr><th>Grazing land management EDGE before</th><th>Grazing land management EDGE now</th></tr>
<tr><td>• Long–term carrying capacity and paper–based exercises
• Short term carrying capacity
• Forage budgeting and paper based exercises
• Evenness of grazing
• Managing utilisation and grazing
• Field activity assessing pasture</td><td>• Phases of pasture growth
• Pasture spelling
• Diet quality (this section was brought in to round off the link between pasture and animal performance and relative to the Grazing animal production model
• Evenness of grazing
• Grazing systems including activity comparing grazing systems. This topic is recommended as a specialist module.
• Forage demand and intake
• Long–term carrying capacity with paper based example and spreadsheet–based exercises and including changed and simpler distance to water discount factor
• Forage budgeting – paper–based and with spreadsheet and including upgraded forage budget to take into account unpalatable 3Ps
• Using this information to build a property profile and priorities for future action (Planning book)</td></tr>
<tr><td>Module 4 Managing with fire
• Learning from history
• Roles of fire
• Managing risk factors
• Native plants and animals
• Planning effective fire regimes
Module 5 Using sown pastures
• Role of sown pastures
• Management considerations with sown pastures
• Managing risk factors
• Management requirements of sown pastures
Module 6 Managing tree–grass balance
• Importance of tree–grass balance
• Managing tree–grass balance to maintain or improve land condition
• Manage risk factors
• Planning woodland management
Module 7 Managing weeds
• Weeds and land condition
• Six principles of weed management
• Weeds to look out for
• Life cycle of weeds
• Managing risk factors
• Planning weed management</td><td>The key principles of these four modules are now in Module 2. It is envisaged that there is more benefit to develop a basic understanding during Grazing land management EDGE and then to attend specialist workshops on the ones of particular relevance thereby better addressing individual priorities for each property.

The order is different in line with relativity and flow:
1. Tree–grass balance: what controls tree–grass balance; woodland thickening; how trees affect pastures; tree basal area and influence on pasture growth; managing tree–grass balance to improve land condition
2. Using fire: Roles in pasture and tree management; grazing land ecosystem response to fire; managing risk factors; case studies with research results to illustrate key points
3. Sown pastures: roles, risks and potential problems; costs; pasture rundown; legumes.
4. Managing weeds: definition; identifying weeds; six principles of weed management; weed control strategies</td></tr>
<tr><td>Module 8 Planning
• The planning segment was mostly at the end of the last module where participants looked at their own property issues and practised</td><td>Planning
• Planning is incorporated throughout.</td></tr>
</table>

***Grazing land management EDGE* before**	***Grazing land management EDGE* now**
calculating long–term carrying capacity for their own paddock	
Tool kit • Calico bag • Shears and quadrat • Weed identification book • Prime Notes CD • Plant identification book for the region • CD of handy tools • Pasture yield photo standards • Land type sheets • Pasture growth tables • Pasture management book for the region (i.e. Ian Partridge's series)	**Tool kit** • Land type sheets printed for location (for use in workshop) • Pasture growth tables • Locally relevant fact sheets and weed identification sheets • USB stick with loaded spreadsheets (e.g. Ian McLean's land condition, Col Paton's forage budget and carrying capacity calculators) and websites links to e.g. videos, land type sheets, pasture yield estimates, fact sheets, weeds sheets

4.1.13 *Grazing fundamentals* evolution

The *Grazing fundamentals* module evolved in response to the issue that there was almost a day's presentation of overlapping content between the *Grazing land management EDGE* and *Nutrition EDGE* workshops. There was also material that would add context to management decisions in the *Breeding EDGE* workshop. Participants who attended multiple workshops found themselves repetitively covering the same material, even though it was in a somewhat varied manner each time.

Grazing fundamentals was developed to minimise this overlap and to provide a standardised summary of the core overlapping concepts across the three packages. All subjects covered in *Grazing fundamentals* are covered in *Grazing land management EDGE*; however in the latter, there is much more detail on common subjects and there is a much broader content base.

The new *Grazing fundamentals* workshop provides deliverers with the option of presenting it as a stand–alone workshop. While designed for land managers as a modular component of the EDGE suite of packages and to complement *Stocktake*, it also provides sound basics for bankers, agronomists and other industry professionals.

Grazing fundamentals provides a broad understanding of all the components of the grazing production system and the core principles behind optimising grazing land productivity. It provides a solid foundation to make informed and responsible management decisions.

***Grazing fundamentals* now**
Section 1 Grazing land ecosystems • Grazing animal production model • Grazing land ecosystem - Climate and major climate influences - Growing season and seasonal decisions dates - Planning book: *Developing your own climate profile* • Land types - Recognising and using land types - Planning Book: *Developing your own land type profile* • Soils - Profiles, texture and structure - Characteristics affecting productivity - Comparing soils • Vegetation - Perennial pastures – their role in grazing lands - Differences between tropical and temperate grasses - Pasture plant identification • Land condition • A,B,C,D framework • Planning book: *paddock land condition*
Section 2 Managing grazing • Managing grazing pressure to improve land condition - Utilisation rates - Stocking rate influence on liveweight gains • Phases of pasture growth • Pasture spelling • Diet quality • Evenness of grazing • Grazing systems including activity comparing grazing systems • Forage demand - Adult equivalents and dry sheep equivalents - Intake - Sward structure • Carrying capacity - Long term carrying capacity - Short term carrying capacity • Forage budgeting • Forage supply - Forage demand - Forage budget example

4.1.14 *Nutrition EDGE*

***Nutrition EDGE* before**	***Nutrition EDGE* now**
Module 1 Ruminant nutrition • Basic digestive anatomy and function • Nutrients • Intake • Nutrient requirements • Relative importance of nutrients	**Module 1 Digestion and nutrients** • Basic digestive anatomy and function • Nutrients • Primary limiting nutrient • Relative importance of nutrients
Module 2 Principles of pasture growth and quality • What does pasture cost? • Three gateways model • Measures of pasture quantity and quality • Principles of pasture growth (quantity) and its quality • Assessing pasture quality relative to cattle requirements	**Module 2 Animal nutrient requirements and water quality** • Energy - Maintenance - Production - Reproduction • Protein • Primary limiting nutrient • Water - Intake - Requirements - Quality, including water quality testing - Methods for improving water quality
Module 3 Grazing management and animal performance • Why plan grazing management? • Three gateways model • How does stocking rate influence liveweight gains/ • What utilisation level is best for both cattle and pastures? • Diet selection • Intake • Grazing systems • Determining livestock numbers using adult equivalents • Pasture assessment • Dry season feed budget • Developing a grazing management plan • Principles of grazing management	**Module 3 Pasture intake, pasture quality and diet quality** • What pasture costs • Influence of land type on pasture growth and quality • Principles of pasture quality • Impact of land type on pasture nitrogen yield • Plant structure and how changes affect nutrient quality • Dry matter intake • Diet selection • Measuring pasture quality • Measuring animal nutrient status through faecal NIRS technology and blood analysis • Effect of stocking rate on profit • How stocking rate influences liveweight gains • Adult equivalents • Pasture assessment, including dry season feed budgeting
Module 4 Mineral nutrition of cattle and sheep • Mineral nutrition of cattle • Minerals • Vitamins • Diagnosis of mineral deficiencies	**Module 4 Mineral nutrition of cattle and sheep** • Overview of minerals and vitamins • Phosphorus • Minerals—function and animal requirements • Vitamins—function and animal requirements • Diagnosing a mineral deficiency
Module 5 Managing nutritional deficiencies • Nutritional deficiencies • Managing nutritional deficiencies	**Module 5 Supplementation and other tools** • Managing nutritional deficiencies • Supplementation

***Nutrition EDGE* before**	***Nutrition EDGE* now**
• Supplementation • Calculating the financial viability of supplementary feeding options	• Rumen modifiers • HGPs • Supplement groups • Reading a label
	Module 6 Practical nutrition management • Calculating the financial viability of supplementary feeding options • Managing nutritional deficiencies • Defining production targets • Choosing the best options • Cost comparison between protein supplements on a dry matter basis • Cost comparison between energy supplements on a dry matter basis

4.1.15 Package integration and linkages

Each EDGE package complements and links to the others and can be delivered in a variety of ways depending on participant and/or group needs. The packages can be delivered independently or together in different combinations.

A follow–up day three to six months after the package (except for *Grazing fundamentals*) is included so that participants can review specific areas of interest and discuss and explore any issues they may have encountered in the meantime.

EDGE packages also complement other available packages and vice versa, for example *Grazing best management practice* (*Grazing BMP*), *Stocktake: balancing supply and demand*, *Testing management options* and the *Northern livestock transporters course*.

Grazing fundamentals provides a broad understanding of all the components of the grazing production system and the core principles behind optimising grazing land productivity. It provides a solid foundation to make informed and responsible management decisions. Grazing fundamentals can be delivered as a stand–alone workshop in a day.

Grazing land management EDGE looks at the factors which govern the productive capacity of grazing land and management tools and strategies which can help to meet or maintain this productive capacity over time. The *Grazing land management EDGE* workshop is particularly concerned with improving land condition and moderating grazing pressure as a means of optimising pasture health, yield and quality over time.

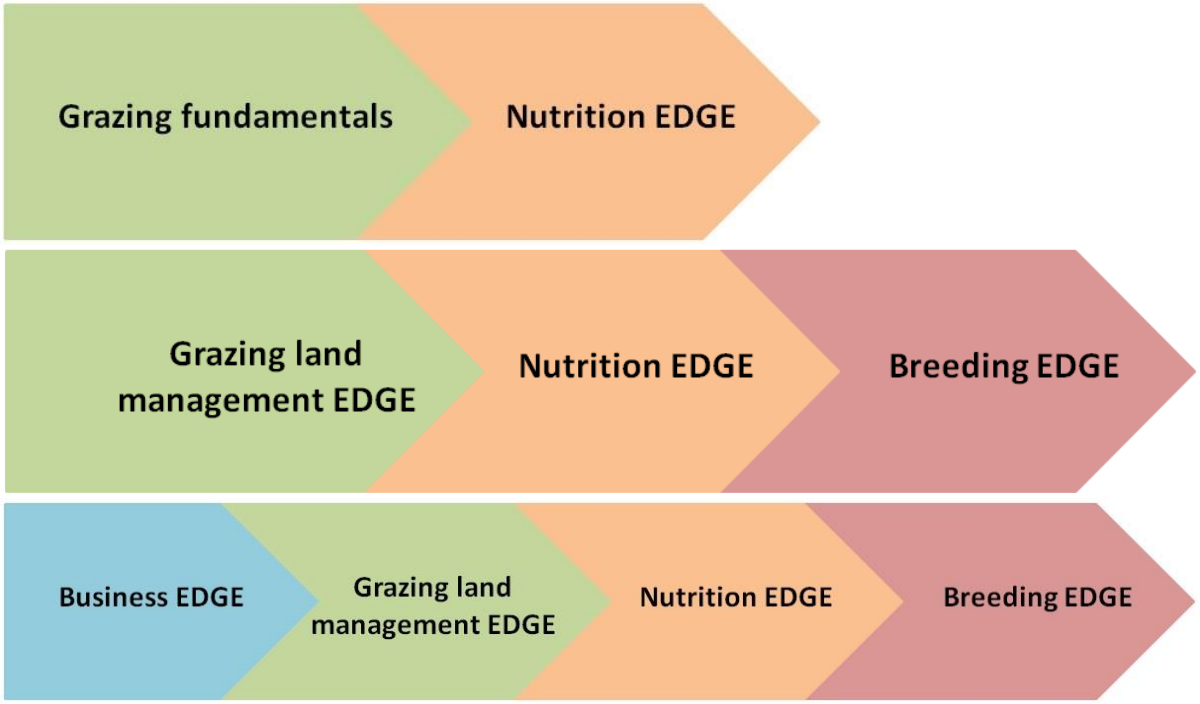
Grazing land management EDGE covers all the concepts presented in *Grazing fundamentals* with more in–depth explanation and demonstration of how to apply skills, such as calculating carrying capacity. Participants who attend *Grazing land management EDGE* are equipped to design and adapt management strategies to suit their land types and climatic conditions. It can be delivered over three days or in a combination of two plus one days. A group that has done *Grazing fundamentals* previously would likely only need to do two days.

Nutrition EDGE focuses on assessing the pasture resource in terms of available nutrients to the animal and identifying the limitations in conjunction with the nutritional needs of different classes of grazing livestock. It then examines how these needs can be satisfied and production targets met by exploring a number of different strategies, without having an

adverse impact on land condition. The *Nutrition EDGE* workshop is particularly concerned with management strategies which address the diet quality and grazing pressure gateways.

While *Grazing fundamentals* covers the grazing production system and provides background on impact on pasture condition, quantity and quality on animal performance, the *Nutrition EDGE* workshop equips participants with the skill to identify and address feed gaps to meet both animal needs and production targets. *Nutrition EDGE* is currently delivered over three days.

The following figures are some examples of possible combinations of EDGE packages:



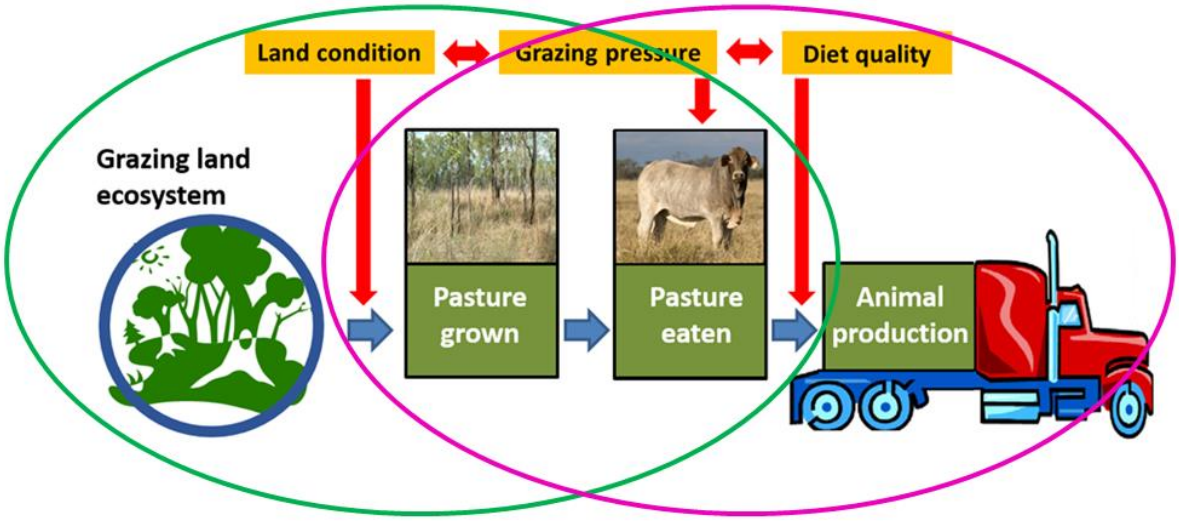


Figure 2 Grazing animal production model with the focus areas for *Grazing land management EDGE* (green) and *Nutrition EDGE* (pink) workshops highlighted.

Stocktake is an applied, skills–based workshop where participants learn to assess land and pasture condition for the purposes of monitoring short– and long–term carrying capacity assessment. While not essential, it is useful if participants have attended either the *Grazing*

land management EDGE or *Grazing fundamentals* workshop previously. *Stocktake* is a one day activity.

The ***Northern livestock transporters course*** has a significantly different approach to the EDGE courses in that it is not aimed at the management level of a beef business. This course is really a stand–alone package of materials that was primarily aimed at commercial livestock transporters, but is also appropriate with minimal modifications to others involved in the transporting of livestock, e.g. on station road train operators, depot operators and stevedores. While it is not primarily aimed at people managing beef businesses, the beef business will benefit from involving staff and contractors undertaking the training.

4.2 Objective 1 recommendations

4.2.1 Recommendations specific to all EDGE packages

Technical manuals

Recommendation 1: Retire the *Grazing land management EDGE* and *Nutrition EDGE* technical manuals, as the workshop notes now include appropriate levels of detail so that they stand–alone, without being overwhelming. This also decreases the expense of printing and maintaining (updating) technical manuals which not many people referred to post–workshop.

A technical manual for *Breeding EDGE* was never developed as participants were provided with copies of *Bull selection: an aid for beef producers on buying better bulls*, *Breeding for profit*, *Beef cattle recording and selection* and *Female selection in beef cattle*.

Facilitators' notes

Recommendation 2: Retire the *Breeding EDGE*, *Grazing land management EDGE* and *Nutrition EDGE* facilitators' notes as explanatory notes are included in the slides and there is more information and guidance provided in the workshop notes. It is more beneficial to provide regular, effective train-the-trainer activities and updates.

Workshop notes

Recommendation 3: Improve referencing to further reading in the workshop notes, including recent publications such as the *Phosphorus management of beef cattle in northern Australia* booklet, cover specific topics in more detail for participants if required.

Recommendation 4: Investigate reprinting DAF publications previously used as further reading for participants that are no longer in print and in light of RD&E developments since they were published. These need to be reviewed and updated for MLA, FutureBeef partners and/or private providers to continue using them.

Recommendation 5: Use key scientific references used throughout the packages and collate these for deliverer background reading and training purposes.

Follow–up workshops

Recommendation 6: Follow–up workshops, or activities, should be held no later than six months following delivery of the original workshop. Ongoing consultancy work with workshop participants enhances their business management and return on investment for attending the workshop, and should be encouraged.

Adult equivalents

Recommendation 7: Meat & Livestock Australia to organise and appropriately contract suitable training to bring all current and potential EDGE deliverers up to speed and confident to deliver the new adult equivalent methodology developed by McLean & Blakeley (2014).

Decision support tools

Recommendation 8: Develop decision support tools for the EDGE packages including spreadsheet–based tools to analyse the cost benefit of:

1. A range of nutritional interventions (*Nutrition EDGE*).
2. Improving land condition and carrying capacity through either spelling or capital expenditure (*Grazing land management EDGE* and *Grazing fundamentals*).
3. A range of animal health treatments (*Breeding EDGE*).

Specialist modules

Recommendation 9: Develop specialist modules for each of the EDGE packages to provide additional, expanded learning for participants in specific areas that they can pursue if relevant to their particular business, e.g. breeder herd management and weaning management. Also identify existing packages, including non–EDGE, that are already achieving the same outcomes for participants and link to, or partner with, these.

In some cases activities meeting these specialist outcomes already exist and are being delivered successfully, e.g. the BullSELECT workshop by Tropical Beef Technology Services. In this instance we recommend linking to, and making EDGE participants aware of, these options, to capitalise on workshops that already deliver this information.

Recommended specialist modules for each EDGE package and detailed frameworks are provided in Appendix 6.5.

Figure 3 below summarises the linkages between ‘core’ EDGE packages, specialist modules and other non–EDGE packages.

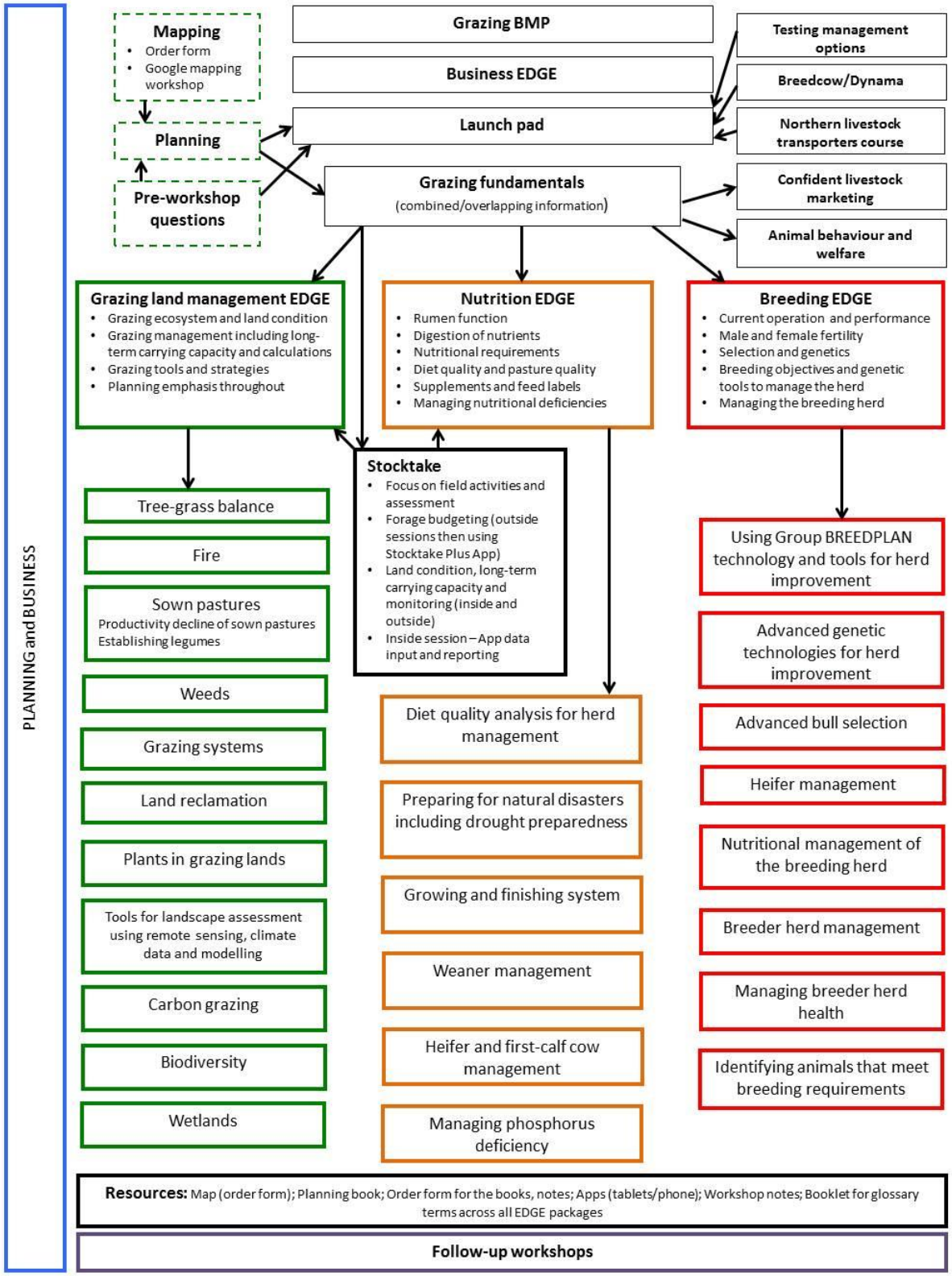


Figure 3 Linkages within and between 'core' EDGE packages, recommended specialist modules and complementary non–EDGE activities

Animal health and welfare

Since the first EDGE packages were developed much has changed in regards to consumer demands, R&D, animal health and welfare legislation, emerging biosecurity issues and consequently producer priorities in this regard. Similarly, there are a number of producer–orientated animal health and welfare activities and resources that have been developed that complement EDGE that producers can take advantage of immediately. In northern Australia these include:

- Grazing BMP
- Livestock Biosecurity Network
- *Managing Indigenous pastoral lands* manual
- Northern livestock transporters course

The **Grazing BMP** (www.bmpgrazing.com.au) is a voluntary, online best management practice program that aims to help producers improve the economic and environmental performance of their businesses. The Grazing BMP animal health and welfare self–assessment module comprises five key areas:

1. Health management program
2. Extreme weather events and predation
3. Biosecurity
4. Animal welfare
5. Livestock transport

The **Livestock Biosecurity Network** (www.lbn.org.au) delivers free, specialised workshops designed to raise understanding of what farm biosecurity means for grain and livestock businesses, including:

- Feral animal control
- Minimising and controlling weed and seed spread
- Animal health management
- Biosecurity risk management
- How to develop a farm biosecurity plan

Module 7—Husbandry, health and welfare of the ***Managing Indigenous pastoral lands*** **manual** developed by McClelland Rural Services for the Rural Industry Research and Development Corporation (RIRDC). The manual, published in 2014 and available from www.rirdc.infoservices.com.au/items/14–014, covers:

1. Husbandry
    1.1. Branding
    1.2. Dehorning
    1.3. Castration
    1.4. Spaying

2. Health
    2.1. Health cattle, more income
    2.2. Diagnosing disease and deficiencies
    2.3. Prevention – vaccines and vaccination programs
    2.4. Reproductive diseases
    2.5. Three day sickness
    2.6. Clostridial diseases such as tetanus
    2.7. Coccidiosis

2.8. Tick fever
2.9. Worms
2.10. Other diseases on cattle

3. Welfare
3.1. Animal handling
3.2. Loading and transport (is it fit to load?)
3.3. Live export (is it fit to export?)
3.4. Extended dry seasons and drought

It provides succinct, practical technical information supported by colour images, line diagrams, case study examples, management checklists for each section and comprehensive further reading lists.

The ***Northern livestock transporters course*** covers:
1. The vital importance of truck drivers
2. Animal welfare
3. Impacts of transport
4. Animal behaviour and handling
5. Safety
6. Best practice in transport

As reported in Section 4.1.15, with some minimal modifications the Northern livestock transporters course would be applicable to others involved in the transporting of livestock, e.g. on station road train operators, depot operators and stevedores.

Recommendation 10: Meat & Livestock Australia liaise with McClelland Rural Services and Rural Industries Research and Development Corporation (RIRDC) about the use and delivery of the *Managing Indigenous pastoral lands* manual to complement and fill the EDGE animal health and welfare gap identified by this project. Meat & Livestock Australia to also liaise with Grazing BMP, the Livestock Biosecurity Network, and NTDPIF to determine the most effective pathway(s) for northern producers (and EDGE participants) through these existing, comprehensive, industry programs and their associated resources.

Images

Recommendation 11: Meat & Livestock Australia to seek and confirm copyright permission or licenses (including payment) for images. A list of images requiring formal permission to be finalised is supplied with each of the updated EDGE packages. Contact details have been supplied for each image wherever possible. This information must be kept and maintained centrally to ensure MLA does not breach copyright.

Editing and design

Recommendation 12: Use a single professional editor to review all four packages to improve consistency of writing style, voice, etc.

Recommendation 13: Do not oversimplify graphs, e.g. stylise them, as this can distort their accuracy and meaning. Use original data wherever possible and include references. This will also assist to streamline future package updates.

Recommendation 14: Reference all material in the workshop manual and presentation slides, i.e. figures, tables, photos, etc. so that participants, deliverers and future developers can readily access original data.

Recommendation 15: Use colour as much as possible, retire the monochrome design, and use high quality (resolution) colour images.

Recommendation 16: Use large, consistently formatted graphs, referenced to source.

Recommendation 17: Use minimal branding on all but workshop note folders and/or individual manual covers – this will help de–clutter pages and increase the amount of white space which will consequently improve readability.

Recommendation 18: Also use minimal branding on all but the first of each individual module presentation slides – this will help de–clutter them and increase their readability.

Recommendation 19: Remove page fill to increase the amount of white space.

4.2.2 Recommendations specific to the *Planning book*

Recommendation 20: Develop an electronic version and an online version of the *Planning book* so that participants can complete and build on their individually data and information electronically and/or online – depending on the reliability of their internet access and individual preferences.

4.2.3 Recommendations specific to *Breeding EDGE*

Develop new, complementary specialist modules or link to existing specialist activities as detailed in Appendix 6.5.

Specialist modules recommended for *Breeding EDGE* are:

1. Using Group BREEDPLAN technology and tools for herd improvement – Tropical Beef Breeding Services already deliver a workshop covering these outcomes
2. Advanced genetic technologies for herd improvement
3. Advanced bull fertility and selection – Tropical Beef Breeding Services already deliver this in their BullSELECT workshop
4. Heifer management
5. Nutritional management of the breeding herd
6. Breeder herd management
7. Managing the health of the breeding herd
8. Animal behaviour and welfare

4.2.4 Recommendations specific to *Grazing land management EDGE*

Forage budgeting, carrying capacity calculations and the new adult equivalent methodology

Recommendation 21: Review and if necessary update forage budget and carrying capacity calculations and associated spreadsheets, to incorporate the adult equivalent methodology developed by McLean & Blakeley (2014); relative to dry matter intake. It must be done in a simple, practical and easy to use way for deliverers and participants.

Specialist modules

Develop new, or link with existing, specialist modules recommended for *Grazing land management EDGE*:

1. Tree–grass balance
2. Fire
3. Sown pastures 1: productivity decline of sown pastures
4. Sown pastures 2: establishing legumes
5. Weeds
6. Grazing systems
7. Land reclamation
8. Plants in grazing lands
9. Exploring tools for landscape assessment using remote sensing and climate data and models
10. Carbon grazing
11. Biodiversity
12. Wetlands

Specialist modules 1 to 5 were previously in *Grazing land management EDGE*; specialist modules 6, 7, 8 and 9 are new, 10 is an existing workshop run by Alan Lauder and 11 and 12 have been developed for some regions through MLA.

See Appendix 6.5.2, for new *Grazing land management EDGE* specialist module frameworks.

Short–term recommendations to be included into Grazing land management EDGE

Source specialist service providers

Recommendation 22: Meat & Livestock Australia to source specialist service providers to prepare property maps for EDGE workshop participants to use during workshop and planning sessions and at home. It would be recommended that workshop participants contact private map providers directly to provide, where possible, a cadastral or satellite map overlaid with:

- Property boundaries
- Paddock boundaries
  - Paddock areas
  - Land type areas within those paddocks where possible
- Land types
- Infrastructure

Recommendation 23: Develop tree basal area sheets:

- Col Paton, EcoRich Grazing, has provided high resolution photos of the GRASSMAN sheets so these can be used to develop one set of tree basal area sheets.
- Bob Shepherd, DAF, is the contact for the Burdekin.
- Additional funding not required.

Recommendation 24: Develop decision support tool for *Grazing land management EDGE:*

- Develop spreadsheet–based tools to analyse and demonstrate (in *Grazing land management EDGE* and *Grazing fundamentals*) the cost–benefit of improving land condition and carrying capacity through either spelling or capital expenditure.
- Additional funding not required.

Recommendation 25: Include Normalised Difference Vegetation Index (NDVI) data linked to nutrient content:
- Explain NDVI and its relevance to pasture growth and nutritional quality
- Include the new Dunblane results – David Phelps, DAF
- Additional funding required, e.g. two days consultant fees

Recommendation 26: Develop financial analysis for land condition change:
- To use as an example to support benefits of land in good condition
- Using Breedcow Dynama and property data from the Burdekin
- Additional funding required, e.g. three days consultant fees

Recommendation 27: Purchase map data from the Queensland Department of Science, Information Technology and Innovation (DSITI):
- Purchase map data from DSITI to illustrate 'break of season' or ENSO influence across Northern Territory, Western Australia and Queensland.
- Purchase price approximately $2000.

Longer–term recommendations for inclusion into Grazing land management EDGE

Recommendation 28: Meat & Livestock Australia to source specialist service providers, where possible, to calculate carrying capacities for properties. This will enable land managers to focus energies on management decisions relevant land condition, stocking rates, improving carrying capacity and productivity.

Recommendation 29: Meat & Livestock Australia to arrange for EDGE access to map data for northern Australia:
- Northern Territory, Western Australia and/or MLA to negotiate with DSITI for partial or complete access to the entire dataset and maps to develop a map maker website similar to what DAF uses for Queensland, see www.daf.qld.gov.au/environment/ag–land–audit/web–mapping–tool.
- This site would be useful for producing maps and information on a regional basis for exploring various climate–pasture scenarios as required (e.g. comparative ENSO phase, 'break of season' maps) to assist with understanding pasture growth relative to climate for different regions.

Recommendation 30: Include information about cyanobacteria in *Grazing land management EDGE* and *Grazing fundamentals*, including their: influence on ecosystem, and; contribution to nutrient cycling.

Recommendations for further research

Recommendation 31: Review land types

Land types review would ideally involve two distinct areas (land type documented information and the land type spatial data) that are closely related. The responsibility of each predominantly lies with DAF and DSITI respectively.

1. Land type documentation

- Conduct a state–wide review of 'standardised land type documents' to consider providing the most relevant and valid information for producers and users; e.g., adding any recent information (e.g. regional ecosystem updates), carrying capacity and land condition information.

- Produce land type documents for regions where they are incomplete (e.g. South East Queensland, Darling Downs).
- Improve existing regions (such as Southern Gulf, Mulga, Maranoa–Balonne, and Moreton – part of South East Queensland) where necessary.
- Review, standardise and add information for 'new' areas (e.g. Mary).

2. Spatial land type data

- Consider rationalising land type names across regional boundaries (to prevent mismatch of land types on either side of boundary, streamline where land types that from one region are mapped in another region due to Regional Ecosystem allocation) for mapping and reporting purposes while ensuring the amalgamation of similarly named land types remains true to biophysical and management characteristics. Names need to remain meaningful to land managers.
- Ensure land types align with regional ecosystems (these regional ecosystems are used in mapping of land types) and that they are the most recent corrected versions. Ensure allocations are updated in land type documentation.
- DAF staff have suggested the potential for including land type relevant information (on documents) in the attribute table (carrying capacity, soil fertility, soil phosphorus, water holding capacity, erosion and runoff etc.; plus have a comments field with for example; identifying research and animal growth estimates.

The process of updating any aspects concerning land type sheets or pasture growth modelling requires significant staff input across departments (DAF and DSITI in particular) as well as catchment groups and private consultants, and many changes will require review, evaluation and updating of pasture growth models. Current land type information for Queensland is available from www.futurebeef.com.au/topics/grazing–land–management/land–types–of–queensland.

Recommendation 32: Review pasture growth tables

Pasture growth tables underpin the carrying capacity calculations across all land types. Given that one of *Grazing land management EDGE* key messages involves the importance of planning stocking rates around carrying capacity, the reliance on these pasture growth tables is extensive.

Whilst most of the pasture growth tables likely reflect accurate predictions of pasture growth for particular land types in certain conditions, there are some that could be improved. DISTI with REEF funding commenced a review of *Stocktake* and *Grazing land management EDGE* pasture growth models for the Burdekin and Fitzroy regions in particular. **It would be of great benefit to continue this review for all pasture growth models.**

An initial review of pasture growth outputs and carrying capacities for land types and locations across Queensland would highlight where gross errors may exist to target land types and locations that need priority attention.

Communication with DAF extension staff will provide critical evaluation and validation of existing pasture growth model outputs. As with land type sheet reviews, there would be considerable numbers of staff involved – including modellers, pasture researchers, and extension officers.

Modellers do a tremendous job with these models and welcome any constructive feedback on the accuracy of the figure produced by the models. It is opportune to provide them with the information they need.

As with land type sheet reviews, there would be considerable numbers of staff involved – including modellers, pasture researchers, and extension officers from across departments (DAF and DSITI in particular) as well as private consultants.

Recommendation 33: Develop 'break of season' rules

In order for land managers to better use information and tools provided at workshops such as EDGE and *Stocktake* it is necessary to improve how timing for management is determined with reference to climate and rainfall.

Much grazing and animal management hinges on when this dry season break occurs and when the wet season finishes. Realistic dates and season lengths, underpinned by supporting scientific data, would significantly improve the effectiveness of land managers. It would enable them to better plan and make decisions regarding wet season spelling, forage budgeting and other stock number adjustments and nutrition and breeding programs.

The 'dry season break' can be defined as when there is sufficient growth (usually to phase two) to produce quantity and quality of pasture for stock to gain weight.

Further work is needed to generate and describe scientifically–defendable parameters and conditions ('break of season rules') that broadly define the start and end of the dry season. These need to take into account – and include analysis of – suitable rainfall events and conditions that lead to significant change in both pasture yield and nutritional content. This needs also to be relative to soil type, climate zone, soil moisture and land condition for various locations.

While the answers may be complex, we need to work through these to reach simple answers which have substance and provide the basis for effective decisions dates.

The focus could start in one region; e.g. the Burdekin, and develop work around analysing historical data and applying bioeconomic modelling to produce extension guidelines. This work would complement other research and development such as *PaddockGrasp* development and FORAGE data dissemination. The more objective guidelines produced from the project would also be very useful in *Grazing BMP* extension.

4.2.5 Recommendations specific to *Grazing fundamentals*

The recommendations for Grazing fundamentals are the same as those for *Grazing land management EDGE* in previous section.

4.2.6 Recommendations specific to *Nutrition EDGE*

Nutrient requirements

Recommendation 34: Update sheep energy and protein requirement tables for both meat and wool breeds on tropical and subtropical pastures.

Recommendation 35: Develop dry matter intake estimates for both meat and wool sheep.

Recommendation 36: Develop dry matter intake estimates for breeders in alignment with the new dry matter intake graphs for dry stock.

Recommendation 37: Develop additional energy and protein requirement tables for:
1. Wet cows that are back in calf, especially those in their second trimester
2. Heifers that weigh 300 kg (many British breeds and some *Bos indicus*)
3. Lactating cows with calves over four months of age; this is especially important because it highlights the difference in requirements between cows in early lactation and those in late lactation.

Recommendation 38: Use Stuart McLennan's written explanation of the updated cattle nutrient requirement tables and figures he prepared for MLA (resulting from this project) as a deliverer reference. A copy of the documents Stuart prepared is provided in Appendix 6.11.

Specialist modules

Develop new, complementary specialist modules or link to existing specialist activities as detailed in Appendix 6.5.3.

Specialist modules recommended for *Nutrition EDGE* are:

1. Diet quality analysis for herd management
2. Preparing for natural disasters
3. Growing and finishing systems
4. Weaner management
5. Heifer and first–calf cow management
6. Managing phosphorus deficiency

4.3 Objective 2

Resources from existing workshop materials (including presenter PowerPoints, notes and teaching materials) updated and consolidated on the FutureBeef website (staff intranet).

The EDGE workshops have a range of PowerPoint presentations and notes, tailored for specific regions. These were collated to determine the key messages that are relevant across all areas; supplemented by key messages reflecting local environments.

Materials for *Breeding EDGE*, *Nutrition EDGE* and *Grazing land management EDGE* (i.e. workshop notes, facilitator notes, technical manuals, PowerPoint slides and associated materials, e.g. roadmaps, planning books, etc.) are centrally located on the project's Teamwork Project Manager™ site. Melissa Driscoll, a consultant who has been closely involved in the EDGE packages in past years, has copies of the other *Grazing land management EDGE* packages/versions and the associated Adobe InDesign files, etc. Melissa also has an online version of *Nutrition EDGE* she was commissioned to develop previously by MLA.

These files will be transitioned to a secure site accessible to accredited deliverers once a suitable repository has been identified and agreed upon. This will depend on the level of security or restricted access that is, or isn't, required. The FutureBeef staff intranet has secure areas for each partner organisation however these cannot be further segmented into package–specific areas. Google Cloud Storage is one possible alternative, e.g. standard storage $0.085 per gigabyte (GB) per month for the first 0–1 terabyte (TB).

Meat & Livestock Australia is also updating their online environment to allow non–MLA staff access to specific areas which is another possible alternative depending on the ease of access, flexibility, storage available, etc.

EDGE materials currently available on the FutureBeef staff intranet (http://intranet.futurebeef.com.au/resources/workshop–and–field–day–materials) to state and territory department staff (and available to private providers on request) for each of the *Breeding EDGE*, *Grazing land management EDGE* and *Nutrition EDGE* packages include:

1. EDGE workshop coordinator roles and contact details (Queensland)
2. EDGE event flyer generic
3. EDGE event flyer editable
4. EDGE participant details template
5. EDGE order form for notes and manuals
6. EDGE letter to participants example
7. EDGE pre–workshop questionnaire
8. EDGE pre–workshop skills audit questions template
9. EDGE pre–workshop skills audit questions template
10. EDGE post workshop skills audit questions template
11. EDGE post workshop skills audit answers template
12. EDGE feedback form template
13. EDGE certificate template
14. EDGE*network* handy hints – to help coordinators and delivers plan and prepare workshops

While these materials are currently FutureBeef–DAF branded versions, it is simple and straightforward to incorporate partner branded and specific materials as they become available.

Similarly, the promotional and operationally–related materials can be, and are being, promoted to all extension officers, particularly newer staff, to support their technical development through the FutureBeef staff intranet.

4.4 Objective 2 recommendations

Print on demand and mobile device friendly

Recommendation 39: Design EDGE and *Northern livestock transporters course* materials digitally so that they can be printed on demand by local suppliers wherever possible. This will help to minimise printing costs and remove storage costs.

Recommendation 40: Develop mobile friendly electronic versions of all EDGE and *Northern livestock transporters course.* Materials are developed and that they meet Australian content accessibility guidelines. This will cater to the increasing use of electronic mobile devices by participants.

EDGE repository

Recommendation 41: Meat & Livestock Australia, in consultation with FutureBeef partners and private deliverers, identify, fund and administer a centralised, easily accessible location for all EDGE workshop materials and tools with one to two people from each organisation nominated to maintain them, either from one of the previously mentioned organisations or external providers.

Administrative and logistical support

Recommendation 42: Meat & Livestock Australia provides suitable administrative and logistical support to private and public providers (as was initially the case) to coordinate EDGE program components such as accreditation, marketing, M&E, etc.

4.5 Objective 3

Continual content update process across the workshop suite developed.

As clearly demonstrated by Objective 1 results and recommendations for this project, it is one thing to identify new RD&E outputs and outcomes to incorporate into training packages. However, it can be an entirely different process to understand it from a practical, on–farm/business perspective **and** incorporate it correctly and effectively.

It is also important to factor in the volume and evolving nature of RD&E outputs and outcomes generated into a regular and structured (focussed) update process. For example, an RD&E final report may be submitted and accepted, however, it can take time for discussion, debate and if applicable acceptance and use of the findings. This is true for researchers, extension staff (public and private) and producers.

4.6 Objective 3 recommendations

Recommendation 43: Meat & Livestock Australia instigate and appropriately contract a six monthly review (or scan) of RD&E outcomes, identifying ones of immediate use and relevance to EDGE packages. These findings to be discussed and acted upon at the recommended annual EDGE review and debrief meeting involving the EDGE manager, coordinators and deliverers.

As per Objective 2 recommendations prepare easily editable versions of all EDGE materials suitable for print–on–demand that can be modified as required.

4.7 Objective 4

Recommendations for a monitoring and evaluation and data management process developed in conjunction with the existing FutureBeef M&E plans and systems.

4.8 Objective 4 results

A monitoring, evaluation and reporting (MER) strategy was developed and is provided in Appendix 6.9. This strategy covers:

- a brief introduction to monitoring and evaluation and the purpose of this particular strategy
- the process used to develop the strategy
- where EDGE sits within MLA: the relevant strategic imperatives and key performance indicators (KPI)
- EDGE vision, goals, objectives, strategies and outcomes
- using program logic to document longer–term outcomes, key result areas, uptake strategies and underpinning development activities and the associated performance measures and evaluation methods for each of these project components

This strategy is consistent with the MER framework used by QualDATA in the *MLA monitoring and evaluation project phase 3: inception meeting* on 5 March 2015.

4.9 Objective 4 recommendations

Recommendation 44: Meat & Livestock Australia review the proposed MER strategy as presented in Appendix 6.9, in light of recent changes to MLA structure and operations, including any strategic imperative and/or KPI changes. Then discuss and finalise and implement the strategy with FutureBeef Program partners, EDGE coordinators and private

deliverers. Revisit the MER strategy annually to ensure its relevance and that the delivery and processes of the EDGE packages are consistent with the strategy.

Recommendation 45: Meat & Livestock Australia organise and appropriately contract annual face-to-face EDGE program meetings with EDGE national manager, EDGE coordinators and private deliverers to review progress against KPIs (EDGE national manager to prepare report using quarterly data) and address general program business and emerging issues (as per business and operational plan recommendations). The timing of the annual meeting and reporting to align with the MLA corporate reporting schedule.

Recommendation 46: Meat & Livestock Australia organise and appropriately contract biennial EDGE program updates, e.g. via webinar, with the EDGE national manager, EDGE coordinators and private deliverers to review progress, identify and address any emerging issues, etc.

Recommendation 47: EDGE coordinators and private deliverers report quarterly (ideally directly into a centralised online system, e.g. QualDATA) KPIs, number and location of workshops, number of participants and businesses, etc. and any new R&D identified, emerging issues, etc. to the EDGE national manager

Recommendation 48: Meat & Livestock Australia investigate and/or confirm an online reporting system that can be used by EDGE coordinators and private deliverers, and ideally participants, to enter M&E data directly that can then be collated, analysed and distributed by the EDGE national manager quarterly and then annually for the EDGE program meeting. Consistent with the outcomes and recommendations from the *Monitoring and evaluation systems framework for Meat & Livestock Australia* final report E.EVL.1401 prepared by QualDATA (2014).

Recommendation 49: Meat & Livestock Australia in consultation with an M&E specialist, EDGE coordinators and private deliverers update the current M&E tools, in particular the pre– and post–skills audit questionnaires and the evaluation form to reflect the new and updated EDGE packages and Northern livestock transporters course and the MER strategy. Meat & Livestock Australia to develop electronic and online versions, or options, of the same that can be used wherever this option is accessible (i.e. connectivity allows).

Recommendation 50: Meat & Livestock Australia develop a simple, effective national EDGE participant database, ideally linked (or part of) the MLA membership database to capture participant details, including information required for M&E – herd size, property size, etc. that they only have to enter once when registering for consecutive EDGE activities and which allows follow-up, i.e. for additional customer service and M&E purposes. The EDGE national manager reviews, updates and interrogates the database regularly (i.e. actively maintain) to ensure its integrity and for quarterly and annual reporting purposes.

4.10 Objective 5

Business and operational plans developed that include consideration of the following:

a. Delivery models based on existing market research and extension/adult learning trends
b. Integrated and consistent communication of key messages across workshops, magazines, newsletters, forums, eBulletins and the time and reach of these across Northern Australia
c. VET accreditation path options around workshops/training packages
d. Train–the–trainer needs for building capacity of deliverers
e. Pricing guidelines for participants and deliverers

4.10.1 Business and operational plan

A business plan to provide MLA with a management tool and operational guidelines to more effectively and efficiently deliver EDGE, specifically the *Breeding EDGE*, *Grazing fundamentals*, *Grazing land management EDGE* and *Nutrition EDGE* packages in northern Australia is proposed in Appendix 6.6. The draft business plan was submitted and accepted in conjunction with the Milestone 2 report (31 July 2013).

The business plan, and in particular the operational guidelines, incorporate the recommendations in Section 6 of this report which in turn capture the recommendations from Applied Ag's review, feedback from the review workshops, and suggestions by technical editorial teams.

The business and operational plan includes:

- EDGE mission statement and objectives
- Value proposition
- Target markets
- Operations
- Financing and pricing
- Performance
- Monitoring, evaluation and reporting
- Recruitment options and skill retention strategies
- Training programs
- Products and services
- Delivery process
- Technology (software)
- Quality control
- Marketing and communication

Under quality control suggestions have been made regarding deliverer accreditation, detailed in Section 6.10.

4.10.2 Delivery models

EDGE delivery option 1: as is

Currently EDGE packages are delivered as relatively isolated, one–off activities with little to no follow–up or engagement after the scheduled one day follow–up workshops. There are instances, however, where participants seek one–to–one consultancies with private providers following the workshop, which facilitates adoption of learning outcomes and management changes. In summary, the process is:

1. Expressions of interest from other activities, such as Grazing BMP, and enquiries direct to agency staff and private providers indicate the level of interest and/or need in an area.

2. Agency staff or private providers individually, or collaboratively, organise a date and location (to match deliverer availability and considering other regional events that may be occurring at the same time) and advertise the workshop more broadly. A detailed guide to workshop organisation and delivery is available on the FutureBeef staff intranet www.intranet.futurebeef.com.au/resources/workshop–and–field–day–materials/edgenetwork–handy–hints/ and also provided in Appendix 6.8.2.

3. Once participants have registered they are contacted individually (by phone and/or email) to give them more information about the workshop, including specific information

they can bring along to make it more productive for them. In the case of *Grazing land management EDGE* this is quite specific, including property maps and descriptions of land types, etc.

4. The workshop is delivered face–to–face.

5. A one–day follow–up activity is delivered, also face–to–face, four to six months after the workshop. The aim of the follow–up activity is to revisit those technical areas where there are further queries after participants have had the opportunity to implement what is learned at the workshop.

This delivery option has and can continue to deliver positive outcomes as recorded in participant feedback as collated in the annual *Workshop evaluation reports* (copies are available from (www.intranet.futurebeef.com.au/direction/monitoring–and–evaluation) and previous triennial *Meat & Livestock Australia awareness and adoption KPI evaluation* reports.

The 2011 *Meat & Livestock Australia awareness and adoption KPI evaluation* (B.COM.1042) reported that *EDGEnetwork activities again had fewer participants in 2011, with 69% making changes. Low participant bases make this data unreliable however this and previous surveys result of 87% is indicative of the significant impact EDGEnetwork has on changing in management practices* (page 5).

This confirms the benefits that can be achieved, but also highlights the resources required to maintain the level of activity and commitment, which have been lacking in the last five years of the program.

EDGE delivery option 2: blended

Steps 1 to 3 are similar to those in Option 1, however develop online expression of interest, registration and payment options in addition to those traditionally offered. Ideally linking direct to, and captured in, a central EDGE database to minimise participants having to enter details multiple times. This will provide additional flexibility to participants and deliverers.

4. Hold a webinar or teleconference (depending on the reliability of the technology and participant preference) to welcome participants, make initial introductions, explore participant needs, explain the process including the benefits of bringing their own data and information to the face–to–face activity, the role of the *Planning book* and answer any questions arising. Also highlight where participants can find materials if they'd like to do some pre–reading.

   If using a teleconference ensure participants have copies of materials to be discussed before the meeting. If using a webinar ensure participants are comfortable with the technology and are set up accordingly well beforehand. Maximum webinar or teleconference time one hour.

   Depending on the location of participants and deliverers this could also be done face–to–face, e.g. in more closely settled regions.

5. Offer phone and email support to participants before the face–to–face activity to answer questions, help collate data, etc.

6. The workshop is delivered face–to–face with participants using their own data and information for discussion and exercises wherever possible, i.e. using the *Planning book*.

7. Phone and email support offered to participants as well as **explicit** individual participant 'check–in' contact to gauge how they're going after the face–to–face activity, e.g. in terms of any questions, points of clarification and progress towards their intended actions resulting from the workshop. For example, for eight participants with at least a 30 minute phone conversation each this equates to four hours or for an average of 45 minutes each 6 hours. It is envisaged that this could be done on a per business basis.

8. Follow–up activity

9. Participant check–in

EDGE delivery option 3: flipped

Steps 1 to 4 and 5 to 9 are similar to those in Options 1 and 2 however the face–to–face activity is **entirely activity–based** working on actual participant issues having done reading and pre–work beforehand and accessing the deliverers' knowledge, skills and experience to work through them and come up with solutions.

EDGE delivery option 4: online or distance education

It is recommended that MLA and FutureBeef partners progress with the *eLearning pilot* as proposed by in the *eLearning strategy research project* (Higgins 2014) using the updated EDGE packages.

Meat & Livestock Australia has successfully invested in the development of e–learning tools and processes in collaboration with MINTRAC, specifically:

- Richardson, C, 2013, *Delivering livestock handling training to meat processors*, Final report A.PAW.0008, Meat & Livestock Australia, North Sydney, New South Wales.
- Richardson, C, 2012, *E–learning for NLIS implementation in meat processing*, Final report A.PAB.0001, Meat & Livestock Australia, North Sydney, New South Wales.

All four options depend on appropriate levels of commitment by stakeholders and an adequately resourced (labour and funds) national program. Each option requires different approaches and in turn deliverer skills and resources.

Consistent with recommendations in Section 4.2.2 to make the most of the investment in EDGE to date and the new packages for all three options existing materials available through MLA, FutureBeef and partner organisations be updated to reflect, or at least be consistent with the key messages and information developed through this project. Explore options to value add with new, complementary information or activities, e.g. social media, webinars, etc. Similarly, EDGE and complementary packages be promoted wherever applicable alongside this information, etc.

These recommendations for delivery of the EDGE packages also apply to deliverer training, i.e. it is important to offer flexible training and professional update options to deliverers as well as participants, practising what we preach.

4.10.3 Key messages

Key messages for each of the FutureBeef Program Priority Areas and 'key profit driver' content areas incorporating the latest R&D relevant across all areas and regions were developed initially by FutureBeef extension staff and were then refined at, and following, the *Training packages review workshops* held in February 2013. There was a high level of

interest and commitment from staff, including government and private deliverers, in developing these messages.

The key messages were developed for each of the three disciplines (breeding, nutrition and grazing land management) to ensure producers and other stakeholders receive a consistent message about the basic management principles, whether it is an EDGE workshop, a Beef Up forum, media release or field day.

Consequently a *FutureBeef communications calendar* (planner) was developed and is being used to focus FutureBeef social media, eBulletin and newsletter delivery. It summarises on–farm activities by season, month and region and links these to the key messages and FutureBeef and related activities that complement them (http://intranet.futurebeef.com.au/directions/plans).

The key messages are available from the FutureBeef staff intranet (http://cdn3.futurebeef.com.au/wp–content/blogs.dir/9/files/2012/10/FB–key–messages–November–2013.pdf) and copies are included in Appendix 6.4.

It is envisaged that these messages will continue to evolve with wider input and as new R&D outcomes become available.

4.10.4 Vocational education and training (VET) accreditation path options

Detailed reports, including recommendations, for aligning FutureBeef training packages with VET units and packages, specifically *Breeding EDGE*, *Business EDGE*, *Grazing fundamentals*, *GLM EDGE*, *Nutrition EDGE* and the *Northern livestock transporters course* are provided in Appendix 6.7.

These reports include:

- Background and introduction to vocational education and training, and recent industry workforce reports
- Different options for accrediting course participants, which are:
    1. Offer a Statement of Attainment for existing units of competency
    2. Adopt an existing skill set
    3. Develop a new skill set from existing units
- Recommendations for the EDGE packages and the *Northern livestock transporters course*

4.10.5 Train–the–trainer needs

Deliverers require technical, presentation, facilitation and technology skills, these requirements are detailed below. It is also important to provide new and developing deliverers opportunities to practice (use) and refine the knowledge and skills they gain from train–the–trainer activities. As EDGE promotes knowledge and skill development for EDGE participants, the EDGE program and deliverers must do the same.

It is also critical that current deliverers be provided with continual technical updates to maintain their knowledge base on which to provide knowledge and skills to participants that attend the workshops that also have a high knowledge base.

Technical and practical skills in breeding, grazing land management and nutrition

Identify key research and extension/consultancy personnel who are leaders in each of these disciplines to develop and deliver training workshops and material to potential trainers. This

should include both formalized technical information as well as practical sessions to underpin what is learned as well as catering for the learning style of many of the participants.

A repository of updated information that is centrally located and accessible to all EDGE deliverers must be maintained by a designated organization/contractor(s). This will allow for deliverers to be kept up–to–date on research outcomes and for new material to be incorporated into the EDGE packages, which will be living documents to facilitate this process.

Group facilitation and presentation

Formal training is essential to the process of delivering a significant amount of technical content in the designated timeframe of the EDGE packages. This material is effectively delivered when the learning needs and learning styles of the participants are catered for. There are mechanisms for both facilitating the workshop that are distinct from delivery of the material and formal training is required for both.

Technology

In this context 'technology' includes tools like webinars, teleconferencing, massive open online courses (MOOCs), Google Drive, mobile devices, interactive whiteboards, etc that are currently used or could be used to improve the effectiveness and efficiency of EDGE outcomes for participants and deliverers. Coordinators and deliverers must be comfortable with and confident using the technologies employed.

It is preferable for anyone wanting to become an EDGE deliverer to attend train-the-trainer activities. Current deliverers are also strongly encouraged to attend this training. Meat & Livestock Australia's role being to coordinate the development and delivery of the training and to contract key specialists in the targeted disciplines, including facilitation and delivery skills. Deliverer accreditation and professional development suggestions are provided in Appendix 6.10.

4.10.6 Pricing guidelines

Tables 2 and 3 summarise actual and estimated time and costs of different delivery scenarios (excluding operational expenses) currently to prepare for, deliver and report on *Breeding EDGE*, *Grazing land management EDGE* or *Nutrition EDGE*.

They have been provided as a base for MLA to have further discussions with FutureBeef partners, EDGE coordinators and private deliverers to review and if necessary amend current prices.

Pricing must be consistent and at commercial rates consistent with inflation, taking into account the full cost of delivery as indicated in Tables 2 and 3.

The current MLA policy regarding EDGE workshop pricing is that 'the degree of participant contribution at EDGE events should be commensurate with the degree of private or public good that may be derived from the activity, i.e. the greater the private good (Category B and C events); the greater the private contribution. We [MLA] prefer that producers [participants] pay a minimum of $300–400 for EDGE, irrespective of how much funding is available' (*pers comm.* Allen 2013).

This will help to maintain the integrity of the package as pricing strongly influences public perception of the value of the package and to a lesser degree, the deliverers of the package. Setting a limit the cost of packages after any subsidy will help maintain pricing integrity.

Therefore, it is also important to advertise packages at the full price with any subsidies noted separately.

There is an excellent opportunity to market two or more of the EDGE workshops as a package deal with matching price incentives to make it more attractive for potential participants and to encourage participation at multiple workshops.

Other incentive options to explore include: early bird registration; 'refresher' price for people who want to repeat a workshop (and bring their previous workshop notes and materials) within five years of having done the workshop originally.

Table 2 EDGE workshop delivery example: Nutrition EDGE delivered in Central Queensland

1	Name of workshop, location	*Nutrition EDGE*, Central Queensland
2	DAF presenters (who and how many days)	4 days of a PO3(4) total salary costs = **$1684*** *Excluding any travel and accommodation
3	Consultant presenters: who, days and rate	Presenter 1, 6 days, $7780 (GST exclusive** and incl. accommodation and travel) Presenter 2, 1 day, $1350 (GST exclusive) **Total cost for consultants = $9,130**
4	Revenue: no. of participants and workshop fees	Minimum: 8 participants from 6 businesses 1 person per each of 6 business @ $1760 = $10,560 Plus second person @ $1485 from 2 (of those 6) businesses = $2970 **Total revenue = $13,530**
5	Expenses: e.g. catering, venue hire, books etc.	**Catering:** $1100 (11 people x $25/day x 4 days) **Venue hire:** Nil **Workshop materials:** Workshop notes $100 each; Technical manual $50 each Minimum total cost of workshop materials for 6 businesses with 8 participants = $1100 (one tech manual per *business* and one workshop notes per *participant*) Total expenses (catering, venue hire, materials) = $2200 **Total cost (salaries and expenses) = $13,014** **Revenue minus costs = $516**

Table 3 EDGE delivery scenarios

	Summary time estimates	Tasks/items	Cost estimates
1	If two DAF presenters one person to organise as well as present – 8 days one person to present only – 5 days Total of 13 days if two DAF presenters ***Plus*** travel time (depending on location)	***First person – 8 days*** 4 days Main workshop presentation/facilitation – 3 days Follow–up presentation – 1 day Plus 4 days for: organising participants materials workshop logistics set up field sites prepare presentation pre-workshop questionnaires following up afterwards with post workshop tasks (collating feedback/participant sheets) ***Second person – 5 days*** Preparation – 1 day Main workshop presentation/facilitation – 3 days Follow–up presentation – 1 day	Base days required 13 days @ $421/day, i.e. salary only costs for a PO3 (4) ***Plus*** Travel time Travel allowances **Cost of 2 DAF staff = $5473 (excluding travel, accommodation and expenses)**
	One DAF for 8 days (as above) One consultant (details below)		**One DAF** costs $3368 (excluding travel, accommodation and expenses) **One consultant** costs $12,000
3	Consultant presenters: One consultant ***or*** Two consultants – two are recommended, particularly for GLM EDGE	Each presenter 6 days Preparation – 2 days Main workshop presentation/facilitation – 3 days Follow-up presentation – 1 day Plus travel accommodation	**One** presenter only 6 days @ $1500*** = $9000 Travel $2000 Accommodation and expenses 5 nights @ $200 = $1000 **= $12,000** ***Current consultancy rates range from $800 up to $1500 per day.
4	Expenses: Catering Venue hire Books	Work on a minimum numbers of 8 participants and 6 businesses. Work on a maximum numbers of 15 participants and 15 businesses. Plus two presenters/facilitators. Catering: 10–17 Venue hire: 4 days @ $125/day Workshop notes: 10–17	**Catering:** @ $25 x 4 days per person = $100 per person, therefore: Catering for 10 people = $1000 Catering for 17 people = $1700 **Venue hire:** 4 days @ $125 = $500 **Workshop notes**: @ $150 each: 8 people = $1200 15 people = $2250 **Total for 8 participants = $2700** **Total for 15 participants = $4450**

	Summary time estimates	Tasks/items	Cost estimates
	Total expenses	Will vary according to number of presenters and where they are from (DAF or private)	
5	Revenue: no. of participants and workshop fees	Minimum: 8 participants from 6 businesses. 1 person per each of 6 business @ $1760 = $10,560 Plus 2nd person @ $1485 from 2 (of those 6) businesses = $2970 **Total = $13,530** Maximum of 15 participants and 15 businesses @ $1760 **Total = $26,400**	

Scenario 1: Two DAF PO3 (4) staff (combined total of 13 days) to deliver a three day workshop with a one day follow–up activity

- Salary only costs $5473
- Catering – minimum (10 people) $1000; maximum (17 people) $1700
- Venue hire 4 days @ $125/day = $500
- Workshop notes and technical manual – minimum (8 people, 6 businesses) $1200; maximum (15 participants, 15 businesses) $2250

Therefore with minimum total expenses of $8173 and minimum revenue of $13,530 workshop return is approximately $5357 – this excludes any DAF staff travel and accommodation expenses.

With maximum total expenses of $9923 and minimum revenue of $26,400 workshop return is approximately $16,977 – this excludes any DAF staff travel and accommodation expenses.

Any workshop profit is re-invested into staff training and development, as well as contributing to communication and marketing activities, and meeting any workshop shortfalls that may occur.

Scenario 2: One DAF PO3 (4) staff (for 8 days) with one consultant (for 6 days) to deliver a three day workshop with a one day follow–up activity

- Salary only costs $3368
- Consultant fees including travel and accommodation $12,000
- Catering – minimum (10 people) $1000; maximum (17 people) $1700
- Venue hire 4 days @ $125/day = $500
- Workshop notes and technical manual – minimum (8 people, 6 businesses) $1200; maximum (15 participants, 15 businesses) $2250

Therefore with minimum total expenses of $18,068 and minimum revenue of $13,530 workshop return is approximately negative $4538 – this excludes any DAF staff travel and accommodation expenses.

With maximum total expenses of $19,818 and minimum revenue of $26,400 workshop return is approximately $6582 – this excludes any DAF staff travel and accommodation expenses.

4.11 Objective 5 recommendations

Business and operational plan

Recommendation 51: Meat & Livestock Australia review the proposed business and operational plan as presented in Appendix 6.6, in light of recent changes to MLA structure and operations, including any strategic imperative and/or KPI changes. Then discuss and finalise and implement the plan with FutureBeef Program partners, EDGE coordinators and private deliverers. Revisit the business and operational plan annually to ensure the relevance of the plan and that the delivery and processes of the EDGE packages are consistent with the plan.

Recommendation 52: Meat & Livestock Australia develop and implement a coordinated, national EDGE program communication and marketing strategy, consistent with the business and operational plan and the MER strategy, in consultation with FutureBeef Program partners, EDGE coordinators and private deliverers. As part of this strategy, MLA reactivates or reinvigorates the EDGE web site and email address, i.e. www.edgenetwork.com.au and edgenetwork@mla.com.au.

Recommendation 53: Meat & Livestock Australia in consultation with EDGE coordinators, FutureBeef partners and private deliverers formalise a deliverer accreditation process, including facilitation, adult learning, presentation skills and delivery of technical information. A deliverer accreditation process and ongoing professional development has been proposed in Appendix 6.10, for discussion.

Delivery models

Recommendation 54: Continue to deliver the EDGE packages and *Northern livestock transporters course* using the current delivery format and using the updated materials.

Recommendation 55: Meat & Livestock Australia to amend EDGE coordinator and private deliverer contracts to incorporate the: updated materials; new business and operational plan, and; new MER strategy and online reporting option. And to allow for greater flexibility in delivery options so that deliverers can: ‘chunk’ delivery to better suit participant and participant group needs; begin using a more blended approach, and; as e-learning options become available they can also be incorporated.

Recommendation 56: Meat & Livestock Australia to progress the *e-learning strategy as proposed in the eLearning strategy research project* final report for E.ONL.1404 (Higgins 2014) using the updated EDGE and *Northern livestock transporters course* materials. This will fast–track more blended and flipped learning delivery.

Recommendation 57: Capitalise on the investment and resulting updated EDGE and *Northern livestock transporters course* materials by making them available and using them, or key components of them, in and by MLA, FutureBeef partners and private deliverers communication, marketing and complementary delivery services. This will promote the packages, i.e. providing ‘teasers’ or ‘tasters’ to potential participants, and help to promote key R&D messages, technologies and tools to industry – a primary charter of MLA and

FutureBeef partners. For example: updating the *Beef cattle nutrition: an introduction to the essentials*, *Managing the breeder herd: practical steps to breeding livestock in northern Australia* and *Grazing land management: sustainable and productive natural resource management* booklets, and; updating FutureBeef web site content accordingly.

Key messages

Recommendation 58: Continue to use and promote the key messages in EDGE and FutureBeef related information, activities and resources. Regularly review and update them as new R&D and/or industry issues emerge.

Vocational education and training options

There are three opportunities for consideration as a result of the review of the EDGE suite of workshop packages. These are:

1. Offer a Statement of Attainment for existing units of competency
2. Adopt an existing skill set e.g. Farm Business Management Skill Set
3. Develop a new skill set from existing units

Recommendation 59: It is our recommendation that a Third Party Partnership Agreement or a Memorandum of Understanding between MLA and the Queensland Agricultural Training Colleges (QATC) be developed so that:

1. The key learning outcomes of the EDGE Grazing land management, Nutrition and Breeding workshops can be mapped to relevant competencies within the AHC10 training package.
2. That suitable new skill sets can be developed for each workshop package using existing AHC10 competencies.
3. That MLA engages QATC to complete recommendations 1 and 2.

Recommendation 60: In addition to recommendations 1 to 3 for the EDGE network suite of packages, MLA should also consider the pathways to accreditation for the *Northern livestock transporters course*.

4. Meat & Livestock Australia work with the relevant state livestock transport representative bodies to determine which accreditation pathway (as detailed in the report in Appendix 6.7.2) is of most relevance to their members.

Train–the–trainer needs

Recommendation 61: Meat & Livestock Australia organise and appropriately contract EDGE deliverer updates and train-the-training as a matter of priority, initially as required but at least annually in the long–term.

Pricing guidelines: Meat & Livestock Australia in consultation with FutureBeef partners, EDGE coordinators and private deliverers:

Recommendation 62: Review and, if necessary, update current EDGE pricing and EDGE pricing guidelines taking into consideration the information provided in Section 4.10.6.

Recommendation 63: Develop a range of package deals incorporating multiple EDGE, or a combination of EDGE and complementary non–EDGE, workshops or activities with matching pricing options to suit the needs of different market segments

Recommendation 64: Develop online payment options.

5. Conclusions and recommendations

The project successfully reviewed and updated the *Breeding EDGE*, *Grazing land management EDGE*, *Nutrition EDGE* and *Northern livestock transporters course*, as well as developing a new *Grazing fundamentals* workshop, with significant input from private providers and departmental staff with experience across northern Australia.

The thoroughness of the process identified gaps in content, tools and knowledge that were filled wherever possible from within the scope of the project. Gaps that could not be addressed in the scope of the project, and areas for further research are detailed in the recommendations with suggested courses of action to progress them.

Sixty-four recommendations have been made for consideration by MLA, FutureBeef partners and private deliverers and other EDGE stakeholders, for easy reference they are listed in full in Appendix 6.12.

5.1 High priority recommendations

Recommendations requiring immediate consideration in order of importance, aside from those relating to editing and design of the updated packages, are:

#61 Meat & Livestock Australia organise and appropriately contract EDGE deliverer updates and train-the-training as a matter of priority, initially as required but at least annually in the long–term.

#45 Meat & Livestock Australia organise and appropriately contract annual face-to-face EDGE program meetings with EDGE national manager, EDGE coordinators and private deliverers to review progress against KPIs (EDGE national manager to prepare report using quarterly data) and address general program business and emerging issues (as per business and operational plan recommendations). The timing of the annual meeting and reporting to align with the MLA corporate reporting schedule.

#46 Meat & Livestock Australia organise and appropriately contract biennial EDGE program updates, e.g. via webinar, with the EDGE national manager, EDGE coordinators and private deliverers to review progress, identify and address any emerging issues, etc.

#50 Meat & Livestock Australia develop a simple, effective national EDGE participant database, ideally linked (or part of) the MLA membership database to capture participant details, including information required for M&E – herd size, property size, etc. that they only have to enter once when registering for consecutive EDGE activities and which allows follow-up, i.e. for additional customer service and M&E purposes. The EDGE national manager reviews, updates and interrogates the database regularly (i.e. actively maintain) to ensure its integrity and for quarterly and annual reporting purposes.

#55 Meat & Livestock Australia to amend EDGE coordinator and private deliverer contracts to incorporate the: updated materials; new business and operational plan, and; new MER strategy and online reporting option. And to allow for greater flexibility in delivery options so that deliverers can: ‘chunk’ delivery to better suit participant and participant group needs; begin using a more blended approach, and; as e-learning options become available they can also be incorporated.

6. Appendices

6.1. FutureBeef training packages content review, prepared by Jillian Alexander, Applied Ag

6.1.1 FutureBeef training packages content review report

6.1.1.1 Introduction

This project entailed a review of the content and learning outcomes of six training packages currently managed by the FutureBeef Extension Team. The six workshops included: GLM EDGE, Nutrition EDGE, Breeding EDGE, Northern Livestock Transporters Course, Stocktake and Testing Management Options. Three of the workshops belong to the MLA–produced suite of EDGE products and the rest were independently developed by Queensland and Northern Territory primary industries staff.

6.1.1.2 Method

The process used to review the content of the packages was as follows:

1. All titles, subject headings, activities and tools, in the order they were chronologically presented in each package's Workshop Notes, were documented in a spread sheet.
2. These were all then categorised as either:
   a. **Core** – Concepts unlikely to change regardless of new research findings;
   b. **Dynamic** – Best practice concepts or recommendations, ongoing work may see this information updated in the future;
   c. **Research Results** – Information directly derived from research projects;
   d. **Activities** – Learning support activity that helps to reinforce or explain a concept or practically demonstrate how to do something; or
   e. **Tools** – Decision support aids that help process complex calculations or aid the decision–making process.
3. A summary of the learning or purpose for each element was assigned. Additional comments made about the content in the following column.
4. Any linkages or overlaps with other FutureBeef packages were identified.
5. Any ideas for improved presentation or delivery mechanisms were noted (to be added to over time).

Learning outcomes were reviewed based on how well the content contributed to meeting learning outcomes for the workshop. Due to the variability in the Workshop Slides, these were not taken into consideration when the assessment was made.

6.1.1.3 Review findings

Without changing any content, the workshop packages could be immediately improved with greater **consistency in structure and presentation**. Of particular concern was how figures and tables were referenced throughout the notes. Haphazard referencing makes it difficult for the participant to follow the presentation and difficult for the presenter to refer to content. There were inconsistencies between workshops in how well tables, graphs, diagrams and photographs were referenced. For example, GLM EDGE did not reference any of its diagrams (e.g. Figure 1, 2), while Nutrition EDGE referenced some of its tables and diagrams, but not others.

The order of subjects in the Workshop Notes and Technical Notes did not align. For example, in GLM, 'Managing with Fire' is Module 4 in the Workshop Notes, and Section 3 in the Technical Notes. In the Nutrition workshop, there were five modules in the Workshop Notes, but eight sections in the Technical Notes. The order of subjects in the Workshop Notes also didn't consistently correspond with the order that the Learning Outcomes are listed at the start of the module. The Breeding EDGE workshop did not have any supporting technical notes.

Another discrepancy was that the content of the Workshop Notes only loosely aligned with Workshop Slides. In some cases, slides had significantly different content to that contained in the notes. The content of Workshop Slides tends to be highly dependent on the deliverer, their experience, presentation skills and the demographics of the group they are presenting to. Slides are often modified on a workshop–by–workshop basis, in an attempt to enhance the learning experience of the participants. The cost of reprinting the Workshop Notes makes regular updates of this resource prohibitive, and thus, the content of the Workshop Notes is often dated compared to the Workshop Slides.

All of the workshops reviewed have been designed to be stand–alone training packages not requiring any prerequisite training. As such, most workshops have some level of **content overlap** with the other workshops. A person attending a number of these workshops would notice a great deal of repetition. GLM EDGE, Nutrition EDGE and Stocktake had whole modules or chapters with overlapping content which were differentiated only by slight variations in definitions and the context in which the concepts are described.

Specific comments for each package are presented below.

6.1.1.4 Grazing Land Management EDGE

The GLM workshop contained more dynamic content than any of the other workshops. The variable nature of the landscape and environment in northern Australia makes it difficult to deliver broad–brush management recommendations. For example, recommendations for fire use will differ in every region and land types within those regions. Dynamic content should be reviewed regularly to ensure the most up–to–date information is presented.

The Jim and Sandy case study examples are a prominent feature throughout the GLM workshop. These examples are often long and complex. Limited detail is provided with the case study examples about how the result was calculated or the assumptions made to do the calculations. This makes it difficult for a participant or deliverer to attempt the calculation themselves. Jim and Sandy were fictitious characters intended to humorously represent stereotypical laggards in the industry. Participants can sometimes take offense to this stereotyping and it may be wise to retire these workshop champions.

The conclusions at the end of each GLM module simply summarise the learning objectives proposed at the start of the module. They do not summarise the key points (e.g. spell your pastures during the growing season). Rather than simply repeating the learning objectives, listing the key messages would be more useful to participants as a means of review and reflection on the module.

6.1.1.5 Nutrition EDGE

The Nutrition EDGE workshop material was dominated by reference tables and calculation sheets. In some instances, the reference tables were repeated numerous times throughout the manual and also copied in the Notes Handy Guide. For example, in the second module Tables 1, 2 and 3 were interspersed through the text of the module, listed at the end of the module and listed in the Notes Handy Guide.

The flow and structure of the Nutrition EDGE notes could have been improved with titles at the start of each module and take home messages listed at the end of each of the modules. The take home messages were listed in the Technical Notes but not the Workshop Notes. The Nutrition EDGE technical notes also contained useful, detailed worked exercises which, unless highlighted by the presenter, may go unnoticed by the participant.

6.1.1.6 Breeding EDGE

The Breeding EDGE workshop contained the most content. It covered more individual subjects than all the other workshops. It was the only EDGE workshop to not include a separate technical manual as part of the workshop package. The high level of detail in the content suggested that the supporting technical information was incorporated into the Workshop Notes.

6.1.1.7 Stocktake

To make Stocktake a stand–alone training package, it repeats a significant quantity of content already covered in GLM EDGE and Nutrition EDGE. Just as much content is devoted to explaining core concepts, such as carrying capacity and Adult Equivalents, as there is to the process of condition monitoring and data management. This need detracts from the amount of time participants spend learning about how to master the skills of field monitoring and data management.

The workshop notes currently contain instructions on how to use the Stocktake database. These need to be updated to include instructions for using the new Stocktake application for mobile devices.

6.1.1.8 Northern Livestock Transporters Course

Unlike the other workshops, the *Northern Livestock Transporters Course* target participants extend beyond graziers, to transport industry professionals. The course addresses a growing need for maintaining professional animal handling standards across all levels of the supply chain, not just at the grass roots level. This course uses YouTube clips and DVDs to provide practical demonstrations when field demonstrations cannot be made. A significant portion of the content of this workshop addresses generic animal handling and welfare issues relevant to the whole livestock production industry.

6.1.1.9 Testing Management Options

Testing Management Options (TMO) is a workshop which demonstrates how to use the TMO spread sheet. The workshop material is not self–explanatory. A participant would need additional verbal explanation from the presenter to fully understand the concepts referred to in the Workshop Notes. More detailed step–by–step instructions in the Workshop Notes would be helpful to participants given that the focus of the workshop is learning how to input data and operate a spread sheet.

The TMO spread sheet is a large, complex, and arguably daunting program for the uninitiated user. Rather than put all calculation cells and reference tables on one sheet, it would be simpler for the user if the program was converted into a database. A database has the capacity to handle multiple, separate data entry pages and generate simple report pages. This would allow users to focus on one aspect of the business at a time.

6.1.1.10 Learning outcomes

The learning outcomes were reviewed based on how well the Workshop Notes and Technical Notes contributed to the outcomes because there is such variability in the slides and field demonstration sessions. Currently, numerous learning outcomes are only fully achieved when presenters supply extra–curricular information (extra to the Workshop Notes, Technical Notes or original Workshop Slides). Either learning outcomes need to be modified to represent what can be achieved with the standard workshop material or the content needs to be modified to ensure the learning outcomes are achieved.

6.1.1.11 Recommendations

Prior to the development of the EDGE workshops, training in the northern beef industry was dominated by field days, short, focused training activities, or applied demonstrations. There was limited quality control and consistency in the messages that were delivered in these training activities. Additionally, few opportunities existed to participate in comprehensive, industry best–practice training. The EDGE workshops were conceived out of the desire to standardise and package the best information the industry had on the key management disciplines. These packages were designed to be a 'one–stop–training–shop' for all things GLM, Nutrition and Breeding; so as much information as could be gathered was squeezed into the training packages and delivered over three days.

The evolution of the EDGE packages has seen the demise of the one–day workshop or field day. With most relevant content being packaged up and copyrighted in the EDGE packages, the pendulum has swung the other way and now limited opportunity exists for more focused, specialised short–course or field training. It is difficult for extension staff to be responsive to industry training needs generated by such things as extreme seasonal conditions, new technology, or legislative changes. The beef industry needs access to a range of training products.

The EDGE process has centralised industry best practice information and data, established a platform for quality control in learning content and training delivery, and started the process of standardising definitions, core concepts and calculation methods across industry. There is still room for improvement in this area. But the stage has now been set to diversify the delivery methods for this content to better meet the needs and interests of clients.

Specific recommendations for the FutureBeef workshops are:

Recommendation 1: *Finish standardising content across training packages*
This has been done to a certain extent; however, it was evident that there was still some inconsistency in definitions, calculations and explanation of concepts across workshops, including the Business EDGE workshop. Cross checking content would ensure that regardless of what training course you are doing in the northern beef industry, you will hear **consistent terminology and use the same calculation methods for cross industry learning tools**. It would also be advantageous if a standard numbering and referencing policy was used throughout the workshop material.

Recommendation 2: *Establish a content pool for each industry discipline*
Instead of having rigid workshop packages, consider establishing a **quality controlled pool of content for each discipline**, regardless if it is an EDGE package or not. Content could range from workshop notes through to reference material and learning tools. The original three day EDGE workshop would be one delivery mechanism for that content, but a range of other methods could also be available. Delivery methods could range from remote e–learning courses to skills–based field days. Additional content may be added to the pool to support for more advanced training activities.

FutureBeef could act as an information broker of quality–checked best industry information. Deliverers would source content from this pool and then package into training activities to satisfy learning needs across industry. Discipline areas would include: GLM; Nutrition; Animal Behaviour, Health and Welfare; Breeding; Business and Marketing.

Recommendation 3: *Workshop content should be directly linked to learning outcomes*
Training is about learning, understanding and being able to apply new information or skills. Learning outcomes are what a participant expects to know, understand, or be able to do, as a result of participating in the training activity. **Learning outcomes should be the starting point for designing any training activity.** Relevant content, activities and tools are

sourced or developed to help achieve the learning outcomes. Reviewing the FutureBeef suite of training packages it was evident that, despite being abundant with technical content, not all content could be directly linked to achieving the learning outcomes. Some was additional to the needs of achieving the learning outcomes, and on occasion, the learning outcomes would have been better achieved with alternative content.

Recommendation 4: ***Identify core training units and specialist modules***
The core, **overlapping principles covered in GLM, Nutrition and Stocktake could be combined and standardised to create a central Land and Grazing Management training** unit (see Appendix 6.1.2). If one person wanted to do Grazing Land Management, and another person wanted to do Nutrition, they could complete the same Land and Grazing Management unit and then proceed to study their special interest GLM and Nutrition subjects (see Appendix 6.1.3). If, at a later date, they also wanted to do Stocktake, they would not need to redo the introductory core principles, but rather, spend the day focusing on the field assessment and database sections.

Nutrition, GLM and Stocktake would then just contain subjects unique to those workshops. Optional advanced or focused training activities could be developed for people interested in learning skills in specialist subjects. For example, weaner management, production feeding, designing grazing systems, or forage budgeting.

Recommendation 5: ***Regional case study properties that can be used across workshops***
Most of the workshops use some sort of case study demonstration to illustrate how to apply skills and work through property problems relevant to the workshop at hand. There is currently considerable variation in how case studies are presented and the level of supporting information provided to assist the reader to compare the case study methodology to their own situation. Additionally, unless they are regularly updated, the examples become out–dated over time as input prices and best practice recommendations change.

Instead of having different case study properties for every workshop, **one comprehensive case study property could be created for every region**. This case study property would have all the data all the developers need to generate workshop–specific case studies. Information such as property, paddock and land type areas, maps, plant lists, grass growth tables, climate files, animal breeding and genetics records, mortality rates, vaccination program, NIRS results, sale and carcase feedback sheets, debt structure, fixed and variable costs, and key performance indicators could all be housed in a case study file. The data sets associated with these case study properties would be regularly, centrally updated.

A virtual property could be established for online learning and real–time updating of market values, seasonal conditions and input costs could be possible with linkages to different reporting datasets. For example, the value of the herd and land would change daily if linked to the MLA market and Elders property reporting sites. A direct link to the Bureau of Meteorology site could allow the participant to look at the three month seasonal outlook for the property to apply their skills at planning grazing management. Prior to a workshop, a deliverer would download the relevant case study activities which would have the most up–to–date information.

Recommendation 6: ***Regular review of content***
A system should be in place for **regular review of content** to ensure it continues to contain the most up–to–date information and reflect industry best practice. Content classified as Dynamic has the greatest potential to need upgrading over time. Research content should also be regularly reviewed for updated data.

Recommendation 7: *Consistent approach to business review and planning*
All of the EDGE workshops devote some time to reviewing personal business plans in the discipline they are addressing. GLM allows time at the end of each module to reflect while Breeding EDGE devotes three whole modules to the process. A **standard business planning book, process and review system** would prevent participants from having to re–document business plans every workshop and provide opportunity to refine their plans over time as they attend more training activities. This could be in a paper–based or electronic form. There may even be opportunity to piggyback onto some of the planning applications for mobile devices.

Recommendation 8: *Recognise Animal Behaviour, Health and Welfare as a separate training discipline*
A glaring omission from the suite of training workshops was the lack of content on **animal health and welfare**. The *Northern Livestock Transporters Course* did a good job at succinctly addressing animal behaviour and welfare issues, however, this content could easily be expanded to a **stand–alone training discipline**. Content would cover issues such as animal husbandry, disease prevention and management, parasite control, low stress handling and meeting animal welfare needs.

6.1.1.12 Conclusion
Standard workshop content should contain material which ensures all learning outcomes are comfortably achieved if the learning plan is followed. How well the content is presented and the learning experience of the participant is then dependant on the skill and experience of the trainer. By supplying up–to–date, quality controlled, industry best practice information, **FutureBeef could act as a broker of information to beef industry extension professionals**. The importance of this role cannot be underestimated as the faces of extension in this industry continue to diversify and evolve.

An electronic copy of the *FutureBeef workshop review spreadsheet* accompanying this report will be provided to MLA as part of the final report for the *Review and update of FutureBeef extension training packages* project.

6.1.2 Appendix 1: Example *Land and grazing management unit* content

Following is a compilation of the overlapping subjects that are found in Grazing Land Management EDGE, Nutrition EDGE and Stocktake. The order of the subjects is different in places to the original workshops and repeated subject titles have been deleted. This unit could be delivered as a precursor to any of these workshops. If participants have completed it once, they would not need to repeat the unit if they did further training in any of the other two courses.

Module 1

Learning Objectives: Know how all the elements of the course fit together and the content that will be covered. Document participant's resources and current livestock management systems for further analysis later in the workshop.

1. Warm up activity – Identify on a map where your property/s is
2. Marketable cattle
3. Value of pasture
4. What does pasture cost?
5. My operation
6. Business objective
7. Property planning

Module 2

Learning Objective: Understand your country's productive potential and limitations.

8. Gateways model
9. Climate
10. Understanding probabilities
11. Historical rainfall records (yearly)
12. Historical rainfall records (3yr moving average)
13. How often
14. Relationship between seasonal outlook and pasture growth
15. Pasture growth tables
16. Land types
17. Ability of different soils to store plant–available water.
18. Carrying capacity
19. Inventory Sheet – Property Carrying Capacity
20. Grazing Land Condition
21. Why assess land condition
22. "ABCD" Framework
23. Monitoring land condition
24. Grazing management – what's it all about?
25. Improving land condition – it's about managing grazing!
26. Carrying capacity
27. Long–term carrying capacity
28. Annual pasture utilisation
29. Safe utilisation rates for different land types
30. Pasture utilisation
31. Land type carrying capacity calculator
32. Activity 9: Calculating the effect of land condition on carrying capacity.
33. Evenness of grazing
34. Distance to water
35. Activity 13: Accounting for distance to water
36. Distance from water carrying capacity calculator

Module 3

Learning Objective: Know how to manage livestock to maintain good land condition and achieve seasonal production goals.

37. Short–term carrying capacity.
38. Adjusting for variable seasonal conditions
39. Forage condition
40. Table 1: Differentiating between land, pasture and soil condition
41. Pasture quantity
42. Pasture quality
43. Measures of: pasture quality and pasture quantity
44. What are the main factors that influence pasture quantity and quality?
45. Worksheet 3 – Factors affecting pasture growth and quality
46. Principles of pasture growth (quantity) and it's quality
47. Phases of pasture growth
48. Timing of spelling
49. Wet season spelling
50. Forage demand
51. Adult Equivalent (AE)
52. Dry Sheep Equivalents

53. The limitations of AEs
54. Relative adult equivalents
55. Activity 7: Calculating AEs
56. Growth rates of cattle on pastures
57. Pasture age
58. Phases of pasture growth
59. Plant type
60. Is grass just grass?
61. Legumes and grasses
62. Temperate and tropical pastures
63. 3Ps
64. What is the role of sown pastures?
65. Measures of quality
66. Indicators of pasture quality
67. Effect of stocking rate on profit
68. What factors determine or influence the correct stocking rate for a specific paddock?
69. How does stocking rate influence live weight gains
70. Feed utilisation
71. What utilisation level is best for both cattle and pastures?
72. Safe utilisation rate
73. Diet selection
74. Intake
75. Sward structure
76. Patch grazing
77. Dry season forage budget
78. Forage budgeting
79. Dry season forage budget calculator
80. Worksheet 7 – dry season forage budget manual calculations
81. Growth rates of cattle on pastures
82. Improving diet quality
83. Do you need to supplementary feed?
84. Interaction between supplement and pasture with supplementation
85. Why plan grazing management
86. Grazing management strategies
87. Grazing systems
88. Principles of grazing systems
89. Notes on some grazing systems
90. Some more common grazing systems
91. Seven steps to apply to systematically evaluate any grazing management option
92. Putting it all together
93. Developing a grazing management plan
94. Worksheet 8 – grazing management plan
95. Principles of grazing management
96. Grazing pressure

Module 4

Learning Objective: Know how to monitor land and pasture condition for the purpose of grazing management.

97. Field assessment
98. Getting started
99. How often
100. Consistency
101. Identify and calculate land type areas in each paddock

102. Property map
103. Management areas
104. Field assessment – Basics
105. Assessing land and forage condition
106. Pasture assessment techniques
107. Activity 12: Skills for assessing pasture.

Module 5

Learning Objective: Review current business plan and identify opportunities to improve land grazing management.

97. Evaluation of options and production systems
98. Figure 25: The planning process
99. Figure 26: Decision making process
100. Putting the plan into action
101. Glossary of terms

6.1.3 Appendix 2: Unique content in *Grazing land management EDGE* and *Nutrition EDGE*

Following is a list of the remaining content in the Grazing Land Management EDGE and Nutrition EDGE courses once any overlapping content is removed.

6.1.3.1 Grazing Land Management EDGE
Module 1

1. What is grazing land management?
2. Land condition affects profit

Module 2

3. Components of an ideal grazing ecosystem
4. Grazing ecosystem
5. Grazing ecosystem
6. Soils and soil condition
7. Soil fertility
8. Grazing Land Condition
9. Soil condition
10. Pasture condition
11. Woodland condition
12. "ABCD" Framework
13. A condition
14. B condition
15. C condition
16. D condition
17. Pasture stability and resilience – Rolling Ball Model
18. Stability
19. Perennial grasses – their role in land condition
20. Energy flow, nutrient and water cycling
21. Energy flow
22. Nutrient cycling
23. Water cycling
24. Effect of land condition on finances
25. Monitoring land condition
26. Density and coverage of 3P grasses

27. Groundcover
28. Soil surface condition
29. Weeds
30. Woodland condition
31. Conserving native plants and animals

Module 4 *(please note all of Module 3 overlaps with other workshops)*

32. Fire – Learning from history
33. Responses to fire
34. Fire in pasture management
35. Fire in tree management
36. Increased risk of erosion
37. Loss of nutrients
38. Conserving native plants and animals
39. Prescribed burning – getting the regime right
40. Planning effective fire regimes
41. Activity 14: Constructing a fire calendar

Module 5

42. Considerations for sown pastures
43. The Rundown Phenomenon
44. How can we halt the rundown?
45. Managing risk factors
46. Which pasture species to suit my situation?
47. Financial implications of sown pastures
48. Assessing financial impact of using sown pastures
49. Management requirements of sown pastures

Module 6

50. Why is the tree–grass balance important?
51. What controls the balance of trees and grass?
52. How do trees affect pasture?
53. The various ways trees interact with pasture
54. Tree basal area verses grass growth
55. Managing the tree–grass balance to maintain or improve land condition
56. Financial considerations of woodland management
57. Using fire in woodland management
58. Managing the risk factors – Poor pasture response; Regrowth problems; Loss of land condition; Increased erosion; Decline in soil fertility; and Dryland salinity.
59. Conserving native plants and animals
60. How will your landscape look?
61. Planning woodland management
62. Planning your tree–grass balance
63. Weeds and land condition
64. Six principles of weed management
65. Perceptions about weeds
66. Weed control successes
67. Weeds to look out for
68. Life cycle of weeds
69. Implementing weed management principles
70. The key to controlling weeds

71. Managing the risk factors – Poor kill; Creation of gaps for other weeds; Safety and health factors; Effect on non–target plants; Residues in animals; Development of herbicide resistance; and Off–site effects.
72. Developing a weed management plan

6.1.3.2 *Nutrition EDGE*
Module 1

1. Warm up activity – discussion about what the stomach and intestines look like when participants cut up a beast
2. Basic digestive anatomy and function
3. ‘Buttercup' the model cow
4. Mouth
5. Oesophagus
6. Rumen and reticulum
7. Oesophageal groove
8. Rumination
9. Rumen microorganisms
10. Omasum
11. Abomasum
12. Small intestine
13. Large intestine
14. Nutrients
15. What are nutrients
16. Water
17. Energy
18. Pathways of energy supply
19. Energy units
20. Partition of feed energy
21. Which has the most energy?
22. Reference table – Approx. DM, DMD and ME of some feeds.
23. Protein
24. Protein digestion and absorption
25. The basic process of protein in digestion and absorption
26. Reference table – Approx. DM, DMD, ME and CP in some feeds.
27. Intake
28. Dry matter intake
29. Graph – Estimated dry matter intake of 200, 400 and 600kg steers for a range of pasture digestibilities
30. Graph – Estimated dry matter intake of mature lactating cows 1, 3 and 6 months after calving.
31. Water
32. Reference table: Daily water requirements of beef cattle and sheep
33. Reference table: Guide to use of saline water
34. Reference table: Nitrates in water
35. Energy
36. Energy for maintenance
37. Energy for production (growth)
38. Energy for reproduction
39. Table 1: Metabolisable Energy requirements (MJ/day) of cattle for maintenance and growth
40. Protein
41. Understand the relative protein requirements of animals at different stages of production
42. Protein content of LWG

43. Table 2: Rumen Degraded Protein (RDP) and Undegraded Dietary Protein (UDP) requirements (g/day) of cattle for maintenance and growth
44. Table 3: Nutrient requirements of breeding cattle
45. Primary limiting nutrient
46. Relative importance of nutrients
47. Worksheet 1 – 400kg steer maintaining live weight
48. Worksheet 2 – 400kg steer gaining 0.5kg/day

Module 2

49. Table 1 – Metabolisable energy requirements (MJ/day) for cattle for maintenance and growth
50. Table 2 – Rumen degraded protein (RDP) and undegraded protein (UDP) requirements of cattle (g/day) for maintenance and growth
51. Table 3 – Nutrient requirements of breeding cattle

Module 4 *(please note all of Module 3 overlaps with other workshops)*

52. Mineral nutrition of cattle
53. Major (macro) minerals
54. Trace minerals
55. Vitamins
56. Phosphorus
57. Soil type
58. Indicators of phosphorus status
59. Pasture growth stage
60. Intake of protein and energy
61. Graph – The relationship between annual live weight gain of cattle and soil phosphorus status on legume–based pasture
62. Table 1 – Diagnostic levels of blood inorganic phosphorus and faecal nitrogen
63. Table 2 – Supplementary phosphorus needs without bone demineralisation
64. Table 3 – Some common acceptable sources of phosphorus to use as supplements
65. Calcium (macro element)
66. Calcium: Phosphorus ratio
67. Cobalt (trace element)
68. Copper (trace element)
69. Iodine (trace element)
70. Iron (trace element)
71. Magnesium (macro element)
72. Manganese (trace element)
73. Phosphorus (macro element)
74. Potassium (macro element)
75. Selenium (trace element)
76. Sodium and Chlorine (trace elements)
77. Sulphur (macro element)
78. Zinc (trace element)
79. Mineral interactions
80. Cadmium and fluorine
81. Vitamin A
82. Vitamin B complex
83. Vitamin C
84. Vitamin D
85. Vitamin E
86. Vitamin K
87. Diagnosis of mineral deficiencies

Module 5

88. Nutritional deficiencies
89. Managing nutritional deficiencies
90. Step 1 – Setting production targets
91. Step 2 – Compare current or predicted performance against targets
92. Step 3 – Possible reasons for differences between current performance and targets
93. Step 4 – Factors limiting performance
94. Step 5 – Options
95. Step 6 – Choosing the best option
96. Step 7 – Putting decisions into action
97. Define target
98. Supplementation
99. Primary limiting nutrient
100. Responses to supplements
101. The law of diminishing returns
102. Interaction between supplement and pasture with supplementation
103. Compensatory growth
104. Do all animals need to be fed?
105. Rumen modifiers
106. Hormonal growth promotants
107. Reading a label
108. Calculating the financial viability of supplementary feeding options
109. Example of a break–even analysis

Module 6

110. Nutrition
111. Managing the breeding herd
112. Nutrition and body scores
113. Identify the nutrition requirements of the animal
114. Assess the quality and intake of pasture available
115. Identify possible deficiencies
116. Table 11 – Body condition scoring (BCS) system for cattle
117. Table 12 – How pregnancy rate of lactating breeders increases with increasing body score
118. Table 13 – Condition score 5 point scale and % in heat
119. Weaning
120. Weaner management
121. Early weaning

6.2 Stakeholder feedback from the three training packages review workshops and two teleconferences

Each of the reports contain detailed:

- SWOT analyses
- additional, i.e. new and emerging, R&D
- monitoring and evaluation suggestions
- suggestions for alternative delivery approaches

6.2.1 Stakeholder feedback from the Breeding EDGE review workshop

6.2.1.1 Breeding EDGE review workshop participants

1. Désirée Jackson, DAF Longreach – Project leader
2. Jane Pryor, DAF Rockhampton – Project leader
3. Gerry Roberts, GR Consulting, Longreach – Facilitator
4. Trisha Cowley, DPIF Katherine
5. Mick Sullivan, DAF Rockhampton
6. Krista Cavallaro, DAF Brisbane
7. Lauren Williams, DAF Mackay
8. Rebecca Farrell, DAF Brisbane
9. John Bertram, Beef Management and Production Advisor, Mount Sylvia
10. Alan Laing, DAF Ayr Research Station
11. Diana Leemon, DAF Brisbane
12. Geoffry Fordyce, QAAFI Charters Towers (via telephone)

6.2.1.2 SWOT analyses

6.2.1.2.1 Breeding EDGE pre–workshop SWOT analysis

Strengths	Weaknesses
Best tool used in 22 years to train producers in genetics	Hard to get producers to "sign up" or commit to this workshop
Changes producers negative paradigms about genetics	Lot of material jammed in 3 days, very tight schedule
Producers practice change in producers' breeder management and genetic selection	Producers have trouble taking it all in – need follow up and hand holding
One producer recently said it was the best workshop of many that he has attended over many years	Due for update/refreshing which is why this process is being undertaken
Tools given to improve fertility which drives profit	Lack of experienced deliverers in FutureBeef (especially NT and WA)
Gives tools to find bulls to improve the traits needed in a herd	Workshop process needs improving – more interaction
Combination of theory and practical	
Has been delivered by experts who understand the whole genetic picture and work behind the slides	
Once producers do actually attend, they ask why didn't we do this years ago	
Well structured	
Comprehensive	
Opportunities	**Threats**
To change beef industry profitability if more attended workshops	Loss of FarmBis etc training subsidies
Incorporate CRC findings	Cost frightens some from doing the workshops they need to improve profitability
Industry is using and interested in more sophisticated management	Industry cost structures i.e. poor returns are encouraging some people to reduce inputs
More collaboration between FutureBeef and external deliverers	Failure of many producers to address fundamental problem that overstocking impacts on cow body condition and results in poor breeder performance
Technical updating for all deliverers	
Website for placement of technical updates/PowerPoints	
Standard 2 day workshop, advanced 2 day workshop	
eLearning	
Nutrition EDGE for indigenous pastoralists	
Technical updating for all deliverers	

6.2.1.2.2 Breeding EDGE workshop SWOT analysis

Total votes	Strengths
12	**A** Extremely comprehensive package. **7 dots** **A** Best tool (north/south) – complete national package. **5 dots**
2	Attendees love it and appreciate how important it is. **2 dots**
2	Based on attitude change. **2 dots**
2	Integrating new information (Beef CRC) in current format (e.g. Bull Power). **2 dots**
2	All EDGE packages based on primary market research – underpinned package development plus ongoing feedback to further refine. **2 dots**
1	**C** Flexible enough to allow for above. **1 dot** **C** Flexible delivery allowing time for questions = credibility and trust from attendees.
1	About cows – attractive topic (people like cows). **1 dot**
	B Experienced well regarded presenters. **B** (First hand) Experience of presenters – also involved in research projects – experience brought forward, industry recognition of presenters/experts.
	Priority area with an industry demand.
	Support for all list.
	Booklets used as references post workshop (hard copy – value of…
	Components (stand–alone) already exist – complementary.

Total votes	Weaknesses
5	Lots of info/info overload. **5 dots**
4	**D** Capacity to deliver the package is diminished by loss of expertise when experienced staff leave and only replaced by young inexperienced and temporary staff. **3 dots** **D** Credibility of brand is threatened by inexperience. **1 dot** **D** Lack of experienced deliverers (threat?)
3	Marketing of cost benefit to producers. **3 dots**
1	Complementary schools beyond the scope of EDGE. **1 dot**
1	Don't agree with workshop process and workshop delivery statements (run on demand). **1 dot**
	Monochrome printed materials (one colour).

Total votes	Opportunities
8	**F** Producers follow up – one on one to develop breeding objectives and breeding plan. **6 dots** **F** Reinforce the post workshop producer presentation/learning – has been an additional value add (department). **2 dots**
4	eTechnology allows exploration of greater flexibility options for accessing the program. **4 dots**
3	Potential for pre–workshop knowledge to be sent out. **3 dots**
3	**E** Expand – follow up need to be part of workshop delivery. **2 dots** **E** Incorporate follow–up into the program. **1 dot**
3	Benefits of genetic improvement are permanent, cumulative and cheap. We have an opportunity to sell the benefits better. **3 dots**
3	Main way forward for improved production will be genetics for a certain percentage of the industry. **3 dots**
2	Establish train the trainer program. **2 dots**
2	Build on the Beef CRC and Cash Cow momentum. **2 dots**
1	Link to financial benefit and demonstration. **1 dot**
1	New generations – more workshops. **1 dot**
	Nutrition EDGE – Indigenous – not relevant.
	Two day workshop – investigate format, can mean wasting time to revisit concepts from Day 1.
	Breeder management schools – log of other supporting training FutureBeef/web, not specific to EDGE.
	Involve potential future presenters in the revision.

Total votes	Threats
7	**I** Lack of succession plan in the Department. **4 dots** **I** Staff – lack of pool or passion (individual) to deliver, lack of experience (succession planning), can't just assign people to areas. **3 dots**
5	**H** Attitude in grazing industry towards paying for advice and changing this attitude is affected by subsidisation in different regions. **5 dots**
4	**K** Lack of industry's appreciation – other areas competing with breeding and genetics. **2 dots** **K** Some breeding societies/studs – lack of adoption. **2 dots**
3	Producer increased time constraints. **3 dots**
2	**G** A Lot of properties under financial strain but can't reduce cattle numbers because of need to keep banks happy. **2 dots**
1	Changes in industry personnel (opportunities for next generation) – not a "one off" delivery fix. **1 dot**
1	**L** Industry cost structures. **1 dot** *NB there was discussion about joining G and L however the consensus was to leave them separate.*
	Generational loss of established production principles e.g. weaning strategies etc.
	J Dodgy competition (gimmick/free) **J** Silver bullets (e.g. super gene)/other competing technologies

6.2.1.2.3 Overall distribution of votes

Issue type*	Total votes	Issue	SWOT
C	**12**	**A** Extremely comprehensive package. **7 dots** **A** Best tool (north/south) – complete national package. **5 dots**	**Strengths**
D	**8**	**F** Producers follow up – one on one to develop breeding objectives and breeding plan. **6 dots** **F** Reinforce the post workshop producer presentation/learning – has been an additional value add (department). **2 dots**	**Opportunities**
Deliverer	**7**	**I** Lack of succession plan in the Department. **4 dots** **I** Staff – lack of pool or passion (individual) to deliver, lack of experience (succession planning), can't just assign people to areas. **3 dots**	**Threats**
C	**5**	Lots of info/info overload. **5 dots**	**Weaknesses**
E	**5**	**H** Attitude in grazing industry towards paying for advice and changing this attitude is affected by subsidisation in different regions. **5 dots**	**Threats**
Deliverer	**4**	**D** Capacity to deliver the package is diminished by loss of expertise when experienced staff leave and only replaced by young inexperienced and temporary staff. **3 dots** **D** Credibility of brand is threatened by inexperience. **1 dot** **D** Lack of experienced deliverers (threat?)	**Weaknesses**
D	**4**	eTechnology allows exploration of greater flexibility options for accessing the program. **4 dots**	**Opportunities**
E	**4**	**K** Lack of industry's appreciation – other areas competing with breeding and genetics. **2 dots** **K** Some breeding societies/studs – lack of adoption. **2 dots**	**Threats**
D	**3**	Potential for pre–workshop knowledge to be sent out. **3 dots**	**Opportunities**
D	**3**	**E** Expand – follow up need to be part of workshop delivery. **2 dots** **E** Incorporate follow–up into the program. **1 dot**	**Opportunities**
C	**3**	Benefits of genetic improvement are permanent, cumulative and cheap. We have an opportunity to sell the benefits better. **3 dots**	**Opportunities**
C	**3**	Main way forward for improved production will be genetics for a certain percentage of the industry. **3 dots**	**Opportunities**
E	**3**	Producer increased time constraints. **3 dots**	**Threats**
D	**3**	Marketing of cost benefit to producers. **3 dots**	**Weaknesses**

Issue type*	Total votes	Issue	SWOT
E	**2**	Attendees love it and appreciate how important it is. **2 dots**	**Strengths**
D	**2**	Based on attitude change. **2 dots**	**Strengths**
C	**2**	Integrating new information (Beef CRC) in current format (e.g. Bull Power). **2 dots**	**Strengths**
C	**2**	All EDGE packages based on primary market research – underpinned package development plus ongoing feedback to further refine. **2 dots**	**Strengths**
Deliverer	**2**	Establish train the trainer program. **2 dots**	**Opportunities**
C	**2**	Build on the Beef CRC and Cash Cow momentum. **2 dots**	**Opportunities**
E	**2**	**G** A Lot of properties under financial strain but can't reduce cattle numbers because of need to keep banks happy. **2 dots**	**Threats**
C	**1**	Link to financial benefit and demonstration. **1 dot**	**Opportunities**
E	**1**	New generations – more workshops. **1 dot**	**Opportunities**
D	**1**	**C** Flexible enough to allow for ongoing feedback to further refine **1 dot** **C** Flexible delivery allowing time for questions = credibility and trust from attendees.	**Strengths**
C	**1**	About cows – attractive topic (people like cows). **1 dot**	**Strengths**
E	**1**	Changes in industry personnel (opportunities for next generation) – not a "one off" delivery fix. **1 dot**	**Threats**
E	**1**	Complementary schools beyond the scope of EDGE. **1 dot**	**Weaknesses**
D	**1**	Don't agree with workshop process and workshop delivery statements (run on demand). **1 dot**	**Weaknesses**
E	**1**	**L** Industry cost structures. **1 dot** *NB there was discussion about joining G and L however the consensus was to leave them separate.*	**Threats**

Issue type C = Content; D = Delivery; Deliverer = Deliverer; E = External*

6.2.1.3 Additional R&D

- Tropical Beef Technology Services (TBTS), Agricultural Business Research Institute (ABRI)
- MateSel (newly developed app) www.breedplan.une.edu.au
- Completeness of performance
- Literature review on adoption in BREEDPLAN
- PDS reports – MSA, Birralee, Swanlea, Wernadinga, etc.

6.2.1.4 Issues noted during the workshop

- Opportunity for partners and privates to add to and use information (technical and extension) from FutureBeef website
- Review by MLA of reason or lack of adoption of genetic technologies (Due September 2013)
- Is there a way to put and economic analysis (e.g. TMO) for use before EDGE workshops to give focus to what producers need to work on first for profitability (connect to review webinar with Business EDGE)
- Is it profit that drives adoption or other values that clients have?
- CSIRO Adoption Model – timeframes to adoption
- Original Breeding EDGE package was based on market research with producers
- Additional content is being continually added to Breeding EDGE but is not done consistently across all packages
- Slides are up to date but the book is not
- We need to revisit the economics of some of our recommendations

6.2.1.5 Breeding EDGE resources audit

Breeding EDGE resource	Where it is held	Who holds it	How to access
Breeding EDGE workshop notes including references and further information	Brian Pastures	MLA	Liz Allen or Trish Cowley
Presenters notes		MLA	Liz Allen
PowerPoint slides		MLA	JB and Alan Laing, Liz Allen (MLA original)
ACV Evaluating and Reporting Bull Fertility	ACV	Desiree	ACV
Heifer management in northern beef herds (aka Heifer manual)	DAF/MLA	MLA	pdf on MLA web, h/copy LA
Weaner management in northern beef herds (aka Weaner manual)	DAF/MLA	MLA	pdf on MLA web, h/copy LA
Phosphorous management of cattle in northern Australia (aka Phosphorus manual)	DAF/MLA	MLA	pdf on MLA web, h/copy LA
Bull selection – buying better bulls	DAF	Désirée	pdf on FB web, h/copy DJ
Breeding for profit	DAF	Désirée	pdf on FB web, h/copy DJ
Female selection in beef cattle	DAF	Désirée	pdf on FB web, h/copy DJ
Beef cattle recording and selection	DAF	Désirée	pdf on FB web, h/copy DJ
Managing the breeder herd – practical steps to breeding livestock in northern Australia	MLA	MLA	pdf on MLA web, h/copy LA
Tropical Beef Technology Services (TBTS) fact sheets	TBTS	TBTS	www.tbts.une.edu.au
BreedObject™ website			www.breedobject.com
Breed society websites			www.breedplan.une.edu.au
Beef CRC Legacy website			www.beefcrc.com
FutureBeef Technical Library DVD	DAF/MLA	Krista/Liz	

Breeding EDGE resource	Where it is held	Who holds it	How to access
CRC Nutrition, Meat Science and Health CD	DAF Rebecca	Rebecca	
CRC Genetics CD	DAF Rebecca	Rebecca	
FutureBeef website – BCS video	DAF		FB web 'multimedia' page
Bull Power (1 and 2)	Rebecca?		John and MLA
Cash Cow (aka Northern Australian Beef Fertility Project)	UQ/ DAF/ CSIRO/ MLA		Mike McGowan
Breeding and genetic reviews			John Bertram
Breeding EDGE market research (Alliance Consulting)	Peter Horchner		MLA, Liz Allen
Feedback from past participants	Brian Pastures	Karen Thompson	MLA
PDS project final reports e.g. MSA, Birralee, Wernadinga, Swanlea, Brides Creek			MLA, older PDS reports on FB staff intranet
Cattle and land management best practices for the Top End region 2011	DPIF	DPIF	Trish/Trudi, pdf on DPIF web
Pastoral Industry Survey NT 2004	DPIF	DPIF	Trish/Trudi, pdfs on FB web
Cattle and land management best practices for the Katherine region 2009	DPIF	DPIF	Trish/Trudi, pdf on DPIF web
FutureBeef AOP	FutureBeef	Krista	FB staff intranet
Anne Maree Huey	DAFWA		
Grazing BMP: breeder management (animal production module)	DAF/AgForce		Mick Sullivan/Matt Brown
Selected Brahman Project	DPIF		Tim Schatz, summary and links to docs on FB web 'projects'
Final report – Heifer projects (NBP.344, NBP.345, NBP.339– current project)	DPIF/MLA		Liz Allen
Final Report – Live Export Selection Index (B.NBP.0526)	DPIF/MLA		pdf on MLA web

6.2.2 Stakeholder feedback from the Nutrition EDGE review workshop

6.2.2.1 Nutrition EDGE workshop participants

1. Désirée Jackson, DAF Longreach – Project leader
2. Jane Pryor, DAF Rockhampton – Project leader
3. Gerry Roberts, GR Consulting, Longreach – Facilitator
4. Roger Sneath, DAF Toowoomba
5. Bernie English, DAF Mareeba
6. Jenny Milson, DAF Longreach
7. Peter Smith, DAFWA–DAFF Charters Towers
8. Kiri Broad, DAF Roma
9. Russ Tyler, Tyler Rural Consulting, Gayndah
10. Felicity Hamlyn–Hill, Beef Enterprise Advisory Services, Nebo
11. Felicity McIntosh, DAF Brisbane
12. Diana Leemon, DAF Brisbane
13. Trudi Oxley, NTDPI

6.2.2.2 SWOT analyses

6.2.2.2.1 Nutrition EDGE pre–workshop SWOT analysis

Strengths	Weaknesses
• Content (most) is there group learning opportunity for improved technical understanding of nutrition => better decisions part of EDGE network. • Nutrition EDGE is a comprehensive package that gives people an understanding of the basics of nutrition so that they can understand why certain nutrients need to be fed rather than just giving them a recipe. • Delivered in an interactive manner that takes in local conditions. • Participants are encouraged to interact and participate (not just sit and listen). • It can be used anywhere in northern Australia with no modification to the base content. (I) • Delivers a good overview of ruminant physiology and rumen function. (I) • Delivers the concept of nutritional requirements of different classes of animals. (I) • Outlines the principles of ruminant nutrition. • Nutritional value of different feeds. • Concept of dry matter and animal appetite. • Good resource material. • Producers can work on their own property supplementation issues. • Complex calculations are presented in a simplified manner.	• Lack of experienced deliverers in FutureBeef (esp. NT and WA) (same for Breeding EDGE). • No advertising of external deliverers on FutureBeef website. • 3 day workshop (can't get away...pumping water, etc.). (III) • Some bits quite technical (particularly in the first few modules – physiology) (includes some indigenous participants). (II) • No time to develop own feed or supplementary feeding plans. • Leave with no action plan. • Follow–up days don't always happen (too busy). • Many PPT versions around. • No technical updating for FutureBeef staff or external deliverers. • Workshop process needs improving – more interaction (same for Breeding EDGE) lack of electronic tools for folk to take home and use. • Too much focus on ration formulation. • Cost without a subsidy available is a problem. • Presenters need to have good technical expertise for districts where participant's properties located. • Modules 4 and 5 in the workshop need to be more focused on attendee's property nutritional needs.

Opportunities	Threats
• More collaboration between FutureBeef and external deliverers. • Technical updating for all deliverers. • Website for placement of technical updates/ppts. • More time for participants to develop their own plans (refine at home). • Review action taken at follow–up days, and issues/concerns. • E–learning. • Nutrition EDGE for indigenous pastoralists. • Technical updating for all deliverers. • Can be used as a training package for staff (but this must be combined with practical field experience). • Could be used as a training package for students at Ag Colleges. • Develop some flexibility with 3 day delivery – maybe 2 days and develop an 'at home' project to report back of a final day or 1.5 days; one day now, one day in 2 weeks; Standard 2 day workshop, advanced 2 day workshop. (II) • Alter delivery program to start with the feed/grazing i.e. start from the front and work through to the back of the animal. • Devote more time to supplement section and working on 'take home' scenarios – maybe from time saved on ration formulation. • More emphasis on the importance of matching stocking rate to carrying capacity. • Formalise the development of a one day nutrition EDGE 'quickie' e.g. role of supplements. Introduce/demonstrate examples of ration formulation software.	• Paradigm thinking by government not moving with technical/communication changes. • Cost of attending particularly when no subsidy exists – This is really a state of mind for producers who are accustomed to receiving a subsidy for cost of training. (I) • Cheaper alternatives that, on the surface, appear to be the same as Nutrition EDGE but are not as comprehensive. • Having sufficient, appropriately trained and experienced staff to deliver the workshop. • The 'keen and interested' people have already attended the workshop. The challenge now is to convince the next 'level' of producers that they will benefit by attending. (I) • Decreasing time availability of potential participants.

Please tell us what aspects/features of the package you like (i.e. would hate to see change)?	What would you like to see changed?
• Nutrient requirements. • Intake basic nutrient requirement exercises, esp. a weaner exercise. • Mineral nutrition (although needs updating). • GLM links re pasture quality and quantity => diet quality=> NIRS. • Exercises matching feed/supplement quality (or component of) with dietary shortfall. • Comprehensive. • Module one, two and three are fairly well balanced. • See ‘strengths’ also.	• More weaner feeding. • Whole section for developing own feed/supplement plans. • Defined follow–up day for reporting back. • Collaboration between FutureBeef and external deliverers. • Technical updates – need them. • Some of the detail could be explained better. • Module 4 and 5 need to be more focused on the needs of the producers in the actual workshop on the day. • Broadened from traditional face–to–face 3–day format. • More options on delivery and how they take the course– e.g. let producers choose the method that suits them.

Please tell us what aspects/features of the package you like (i.e. would hate to see change)?	What would you like to see changed?
	• Smaller modules and train–the–trainer. • Incorporate the various RD&E strategies and priority areas. • Establish linkages with other projects e.g. Grazing BMP. • Assist producers to develop an action plan for further training or required assistance. • See 'opportunities' also.

New R&D outcomes, tools, courses, consultants and/or contacts that relate to this package/topic area

- Phosphorus review and booklet (MLA)
- Weaner booklet (MLA)
- HGP booklet (MLA)
- Growth pathways project outcomes (Stu McLennan)
- New consultant/deliverer – Beef Enterprise Advisory Services (employs Felicity Hamlyn–Hill) re Nutrition EDGE and Breeding EDGE
- There needs to be a literature review of new research by Stu McLennan, Athol Kleive and others. I cannot name specific pieces of research.
- Update the P story – specifically the 'diagnosis' of P status and likely responses to supplementation and concept to depletion and repletion of P in lactating females; dry season P supplementation.
- Highlight/promote/whatever simple methods of identifying potentially bogus products e.g. 'Blue Cap'.
- Really focus on the target nutrients in supplements and calculation of costs.
- Producing cattle that will grade MSA and or production systems that earn the most money.

6.2.2.2.2 Nutrition EDGE workshop SWOT analysis collated

Total votes	Strengths
7	**A** Comprehensive package around nutrition basics **7 dots** **A** Practical and comprehensive overview of ruminant nutrition and physiology
5	**C** Impartiality – selling facts **3 dots** **C** Scientific–based knowledge **1 dot** **C** Un–biased (not trying to sell anything) **1 dot**
4	eTechnology capacity to support the package **4 dots**
3	Credibility of deliverers with industry **3 dots**
2	All useful and relevant (no extra fat) **2 dots**
1	**B** Interactive delivery interpreting local conditions **1 dot** **B** Slides can be modified and tailored to regions
1	Paddock sessions **1 dot**
	Practical workshop
	Group cohesiveness after 3 days
	Independent modules (can be used separately)
	Content has been well developed
	Two presenters
	Practical exercises

Total votes	Strengths
	Access to the latest research
	Very flexible as it is principle based (for northern beef industry) rather than recipe based

Total votes	Weaknesses
5	Shortage of experienced deliverers **5 dots**
4	No formal technical updating for deliverers **4 dots**
4	**D** Limited (minimal) time for people to make their own plan **3 dots** **D** Participants don't leave with formalised action plans **1 dot**
2	Different versions of power points **2 dots**
1	Not enough in outside sessions **1 dot**
1	Are there too many calculations? **1 dot**
	Limited resources (time, money) to follow–up workshops – technical on farm support
	No way to capture local information
	Follow–ups not always timely un–structured not consistent
	No reason to apply info sometimes
	Slides don't follow workshop notes
	Not enough time to hear producer experiences – to learn from each other
	Three days is exhausting
	Workshop notes look boring
	Workshop notes expensive
	Calculation exercises get rushed

Total votes	Opportunities
8	Introduce more technical tools for calculations e.g. ration calc, feed calc **8 dots**
8	**G** Better economics – linking to bottom line **6 dots** **G** Linking what is done in the packages to the bottom line **2 dots**
7	Participants to leave with a developed plan for their business **7 dots**
7	**E** Incorporate some delivery outside of workshop time e.g. pre–workshop homework **6 dots** **E** Series of webinars – one for each module **1 dot**
4	**H** Linking with other packages **4 dots** **H** Better link packages e.g. breeder management
3	Technical update get–togethers **3 dots**
3	Resources available on internet e.g. template for nutritional plan **3 dots**
2	Universities and agricultural colleges – give practical application **2 dots**
2	More collaboration between government and private deliverers **2 dots**
2	**F** Create more connection and focus prior to workshop e.g. how will I use this? **1 dot** **F** Collect current situation and goals prior to workshop **1 dot**
1	Promotion and assistance to get younger staff to workshops to learn **1 dot**
1	Adapt each course to the audience with options for delivery (e.g. different new audiences) **1 dot**

Total votes	Opportunities
	Demo videos to reinforce key learning and practical application
	Spread training over more time
	Split payments e.g. pay per section
	Keep energy and momentum going after workshop e.g. Facebook discussion groups, nutrition blog on FutureBeef site
	Webinar/tutorial videos then small assignment
	New generation (staff and participants)
	To reinstate a 'Nutrition Champion' (such as Russ) – who can co–ordinate the technical updates
	Better mentoring process
	New audiences e.g. Indigenous, student
	Standard and advanced versions
	Better market real/scientific based knowledge

Total votes	Threats
5	**L** Conflicting messages e.g. suppliers selling their product **4 dots** **L** Mass of industry "snake–oil" in regard to nutrition **1 dot**
3	**K** Time constraints of the modern beef business **3 dots** **K** Decreasing time available by cockies
2	**I** Client (producer) attitude to full payment for workshops **2 dots** **I** Government funding for producer training **I** Subsidies – uncertainty and producer paradigm **I** Financial constraints
1	Reduced pool of deliverers (time demand/availability) **1 dot**
	J Producer seeing value in learning how to better utilise nutritional resources **J** The marketing workshops and assoc. services
	M Dodgy packages being offered **M** Lack of information consistency across course providers e.g. RCS, EDGE, Elders
	N RCS, GFP and others **N** Saturation of market
	Other project demands
	Temp contracts hinder long term plans
	A lot of new female beef extension officers – go on maternity leave

6.2.2.2.3 Overall distribution of votes

Issue type*	Total votes	Issue	SWOT
C	**8**	Introduce more technical tools for calculations e.g. Ration Calc, Feed Calc **8 dots**	**Opportunity**
C	**8**	**G** Better economics – linking to bottom line **6 dots** **G** Linking what is done in the packages to the bottom line **2 dots**	**Opportunity**
C	**7**	Participants to leave with a developed plan for their business **7 dots**	**Opportunity**
C	**7**	**A** Comprehensive package around nutrition basics **7 dots** **A** Practical and comprehensive overview of ruminant nutrition and physiology	**Strengths**
D	**7**	**E** Incorporate some delivery outside of workshop time e.g. pre–workshop homework **6 dots** **E** Series of webinars – one for each module **1 dot**	**Opportunity**
C	**5**	**C** Impartiality – selling facts **3 dots** **C** Scientific–based knowledge **1 dot** **C** Un–biased (not trying to sell anything) **1 dot**	**Strengths**
E	5	**L** Conflicting messages e.g. suppliers selling their product **4 dots** **L** Mass of industry "snake–oil" in regard to nutrition **1 dot**	**Threats**
Deliverer	**5**	Shortage of experienced deliverers **5 dots**	**Weaknesses**
C	**4**	**H** Linking with other packages **4 dots**	**Opportunity**
D	**4**	eTechnology capacity to support the package **4 dots**	**Strengths**
Deliverer	**4**	No formal technical updating for deliverers **4 dots**	**Weaknesses**
D	**4**	**D** Limited (minimal) time for people to make their own plan **3 dots** **D** Participants don't leave with formalised action plans **1 dot**	**Weaknesses**
Deliverer	**3**	Technical update get–togethers **3 dots**	**Opportunity**
D	**3**	Resources available on internet e.g. template for nutritional plan **3 dots**	**Opportunity**
Deliverers	**3**	Credibility of deliverers with industry **3 dots**	**Strengths**
E	3	**K** Time constraints of the modern beef business **3 dots**	**Threats**
D	**2**	Universities and agricultural colleges – give practical application **2 dots**	**Opportunities**
Deliverers	**2**	More collaboration between government and private deliverers **2 dots**	**Opportunities**
D	**2**	**F** Create more connection and focus prior to workshop e.g. how will I use this? **1 dot** **F** Collect current situation and goals prior to workshop **1 dot**	**Opportunities**
C	**2**	All useful and relevant (no extra fat) **2 dots**	**Strengths**
C	**2**	Different versions of power points **2 dots**	**Weaknesses**
E	**2**	**I** Client (producer) attitude to full payment for	**Threats**

Issue type*	Total votes	Issue	SWOT
		workshops **2 dots** **I** Government funding for producer training **I** Subsidies – uncertainty and producer paradigm **I** Financial constraints	
Deliverer	**1**	Promotion and assistance to get younger staff to workshops to learn **1 dot**	**Opportunities**
D	**1**	Adapt each course to the audience with options for delivery (e.g. different new audiences) **1 dot**	**Opportunities**
D	**1**	Not enough outside sessions **1 dot**	**Weaknesses**
C	**1**	Are there too many calculations? **1 dot**	**Weaknesses**
D	**1**	**B** Interactive delivery interpreting local conditions **1 dot** **B** Slides can be modified and tailored to regions	**Strengths**
D	**1**	Paddock sessions **1 dot**	**Strengths**
Deliverers	**1**	Reduced pool of deliverers (time demand/availability) **1 dot**	**Threats**

Overall distribution of votes – Issue type C = Content; D = Delivery; Deliverer = Deliverer; E = External*

6.2.2.3 Additional R&D

- (Where is the science? Ideas on how we could have 'checking/science vetting process' – Repacking messages to make sure we are pre–empting people looking to 'blue cap'. Next thing is 'how do producers make nutritional decisions'. Classic thing on READING THE LABELS. Delivery methods (sale–pitch of supplements, easy to feed). Project team to check in with legalities of putting $$ on components of supplements.
- Really focus on the target nutrients in supplements and calculation of costs
- Producing cattle that will grade MSA and or production systems that earns the most money
- Dry season management of a beef business book (DPI)
- Least Cost Supp spread sheet (McLennan)
- Pasture growth models – GRASP (under review – Ken Day – Giselle Whish)
- Introduce a sanitised/abridged/useable version of Ration Calc (Sneath)
- McLennan's graphs and NIRS graphs over the year for the area that the deliverer is delivering in
- NIRS graphs (e.g. Kidman, Pilbara and Kimberley) – NIRS producer report
- Quigley, Poppi and Dixon P research results
- Intake calculator – Quik Intake (McLennan and Poppi)
- Cash Cow data/results (McGowan et al UQ due end February 2013)
- MLA technical library
- Summarised trial and case study information, e.g. English, McLennan so can look at different examples – everyone to have a look through cupboards – including PDS reports (copy from library to scan)
- Weaning and breeder management
- BCS (body condition score) – Ian Blackwood – report a way off – will become bible – Peter Smith – visual – see Peter's email – English's YouTube video
- Decision support tree for managing breeders – there's one in package for minerals – link to Breeding EDGE
- Collate information/activities in a resource booklet so don't have to keep updating/changing manual
- Hamlyn–Hill–Laing MSA/HGP PDS data/results

- Template or some way of costing/cost–benefit analysis
- Look at the economics before get too bogged down in practical management aspects
- Beef CRC outcomes and the Livestock Library
- Rumen modifier data – McLennan
- Evidence–based information
- Henderson report – are these outcomes applicable from nutrition, animal welfare perspective – currently with MLA – breeder mortality and wet season P
- Hasker's book
- Bone chewing country book (Boorman) – If we can't find, filing cabinet in BP (Russ' old stuff)
- GAP – Water quality (suggestion to do a lit review on quality and intake)
- Roger Cheffin's booklets

6.2.2.4 Monitoring and evaluation: initial ideas

What M&E has had a big impact on the package?	What M&E could have a big impact on the future success of the package?
Used evaluation feedback to develop workbook so calculations together – English–Dodt	Use the follow–ups to monitor and evaluate practice change.
'Things people liked' or 'Things they would like changed' – daily.	MLA surveys with attendees 6–12 months post–workshop. Done by independent evaluator. NGRMG do this well.
Skill updates for deliverers.	Time–related footprint aka spatial mapping of properties a few years apart.
At end of workshop what will people stop, continue or start to do.	Getting people to put a nutritional plan together and follow–up to see how they went.
Spatial mapping of properties that had attended workshops (Holloway).	Remove M&E that we've done in the past that wasn't useful/used, e.g. the evaluation sheets.
Review previous M&E data collected as part of this project – Flick to drive to Gayndah and collect… Russ buys lunch!	Collate, distribute and use M&E data collected.
Quiz questions at end of the day for a bit of fun – must have chocolates…	Is there a need for all the 'stuff' currently being delivered in the package – do people want it?
	ORID process.
	Business EDGE–like skills audit.

6.2.2.5 Alternative delivery approaches for Nutrition EDGE

Suggested alternative approach	Reason
Combination of f2f, e–learning, webinars, etc. instead of 3–day f2f	Time constraints Info overload
Increased use of goal focused learning as a starting point	
Baby steps – home work. Don't get them to do crucial things at home that would hold others up if they didn't do it.	Saves workshop time
Questioning as a group – feedback on experiences – calculating costs etc. – f2f then as webinar	Gives direction to do some nutrition – hones in on priority of property. Practical and applied.
YouTube videos/other videos	Reinforce what is learned and apply at home
Follow–up on–property	1st hand learning
Electronic calculations	Concern more on outcome (result in action) not the calculations itself
Less detail on subjects (digestive system, energy cycle)	Need to focus more on management outcome or consequence
Workshop targeted to participants needs via pre–workshop phone, e–mail, web	Lot information may not be of value can focus on participants needs
Video presentations available for some sections	Some sections not relevant for some districts, e.g. phosphorus – trace elements
1st session establishing production goals and constraints to achieving them (part of current module 5 – send out as pre workshop "We will be discussing this topic")	Focus workshop on client issues/ideas
Webinars e.g. one per week with some homework. Like school of the air type activity	Gives one section of information at a time, can soak that in, time constraints not as bad.
e–learning e.g. webinar or modules, then report back to group later. Could have technical support.	Helps with time constraints.
2–day standard workshop and 2–day advanced workshop	To help with time constraints, allows you to pitch it to the learning ability. Audience out there that needs standard workshop we haven't got to yet that might have been turned off by harder content.
Templates available on a website	More reason and easier to apply when not at the workshop.
Pre–workshop activities e.g. nutritional plan	Will help people focus on what they will be learning and what they want to get from the course.
Pre–workshop activities and 2 day workshop then 1 day "What did I do" type of post day	Logical sequence to action planning, time help, more pressure to implement changes.
Calculations available electronically & used in w/shop	Not bogging down and using up too much time on calculation. Concentrate on outcome and time to focus on result/action. More examples can be worked through and answered.
Less detail on some subjects (e.g. energy cycles)	Can focus more on the relevant message Focus on management consequences

Suggested alternative approach	Reason
Workshop targeted and workshop participants needs via pre–workshop contact, e.g. phone, webinar, email questionnaire	Better able to focus on their priority issues and get them to implement action
Some sections can be presented as video – before or even afterwards	Some sections are just lectures and not always relevant. Allows more time to concentrate on planning for individual cases.
Start with practical need of client rather than focusing on detail/theory	e.g. don't know how car works but can drive it. Give me skills to change tyre, check oil and contact if needed. Not how it works.
Work back from there – start where people are at not the 'traditional' starting point	e.g. how do you drive car in wet weather, gravel roads, night time… Diff. ways of driving but not applicable to everyone
Pre workshop 'priming' activities/learning/skills to do workshop activities	e.g. if someone hasn't used s/sheets or excel then can/can't use it
Build in opportunities to demonstrate 'things' through the website	So that a) can see something in practice b) can follow up at home (diff. learning preferences)

6.2.2.6 Nutrition EDGE resources audit

Nutrition EDGE resource	Where it is held	Who holds it	How to access
Nutrition EDGE workshop notes including references and further information	MLA	MLA	Liz Allen
Presenters notes	MLA	MLA	Liz Allen
PowerPoint slides	MLA	MLA	Liz Allen
Weaner management in northern beef herds (aka Weaner manual)	DAF/MLA	MLA	pdf on MLA web, h/copy LA
Phosphorous management of cattle in northern Australia (aka Phosphorus manual)	DAF/MLA	MLA	pdf on MLA web, h/copy LA
Hormone growth promotants and beef production: a best practice guide	MLA	MLA	pdf on MLA web, h/copy LA
Optimising growth paths of beef cattle in northern Australia for increased profit B.NBP.0391 – project outcomes/final report	DAF/QAAFI/MLA	MLA	Stuart McLennan – in progress
Literature review of new research – suggested			
Dry season management of a beef business: a guide to planning, managing and supplementary feeding	DAF	DAFF	pdf on FB web, h/copy Ken Murphy
Least cost supplement spreadsheet	DAF/QAAFI		Stuart McLennan
Pasture growth models – GRASP	DSITI		Ken Day, Giselle Whish
Ration Calc	DAF	Roger Sneath	Copy on FB staff intranet
Quik Intake calculator (under development)	DAF/QAAFI		McLennan and Poppi
Cash Cow (aka Northern Australian Beef Fertility Project)	UQ/ DAF/ CSIRO/ MLA		Mike McGowan
FutureBeef Technical Library DVD	DAF/MLA	Krista/Liz	
Summarised trial and case study information, e.g. PDS project reports	DAF/MLA		MLA, older PDS reports on FB staff intranet
Body condition score (BCS) – see English's video	DAF		FB web 'multimedia' pages
Beef CRC Legacy website	Beef CRC		www.beefcrc.com
Livestock Library	Australian Wool Education Trust		www.livestocklibrary.com.au
Rumen modifier data	DAF		Stuart McLennan

Nutrition EDGE resource	Where it is held	Who holds it	How to access
Final report – Determining property–level rates of breeder cow mortality in northern Australia (aka Henderson report)	MLA	MLA	pdf on MLA web
Beef cattle performance in northern Australia: a summary of recent research	DAF	DAFF	pdf on FB web
Bone chewing country: cattle management for northern Australia (Boorman)	DAF	DAFF	pdf on FB staff website
Nutritional and managerial opportunities for meeting beef markets (Cheffins)	DAF	DAFF	pdf on FB staff website

This table was compiled from stakeholder feedback collected at the workshop, February 2013.

6.2.3 Stakeholder feedback from the *Grazing land management EDGE* review workshop

6.2.3.1 *Grazing land management EDGE* workshop participants

1. Jane Pryor, DAF Rockhampton – Project leader
2. Gerry Roberts, GR Consulting, Longreach – Facilitator
3. Jenny Milson, DAF Longreach
4. David Phelps, DAF Longreach
5. Bob Shepherd, DAF Charters Towers
6. Megan Debney, DAF Charters Towers
7. Trudi Oxley, DPIF Katherine
8. Anne–Marie Huey, DAFWA Cable Beach
9. Jill Alexander, Applied Ag, Dalby
10. Col Paton, EcoRich Grazing, Roma
11. Mick Quirk, MLA Brisbane
12. Krista Cavallaro, DAF Brisbane
13. Felicity McIntosh, DAF Brisbane
14. Diana Leemon, DAF Brisbane

6.2.3.2 SWOT analyses

6.2.3.2.1 *Grazing land management EDGE* pre–workshop SWOT analysis

Strengths	Weaknesses
• Content drawn on best knowledge from DPI and MLA – extension and research (I) • Unbiased – not trying to sell anything – based on science, presents integrated R&D (IIIII) • Depth of presenter experience and those putting package together (IIII) • Practical workshop– especially follow–up (III) Modules can stand alone • Tailored to key production regions using local knowledge • Are able to add in local information as necessary • Workshop group cohesiveness is created over the three days. There is 'safety' and 'trust' in the group with the discussions and activities presented a strong set of principles applicable to all northern grazing lands and perhaps all rangelands in Australia principles backed by the best local data or alternatively the most local illustration of that principle. • Caters for both production and biodiversity outcomes, but most strong on production • The production focus engages participants and then allows them to be introduced to sustainability concepts e.g. their properties as ecosystems, ecosystem services, keystone species, etc. starts participants down a path of planning their GLM • A variety of presentation techniques used to appeal to different personality types, but slides form the major information presentation • Having a group of people together allows shared experiences • Now is a variation on the 3 day workshop technique e.g. Border Rivers, some in paddock with GLM Taster, some internet, some face–to–face commits participants to doing something when they get home by setting a date for a follow–up day to check on progress with plans • The content is: • best knowledge • detailed • comprehensive • relevant • systems based • based on industry (I) • Established market share, compliments rather than competes • Accredited Nationally allowing RPL • Repository of knowledge • Well packaged manuals and information (II) • Very high adoption of new practices by participants; may need more than one attending (III)	• Material in workshop notes looks boring – Monochrome pages boring , folders cumbersome, age of information, big job to organise (II) • Workshop notes don't follow slides • Information and material on 'intakes' is incomplete • Lack of practical examples for exercises for other land types ® E.g. Spinifex (we don't have the base info) ® Buffel (we don't have the time to run the extra example) • Follow–ups don't appear to be valued by participants or insufficient (I) • 3 day workshop has a number of issues – time, f2f expensive, travel, accommodation etc both presenters and attendees (II) • Cost (II) • Some personality types don't like the workshop environment a lot of information is crammed into 3 days and unless that is reviewed and/or used regularly it is usually lost • Some people want more time and detail on some aspects and less on others that might not be useful to them • Presentations are largely slide based – "death by PowerPoint", only a few exercises to break sessions • Usually group based and not offered to individuals • Content can be overwhelming for participants • Participants generally dislike doing so many calculations • Participants rarely re–use the workbooks and manuals once they get home • Market now saturated? • high intensity learning environment can put some people off • Relatively high volume print run of manuals slows ability to update with new information • Lower numbers of presenters available in some regions and low attendee numbers • Lack of locally specific information is some areas (Pilbara) • Too much presenting and talking by the presenters • Insufficient integration into the business • Packages are too big • Difficulty in finding out or obtaining some R&D power–point slides from papers & conferences

Strengths	Weaknesses
• Participant interaction, peer learning and review as well as presenter interaction • PowerPoints/information can be readily modified to match the region, location, participants, update latest information etc. (II) • Very well received and highly regarded by industry, in general (I) • Good coverage of fundamental principles incorporates (and encourages) the contribution of local knowledge around the table • Good way to provide technical information and extension training to new staff (RD&E) • Good opportunity to engage with producers who are new to a district or new to the beef industry • Locally relevant regional information • Relatively easy to upgrade as new information comes on board • Core, consistent messages to all workshop participants • Foundation knowledge to which more complex solutions can be tailored • Principles and concepts (e.g. land condition) well acknowledged and familiar to grazing industry.	and other random presentations • insufficient QA in some content and presentations • Little scope to explore emerging and popular issues in grazing management (e.g. soil carbon) • Layout seems to run together, doesn't clearly distinguish between subjects in sections. • Jim and Sandy are a bit cheesy (I) • Little scope for forward thinking graziers to learn at an advanced level if they are already familiar with concepts • Little flexibility to focus on burning issues (e.g. a group may be well aware of land condition and weed prevention concepts but are particularly keen to explore novel grazing management systems). • Doesn't cater for clients who just want to focus on one area (see above). If they are time poor, they may just want to do a day on soil health. • People can feel that they have done it all before, (arising from nutrition and NT Rangeland Management Courses) • For NT, Biodiversity is a weakness, presenters not confident and doesn't integrate seamlessly • Infrequent NT courses leave large gaps between workshops making it hard for presenters to get in the swing! • Doesn't cover well the tall grass, floodplains and improved pasture for the Katherine version • Doesn't account well for the whole property context in the planning process

Opportunities	Threats
• Ex DPI staff are able to deliver • We are able to build on the package as research results become available • Stand–alone modules allow the workshop to be split if necessary • Highlights research gaps • Match workshop notes to follow slides • Create more connection and focus prior to workshops via ® more focus questions ® finding out their 'why' • Find ways to keep energy going after workshops (e.g. through discussion groups and via social and other networking) and use that energy to ensure better attendance at follow–ups and encourage seeking of info & assistance (II) • Make the follow–up a more formal and integral part of the workshop • Target feed companies to attend workshops so that relevant nutritional advice flows through them also and producers end up with better product and better results • Break GLM into sub components: – basic must do sections that cover basic principles – elect for more or less emphasis on different components, e.g. fire not useful in some areas – A prerequisite may be a prior attendance at a GLM or Stocktake workshop. (II) • Offer the sections separately over a period of time • Offer field based face–to–face sections, webinar and internet options have more activities if it is still done as a 3 day block, face–to–face design something that can be done by individuals, guest presenters, more interactive (II) • Calculations converted to apps/spread sheets – but with novel learning methods to ensure participants understand how the numbers are derived, and with the skills to validate the answers • New generation of potential participants entering industry • New delivery technologies & flexible delivery methods • Tie–in with other funding bodies such as NRM groups to instigate further opportunities and on–ground projects (I) • Jim and Sandy retire from the industry and their property becomes vacant crown land!! • Reduce the size of the package (the Burdekin version is bulging with good stuff) • Develop an alternative to the workbook – an e–version, CDs (II)	• Fewer experienced presenters (burnout); can't train new presenters or co–present; where else can trainers learn more? (IIII) • Some new presenters may not have the experience to maintain high standard and credibility • Lack of consistency (of information) with nutritional workshops run by other consultants • Some participants (actual and potential) have entrenched bias generated from incorrect advice or training from other sources • Poor advice given by feed company reps and 'nutritionists' • Danger that some participants will still go out and 'do what they have always done' • Competition from alternative courses that are not as well put together or not based on sound principles appearing more attractive • Competition delivering inferior courses cheaper • Saturated market with new courses/already have all willing participants (III) • Too expensive for the audience unless subsidised (III) • New delivery technologies could dilute the interaction and learning experience • Risk of information not updated frequently enough • Lack of momentum – too long between courses • Doing GLM will become compulsory for whatever reason(s) • R&D doesn't keep up with emerging issues and the content becomes 'old hat' (e.g. what do I need to know about soil carbon, how do I manage it and what is the latest research indicating). • Nothing new to satisfy the learning aspirations of landholders keen to keep improving their knowledge and skills. • Economic pressure to both producers attending the course, and also potentially to increase pressure on rangeland condition • There may be potential to saturate a region if there is not the ability to change the course to respond to client needs less than every 12 years!

Opportunities	Threats
• Enhance the economic analysis of changed management i.e. stronger links between practices, land condition and profits • Revamp the planning module • Freshen up the slides (as much for the presenters as well as the producers) • Integrate into computer mapping packages e.g. water circle calculations and land type areas per paddock are very tedious • Harness the "producer knowledge in the room" better • Integrate the near–real time satellite data from Landsat 8 that is being made available from Dan Tindall's group at Dept. of Science • Cap the cost to the producer at one person with additional people from the same business charged only for catering and cost of materials • Work with scientists to document the science or otherwise behind emerging issues. • Team with organisations, R&D bodies from other industries and states to collate the information required to generate new information to address new and emerging issues. • Engage specialists to compile and deliver this training (may be outside beef industry – whoever has the best knowledge (e.g. Could use the soil food web group or Armidale University to compile data for a section on soil health– incorporated into the current workshop or done as a one–off workshop/e–learning activity. • Field days to learn practical skills (without theory session – this could be done remotely). • Provide more practical examples of stock numbers can actually be manipulated • Better differentiate between RCS courses and GLM in our promotions. • Better reach our market to get people who think they don’t need to come/don’t understand what the course entails. • Include a conversion table showing LSUs, DSEs etc. and more animals in table i.e. camels donkey etc. • NBN to enable e–learning, modules online, follow up webinars, updated tools on the web.	

Please tell us what aspects/features of the package you like (i.e. would hate to see change)?	What would you like to see changed?
• Cow • Total immersion' created by three intensive days • Group energy • Group sharing of practical experiences and examples (of what doesn't work as well as what does!) • Format e.g. ® Pre–workshop questionnaire (property background and nutritional issues) ® Outline/road map ® Expectations ® time for reflection (writing in books and group revision) ® review at end of each day ® start/stop/continue at end of last day • Science based and unbiased presentation of sound principles • Core principles of land condition and its management, grazing management (I) • Regional packages and individual property focus • Ability to interact with peers and industry professionals the trust and rapport that is built amongst participants and presenters • Practical sessions • Ongoing R&D to support and back–up principles • Experienced and skilled presenters • The concept of using the activities, the reliance on discussions to bring out the experience in the room. • The idea of basing principles on research data. • The idea of having very local customised data for regional packages. • See also 'strengths'	• More time for calculations • Could there be some preparation pre–workshop to save time in workshop and help identify individual needs • First day is too long; could be abbreviated • Carrying capacity calculations could be made easier with a spread sheet • Reduced time spent on calculations, allowing more time for participants to analyse their own situation, complete carrying capacity estimates for paddocks etc. • Need to keep up with the rapid changes in technology, taking advantage of the best delivery mechanisms for self–paced learning – but not just using a technology because it is new.; let producers' choose their preferred method Broaden 3 day format (II) • We could provide supplementary information on YouTube – especially some of the practical sessions and also some of the trickier concepts and skills (e.g. using a feed budget spread sheet). • Improved follow–up to deal with participant questions and reinforce key messages • Experts able to guest lecture on topics (this could be webinar based). E.g. soil scientist may do a session on soil health, one facilitator might manage the whole workshop, but a variety of presenters or experts may be involved (particularly if done in an e–learning format). • More dynamic content. • Workshops that can be 100% field based (like a traditional field day but the focus is learning about a particular topic and the content and presentation is pre–prepared). E.g. at research station, on–property, at a university or wherever the subject can be best taught in the field. • Costing of options (original costings were done 10 or more years ago for some packages) needs to stay up to date if included. • Phone or tablet applications that could do option costings, land type database and ground cover photos. I would like to see reference material available on more app's for easy look up. • The technical information updated, with the benefit of 12 years of delivery, a good look at the materials as a group to see what really could be left out. • GLM needs more nutritional stuff (pasture quality, what is required for maintenance–

Please tell us what aspects/features of the package you like (i.e. would hate to see change)?	What would you like to see changed?
	growth – lactation... MJ/protein etc.). • Less land condition stuff • EDGE nutrition has a good balance so GLM needs to be improved along the same lines. E.g. pasture plots, leaf/stem, and estimating protein/digest/energy. Could we use all the NIRS data to come up with pasture quality charts (across wet and dry season) for key pasture communities across the state? This could be used for both GLM and nutrition. • Smaller modules and train–the–trainer • Incorporate the various RD&E strategies and priority areas • Establish linkages with other projects e.g. Grazing BMP • Assist producers to develop an action plan for further training or required assistance

6.2.3.2.2 *Grazing land management EDGE* workshop SWOT analysis

Total votes	Strengths
7	**B** Evidence based/reliable **2 dots** **B** Good science, good principles supported by local information **5 dots**
3	Depth and breadth of experience of people involved **3 dots**
3	Group format allows producers to share experiences **3 dots**
3	**A** Use of locally relevant information **2 dots** **A** Tailored to local regions **A** Good repository of GLM information **1 dot**
2	Interaction between deliverers and producers (two–way) **2 dots**
2	Training tool for staff and industry service providers **2 dots**
2	Participants leave with an action plan they are committed to by follow–up **2 dots**
2	Participants are able to focus on their own property **2 dots**
1	Practical workshop with exercises and outside activities **1 dot**
1	Ability to incorporate other people into workshop **1 dot**
1	**C** Principle–based **C** Production focused, linked to environment and ecological principles **1 dot**
	Group cohesiveness
	Unbiased and science based
	Current R&D which is easy to update
	Well received
	High adoption – land type, land condition etc.

Total votes	Weaknesses
10	**J** Unnecessary detail in some areas e.g. nitrogen cycle workshop slides **9 dots** **J** Too much information in one hit – examples, reasoning **1 dot**
3	Logistics of organising workshop materials – too many materials **3 dots**
3	Marketing – saturation at top end, how to get to the rest? **3 dots**
3	Limited M&E data to evaluate success **3 dots**
3	Lack of connection to other messages and packages **3 dots**
2	Follow–up to support adoption **2 dots**
1	Some regions lack relevant local science (e.g. examples to support principles and data for GRASP) **1 dot**
1	Limited ability to regularly update material (manuals and workbook) **1 dot**
1	Trouble getting new information (e.g. remote technology) – 4 yr. time lag **1 dot**
1	Planning book does not encourage continual use **1 dot**
1	**K** Three day format **1 dot** **K** Long…
	Some slides don't match workshop
	Losing experienced presenters
	Don't need to do GLM EDGE if already done Nutrition EDGE (overlap)
	Some pasture growth tables need revision
	Process of matching local pasture growth to a location and land type
	Variation in consistency between regional versions
	One product fits all
	Bring in specialists to talk about specific issues – cost, access, practicality
	Theoretical/classroom–based training for bulk of workshop
	Lack of "excitement" – a grab on first day to stimulate excitement for rest of workshop
	Cost
	Workshop notes look boring
	Often not getting the ultimate decision maker to the workshop

Total votes	Opportunities
8	Focus on the doing (adoption) **8 dots**
6	Allow participants to share their knowledge/experience/skills and innovative solutions **6 dots**
6	**D** Allow flexibility depending on participant group **3 dots** **D** Potential to remodel package for new generation and technology availability **3 dots**
4	Have a range of delivery modes **4 dots**
4	**E** Develop streamlined planning to encourage ongoing planning at home/on property **2 dots** **E** Mathematical calculations simplify, alternative ways of doing them/tools **2 dots**
3	Link to financial value **3 dots**
2	Integrate more R&D information into the packages **2 dots**
2	Field dominant training **2 dots**
2	More responsive to R&D needs identified in workshops by participants **2 dots**

1	Identify learning pathways to training options (e.g. BMP, rangeland courses) **1 dot**
1	Accreditation of courses and deliverers **1 dot**
1	Linking EDGE packages by common modules **1 dot**
1	Consistency between regional packages within GLM **1 dot**
1	Consistency across FutureBeef (messages, look and feel and principles) **1 dot**
1	Highlight research gaps **1 dot**
1	Peer–to–peer learning **1 dot**
1	Draw in BMP participants – massage package to fit their needs **1 dot**
1	Demo clearly how all packages fit together **1 dot**
1	New generation of potential participants 1 **dot**
1	Follow–up D&E projects **1 dot** • PDS • Caring for Country
	Differentiate the package for different market sectors
	Pre–workshop preparation
	Better M&E, collection and interpretation/continuous improvement
	Follow–up days on–property
	Tap into federal funding and emerging R&D from other states
	Retire Jim and Sandy
	Retire PowerPoint and reduce
	NGS material

Total votes	**Threats**
6	**F** Diminishing pool of experienced presenters **6 dots** **F** Fewer experienced presenters
5	**H** Snake oil sales offer too good to be true solutions **4 dots** **H** Un–scientific information put out by dodgy inc. presenters who market well **1 dot**
3	Inability to provide technical information to providers/update/train trainers **3 dots**
2	Lack of marketing that acknowledges the value of a course **2 dots**
	Too much technical information can dilute learning experience
	Lack of interest/motivation
	G Saturated a lot of the market **G** Regional saturation
	Misuse of GLM information by dodgy presenters
	Lack of funding/subsidies to attend workshops
	Perception of “I can’t afford it”
	Bias of subsidy providers e.g. who they use as extension deliverers
	Entrenched bias by potential participants

6.2.3.2.3 Overall distribution of votes

Issue type*	Total votes	Issue	SWOT
C & D	**10**	**J** Unnecessary detail in some areas e.g. nitrogen cycle workshop slides **9 dots** **J** Too much information in one hit – examples, reasoning **1 dot**	**Weakness**
D	**8**	Focus on the doing (adoption) **8 dots**	**Opportunities**
C	**7**	**B** Evidence based/reliable **2 dots** **B** Good science, good principles supported by local information **5 dots**	**Strengths**
Deliverer	**6**	**F** Diminishing pool of experienced presenters **6 dots** **F** Fewer experienced presenters	**Threats**
D	**6**	Allow participants to share their knowledge/experience/skills and innovative solutions **6 dots**	**Opportunities**
D	**6**	**D** Allow flexibility depending on participant group **3 dots** **D** Potential to remodel package for new generation and tech availability **3 dots**	**Opportunities**
E	**5**	**H** Snake oil sales offer too good to be true solutions **4 dots** **H** Un–scientific information put out by dodgy inc. presenters who market well **1 dot**	**Threats**
D	**4**	Have a range of delivery modes **4 dots**	**Opportunities**
D	**4**	**E** Develop streamlined planning to encourage ongoing planning at home/on property **2 dots** **E** Mathematical calculations simplify, alternative ways of doing them/tools **2 dots**	**Opportunities**
C	**3**	Link to financial value **3 dots**	**Opportunities**
Deliverer	**3**	Depth and breadth of experience of people involved **3 dots**	**Strengths**
D	**3**	Group format allows producers to share experiences **3 dots**	**Strengths**
C	**3**	**A** Use of locally relevant information **2 dots** **A** Good repository of GLM information **1 dot** **A** Tailored to local regions	**Strengths**
E	**3**	Inability to provide technical information to providers/update/train trainers **3 dots**	**Threats**
D	**3**	Logistics of organising workshop materials – too many materials **3 dots**	**Weaknesses**
E	**3**	Marketing – saturation at top end, how to get to the rest? **3 dots**	**Weaknesses**
E	**3**	Limited M&E data to evaluate success **3 dots**	**Weaknesses**
C	**3**	Lack of connection to other messages and packages **3 dots**	**Weaknesses**
E	**2**	Lack of marketing that acknowledges the value of a course **2 dots**	**Threats**
C	**2**	Integrate more R&D information into the packages **2 dots**	**Opportunities**
D	**2**	Field dominant training **2 dots**	**Opportunities**

Issue type*	Total votes	Issue	SWOT
C	**2**	More responsive to R&D needs identified in workshops by participants **2 dots**	**Opportunities**
D	**2**	Follow–up to support adoption **2 dots**	**Weaknesses**
D	**2**	Interaction between deliverers and producers (two–way) **2 dots**	**Strengths**
C	**2**	Training tool for staff and industry service providers **2 dots**	**Strengths**
D	**2**	Participants leave with an action plan they are committed to by follow–up **2 dots**	**Strengths**
D	**2**	Participants are able to focus on their own property **2 dots**	**Strengths**
C & D	**1**	Identify learning pathways to training options (e.g. BMP, rangeland courses) **1 dot**	**Opportunities**
Deliverer	**1**	Accreditation of courses and deliverers **1 dot**	**Opportunities**
C	**1**	Linking EDGE packages by common modules **1 dot**	**Opportunities**
C	**1**	Consistency between regional packages within GLM EDGE **1 dot**	**Opportunities**
C & D	**1**	Consistency across FutureBeef (messages, look and feel and principles) **1 dot**	**Opportunities**
C	**1**	Highlight research gaps **1 dot**	**Opportunities**
C	**1**	Peer–to–peer learning **1 dot**	**Opportunities**
C & D	**1**	Draw in BMP participants – massage package to fit their needs **1 dot**	**Opportunities**
D	**1**	Demonstrate clearly how all packages fit together **1 dot**	**Opportunities**
E	**1**	New generation of potential participants 1 **dot**	**Opportunities**
C	**1**	Follow–up D&E projects **1 dot** • PDS • Caring for Country	**Opportunities**
C	**1**	Some regions lack relevant local science (e.g. examples to support principles and data for GRASP) **1 dot**	**Weaknesses**
E	**1**	Limited ability to regularly update material (manuals and workbook) **1 dot**	**Weaknesses**
E	**1**	Trouble getting new information (e.g. remote technology) – 4 yr. time lag **1 dot**	**Weaknesses**
D	**1**	Planning book does not encourage continual use **1 dot**	**Weaknesses**
D	**1**	**K** Three day format **1 dot** **K** Long…	**Weaknesses**
D	**1**	Practical workshop with exercises and outside activities **1 dot**	**Strengths**
D	**1**	Ability to incorporate other people into workshop **1 dot**	**Strengths**
C	**1**	**C** Principle–based **C** Production focused, linked to environment and ecological principles **1 dot**	**Strengths**

Issue type C = Content; D = Delivery; Deliverer = Deliverer; E = External*

6.2.3.3 New R&D outcomes, tools, courses, consultants and/or contacts that relate to this package/topic area – provided as part of the pre–workshop survey

- New R&D outcomes
- NIRS outcomes
- Phosphorus Literature review
- Water quality literature review
- Other literature reviews
- Stu McLennan's work
- Rob Dixon's work
- Excel spread sheets for calculations
- Intake formula ready reckoner
- Label interpreter
- Cost/nutrient (need/feed) calculator
- Poster of intakes graph for wall
- Other posters?
- Consultants/Presenters:• Russ Tyler • Col Paton • Jill Alexander • Kay Taylor • Bill Schulke • Copper Hill • Mick Sullivan • Ken Murphy • Angela Elliott (Boulia?) • New staff as they are trained and experienced • Bec Gunther • Emma Hegarty • Megan Debney • Jim Fletcher
- NGS regional best bet manuals and key information
- Mitchell grass dieback and rooting depth information
- Some of the stuff published at recent Australian Rangelands Conferences
- Soil health – microbial, nutrient, physical (many government and private organisations are dealing with this).
- Better alignment and outflow of findings from federally funded projects (even if they are community based) like Caring for Our Country, Action on the Ground etc...
- I would love to see some 'left–field' practitioners and scientists get a run. Even if it was just as a discussion session to explore the validity of their concepts to local landholders. E.g. look at what could be learnt from the farming operation of someone like Joel Salatin.
- Would be nice to see the more advanced (may have been to a few different workshops and looking to advance this knowledge and improve their operation further) landholders challenged to push the boundaries in terms of innovation and adopting/adapting new technology.
- NT Utilisation project
- Pigeonhole project
- Mt Sanford grazing trial
- Shruburn
- Sturt Plateau
- GRASP calibration

6.2.3.4 Additional R&D

- CSIRO work
- Federally funded projects
- QMDC–Paton fire work
- NRM group weed management work
- Tropical Weeds: bellyache bush; basic ecology of weeds; specific herbicide work
- Feral pigs – Charters Towers work
- Grain&Graze: e.g. LeyGrain Manual NB this package is somewhat separate to GLM
- Rangelands Society conference proceedings
- Kidman Springs pasture sustainability write–up – to be released shortly – CC work
- Alexandria fire trial – final report almost out

- Delamere–Alex spell burn PDS
- Beetaloo grazing systems trial
- Land condition guides: Stuart, VRD and Barkly
- Long term grazing of sheep – Toorak – just been published
- Precision pastoral management tool – in progress – Alice Springs CRC (Leigo)
- Mitchell grass rooting depth data and photos (Phelps)
- Pasture recovery after flooding in the Condamine (Paton)
- Pasture recovery after flooding Gulf country (Rolfe)
- Landsdowne R.S – spatially enabled livestock management – CSIRO
- Land reclamation trial at Spyglass R.S – Hall
- About to start – Near real time Landsat imagery (Tindall QG)
- DSITI – working on PaddockGRASP tool

6.2.3.5 Grazing land management resources audit

GLM resources	Where it is held	Who holds it	How to access	Region
Mitchell grass rooting depth photos		Phelps		
PowerPoints				
Technical manual				
Facilitation guides				
Posters		Pryor/regional coordinators		
Additional resources				
Land type sheets	FutureBeef website	Giselle Whish is ‘key controller’		
Pasture photo–standards	FutureBeef website	Beutel		
Butterfly pea book	FutureBeef website	Conway at Emerald (SFS group) has hardcopy stash		
Local NRM weed books				
Pasture growth tables	PaddockGRASP	Leigh Smith		
NGS technical manuals		Phelps		
VegMachine		Beutel		
Property maps	Identify contacts, potentially PaddockGRASP	Leigh Smith		
Case studies	FutureBeef case studies – print and multimedia	NRM sites/YouTube		
Pasture monitoring booklet – Not watching the grass grow	FutureBeef website	Beutel		
Australian Rangelands Society proceedings	ARS website			
NBRUC conference	NABRC website	Kyte		

6.2.3.6 Monitoring and evaluation: initial ideas

What M&E has had a big impact on the package? PAST	What M&E could have a big impact on the future success of the package? FUTURE
Having an internal view (interactive – group discussion and reporting back) that identifies what has or hasn't worked process wise that can be improved next time	Pre–workshop survey tied in with post–workshop survey
Using independent reviews/reviewers – Ian Perkins review for Desert Channels Queensland specifically on GLM EDGE; state–wide review – Rickards; internal review by Fred Chudleigh (investment return for the department)…	Good process that looks at both modules and workshop and impact on practices
6 month follow–ups on farm do give good indication of changes made.	Process that captures post–contact changes in actions, use of tools that will give us an indication of possible long–term impacts
Casual conversations/contact post–workshop (Italy)	A longitudinal process that will capture impact across activities over time
Spatial mapping of GLM footprint, i.e. property location and size. Can also use to identify targets. (Digital and in–workshop)	Capture anecdotal stories of change – use this more widely/proactively (narratives) – from participants and deliverers. Talk to earlier participants to see what's changed in last 10 years.
Word of mouth – talk to people about what they/other participants have done	Case studies focused on what they did on property
Maintaining contact with people and seeing what changes they've made – individual property visits	Success stories
Tyler, Bertram, Paton – mentoring and accreditation process	There needs to be an accreditation process
Reef Catchments grazing practice survey – this is longitudinal	Track changes through VegMachine over time
Regional NRM groups, e.g. Reef Rescue, the best funding applications generally produced by groups that had done GLM	Less time between workshop and seeking feedback from participants
ERMPs best applications again generally done by groups that had done GLM	Tie M&E timing to the practice
Far North group have good stories about what's been achieved and a good database	
Wet season spelling field day participant survey – longitudinal (Phelps 2012)	
Case studies on property changes	
NT study with Coutts – have feedback/report (Oxley)	

6.2.3.7 Alternative delivery approaches for *Grazing land management EDGE*

Suggested alternative approach	Reason
Support materials for revision e.g. Col's YouTube videos	Cements concepts Great for reflective learners
Initial (prior) support material	Flipped learning
More detailed information that we didn't have time to cover in workshop	Don't get time–pushed in workshop Give opportunity to learn about a topic of their interest
More paddock–based activities (pick and choose to suit participant requirements)	Address issues and learn in real practical situations Better for kinaesthetic learners
Retain 2–3 day option	Due to distance or other reasons, some people prefer to get it done in one hit
Paddock based	Graziers are practical and learn better in context • relaxed • attentive • sharing
YouTube key messages	Watch when you want
Webinars – interactive	Reduces travel and time Bring in experts
On–line resources for modules; FAQ, wikis, blogs – almost the manual (content) on–line and interactive	As above
On–property (kitchen table) conversations	Relaxed learning; allows other family members to be there; individually tailored
Group discussion activities Incorp in current format or components of format	Stimulates learning from each other – allows 'thinking' about info versus being told
Review sessions (e.g. using games for informal/group for info recall	To encourage more interaction; changed participant energy positive way; well–received
Field exercise for land condition assessment – out of classroom 'doing' – need to practice it	Focus on practical context to get info versus in class environment
Could use YouTube clips as part of pre–workshop prep	Good for short on time
Using USB and DVD where internet access is poor	Multipurpose: overcome internet barrier (plus access/timing due to peak internet periods)
Could use producers to promote vision (YouTube) – testimonials; example of how to apply practice	Pre–workshop – testimonials – What I already do – What am I going to get out this… (Could use as testimonials)
Use of animated characters	Characters… takes learner through the exercise
Savannah Plan approach	Work with properties in extensive areas where the "group stuff" doesn't work
On–property activities • specific • in a whole of enterprise context	Learning by doing
E–learning	Can be done after hours. Can be done during the wet season.

Suggested alternative approach	Reason
On–line discussion groups e.g. blogs	More interactive. A record on topics and discussions is maintained.
Industry forums e.g. Beef Up Forum	Presentations across whole of enterprise. Linkages can be made and questions asked
Case studies of “successful” beef business but presented on–property	Ability to see, hear and quiz host property owner/mgr.=
Producer presenters at forums, seminars, workshops etc.	Provide details on linkages e.g. difficult to improve herd performance or market compliance if GLM is not done well. Also links to enterprise profitability.
Simple concise materials to support … calculators: • concise explanation (YouTube) • work booklet • get a maths teacher to help with the writing of these materials • road test on a 13 yr. old	Any group of people will have a range of mathematical abilities – some people will have high ability no problems with calculator. Others will need a clear simple stepwise approach to …
Visual – picture based, especially notes, slides	“A picture is worth a thousand words”
Narrative based delivery in workshops (stimulate out of workshop learning)	Makes learning facts more relevant
Interactive animations – in pre–learning	Help with learning pre–workshop learnings
In workshops more questionnaire for understanding	Helps presenter know where everyone is in relation to the principles being discussed
Role play/interpretive dance	Action learning – people learn better by doing (Kinaesthetic learning is stronger in most people then auditory or visual learning)
Modules with minimum information (info–focussed modules)	Currently swamp people with information. Information is not necessarily the most important thing. It is not so much about info but what you want to achieve.
On property delivery one to one, small group. Broken up modules.	Barriers to adoption usually emerge when they go home. Solving on property issues during the delivery can help.
Interactive e–learning for more technical aspects prior to group activity.	To save time for the action oriented group work
Small group “executive link” style follow up for attacking the planning phase after going thru the courses, can use various technologies Savannah Plan?	Solve on property issues in a whole property priorities framework, with the benefit of others expertise, experience and insights
One to one GLM delivery a ’la GLM plus	For those who don’t attend group activities. More hand holding for planning/problem solving on implementation.
Benchmarking production, SRs, financial, utilisation rates, lifestyle!	Ability to prioritise the part of the business most in need of investment (information)
Field days: • follow up • prequel – setting scene, identifying issues	On property trouble shooting by group after GLM has been completed and implemented

Suggested alternative approach	Reason
A 2? Day intensive workshop for the knowledge seekers	To maintain option that presents a comprehensive information set for those who require it. To maintain a complete “repository” of the materials.
Mentoring programs – linking producers with interest and success with those solving problems	Provide a system for linking those with practical experience with those who seek it in a formalised way. A product to suit the values of the segments (leaders – ethics, contribution; majority – pragmatic, peer influenced, … evidence)
Key principles can be done remotely (e.g. online/CD/text)	Do at own pace in own time (suits learning). Some understanding beforehand.
Core modules and separate modules which you can enrol in separately	Needs – based (satisfying a need/desire). Fixing a problem (e.g. how to solve …) (e.g. just want to learning about sowing pasture)
Advanced, refresher or intensive courses e.g. grazing systems could be online or field	Needs of learning or specific issues
Practical/hands on learning days e.g. assess pasture quality or forage budgeting	Most clients are practical learners and need to see in field to understand and apply at home
Use own data instead of Jim and Sandy examples	More relevant; up–to–date info
Reference material as app’s (e.g. Plants Southern Inland Queensland, Land type sheet) – electronic/online	Easy access and referral
Use tablets to fill out feedback forms and email direct back to FutureBeef Central	Minimise paper handling. Ensure feedback goes to a central location.
Use our real research data as our property info to share and help explain principles. Participants can use theirs.	Can then ditch Jim and Sandy and incorporate locally relevant information and new R&D where applicable.

6.2.4 *Business EDGE* teleconference notes

Table 4 Things Business EDGE is doing well that other packages can use and the reasons why

Item	Reason
Material really hits the need for management accounting capabilities for family businesses in north. Fills void they don't know exists, shows how business.	It uses real business examples, it is an area overlooked for some time and fills the gap where colleges e.g. Marcus Oldham in other states covers.
Run by consultants who have vested interest in quality of information delivered.	Others helping to achieve better business goals.
Sound business principles applied to agriculture. Other packages operational, *Business EDGE* is at the management level – i.e. sits above the operational level. Other EDGE packages grounded in science and will benefit if they are linked to the bottom line outcomes in *Business EDGE*.	Brings together the concepts in the other edge packages and analyses business bottom line. *Business EDGE* sits above others and the others need to link to the bottom line.
Two day format.	Appealing because shorter but it forces relevance.
Having credible presenters with relevant knowledge.	Builds on personal experience, pathway for professional development of presenters.
Spreadsheets and examples are really helpful to participants.	Value to their business, decision making tool.
Good use of case study material.	Endpoint – pulls all information together to make useful evaluations.
Course content layout – material notes (prose) and power point slides.	Get course content twice – full explanation in the notes (read at home) and can scribble on presentation slides during workshop.
Relevant and timely content presented in a way that people want to hear it.	Participants take on board messages and are called to action.
Missing link – business enterprise approach.	Integrated approach to extension delivery. Fits *Grazing BMP* approach.

FutureBeef draft SOP business management

1. Analyse the business to understand where the issues are in terms of turnover, overheads and gross margin.
   - Terminology is RCS based
   - Question relevance of terms
   - Culture of profit – what drives business
   - Gross margin trap up north – should talk about profit rather than gross margins
2. Identify the primary driver that will most impact on profit and see what can be changed.
   - Cost of production
   - kg beef/AE (Ian McLean benchmarking package)
3. After analysing the business, develop strategies to overcome weaknesses specific to your business before it is too late.
4. Understand the implications of attempting to lift stocking rate above the carrying capacity.
5. Focus firstly on what can be done to sustainably lift carrying capacity.
6. In the extensive breeder regions, renewed focus on heifer management, breeder performance and bull selection based on objective measurement.
7. Continue to develop skills and capacity of business managers.
8. Ensure bull selection is appropriate and accounts for the pressure likely to be incurred within a given breeding system.

Measurement of profitability

- Enterprise type/system, culture of measurement, culture of talking about profit, philosophical priorities, need to improve capability of managers so they know their business
- Need to understand what drives profitability
- Recording and using accurate objective data – culture of measurement
- Ability to use data – learning and training and communication, accessing information and strategies etc.
- Use of decision making, use of action learning process cycle – develop this culture, continuous improvement

Create links between packages – tools/terminology

Monitoring and evaluation

- Does the pre/post survey provide useful information?
- Measures whether participants have understood concepts and increased skills and confidence in business
- Refer to MLA executive summary from Krista Cavallaro
- Post course evaluation – Bennett's hierarchy, 3–6 months post course practice change, what is the evidence?
- Should we develop this as part of the review? Felicity McIntosh to follow up

6.2.5 Monitoring and evaluation teleconference notes

Table 5 Things being done well in M&E that EDGE packages can use and the reasons why

Item	Reason
Projects with a funding allocation for M&E as part of the project.	Access to existing M&E tools e.g. QualDATA, online project management tools e.g. Teamwork, new tools e.g. FutureBeef client database and FutureBeef wikispaces for project reporting.
Turning point clickers.	Give immediate and fun feedback, quantitative data collection.
Producers put up post its – stop, start and continue doing as a result of the information in the workshop.	Post workshop idea about what they were doing not so well and doing well and what they are going to continue to do.
Having a focus on progress toward practice change and actual practice change.	Focuses team on achieving change and activities needed to achieve that change.
Well recognised brand.	EDGE reputation is important and valued by producers.
End of day and end of workshop appraisal.	Improves the workshop on a practical (housekeeping) and technical level and contribute to professional development (constructive peer feedback).
Dedicated officer with passion to drive and coordinate project M&E	Projects with multi regional approach requires high level overall view of what is happening across all levels.
Focus on outcomes and the use of a visual map for that.	Provides high level direction and shows how activities contribute to long term outcomes. Technology – DoView (organisational chart rather than geographical map) – see www.doview.com.
Producers develop business plan that incorporate one or two technologies learnt in the workshop and attend follow up workshop to present to peers and presenters. Second follow	Committed to change, self–evaluate change, change was tailored to own situation, held them accountable to themselves and the group. Provided opportunities to collaborate and share

Item	Reason
up to find out how they went.	experiences after workshop and save money.
Collection of participant responses in the form of surveys (QualDATA).	Provide evidence and meaningful data, proof of impact for funding bodies.
Ground truthing from an external reviewer – critical points along timeline for external review depending on funding.	Gives an independent review that triangulates with internal review – good check.
Gives producers a goal to work toward, a sense of achievement.	Valuable because it is written down and it is then concrete and accountable.
Pre– and post–workshop questionnaire, skills audits.	Positive feedback for participants and well useful information for presenters.

Marketing ideas

- Branding (MLA and EDGE – business), heard about it through an MLA channel
- Email past Beef Up forum participants
- Word of mouth or referrals – past participants to forward out
- Bulk email not working for registrations (i.e. people on seats), still a good way to promote a brand/product/awareness – saturation!
- Print media (Queensland Country Life not Beef Central – more corporates rather than individual producers)
- Personal approach, need a proactive advocate, word of mouth
- Imparja (TV) advertisements

Discussion summary

- Do you think that Beef Central is unknown among producers just in Central Queensland – as they do have a huge readership?
- Regional Beef Research Committee chairs unaware of FutureBeef website – not representative of all producers though – opportunity for promotion.
- Krista aware of a challenge in terms of staff promotion of FutureBeef website.
- Use of video testimonials – benefits and outcomes of course, use past participants.
- Producer testimonials, champions of workshops, use them as testimonials in the local area. Timing is important – use them when they have enthusiasm and energy (recent experiences).
- EDGE package standing banner – front offices.
- Branding – will packages remain as EDGE or become FutureBeef as a result of the review?
- Getting presenters to promote packages e.g. Pfizer.
- Moving promotions – attract attention (e.g. Beef Central website, Mort & Co. ads etc).
- Crucial to use the new technologies but don't forget to use the phone and personal contact, print, TV etc.
- Online marketing, video testimonials, personal networks, word of mouth, by email
- *North Queensland Register*, *Northern muster* insert print edition, doubles our circulation – marketing messages to complement what we have online, cross promotion advantages.
- Embrace social media and the technology 'tsunami'.
- Persuasion skills – wider range of channels when pushing a key message – using emotive channels, political (group of people working toward something) not just rational.
- Promotion of workshops using the enquiries received e.g. nutrition enquiries.
- MLA report evaluation knowing what we know how does that influence future marketing?

6.3 EDGE coordinators and deliverers in northern Australia

Role	Name	Organisation	Location	Packages accredited to deliver
WA coordinator	Manus Stockdale	DAFWA	Perth	
NT coordinator	Trudi Oxley	NTDPIF	Katherine	NTLC
Qld coordinator	Jenny Milson	DAF	Longreach	
Deliverer	Col Paton	EcoRich Grazing	Goombungee	GLM, Stocktake
Deliverer	Désirée Jackson	Désirée Jackson Livestock Management	Longreach	BE, NE
Deliverer	Jill Alexander	Applied Ag	Dalby	GLM, NE, Stocktake
Deliverer	Kay Taylor		Miles	BE, NE, TMO
Deliverer	Peter Smith			NE
Deliverer	Russell Tyler	Tyler Rural Consulting	Gayndah	NE
Deliverer	John Bertram	John David Bertram	Gatton	BE
Deliverer	Felicity Hamlyn–Hill	Beef Enterprise Advisory Services	Nebo	BE, NE
Deliverer	Ian McLean	Bush Agribusiness	Toowoomba	Business EDGE
Deliverer	Phil Holmes	Holmes & Co	Gordon	Business EDGE
Deliverer	David Counsell	Bush Agribusiness	Toowoomba	Business EDGE
Deliverer	Steve Petty	Northern Development Co	Kununurra	Business EDGE
Deliverer	Graeme Busby	UQ Gatton Vocational Education Centre	Gatton	Business EDGE
Deliverer	Steve Banney	Steve Banney Agribusiness	Tuchekoi	Business EDGE
Deliverer	Jenny Milson	DAF	Longreach	GLM, NE, Stocktake
Deliverer	Roger Sneath	DAF	Toowoomba	NE, TMO
Deliverer	Megan Willis	DAF	Charters Towers	GLM, Stocktake
Deliverer	Bernie English	DAF	Mareeba	GLM, NE
Deliverer	Rebecca Gunther	DAF	Cloncurry	GLM
Deliverer	Brigid Nelson	DAF	Charters Towers	GLM
Deliverer	Damien O'Sullivan	DAF	Kingaroy	GLM, Stocktake
Deliverer	David Phelps	DAF	Longreach	GLM
Deliverer	Joe Rolfe	DAF	Mareeba	GLM
Deliverer	Bob Shepherd	DAF	Charters Towers	GLM
Deliverer	Jane Pryor	DAF	Rockhampton	GLM, Stocktake

6.4 Key messages for FutureBeef Program priority areas

6.4.1 Breeding

1. Develop specific, measurable breeding objectives with milestone dates focussing on marketing requirements and improving herd performance.

2. Select for traits that are reasonably heritable, can be measured, and are economically important for the herd and where there is a reasonable variation in the herd so that rapid improvement can be made.

3. Put more effort into selecting bulls than breeders for more rapid improvement in herd performance.

4. Select the breeder herd that is best suited to the environment and target market.

5. Use targeted crossbreeding (heterosis) plus genetic selection to accelerate improvements in herd performance.

6. Use BREEDPLAN to genetically assess bulls for traits that are being selected for.

7. Use young bulls that have passed a BBSE (bull breeding soundness examination), including sperm morphology test.

8. Select females on reproductive efficiency, docility and environmental adaptation.

9. Cull breeders for reproductive failure and poor performance in other key traits (e.g. milk production, udder conformation, and environmental adaptation).

10. Manage breeders to ensure their condition score in 3.0 (on a scale of 1.5) or higher so that breeders resume cycling soon after calving to maintain a 365–day calving cycle. Body condition at mating has the greatest effect on female fertility.

11. If the wet season fails, wean calves down to 100 kg or down to 60 kg if breeder survival is at risk and condition score is deteriorating rapidly.

12. Manage heifers from weaning to joining to maximise the proportion that reach a critical mating weight (CMW) at joining by:

- minimising weight loss in weaner heifers during the post–weaning dry season;
- allocating heifers to best paddocks; and
- supplementing heifers as required to gain 100 g/day from weaning to mating.

13. Select docile heifers at weaning or early in life.

14. Mate more heifers than are needed for replacements in the breeding herd to allow culling for non–performance whilst maintaining breeder herd numbers.

15. Select heifers that conceive early in the mating period as they will be the more reliable breeders and most likely to produce a calf each year.

16. Manage heifers separately from breeders to achieve maximum re–conception through better use of paddocks, targeted supplementation such as spike feeding prior to calving, and weaning early if required.

17. Use conservative stocking rates in breeder paddocks to ensure adequate pasture at all times and identify and address any nutritional deficiencies prior to the onset of weight loss.

6.4.2 Grazing land management

1. Manage stocking rate around long term carrying capacity (LTCC).

2. Recognise stocking rate as the primary driver of land condition and animal performance.
   - Be flexible. Adjust stocking rate based on seasonal forage supply and changing conditions.
   - *Consistently* stocking beyond the capacity of your land drives down land condition and animal performance.
   - *Consistently* understocking compromises productivity per hectare.

3. Implement wet season spelling to encourage good land condition.
   - Spell country in the first six to eight weeks of the growing season to maintain land condition and maximise seed production.
   - Implement a full wet season spell to improve land in fair to poor condition.
   - Implement wet season spelling in two or more consecutive growing seasons to recover land in poor condition.

4. Change from *continuous* low stocking rate system to a *wet season spelling* system to improve land condition and achieve higher weight gains/ha by running slightly more stock.
   - Recognise that continuous low stocking rates at half (or less) the recommended safe long term utilisation rate, may gradually improve land condition but generally compromises weight gains/ha.

5. Use available pasture growth information specific for location, land type, land condition and tree density and considering infrastructure (particularly water placement and paddock layout) to:
   - Benchmark your property's carrying capacity
   - Strategically approach wet season spelling
   - Estimate land condition recovery time span.

This is a dynamic document.

Other considerations include:
- Best management principles are required to prepare for variable climate and potential climate change.
- LTCC is a benchmark not a ceiling. Stocking rate needs to be calculated to suit the season.
- To maintain land condition, destock quickly and restock gradually (be sensitive to early destocking and slow to re-stock).
- If land condition is going backwards implementing wet season spelling is the best management option.
- The more degraded the land condition, the more input is required and the higher the cost of recovery. For example, once land reaches D condition high cost mechanical or chemical intervention is necessary.
- It is likely that the longer country sits in a low condition the more difficult it is to recover (e.g. seed bank for 3Ps may deteriorate, organic matter/cover is reduced and hard-seeded weeds are favoured).

6.4.3 Nutrition

6.4.3.1 Pasture management

1. Manage stocking rates strategically to ensure that there is sufficient pasture at all times to meet pasture intake requirements.

2. Use grazing management strategies that preserve and promote good land condition, 3P pastures and legumes. Land in A condition is twice as productive as land in C condition.

3. Understand and monitor nutrient supply and animal performance potential of paddocks and pastures throughout the year.

6.4.3.2 Herd management

1. Understand and monitor nutrient requirements of different classes of stock throughout the year.

2. Identify the primary limiting nutrient(s) throughout the year for different classes of stock in each paddock and consider the cost–benefit of providing supplements.

3. Avoid long feeding programs because they are very expensive, and are stressful on people, stock, pastures, soils, infrastructure, finances and potential future productivity.

4. Manage breeders to ensure their condition score is 3 or higher at calving so that breeders resume cycling soon after calving to maintain a 365-day calving cycle.

5. Use seasonal mating, where possible, to match available highest quality diet with breeder peaks in nutritional requirements.

6. Wean calves early to preserve breeder body condition because dry season tropical pastures in northern Australia do not meet the nutrient requirements of lactating cows.

7. Weaning significantly reducing a breeder's nutrient requirements which is the equivalent of having to feed a wet cow 2 kg of grain or 3 kg of fortified molasses each day to meet its energy requirement.

8. If the wet season fails wean all calves down to 100 kg, and 60 kg if breeder condition score is likely to be compromised.

9. Educate young animals at weaning for ease of handling throughout their lives.

10. Feed good quality hay to weaners at all times whilst in yards.

11. To achieve weight gain in calves under 150 kg, feed supplements that are high in protein and energy.

12. For heifer calves retained as breeders feed as required, to gain a minimum of 100 g/day from weaning to mating.

13. Destock weaner paddocks of all stock (including horses) from the beginning of the growing season until weaning commences.

14. Develop and implement a strategic plan to manage your production system in relation to production targets.

6.4.3.3 Phosphorus management

1. Determine the phosphorus status of cattle in all paddocks on the property.

2. Feed phosphorus in the wet season to all stock where soil phosphorus levels are deficient (<5 mg/kg).

3. Test breeders for phosphorus status where soil phosphorus levels are marginal (6–8 mg/kg).

4. Choose appropriate phosphorus diagnostic test for different classes of cattle.

5. Have results of blood and dung analyses interpreted by an NIRS specialist.

6. Use the ratio of faecal phosphorus to dry matter digestibility, which provides an indication of the balance between phosphorus and energy, as a guide to indicate the likely response to phosphorus supplementation in addition to measuring animal phosphorus status.

7. Supplement phosphorus-deficient animals with phosphorus when phosphorus is most limiting in the diet and dietary crude protein and energy levels are high enough for production.

8. Supplement cattle grazing stylo-based pastures with phosphorus in the early dry season.

6.4.4 Weaner management

1. Calves are taken from their mothers mainly for the benefit of the cow.

2. Stopping the need to produce milk reduces the cow's nutrient requirement and allows her to regain condition.

3. Stopping the need to produce milk is equivalent to feeding the cow with 2 kg of grain or 3 kg of fortified molasses each day.

4. Lighter stocking in breeder paddocks maximises the opportunity for the cows to maintain good body condition.

5. The cow needs to have a body condition score of 3 or higher at calving to maximise the chance of getting pregnant again while rearing her calf.

6. A cow must get pregnant within 75 days of calving to produce a calf every year.

7. With seasonal mating, calves are normally weaned at four to eight months of age in late autumn.

8. With year–round mating, calves are at a wide range of ages at the first muster in late autumn; weaning of all calves over 100 kg allows the cows to recover body condition and survive the dry season.

9. If the wet season fails, all calves can be weaned younger under both seasonal and continuous mating systems.

10. Hay is the main feed for weaners in the yard. Good quality hay must always be available from the first day of weaning.

11. Calves weaned under 150 kg should be fed to gain weight, and need supplements of highly digestible protein and energy.

12. Heifer calves retained as breeders should be fed to gain 100 g/day from weaning to mating.

13. Weaning is the time for educating young animals to set them up for ease of handling throughout their lives.

14. Weaner education includes being worked calmly through the yards and being tailed out from the yards to the weaner paddock and back.

15. Weaner paddocks should be rested over the year to accumulate a body of good herbage; they should not be used as a holding paddock for sale or sick stock, or for the working horses.

6.4.4.1 Benefits of early weaning

The likely benefits of good weaning and weaner management on the breeder herd include:
- better overall breeder condition
- higher conception rates
- fewer mortalities
- lower cost of supplements for breeders
- more females for sale
- more concentrated calving in continuously–mated herds
- more maiden heifers heavy enough to mate

6.4.4.2 Extra costs

Extra costs of early weaning will include:
- more expensive supplementary feed
- more labour for tending small weaners
- increased infrastructure for yarding and feeding weaners

6.4.5 Whole of business management

1. Analyse the business to understand where the issues are in terms of turnover, overheads and gross margin. Identify the primary driver that will most impact on profit and see what can be changed.

2. After analysing the business, develop strategies to overcome weaknesses specific to your business before it is too late.

3. Understand the implications of attempting to lift stocking rate above the carrying capacity.

4. Focus firstly on what can be done to sustainably lift carrying capacity.

5. In the extensive breeder regions, renewed focus on heifer management, breeder performance and bull selection based on objective measurement.

6. Continue develop skills and capacity of business managers.

7. Ensure bull selection is appropriate and accounts for the pressure likely to be incurred within a given breeding system.

6.5 Specialist modules

6.5.1 *Breeding EDGE* specialist module frameworks

6.5.1.1 Using Group BREEDPLAN technology and tools for herd improvement

1. Understanding Group BREEDPLAN traits
2. Growth traits
3. Fertility traits
4. Carcase traits
5. Selecting traits based on herd improvement priorities
6. EBV selection
7. Selection indexes

Tropical Beef Breeding Services deliver this workshop, for more information visit www.tbts.une.edu.au.

6.5.1.2 Advanced genetic technologies for herd improvement

6.5.1.3 Advanced bull selection

This workshop is delivered by John Bertram, for more information contact 0429 932 170 or email commpark8@skymesh.com.au.

6.5.1.4 Heifer management

1. Weaning to mating
2. Mating management
3. Weaning

6.5.1.5 Nutritional management of the breeding herd

1. Managing breeder body condition score
2. Weaning
3. Mating management
4. Nutrition

6.5.1.6 Breeder herd management

1. Control mating
2. Breeder segregation and management
3. Breeding management calendar

6.5.1.7 Managing the health of the breeding herd

1. Reproductive diseases
2. Managing bulls
3. Managing breeders and replacement females

6.5.2 *Grazing land management EDGE* specialist module frameworks

6.5.2.1 Tree–grass balance

1. Overview
2. Animal production module
3. Learning outcomes
4. Tree–grass interactions
    a. Microclimatic effects
    b. Nutrient cycling
    c. Pasture growth and quality
5. Managing options for enhancing productivity and biodiversity
6. Impact of woody vegetation on biodiversity
7. Managing regrowth

6.5.2.2 Fire

1. Overview (brief paragraph)
2. Learning outcomes
3. Animal production model
4. Learning from history (expand on Gammage book and Lewis book)
5. Roles of fire
    a. Roles of fire in pasture management
        i. Improving vigour
        ii. Changing species composition
        iii. Removing rank feed
        iv. Evenness of grazing
        v. Improving diet quality
    b. Role of fire in tree management
        i. Managing woody weeds
        ii. Reducing woodland thickening and regrowth
6. How the grazing land ecosystem responds to fire
    a. Tree re–sprouters
    b. Trees growing from seed
    c. Pasture responses to fire
        i. Grass structure, e.g. crown and relation to fire
        ii. Seed burial to avoid fire
        iii. Smoke induced germination (breaking dormancy)
7. Fire and biodiversity in Australian landscapes
    a. Fire dependant and fire sensitive ecosystems
    b. Managing for both ecosystems
    c. A range of ‘times since burning’, i.e. mosaic burning
8. Managing the risk factors
    a. Increased erosion
    b. Loss of nutrients to the atmosphere
    c. Loss of land condition
    d. Loss of soil organic matter
    e. Loss of habitat for wildlife

9. Mechanics of fire—fire intensities and their effects
10. Getting the right fire regime (managing grazing to achieve the intensity that you need)
11. Planning for fire
12. Summary of managing for fire

6.5.2.3 Sown pastures 1: productivity decline of sown pastures

1. Symptoms
2. Cost to industry
3. What causes sown pasture rundown?
4. What can I do about it?
5. Legume options

As per Stuart Buck et al. *Sown pasture rundown* workshop. Also sown pasture rundown pages on FutureBeef website (www.futurebeef.com.au/topics/pastures-and-forage-crops/sown-pasture-rundown) and webinar (https://youtu.be/roZNFti4dBQ).

6.5.2.4 Sown pastures 2: establishing legumes

1. Planning and preparation
2. Legume selection
3. Planting
4. Grazing management in the establishment year
5. Developing an action plan

6.5.2.5 Weeds

1. Overview
2. Learning outcomes
3. Animal production model
4. Indoor component
    a. Beef up existing content
    b. Specific weed control strategies
5. Paddock session looking at examples of control methods
6. Comparative cost of control methods
7. Examples of weeds with relevant information, e.g. African lovegrass, GRT – relevant for region

6.5.2.6 Grazing systems

1. Overview (brief paragraph)
2. Learning outcomes
3. Animal production model
4. Three principles of any grazing system
    a. Stock to long term carrying capacity
    b. Rest pastures from grazing during the growing season
        i. Every 3–5 years if land is in good condition
        ii. As many growing seasons as possible for land that is in poor condition

    c. Even out grazing as best as possible by:
        i. Spelling
        ii. Fire
        iii. Watering points
        iv. Fencing to land type
        v. Positioning supplements
5. Exercise tick the box
6. The spectrum of grazing systems (continuum)
    a. The main principles each uses to improving land condition
7. Planning a grazing strategy
8. Summary of grazing systems

6.5.2.7 Land reclamation

1. Overview (brief paragraph)
2. Learning outcomes
3. Animal production model
4. Recognising land degradation
    a. Types
    b. Symptoms
    c. Causes
5. Activity demonstrating soil dispersibility
6. Treatment for areas of land degradation
    a. Addressing the cause
    b. Considering options
7. Reclamation options for land degradation scenarios
    a. Claypan
    b. Scalded sloping land
    c. Single gully
    d. Network of gullies
    e. Eroded access track
    f. Stream bank erosion
8. Seeding for land reclamation
9. Management after reclamation activities
10. Results of reclamation
    a. Production benefits
    b. Environmental benefits
11. Economic considerations to determine priorities for action
12. Activity to address degradation issues
13. Summary of land reclamation

6.5.2.8 Plants in grazing lands

1. identification
2. physiology
3. perennial species
4. distribution
5. grazing value

6. ecosystem value (trees especially)
7. toxic plants

6.5.2.9 Tools for landscape assessment using remote sensing, climate data and modelling

To be developed in consultation with DSITI

6.5.2.10 Biodiversity

Existing workshop run by Alan Lauder

6.5.2.11 Biodiversity

Existing workshop for some regions – MLA

6.5.2.12 Wetlands

Existing workshop for some regions – MLA

6.5.3 *Nutrition EDGE* specialist module frameworks

6.5.3.1 Diet quality analysis for herd management

1. How the technology works
2. Collecting samples
3. Diet quality analysis – setting a program and how to use the information
4. Some examples
5. Work on your own results to match targets
6. Part of the planning process – combine with other measurements

6.5.3.2 Preparing for natural disasters

1. How to calculate, what financial analysis to use, to determine ideal feeding periods and when to pull out
2. Extra emphasis from drought perspective (forage budgets)
    a. Adjust numbers, soil temperature, economics, impact on pasture recovery
    b. Wambiana data (drought)
3. Flood
4. Bush fire

6.5.3.3 Growing and finishing systems

1. Crop (forage sorghum, leucaena, etc); grain–assisted – paddock; feedlot – home, commercial
2. Strategies to improve productivity – applied research, e.g. Stu McLennan's work on strategic nutritional management, i.e. growth pathways and feeding regimes
3. More trial examples of responses and economics, e.g. to supplement or not to supplement
4. Enhancing productivity
    a. Using HGPs – this can be combined with rumen modifiers and other feed additives
    b. How different rumen modifiers and other feed additives work
5. Myth buster on fodder sheds, zeolite/bentonite, liquid minerals, etc.

6.5.3.4 Weaner management

6.5.3.5 Heifer and first–calf cow management

6.5.3.6 Managing phosphorus deficiency

6.6 Business plan

6.6.1 Purpose

The purpose of this business plan is to provide a management tool and operational guide for MLA to more effectively and efficiently deliver EDGE*network*®, specifically the *Breeding EDGE*, *Grazing fundamentals*, *Grazing land management EDGE* and *Nutrition EDGE* packages, in northern Australia.

6.6.2 Summary

The EDGE*network* (EDGE) offers practical learning opportunities to help northern Australia beef cattle and sheep producers gain knowledge and develop skills necessary to improve their livestock enterprises. This educational and informative format encourages producers to expand their current expertise and learn new skills, be motivated by other producers and access the latest information. Producers gain the best of group and individual learning by working in small groups that enable them to receive personalised service.

6.6.3 Mission statement

EDGE offers practical learning opportunities to help northern Australia beef cattle and sheep producers gain knowledge and develop skills necessary to improve their livestock enterprises.

This educational and informative format encourages producers to expand their current expertise and learn new skills, be motivated by other producers and access the latest information. Producers gain the best of group and individual learning by working in small groups that enable them to receive personalised service.

6.6.4 Objectives

The overall aim of EDGE is to effectively support beef cattle and sheep producers, their service providers and advisors to develop the knowledge and skills necessary to improve their livestock enterprises, and be motivated and adopt appropriate best management practices within the areas of business, breeding, grazing land management and nutrition at a greater rate, across a greater geographical area and with better application then they would have otherwise.

Through the coordinated, flexible delivery of the *Breeding EDGE*, *Business EDGE*, *Grazing fundamentals*, *Grazing land management EDGE* and *Nutrition EDGE* packages to beef and sheep producers across northern Australia (i.e. Queensland, Northern Territory, and the Kimberley and Pilbara regions of Western Australia).

6.6.5 Customers

The key customers of EDGE are non–corporate (or family owned) and corporate beef cattle and sheep businesses in northern Australia.

Other EDGE customers include:

- Small area landholders
- Natural resource management organisation staff
- Agribusiness consultants
- Agricultural college students and staff
- Agricultural school students and staff
- Livestock feed companies
- Livestock health companies

6.6.6 Key result areas

1. The number and location of EDGE packages (workshops) delivered
2. The number of workshop participants
3. The number, size (herd size and land area), type and location of participant businesses
4. Changes in participants' awareness, knowledge and skills
5. Indicative practice change and potential benefits that could result from this change
6. Unintended or unexpected benefits or consequences

6.6.7 Value proposition

EDGE*network* packages are comprehensive, tailored packages for northern beef cattle and sheep production systems delivered by skilled, experienced facilitators that will have a positive impact on participants' businesses bottom line.

6.6.8 Target markets

6.6.8.1 Market research

Significant market research was conducted by MLA before the development of the EDGE packages (Section 1). These packages have been successfully delivered to many producers and other stakeholders in the beef industry across northern Australia.

The demographics of the target market have changed slightly with many younger generations interested in EDGE training. The learning styles, time constraints and use of e–technology are paramount to the successful delivery across a significant proportion of this new target market.

6.6.8.2 Market targets

The EDGE packages have been delivered for over a decade to producers and other stakeholders across Australia. Some producers are looking to revisit the packages.

By far, the largest potential market sits with the Generation X and Y groups. Where once face–to–face was essential for the delivery of all formalized workshop concepts, this is no longer a requirement with younger generations.

Greater time and learning efficiencies can be achieved with some groups through the use of e–technology, pre–workshop business plan preparation and segmentation of workshop modules to allow for gradual implementation of concepts into the business.

More emphasis on post–workshop action planning to facilitate and enhance adoption will ensure greater customer satisfaction and improved on–property profitability and sustainability.

6.6.8.3 Environmental and industry analysis

Drought and other natural disasters have always had the effect of reducing cash flow and producers' ability to budget for workshops at a time when this information would be extremely vital to the operations of the property.

Segmenting the workshops into independent modules enables producers to select those modules which are most relevant to their own unique business requirements and priorities, and is a more affordable option than paying for a three day workshop in one lump sum. In addition, delivery of these packages using e–technology enables producers to continue with the day–to–day operations of the property at a time when there are significant increased time demands for the husbandry of stock.

6.6.8.4 Non–corporate beef cattle and sheep businesses in northern Australia

Table 6: Beef cattle properties in northern Australia

Region	State	Population (number of properties)	Average herd size (AE)	Average hectares management
Southern Coastal	Qld	1,422	1,132	4,445
Northern Coastal	Qld	295	1,741	10,702
Eastern Downs	Qld	416	716	3,717
Southern Inland & Central	Qld	1,954	1,535	8,531
Cape & Carpentaria	Qld	67	6,183	121,159
West & South–West	Qld	175	4,460	105,911
Central North	Qld	514	3,863	38,591
Central West	Qld	462	2,188	21,852
Qld subtotal		*5,305*		
Alice Springs	NT	49	6,062	376,307
Barkly Tablelands	NT	13	12,682	417,691
VRD & Katherine	NT	44	10,331	161,829
Darwin & Top–End	NT	25	4,482	67,866
NT subtotal		*131*		
Kimberley	WA	30	9,108	236,167
Pilbara	WA	25	8,214	239,842
WA subtotal		*55*		
Total		**5,493**		

Source: The northern beef report: 2013 situation analysis

6.6.8.5 Corporate beef cattle and sheep businesses

Corporate beef cattle and sheep businesses include:

- Australian Agricultural Company (AACo)
- Consolidated Pastoral Company (CPC)
- Jumbuck Pastoral Company
- Keats Family Pastoral
- S. Kidman & Co Ltd (S.K.)
- McDonald Holdings (MDH)
- North Australian Pastoral Company (NAPCo)
- Paraway Pastoral Company
- Russell Pastoral Company
- Stanbroke

6.6.8.6 Other EDGE customers

Customer	Location	Number(s)
West Australian Colleges of Agriculture		
Northern Territory Rural College		
Agricultural campus of Charles Darwin University		
Mataranka Station	Katherine	
Queensland Agricultural Training Colleges (QATC)		
Emerald Agricultural College (EAC)	Emerald	During 2013–14 EAC trained 280 unique* students and delivered 1892 competencies in full–time, short courses and traineeships. 54 fulltime students enrolled 2014. 35 fulltime students graduated November 2013.
Longreach Pastoral College (LPC)	Longreach	During 2013–14 LPC trained 306 unique students and delivered 1412 competencies in full–time, short courses and traineeships Approximately 32 fulltime students enrolled 2014. 26 fulltime students graduated November 2013.
Rural Training Queensland (RTQ)		During 2013–14 RTQ trained 2254 unique students and delivered 8941 units of competency.
QATC production facilities (training farms)		Emerald Berrigurra Narayen Longreach Rosebank
University of Queensland		
Other tertiary agricultural students		
Feed company sales representatives and nutritionists		
Consultants		

Sources: College websites and the *Australian Agricultural College Corporation 2013–2014 annual report* (www.qatc.edu.au/about_us/Documents/AACC_Annual_Report_2013–14.pdf).

* Unique student numbers are based on students that have undertaken a minimum of one unit of training and reflect both residential students and non–residential students.

6.6.9 Operations

6.6.9.1 Management and ownership

EDGE is owned and copyright held by MLA and the Department of Environment and Primary Industries, Victoria (DEPI).

Meat & Livestock Australia contracts public and private sector providers to provide the workshop delivery services on the basis of it having met MLA's requirements for method and standard of delivery. It also has EDGE delivery coordination contracts with each of the three partner state agencies to coordinate the marketing, delivery and administration of EDGE workshops. The EDGE coordinators are responsible for ensuring that agency staff adhere to the contractual requirements, including how promotions, workshop delivery, and monitoring and evaluation are conducted. Meat & Livestock Australia manages the contracts for private providers directly. At times, depending on capacity, agency staff can also subcontract partner or private deliverers, where this is part of a contracted project. Private providers can also organise and conduct EDGE training, separate to the public sector delivery.

The current EDGE contacts and support for northern Australia are:

- National EDGE coordinator: Charlotte Fox, R&D Extension Manager – Beef, MLA
- Western Australia EDGE coordinator: Manus Stockdale, Development Officer / Project Manager, DAFWA
- Northern Territory EDGE coordinator: Trudi Oxley, Beef Industry Development Officer, NTDPIF
- Queensland EDGE coordinator: Jenny Milson, Rangelands Scientist, DAF

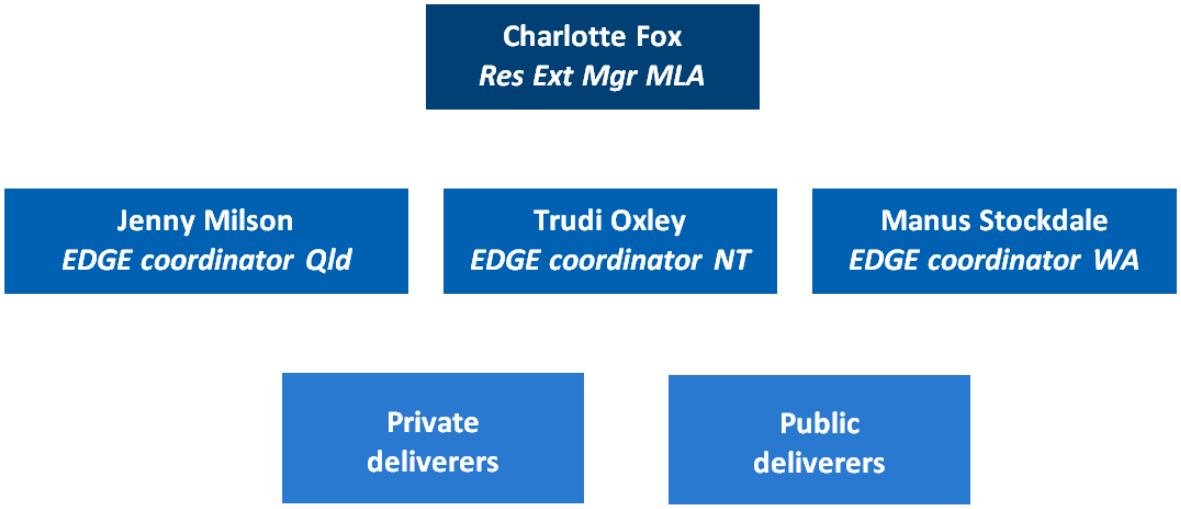


Figure 4 EDGE management

6.6.9.2 Pricing

The degree of participant contribution at EDGE events should be commensurate with the degree of private or public good that may be derived from the activity, i.e. the greater the private good (Category B and C events); the greater the private contribution. It is preferred that participants pay a minimum of $300 for EDGE, irrespective of how much funding is available.

EDGE workshops are advertised at full price with any subsidies noted separately.

The EDGE workshop pricing structure is:

First person from a business	$1760
Each person when ***two*** attend from the same business	$1485
Each person when ***three*** attend from the same business	$1210
Fourth person from the business	$1760 (and the cycle starts again as above)

There is a 'refresher' price of $880 per person. This is relevant for people who wish to repeat a course (and bring their previous workshop notes and materials) within five years of having done the workshop originally.

6.6.9.3 Performance

EDGE currently sits under for MLA's Strategic imperative 3—Increasing productivity across the supply chain and Objective 3.5—Increase producer engagement with MLA information and tools to build capacity.

The **strategic initiatives** of this strategic imperative are:

3.5.1 Inform: Keep producers informed about the activities and opportunities created by their levy investment in research and marketing

3.5.2 Influence: Engage producers with MLA information, tools and learning opportunities to influence improved practices

3.5.3 Involve: Facilitate the involvement of innovative producers and delivery partners to enhance producer engagement with MLA programs and activities

The **key performance indicators (KPIs)** for these strategic initiatives are:

3.5.1 At least 50% of producers engage with MLA through communication tools and programs and producer satisfaction with MLA communications increases from 3.4 to 3.8 out of 5.

3.5.2 At least 50% of those producers actively engaged in MLA extension programs improve their knowledge, skills and/or capacity to improve practice as a result of their engagement.

3.5.3 Year one: Conduct and review at least two pilots of alternative collaborative public–private delivery partnerships in each state enabling effective industry engagement and, considering results, set appropriate KPIs for the final two years of the plan.

The EDGE program is designed to positively contribute to strategic initiative 3.5.2 and to a lesser degree 3.5.1.

Therefore, consistent with these KPIs EDGE must measure, with specific consistent metrics against MLA's current targets of at least 50% of northern Australia beef cattle and sheep producers actively engaged in MLA extension programs improve their knowledge, skills and/or capacity to improve practice as a result and producer satisfaction with MLA communications, including EDGE workshops, increases from 3.4 to 3.8 out of 5.

6.6.9.4 Monitoring, evaluation and reporting

The purpose of EDGE monitoring, evaluation and reporting (MER) is to:

1. Develop future EDGE activities more effectively
2. Identify where adjustments and improvements can be made to the EDGE program and individual packages
3. Determine how, and to what extent, EDGE objectives are being met and what cost (or with what inputs)
4. Report on project performance against investment to EDGE program funders and key stakeholders.

The full EDGE MER strategy is provided in Appendix 6.9.

6.6.9.5 Delivery

National coordination

This is undertaken by the MLA EDGE national manager and project officer. It is important the national manager maintain internal, as well as external, networks and regular communications to:

1. Ensure clients receive seamless, consistent service provision, e.g. if they attend and EDGE workshop they will also be directed to other applicable MLA, FutureBeef partner or complementary non–EDGE services or products and vice versa.
2. Optimise marketing and promotional leverage between complementary MLA, FutureBeef partner and private provider programs, e.g. using vehicles such as the *Feedback* magazine, FutureBeef eBulletin or private deliverer newsletters.

The MLA EDGE program

The MLA EDGE program will provide the following functions:

- Develop strategy for the future direction of the EDGE program
- Liaise with the joint owner (Department of Environment and Primary Industries, Victoria) and ensure compliance with the terms of the agreement
- Develop and implement a national marketing strategy to help achieve targeted participation in EDGE
- Manage the production, storage, inventories and distribution of workshop and associated marketing (promotional) materials
- Manage the contracting and associated invoicing of EDGE coordinators and private deliverers for workshop notes, etc
- Maintain participant and monitoring, evaluation and reporting database(s)
- Coordinate the technical writing and technical review of EDGE workshops and related resources
- Coordinate the mapping of workshop content to the Australian Skills Quality Authority competencies
- Coordinate the editing and digital design of workshop materials
- Coordinate the piloting of new, or significantly reviewed and updated, workshops
- Coordinate train-the-trainer workshops

The MLA EDGE national manager

The key roles of the MLA EDGE national manager are to:

- Manage the strategic development and future development of EDGE
- Develop and implement the EDGE business and operational plan, including: marketing and communication plans, and; the monitoring, evaluation and reporting strategy with input from relevant stakeholders
- Represent MLA and EDGE at relevant events to increase awareness and adoption of EDGE and related programs, e.g. FutureBeef partner and complementary non–EDGE programs
- Develop and maintain relevant professional and industry networks and relationships
- Possess and enhance knowledge of the key drivers of change and apply that knowledge to maximise the impact of EDGE and related programs
- Possess and enhance knowledge of the Australian tertiary and vocational education and training (including extension and e-learning) sectors and apply that knowledge to maximise the impact of EDGE and related programs
- Monitor monthly expenses against the financial forecast and update as required
- Manage and provide input into other MLA capacity building projects and activities as required

The MLA EDGE project officer

The key roles of the MLA EDGE project officer are to:

- Support the EDGE national manager, EDGE coordinators and private deliverers as required
- Manage EDGE logistics and provide input into the content, production and delivery of EDGE workshops
- Manage and provide input into the EDGE business and operational plan, including marketing and communication and the monitoring, evaluation and reporting strategy
- Represent MLA and EDGE at relevant events and liaise with stakeholders (including answering client enquiries) to increase awareness and adoption of EDGE
- Possess and enhance knowledge of the key drivers of change and apply that knowledge to maximise the impact of EDGE
- Possess and enhance knowledge of the Australian tertiary and vocational education and training (including extension and e-learning) sectors and apply that knowledge to maximise the impact of EDGE and related programs
- Assist in the management and direction of EDGE coordinators and private deliverers to ensure quality delivery and continuous improvement
- Maintain and service networks and relationships with relevant stakeholders
- Monitor monthly expenses against the financial forecast and update as required
- Manage and provide input into other MLA capacity building projects and activities as required

State and territory EDGE coordinators

State and territory EDGE coordinators are responsible for:

- Leading and coordinating the state or territory EDGE delivery team
- The communication and marketing of EDGE to producers
- Organising and delivering, including contracting private deliverers, EDGE workshops to producers on a commercial basis, using accredited deliverers
- Ordering workshop materials from MLA

- Ensuring that MLA evaluation forms and pre– and post–skills audit questionnaires are issued to and complete by participants, and provide these to MLA for collating and reporting back
- Providing quarterly and annual reports to MLA on workshop numbers, locations, participant numbers, new R&D, emerging issues, etc
- Attending and contributing to the annual face-to-face EDGE program meeting and biennial program catch-ups as contracted and appropriately funded
- Attend events and field days on behave of EDGE as required and appropriately contracted (including funds) by MLA
- Revise workshop content, develop new material, pilot new products and evaluate products as required and appropriately contracted (including funds) by MLA
- Identify new deliverers (public and private)
- Contribute to the accreditation, training and update of deliverers as required and appropriately contracted (including funds) by MLA
- Seek out and develop alternative delivery options to increase and improve delivery outcomes

Key personnel

Role	Name	Organisation	Location	Packages accredited to deliver
WA coordinator	Manus Stockdale	DAFWA	Perth	
NT coordinator	Trudi Oxley	NTDPIF	Katherine	NLTC
Qld coordinator	Jenny Milson	DAF	Longreach	GLM, NE, Stocktake
Deliverer	Col Paton	EcoRich Grazing	Goombungee	GLM, Stocktake
Deliverer	Désirée Jackson	Désirée Jackson Livestock Management	Longreach	BE, NE
Deliverer	Jill Alexander	Applied Ag	Dalby	GLM, NE, Stocktake
Deliverer	Kay Taylor		Miles	BE, NE, TMO
Deliverer	Peter Smith			NE
Deliverer	Russell Tyler	Tyler Rural Consulting	Gayndah	NE
Deliverer	John Bertram	John David Bertram	Gatton	BE
Deliverer	Felicity Hamlyn–Hill	Beef Enterprise Advisory Services	Nebo	BE, NE
Deliverer	Ian McLean	Bush Agribusiness	Toowoomba	Business EDGE
Deliverer	Phil Holmes	Holmes & Co	Gordon	Business EDGE
Deliverer	David Counsell	Bush Agribusiness	Toowoomba	Business EDGE
Deliverer	Steve Petty	Northern Development Co	Kununurra	Business EDGE
Deliverer	Graeme Busby	UQ Gatton Vocational Education Centre	Gatton	Business EDGE
Deliverer	Steve Banney	Steve Banney Agribusiness	Tuchekoi	Business EDGE
Deliverer	Jenny Milson	DAF	Longreach	GLM, NE, Stocktake
Deliverer	Roger Sneath	DAF	Toowoomba	NE, TMO
Deliverer	Megan Willis	DAF	Charters Towers	GLM, Stocktake
Deliverer	Bernie English	DAF	Mareeba	GLM, NE
Deliverer	Rebecca Gunther	DAF	Cloncurry	GLM

Role	Name	Organisation	Location	Packages accredited to deliver
Deliverer	Brigid Nelson	DAF	Charters Towers	GLM
Deliverer	Damien O'Sullivan	DAF	Kingaroy	GLM, Stocktake
Deliverer	David Phelps	DAF	Longreach	GLM
Deliverer	Joe Rolfe	DAF	Mareeba	GLM
Deliverer	Bob Shepherd	DAF	Charters Towers	GLM
Deliverer	Jane Pryor	DAF	Rockhampton	GLM, Stocktake

Recruitment options

1. Train–the–trainer delivered to experienced beef management advisors/extension officers.
2. Commitment from MLA to provide annual training updates at a cost.
3. Formal qualifications – Cert IV, BSc (Agr) preferable with expertise in beef cattle production, or relevant Diploma and significant industry experience in an advisory role.
4. Potential candidates must show evidence of extensive experience in addition to their formal qualifications to deliver EDGE packages and have attended an EDGE workshop in their area of expertise.
5. Potential candidates who meet 4 above must deliver at least two workshops as a junior presenter with a more experienced presenter and be deemed suitable to deliver as a senior deliverer. Within DAF, junior presenters must be approved as accredited deliverers by the coordinators for *Breeding EDGE*, *Grazing land management EDGE* and *Nutrition EDGE*.
6. Formal training in adult learning, group facilitation and presentation.

Training programs

Three day training on each package, co–delivery with accredited deliverer until competent and confident, technical and delivery (e.g. adult learning, group facilitation, presentation, electronic and apps) training and updates.

1. technical skills and training
2. delivery skills and training
3. update/refresher activities, processes, resources, etc. for existing deliverers (e.g. FutureBeef website and intranet, complementary courses, associations, etc.)

Skill retention strategies

Accredited presenters must remain current in their role as an advisor or scientist in the area of expertise they wish to remain accredited for.

Records will be maintained of EDGE workshops that are delivered and the key deliverers for those EDGE workshops. Only FutureBeef staff that are accredited may deliver as a senior presenter. All other staff may only deliver if approved by the relevant EDGE coordinator and only with a senior presenter to determine their suitability as a senior presenter. They must have excellent skills in technical content, presentation, and delivery, and must have the ability to adapt quickly to the learning requirements of their target audience.

6.6.9.6 Products and services

6.6.9.6.1 Current products and services

Product/service	Description	Price
Breeding EDGE	A three day interactive workshop and practical session that covers all aspects of reproduction and genetics. During the workshop participants develop a breeding strategy for their property. A follow–up day is available to fine tune breeding strategies.	$1620 plus GST ($230 plus GST for the second person from the same business)
Business EDGE	A two day financial and business management training workshop for northern beef producers. It will enhance participant's knowledge and skills of financial and business management essential for improving business efficiency and profitability.	$1200 for first attendee from business, $1100 each for two from business, $1000 each for three or more from business (all prices exclude GST)
Grazing land management EDGE	This workshop gives participants a practical and planned approach to improve the productivity and sustainability of their country. Held over three days the workshop provides information and tools specific to the land types, climate and production systems in the region.	$1620 plus GST ($230 plus GST for the second person from the same business)
Nutrition EDGE	A three day interactive workshop and practical session that covers all aspects of animal nutrition, including how nutrition affects animal growth rates, financial returns and market access. Participants learn what nutrition and supplements are required to improve the health and growth of your stock, and to assess the level of nutrition provided by your pastures.	$1620 plus GST ($230 plus GST for the second person from the same business)

6.6.9.6.2 Complementary non–EDGE packages

Product/service	Description	Price
Grazing BMP	Grazing BMP is a voluntary online self–assessment tool to develop and implement a best management practice program for the grazing industry, enabling: Producers to identify and access training to improve knowledge and skills which will enable adoption of best practice Producers and industry to accurately monitor and report upon improvements in management practice at a range of levels Producers to benchmark their own practices against industry accepted best practice, and design and implement actions to improve. Grazing BMP consists of five modules: soil health; grazing land management; animal production; animal health and welfare, and; people and business.	Free
Northern livestock transporters course	This course deals with topics of industry significance in relation to livestock transport. Drivers are given an overview of the importance of road transport to the northern pastoral industry, including the proud history of road transport in the north. Drivers are also provided an overview of the	$150 plus GST

Product/service	Description	Price
	importance of animal welfare and their responsibilities to the animals they cart. Impacts of transport, animal handling and behaviour and safety are covered by way of presentations, DVD footage, participant discussion and practical exercises throughout most of the day. The final session summarises the information provided during the day into a practical walk–through of best practice in transport and the responsibility of drivers during cattle transport.	
Testing management options	This workshop uses a simple whole–farm process to assess the profitability of different enterprise and management options such as: breeding cattle versus trading; selling feedlots versus producing Japanese ox; buying more land, and; supplementary feeding. As a group participants describe a 'typical', hypothetical property in its 'steady state'. They then compare this with alternative enterprise or management options.	$300 plus GST (the second or third person from the same business pay half price)
Stocktake	This one day practical training workshop steps participants through the concepts of land condition and monitoring. It demonstrates field assessment techniques using a database. *Stocktake* is a monitoring package that ´takes stock´ of participants' grazing resources and identifies points to improve management decisions. Participants will be able to: conduct paddock–scale assessment of land condition and pasture yields; manage and interpret data for business planning; quantify the potential for improvement in productivity, and; complete forage budgets – determine how long feed is going to last with the present number of cattle in the paddock.	$300 plus GST (the second person from the same business is free)

6.6.9.6.3 Delivery process

Meat & Livestock to: contract state and territory EDGE coordinators; accredit deliverers (public and private), and; contract private deliverers.

Meat & Livestock to collate, analyse and report back to EDGE coordinators and private deliverers on M&E data collected.

EDGE workshop coordinator roles: Each workshop coordinator (names and contact details below) is your first port of call should you wish to hold a specific EDGE workshop in your area or if you have enquiries concerning a workshop. The coordinator is there to support you.

It is imperative that all team members understand that MLA has certain protocols that need to be followed when running and following up on EDGE workshops. An understanding of, and respect for, these protocols has contributed strongly to the success of EDGE package delivery in previous years.

To assist with the smooth delivery of workshops and to ensure MLA requirements are satisfied workshop coordinators are there to:

- find the most seamless way to ensure that we tick all the boxes for MLA
- assist you in achieving the best results for:
  - our producer clients
  - you (the workshop organiser)
  - deliverers (both those who are experienced and those who are gaining experience)
  - DAFWA, NTDPIF, DAF and FutureBeef

The workshop coordinator is also there to:

- Liaise with workshop organisers to select the most suitable presenter combinations to deliver at a particular workshop. It is important to ensure there is the right mix of experience in both technical and extension capacities and to ensure that the key deliverers are accredited. This may or may not involve contracting externally accredited deliverers.
- Ensure there are no clashes with other EDGE workshops
- Ensure that the EDGE delivery calendar is updated and that workshop details are advertised through MLA's Feedback magazine, and the MLA and FutureBeef websites
- Ensure that the correct protocols set by MLA for promoting and delivery of workshops are followed
- Ensure that the information (e.g. feedback forms) collected at the workshop is collated and sent MLA
- Ensure availability of all necessary resources
- Ensure follow–up workshops are carried out in a timely manner
- Find opportunities for potential deliverers to gain experience in EDGE delivery by assisting two experienced presenters at the workshop of their interest
- Ensure that there is only one, or at the most two, departmental, NRM or Catchment staff attending as participants at producer workshops. This prevents situations where some producers feel uncomfortable in the presence of a number of staff learning at the same time.
- Work towards generating technical training for staff to ensure consistency of messages to industry and the delivery professionalism that has become expected of EDGE packages.
    - This is a crucial training opportunity and best done with peers as delivery of that workshop can be pitched at a consistent audience and more depth of information can be provided where necessary. It also ensures that frank discussions can be carried out concerning producer examples.
    - It is of high priority to have all FutureBeef extension staff and private providers participate in the EDGE package(s) of their interest, especially if they are keen to become future presenters.
- Liaise with experienced presenters to identify and recommend staff to be accredited as presenters

Organising an EDGE workshop:

Presenters and dates

Contact the EDGE workshop coordinator.

- Work together to determine the most suitable presenter combinations to deliver at a particular workshop. It is important to ensure that:
    - there is the right mix of accredited presenters in both technical and extension capacities (ideally presenters will have strengths in both areas but at least one presenter needs to be technically strong and one skilled in the areas of facilitation and monitoring and evaluation)
    - there needs to be at least two presenters for each EDGE workshop (except *Business EDGE*)
- Contact presenters – best to have one person contacting presenters for consistency – decide between organiser and coordinator but keep the other reliably informed to save double up and so everyone knows what is going on.
- Decide on dates ensuring no other clashes with other events in the area, e.g. check the FutureBeef event calendar.
- Confirm dates with presenter.
- Book venue.

- Notify the MLA EDGE contact, Charlotte Fox (R&D Extension Manager – Beef, On Farm Innovation and Adoptions) on 02 9463 9206 or cfox@mla.com.au.

Publicity

- Create an event on the FutureBeef website by emailing events@futurebeef.com.au.
- Customise flyer.
- Distribute flyer.
- Send invitation/flyer (mail or email) to everyone who has indicated interest at some point (including recent Grazing BMP lists and others).
- Other promotion – newsletters, mail–outs, eBulletins, etc.
- Contact FutureBeef to organise a Mail Chimp campaign.

Registrations

- Contact FutureBeef to create an on–line registration (currently Queensland only).
- Manual registrations (local receipting where possible).
- It is desirable (and preferred by MLA) that there are 10 to 15 participants at each workshop (minimum 6 businesses). In some cases in extensive areas (e.g. Boulia) workshop numbers of 8 (5 businesses) can be negotiated with the workshop coordinator. In terms of upper limit, it is preferred to keep the numbers limited to 15 but up to 18 can be negotiated with the workshop coordinator. (This allows flexibility when someone rings up when you have 14 people and they want to bring 2 or 3 from a business.)
- It is important to highlight to anyone enquiring or registering without payment that a spot at a workshop is only confirmed when the workshop fee is paid. Registration only does not guarantee a spot at the workshop.

As registrations are received

- Create a 'Participants list spreadsheet' for the workshop from the template and enter all registration details into this spreadsheet.
- Fax or email letter of welcome and confirmation of registration and attach the relevant pre–workshop questionnaire.
- Enter returned questionnaire details into participant list spreadsheet (position title, cattle numbers, property size, enterprise etc.).
- Send entered questionnaires onto presenters (so they can tailor their presentation to suit participants)
- Ensure all are returned by the RSVP date (7–10 days prior for Breeding EDGE and Nutrition EDGE, and 21 days prior for Grazing land management EDGE) to give the presenters time to tailor the information. If not received, follow them up with a phone call.
- Enclose/attach list of accommodation options.

At least three weeks out

- Order workshop notes from MLA using order form and send to the workshop coordinator, in the email please include:
    - Workshop name
    - Workshop contact
    - Workshop date
    - Date materials are required
    - Location of workshop
    - Cost centre code

    - Workshop deliverers(s).
- Order relevant MLA publications and CDs.
- Print off relevant fact sheets and information from the FutureBeef website.
- For *Grazing land management EDGE* prepare property maps and land type books.

Paperwork and forms to print for the workshop

- Meat & Livestock Australia pre– and post–audit forms. These must be filled out at the beginning and end of the workshop – in the workshop – they are of limited value if completed outside the workshop.
- Evaluation forms (please ensure one per person not one per couple for example).
- Certificates.
- List of participants – just names and addresses – to insert in front of Workshop notes.

Other jobs

- Organise catering
- Workshop materials
- Paddock or yard sessions

Post–workshop

- Liaise with presenter about follow–up. The deliverer to organise a targeted follow–up approach using producer feedback on what they are going to implement.
- Send 'Participants list spreadsheet' to EDGE coordinator and relevant workshop coordinator.
- Scan completed 'Feedback sheets' and email to workshop coordinator for entry into 'Feedback spreadsheet'.
- Workshop coordinator to send completed Feedback spreadsheet to EDGE coordinator and workshop coordinator for checking and then workshop coordinator to send to Charlotte:
    - participants lists
    - feedback spreadsheet
- Scan and send pre– and post–audits to Charlotte Fox (cc EDGE coordinator and workshop coordinator).
- List (and copies of) of any media releases, radio interviews, eBulletin articles, newsletter articles etc. (useful for quarterly reporting) sent to workshop coordinator and EDGE coordinator.

Deliverers (presenters): It is preferable that there are two **accredited** deliverers at each workshop.

Other departmental staff, private providers, NRM and Catchment staff that are technically experienced and will be required to run two workshops with experienced presenters before being accredited as EDGE deliverers. Some early career staff may also undergo training and provide assistance to accredited deliverers at workshops. Meat & Livestock Australia will be advised in due course to gain authorisation of these staff as accredited deliverers.

Minimum and maximum participant numbers:
- Minimum number of eight participants (minimum of six businesses)
- Maximum number of fifteen participants

Approval is required from MLA, **before** the workshop is confirmed, if participant numbers are below eight or above 15.

To ensure effective group delivery there must be absolutely no more than 20 participants. Participant numbers less than eight can also be difficult, i.e. to get sufficient interaction, and any less than six businesses becomes uneconomic.

Evaluation: The following evaluation must be conducted at all workshops:
- Pre– and post–skills audit questionnaires
- Evaluation form

Completed course evaluation forms and pre– and post–skills audit questionnaires must be submitted to MLA within 15 working days of workshop completion.

Staff attendance: MLA is happy for departmental, MLA, NRM and/or Catchment agency staff to attend EDGE workshops in limited numbers, that is, for:
- 8–12 producers – 1 staff member (in addition to the delivers)
- 13+ producers – 2 staff members (in addition to the delivers)

6.6.9.6.4 Warranties and refunds

Warranties, refunds and insurance are currently the responsibility of individual delivery organisations and private providers.

6.6.9.6.5 Quality control

Meat & Livestock Australia is committed to providing the highest quality, consistent learning opportunities to Australian red meat producers through EDGE. This includes learning materials, i.e. workshop notes, processes, deliverers and ongoing service provision.

The workshop development process is summarised in Figure 5. The pilot(s) and independent evaluation contribute to the quality control of workshop development (content and delivery process). This process is complemented by the workshop desktopping process (editing and design) illustrated in Figure 6.

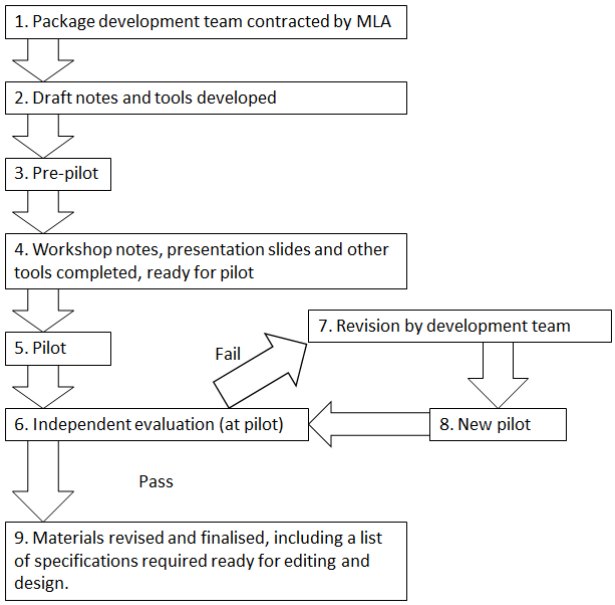


Figure 5 EDGE development process and quality assurance

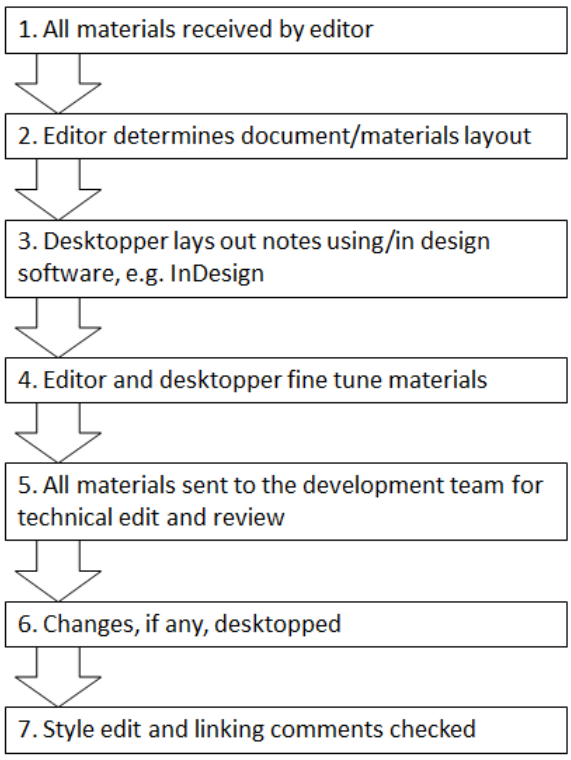


Figure 6 EDGE editing and design phase

6.7 Aligning EDGE packages and the Northern livestock transporters course with VET units and packages

6.7.1 EDGE alignment with VET units and packages

This report was prepared by Rebecca Farrell, Department of Agriculture and Fisheries.

6.7.1.1 Summary

It's not just a family farming background, the outdoor lifestyle and working with animals that attract and motivate people to seek employment in the (northern beef or pastoral) livestock industries. Other keys motivators include career opportunity, and the development and improvement of skills and knowledge (MLA Final report B.NBP.0370).

Each EDGE workshop package has a key learning outcome. As a result of attending an EDGE workshop, the key learning outcomes are as follows:

- Participants attending the Breeding EDGE will be able to develop a breeding program, using genetic and reproductive knowledge and technologies, to achieve desired production targets.
- Participants who attend the GLM EDGE will have a thorough understanding of the grazing land environment in which they operate. It will provide the knowledge they need to strategically manage their grazing business so that they can optimise their land condition and productivity in the long–term.
- Participants who attend the Nutrition EDGE will be able to make better decisions to achieve their herd performance targets through improved breeder fertility, weight gains, reduced mortality, optimal use of supplements and overall management.

As a result of the review of the EDGE*network* suite of workshop packages, the Department of Agriculture and Fisheries, Queensland has identified three different opportunities for

consideration with regards to the alignment of these learning outcomes with the Vocational Education and Training (VET) learning pathway within the Agriculture, Horticulture, and Conservation and Land Management 10 (AHC10) training package at the Certificate III/IV and/or Diploma level competencies and/or the Farm Business Management skill set.

These options are:

1. Offer a Statement of Attainment for existing units of competency
2. Adopt an existing skill set e.g. Farm Business Management Skill Set
3. Develop a new skill set from existing units

Alignment with the AHC10 training package will provide employees working in the (northern beef or pastoral) livestock industries who have participated in an EDGE*network* workshop, the opportunity to have their skills and knowledge formally recognised as prior learning (RPL) or credited towards an industry qualification (from the AHC10 training package).

6.7.1.2 Definitions

VET: Vocational education and training

Competency: The consistent application of knowledge and skill to the standard of performance required in the workplace. It embodies the ability to transfer and apply skills and knowledge to new situations and environments.

Competency based assessment: The gathering and judging of evidence in order to decide whether a person has achieved a standard of competence.

Competency based training: A method of assessment which develops the skills, knowledge and attitudes required to achieve competency.

Recognition of prior learning (RPL): The acknowledgement of a person's skills and knowledge acquired through previous training, world or life experience, which may be useful to grant status or credit in a subject or module. It can lead to a full qualification in the VET sector.

Recognition of current competencies: The assessment of a person's current capacity to perform; it applies if an individual has previously successfully completed the requirements for a unit of competency or a module and is now required to be reassessed to ensure that the competence is being maintained.

Registered training organisation (RTO): Training providers registered by the Australian Skills Quality Authority (ASQA) or in some cases, a state or territory registering and accrediting body to deliver training and/or conduct assessments and issue nationally recognised qualifications in accordance with the Australian Quality Training Framework or the VET Quality Framework. RTOs include TAFE colleges and institutes, adult and community education providers, private providers, community organisations, schools, higher education institutions, commercial and enterprise training providers, industry bodies and other organisations meeting the registration requirements.

Skills sets: Single units or combinations of units which link to a license or regulatory requirement, or defined industry need. In 2007, the National Quality Council (NQC) determined that skill sets would complement full qualifications within the Australian Qualifications Framework (AQF) and be included in training packages. Prior to this, students who did not complete a full qualification could only receive a Statement of Attainment for each unit completed, without any indication of whether the units selected met a defined

industry need or licensing/regulatory requirement. Nationally endorsed skill sets will provide formal recognition of training for a discrete part of a qualification linked to a function or role within an occupation.

Units of competency: The nationally agreed statements of the skills and knowledge required for effective performance in a particular job or job function. They identify the skills and knowledge as outcomes that contribute to the whole job function. Units of competency are an endorsed component of training packages.

Statement of attainment: Formal certification in the vocational education and training sector by a registered training organisation that a person has achieved: (a) part of an Australian Qualifications Framework (AQF) qualification; or (b) one or more units of competency from a nationally endorsed training package; or (c) all the units of competency or modules comprising an accredited short course.

AHC10: Agriculture, Horticulture, and Conservation and Land Management 10 Training package

Source: VOCEDplus 2014, *Glossary of VET*, National Centre for Vocational Education Research, Canberra, viewed 2 April 2015, <www.voced.edu.au/content/glossary–vet>.

6.7.1.3 Other acronyms

MLA: Meat & Livestock Australia

AWI: Australian Wool Innovation Ltd

NFF: National Farmers Federation

NEST: National Agribusiness Education Skills and Labour Taskforce

DAF: Department of Agriculture and Fisheries

GLM: Grazing land management

QATC: Queensland Agricultural Training Colleges

MOU: Memorandum of Understanding

TPPA: Third Party Partnership Agreement

6.7.1.4 Introduction

To ensure the agriculture sector in general remains competitive, it is important that it can recruit and retain a skilled workforce. The key findings of a national workforce survey commissioned by MLA and AWI in 2007 (MLA Final report B.NBP.0370) suggested that while financial security, stability and predictability were key motivators in attracting and retaining staff in the northern beef (pastoral livestock) industry, what is just as important for staff, is a clear vision for their career with their employer and job satisfaction through skills development.

Facilitated by the NFF, the National Agribusiness Education Skills and Labour Taskforce (NEST) was formed in 2012. In the National Agriculture Workforce Development Plan report (2014), the taskforce identified some key things to address in order to promote agriculture as

a competitive employer. The most important issues from the EDGE network training package review perspective are the:

- Creation of credible training programs (combined with job placement) to assist with industry engagement and create linkages to career pathways.
- Potential for skill sets to meet industry skill needs in a more targeted and efficient way.

  The Agricultural industry skills and workforce development report prepared in 2013 by DAF revealed that the beef industry is affected by a shortage of workers as a result of:

  - Competition from other industries (e.g. mining)
- Low level of formally recognised skills
- Fragmented career pathways.

This report identified that enhancing the capacity of the northern Australian beef (pastoral livestock) industry to attract and retain on–station workers was a priority. As a result, DAF commissioned the development of the *Beef industry on–station quality workforce handbook*. The handbook identifies the skills needed in the northern Australian (pastoral livestock) industry and provides guidelines for career development.

Currently there is limited scope for northern beef (pastoral livestock) producers or on–station employees to have their skills and knowledge formally recognised. The EDGE GLM, Nutrition and Breeding workshop packages are currently delivered over a three–day workshop. Each workshop package delivers a theory and practical component designed to engage participants and develop their knowledge and skills to ultimately apply the principles learned to their own businesses.

With this in mind, DAF has identified that there is opportunity for these producers to gain recognition through a combination of attending one (or more/all) of the EDGE workshops, some workplace training and assessment and recognition of prior skills and knowledge (learning).

6.7.1.5 Opportunities for accrediting course participants

Vocational Education and Training in any form must be registered by a Registered Training Authority. There are two components to VET:

1. Delivery of training
2. Assessment of competency

The person delivering the training and assessing the competency must hold their Certificate IV in Workplace Training and Assessment (TAE40110) and have successfully completed the units of competency in which they intend to deliver and assess.

All deliverers of EDGE network workshops must have a current Certificate IV TAE40110. In addition to this, deliverers are required to be accredited by MLA to deliver the EDGE workshops. [MLA is responsible for maintaining a register of accredited deliverers and ensuring that their TAE40110 is up to date].

The training and assessment can be delivered in house by the RTO or through a third party under a Third Party Partnership Agreement (TPPA)/Memorandum of Understanding (MOU). It is the responsibility of the RTO to inform the Australian Skills Quality Authority (ASQA) of such partnerships. If this be the preferred option then MLA will develop a TPPA or an MOU with a suitable RTO.

The Queensland Agricultural Training College (QATC) is currently registered to deliver the AHC10 training package and the Farm Business Management skill set. DAF has identified the Queensland Agricultural Training College (QATC) as a suitable partner organisation to (a) assist with mapping the EDGE package learning outcomes to the competencies in the AHC10 training package and/or the Farm Business Management Skill Set and (b) Be the RTO through which participants gain their qualification; e.g. through recognition of prior learning and assessment of competency.

6.7.1.5.1 Option 1—Offer a Statement of Attainment for existing units of competency

The learning outcomes for the EDGE GLM, Nutrition and Breeding workshops can be mapped to existing units of competency within; for example; the AHC40110 Certificate IV in Agriculture/AHC50110 Diploma of Agriculture and the AHC41010 Certificate IV in Agribusiness/AHC51410 Diploma of Agribusiness Management courses.

To be able to offer a Statement of Attainment for attending an EDGE workshop, we require assistance from the QATC to map EDGE learning outcomes to competencies. The QATC currently has all of the above (i.e. AHC40110/AHC50110 and AHC41010/AHC51010) on their scope of registration and they are approved to deliver these qualifications.

6.7.1.5.2 Option 2—Adopt an existing skill set – Farm Business Management Skill Set AHCSS00025

The target group for this skill set is farmers and farm business managers with responsibility for farm business planning and management, including risk management.

The units in this skill set provide credit toward a number of qualifications in the AHC10 Training Package including:

- AHC40110 Certificate IV in Agriculture
- AHC41010 Certificate IV in Agribusiness
- AHC50110 Diploma of Agriculture
- AHC51410 Diploma of Agribusiness Management

There are four units of competency in this skill set:

- AHCBUS403A Support and review business structure and relationships
- AHCBUS506A Develop and review a business plan
- AHCBUS507A Monitor and review business performance
- BSBRSK501B Manage risk

The QATC has this skill set on their scope of registration and they are approved to deliver this skill set.

6.7.1.5.3 Option 3—Develop a new skill set from existing units

With the assistance from the Queensland Agricultural Training College, there is scope to develop a new skill set/s.

The AHC40110 Certificate IV in Agriculture/AHC50110 Diploma of Agriculture and the AHC41010 Certificate IV in Agribusiness/ AHC51410 Diploma of Agribusiness Management as well as AHC40910 Certificate IV/ AHC51110 Diploma in Conservation and Land Management have existing units of competency which could be included in a new skill set/s.

These may include:

- AHCBAC401A Manage pastures for livestock production
- AHCLSK401A Develop feeding plans for a production system
- AHCLSK402A Develop livestock feeding plans
- AHCLSK416A Identify and select animals for breeding
- AHCAIS401A Supervise artificial breeding and/or embryo transfer programs
- AHCAGB401A Implement and monitor a property improvement plan
- AHCAGB402A Analyse and interpret production data
- BSBRSK401A Identify risk and apply risk management processes
- AHCAGB501A Develop climate risk management strategies
- AHCAGB505A Develop a whole farm plan
- AHCAGB504A Plan production for the whole land/farm based business
- AHCBUS506A Develop and review a business plan
- AHCBUS507A Monitor and review business performance
- AHCLSK503A Develop and implement a breeding strategy
- AHCLSK504A Develop livestock health and welfare strategies
- AHCLSK505A Develop production plans for livestock
- AHCLPW404A Produce maps for land management purposes
- AHCLPW405A Monitor biodiversity
- AHCNAR501A Manage natural areas on a rural property
- AHCNAR506A Develop and implement sustainable land use strategies

An example skill set for the *Breeding EDGE* workshop may be:

- AHCLSK503A Develop and implement a breeding strategy
- AHCLSK416A Identify and select animals for breeding
- AHCLSK411A Supervise natural mating of livestock
- AHCLSK312A Coordinate artificial insemination and fertility management of livestock
- AHCAIS401A Supervise artificial breeding and/or embryo transfer programs

6.7.1.6 Recommendations

1. That MLA engages QATC to map the learning outcomes of the EDGE GLM, Nutrition and Breeding workshops to competencies within the AHC10 training package.

2. That suitable new skill sets are developed for each workshop package using existing AHC10 competencies.

3. That an MOU or TPPA between MLA and QATC be developed.

6.7.1.7 References

State of Queensland 2014, *Beef industry on–station quality workforce handbook*, Queensland Government, Brisbane.

The Centre for International Economics and The Ryder Self Group 2008, *Attracting and retaining staff in Australia's beef, sheep and pastoral wool industries*, Final report NBP.0370, Meat & Livestock Australia Limited, North Sydney, New South Wales.

National Farmers' Federation 2014, *National agriculture workforce development plan, National Farmers' Federation, Barton*, Australian Capital Territory.

Definitions retrieved from www.voced.edu.au/content/glossary–vet, viewed 2 April 2015.

AHC10 Training Package retrieved from www.training.gov.au/Training/Details/AHC10, viewed 2 April 2015.

6.7.2 *Northern livestock transporters course* alignment with VET units and packages

This report was prepared by Trudi Oxley and Stephanie Coombes, Northern Territory Department of Primary Industry & Fisheries.

6.7.2.1 Summary

The Department of Primary Industry and Fisheries has identified five different opportunities for livestock transporters to gain formal recognition for the skills and knowledge required in their profession, through attending the *Northern livestock transporters course*, Workplace Training and Assessment and Recognition of Prior Learning.

Option 1—Offer a Statement of Attainment for 2 existing units of competency
Option 2—Adopt an existing skill set – Transport Livestock Skills Set MTMSS0057
Option 3—Request to amend Transport Livestock Skills Set MTMSS0057
Option 4—Develop a new skill set from existing units
Option 5—Develop a new skill set from existing units and create new units

6.7.2.2 Definitions

Australian Skills Quality Authority (ASQA): The Australian Skills Quality Authority is the national Vocational Education and Training (VET) regulator responsible for registering training providers and accrediting courses.

Competency: Competency relates to the learner's ability to meet the requirements of the unit/s of competency in terms of skills and knowledge.

Competency–based assessment: Competency–based assessment is a process of systematically gathering, interpreting, recording and communicating to stakeholders, information on candidate performance against industry competency standards and/or learning outcomes.

Competency–based training: Competency–based training is the training.

Competency mapping: The identification of core skills critical to vocational competence within a unit of competency.

Recognition of prior learning (RPL): Recognition of prior learning is when learners match their previous training, work or life experience with the required skills and knowledge outlined in a qualification so they can receive recognition based on the evidence they provide that matches the requirements of the qualification/course.

Registered training organisation (RTO): A registered training organisation provides and assesses nationally recognised training. Only RTOs can issue nationally recognised qualifications.

Scope of registration: Scope of registration refers to the list of specific Australian Qualifications Framework qualifications or units of competency within training packages, or accredited courses or services that an RTO can deliver or supply.

Skill sets: Skills sets are single units of competency or combinations of units of competency that link to a licence, regulatory requirement or defined industry need. They build on a relevant qualification.

Statement of Attainment: A statement of attainment is provided for each unit of competency completed. This is an official record of an individual's successful completion of specific skills, and can contribute to a full qualification as more units are completed. A statement of attainment is recognised across all registered training organisations (RTOs) (www.ibsa.org.au/what–statement–attainment).

Unit of competency: A unit of competency (sometimes referred to as a competency standard) is the specification of industry skills and knowledge and the application of those skills and knowledge to the standard of performance expected in the workplace.

Source: https://aspirelr.com.au/assets/document/1357165371–tae_glossary_171212.pdf

6.7.2.3 Introduction

The Northern Livestock Transports Course (NLTC) is a joint venture of the Northern Territory Department of Primary Industry and Fisheries (NTDPIF) and Meat and Livestock Australia (MLA).

The one day course focuses on the skills and knowledge required by livestock transporters to maximise welfare during long distance cattle transport and includes a theory component, practical activities, guest speakers and a tailored stock handling DVD.

Currently there are limited opportunities for livestock transporters to obtain qualifications which recognise the skills and knowledge required in their profession. The NTDPIF has identified six opportunities for livestock transporters to gain such recognition through both a combination of attending the NLTC, workplace training and assessment and recognition of prior learning (RPL).

6.7.2.4 Opportunities for accrediting participants

Any form of Vocational Education and Training (VET) must be registered by a Registered Training Organisation (RTO). There are two main components to VET training:

1. Delivery of training
2. Assessment of competency

The training and assessment can be delivered in house by the RTO or through a third party under a Third Party Partnership Agreement/Memorandum of Understanding. It is the responsibility of the RTO to inform the Australian Skills Quality Authority (ASQA) of such partnerships.

The person delivering the training and assessing competency must hold their Certificate IV in Training and Assessment (TAE40110) and have successfully completed the units of training which they intend to deliver and assess.

NTDPIF has identified two RTOs who have the capacity for a Third Party Partnership agreement in regards to delivering training to supplement the NTLC:

1. Charles Darwin University, Katherine Rural Campus (CDU KRC)(NT)
2. Rural Industry Training and Extension (RITE) (QLD and NT)

6.7.2.4.1 Option 1—Offer a Statement of Attainment for 2 existing units of competency

There are two units of competency which are currently mapped to the theory and practical components of the NLTC and workplace experience/RPL:

- AHCLSK207A Load and unload livestock
- TLID3020A Care for livestock in transit

CDU KRC and RITE currently have unit AHCLSK207A on their scope of registration, and therefore have training and assessment materials available for that unit. Both RTOs are willing to apply to ASQA to add unit TLID3020A to their scope of registration, however they would need to develop training and assessment materials for that unit. The most appropriate mode for development of this option would need to be assessed for each region and transporter.

6.7.2.4.2 Option 2—Adopt an existing skill set – Transport Livestock Skills Set MTMSS0057

The Transport Livestock Skills Set (Course code MTMSS0057) is from the Australian Meat Industry Training Package (MTM11) and meets the industry animal welfare and handling requirements for transport operators who have responsibility for transporting livestock to a meat processing plant. It contains both of the units listed in Option 1, as well as a livestock handling unit.

Transport Livestock Skills Set MTMSS0057:

- AHCLSK205A Handle livestock using basic techniques
- AHCLSK207A Load and unload livestock
- TLID3020A Care for livestock in transit

CDU KRC and RITE currently have the additional unit AHCLSK205A on their scope of registration, and have training and assessment materials available for that unit. As RITE is based in Queensland this would also be an appropriate avenue for Queensland transporters. This skills set is administered by AgriFood Skills Australia.

6.7.2.4.3 Option 3—Request to amend Transport Livestock Skills Set MTMSS0057

The AgriFood Skills Australia Continuous Improvement Register provides an opportunity for stakeholders to submit feedback and issues about AgriFood Training Packages. A submission may be made requesting to adjust the existing Transport Livestock Skills Set MTMSS0057 which may include the addition of:

- AHCLSK320A Coordinate and monitor livestock transport
- MTMP414A Oversee humane handling of animals
- MTMP2010A Apply animal welfare and handling requirements

CDU KRC and RITE currently do not have these units on scope, but are willing to apply to ASQA to add them to their scope of registration.

Training and assessment resources for units MTMP414A and MTMP2010A are both available for use courtesy of the National Meat Industry Training Advisory Council (MINTRAC). The materials may require some adjustment to suit the NLTC which can be done by the NT DPIF or the chosen RTO.

Training and assessment materials for AHCLSK320A will need to be developed however. Information on the AgriFood Skills Australia Continuous Improvement process can be found at www.agrifoodskills.net.au/?page=AboutCIRegister.

6.7.2.4.4 Option 4—Develop a new skill set from existing units

A course that does not lead to a qualification under the Australian Qualifications Framework (AQF) can also be accredited by a course accrediting body. The course title in this case reads 'Course in …' Such courses do not have the breadth and depth of knowledge required for a qualification but they can lead to the issue of an AQF statement of attainment that is nationally recognised.*

However, a course cannot be accredited if it duplicates by title or coverage the outcomes of an endorsed training package qualification.† Course developers can gain written confirmation from AgriFood Skills Australia that their proposed course does not duplicate, by title or coverage, the outcomes of an endorsed Training Package qualification. They must provide the detail outlined in the AgriFood Skills Australia Review Application prior to submitting their course accreditation application to the Australian Skills Quality Authority (ASQA). The process to review this documentation will take 3 – 6 weeks depending on the complexity of the proposed course and the level of detail provided by the proponent. Course developers should consider these timeframes when planning their course accreditation submission.‡

Some existing units of competency which may be included in a new skill set (for example) 'Course in Northern Livestock Transport' are:

- AHCLSK205A Handle livestock using basic techniques
- AHCLSK207A Load and unload livestock
- TLID3020A Care for livestock in transit
- AHCLSK320A Coordinate and monitor livestock transport
- MTMP414A Oversee humane handling of animals
- MTMP2010A Apply animal welfare and handling requirements
- AHCOHS101A Work safely
- AHCOHS201A Participate in OHS processes
- AHCWRK209A Participate in environmentally sustainable work practices

As noted with previous Options, units that are not currently on the RTOs scope of registration will have to be registered, with training and assessment material developed.

6.7.2.4.5 Option 5—Develop a new skill set from existing units and create new units

In addition to creating a skill set 'Course in Northern Livestock Transport' from pre–existing units as discussed in Option 4, new units may be developed after identifying and mapping competencies.

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* Users' guide to the Standards for VET **Accredited** Courses 2012 http://www.asqa.gov.au/verve/_resources/Users_guide_to_the_Standards_for_VET_Accredited_Courses_2012.pdf

† Users' guide to the Standards for VET **Accredited** Courses 2012 http://www.asqa.gov.au/verve/_resources/Users_guide_to_the_Standards_for_VET_Accredited_Courses_2012.pdf

‡ Accredited Course Review http://www.agrifoodskills.net.au/?page=AccreditedCourse

Such units may be along the lines of:

- Road train maintenance
- Operate livestock transport vehicles in remote locations

The development of a new unit of competency would require industry consultation and consultation with the relevant Industry Skills Council, being AgriFood Skills Australia. Other industry organisations which should be consulted include:

- Australian Livestock and Rural Transport Association
- Livestock Transport businesses such as Road Trains of Australia, Tanami Transport and Barkly Transport.

6.8 EDGE process

6.8.1 EDGE workshop coordinator roles

The following process was developed and refined by Jenny Milson, EDGE coordinator Queensland (DAF) in consultation with Queensland EDGE deliverers and the MLA EDGE coordinator.

A copy is available from the FutureBeef staff intranet (www.intranet.futurebeef.com.au/files/2013/07/EDGE–coordinator–roles–January–20152.pdf). While this process is currently DAF centric it is simple and straightforward to update and/or incorporate partner specific information as it becomes available.

6.8.1.1 Detail of EDGE workshop coordinator roles

Each workshop coordinator (names and contact details below) is your first port of call should you wish to hold a specific EDGE*network*® workshop in your area or if you have enquiries concerning a workshop.

The coordinator is there to support you.

It is imperative that all team members understand that MLA has certain protocols that we need to follow when running and following up on EDGE workshops.

An understanding of – and respect for – these protocols has contributed strongly to the success of EDGE package delivery in previous years. DAF has formed a very healthy ‘EDGE’ working relationship with MLA and we look forward to this continuing in the future.

To assist with the smooth delivery of workshops and to ensure MLA requirements are satisfied workshop coordinators are there to:

- find the most seamless way to ensure that we tick all the boxes for MLA
- assist you in achieving the best results for:
    - our producer clients
    - you (the workshop organiser)
    - staff who are presenting (both those who are experienced and those who are gaining experience)
    - DAF and FutureBeef

The workshop coordinator is also there to:

- Liaise with workshop organisers to select the most suitable presenter combinations to deliver at a particular workshop. It is important to ensure there is the right mix of

experience in both technical and extension capacities and to ensure that the key deliverers are accredited.
    - This may or may not involve contracting externally accredited deliverers
- Ensure there are no clashes with other EDGE workshops
- Ensure that the EDGE delivery calendar is updated and that workshop details are advertised through MLA's Feedback magazine, and the MLA and FutureBeef websites
- Ensure that the correct protocols set by MLA for promoting and delivery of workshops are followed
- Ensure that the information (e.g. feedback forms) collected at the workshop is collated and sent to Veronica Robinson T: 07 3255 4312 E: veronica.robinson@daf.qld.gov.au
- Ensure availability of all necessary resources (books, maps, workshop notes, technical notes, feedback forms, Buttercup, etc.)
- Ensure follow–up workshops are carried out in a timely manner
- Find opportunities for potential deliverers to gain experience in EDGE delivery by assisting two experienced presenters at the workshop of their interest
- Ensure that there is only one, or at the most two, DAF staff attending as participants at producer workshops. This prevents situations where some producers feel uncomfortable in the presence of a number of DAF staff learning at the same time.
- Work towards generating technical training for staff to ensure consistency of messages to industry and the delivery professionalism that has become expected of EDGE packages.
    - This is a crucial training opportunity and best done with peers as delivery of that workshop can be pitched at a consistent audience and more depth of information can be provided where necessary. It also ensures that frank discussions can be carried out concerning producer examples.
    - It is of high priority to have all FutureBeef extension staff participate in the EDGE package(s) of their interest, especially if they are keen to become future presenters
- Liaise with experienced presenters to identify and recommend staff to be accredited as presenters

Your EDGE workshop coordinators are:
- *Breeding EDGE* – Rebecca Farrell T: 07 3255 4265 E: rebecca.farrell@daf.qld.gov.au
- *Grazing land management EDGE* – Megan Willis T: 07 4761 5192 E: megan.willis@daf.qld.gov.au
- *Nutrition EDGE* – Felicity McIntosh T: 07 3255 4261 E: felicity.mcintosh@daf.qld.gov.au

To help you plan your next workshop, download a copy of the EDGE coordinator roles January 2015 (PDF 28 kB) and visit EDGE*network* handy hints.

6.8.2 Organising an EDGE workshop process

The following notes and tips were designed to assist EDGE coordinators and deliverers organise EDGE workshops. They were also developed and refined by Jenny Milson with input from Queensland EDGE deliverers and the MLA EDGE coordinator.

A copy is available from the FutureBeef staff intranet (www.intranet.futurebeef.com.au/resources/workshop–and–field–day–materials/edgenetwork–handy–hints). While this process is currently DAF centric it is simple and straightforward to update and/or incorporate partner specific information as it becomes available.

6.8.2.1 Presenters and dates

Contact the EDGE workshop coordinator.

- Work together to determine the most suitable presenter combinations to deliver at a particular workshop. It is important to ensure that:
  - there is the right mix of accredited presenters in both technical and extension capacities (ideally presenters will have strengths in both areas but at least one presenter needs to be technically strong and one skilled in the areas of facilitation and monitoring and evaluation)
  - there needs to be at least two presenters for each EDGE workshop (except *Business EDGE*)
- Contact presenters – best to have one person contacting presenters for consistency – decide between organiser and coordinator but keep the other reliably informed to save double up and so everyone knows what is going on.
- Decide on dates ensuring no other clashes with other events in the area, e.g. check the FutureBeef event calendar.
- Confirm dates with presenter.
- Book venue.
- Notify the MLA EDGE contact, Charlotte Fox (R&D Extension Manager – Beef, On Farm Innovation and Adoptions) on 02 9463 9206 or cfox@mla.com.au.

6.8.2.2 Publicity

- Create an event on the FutureBeef website by emailing events@futurebeef.com.au.
- Customise flyer.
- Distribute flyer.
- Send invitation/flyer (mail or email) to everyone who has indicated interest at some point (including recent Grazing BMP lists and others).
- Other promotion – newsletters, mail–outs, eBulletins, etc.
- Contact Rebecca Farrell to organise a Mail Chimp campaign.

6.8.2.3 Registrations

- Contact Felicity McIntosh to create on–line registration (with appropriate limits).
- Manual registrations (local receipting where possible).
- It is desirable (and preferred by MLA) that we have 10 to 15 participants at each workshop (minimum 6 businesses). In some cases in extensive areas (e.g. Boulia) workshop numbers of 8 (5 businesses) can be negotiated with workshop coordinator. In terms of upper limit, it is preferred to keep the numbers limited to 15 but up to 18 can be negotiated with workshop coordinator. (This allows flexibility when someone rings up when you have 14 people and they want to bring 2 or 3 from a business.)
- Please highlight to anyone enquiring or registering without payment that a spot at a workshop is only confirmed when the workshop fee is paid. Registration only does not guarantee a spot at the workshop.

6.8.2.4 As registrations are received

- Create a 'Participants list spreadsheet' for your workshop from the template and enter all registration details into this spreadsheet.
- Fax or email letter of welcome and confirmation of registration and attach the relevant pre–workshop questionnaire.
- Enter returned questionnaire details into participant list spreadsheet (position title, cattle numbers, property size, enterprise etc.).

- Send entered questionnaires onto presenters (so they can tailor their presentation to suit participants)
- Ensure all are returned by the RSVP date (7–10 days prior for Nutrition and Breeding and 21 days prior for GLM) to give the presenters time to tailor the information. If not received, chase them up with a phone call.
- Enclose/attach list of accommodation options.

6.8.2.5 At least three weeks out

- Order workshop notes from Meat & Livestock Australia using order form and send to Veronica Robinson (cc workshop coordinator). Please include the following in your email to Veronica:
  - Workshop name
  - Workshop contact
  - Workshop date
  - Date materials are required
  - Location of workshop
  - Cost centre code
  - Workshop facilitator(s).
- Order relevant MLA publications and CDs.
- Print off relevant fact sheets and information from the FutureBeef website. If you know of others that aren't there, please let Felicity know so she can add where appropriate.
- For *Grazing land management EDGE* prepare property maps and land type books.

6.8.2.6 Paperwork and forms to print for the workshop

- Meat & Livestock Australia pre– and post–audit forms. These must be filled out at the beginning and end of the workshop – in the workshop – they are of limited value if completed outside the workshop.
- Evaluation forms (please ensure one per person not one per couple for example).
- Certificates.
- List of participants – just names and addresses – to insert in front of Workshop notes.

6.8.2.7 Other jobs

- Organise catering
- Workshop materials
- Paddock or yard sessions

6.8.2.8 Post–workshop

- Liaise with presenter about follow–up. The presenter to organise a targeted follow–up approach using producer feedback on what they are going to implement.
- Send 'Participants list spreadsheet' to EDGE coordinator and relevant workshop coordinator.
- Scan completed 'Feedback sheets' and email to Veronica for entry into 'Feedback spreadsheet'.
- Veronica to send completed Feedback spreadsheet to EDGE coordinator and workshop coordinator for checking and then workshop coordinator to send to Charlotte:
  - participants lists
  - feedback spreadsheet
- Scan and send pre– and post–audits to Charlotte Fox (cc EDGE coordinator and workshop coordinator). This is an MLA requirement and DAF is not to collate the information.

- List (and copies of) of any media releases, radio interviews, eBulletin articles, newsletter articles etc. (useful for quarterly reporting) sent to workshop coordinator and EDGE coordinator.

6.8.2.9 Queensland EDGE contacts

- EDGE coordinator: Jenny Milson T: 07 4650 1247 E: jenny.milson@daf.qld.gov.au
- *Breeding EDGE* coordinator: Rebecca Farrell T: 07 3255 4265 E: rebecca.farrell@daf.qld.gov.au
- *Grazing land management EDGE* coordinator: Megan Willis T: 07 4761 5192 E: megan.willis@daf.qld.gov.au
- *Nutrition EDGE* coordinator: Felicity McIntosh T: 07 3255 4261 E: felicity.mcintosh@daf.qld.gov.au

6.9 Monitoring, evaluation and reporting

6.9.1 Introduction

Effective monitoring and evaluation is critical in everything we do before, during and after any activity, project or program. It helps us:

- develop better plans
- monitor progress and make adjustments throughout a course of action increasing the likelihood of achieving our objectives
- demonstrate how, and to what extent, objectives were met and at what cost
- capture invaluable insights into what worked and what didn't from which we can learn and refine future activities accordingly to improve their effectiveness and efficiency
- successfully inform all levels of stakeholders that we may report to

The purpose for monitoring and evaluating the EDGE*network* program (EDGE) in northern Australia is to:

1. develop future EDGE activities more effectively, e.g. developing an EDGE business plan
2. identify where adjustments and improvements can be made to the EDGE program and individual packages
3. determine how, and to what extent, the objectives of EDGE are being met and at what cost (or with what inputs)
4. capture insights from what isn't working, or could work better, that we can use and share to refine EDGE and other activities we're involved with

There are numerous ways, or methodologies, for developing monitoring and evaluation frameworks or strategies. The methodologies we have used are based on Bennett's hierarchy and Program logic. They're both logical, sequential processes that start with what is trying to be achieved (outcomes) working back to determine how best this can be measured, consequently highlighting what needs to be done.

At the time of writing MLA are reviewing their corporate monitoring, evaluation and reporting processes and have employed Dr Jeff Coutts, Director of CouttsJ&R. Wherever possible reference to, and consistency with this process, has been made with these EDGE recommendations.

Meat & Livestock Australia is also developing a new, consistent, systematic and more effective monitoring, evaluation and reporting system initially for the LPI unit but which they hope to roll out company–wide. This includes an online reporting system which program

coordinators and deliverers can use to enter data directly improving the efficiency and effectiveness of this currently vital but time consuming component of EDGE reporting.

6.9.2 Developing an EDGE monitoring, evaluation and reporting system

There is currently no defined or formally agreed upon EDGE monitoring, evaluation and reporting (MER) plan and associated strategies which is reflected in the ad hoc data collection and often frustrating experiences of deliverers and participants with regards to the current processes.

The following steps were followed to develop the proposed EDGE MER system:

1. Define where EDGE 'fits' within MLA and hence what key performance indicators it is contributing to, why and to whom the program is reporting to
2. Define EDGE vision, goals, objectives, strategies and outcomes
3. Define the desired targets (performance measures) that the program is aiming for
4. Identify what needs to be measured (categories and metrics) and how to determine if these objectives, and in turn MLA KPIs, are being met
5. Identify appropriate tools and processes to gather this data and how it will be analysed, used and distributed (which will in turn inform the amount of support, e.g. administrative, required to achieve this).
6. Review and update current M&E in light of a) outcomes from Steps 1 to 5 and b) feedback from deliverers, participants and coordinators regarding the current system

6.9.2.1 Step 1—Where EDGE sits within MLA

EDGE currently sits under MLA's **strategic imperative** 3—Increasing productivity across the supply chain and objective 3.5—Increase producer engagement with MLA information and tools to build capacity (Corporate plan 2010–2015: building demand and productivity for Australia's cattle, sheep and goat industries).

The **strategic initiatives** of this strategic imperative are:

3.5.1 Inform: Keep producers informed about the activities and opportunities created by their levy investment in research and marketing

3.5.2 Influence: Engage producers with MLA information, tools and learning opportunities to influence improved practices

3.5.3 Involve: Facilitate the involvement of innovative producers and delivery partners to enhance producer engagement with MLA programs and activities

The **key performance indicators (KPIs)** for these strategic initiatives are:

3.5.1 At least 50% of producers engage with MLA through communication tools and programs and producer satisfaction with MLA communications increases from 3.4 to 3.8 out of 5.

3.5.2 At least 50% of those producers actively engaged in MLA extension programs improve their knowledge, skills and/or capacity to improve practice as a result of their engagement.

3.5.3 Year one: Conduct and review at least two pilots of alternative collaborative public–private delivery partnerships in each state enabling effective industry engagement and, considering results, set appropriate KPIs for the final two years of the plan.

The EDGE program is designed to positively contribute to strategic initiative 3.5.2 and to a lesser degree 3.5.1. Therefore, consistent with these KPIs EDGE must **measure**, with specific consistent **metrics** against MLA's current targets of 'at least 50% of [northern Australia beef cattle and sheep] producers actively engaged in MLA extension programs improve their knowledge, skills and/or capacity to improve practice as a result' and '…producer satisfaction with MLA communications [EDGE workshops or activities] increases from 3.4 to 3.8 out of 5'.

6.9.2.2 Step 2—EDGE vision, goals, objectives, strategies and outcomes

The current vision of EDGE is…

MLA's EDGEnetwork offers practical learning opportunities to help [northern Australia beef cattle] producers gain knowledge and develop skills necessary to improve their livestock enterprises.

This educational and informative format encourages producers to expand their current expertise and learn new skills, be motivated by other producers and access the latest information. Producers gain the best of group and individual learning by working in small groups that enable them to receive personalised service.

The EDGEnetwork (EDGE) workshops have been developed by industry specialists and tested by producers Australia–wide to guarantee their quality and relevance.

Source: www.mla.com.au/Research–and–development/Extension–and–training/EDGEnetwork – accessed 12:40 10 November 2014.

The original EDGE vision, goals, objectives, strategies and outcomes are listed in Appendix 6.9.5.1.These early statements, the current vision above, project team member experience and QualData documentation prepared as part of the MLA MER review were used to develop new/updated versions using the *Program logic* framework (Appendix 6.9.5.3) and listed below.

EDGE longer term (higher level) outcomes, i.e. benefits for the industry – Overall, more profitable and sustainable beef and sheep production:

- Increased food safety, product integrity and biosecurity
- Increased efficiency of natural resource use, reduced environmental
- Improved animal health and welfare
- Increased cost–efficiency, productivity and profitability

Key result areas, i.e. to be achieved by the end of the project or program – Overall, EDGE effectively supports beef and sheep producers, their service providers and advisors develop knowledge and skills necessary to improve their livestock enterprises, are motivated and adopt appropriate best management practices within the areas of business, breeding, grazing land management and nutrition at a greater rate, across a greater geographical area and with better application than they would have otherwise.

Uptake strategies, i.e. how engagement will occur include:

- Provision of EDGE workshops, related activities and information to medium–to–large beef businesses in the areas of business, breeding, grazing land management, and nutrition to make beneficial changes on–farm to improve business performance.

- Provision of EDGE workshops, related activities and information to beef producer suppliers and advisors to better support beef business make beneficial changes on–farm to improve business performance.
- Extent to which EDGE is coordinated to maximise synergies and work effectively to a whole of northern Australia outcome.
- Extent to which monitoring, evaluation and reporting processes are in place to provide required information.

Underpinning development activities, i.e. how structures and outputs are developed, include:

- National manager and regional (state/territory) coordinators with administration support.
- Adoption of a continuous improvement process.
- Ongoing marketing and communication.
- Ongoing maintenance and development of EDGE activities, resources and support mechanisms.
- Ongoing and improved engagement and negotiation with other stakeholders to ensure the necessary activities and resources are available to meet the targeted needs.
- Training and equipping coordinators, deliverers and their support staff (e.g. administration), with the skills, tools and other resources needed to effectively undertake their tasks in relation to EDGE (e.g. train–the–trainer activities/processes for deliverers – technical and facilitatory; eTechnology/eExtension use training; monitoring and evaluation tools and technique training; reporting–report writing training).

6.9.2.3 Step 3—EDGE performance measures and evaluation methods to measure success towards achieving program goals and objectives

6.9.2.3.1 Step 3.1—Longer term outcomes

Longer term outcomes performance measures indicating that EDGE is positively contributing to (along with other activities in the beef and sheep industries) are the extent to which the northern Australia beef and sheep industries are strengthening over time, as shown by:

- Increasing productivity
- Increasing profitability
- Increasing confidence in industry prospects
- Improving environmental indicators
- Improving animal health and welfare indicators

These can be measured or gauged by industry–wide trends captured by existing methods, specifically (i.e. with most relevance to EDGE):

- **ABARES** industry data and publications, e.g. *Australian beef: Financial performance of beef cattle producing farms, 2011–12 to 2013–14*, *Australian lamb: financial performance of slaughter lamb producing farms, 2011–12 to 2013–14*
- **MLA** data and publications, e.g. *Northern beef report: 2013 situation analysis*
- **State and territory** data and publications, e.g. Queensland AgTrends reports

6.9.2.3.2 Step 3.2—Key result areas

Performance measures indicating how well EDGE is meeting its key result areas are the extent to which:

- EDGE **works with other providers and stakeholders**, and **complements** other services and programs
- participating producers, their service providers and advisors are **aware**, have increased **knowledge**, **understanding**, **skills** and motivation to make targeted changes
- participating producers **adopt targeted practices** with direct input from EDGE activities and/or information – and the influence of EDGE on the **rate, extent and quality of change**

The measured or calculated **impacts of changes** on these specific targeted practices within business, breeding, grazing land management, and nutrition (e.g. as per the current FutureBeef program strategic priority areas), specifically changes and impacts on:

1. Weaner management
   - reduced weaning costs
   - increased productivity – more sale and replacement animals

2. Phosphorus supplementation
   - Increased productivity – improved growth and fertility

3. Whole of business management
   - improved economic decision making
   - improved profitability
   - improved data for management decisions

4. Grazing land management
   - decreased feed costs
   - improved kg/ha of beef
   - improved ground cover and erosion
   - Better pasture/feed base

5. Breeder management
   - increased returns from more sale and replacement animals
   - increased performance – growth rates, fertility, etc.

   Changes in awareness, knowledge, skills and attitudes can be, and have to varying degrees been, measured by:

   - Pre– and post–workshop or activity questionnaires
   - Intra–workshop processes, e.g. the *Keep, stop, start* activity
   - Follow–up surveys, e.g. *Meat & Livestock Australia awareness and adoption KPI evaluation 2011* conducted by Axiom Research (B.COM.1042)

Recommendations for improving the efficiency and effectiveness of measuring progress towards these key result areas are discussed in Step 4. These recommendations also address issues identified by coordinators, deliverers and participants listed below.

Issues and opportunities with/for current EDGE M&E tools and processes

Issues and opportunities identified by coordinators, deliverers and participants regarding the current M&E tools and processes used include:

- A lot of information is collected but not necessarily used.
- What is the absolute minimum required to fulfil EDGE and delivery partners' needs?
- Feedback/evaluation fatigue, e.g. if participants are also undertaking Grazing BMP they're getting asked for feedback from more than one, but related sources.
- The time it takes within the workshop for participants to complete the pre– and post–questionnaires.
- The time it takes after the workshop for coordinators and deliverers to compile and submit the questionnaire information.
- Not being able to link the pre– and post–questionnaire responses to a single participant, i.e. don't necessarily need to know who the person is but do need to be able to compare pre– and post–responses to more accurately measure change.
- Quality and consistency of data received, e.g. it is difficult to interpret some responses if you were not present at the workshop.
- Perception that people are being tested like being back in school which may not have been a pleasant experience and a very top–down approach.
- Is there an easier, less intrusive way to do it?
- Coordinators and deliverers to be suitably trained and skilled in monitoring, evaluation and reporting principles and practices to successfully deliver EDGE monitoring, evaluation and reporting requirements which in turn play a vital role in ongoing program development and future funding, as well as contributing to participant learning.
- With new systems, e.g. online, can an electronic option be developed to complement hardcopy versions?
- What additional administrative support is required and/or impact on incorporating this into the delivery and pricing strategy.

Other issues or opportunities to consider are that:

- A range of options is needed for people to provide feedback as influenced by a) personal preference, e.g. face–to–face, anonymously, written, oral, etc b) internet connectivity c) other feedback being sought from same group (potential for feedback/evaluation fatigue).
- While internet connectivity has improved it is still a long way from being 100% accessible or reliable – for both participants and deliverers.
- MLA and FutureBeef now have online registration and payment facilities.

6.9.2.3.3 Step 3.3—Uptake strategies

Measures of uptake strategy or engagement performance and targets (in brackets) are:

- Number of **workshops** run (increasing)
- Where they're run (across wide(r) geographical spread)
- Number of **participants** (increasing to max. limit per workshop)
- Number of **businesses** these attendees represent (increasing)
- Location of these businesses (NB one business may have >1 property/land parcel) PICs / Lot on Plan Numbers
- **Type** of participants, i.e. beef producer, supplier, advisor
- **Land** area managed (hectares)
- Number of **cattle** managed (no. of head)

- **Changes** in awareness, knowledge, skills, attitude and aspirations (e.g. participants feel better able to improve business performance in some way)
- Intended or actual **practice changes**
- The extent of the change and its **impact** on business performance, environment, animal welfare, etc.
- Success from a deliverer (public and private) perspective, e.g. financially, increased contacts/client base, led to more consultancies, etc.
- EDGE **coordination** worked effectively resulting in improved synergies between stakeholders and delivery of EDGE activities.
- **Monitoring, evaluation and reporting** processes, tools and techniques providing sufficient quality and quantity of data to effectively report to MLA, state/territory agencies and other key stakeholders the cost–benefit of the EDGE program.

6.9.2.4 Step 4—Underpinning development activities

The performance measure and targets for underpinning development activities is that the following are in place and functioning effectively:

- EDGE **strategic plan** 2015–2018 developed, signed–off by relevant stakeholders and implemented – this would include or be consistent with the program M&E, marketing and communication plans.
- National manager (1) and regional **coordinators** (3) appointed.
- National (1) and regional EDGE '**administrators**' (3) appointed.
- Co–ordination and delivery **contracts/agreements** in place.
- **Monitoring, evaluation and reporting plan** (including responsibilities, funding, etc) developed, signed–off and implemented.
- **Communication and marketing plan** (including responsibilities, funding, etc) developed and signed–off and implemented.
- **Dollars and FTE allocations** invested

6.9.2.5 Steps 4 and 5—the categories and metrics that need to be measured and how

6.9.2.5.1 Longer–term outcomes

The National EDGE manager reviews and reports appropriate national and MLA corporate or R&D reports at least annually or as they become available to determine the trends relating to business, breeding, grazing land management and nutrition. The aim is for these to remain positive and ideally significantly improve each period. Recommended reports include: *Australian beef: Financial performance of beef cattle producing farms, 2011–12 to 2013–14* and *Australian lamb: financial performance of slaughter lamb producing farms, 2011–12 to 2013–14* compiled by ABARES and MLA's *Northern beef report: 2013 situation analysis*.

State and territory EDGE coordinators to similarly review appropriate state and territory reports at least annually. Recommend reports include *Queensland AgTrends* (www.daf.qld.gov.au/business–trade/agtrends).

These would be reported (in writing and verbally) at an annual *EDGE management meeting* with the National manager, state and territory coordinators and private deliverers.

6.9.2.5.2 Key result areas

How well **EDGE works with other providers and stakeholders, and complements other services and programs** could be gauged from focussed discussions between the National manager and coordinators and deliverers. Similarly focussed face–to–face and/or telephone

conversations with other key stakeholders (again conducted annually and reported at the EDGE management meeting) would provide a valuable indication of the extent to which this is being achieved.

The extent to which participating producers, their service providers and advisors are aware, have increased knowledge, understanding, skills and motivation to make targeted changes can be determined a number of ways.

Currently pre– and post–skills audit questionnaires are used. There is an opportunity to streamline these questionnaires, ensure they incorporate questions relating directly to what is delivered in the workshops (and align with FutureBeef program priority areas) and also deliver them differently. The minimum target response rate regardless of the method used is 80% of total workshop participants.

For example, internet and participant enthusiasm permitting, pre–workshop quizzes could be administered online using SurveyMonkey. This software is cost–effective, easy to use, questions can be quickly and easily modified, and responses quickly collated into pdf, Word or Excel. An example using current GLM EDGE pre–workshop questions is available at www.surveymonkey.com/s/GLMEDGE–quizz.

Internet not permitting, participants can complete replica hardcopy versions that can be entered by the deliverer, coordinator or support person into SurveyMonkey or the Excel version of the same.

Concurrently it is important to also monitor and evaluate the content and delivery of the workshops themselves. This is currently done using feedback questionnaires. These can also be quickly and simply modified into electronic versions as per the pre– and post–workshop quizzes.

Copies of the current questionnaires, the workshop evaluation form and the spread sheet are available to state and territory coordinators and deliverers on the FutureBeef staff intranet at http://intranet.futurebeef.com.au/resources/workshop–and–field–day–materials.

The biennial, or three yearly, *Meat & Livestock Australia awareness and adoption KPI evaluation 2011* conducted by Axiom Research (B.COM.1042 Final Report) captures data on producer adoption of targeted practices with direct input from EDGE activities and/or information.

If required this data could be supplemented with an independent EDGE specific/targeted survey of participants 6 to 12 months post–workshop. This survey (format to be determined) could include questions relating to the influence of EDGE on the rate, extent and quality of change participants have undertaken.

6.9.2.5.3 Uptake strategies

Ideally workshop and participant data is inputted directly by coordinators and deliverers into a central, existing database (e.g. the MLA membership database or an online accessible Excel spread sheet) and managed (i.e. updated and interrogated) by a National EDGE manager with appropriate support.

6.9.3 MER recommendations

The first recommendation from this MER review is for MLA and EDGE program stakeholders to review and update the full range of EDGE goals, objectives, strategies and outcomes.

6.9.4 EDGE background and program positioning

MLA's EDGEnetwork offers practical learning opportunities to help [northern Australia beef cattle] producers gain knowledge and develop skills necessary to improve their livestock enterprises.

This educational and informative format encourages producers to expand their current expertise and learn new skills, be motivated by other producers and access the latest information. Producers gain the best of group and individual learning by working in small groups that enable them to receive personalised service.

The EDGEnetwork (EDGE) workshops have been developed by industry specialists and tested by producers Australia–wide to guarantee their quality and relevance (www.mla.com.au/Research–and–development/Extension–and–training/EDGEnetwork – accessed 12:40 10 November 2014).

6.9.4.1 MLA's current strategic imperatives, strategic initiatives and key performance indicators

EDGE currently sits under MLA's **strategic imperative** 3—Increasing productivity across the supply chain and objective 3.5—Increase producer engagement with MLA information and tools to build capacity (Corporate plan 2010–2015: building demand and productivity for Australia's cattle, sheep and goat industries).

The **strategic initiatives** of this strategic imperative are:

3.5.1 Inform: Keep producers informed about the activities and opportunities created by their levy investment in research and marketing

3.5.2 Influence: Engage producers with MLA information, tools and learning opportunities to influence improved practices

3.5.3 Involve: Facilitate the involvement of innovative producers and delivery partners to enhance producer engagement with MLA programs and activities

The **key performance indicators (KPIs)** for these strategic initiatives are:

3.5.1 At least 50% of producers engage with MLA through communication tools and programs and producer satisfaction with MLA communications increases from 3.4 to 3.8 out of 5.

3.5.2 At least 50% of those producers actively engaged in MLA extension programs improve their knowledge, skills and/or capacity to improve practice as a result of their engagement.

3.5.3 Year one: Conduct and review at least two pilots of alternative collaborative public–private delivery partnerships in each state enabling effective industry engagement and, considering results, set appropriate KPIs for the final two years of the plan.

The EDGE program is designed to positively contribute to strategic initiative 3.5.2 and to a lesser degree 3.5.1. Therefore, consistent with these KPIs EDGE must **measure**, with specific consistent **metrics** against MLA's current targets of 'at least 50% of [northern Australia beef cattle] producers actively engaged in MLA extension programs improve their knowledge, skills and/or capacity to improve practice as a result' and '…producer satisfaction with MLA communications [EDGE workshops or activities] increases from 3.4 to 3.8 out of 5'.

MLA currently engages with the majority of northern Australia beef cattle businesses. The *Northern beef report: 2013 situation analysis* lists the population (i.e. number of properties) across northern Australia as:

Table 7 Number and distribution of beef cattle businesses in northern Australia (Source: *Northern beef report: 2013 situation analysis*)

Region	State	Population (number of properties)	Average herd size (AE)	Average hectares managed
Southern Coastal	Qld	1,422	1,132	4,445
Northern Coastal	Qld	295	1,741	10,702
Eastern Downs	Qld	416	716	3,717
Southern Inland and Central	Qld	1,954	1,535	8,531
Cape and Carpentaria	Qld	67	6,183	121,159
West and South–West	Qld	175	4,460	105,911
Central North	Qld	514	3,863	38,591
Central West	Qld	462	2,188	21,852
Qld subtotal		*5,305*		
Alice Springs	NT	49	6,062	376,307
Barkly Tablelands	NT	13	12,682	417,691
VRD and Katherine	NT	44	10,331	161,829
Darwin and Top–End	NT	25	4,482	67,866
NT subtotal		*131*		
Kimberley	WA	30	9,108	236,167
Pilbara	WA	25	8,214	239,842
WA subtotal		*55*		
Total		**5,493**		

Table 8 summarises the per cent of the population MLA is currently engaged with, e.g. MLA producer memberships and the target number of 50% of the engaged population that improved their knowledge, skills and/or capacity to improve practice as a result of engaging with MLA extension projects, of which EDGE is one.

Table 8 The proportion of northern beef cattle businesses that MLA currently engages with (Source: *pers comm* Fox 2014)

Region	State	Number of properties	% of population MLA is engaged with	Target no. of population that experiences change
Southern Coastal	Qld	1,422		
Northern Coastal	Qld	295		
Eastern Downs	Qld	416		
Southern Inland and Central	Qld	1,954		
Cape and Carpentaria	Qld	67		
West and South–West	Qld	175		
Central North	Qld	514		
Central West	Qld	462		
Qld subtotal		*5,305*	*197% (10,441*)*	
Alice Springs	NT	49		
Barkly Tablelands	NT	13		
VRD and Katherine	NT	44		
Darwin and Top–End	NT	25		
NT subtotal		*131*	*109% (143*)*	
Kimberley	WA	30		
Pilbara	WA	25		
WA subtotal		*55*	*104% (57*)*	
Total		**5,493**	**194% (10,641)**	
*The total number of MLA members with grass–fed cattle within the regions listed (*pers comm* Fox 2014).				

6.9.5.1 Original EDGE vision, goals, objectives, strategies and outcomes

The EDGE **vision**, as reported in Blakeley 2001, was: Producers achieving business development through learning and continuous improvement.

The EDGE **goals** were to:

- Improve the financial and social wellbeing of Australian livestock producers
- Enable changes in practices of Australian livestock producers through the adoption of a learning culture
- Enhance learning systems in Australia that meet livestock producer's aspirations and needs.

The EDGE **objectives** and their associated **strategies** were:

Objective 1: To ensure EDGE products and services are of highest quality

Strategies: Development of products and services are founded on clear understanding of client needs

Development of products and services are based on quality development process.

The materials quality and deliverers skills are excellent.

EDGE materials are regularly updated.

Wherever possible, EDGE will draw on existing material and incorporate them into, or link to them through, its suite of training products.

Objective 2:	To ensure EDGE delivery is of highest quality
Strategies:	All EDGE deliverers will undergo a formal training process and be required to participate in a continuous improvement program.
	EDGE implements a quality assurance system for the delivery of all workshops.
	EDGE will enable differential pricing to reflect demand for high quality delivery teams.
	EDGE delivery will cater for the varying requirements of the clients. Flexible delivery procedures will be catered for.
	EDGE will install a robust licensing agreement to ensure compliance.
Objective 3:	To ensure the EDGE communication and marketing plan is effective.
Strategies:	EDGE will develop a formal communication plan. The communication plan will encompass clients, partners, industry and political agencies.
	EDGE will implement the communication plan.
	EDGE will develop a formal marketing and sales strategy.
	Those strategies will add value to the licensees' business.
	All MLA's structured education and training programs will be communicated through the EDGE network.
Objective 4:	To have collaboration and support from the public and private sector in the development and delivery of EDGE.
Strategies:	EDGE will develop products in conjunction with public and private sectors.
	EDGE will license the management and administration of the delivery teams to both the public and private sectors.
	EDGE will develop and identify pathways to integrate with the Agriculture Training Package to allow certification of competencies and attainment of national qualifications.
Objective 5:	To have EDGE self–funding.
Strategies:	EDGE delivery and management will be cost recovery. Clients will be informed of the cost and benefits from undertaking training.
	EDGE will work closely with government agencies and public companies (sponsorship) to assist clients reduce their out–of–pocket expenses from participating in EDGE.
	EDGE will allow licensees to determine the price for workshops.
	EDGE will encourage licensees to provide ongoing follow–up support to clients. Such support packages can be built into their fee structures.
Objective 6:	To ensure EDGE administration and coordination is efficient and cost–effective.
Strategies:	EDGE will have a management structure that is responsive to the customers and licensees' needs.
	EDGE management structure will design and implement a quality business management system.
	EDGE management will be accountable to the EDGE National manager and relevant industry steering committees.
	EDGE management will focus on the coordination and simplification of the delivery of training products for the Australian livestock industry.

Objective 7: To ensure EDGE Client Support System is regularly updated and maintained.

Strategies: EDGE will implement and maintain a client support system for northern Australia.

EDGE will investigate new and innovative ways to improve the uptake of best practice for EDGE clients.

Serious consideration will be given to the development and provision of a central benchmarking/database process for reference and comparison by producers of their performance for those EDGE activities.

EDGE, through the implementation of its objectives and strategies, would achieve the following **outcomes**:

1. Livestock producers recognising, quantifying and implementing industry best practice and quality assurance in meat production, marketing, business, human resource and sustainable resource management.
2. Increased individual producer professional development and attainment of business and family goals.
3. An improvement in individual business and whole industry performance.
4. A lasting network of producer groups with an ongoing learning and continuous improvement culture.
5. A network of skilled producer groups with a commitment to innovative practices and R&D.
6. A network of accredited group facilitators who have the capacity to effectively support producers to implement changes in line with best practice.
7. An integrated suite of learning activities and resources, covering all aspects of livestock business management, with an ongoing development and continuous improvement framework.

6.9.5.2 EDGE contribution to engaging with northern Australia beef cattle and sheep producers

Between 2000 (the inception of EDGE in northern Australia) and March 2009 *Nutrition EDGE* had 1,086 attendees and *Grazing land management EDGE* had 781 attendees. It was estimated that the payoffs for northern beef EDGE were benefits of $59 million, costs of $15 million, net present value of $45 million, with a benefit cost ration of 4.0 and internal rate of return of 19% (Centre for International Economics 2009, pages 19 and 57).

More recent workshop and attendee numbers are reported in Tables 9 to 11 (MLA to provide).

Table 9 Breeding EDGE participant and business numbers

Region	No. of properties	2013–14		2012–13		2011–12		% of properties engaged
Qld	5,305							
NT	131							
WA	55							

Table 10 Business EDGE participant and business numbers

Region	No. of properties	2013–14		2012–13		2011–12		% of properties engaged
Qld	5,305			84	46	190	107	~3%
NT	131			9	5	38	19	~18%
WA	55			0	0	0	0	0%

Table 11 GLM EDGE participant and business numbers

Region	No. of properties	2013–14		2012–13		2011–12		% of properties engaged
Qld	5,305			47	28			~1%
NT	131			0	0			0%
WA	55			14	10			~8%

Table 12 Nutrition EDGE participant and business numbers

Region	No. of properties	2013–14		2012–13		2011–12		% of properties engaged
Qld	5,305	19	12	10	1	0	0	~0%
NT	131	0	0	0	0	0	0	0%
WA	55	0	0	0	0	0	0	0%

Table 13 Total EDGE participant and business numbers

Region	No. of properties	2013–14		2012–13		2011–12		% of properties engaged
Qld	5,305							
NT	131							
WA	55							

6.9.5.3 Program logic

Level	Program logic	Performance measures	Evaluation methods
Longer term outcomes (Benefits for the industry)	**Overall:** More profitable and sustainable beef production Increased food safety, product integrity and biosecurity Increased efficiency of natural resource use, reduced environmental impacts Improved animal health and welfare Increased cost–efficiency, productivity and profitability	Extent to which the northern Australia beef industry is strengthening over time as shown by: Increasing **productivity** Increasing **profitability** Increasing **confidence** in industry prospects Improving **environmental** indicators Improving **animal health and welfare** indicators	ABARES surveys and statistics Western Australia, Northern Territory and Queensland government and territory surveys and statistics MLA surveys and statistics That is, **industry trends** in areas/metrics that EDGE is aiming to positively influence Identify the key reports, surveys and/or statistics that are most applicable for this purpose
Key result areas (Achieved by the end of the project or program)	**Overall:** EDGE effectively supports beef producers, their service providers and advisors develop knowledge and skills necessary to improve their livestock enterprises, are motivated and adopt appropriate best management practices within the areas of business, breeding, grazing land management and nutrition at a greater rate, across a greater geographical area and with better application than they would have otherwise.	Extent to which EDGE **works with other providers and stakeholders**, and **complements** other services and programs. Extent to which beef producers, their service providers and advisors are **aware**, have increased **understanding**, **skills** and *motivation* to make targeted changes. Extent to which producers **adopt targeted practices** with direct input from EDGE activities and/or information – and the influence of EDGE on the **rate, extent and quality of change**. The measured or calculated **impacts of changes** on these specific targeted practices within business, breeding, grazing land management, and nutrition (e.g. as per the current FutureBeef program strategic priority	Direct capturing* and reporting on from EDGE manager, state and territory coordinators, and deliverers of the impacts of their EDGE–activities on the extent of changes in capacity and targeted practices amongst beef producers, their suppliers and advisors. Collated through a common monitoring, evaluation and reporting system. irect capturing includes mechanisms (tools and techniques) such as pre–and post–skills audits, feedback sheets, narratives, observations and follow–up surveys. These mechanisms need to align with the desired specific targeted practice changes, as well as allowing unforeseen benefits to be captured. Need **participant** 'benchmarks', e.g. levels of awareness, knowledge, skills, attitude and aspirations

Level	Program logic	Performance measures	Evaluation methods
		areas): Weaner management • reduced weaning costs • increased productivity – more sale and replacement animals Phosphorus supplementation • Increased productivity – improved growth and fertility Whole of business management • improved economic decision making • improved profitability • improved data for management decisions Grazing land management • decreased feed costs • improved kg/ha of beef • improved ground cover and erosion • Better pasture/feed base Breeder management • increased returns from more sale and replacement animals • increased performance – growth rates, fertility, etc	before/at engaging with EDGE activity and after (directly and after suitable time to allow changes to be tried). Including with regards specific targeted practices, such as the current FutureBeef program strategic priority areas. Annual survey of industry **service providers and stakeholders** to gauge the extent that EDGE works with them and complements their services and programs. That is, focusing on awareness, support, observed impact and happiness with input from EDGE. Biannual northern Australia–wide **beef producer** perception and practice survey – directly linked to EDGE targeted practices. (It could be combined with existing MLA and proposed FutureBeef program surveys.)
Uptake strategies (How engagement will occur)	Provision of EDGE workshops, related activities and information to **medium–to–large beef businesses** in the areas of business, breeding, grazing land management, and nutrition to make beneficial changes on–farm to improve business	Number of **workshops** run (increasing) Where they're run (across wide(r) geographical spread) Number of **participants** (increasing to max. limit per workshop) Number of **businesses** these	Deliverers report post–workshop to state/territory coordinators with **number** of workshops, workshop location, number of **participants**, number of businesses these attendees represent, **type** of business, location of **businesses**,

Level	Program logic	Performance measures	Evaluation methods
	performance. Provision of EDGE workshops, related activities and information to beef producer **suppliers** and **advisors** to better support beef business make beneficial changes on–farm to improve business performance. Extent to which EDGE is **coordinated** to maximise synergies and work effectively to a whole of northern Australia outcome. Extent to which **monitoring, evaluation and reporting** processes are in place to provide required information.	attendees represent Location of these businesses (NB one business may have >1 property/land parcel) PICs / Lot nos **Type** of participants, i.e. beef producer, supplier, advisor **Land** area managed (hectares) Number of **cattle** managed (no. of head) **Changes** in awareness, knowledge, skills, attitude and aspirations (e.g. participants feel better able to improve business performance in some way) Intended or actual **practice changes** The extent of the change and its **impact** on business performance, environment, animal welfare, etc Success from a deliverer (public and private) perspective, e.g. financially, increased contacts/client base, led to more consultancies, etc EDGE **coordination** worked effectively resulting in improved synergies between stakeholders and delivery of EDGE activities. **Monitoring, evaluation and reporting** processes, tools and techniques providing sufficient quality and quantity of data to effectively report to MLA, state/territory agencies and other key stakeholders the cost–benefit of the EDGE program.	**land** area and **cattle** managed. Data collected at registration (e.g. registration form). Location/s, land area and cattle numbers could also be captured in pre–workshop mapping. Deliverers report post–workshop to state/territory coordinators regarding **changes** in awareness, knowledge, skills, attitude and/or aspirations occurring during the workshop. As well as intended **practice change** (first workshop) or actual change and its **impacts** (follow–up workshop). Possible tools/techniques incl. feedback sheets, 'stop–start–continue' activity, discussions, etc. State/territory coordinators collate information and report quarterly to national coordinator, e.g. hardcopy or electronic online templates. Statistics on use of supporting activities, e.g. eTechnology/eExtension platforms and access to website(s), etc.
Underpinning development activities (How structures and outputs are developed)	National manager and regional (state/territory) coordinators with administration support. Adoption of a continuous improvement process.	EDGE **strategic plan** 2015–2018 developed, signed–off by relevant stakeholders and implemented – this would include or be consistent with the program M&E, marketing and	Annual review and debrief with EDGE manager, coordinators, deliverers. Including support staff and other key stakeholders as appropriate. Quarterly coordinator reports

Level	Program logic	Performance measures	Evaluation methods
	Ongoing marketing and communication. Ongoing maintenance and development of EDGE activities, resources and support mechanisms. Ongoing and improved engagement and negotiation with other stakeholders to ensure the necessary activities and resources are available to meet the targeted needs. Training and equipping coordinators, deliverers and their support staff (e.g. administration), with the skills, tools and other resources needed to effectively undertake their tasks in relation to EDGE. (e.g. train–the–trainer activities/processes for deliverers – technical and facilitatory; eTechnology/eExtension use training; monitoring and evaluation tools and technique training; reporting–report writing training.)	communication plans. National manager (1) and regional **coordinators** (3) appointed. National (1) and regional EDGE '**administrators**' (3) appointed. Co–ordination and delivery **contracts/agreements** in place. **Monitoring, evaluation and reporting plan** (incl. responsibilities, funding, etc) developed, signed–off and implemented. **Communication and marketing plan** (incl. responsibilities, funding, etc) developed and signed–off and implemented. **Dollars and FTE allocations** invested	Individual activity reports from deliverers Cost–benefit analysis of investment versus outcomes Questions in the biannual survey of stakeholders

6.9.5.4 Monitoring, evaluation and reporting plan

Level	Monitoring and evaluation questions	Methods (EDGE and MLA do now, or have done, to varying degrees)
1. What did we do? (Project process, activities and outputs)	1. Are planned structures, management and staffing in place and operating effectively? 2. How well did planned collaboration occur – what did it add to the outcome? 3. Were planned activities undertaken and outputs produced – and how well were these done and/or produced? 4. What were the barriers, enablers and lessons learned from implementing EDGE?	• Good project records on activities • Structured debriefs with project teams, steering groups and collaborators • Peer review – on process and content • Feedback sheets – process questions • Informed person interviews and surveys
2. How well did we do it? (Awareness, skill development and capacity gains)	1. What was the reach of EDGE – in terms of awareness and type of engagement? 2. What key messages from EDGE have been recalled by whom? 3. What gains were made in terms of understanding, skills and motivation (targeted and other) in what groups of people, where? 4. What was most helpful in supporting capacity change?	• Project records on distribution and access of information and tools – including Google Analytics • Media analysis and survey questions re recall • Feedback sheets – questions re specific gains in understanding, skills and intentions • Pre– and post–activity development assessments • Follow–up survey – questions re reflection on capacity gains
3. Is anyone better off? (Practice changes in the target customer group)	1. What practice change occurred (targeted and other), where and across what percentage of the herd/industry in the life of EDGE? 2. What practice change would have occurred without EDGE? 3. What are the indications for practice change beyond the life of EDGE – what is needed to assist this? 4. What was the influence of EDGE in terms of increased reach, faster change or more effective application? 5. What were the barriers or enablers to change – and where are the research gaps?	• Follow–up surveys of participants in activities or receivers of tools and information – questions re: practice change; barriers and enablers, and; project influence. For example, MLA's 'Awareness and adoption KPI evaluation' surveys; MLA's 'Australian management practices survey'; MLA's 'EDGE and MBfP mini survey'; MLA's 'Northern beef report: 2013 situation analysis' • Narratives – capturing instances of change as they are observed or reported • Case studies • Secondary sources – such as increases in purchases of equipment or stock
4. Benefits	1. What are the (indicative and	• Follow–up surveys –

Level	Monitoring and evaluation questions	Methods (EDGE and MLA do now, or have done, to varying degrees)
(How did these practice changes contribute to the intended benefits of this investment?)	additional) benefits arising from the practice change(s) made – production, enterprise management, economic, social and environmental – in terms of appropriate metrics? 2. What are the unintended/unexpected benefits or consequences?	questions on observed or expected benefits and consequences. For example, MLA's 'Awareness and adoption KPI evaluation' surveys; MLA's 'Australian management practices survey'; MLA's 'EDGE and MBfP mini survey'. • Narratives – capturing observed benefits • Case studies – detailed analysis of benefits and consequences • Informed person interviews or survey – questions on observed benefits or consequences • Independent evaluation, e.g. like the 'Grazing Best Management Practice Evaluation' conducted by Roberts Evaluation Pty Ltd for the Fitzroy Basin Association (2014).
5. Broader impacts	1. What contribution has this made to MLA's program KPIs and strategic priorities? 2. What are the lessons for future investment decisions? 3. What other factors influenced the outcomes of investment (positively and negatively)?	• Collated and calculated broader impact based on evidence and research • Broader industry benchmarking surveys – questions related to gains and influences. For example, MLA's 'Awareness and adoption KPI evaluation' surveys. ABARES' 'Australian farm survey results 2010–12 to 2012–13'. • Regional, state, territory and national statistics on industry performance in KPI areas. For example: 'Desert Channels Qld Inc. 2008 GLM participant survey'; NT's 'Pastoral industry surveys'; Qld's 'AgTrends' reports; MLA's 'Australia management practices survey'; MLA's 'Northern beef report: 2013 situation analysis'

6.10 Deliverer accreditation

6.10.1 Introduction

FutureBeef is committed to providing the highest quality, consistent learning opportunities to Australian red meat producers through EDGE. This includes the learning materials, i.e. workshop notes, trainers (or deliverers) and ongoing service provision.

Following is a proposed policy for EDGE deliverers, specifically deliverer:
1. Identification and application
2. Accreditation
3. Initial training, or train–the–trainer
4. Ongoing professional development
5. Marketing and communication support

This is a proposal and must be discussed and agreed upon in consultation with relevant EDGE licensees, coordinators and deliverers before finalizing.

Similarly, as the EDGE program continues to evolve these policies will need to be reviewed and updated as required.

6.10.2 Background

The accreditation of EDGE deliverers developed differently between northern and southern Australia. EDGE was initially established in southern Australia in the late 1990s. Protocols and processes were developed for the deliverer accreditation and training at this time (Wallis 2000). Over time these processes were adapted by individual state licensees to fit their needs, those of their local deliverers in line with national EDGE policy and budget.

When EDGE was launched in northern Australia in the early 2000s a slightly different set of protocols and processes (still based on the underlying principles of EDGE) were developed and in turn were modified to suit northern Australian circumstances.

It is timely to review and consolidate these processes for northern Australia. And where relevant make them as consistent as possible to help minimize confusion between deliverers, who are likely to deliver across state boundaries, and to ensure the consistency and quality of delivery of EDGE workshops across Australia.

6.10.3 Identification and application

Historically, the identification of EDGE deliverers and group facilitators was a planned, strategic process. Expressions of interest were called for and potential deliverers would apply (addressing specific selection criteria) indicating their particularly areas of expertise or interest. They would submit an application which was reviewed by the EDGE steering committee, national manager and state licensee/coordinator. Successful applicants would then be interviewed before, or at, the initial induction and training session.

The form of the interview, initial induction and training sessions varied between northern and southern Australia and to a lesser degree between workshops. For example, potential deliverers for PROGRAZE® VICTORIA had to complete assessment tasks to be submitted to a ‘coach’ who they would co–deliver with before becoming accredited.

For shorter, one day workshops this process was streamlined to potential deliverers being walked through workshop content (participant workshop notes) and process (facilitator notes) with an accredited trainer and/or the developer of the workshop; presenting a 20 minute activity to achieve a learning activity on which they are assessed; and then going

onto deliver the workshop as is or co–delivering to develop their skills further before obtaining full accreditation.

A number of trainers indicated that the best way for potential deliverers to come up to speed was for them to become familiar with the material and then co–deliver with an accredited trainer. This gave them the opportunity to see how the workshop is delivered in practice while being supported by an experienced deliverer in their first delivery. It is also a good way of assessing their skills in a real–life situation.

Initially in northern Australia expressions of interest were also advertised. Potential deliverers had to prepare applications addressing selection criteria and detailing their experience, skills and industry credibility. Successful applicants would then attend an induction and training session regarding the particular EDGE workshop they wished to deliver. At this session they were required to present a 20 minute activity to achieve a learning activity in front of a selection panel comprised of the developer, national manager, producers and peers. This was similar to the southern process.

At present, new deliverers are nominated by the individual organisations based on their experience, skills and credibility. While these new deliverers are not required to go through quite the same rigorous process, it has been mutually agreed that the organisations involved will not nominate a person unless they are of suitable quality as it would decrease their industry credibility.

In northern Australia MLA has traditionally bore the costs associated with advertising, selection and initial induction and training of potential deliverers.

6.10.3.1 Recommendations for deliverer identification and application

1. A consistent, national approach is agreed upon (including the associated materials) for deliverer application and subsequent accreditation in consultation with relevant state and territory licensees, coordinators and deliverers.

2. EDGE nationally, i.e. MLA, does not contribute towards or pay for potential deliverers travel, incidentals, time and/or salary costs to attend EDGE information, induction and/or specific workshop training activities.

3. EDGE nationally contributes towards a proportion of train–the–trainer activities, the other paid for by the licensee/coordinator. Specifically:
   - Participant accommodation
   - Catering and meals
   - Venue hire
   - Trainer fees

4. EDGE nationally contributes to purchasing or providing (where it is MLA material) specific reference material/s for accredited, active deliverers. If these have been identified by the original developers and/or current trainers to be essential support/reference material for deliverers. Particularly where EDGE nationally may be able to make a bulk, cheaper purchase. This also helps to ensure that all deliverers have the same tools and support to deliver consistently across Australia.

5. Each state and/or territory licensee, coordinator or deliverer must prepare a 12 month proposal (including budget) for train–the–trainer activities so that the costs can be budgeted for and distributed equitably across all states and territory before MLA makes or agrees to any contribution.

6. New expressions of interest in delivering EDGE in Queensland, i.e. outside of current delivery organisations, be assessed using the recommended application and selection process. If successful, then given the opportunity to deliver EDGE in Queensland, New South Wales and the Northern Territory. This decision and subsequent process to be transparent and discussed with current Queensland, Northern Territory and Western Australia deliverer organisations.

6.10.4 Initial training, or train–the–trainer (including induction)

Originally there were two types of training – one for 'group facilitators' (who may also be specialist deliverers) and another for 'specialist deliverers'.

Their initial training involved a one–day induction and briefing on EDGE and their respective roles and responsibilities. Wallis (2000) details the recommended processes for this induction/briefing in *Getting Started with EDGE Network – Guidelines for selecting and training EDGE Network Deliverers*.

Depending on the workshop/s they wished to deliver they would also attend specific workshop training. In some cases potential deliverers may be eligible for 'Recognition of Prior Learning' (RPL) and therefore not have to attend or go through the same training and accreditation process.

The induction and specific workshop training are **not** designed to provide specialist deliverers or group facilitators with the technical or facilitation information, skills or experience to deliver a particular workshop successfully. If the specialist deliverer or group facilitator has been assessed at interview as having specialist skills in an area than these skills and knowledge are assumed. Alternatively, EDGE may help deliverers and group facilitators identify their training needs and direct them to appropriate further training outside EDGE.

6.10.4.1 Recommendations for initial deliverer training

7. All potential deliverers must attend an EDGE induction/briefing session explaining the vision, goals and objectives of the program as well as its' structure and administrative requirements. This may or may not form part of the specific workshop training. It is important that all new potential deliverers and even previously accredited deliverers are updated. Wherever possible this session would be presented by the national manager and/or project officer.

8. All potential deliverers must attend workshop specific training. Depending on the workshop this may take one to two days, with or without the induction/briefing session. At this training they will undertake all or part of the accreditation process.

6.10.5 Accreditation

The process of deliverer accreditation has been dealt with to some degree already in Section 6.10.3.1 above. Essentially there are five options or outcomes of the accreditation for potential deliverers, these are:

1. Full accreditation after a successful application, induction, training, accreditation presentation and interview.
2. Part accreditation to co–deliver with an accredited deliverer until experience and skills sufficient for full accreditation. For example, co–delivering one to two workshops until confident.

3. Not obtaining accreditation but undertake relevant training in technical and/or facilitation skills and applying again. EDGE, the state coordinator and/or peers can help identify suitable training activities to achieve this.
4. Not obtaining accreditation (or even desiring to do so in the first place) but use knowledge and understanding gained of EDGE and the workshop/s to promote the products to clients.
5. Recognition of prior learning.

6.10.5.1 Recommendations for deliverer accreditation

9. That EDGE deliverer accreditation be based upon:
    - a written application addressing specific selection criteria, curriculum vitae and evidence of experience, skills and industry credibility
    - Certificate IV in Workplace Training & Assessment
    - attending an EDGE induction/briefing session after being short–listed from the written application
    - participating in the relevant workshop/s training session
    - preparing assessment tasks and co–delivering with an accredited deliverer before becoming accredited where applicable
    - for less 'involved' workshops presenting a 20 minute activity (taken from the workshop to be delivered) to a selection panel to achieve a specific learning activity

10. The selection panel to be comprised of the state licensee/coordinator, national manager, accredited deliverer (independent peer) and at least one producer. The panel to use a standard assessment proforma.

11. All potential deliverers, successful or otherwise to be given formal, professional, constructive feedback regarding their performance from the national manager and state licensee/coordinator.

12. EDGE continues to provide an appeals process whereby unsuccessful applicants can approach the national manager after receiving formal feedback.

6.10.6 Ongoing professional development

FutureBeef is similarly committed to the ongoing professional development of EDGE deliverers to ensure their technical and facilitation skills are as up to date as possible. While EDGE may not be able, or should be expected, to finance all professional development activities for deliverers they can contribute to, or facilitate, them.

This already occurs is the provision of workshop notes, facilitator notes, marketing/promotional material and trainer's free–of–charge to potential deliverers. And in contributing to the venue hire, accommodation and catering. Other suggestions for EDGE to assist the ongoing professional development of EDGE deliverers are outlined in the recommendations below.

6.10.6.1 Recommendations for deliverer ongoing professional development

13. Encouraging and supporting (directly or indirectly) annual reviews and update forums for state/territory based deliverers. Similar to the previously conducted north Australia (primarily Queensland) technical update and review.

14. Ensure MLA supported research results are distributed in a timely and effective manner directly to all EDGE licensees, coordinators and deliverers. The national manager and

project officer to set up a process to enable this to happen, i.e. with other relevant MLA programs/departments.

15. Personally/individually invite licensees, coordinators and deliverers to all relevant MLA events such as Beef Up Forums and other industry forums to assist them keep abreast of latest industry developments and technical advances.

16. EDGE to arrange for specialists (technical and facilitation from Australia and international when visiting Australia) to attend EDGE forums to address licensees, coordinators and deliverers wherever possible.

17. EDGE to implement an award program to recognize excellence in coordination, deliverer and facilitation within EDGE.

18. EDGE to encourage involvement of licensees, coordinators and individual deliverers in relevant professional networks, conferences, etc.

6.10.7 Marketing and communication support

EDGE has supported the production and supply of professional, high quality, consistent marketing and promotional materials to licensees, coordinators and individual deliverers.

6.10.7.1 Recommendations for deliverer marketing and communication support

19. EDGE to continue the production and supply of professional, quality, consistent marketing and promotional materials to licensees, coordinators, individual deliverers and interested external clients. These to be developed in consultation with licensees, coordinators and deliverers.

6.10.8 Summary

In summary the recommendations for EDGE deliverer accreditation, ongoing professional development and support are:

1. A consistent, national approach is agreed upon (including the associated materials) for deliverer application and subsequent accreditation in consultation with relevant state and territory licensees, coordinators and deliverers.

2. EDGE nationally, i.e. MLA, does not contribute towards or pay for potential deliverers travel, incidentals, time and/or salary costs to attend EDGE information, induction and/or specific workshop training activities.

3. EDGE nationally contributes towards a proportion, e.g. 50% of train–the–trainer activities, the other 50% paid for by the licensee/coordinator. Specifically:
   - Participant accommodation
   - Catering and meals
   - Venue hire
   - Trainer fees

4. EDGE nationally contributes to purchasing or providing (where it is MLA material) specific reference material/s for accredited, active deliverers. If these have been identified by the original developers and/or current trainers to be essential support/reference material for deliverers. Particularly where EDGE nationally may be able to make a bulk, cheaper purchase. This also helps to ensure that all deliverers have the same tools and support to deliver consistently across Australia.

5. Each state and/or territory licensee, coordinator or deliverer must prepare a 12 month proposal (including budget) for train–the–trainer activities so that the costs can be budgeted for and distributed equitably across all states and territory before MLA makes or agrees to any contribution.

6. New expressions of interest in delivering EDGE in Queensland, i.e. outside of current delivery organisations, be assessed using the recommended application and selection process. If successful, then given the opportunity to deliver EDGE in Queensland, New South Wales, the Northern Territory and Western Australia. This decision and subsequent process to be transparent and discussed with current Queensland, Northern Territory and Western Australia deliverer organisations.

7. All potential deliverers must attend an EDGE induction/briefing session explaining the vision, goals and objectives of the program as well as its' structure and administrative requirements. This may or may not form part of the specific workshop training. It is important that all new potential deliverers and even previously accredited deliverers are updated. Wherever possible this session would be presented by the national manager and/or project officer.

8. All potential deliverers must attend workshop specific training. Depending on the workshop this may take one to two days, with or without the induction/briefing session. At this training they will undertake all or part of the accreditation process.

9. That EDGE deliverer accreditation be based upon:
    - a written application addressing specific selection criteria, curriculum vitae and evidence of experience, skills and industry credibility
    - Certificate IV in Workplace Training & Assessment
    - attending an EDGE induction/briefing session after being short–listed from the written application
    - participating in the relevant workshop/s training session
    - preparing assessment tasks and co–delivering with an accredited deliverer before becoming accredited where applicable
    - for less 'involved' workshops presenting a 20 minute activity (taken from the workshop to be delivered) to a selection panel to achieve a specific learning activity

10. The selection panel to be comprised of the state licensee/coordinator, national manager, accredited deliverer (independent peer) and at least one producer. The panel to use a standard assessment proforma.

11. All potential deliverers, successful or otherwise to be given formal, professional, constructive feedback regarding their performance from the national manager and state licensee/coordinator.

12. EDGE continues to provide an appeals process whereby unsuccessful applicants can approach the national manager after receiving formal feedback.

13. Encouraging and supporting (directly or indirectly) annual reviews and update forums for state/territory based deliverers. Similar to the South Australian annual EDGE conference and the north Australia (primarily Queensland) technical update and review.

14. Ensure MLA supported research results are distributed in a timely and effective manner directly to all EDGE licensees, coordinators and deliverers. The national manager and project officer to set up a process to enable this to happen, i.e. with other relevant MLA programs/departments.

15. Personally/individually invite licensees, coordinators and deliverers to all relevant MLA events such as Beef Up Forums and other industry forums to assist them keep abreast of latest industry developments and technical advances.

16. EDGE to arrange for specialists (technical and facilitation from Australia and international when visiting Australia) to attend EDGE forums to address licensees, coordinators and deliverers wherever possible.

17. EDGE to implement an award program to recognize excellence in coordination, deliverer and facilitation within EDGE.

18. EDGE to encourage involvement of licensees, coordinators and individual deliverers in relevant professional networks, conferences, etc.

19. EDGE to continue the production and supply of professional, quality, consistent marketing and promotional materials to licensees, coordinators, individual deliverers and interested external clients. These to be developed in consultation with licensees, coordinators and deliverers.

6.11 Nutrient requirements reports by Dr Stuart McLennan

6.11.1 Report 1. Estimation of intake from digestibility of the selected diet

6.11.1.1 Background

The current Nutrition EDGE manual includes figures showing estimated DM intakes of (a) steers of three different liveweights (LWs; 200, 400 and 600 kg; Figure 29), and (b) mature lactating cows at 1, 3 and 6 months post–calving (Figure 30), against pasture (diet) DM digestibilities (DMDs) ranging from 50 to 80%. These figures were considered to lack precision especially at the low end of the DMD range. The origin of the original graphs is unknown.

6.11.1.2 Objective

(i) To evaluate a series of methods for generating alternative intake/DMD prediction curves for steers with the aim of improved precision for predicting the intake of grazing steers.

In order to revise these prediction curves some assumptions need to be made as there are more variables than just DMD that affect intake under practical feeding situations. For instance, it is inconceivable that the animals will not be increasing their productivity as DMD increases over about 20% units but the curves are supposed to reflect only the effect of DMD on intake. A description of the assumptions made for the steers are included below. Only revision to Figure 29 (steers) has been attempted. There is insufficient information on the inputs and assumptions used in generating Figure 30 (lactating cows) to attempt any revision (see later). Changes in DMD are likely to be associated with changes in not only DMD but also in cow liveweight gain (LWG) and milk production which in turn will affect intake over and above any effects of DMD alone. As the assumptions used in the current figure for cows are unknown they cannot be reproduced using the methods described below. It is important to stress that there is no way of categorically determining whether any new curves are better than the existing ones without a detailed study set up to ‘measure’ voluntary intake of cattle grazing pastures of varying quality (including tropical species), a pursuit which has proved almost impossible in the past. Thus it will be largely a subjective call as to whether the revised prediction curves are better than the existing ones.

6.11.1.3 Methodology

The methods used to generate new prediction curves for steers included:

(i) The equations from the Australian feeding standards (Nutritional Requirements of Domesticated Livestock; NRDR 2007; hereafter NRDR), which have been included in the software package 'GrazFeed', as described in Chapter 6 ('Prediction of Feed Intake') of that publication.
(ii) The 'QuikIntake' (QI) spreadsheet calculator, based on a confined animal (zero grazing/walking).
(iii) The QI spreadsheet calculator, based on an animal walking 7 km/d on level ground.
(iv) The Minson and McDonald (1987; hereafter M&M) prediction equation.

A brief description of each of these is included together with their basic assumptions.
Setting the boundaries and general assumptions

Where it was relevant the animal involved was assumed to be a *Bos indicus* crossbred (75% *indicus*) steer with a standard reference weight (SRW; see definition below) of 660 kg. This is consistent with the value used in the adult equivalents (AE) calculator. The effect of varying the SRW was investigated.

The current Nutrition EDGE figure includes predictions based on diets of DMD ranging from 40 to 80% but DMDs at the upper extremity of the range are not going to be reached on tropical pastures. In this exercise, intakes were initially predicted between 50 and 70% DMD, the 'usual' range for cattle grazing tropical pastures in northern Australia. In the final analysis the range was extended to 40–70% DMD.

1. Australian feeding standards / GrazFeed

This method of predicting intake has been described in Chapter 6 of NRDR and is that used in the GrazFeed software version of these feeding standards. The method is based on an estimate, firstly, of the 'Potential Intake' of feed by the animal which is defined as the amount of feed eaten when feed supply is abundant and the animal selects a diet with a DMD of at least 80%, or an M/D of at least 11 MJ/kg DM. The main factors defining potential intake are the body size of the animal and its physiological state. However, potential intake may be reduced by disease and thermal stress. The next step in intake prediction is to derive an estimate of 'Relative Ingestibility' of the diet, which represents the proportion of the potential intake that the animal can be expected to consume under existing conditions. Relative ingestibility is thus a function of the extent to which the chemical composition of the selected diet restricts its intake (e.g., its DMD), as well the sward structure and pasture availability which limits the animal's ability to harvest herbage in the time available. Relative ingestibility is thus expressed as a fraction (0–1). For the current exercise it is assumed that herbage availability is not limiting and that the animals are disease–free and grazing in a thermo–neutral environment.
The predicted intake is calculated as the product of the potential intake (kg DM/day) and the relative ingestibility (fractional).

Calculation of potential intake
As mentioned above potential intake refers to the upper limit of the voluntary intake of the animal and is a function of the animal's body size and physiological state. Current weight of the animal though is not a good predictor of body size as it is confounded by stage of development and body condition. Thus animals at the same body weight could differ in age, frame size and body condition by virtue of the different growth paths to that point and would be expected to have different potential intakes. An example would be a tall, lean, older steer vs a young, shorter, fat steer of the same body weight. Thus the calculation of potential

intake is to some extent based on the 'normal weight' of the animal. The normal weight refers to the animal's position on an allometric growth curve, such as that described by Brody (1945). Another key factor in determining potential intake is the SRW of the animal which is defined by the weight of a mature animal (completed skeletal growth) when its condition score is in the middle of the range. Possible SRWs are provided in a table in the feeding standards (NRDR) but it is stressed by the editors that these are not constants and that the SRW can vary with the environment in which the animal grows, as this will affect the final mature size of the animal. This is a difficult concept for many to grasp. A change in the SRW can have a considerable effect on the calculated potential intake and thus on the eventual predicted forage intake.

Calculation of relative ingestibility
The calculation of relative ingestibility is based on the recognised general linear relationship between apparent digestibility and voluntary intake of the diet. However, it is also acknowledged from the literature that such relationships vary with the forage involved, with different slopes of the regression line reported for different plants and even different species of the same genus. It has also been well demonstrated that the intake/DMD relationship is quite different for tropical (C4) and temperate(C3) forages, whereby at same digestibility intake is much higher for cattle consuming tropical compared with temperate pastures. However, the upper limit of digestibility usually encountered is also lower for the tropical species (around 70% maximum). These differences have been accommodated in GrazFeed by including separate but parallel linear relationships (same slope, different intercept) between DMD and relative ingestibility for the tropical and temperate pastures. A further relationship is provided for legume species and provision is made to include the proportion of legume in mixed pastures where the major species is C3 or C4. In summary, if pasture is non–limiting in supply and the animal's ability to harvest it is not compromised, the major factor affecting relative ingestibility is the DMD of the diet. The relative ingestibility is expressed as a fraction (0–1) and multiplied by the potential intake to arrive at a predicted intake of pasture. In the current simulation, it is assumed that the legume content in the pastures is zero.

2. 'QuikIntake'
The QI spreadsheet calculator includes the equations from the Australian feeding standards (NRDR) and predicts intake, firstly of metabolisable energy (ME) and thence of DM, by back–calculation from observed animal performance. This is the reverse of the 'normal' usage of the feeding standards where known or predicted nutrient intake is used to predict animal performance. The main variables incorporated in the QI spreadsheet are a description of the selected diet in the form of a DMD value, a description of the animal in terms of the breed, sex, LW and age and an observed or 'expected' (historical) LW change. The breed and sex of the animal provide the basis for defining the SRW (see earlier) for the particular animal although this should include some local knowledge about the likely mature weight of similar animals in the present environment. For breeding cattle there is also provision for a description of the stage of pregnancy or lactation. The quality of the diet is defined by its DMD, as determined for instance using faecal near infra–red spectroscopy (F.NIRS), and this is converted by simple equation to an ME content (M/D; MJ/kg DM). The total ME requirements are determined, using the various equations of the feeding standards, for the maintenance of the animal, for its activity levels (grazing and walking on ground of a stated elevation) and for its production over and above maintenance, i.e., for the observed LWG, pregnancy and lactation. The DM intake is then determined by dividing this total ME intake by the energy density of the diet (M/D) to express intake as kg/d DM or as a proportion of LW (%W/d).

The contribution of the described animal in terms of adult equivalents (AEs) is also calculated as multiples of either 450 kg LW or of ME intake (MEI) of 72.6 MJ/d, the latter

representing a *Bos indicus* crossbred steer at maintenance consuming a diet of 7.75 MJ/kg DM (*ca*. 55% DMD) and walking 7 km/d on level ground.

The current exercise is based on predicting *ad libitum* intake of cattle with DMD of the diet varying between 50 and 70%. However, QI also requires an estimate of the LWG of the animals (and pregnancy and lactation status for females). For this exercise the LWG is assumed to increase with DMD in the same manner as suggested by Minson and McDonald (1987), i.e., the assumed LWGs for diet DMD of 50, 55, 60, 65 and 70% were 0, 0.25, 0.50, 0.75 and 1.00 kg/d, respectively. The age of the animal is also an unknown so the assumed ages for steers of LW 200, 300, 400, 500 and 600 kg were 8, 20, 30, 38 and 44 months, respectively. Age does not have a major effect on the intake predictions.

The simulations were carried out for steers in confinement (zero activity) and for steers walking 7 km/d, as was used in the AE calculator.

3. Minson and McDonald (1987)
The method set out in M&M was essentially centred on first estimating the quality of the forage selected by grazing cattle based on their LW and LWG, and then using this forage quality estimate in conjunction with the ARC (1980) energy requirement tables to determine the amount of forage of this quality that would need to be consumed by cattle (growing cattle only) of a certain LW to achieve a particular LWG.

This method assumed that forage was non–limiting in availability, and it also used the simplified assumption that growth rate of the cattle was linearly related to the DMD of the pasture eaten, where 50% DMD corresponded to zero growth rate and 70% DMD coincided with a growth rate of 1.0 kg/d. Using these assumptions and back–calculations from the ARC tables the authors derived a multiple regression equation to estimate intake from LW and LWG. The intake predictions were then presented in tabular format with LW varying between 100 and 600 kg and LWGs varying from minus 0.5 to +1.0 kg/d. As the ARC energy requirement tables are based on animals in confinement, with a small allowance for activity (4.3 kJ/kg LW/d; i.e., 1.72 MJ/d for a 400 kg steer), the predictions from the M&M equations will also relate primarily to confined animals. It should also be noted that the ARC tables used in deriving the equation referred to steers of breeds of medium mature size and heifers of breeds of large mature size, thereby probably aligning with the *Bos indicus*–derived breeds but not with the larger European breeds.

General comment
A caveat needs to be placed on all of the results of these predictions of intake. For any combination of diet DMD (or M/D) and animal LW it is possible to estimate ad libitum intake by the animals. However, this does not mean that the predicted intake is attainable. There is a limit to the intake of DM that an animal can achieve which, for forage diets, is largely constrained by physical factors related to the retention time of digesta in the gastrointestinal tract of the animal. Intake predictions over and above this upper threshold are non–sensible. Some of the intakes presented in the attached figures will exceed this threshold and the figures should be considered with caution. However, as there are no clear–cut rules on this aspect a degree of subjectivity is required in assessing the results of these various simulations.

6.11.1.4 Results

For all predictions using all methods, intake decreased progressively with increasing LW at any diet DMD value. This is consistent with observations that under practical feeding conditions older, heavier cattle eat less, on a LW basis, than their younger, lighter counterparts.

1. Predictions using the feeding standards (NRDR 2007) – suing the potential intake and relative ingestibility of the diet

The results of the simulations based on the feeding standards are presented in Fig. 1.

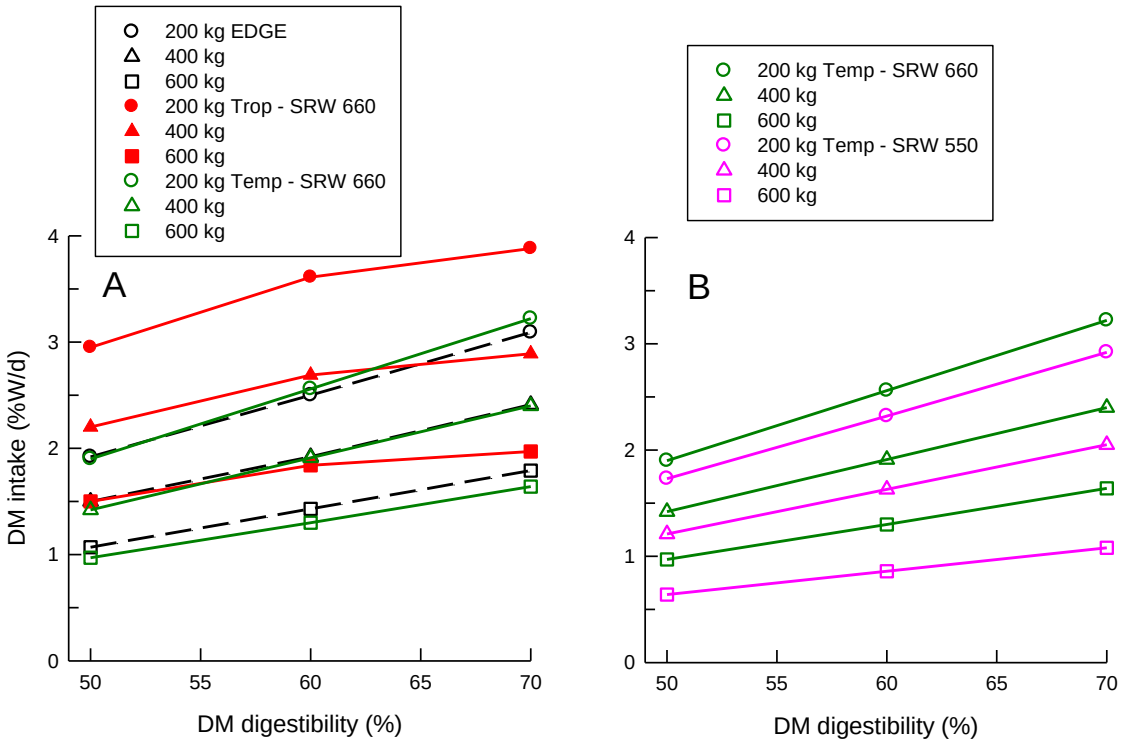

Fig. 1. *Relationship between DM digestibility and DM intake for steers of various liveweights (200 – 600 kg) according to the predictions of the Australian feeding standards (NRDR 2007), compared with those included in the Nutrition EDGE manual (dashed lines in graph A). (Fig. 1A) intake predictions for steers with a standard reference weight (SRW) of 660 kg and where the forage (nil legume) is either a C4 (Trop; red lines) or C3 (Temp; dark green lines) type; and (Fig. 1B) intake predictions for steers on a C3 forage and having a SRW of either 660 (dark green lines) or 550 kg (pink lines).*

Fig. 1A. There is close agreement between the current EDGE intake predictions and those based on the NRDR (2007) where the steers are assumed to have a SRW of 660 kg and the forage base is a C3 (temperate) species. However, changing the forage type from a C3 to a C4 (tropical) resulted in marked increases in the prediction of voluntary intake at any DMD (Fig. 1A) to the extent that a 200 kg steer is predicted to consume nearly 3%W/d of a 50% DMD diet. This arises due to assumption in the NRDR calculations that intake is higher for C4 compared to C3 plants at any DMD, leading to corresponding higher values for relative ingestibility for C4 plants. As the potential intake does not differ for the two forage types, this being largely related to the LW of the animal and its SRW, the intake predictions (product of potential intake and relative ingestibility, or DMD) are also higher for C4 compared with C3 forage types.

Fig. 1B. Reducing the SRW of the steers from 660 to 550 kg, where a common forage type (C3) is consumed, results in considerable reductions in the predicted intake at any DMD value. The effect apparently increases with increasing LW of the steers. In this case the potential intake is reduced as SRW declines but there is no change in the relative ingestibility at any given value for DMD. This figure shows the importance of correctly defining the SRW of the cattle involved. It also shows that when using this approach for intake prediction there is no single relationship between DMD and intake that applies across cattle types and environments.

As discussed earlier, predicted intake (as a proportion of LW) declined in each case with increasing LW of the steers.

Predictions using *QuikIntake – back–calculation from LW change*

The results of the simulations based on the *QuikIntake* calculator are presented in Fig. 2.

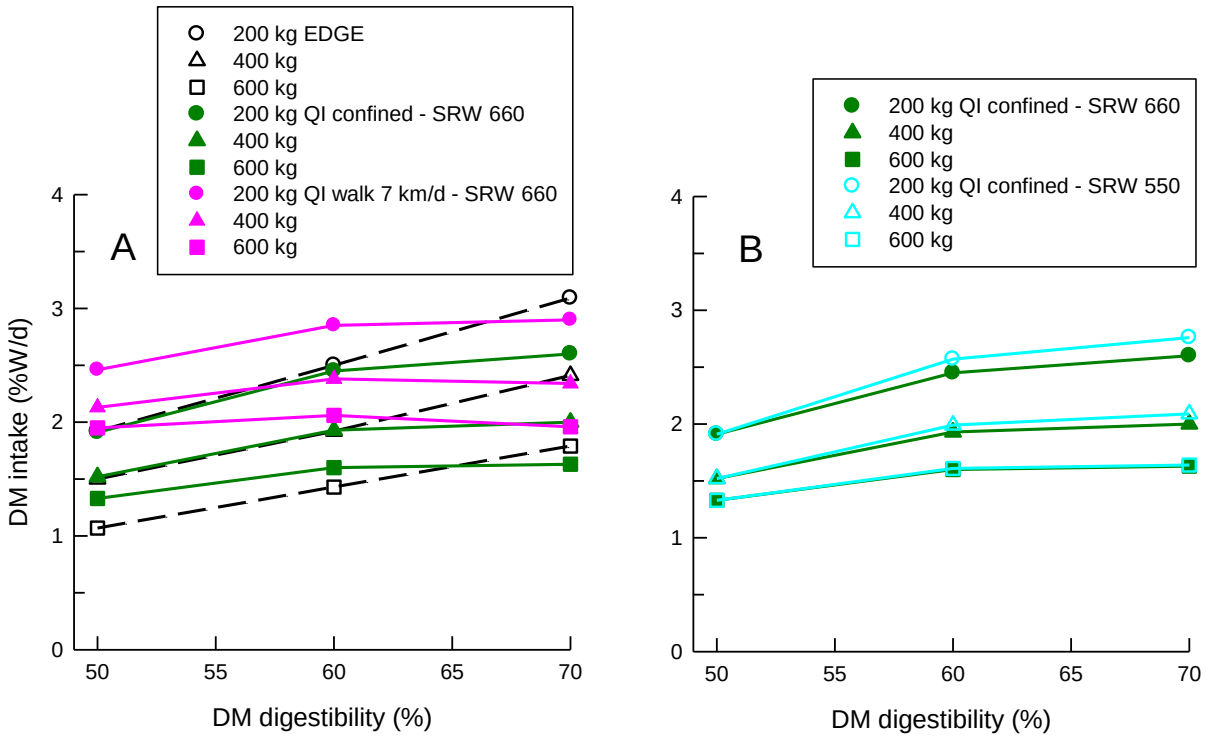

Fig. 2. *Relationship between DM digestibility and DM intake for steers of various liveweights (200 – 600 kg) according to the predictions of the QuikIntake spreadsheet calculator, compared with those included in the Nutrition EDGE manual (dashed lines in graph A). (Fig. 2A) intake predictions for steers with a standard reference weight (SRW) of 660 kg and where the steer is either confined (dark green lines) or is walking 7 km/d (pink lines); and (Fig. 2B) intake predictions for steers confined and having a SRW of either 660 (dark green lines) or 550 kg (light blue lines).*

QuikIntake uses the equations from the NRDR (2007) updated according to the most recent version of the web–based GrazFeed technical manual (current version: Freer *et al*. 2012). These predictions are based on back–calculation from LWG using the diet DMD to define the energy content of the diet. They do not use a potential and relative intake approach as described above (see Fig. 1). Assumed values for LWG of the steers are aligned with the DMD of the diet, as described earlier.

Fig. 2A. Assuming a SRW of 660 kg (consistent with that used for this breed of steer in the AE calculator) and that the steers are confined (no grazing), the predicted intakes using QI are similar to those currently in the EDGE manual at low DMD values, especially for steers between 200 and 400 kg, but deviate at the higher DMD of 70%. Unlike the EDGE predictions where there is a near–linear relationship between intake and DMD across the full range of DMD, the intake response predicted by QI tends to level out as DMD increases in response to the higher M/D of the diet and thus lower intake required to provide the necessary ME for growth. For example, with the 400 kg steer, at 50% DMD the predicted total MEI is 41.9 MJ/d on a diet of M/D 6.9 MJ/kg DM; at 70% DMD, MEI is 82.6 MJ/d on a diet of M/D 10.3 MJ/kg DM. Thus the predicted DM intakes (MEI divided by M/D) are 6.1 kg/d and 8.0 kg/d, respectively, not as large as difference in MEI alone might suggest.

Adding an activity component in the form of walking 7 km/d increases markedly the energy requirements of the animal and thus the predicted DM intakes. The effect is greatest at low DMD (and thus low LWG) as the energy cost of walking is (approximately) a constant in absolute terms (MJ/d) but represents a bigger proportion of total ME requirements at low

compared with high LWG (and thus also DMD). The walking component is consistent here with that used in the new calculation of adult equivalents (AEs).

Fig. 2B. This figure shows very little effect of reducing the SRW of confined steers from 660 to 550 kg when QI is used to estimate ME requirements and intake, in contrast with the NRDR method used above (see Fig. 1 for comparison).

2. Predictions using Minson & McDonald (1987) equation

The results of the simulations based on the M&M equation are presented in Fig. 3.

Fig. 3A. The multiple regression equation of M&M delivered near–linear prediction responses for intake (the slope increased slightly with increasing DMD) which indicated overall a more gradual increase in intake as DMD increased than shown by the current EDGE figures. For instance, when the DMD was 70% the EDGE curve indicated an intake of 3.1%W/d compared to about 2.7%W/d for the M&M predictions.

Fig. 3B. This figure shows a comparison between the M&M predictions of intake and those from the QI analysis for steers with nil activity allowance. There is relatively close agreement across LWs for the intake predictions of M&M and those of QI for confined steers, the main difference being that the latter are more curved than the former. It should be remembered that the M&M equation was derived from the ARC tables which made only a small allowance for activity and certainly not the equivalent of an animal walking 7 km/d. As indicated in Fig. 2B, adding a walking component to the QI predictions considerably increases the intake predictions. For instance for a 200 kg steer the addition of walking activity increases the maintenance energy requirements by 29–24% and the total ME requirements by 29–12% for diets progressively increasing in DMD from 50 to 70%, respectively (data not shown in figures). This considerably increases the intake predictions; for example, the QI–predicted intake for a 200 kg steer walking 7 km/d is 2.45%W/d at 50% DMD and 2.9%W/d at 70% DMD, whereas the comparable predicted intakes for confined steers were 1.91 and 2.60%W/d, respectively.

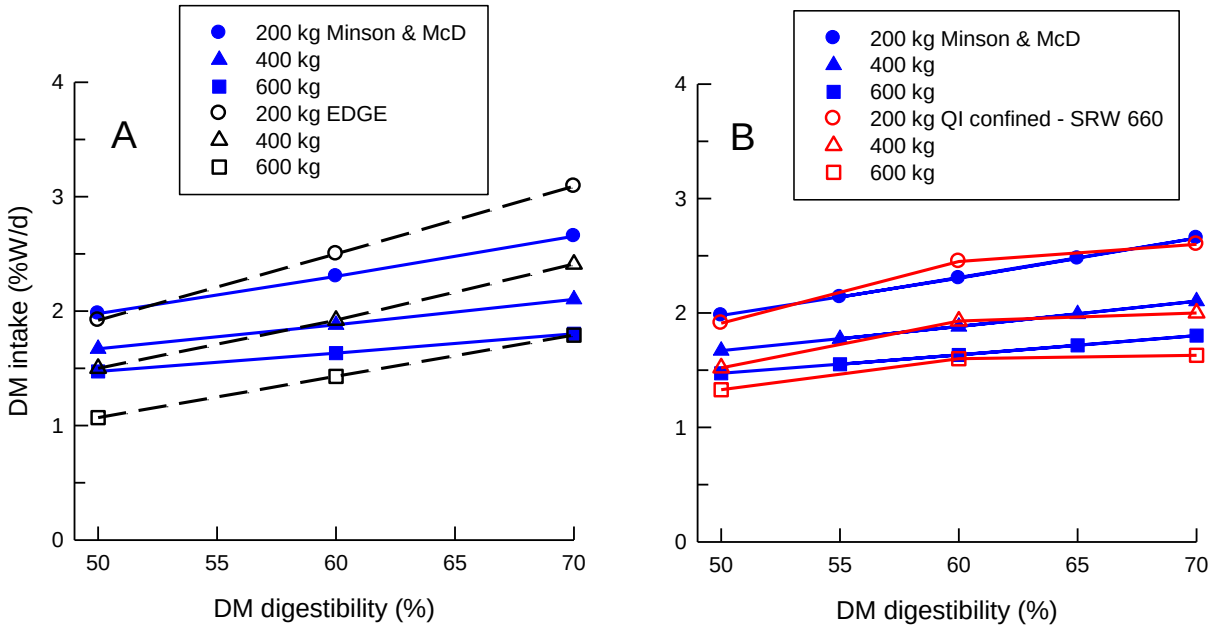

Fig. 3. *Relationship between DM digestibility and DM intake for steers of various liveweights (200 – 600 kg) according to the predictions of the Minson and McDonald (1987) equation and of the QuikIntake spreadsheet calculator, compared with those included in the Nutrition EDGE manual (dashed lines; graph A). (Fig. 3A) intake predictions for steers according to the Minson and McDonald equation (blue lines); and (Fig. 3B) intake predictions using QuikIntake for steers (SRW 660 kg) confined (no walking; red lines) compared with the predictions of Minson and McDonald (blue lines).*

6.11.1.5 Discussion

Researchers have for many decades investigated the possibility of a relationship between intake and a single descriptor of feed quality, such as DMD, without success. The general consensus is that intake is a function of multiple factors defining feed quality. Thus there is, unfortunately, no universal, biologically–sound relationship between DMD and intake that applies across all animal types, pasture types and general grazing situations. There is a general relationship between intake and DMD consistent with the principle that a key determinant of voluntary intake is the rate of passage of feed matter through the alimentary tract, and digestibility of plant material especially in the rumen is a key determinant of passage rate. Thus there will be a general relationship between intake and DMD. Previous research has shown that the relationship varies quite markedly with the plant type, for instance the genus or even species of plants of the same genus. In particular the relationship appears to differ considerably between C3 and C4 plant types such that, at the same DMD, the intake is usually considerably greater with C4 compared with C3 plants. This fact is acknowledged in the use of separate linear relationships for C3 and C4 plants in GrazFeed predictions. However, at my most recent meeting with Dr Mike Freer, a key contributor and editor of the Australian NRDR (1987) feeding standards and its software companion, GrazFeed, he suggested that perhaps a single relationship could be used for both plant types.

All methods of prediction of intake show a progressive decline in intake prediction with the LW of the animal, for any given DMD value. This is consistent with observations in practice.

The various methods of prediction of intake explored here have delivered intake/DMD relationships of different shapes. None are linear although the existing EDGE and the M&M curves approach linearity. In the latter case this is partly predicated by their assumption that LWG is linearly related to DMD, and in their equation LWG is one variable determining intake for animals of any given LW. By contrast, the relationships derived using QI show a definite trend for intake to plateau or even decline as DMD increases. Several factors contribute to this finding. The first is that in order to use QI for these simulations it was necessary to assume a LWG and in this case the linear relationship between DMD and LWG proposed by M&M was used, whereby 50% DMD = 0.0, 60% = 0.5 and 70% DMD = 1.0 kg/d LWG. The veracity of this relationship can be challenged but the general concept is sound. Thus as DMD increases so too does LWG and as a result the total MEI predicted by QI will also increase. This total MEI is the sum of the ME required for maintenance, which is relatively constant for confined animals of a set LW across a range of DMDs and growth rates (note that LWG is increased proportionately with DMD), and that required for gain which is the main variable. Furthermore, as DMD increases so too does M/D of the diet. As LWG increases the energy for growth increases in rough proportion but as MEm is relatively constant at any LW, the total MEI does not increase in direct proportion to LWG. Thus increases in intake are the consequence of this variable MEI divided by the increasing M/D of the diet, so that intake also does not increase in direct proportion with LWG and DMD.

Adding an energy cost for activity, in this case walking 7 km/d on level ground (in keeping with the AE calculator), markedly increases the maintenance requirements of the animal (walking and grazing activity is added to the maintenance component) and thus the predicted intake at any DMD value. The walking component (7 km/d) added, on average across DMDs, 26, 37 and 43% to the ME for maintenance or 19, 27 and 32% to the ME

required overall (maintenance plus ME for growth) for 200, 400 and 600 kg steers, respectively. In the 'ME_required' spreadsheet produced in association with the GrazFeed model, Freer suggests adding about 15% to the maintenance requirements for walking activity of a grazing animal, although this can be changed in the spreadsheet. Using the 7 km/d standard in the present exercise, and the equations from the feeding standards to calculate the ME required for this activity, the predicted DM intake is increased by 19, 27 and 32% for 200, 400 and 600 kg steers across DMD values, respectively, or an average of 0.45%W/d across LWs and DMDs. The effect is greatest at low DMD. These intake increases seem too high relative to practical experience and a lower increase could be used but this would not be consistent with the 7 km/d cost included in the AE calculator.

With the NRDR predictions, the relationship between DMD and intake approaches linearity for a C3 plant type but with C4 plants there is a definite levelling out of intake as DMD increases beyond 60%. This seems related to the fact that relative ingestibility increases proportionately with DMD for C3 plants but reaches plateau (relative ingestibility = 1.0) when the DMD is about 64% for C4 plants; potential intake is constant when LW is fixed.

The intake predictions based on the C4 relationship between DMD and relative ingestibility are extremely high, with intakes of nearly 3%W/d for a 200 kg steer consuming a diet of 50% DMD (and presumably just maintaining LW). At the other extreme the predicted intake for this steer when the DMD is 70% is 3.9%W/d. The corresponding intakes for a C3 pasture are 1.9 and 3.2%W/d, respectively, which seem much more reasonable although still higher than expected. This finding would explain the gross over–prediction of intake, or under–prediction of LWG from known intake, when the GrazFeed model is applied to tropical grazing situations. If this method is to be used to predict intakes from DMD it seems necessary to use the C3 relationships even for C4 pastures.

Intake prediction using this method is very sensitive to the SRW of the animals, which impacts on potential intake, so it is important that some careful consideration is given to this factor. This also shows that using a single response curve for DMD/intake across breeds and environments is an oversimplification if this method is to be applied.

The predictions of intake using the M&M method employ a relatively simplistic approach, as has been described above, and relies on energy requirements tabulated in the ARC (1980) feeding standards from the UK. In practice the M&M method has been found to give meaningful estimates of intake despite the fact that, being linked to the UK system, they are based empirically on (i) mainly *B. taurus* cattle given temperate diets; (ii) confined animals with a small energy allowance for activity (4.3 kJ/kg W.d; or 0.86, 1.72 and 2.58 MJ/d for 200, 400 and 600 kg steers, respectively); and (iii) one type of animal, i.e., bullocks of breeds of medium mature size and heifers of breeds of large mature size. The generated curves have more gradual slope than the existing EDGE curves and thus seem more consistent with practical findings.

Considering Figure 30 in the Nutrition EDGE manual, if the above methods were used to reproduce this figure using changes in DMD only, i.e., keeping cow LWG and milk production constant, then intake would decrease with increasing DMD as less pasture would be required at higher DMD to meet the energy demands for a specified level of production. In real life increases in DMD would be accompanied by changes in LW and milk production and accordingly, intake would increase to meet these higher demands for ME as DMD increased.

6.11.1.6 Validation

Data from the Growth Path Optimisation project (B.NBP.0391) pen feeding studies have been included in Fig. 4 for comparison with the prediction curves derived using the NRDR, QI (confined animals) and the M&M equation, as well as the existing Nutrition EDGE curves, for 200 kg *B. indicus* crossbred steers with a SRW of 660 kg (see simulations above). In the case of QI and M&M, it was assumed that the steers lost 0.75 kg/d when the DMD was 40%. This observed data is for *B. indicus* crossbred steers, 8–12 months of age and of average LW 228 kg, fed a range of forage types (C3 and C4) *ad libitum* in pens (confined – no walking). The DMD ranged from 40.0–65.1% (average 54.1%) and intakes ranged from 0.95–2.44%W/d (average 1.59%W/d). Fig. 4 shows that the observed intakes were generally lower than the various prediction methods predicted, i.e., most methods of prediction tended to over–estimate intake. The M&M predictions were parallel to the observed but displaced by about 0.45%W/d, the same amount allocated to walking 7 km/d (see above).

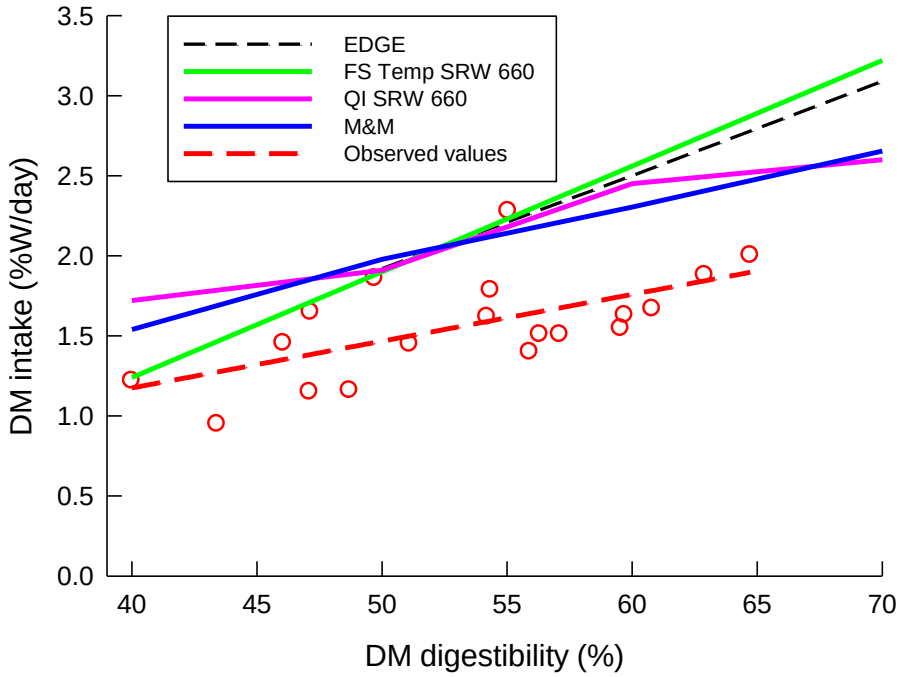

Fig. 4. *Relationship between DM digestibility and DM intake for steers of ~200 kg according to the predictions of (i) the Australian feeding standards (NRDR 2007) where the standard reference weight (SRW) is 660 kg and the diet is a C3 forage, (ii) the QuikIntake (QI) spreadsheet calculator using a SRW of 660 kg for confined animals, and (iii) the Minson and McDonald (1987; M&M) equation, compared with that included in the Nutrition EDGE manual and that based on observed data from pen feeding studies using steers confined in pens (details in the text). Data points indicate group averages for steers on a range of C3 and C4 forage diets.*

6.11.1.7 Conclusions

Although some of the prediction methods indicate an almost linear relationship between intake and DMD there is logic in a bent–stick relationship whereby intake flattens out as DMD increases. This is due to the fact that the other variable changing with increasing DMD (and thus M/D) is LWG which is a function of the amount of energy consumed over and above that required for maintenance of the animal (almost constant for a set LW). QI predicts such a broken–stick model. None of the prediction methods closely agreed with the intakes observed for steers in pens; all over–estimated intake over the main part of the range. Thus it could be argued that no method appears a major improvement on the prediction curves already reported in the Nutrition EDGE manual. The predictions of M&M appeared to provide a more gradual slope than the existing EDGE relationship, with lower

intakes at the upper end of the range, and one that was approximately parallel (similar slope) to that of the 'observed' relationship but displaced (over–estimated) by about 0.45%W/d. This is equal to the intake cost earlier attributed to steers walking 7 km/d (see above).

6.11.1.8 Recommendation

The M&M curves are suggested as the best compromise for replacing the existing EDGE relationships (see Fig. 5), based on (i) their simplicity of application, (ii) their more gradual increase in intake relative to DMD, delivering lower values at high DMD which are more consistent with expectations from tropical pastures, and (iii) their parallel alignment with the observed validation relationship. As the M&M line is displaced from the validation line by approximately the same intake value (0.45 %W/d) as was determined above to be the energy cost of walking 7 km/d, no further adjustment is suggested. Thus the M&M relationships are presented for steers of different LWs with moderate grazing activity. These relationships between DMD and intake demonstrate the key principles of (i) intake increasing with DMD, and (ii) intake decreasing with LW at any given DMD value, and are thus suitable for use in the EDGE manual for 'educating' producers. They will fall short of being an accurate predictive tool for field workers but it is naïve to envisage a single relationship to encapsulate all of the permutations of breed, SRW, forage type etc., as discussed previously. Furthermore, some assumptions have had to be made on the effects of DMD on animal production, i.e., LWG, which is not a constant across the range of DMDs. As also cautioned, care should be taken in using the relationships where intakes fall beyond expected limits.

No changes to Figure 30 in the manual are suggested as it demonstrates the key principle of higher energy demands for higher production.

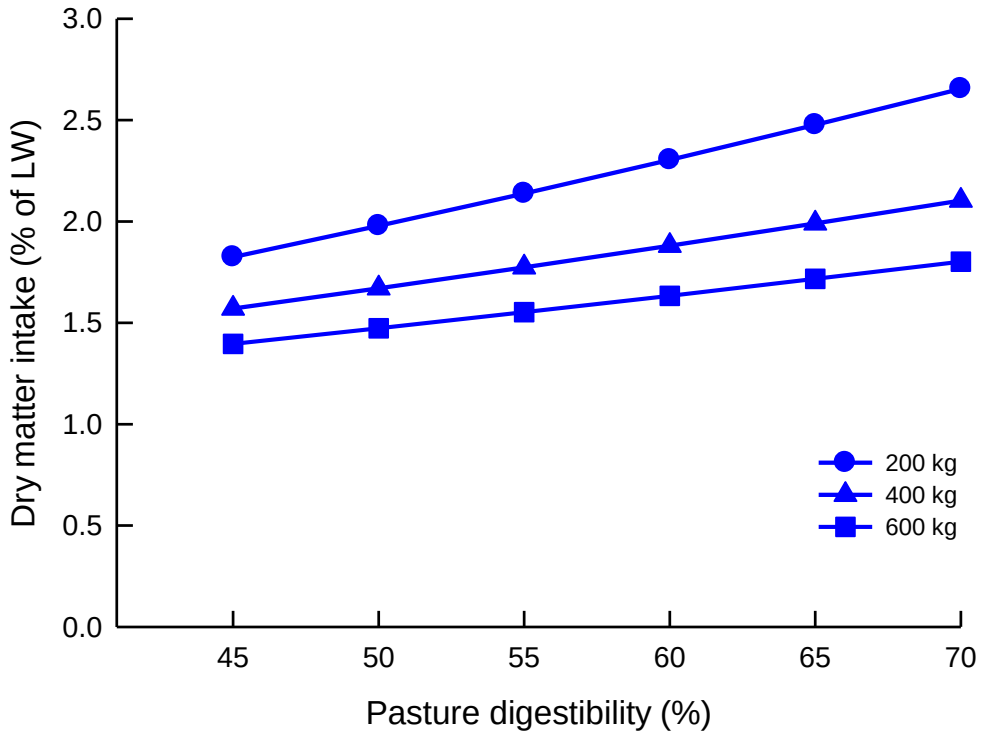

Fig. 5. *Predicted dry matter intakes of forage by 200, 400 and 600 kg steers across a range of pasture digestibilities (theoretical relationships, adapted from Minson and McDonald 1987)*.

6.11.1.9 References

ARC (1980) 'The nutrient requirements of ruminant livestock'. Technical review by the Agricultural Research Council working party. (Commonwealth Agricultural Bureaux: Farnham Royal, England).

Minson DJ, McDonald CK (1987) Estimating forage intake from the growth of beef cattle. *Tropical Grasslands* **21**, 116–122.

NRDR (2007) 'Nutrient requirements of domesticated ruminants.' (CSIRO Publishing: Melbourne, Australia).

6.11.2 Report 2. Development of new nutrient requirement tables based on the Australian feeding standards

6.11.2.1 Background

The current Nutrition EDGE manual includes nutrient requirement tables extracted from the ARC (1980) publication. These requirements for both energy and protein are empirically-based and derived from experiments using predominantly *Bos taurus* cattle given temperate diets in pens. The committee reviewing the Nutrition EDGE package decided it was time to update the tables and base them on the Australian feeding standards (NRDR 2007), bringing them into line with the recent changes to the adult equivalent (AE) calculations which are now also based on the Australian feeding standards, i.e., the NRDR (2007) equations. The current Nutrition EDGE tables show the metabolisable energy (ME) and protein (rumen degradable and undegraded dietary proteins; RDP and UDP) requirements for (i) steers of liveweight (LW) ranging from 100-600 kg, gaining from 0-1.5 kg/d, when the energy density (M/D) of their diet is 5, 7, 9, 11 and 13 MJ/kg DM, and (ii) heifers and cows in different stages of pregnancy and lactations, and bulls. Details about the M/D of the diets for the latter cows and bulls are not given.

6.11.2.2 Objective

(i) Revise the current tables in the Nutrition EDGE manual outlining the metabolisable energy (ME) and crude protein (CP) requirements of grazing beef cattle, using the Australian feeding standards (Nutrient Requirements of Domesticated Ruminants (NRDR 2007).

The replacement tables will include the requirements of *B. taurus* and *B. indicus* crossbred (75% *indicus*) steers either confined to pens (nil activity) or grazing and walking 7 km/d on level ground. In addition, requirements will be determined for bulls and for heifers and mature, pregnant or lactating *B. indicus* crossbred cows, as per the current Nutrition EDGE tables.

The key question in undertaking this exercise is: **who is the end-user of these tables**? Are they designed to demonstrate key principles of nutrient requirement and use for producer participants in EDGE workshops, or for the use of cattle advisory personnel to assess the adequacy of the pasture and the need for supplements, or a combination of both. This question is fundamental as it sets the level of accuracy which is acceptable and, more to the point, whether this tabular format is appropriate for the end use.

6.11.2.3 Methodology

The revised tables have been formulated using the 'QuikIntake' spreadsheet calculator (QI) which encapsulates the equations from the Australian feeding standards (NRDR 2007). The QI spreadsheet is continuously updated in line with revisions to the equations in the feeding standards and its companion software, 'GrazFeed', as are outlined in an on-line technical

paper (Freer *et al*. 2012; latest version). Other software scrutinised in the current exercise were the web-based Excel programs which accompany NRDR and GrazFeed, viz., 'CattleExplorer', 'ME_required' and 'CP_required', to ensure the latest equations were in use in QI.

Description of the animals
Two 'types' of steer have been included in the tables.

1. *B. taurus* steer. The animal used was a Shorthorn steer with a Standard Reference Weight (SRW) of 600 kg, as defined in NRDR (2007; page 39).
2. *B. indicus* crossbred steer. In this case the animal was a crossbred steer of 75% *B. indicus* content and with a SRW of 660 kg (NRDR 2007).

By definition, these SRWs can vary according to the environment in which the animals are grown, in keeping with changes in their mature size in different growing environments, but for the current exercise the SRWs 'suggested' in NRDR (2007) were used. They are also consistent with those used in the adult equivalents (AE) calculator and probably do represent the relative differences in mature size between the two cattle types. Nevertheless, in some environments the SRW should be changed to better reflect the grazing environment but the tabular format of the current exercise cannot easily accommodate multiple SRWs.

One of the factors affecting the ME requirements of cattle in the Australian feeding systems, and in particular their maintenance ME requirements, is their age. Thus it was necessary to allocate an age for each LW category for the steers. For consistency, the same LW/age relationship was used for steers of both genotypes, this being 4, 8, 20, 30, 38 and 44 months of age at LW 100, 200, 300, 400, 500 and 600 kg, respectively. It should be noted though that the effect of age is relatively minor so using the same age/LW relationships for both genotypes, despite their different SRWs, had minimal effect.

In relation to the breeding animals, only one breed was used in the revised table – the (75%) *B. indicus* crossbred animal. The current EDGE tables do not indicate the breed of cattle to which they refer but, being based on the UK system, it was likely to be *B. taurus* in origin. In addition, these tables do not indicate the age of the animals, the quality of the diet, i.e., the M/D or 'q' value (ME/GE, as used in ARC 1980) or the level of activity. The following is a description of the animals used to populate the table referring to reproductive cattle.

1. Pregnant heifers, last third of pregnancy: *B. indicus* crossbred (75% *indicus*) heifer, 550 kg SRW, 2.5 years old, day 200 of gestation, expected calf birth weight (BW) of 35 kg, heifer walking 7 km/d with a diet of M/D = 8.0 MJ/kg DM (about 56.5% DMD).
2. Dry pregnant mature cow: *B. indicus* crossbred (75% *indicus*) cow, 550 kg SRW, 6 years old, day 200 of gestation, expected calf BW of 35 kg, cow walking 7 km/d with a diet of M/D = 8.0 MJ/kg DM.
3. Lactating heifers, with calf up to 4 months old: *B. indicus* crossbred (75% *indicus*) heifer, 550 kg SRW, 3 years old, day 90 of lactation, cow producing 5 kg/d of milk and walking 7 km/d, calf BW 35 kg and growing at 0.7 kg/d and with current LW 100 kg, calf receiving 50% of ME from pasture, walking 2 km/d with a diet of M/D = 8.0 MJ/kg DM.
4. Lactating mature cows, with calf up to 4 months old: as for '3' above except the cow age was 6 years and it was producing 10 kg/d of milk.
5. Bulls: *B. indicus* crossbred (75% *indicus*) bulls, 770 kg SRW, with ages of 2.5, 3.5, 4.5 and 4.5 years for LWs 500, 600, 750 and 800 kg, respectively, walking 7 km/d and consuming a diet of 8 MJ/kg DM.

Determination of ME requirements
As mentioned above, the ME requirements were determined according to the equations in the NRDR (2007) feeding standards, using the spreadsheet calculator 'QuikIntake'. **A more detailed description of this process is given in the previous report.** The main inputs

included the energy density of the diet (M/D), which varied from 5 to 13 MJ/kg DM, the breed and sex of the animal (which determined its SRW), its age and LW and the specified level of production, i.e., LWG (kg/d) for steers or days of pregnancy/lactation for cows. The M/D was calculated from DMD using the equations provided in NRDR (2007) and both M/D and DMD have been included in the tables for reference.

In the case of the steers, requirements were determined for the two genotypes of animals either confined (no walking) or walking 7 km/d on level ground. The latter was consistent with the activity assumed in the AE calculator. As indicated above, the requirements of the heifers, cows and bulls were based solely on the animals walking 7 km/d.

Protein requirements
The equations from NRDR (2007) required to calculate protein requirements of cattle have been included in the latest version of QI. Only a brief description of the inputs are included here and the reader is referred to the feeding standards (NRDR 2007) and to the spreadsheets 'CattleExplorer' and 'CP_required' for further detail on the equations used. For non-pregnant and non-lactating cattle, the CP requirements were determined as the sum of the endogenous urinary and endogenous faecal CP, the dermal CP loss and the protein in gain. The endogenous urinary protein (EUP) is a function of the animal's LW although the lower excretion rates of *B. indicus* breeds relative to their British and European counterparts were accounted for by applying a multiplier of 0.8. The dermal loss is also a function of LW. The endogenous faecal protein (EFP) output is a function of total DM intake, so an estimate of intake was required. In the current exercise DM intake was determined by dividing the total ME required for a given level of production, as estimated by QI (see above), by the M/D of the diet. Thus there is a strong link between the ME and CP requirements of the animal. The protein in gain was determined according to the functions in the feeding standards which include the LWG of the animal, its stage of maturity (LW relative to SRW), and the level of feeding (multiples of maintenance requirements), all of which denote the amount of protein deposited in the total gain of the animal.

Having summed all of these elements as the total CP requirements, this total was then converted into the equivalent in the form of digestible protein leaving the stomach (DPLS) which is equal to the total CP required divided by 0.7, to account for the 70% efficiency of use of the DPLS for various outcomes, i.e., for EUP, EFP, dermal loss and protein in gain. Having determined total requirements these were then divided into the separate requirements for RDP and UDP. The RDP required for microbial crude protein (MCP) production is a function of ME intake (= MEI * 8.25; i.e., 8.25 g MCP/MJ of ME, or *ca*. 130 g MCP/kg digestible organic matter; DOM), but only about 60% of this MCP is available in the intestines as digestible protein for absorption. Thus the needs for RDP are determined first and this is subtracted from the total DPLS with the remainder being the UDP requirements (with an efficiency of use of 0.7 also applied). In the tables the requirements for RDP are shown first, then the UDP need. If only one figure is shown this indicates that all the animal's needs can be met with just RDP, as often occurs with older growing cattle. Younger cattle often have a need for UDP as well as RDP for growth. **It is important to understand that in some situations, especially with mature animals, all of the protein requirements could be met by RDP but in some instances a UDP requirement is also indicated. This often occurs because RDP use is limited by the availability of fermentable energy (DOM)**, at least at the low efficiency of 130 g MCP/kg DOM, so the shortfall is made up with UDP. A higher efficiency of utilisation of RDP would reduce the need for UDP. Under grazing conditions the actual efficiency is unknown so the value of 130 g/kg DOM is an approximation only. With respect to female cattle, in addition to the protein requirements for maternal growth there is also a requirement for conceptus growth in pregnant animals and for milk produced by lactating animals.

The reader is referred to NRDR (2007) and Freer *et al*. (2012) for a more detailed description of these equations and calculations.

General considerations
The tables produced outline the ME and protein requirements of cattle of different LWs, or stages of pregnancy/lactation, to achieve a specified level of production, e.g., LWG. However, **it should be stressed that specifying a need for energy or protein does not mean that the animal will be able to consume that amount of nutrients**, **or that the desired level of production will be achieved**, as the physical constraint on voluntary intake will at some point limit the animal's ability to consume those nutrients. This threshold on voluntary intake declines with declining quality of the diet. Thus a steer consuming a low quality diet (say 7 MJ/kg DM) will not be able to consume sufficient DM to reach the ME target required for a LWG of, say, 1.0 kg/d; in fact it may not be able to eat sufficient DM to even maintain LW. This caveat needs to be placed on the tables. Where an unrealistically high intake would be required to allow a certain LWG, the cells of the table have been left empty but in other cases where requirements have been included, judgement is still needed by the user as to whether the required intake or performance is achievable.

The DM intake (kg/d) required for a specified production level can be calculated by dividing the total ME required (MJ/d) by the energy density of the diet (M/D; MJ/kg DM), and this can be converted to an intake expressed on a LW basis (%W/d) by further dividing by the LW of the animal and multiplying by 100 to express it as a percentage.

The calculated DM intakes by steers required to achieve the ME requirements for a certain level of production have been included in the Excel spreadsheet, for reference. The shaded areas indicate a subjective assessment of where intakes which would probably be unattainable given the LW of the steer, the M/D of the diet and the level of production targeted. These could be used to revise which cells are included in the various ME and CP requirement tables.

6.11.2.4 Results

1. ME requirements of steers predicted by ARC (as per the Nutrition EDGE tables)
The ME requirements currently presented in the Nutrition EDGE manual are from ARC (1980) and are based on steers of breeds of medium size, confined in pens but with a small allowance for activity (4.3 kJ/kg W.d; i.e., 1.72 MJ/d for a 400 kg steer). ME requirements in the EDGE manual are given for various combinations of LW, LWG and dietary M/D with some cells in the table left empty where the growth rate was considered to be unachievable at the given diet quality.

In Table 1 from Nutrition EDGE these ME requirements have been converted to DM intakes by dividing the ME intake value by the M/D of the diet and then expressing this as a percentage of LW (see below). This has been done to illustrate the magnitude of the DM intakes required to achieve stated ME intakes. Some of the DM intakes in Table 1 seem unrealistically high. Thus, within Table 1, an arbitrary assessment has been made of the achievable DM intakes (non-shaded cells) by steers for the particular LW and diet quality, at least for tropical forage diets. For instance, it is well known that intakes (expressed on a LW basis) will increase as the quality of the diet increases but, for a given quality of diet, will generally decrease with increasing LW of the animal. From our own experience with steers in pens, light steers (*ca*. 200 kg) will eat about 1.6-2.0%W/d of a 50% DMD (6.9 MJ/kg DM) tropical grass hay whilst older steers (*ca*. 450 kg) will only eat about 1.3-1.6%W/d of the same hay. Most steers will only maintain weight at best on hay of this quality. The maximum intake by steers of a tropical forage will thus increase with the quality (M/D) of the diet but the absolute upper threshold is probably in the order of 2.5%W/d (maybe slightly higher for the young, very light steers) for a fresh, green, leafy new-season pasture (say, 65% DMD or 9.5 MJ/kg DM). The arbitrary assessment carried out in Table 1 takes into account both the

LW of the steer and quality of the diet in determining the likely intake threshold for that situation, i.e., if the intake is likely to be achieved. A considerable proportion of the intakes shown in Table 1 is above these perceived thresholds (shaded cells) and their inclusion is questioned.

Thus even the current Nutrition EDGE tables, based on ARC (1980), include ME requirement values well outside what are achievable and the table should be adjusted accordingly. For instance, steers given a diet of M/D = 5.0 MJ/kg DM (computes to 39.0% DMD) will not even maintain LW on this diet, so this section of the table should be deleted. The alternative would be to increase the range of growth rates to include LW loss. Diets of M/D=13 MJ/kg DM (about 85% DMD) will only relate to feedlot diets if at all and could also be omitted. The upper limit for energy density in the diet for tropical forages should be around 10 MJ/kg DM, and possibly at about 11 MJ/kg DM for temperate forages, so a reasonable range of diet quality would be from 7 to 11 MJ/kg DM if the current LWG range is retained.

2. ME requirements of steers predicted by QuikIntake (as per the Australian feeding standards)

The ME requirements estimated using QI are shown in the accompanying Excel spreadsheets. Separate tables are given for *B. taurus* (i.e., Shorthorn) and *B. indicus* crossbred (75% *indicus*) steers, each with either nil activity (confined) or walking 7 km/d (as per the AE calculator). These requirements have been compared to those from ARC (1980) as detailed in the Nutrition EDGE manual, in two figures shown below.

The caveat should be clearly placed on these tables that they define the requirements of animals to reach a certain target, not whether that target is attainable. Inability of the animal to consume sufficient DM places an upper threshold on the ME (or protein) intake.

Fig. 1 shows the ME requirements for steers of LW either (A) 200 or (B) 400 kg, for a range of growth rates (0-1.25 kg/d) when the diet quality was constant at 9 MJ/kg DM (*ca*. 62.2% DMD). The ME requirements estimated using QI are compared with those currently used in Nutrition EDGE (ARC values). In addition, the predicted intakes of ME from Minson and McDonald (1987) are plotted for comparison. Several conclusions can be drawn from these data sets.

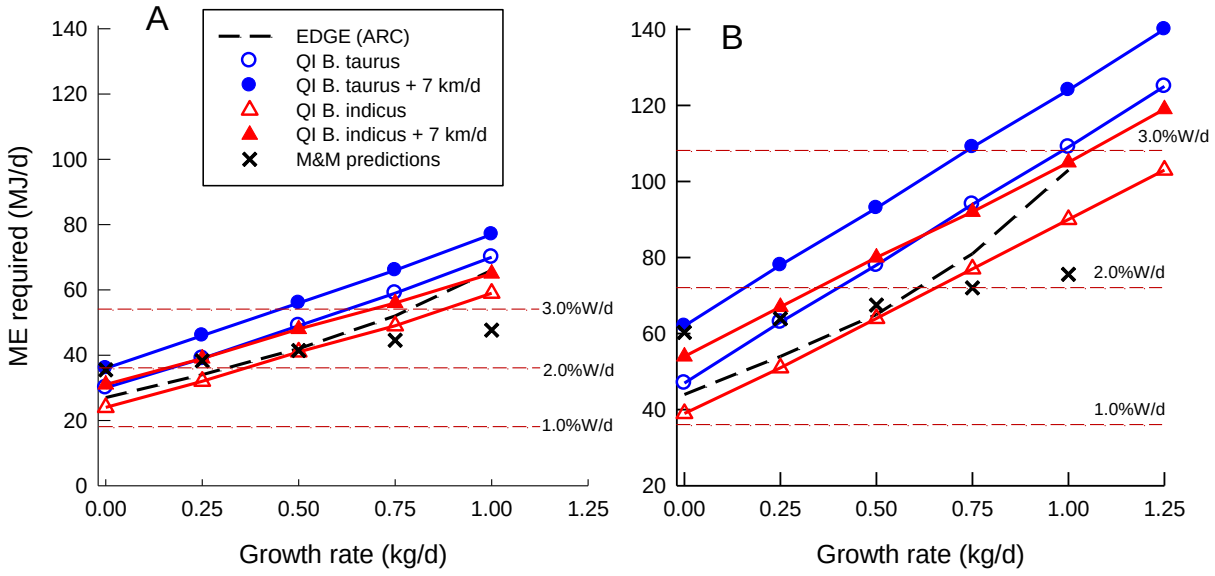

Fig. 1. *The metabolisable energy (ME) requirements of* Bos taurus *and* B. indicus *crossbred steers of initial liveweight (A) 200 kg or (B) 400 kg, either in confinement (no activity; open symbols) or walking 7 km/d (filled symbols) and receiving a diet of energy density (M/D) 9 MJ/kg DM, to achieve various growth rates, as determined by the ARC (1980) and presented in the Nutrition EDGE manual (EDGE (ARC); dashed line), by the QuikIntake (QI) spreadsheet calculator using the Australian feeding standard equations (NRDR 2007; solid lines), and by the Minson and McDonald (1987) multiple regression equation (M&M predictions; crosses).* Breed type is not specified in the EDGE (ARC) and M&M predictions and probably relates to *B. taurus* cattle. The horizontal dashed lines in each figure show the ME requirements corresponding to DM intakes of 1, 2 or 3%W/d.

Notes relating to Fig. 1.

(i) Using the calculations of QI, *B. taurus* steers have a higher ME requirement to achieve a given LWG compared with their *B. indicus* crossbred counterparts. The difference between genotypes increases in absolute terms as LW of the steers increases (from *ca*. 4 MJ/d difference for 200 kg steers to 16 MJ/d for 600 kg steers, averaged over all diet qualities and growth rates), but the percentage difference was relatively constant across LWs with *B. taurus* steers having 20% greater ME requirement, on average across diet quality, for the same gain as *B. indicus* crossbred steers (data not shown in Fig. 1).

(ii) The ARC ME requirements are fairly similar to those predicted using QI for *B. indicus* steers (nil activity) over most of the LWG range, the biggest discrepancy occurring at the higher growth rates. The ARC predicted ME requirements appear to rise at an increasing rate with growth rate of the steers whereas the QI trend for the same LWG range appears relatively linear (Fig. 1). One can only surmise that the ARC trends are in line with increasing energy requirements for fat deposition at higher growth rates. These patterns of difference between systems (ARC vs NRDR) were consistent for steers of LW 200, 400 and 600 (not shown) kg.

(iii) The inclusion of an ME allowance for walking increased the ME requirements by about 12 MJ/d, or 18%, on average across LWs, LWGs and diet qualities. The effect tended to be relatively constant in absolute terms (MJ/d) across growth rates (see Fig. 1) but, on a percentage basis, increased with the LW of the steers (*ca*. 10% at 200 kg to 23% at 600 kg).

(iv) The most concerning feature of Fig. 1 was that the predicted ME requirements for even modest growth rates of steers on this quality of diet (9 MJ/kg DM) required DM intakes beyond the apparent scope of the steers to achieve. This was the case with the EDGE (ARC) as well as the QI systems. In these figures the relationship between ME intake and DM intakes (from 1 to 3%W/d) are shown as horizontal dashed lines. Thus, according to QI calculations, 200 kg steers consuming a diet of 9 MJ/kg DM (62.2% DMD) would require the very high intakes of ME of 49 and 59 MJ/d, equivalent to 2.7 and 3.3%W/d of DM, for (confined) *B. indicus* crossbred and *B. taurus* steers, respectively, to achieve a growth rate of 0.75 kg/d, which should be easily achievable on this quality diet. The corresponding DM intakes for steers of the two genotypes walking 7 km/d are 3.1 and 3.7%W/d, respectively. The predicted intake of ME according to the Minson and McDonald multiple regression equation (based on the ARC tables) are shown as crosses in Fig. 1 and indicate considerably lower ME and DM intakes (e.g., 2.5%W/d for 0.75 kg/d gain) relative to both the ARC and the QI predictions, at the higher growth rates.

It appears that changing from the ARC to the Australian feeding standards (QI) will lead to increases in the estimated requirements of steers for ME, at least for *B. taurus* steers, and that some of the calculated ME requirements correspond with DM intakes beyond the limits of the animals to achieve with the quality of the diet, although experience tells us that the growth rates would be achievable. The situation is exacerbated by the addition of a walking activity which naturally increases ME requirements. In the example shown in Fig. 1, steers consuming a diet of 9 MJ/kg DM (ca. 62% DMD) should be able to grow at 1 kg/d while consuming less than 3%W/d of DM but this is not what is indicated. The closest agreement between the EDGE and QI requirements were for *B. indicus* steers confined to nil activity; the main deviation between these models was at the high growth rate of 1 kg/d. This is surprising in that although the ARC tables relate to steers with minimal activity, they are known to be derived mainly from trials using *B. taurus* cattle.

3. Protein requirements of steers predicted by QuikIntake

The RDP and UDP requirements estimated using QI are also shown in the accompanying Excel spreadsheets for *B. taurus* and *B. indicus* crossbred steers, each with either nil activity (confined) or walking 7 km/d. These requirements have been compared to those from ARC (1980) as detailed in the Nutrition EDGE manual, in Fig. 2 shown below.

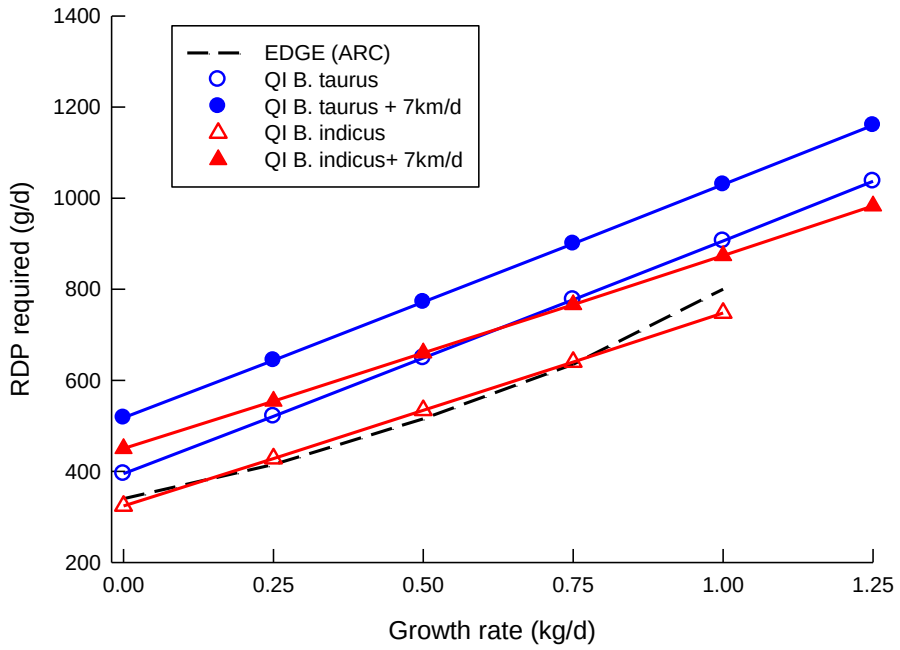

Fig. 2. *The rumen degradable protein (RDP) requirements of 400 kg* Bos taurus *and* B. indicus *crossbred steers either in confinement (no activity; open symbols) or walking 7 km/d (filled symbols) and receiving a diet of energy density (M/D) 9 MJ/kg DM, to achieve various growth rates, as determined by the ARC (1980) and presented in the Nutrition EDGE manual (EDGE (ARC); dashed line) or by the QuikIntake (QI) spreadsheet calculator using the Australian feeding standard equations (NRDR 2007; solid lines).* Breed type is not specified in the EDGE (ARC) table but probably relates to *B. taurus* cattle.

Notes relating to Fig. 2.

(i) The protein requirement trends in Fig. 2 tend to closely mirror those of ME requirements shown in Fig. 1. This is understandable since, as previously stated, the endogenous faecal protein (EFP) component is a function of DM intake and thus also of ME intake. Furthermore, the equations used in calculating the protein content of gain are similar to those calculating the energy content of gain. Thus, as a large proportion of the total protein requirements is associated with the EFP and protein in gain components, the CP and ME requirements will tend to increase in parallel as growth rate of the steers increases.

(ii) There is close agreement between the protein requirements determined using the ARC (based presumably on *B. taurus* cattle) and those of QI for *B. indicus* crossbred steers with nil activity, but those determined by QI for B. taurus steers are considerably higher (Fig. 2).

(iii) Adding an activity cost for walking (7 km/d) increased the RDP requirement of 400 kg steers by, on average over all diet qualities (7-13 MJ/kg DM), 113 g/d or 17% for *B. taurus* and by 139 g/d or 29% for *B. indicus* crossbred steers, respectively.

(iv) The QI tables of protein requirements suggest a higher need for UDP than the corresponding ARC (EDGE) tables. In the latter only lightweight steers of 100-200 kg had any requirement for UDP; the main part of protein requirements came from RDP. By contrast, the QI calculations suggest that UDP is also required by heavier steers at times, especially for higher growth rates. This is probably related to the fact that, in the current exercise, the total protein requirements were divided into needs for RDP and

UDP by first estimating RDP requirements on the basis of what is required for MCP production relative to the fermentable energy available, i.e., 130 g RDP/kg DOM (with allowances for utilisation efficiency), and then allocating the remainder to UDP. This efficiency of microbial CP production is at the lower end of the feeding standards recommendations (130-170 g RDP/kg DOM) and so may underestimate RDP, and consequently overestimate UDP, requirements. Having said this, the efficiencies of use of RDP on tropical pastures in practice can often be as low as 60 g MCP/kg DOM, so the requirements for UDP may be even higher than indicated in the tables on these pasture types when low in quality. The tables only provide an indication and using 130 g RDP/kg DOM is a good starting point for tropical forages.

Fig. 3 shows the RDP and UDP requirements of 200 kg steer of the different genotypes, with and without activity.

Notes relating to Fig. 3.

(i) As discussed above the requirements for RDP, and for protein in total, are greater for *B. taurus* steers than for their *B. indicus* counterparts. The additional protein requirements for walking activity are also shown in this figure.

(ii) At maintenance the steers could meet all of their protein requirements from RDP alone.

(iii) As growth rates increased there was an increasing need for UDP as well as RDP to meet requirements.

(iv) The requirements for UDP tended to be lower for the steers walking 7 km/d relative to their ‘inactive’ counterparts. This was probably related to the predicted higher ME intake by the walking steers and thus the higher RDP requirements and by corollary, lower UDP requirements.

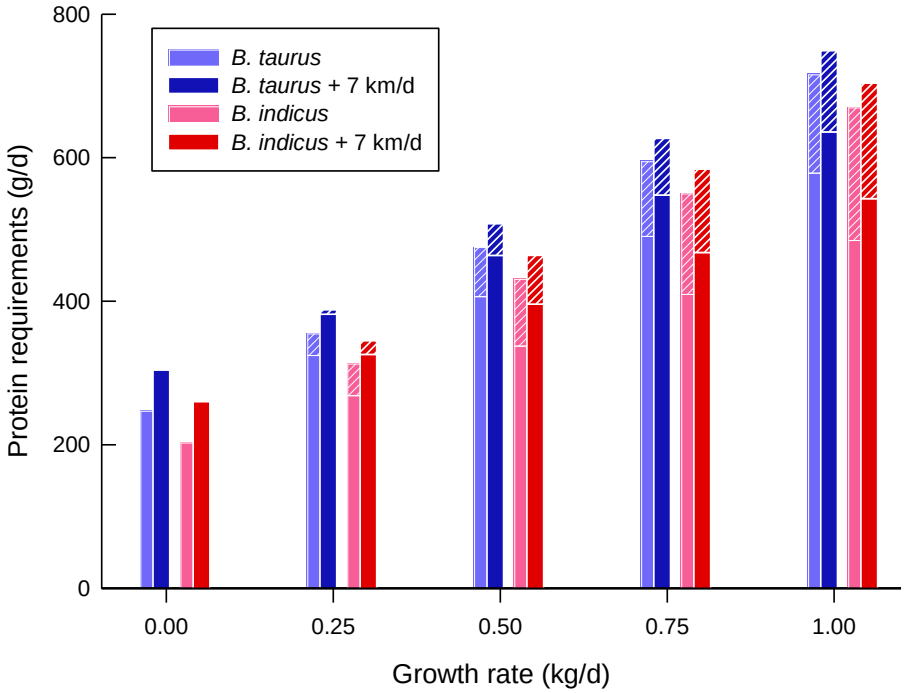

Fig. 3. *The rumen degradable protein (RDP; solid bars) and undegraded dietary protein (UDP; hatched bars) requirements of 200 kg* Bos taurus *and* B. indicus *crossbred steers either in confinement (no activity) or walking 7 km/d and receiving a diet of energy density (M/D) 9 MJ/kg DM, to achieve various growth rates, as determined by the QuikIntake (QI) spreadsheet calculator using the Australian feeding standard equations (NRDR 2007).*

4. ME and protein requirements of heifers, cows and bulls predicted by QuikIntake

The revised ME requirements of heifers and cows predicted by QI are reasonably similar to those from the Nutrition EDGE manual, the main exception being for lactating heifers where the revised requirements are elevated. The general similarity between current and revised ME requirements is surprising in that the EDGE tables probably relate to *B. taurus* cattle with minimal activity whilst those predicted using QI are for *B. indicus* crossbred cattle walking 7 km/d. Perhaps the lower requirements of *B. indicus* cattle is compensated for by their activity allowance. The revised ME requirements for bulls are about 10-20% higher than for the EDGE table but the latter give no indication of the quality of the diet, so an informed comparison is difficult.

Overall the protein requirements predicted by QI are lower than those for EDGE for dry, pregnant females but slightly higher for bulls. With the lactating cattle, QI predicts a need for both RDP and UDP whereas there is no distinction given in the EDGE table. As alluded to earlier this is probably related to the fact that, using the NRDR (2007) system, there is insufficient energy intake to utilise the RDP and the shortfall needs to be made up with UDP.

6.11.2.5 Discussion and conclusions

As alluded to earlier, the first question that needs to be answered is: **who will be the end-user** of these tables and **for what will they be used**. If the answer is that they will be used mainly to demonstrate to cattle producers the key principles of energy and protein requirements and how they change with the quality of the diet (M/D), the LW of the animal and its productivity either for growth or pregnancy/lactation, then providing tables based on the Australian feeding standards instead of the UK system (ARC 1980) will not provide any real advancement. The key principles are the same for both systems; they only differ

quantitatively and the existing tables would suffice. If this is the main purpose of providing these requirement tables then the recommendation is to include only one set - those relating to *B. indicus* crossbreds walking 7 km/d. They encompass the key principles relating to energy and protein use and requirements.

On the other hand, if, as seems the case to some extent, the tables are also being used by beef extension (Future Beef) personnel to make judgements on the adequacy of an existing production scenario to meet particular production targets, or to determine the amount of additional nutritional inputs required to meet those targets, then the goal should be to provide the most accurate information available. It makes sense that the information provided in the current Nutrition EDGE tables, which are derived from the UK ARC (1980) system developed empirically using data from experiments based on mainly *B. taurus* cattle and temperate diets fed in pens, should be replaced by that based on the Australian feeding standards (NRDR 2007) which can accommodate the types of animals and forages commonly encountered in northern Australia. This would also be consistent with current changes to the estimation of adult equivalents which also uses the NRDR (2007) system. Such a change though clearly raises two issues.

Firstly, the revised tables based on QI calculations, and thus on the local feeding standards, have higher predictions of requirements in most cases for both ME and protein than those currently reported in the ARC-derived tables in Nutrition EDGE. When the ME requirements are translated into DM intake requirements, some of the required intakes are well beyond what the animal would be expected to attain for a diet of that quality yet the growth rate is known to be achievable under the same conditions. This suggests that the Australian feeding standards are tending to regularly over-predict both ME and DM intake requirements. Some support for this contention has been provided in previous research (McLennan and Poppi 2005 (Project NBP.331 Final Report); McLennan 2013 (Project B.NBP.0391 Final Report). The answers to this dilemma are currently not available. It should be noted that even the ARC tables are at times associated with ME requirements which require DM intakes outside the capacity of grazing cattle. It is somewhat ironic that in the current exercise the best agreement between the ARC requirements and those of the NRDR system were when the latter used *B. indicus* steers with no activity allowance yet the ARC tables would undoubtedly be derived from experiments using temperate breeds of cattle (with minimal activity allowance) and temperate diets. Nevertheless, changing the tables to those predicted using NRDR (2007) will lead to some frustration by users when the required DM intakes are calculated and seen to be excessive even though the production rates are achievable. Adding an activity allowance for 7 km/d walking will exacerbate this situation by further increasing DM intake requirements. The user needs to apply some judgement on whether an intake or production target is attainable when using these tables.

It is understood here that if the ME requirements are slightly exaggerated by NRDR (2007) so too will be the protein requirements as these are closely aligned with ME requirements.

If the tabular format for representing requirements is to be used, then a decision is required on whether to include the walking activity allowance or not. As indicated above, including it increases ME and protein requirements and the DM intake required to achieve those requirements. The current calculations indicated that the activity cost was, on average, about an 18% increase in ME requirement but this increased with LW of the steers (10-23% for 200-600 kg steers). If activity is not included in the tables allowance could be made to increase ME requirements by suggesting the user add an increment of between 10 and 20% over the range of 200 to 600 kg LW, on a sliding scale. The effects on RDP and UDP are less predictable though and it would be more problematical to add a proportional activity allowance.

The second main issue, and one that has been touched on above, is that to cover all combinations of breed, sex, variable SRW, pregnancy and lactation status, activity levels, etc., would require a multitude of tables far beyond the scope of the Nutrition EDGE manual. This is the reason the NRDR (2007) booklet does not include tables; instead the equations

are encapsulated in the software package 'GrazFeed'. This allows the user to input the key information on an animal and production situation for a specific answer. It has been found though that there are problems with using GrazFeed with tropical cattle and tropical grazing systems and some of these relate to the method of estimating diet quality and the reliance on a relationship between intake and DMD (see Report 1). The alternative is to use a spreadsheet approach such as QI or the web-based spreadsheets associated with the GrazFeed site, viz. 'ME_required' and 'CP_required'. Their advantage is that they allow the user to work backwards from 'known' animal performance to calculate requirements without the need to predict diet quality other than a faecal NIRS assessment of DMD. Extension personnel would be much better served by using this approach than relying on tables covering a small number of situations. **This is a recommendation from the current study**. The caveat is that QI is a servant of the NRDR (2007) system and will provide some variable over-estimate of requirements. This can only be remedied with an overhaul of the current feeding standards, at least for tropical feeding systems.

It is also recommended that some sections of the tables are deleted, viz. those that involve unattainable growth rates or intakes for the quality of the diet (M/D) and/or the production level for the LW of the animal. Inclusion of these sections provides a false expectation that the intakes can be attained. The sections for diet M/D of 5-6 MJ/kg DM, where even LW maintenance is not feasible, and for M/D>12 MJ/kg DM, which is unlikely to be attained even in feedlots, should be omitted.

The current Nutrition EDGE table showing ME and protein requirements of heifers, cows and bulls seems rather *ad hoc*, relating to seemingly random, limited groups of cattle in various stages of pregnancy and lactation and with varying growth rates. The derivation of these tables is unknown but appear to be provided to show generally the effects of different physiological states on ME and protein requirements. They would be of limited use to cattle advisors and the use of a more embracing spreadsheet application is again recommended. Replacement of the current table with that revised using the NRDR (2007) system is also recommended (see attached).

No changes have been made to the calcium and phosphorus requirements previously set out in Nutrition EDGE. These were not reviewed.

6.12.2.6 References

ARC (1980) 'The nutrient requirements of ruminant livestock'. Technical review by the Agricultural Research Council working party. (Commonwealth Agricultural Bureaux: Farnham Royal, England)

Minson DJ, McDonald CK (1987) Estimating forage intake from the growth of beef cattle. *Tropical Grasslands* **21**, 116-122.

NRDR (2007) 'Nutrient requirements of domesticated ruminants.' (CSIRO Publishing: Melbourne, Australia)

Table 1. Intakes of DM (%W/d) required by steers to achieve the necessary intakes of metabolisable energy (ME) tabulated in the existing Nutrition EDGE table.

Intake was calculated as the ME requirements (MJ/d) divided by the energy density of the diet (M/D; MJ/kg DM). Shaded cells indicate (on subjective assessment) intakes which are probably unachievable for the specified steer liveweight and diet quality.

ME of diet	Liveweight	Liveweight gain (kg/day)						
(MJ/kg DM)	(kg)	0	0.25	0.50	0.75	1.00	1.25	1.50
	100	3.8	5.0	7.0	—	—	—	—
5	200	3.1	3.8	5.3	—	—	—	—
(39.0% DMD)	300	2.7	3.5	4.6	—	—	—	—
	400	2.4	3.2	4.2	—	—	—	—
	500	2.3	2.9	4.3	—	—	—	—
	600	2.1	2.7	3.6	—	—	—	—
	100							
6	200							
(44.8% DMD)	300							
	400							
	500							
	600							
	100	2.6	3.3	4.4	6.1	—	—	—
7	200	2.1	2.6	3.4	4.4	—	—	—
(50.6% DMD)	300	1.8	2.3	2.9	3.8	—	—	—
	400	1.6	2.1	2.6	3.4	—	—	—
	500	1.5	1.9	2.4	3.2	—	—	—
	600	1.5	1.8	2.3	3.0	—	—	—
	100							
8	200							
56.5% DMD	300							
	400							
	500							
	600							
	100	1.9	2.4	3.0	3.9	5.2	—	—
9	200	1.5	1.9	2.3	2.9	3.7	—	—
62.3% DMD	300	1.3	1.6	2.0	2.5	3.1	—	—
	400	1.2	1.5	1.8	2.3	2.9	—	—
	500	1.1	1.4	1.7	2.1	2.6	—	—
	600	1.1	1.3	1.6	2.0	2.5	—	—

ME of diet	Liveweight	Liveweight gain (kg/day)						
(MJ/kg DM)	(kg)	0	0.25	0.50	0.75	1.00	1.25	1.50
	100							
10	200							
68.0% DMD	300							
	400							
	500							
	600							
	100	1.5	1.8	2.3	2.8	3.5	4.5	6.0
11	200	1.2	1.4	1.7	2.1	2.5	3.2	4.0
73.9% DMD	300	1.0	1.2	1.5	1.8	2.2	2.7	3.4
	400	1.0	1.1	1.4	1.7	2.0	2.5	3.1
	500	0.9	1.1	1.3	1.5	1.9	2.3	2.8
	600	0.8	1.0	1.2	1.4	1.7	2.1	2.7
	100							
12	200							
79.7% DMD	300							
	400							
	500							
	600							
	100	1.2	1.5	1.8	2.2	2.5	3.2	3.9
13	200	1.0	1.2	1.3	1.6	1.9	2.3	2.8
85.5% DMD	300	0.8	1.0	1.2	1.4	1.7	2.0	2.4
	400	0.8	0.9	1.1	1.3	1.5	1.8	2.1
	500	0.7	0.8	1.0	1.2	1.4	1.7	2.0
	600	0.7	0.8	0.9	1.1	1.3	1.6	1.9

6.12 Complete list of recommendations

6.12.1 Technical manuals

#1 Retire the *Grazing land management EDGE* and *Nutrition EDGE* technical manuals, as the workshop notes now include appropriate levels of detail so that they stand–alone without being overwhelming. This also decreases the expense of printing and maintaining (updating) technical manuals which not many people referred to post–workshop.

6.12.2 Facilitators' notes

#2 Retire the *Breeding EDGE*, *Grazing land management EDGE* and *Nutrition EDGE* facilitators' notes as explanatory notes are included in the slides and there is more information and guidance provided in the workshop notes. It is more beneficial to provide regular, effective train-the-trainer activities and updates.

6.12.3 Workshop notes

#3 Improve referencing to further reading in the workshop notes, including recent publications such as the *Phosphorus management of beef cattle in northern Australia* booklet, cover specific topics in more detail for participants if required.

#4 Investigate reprinting DAF publications previously used as further reading for participants that are no longer in print and in light of RD&E developments since they were published need to be reviewed and updated for MLA, FutureBeef partners and/or private providers to continue using them.

#5 Use key scientific references used throughout the packages and collate these for deliverer background reading and training purposes.

6.12.4 Follow–up workshops

#6 Follow–up workshops, or activities, should be held no later than six months following delivery of the original workshop. Ongoing consultancy work with workshop participants enhances their business management and return on investment for attending the workshop, and should be encouraged.

6.12.5 New adult equivalent methodology

#7 Meat & Livestock Australia to organise and appropriately contract suitable training to bring all current and potential EDGE deliverers up to speed and confident to deliver the new adult equivalent methodology developed by McLean & Blakeley (2014).

6.12.6 Decision support tools

#8 Develop decision support tools for the EDGE packages including spreadsheet–based tools to analyse the cost benefit of: (1) a range of nutritional interventions (*Nutrition EDGE*); (2) improving land condition and carrying capacity through either spelling or capital expenditure (*Grazing land management EDGE* and *Grazing fundamentals*), and; (3) a range of animal health treatments (*Breeding EDGE*).

6.12.7 Specialist modules

#9 Develop specialist modules for each of the EDGE packages to provide additional, expanded learning for participants in specific areas that they can pursue if relevant to their particular business, e.g. breeder herd management and weaning management. Also identify existing packages, including non-EDGE, that are already achieving the same outcomes for participants and link to, or partner with, these.

6.12.8 Animal health and welfare

#10 Meat & Livestock Australia liaise with McClelland Rural Services and RIRDC about the use and delivery of the *Managing Indigenous pastoral lands* manual to complement and fill the EDGE animal health and welfare gap identified by this project. Meat & Livestock Australia to also liaise with Grazing BMP, the Livestock Biosecurity Network, and NTDPIF to determine the most effective pathway(s) for northern producers (and EDGE participants) through these existing, comprehensive, industry programs and their associated resources.

6.12.9 Images

#11 Meat & Livestock Australia to seek and confirm copyright permission or licenses (including payment) for images. A list of images requiring formal permission to be finalised is supplied with each of the updated EDGE packages. Contact details have been supplied for each image wherever possible. This information must be kept and maintained centrally to ensure MLA does not breach copyright.

6.12.10 Editing and design

#12 Use a single professional editor to review all four packages to improve consistency of writing style, voice, etc.

#13 Do not oversimplify graphs, e.g. stylise them, as this can distort their accuracy and meaning. Use original data wherever possible and include references. This will also assist to streamline future package updates.

#14 Reference all material in the workshop manual and presentation slides, i.e. figures, tables, photos, etc. so that participants, deliverers and future developers can readily access original data.

#15 Use colour as much as possible, retire the monochrome design, and use high quality (resolution) colour images.

#16 Use large, consistently formatted graphs, referenced to source.

#17 Use minimal branding on all but workshop note folders and/or individual manual covers – this will help de–clutter pages and increase the amount of white space which will consequently improve readability.

#18 Also use minimal branding on all but the first of each individual module presentation slides – this will help de–clutter them and increase their readability.

#19 Remove page fill to increase the amount of white space.

6.12.11 Planning book

#20 Develop an electronic version and an online version of the *Planning book* so that participants can complete and build on their individually data and information electronically and/or online – depending on the reliability of their internet access and individual preferences.

6.12.12 Grazing land management EDGE

#21 Review and if necessary update forage budget and carrying capacity calculations and associated spreadsheets, to incorporate the adult equivalent methodology developed by McLean & Blakeley (2014); relative to dry matter intake. It must be done in as simple, practical and easy to use way for deliverers and participants.

#22 Meat & Livestock Australia to source specialist service providers to prepare property maps for EDGE workshop participants (detail provided in Section 4.2.4).

#23 Develop tree basal area sheets (detail provided in Section 4.2.4).

#24 Develop decision support tool for *Grazing land management EDGE* (detail provided in Section 4.2.4).

#25 Include Normalised Difference Vegetation Index (NDVI) data linked to nutrient content (detail provided in Section 4.2.4).

#26 Develop financial analysis for land condition change (detail provided in Section 4.2.4).

#27 Purchase map data from the Queensland Department of Science, Information Technology and Innovation (DSITI) (detail provided in Section 4.2.4).

#28 Meat & Livestock Australia to source specialist service providers, where possible, to calculate carrying capacities for properties (detail provided in Section 4.2.4).

#29 Meat & Livestock Australia to arrange for EDGE access to map data for northern Australia (detail provided in Section 4.2.4).

#30 Include information about cyanobacteria in *Grazing land management EDGE* and *Grazing fundamentals* (detail provided in Section 4.2.4).

6.12.13 Recommendations for further research (see Section 4.2.4 for detail)

#31 Review land types.

#32 Review pasture growth tables.

#33 Develop 'break of season' rules.

6.12.14 Recommendations for further work (see Section 4.2.6 for detail)

#34 Update sheep energy and protein requirement tables for both meat and wool breeds on tropical and subtropical pastures.

#35 Develop dry matter intake estimates for both meat and wool sheep.

#36 Develop dry matter intake estimates for breeders in alignment with the new dry matter intake graphs for dry stock.

#37 Develop additional energy and protein requirement tables for: wet cows that are back in calf, especially those in their second trimester; heifers that weigh 300 kg (many British breeds and some *Bos indicus*), and; lactating cows with calves over 4 months of age; this is especially important because it highlights the difference in requirements between cows in early lactation and those in late lactation.

#38 Use Stuart McLennan's written explanation of the updated cattle nutrient requirement tables and figures he prepared for MLA (resulting from this project) as a deliverer reference. A copy of the documents Stuart prepared is provided in Appendix 6.11.

6.12.15 Managing EDGE resources

#39 Design EDGE and *Northern livestock transporters course* materials digitally so that they can be printed on demand by local suppliers wherever possible. This will help to minimise printing costs and remove storage costs.

#40 Develop mobile friendly electronic versions of all EDGE and *Northern livestock transporters course* materials are developed and that they meet Australian content accessibility guidelines. This will cater to the increasing use of electronic mobile devices by participants.

#41 Meat & Livestock Australia, in consultation with FutureBeef partners and private deliverers, identify, fund and administer a centralised, easily accessible location for all EDGE workshop materials and tools with one to two people from each organisation nominated to maintain them, either from one of the previously mentioned organisations or external providers.

#42 Meat & Livestock Australia provides suitable administrative and logistical support to private and public providers (as was initially the case) to coordinate EDGE program components such as accreditation, marketing, M&E, etc.

#43 Meat & Livestock Australia instigate and appropriately contract a six monthly review (or scan) of RD&E outcomes, identifying ones of immediate use and relevance to EDGE packages. These findings are discussed and acted upon at the recommended annual EDGE review and debrief meeting involving the EDGE manager, coordinators and deliverers.

6.12.16 Monitoring, evaluation and reporting

#44 Meat & Livestock Australia review the proposed MER strategy as presented in Appendix 6.9, in light of recent changes to MLA structure and operations, including any strategic imperative and/or KPI changes. Then discuss and finalise and implement the strategy with FutureBeef Program partners, EDGE coordinators and private deliverers. Revisit the MER strategy annually to ensure its relevance and that the delivery and processes of the EDGE packages are consistent with the strategy.

#45 Meat & Livestock Australia organise and appropriately contract annual face-to-face EDGE program meetings with EDGE national manager, EDGE coordinators and private deliverers to review progress against KPIs (EDGE national manager to prepare report using quarterly data) and address general program business and emerging issues (as per business and operational plan recommendations). The timing of the annual meeting and reporting to align with the MLA corporate reporting schedule.

#46 Meat & Livestock Australia organise and appropriately contract biennial EDGE program updates, e.g. via webinar, with the EDGE national manager, EDGE coordinators and private deliverers to review progress, identify and address any emerging issues, etc.

#47 EDGE coordinators and private deliverers report quarterly (ideally directly into a centralise online system, e.g. QualDATA) KPIs, number and location of workshops, number of participants and businesses, etc. and any new R&D identified, emerging issues, etc to the EDGE national manager.

#48 Meat & Livestock Australia investigate and/or confirm an online reporting system that can be used by EDGE coordinators and private deliverers, and ideally participants, to enter M&E data directly that can then be collated, analysed and distributed by the EDGE national manager quarterly and then annually for the EDGE program meeting. Consistent with the outcomes and recommendations from the *Monitoring and evaluation systems framework for Meat & Livestock Australia* final report E.EVL.1401 prepared by QualDATA (2014).

#49 Meat & Livestock Australia in consultation with an M&E specialist, EDGE coordinators and private deliverers update the current M&E tools, in particular the pre– and post–skills audit questionnaires and the evaluation form to reflect the new and updated EDGE packages and Northern livestock transporters course and the MER strategy. Meat & Livestock Australia to develop electronic and online versions, or options, of the same that can be used wherever this option is accessible (i.e. connectivity allows).

#50 Meat & Livestock Australia develop a simple, effective national EDGE participant database, ideally linked (or part of) the MLA membership database to capture participant details, including information required for M&E – herd size, property size, etc that they only have to enter once when registering for consecutive EDGE activities and which allows follow-up, i.e. for additional customer service and M&E purposes. The EDGE national manager reviews, updates and interrogates the database regularly (i.e. actively maintain) to ensure its integrity and for quarterly and annual reporting purposes.

6.12.17 Business and operational plan

#51 Meat & Livestock Australia review the proposed business and operational plan as presented in Appendix 6.6, in light of recent changes to MLA structure and operations, including any strategic imperative and/or KPI changes. Then discuss and finalise and implement the plan with FutureBeef Program partners, EDGE coordinators and private deliverers. Revisit the business and operational plan annually to ensure the relevance of the plan and that the delivery and processes of the EDGE packages are consistent with the plan.

#52 Meat & Livestock Australia develop and implement a coordinated, national EDGE program communication and marketing strategy, consistent with the business and operational plan and the MER strategy, in consultation with FutureBeef Program partners, EDGE coordinators and private deliverers. As part of this strategy, MLA reactivates or reinvigorates the EDGE web site and email address, i.e. www.edgenetwork.com.au and edgenetwork@mla.com.au.

#53 Meat & Livestock Australia in consultation with EDGE coordinators, FutureBeef partners and private deliverers formalise a deliverer accreditation process, including facilitation, adult learning, presentation skills and delivery of technical information. A deliverer accreditation process and ongoing professional development has been proposed in Appendix 6.10, for discussion.

6.12.18 Delivery models

#54 Continue to deliver the EDGE packages and *Northern livestock transporters course* using the current delivery format and using the updated materials.

#55 Meat & Livestock Australia to amend EDGE coordinator and private deliverer contracts to incorporate the: updated materials; new business and operational plan, and; new MER strategy and online reporting option. And to allow for greater flexibility in delivery options so that deliverers can: ‘chunk’ delivery to better suit participant and participant group needs; begin using a more blended approach, and; as e-learning options become available they can also be incorporated.

#56 Meat & Livestock Australia to progress the *e-learning strategy as proposed in the eLearning strategy research project* final report for E.ONL.1404 (Higgins 2014) using the updated EDGE and *Northern livestock transporters course* materials. This will fast–track more blended and flipped learning delivery.

#57 Capitalise on the investment and resulting updated EDGE and *Northern livestock transporters course* materials by making them available and using them, or key components of them, in and by MLA, FutureBeef partners and private deliverers communication, marketing and complementary delivery services. This will promote the packages, i.e. providing ‘teasers’ or ‘tasters’ to potential participants, and help to promote key R&D messages, technologies and tools to industry – a primary charter of MLA and FutureBeef partners. For example: updating the *Beef cattle nutrition: an introduction to the essentials*, *Managing the breeder herd: practical steps to breeding livestock in northern Australia* and *Grazing land management: sustainable and productive natural resource management* booklets, and; updating FutureBeef web site content accordingly.

6.12.19 Key messages

#58 Continue to use and promote the key messages in EDGE and FutureBeef related information, activities and resources. Regularly review and update them as new R&D and/or industry issues emerge.

6.12.20 Vocational education and training options

#59 Meat & Livestock Australia develop a Third Party Partnership Agreement or a Memorandum of Understanding with the Queensland Agricultural Training Colleges be developed so that: (1) the key learning outcomes of the EDGE Grazing land management, Nutrition and Breeding workshops can be mapped to relevant competencies within the AHC10 training package; (2) suitable new skill sets can be developed for each workshop package using existing AHC10 competencies, and; (3) MLA engages the Queensland Agricultural Training College to complete recommendations one and two.

#60 In addition to recommendations 1 to 3 for the EDGE network suite of packages, MLA consider the pathways to accreditation for the *Northern livestock transporters course*. Meat & Livestock Australia work with the relevant state livestock transport representative bodies to determine which accreditation pathway (as detailed in the report in Appendix 6.7.2) is of most relevance to their members.

6.12.21 Train-the-trainer needs

#61 Meat & Livestock Australia organise and appropriately contract EDGE deliverer updates and train-the-training as a matter of priority, initially as required but at least annually in the long–term.

6.12.22 Pricing guidelines

Meat & Livestock Australia in consultation with FutureBeef partners, EDGE coordinators and private deliverers:

#62 Review and, if necessary, update current EDGE pricing and EDGE pricing guidelines taking into consideration the information provided in Section 4.10.6

#63 Develop a range of package deals incorporating multiple EDGE, or a combination of EDGE and complementary non–EDGE, workshops or activities with matching pricing options to suit the needs of different market segments.

#64 Develop online payment options.

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