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Pty Ltd



# final report

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## Feedbase Investment Plan: Mid-term review

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## Executive summary

### Introduction

The Feedbase Investment Plan (FIP) is a substantial investment for MLA and its partners in the red meat industry. It incorporates research, development and to a degree extension (RD&E), with some projects recognisably pure research while other elements are clearly focussed on 'on-ground' trialling by commercial producers.

MLA requires a review of the FIP at the halfway mark of its implementation. Essentially, this review is aimed at ensuring the program is addressing the right research questions, is on track to deliver a positive return on investment and that strategic direction, support and governance are appropriately provided by the Steering Committee and the Pillar Advisory Committees. Specifically, the terms of reference are to review and summarise:

1. Progress towards delivering on the Feedbase Investment Plan;
2. Emerging research and development gaps that may not have been considered as priorities when the FIP R&D plan was developed;
3. The relevance – of priorities that were identified in the Feedbase Investment Research and Development plan in the context of existing projects, new science or issues that are emerging in existing projects within the red meat industry and in other industries;
4. Gaps that exist within the existing program of research and development; and
5. Strategic direction and support and governance provided by the Steering Committee and Pillar Advisory committees.

This draft final report presents an assessment of the progress of the FIP mid-term. It has been reached through a process involving:

- ✚ Desktop review of numerous documents at a program, pillar and project level;
- ✚ Development of a consultation paper which was circulated to 32 key stakeholders. Eighteen submissions were received or telephone interviews held, providing insightful feedback on the progress of, and any gaps relevant to, the FIP;
- ✚ Synthesis of the responses to the consultation paper into a summary document of key findings and recommendations, which was presented to the FIP Steering Committee where further feedback was obtained; and
- ✚ Preparation of this draft final report, including further follow-up consultations with FIP personnel to clarify specific points.

This draft final report will be circulated to stakeholders for review early in 2015 before final changes are made to the report by March.

## RD&E program: key findings

1. There is a widespread view that the establishment of the FIP has been a very positive development for the red meat industry, for pastures research and for the human capacity to undertake pasture research in Australia.
2. The background consultation and intellectual input to develop the initial 'Feedbase Investment Plan' and the subsequent 'Feedbase R&D Plan' were very comprehensive. The achievement of developing, reviewing, contracting and commencing such a broad range of complex projects across the FIP is a credit to researchers and administrators alike.
3. The Program is progressing well. Projects that have been contracted appear to be on track to deliver the outcomes envisaged.
4. The overall structure of the Program is sound. Many directly involved in the program want the 'scaffolding' of FIP to be preserved as far as possible so that, if the opportunity presents itself for more projects to be commissioned (either now or in the future), there is logic to the selection and management of those projects, and the human capacity to undertake them is available.
5. There are of course some concerns but these are mainly directed at project areas that have not been progressed – predominantly as a result of budget restrictions after the commencement of the Program. These restrictions are likely to have an impact on the ability to meet key targets for the FIP, but for reasons listed below, it is not clear precisely how.
6. There are also differing views regarding the process used in the selection of the initial portfolio of projects. There is some feeling that decisions were taken in advance of any governance structures being put in place, that the collaborative process resulted in a lack of transparency and that in-kind contributions have not been sufficiently acknowledged in the FIP partnership.
7. As noted above, the impact of budget restrictions on the FIP is widely acknowledged and accepted. However, some stakeholders expressed the view that a more open discussion about possible alternative funding models could be valuable.
8. Pillars/projects were at different levels of development when the Program started. This has led to differing stages of implementation and complexity across pillars:
  - ⊕ **Pasture breeding & evaluation (PBE)** is well established with major projects contracted across all four themes. A concern raised by several stakeholders is a lack of focus on disease resistance (especially root rot) within this pillar, but it is noted that there are two large root disease projects being funded under PSP (although they take *'quite different approaches to the problem'*) and that AWI is investing separately in this area. There are concerns too that there is a lack of focus on digestibility / economic value of traits.
  - ⊕ **Productive & sustainable pastures (PSP)** is well advanced especially in relation to phosphorus, sub-tropical pastures and scoping of soils research. However, nitrogen supply and pasture persistence (for which a review has been completed) may be areas requiring greater focus if additional funds become available. There are indications that phosphorus work (B.PUE.102) may have relevance to nitrogen supply.

- # **Grazing systems management (GSM)** is predominantly based on the assimilation of EverGraze and Enrich projects which were already operating at the commencement of the FIP. Separate to these two projects, scoping studies have been performed and a small number of projects contracted (e.g. pasture biomass estimation, dual-purpose crops). However, while there has been some progress, the development of pasture and livestock performance indicators (except for biomass) has been limited. There has been quite widespread commentary that the animal / plant interface is largely lacking across the program (the exceptions being EverGraze and B.GSM.0008, 'Step changes in meat production systems from dual-purpose crops in the feed-base').
  - # **Weeds/biodiversity** was initially the least developed pillar (as expected) but has undergone a huge amount of detailed thinking and scoping to correctly position the pillar and identify key priorities. A small number of projects have since been contracted but this pillar in particular has run into issues as a result of reductions in available RD&E funds, as have other pillars. Virtually no feedback about this pillar was received during the consultation phase.
  - # **Decision tools** has not progressed after relevant scoping projects were performed in relation to modelling, and integration and data collection. This pillar is on hold due to a lack of sufficiently attractive investments in this area and (more recently) reduced funds.
  - # **Participatory R&D** coordinators have been appointed in each state and 24 Producer Research Sites (PRS) have been established. The manner in which these sites are managed is different to that in which many producers have been involved in R&D in the past, and this has introduced some challenges. However, feedback suggests that most sites seem to be performing well. This 'pillar' holds an important place in the FIP as it provides a key interface with producers. It is understood that the intent was for state coordinators to meet to review the process for work in this area. While some support exists for this amongst PRS co-ordinators, the cost would need to be justified.
9. Several R&D gaps have been identified by participants during this mid-term review as described above. The potential for these gaps to be considered and funded in the short term is expected to be limited, at least by MLA. It is possible however that these could be funded through the consultative process that is currently under development by MLA when it is implemented (see also point 7 above).
  10. While contracted projects across the FIP are progressing well, how these projects contribute to the overall objectives of the program is not clear (see also point 11 below). A program the size of FIP should have its own M&E framework including a program logic that shows clearly how each project and pillar contributes to the overall goals of the program (i.e. an additional \$25m in on-farm value by 2020; 2.5% annual increase in beef/Ha). This would in turn show what data need to be captured throughout the program to monitor progress and demonstrate outcomes. The Producer Research Sites will play an important role in the FIP M&E plan as they can contribute valuable commercial data by testing if and how the R&D fits into a farming system.
  11. As an M&E plan has not yet been implemented, how well the program is on track to meet its key targets is unclear.

12. A detailed communication plan has been developed and is in the process of being rolled out across the program.
13. The overall future of FIP is a subject of some concern among stakeholders. As noted earlier there is significant support for ongoing effort in the area of feedbase RD&E. One of the stakeholders interviewed talked about the need for 'creative conversations' about investment models that mitigate the problem of declining MLA funding. This might be an important future role for the Steering Committee.

## **Governance: key findings**

1. The Steering Committee (SC) does not see itself as such. Members describe it instead as a group that receives information on the program from MLA – it does not 'steer' as there are few decisions to be made. Members believe that the Committee should in future provide greater direction to the program, for example in relation to elements such as oversight of the M&E and communication plans. There was also commentary that the SC should be active in planning for future feedbase investments.
2. Many of the members have not been on the Committee from the start and confess to a relatively limited knowledge of the program. This is unsurprising.
3. Pillar Advisory Groups (PAGs) have been established, with a charter to provide the technical expertise to ensure research is tracking successfully, that the latest science from around the world is brought to bear on the program and to identify gaps for future projects.
4. However, the PAGs are very uneven in their level of activity and engagement. A similar situation to that described for the SC is operative: when there is less than a critical mass of activity within a pillar, and no apparent capacity for members of the PAG to influence anything, there is a lack of clear purpose. Of the three main pillars, only PSP appears to have a functional PAG – members of other PAGs do not see their relevance, which is understandable given the number and type of projects within those pillars. The question is whether just the one PAG should be continued, even if it is successful, which would leave other pillars as 'orphans'.

## **Recommendations**

This review makes the following recommendations in relation to future arrangements for the FIP and associated work:

1. While MLA budget restrictions have impacted, good progress has been made towards delivering on the Feedbase Investment Plan. Projects that have been contracted are progressing well. Except for those areas identified by this review, substantive operational change is not required.
2. Notwithstanding Recommendation 1, budget reductions have had an impact on the scope and coverage of the FIP. As a result, the SC should review the FIP targets (key performance indicators) and make an assessment as to whether these should be changed and, if so, in what way.

3. Recognition of in-kind contributions is important for the program as a whole, both currently and historically. At present, though, such contributions are not consistently calculated, well documented or audited. The Steering Committee should determine the importance of this issue and if deemed appropriate agree on a definition of 'in-kind' and provide updated figures for projects.
4. To a large extent, no emerging research and development gaps (that is, areas of R&D not identified as priorities when the FIP R&D plan was developed but now important) have been identified. The priorities identified by the FIP remain valid.
5. There are gaps within the existing program of R&D – not because they were overlooked during the development and implementation of the FIP but because funding restrictions have prevented their progression. When funds become available (see Recommendation 6 below) the following general areas have been identified as priorities:
  - i. Inclusion of disease resistance within the PBE pillar. This was considered at the time of the FIP development but was removed due to budget limitations. It is recognised that this is a technically difficult issue and high risk science. For that reason, if funds become available, a review of this issue should be commissioned to assess if additional research is justified. This review also requires input from other RDCs to ensure that all investments in this area are taken into account as, for example, AWI is funding root disease resistance in sub-clover with a focus on phytophthora.
  - ii. The productive soils theme within the PSP pillar was largely based around soil phosphorus and nitrogen. Numerous P projects have been commissioned but none concerning nitrogen. A project concept 'Optimising nitrogen (N) supply to grass based pasture systems (including addressing legume content and persistence)' was considered at a workshop but not progressed (note: project B.PSP.0013 does cover 'Pasture legumes in the mixed farming zones').
  - iii. Pasture persistence has been identified as a key priority. A review of this area (B.PSP.0030) was completed and it made several recommendations for projects. Such projects should be considered a priority should funding become available.
  - iv. Data at the animal / plant interface – at breeding, pasture and grazing system levels. There were numerous general references from stakeholders across the FIP that from a red meat perspective this is a gap and that there should be more data captured on how pasture projects impact on animal performance (Note: the EverGraze and Enrich projects have contributed to this objective and each project had its own recommendations for further R&D.)
  - v. Within the GSM pillar a key theme was 'pasture and livestock indicators'. A review has been completed (B.GSM.0004, 'Potential for information technologies to improve decision making for the southern livestock industries') however, apart from one 'biomass' project no other projects in this area are being undertaken.
  - vi. Weeds – as a late starter within the FIP, this pillar has been seriously impacted by budget restrictions and remains a gap in the program.

Phalaris toxicity and endophyte (ryegrass and tall fescue) were also raised as important R&D gaps by one respondent. It has not been possible to assess their level of priority from this review and it is understood that these are being covered by MLA's animal health program.

6. Alternative funding opportunities should be explored (e.g. through the Australian Research Council (ARC) or other sources) to address some of these RD&E gaps, assuming MLA's further investment over the next three years will be limited.
7. The Steering Committee should critically review its role and purpose, with particular regard to:
  - i. Overseeing the development and implementation of key FIP enabling activities including M&E and communication;
  - ii. Considering alternative funding sources for relevant projects within (and related to) the FIP and identifying projects being conducted outside the FIP which have relevance to it (e.g. the identified R&D gap in disease resistance in the pre-breeding portfolio given that AWI is making investments in this area);
  - iii. Identifying how to best capture key learnings from the operation of the FIP;
  - iv. Putting in place a process to identify the future feedbase RD&E needed to drive red meat industry competitiveness; and
  - v. Considering the implications of MLA's proposed new funding models, including an open call, which is seen as a useful new process.
8. The PSP PAG should be retained, because it is successful, and membership should be supplemented with producers (likely from PRS).
9. The Pillar Advisory Groups for PBE and GSM are unlikely to be beneficial to members of these pillars. They should be retained in name only and reactivated if needed.
10. To boost engagement across the program, consideration should be given to holding an FIP 'mini-conference' during the next 12 months. The mini-conference should be open to Pillar Leaders, Project Leaders, PRS coordinators and key producers and its purpose would be to:
  - i. Critically review progress across the portfolio;
  - ii. Allow participants to learn from each other's experiences;
  - iii. Attend to critical program matters such as implementation of the communication plan and M&E framework;
  - iv. Identify areas for resource sharing and reduced duplication between projects;
  - v. Identify RD&E gaps in the portfolio and capacity gaps across the sector; and
  - vi. Further build networks.

This approach would hopefully create some of the '1+1 = 3' outcome that an integrated program should deliver and supplement the SC with the technical expertise that would assist in determining portfolio gaps. If this was progressed, it would be useful for PRS coordinators to meet at the same time.

11. An M&E framework/program logic (consistent with the broader MLA M&E framework) should be developed immediately and implemented across the program. Should it decide to assume this responsibility (see Recommendation 7), the Steering Committee should provide the framework and 'high level' indicators to Pillar Leaders and Project Leaders so that they can demonstrate how their projects will contribute to program outcomes. An example of such a program logic is provided in the report.

12. The FIP communication plan should be further implemented, with oversight being provided by the Steering Committee should it decide to assume this responsibility (see Recommendation 7).



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## Abbreviations used in this document

ARC	Australian Research Council
AWI	Australian Wool Innovation
BCA	Benefit/cost analysis
BCR	Benefit/cost ratio
DAFWA	Department of Agriculture and Food WA
DEPI	Department of Environment and Primary Industries (Vic)
FFI CRC	Future Farm Industries Cooperative Research Centre
FIP	Feedbase Investment Plan
GRDC	Grains Research & Development Corporation
GSM	Grazing Systems Management (Pillar 3)
HRZ	High Rainfall Zone
KPI	Key performance indicator
M&E	Monitoring and evaluation
MBfP	More Beef from Pastures
MMfS	Making More from Sheep
MDC	MLA Donor Company
PAG	Pillar Advisory Group
PBE	Pasture Breeding and Evaluation (Pillar 1)
PISC	Primary Industries Standing Committee
PDS	Producer Demonstration Site
PRS	Producer Research Site (formerly Participatory R&D)
PSP	Profitable and Sustainable Pastures (Pillar 2)
PTN	Pasture Trial Network
PUE	Phosphorus use efficiency
PVTN	Pasture Variety Trial Network
RD&E	Research, development and extension
RDC	Research & Development Corporation
RIRDC	Rural Industries Research & Development Corporation
RMCiC	Red Meat Co-investment Committee
SARDI	South Australian Research & Development Institute
SC	Steering Committee

## Background and process for the review

The Feedbase Investment Plan (FIP) is the main RD&E program for the southern feedbase and is managed by MLA, with an original MLA Board-approved budget of \$27 million. As a result of budget restrictions a total of \$20.5 million has been contracted to date. A further total of \$15.9m of in-kind contribution has been recorded and/or identified by project partners. The MLA Board approval requires that the investment be delivered over the period 2011 – 2017 (an additional year's extension was granted in 2012). The FIP, which comprises five key pillars (six if the 'Feedbase delivery program' is considered as a pillar) commenced in 2011/12. The 2017 timeframe will make it difficult to undertake further investment, even if funds are available, as projects will need to be completed by the end of 2017 unless specific MLA Board approval is sought.

MLA requires a review of the FIP at the halfway mark of its implementation. Essentially, this review is aimed at ensuring the program is addressing the right research questions, is on track to deliver a positive return on investment and that strategic direction, support and governance are appropriately provided by the Steering Committee and the Pillar Advisory Groups. Specifically, the terms of reference are to review and summarise:

1. Progress towards delivering on the Feedbase Investment Plan;
2. Emerging research and development gaps that may not have been considered as priorities when the FIP R&D plan was developed;
3. The relevance – of priorities that were identified in the Feedbase Investment Plan Research and Development Plan in the context of existing projects, new science or issues that are emerging in existing projects within the red meat industry and in other industries;
4. Gaps that exist within the existing program of research and development; and
5. Strategic direction and support and governance provided by the Steering Committee and Pillar Advisory committees.

The process undertaken by this review has comprised:

- ✚ A desktop review of background documents in the lead-up to the implementation of FIP, the specific plans relating to each of the five pillars, and an examination of scoping studies, project contracts, milestone reports and other relevant materials. A list of documents reviewed is provided in Appendix 1.
- ✚ Preparation of a consultation paper which presented some preliminary observations on the program's progress and its management, any impediments or changes that may have arisen and possible gaps in the program, and a series of questions to elicit broader feedback from those directly involved.
- ✚ Circulation of the consultation paper to each of the organisations involved in the FIP, plus other interested parties, with the invitation to provide a response to the paper. A list of these individual invitees is provided in Appendix 2. Each organisation was provided the opportunity to discuss its submission by teleconference with the consultants. Discussions were actively sought with those parties that provided views of particular interest (for example, those that were significantly different to those of others). Thirty-two invitations to make a submission were sent out.

- ✦ Receipt of written submissions (18) along with interviews of a number of key individuals (FIP Steering Committee members, Pillars Leaders, some Project Leaders). The input received was based on a short proforma questionnaire (provided in Appendix 3) to maintain consistency. The selection of these key individuals was done in conjunction with MLA management, with a small number also putting themselves forward for interview.
- ✦ Synthesis of the findings from the above stages into a draft summary report presenting key findings and recommendations for MLA and the FIP Steering Committee. This report was presented to a Steering Committee meeting on 25 November 2014 where feedback was provided to the consultants.
- ✦ Redrafting of this draft final report, including further follow-up consultations with FIP personnel to clarify specific points.

This draft final report will be circulated to all stakeholders for review early in 2015 before final changes are made to the report by March.

## **Development of the program**

MLA (and the Meat Research Corporation prior to that) has invested in a range of areas under the broad heading of 'pastures and feedbase' over the last 20 years, with a quantum of investment estimated at approximately \$4m per annum. In 2010, the convergence of three initiatives was the genesis of the development of a more formal feedbase RD&E plan:

- ✦ The MLA Board requested the development of a comprehensive pastures and feedbase RD&E investment plan;
- ✦ A review of Pastures Australia recommended a national pastures strategy be developed; and
- ✦ Following development of the national beef and sheep RD&E strategies, the Primary Industries Standing Committee (PISC) identified a deficiency in pastures and feedbase RD&E, recommending a national plan be developed.

The Pastures Australia review identified that Australia's pasture industry was fragmented and that, with declining resources, there was a need to avoid duplication.

As a result, the Red Meat Co-investment Committee (RMCiC) created a pasture sub-committee which commissioned the development of a Feedbase Investment Plan (FIP) to determine researchable priorities in all southern agro-ecological zones. This draft plan<sup>1</sup> provided a comprehensive situation analysis and, via extensive consultation, established feedbase priorities. However, the plan was considered to be too extension-orientated and while key R&D priorities were identified, there was insufficient detail to move directly to commissioning projects. As a result, a further process was implemented, including the appointment of a feedbase coordinator, to develop a feedbase R&D plan providing greater clarity around the R&D priorities, the outcomes being sought, and likely returns on such investments.

In the Feedbase R&D Plan<sup>2</sup> five R&D pillars were established, namely:

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<sup>1</sup> Shovelton et al (January 2011). Feedbase Investment Plan. R, D & E Priorities for the Southern Australian Feedbase

<sup>2</sup> Mason, W & Allan, C (May 2011). Feedbase R&D Plan. Approved Draft. R&D for the meat industry feedbase in southern Australia

1. Pasture breeding & evaluation;
2. Productive & sustainable pastures;
3. Grazing management & production systems;
4. Weeds/biodiversity; and
5. Decision tools.

Details in relation to the Weeds/biodiversity and Decision tools pillars were not included in the original R&D Plan but were to be developed in parallel. At one stage consideration was given to having a 'Soils' pillar but this was merged into Productive & sustainable pastures. 'Grazing management & production systems' has been simplified to 'Grazing systems management'.

During the development of the R&D Plan, there was a call for and assessment of projects focussed on the first three pillars above. The response to the call was strong with approximately 150 project proposals being submitted. There is some disquiet as to how this response was handled.

Some projects were assessed by MLA and advisors as being ready to start immediately while, for other areas, further review and development was required. As a result, a staged approach was always recommended for the FIP along the following lines:

- ⊕ Projects with a high level of collective agreement were budgeted to begin in July 2011;
- ⊕ Projects that required more input, perhaps workshops, minor reviews, producer consultation or similar preparatory work were expected to be ready for final approval by December 2011; and
- ⊕ Projects where major development was needed – possibly a science review – would not be ready for final approval until the end of June 2012.

It is important to note that the FIP was one of the first initiatives established under the PISC collaborative engagement framework, alongside the dairy industry's 'Dairy Moving Forward'. It also established a range of principles determining the manner in which the program would operate (for example, targeting the top 20% of producers, focusing on participatory R&D wherever possible). The FIP was a test case for the national RD&E strategies to which each of the PISC agencies had signed up.

The intended overall outcomes of the FIP are that by 2020:

- ⊕ Pasture improvement is adding \$25m on-farm value per year by 2020; and
- ⊕ Kilograms of meat per hectare is rising at 2.5% per annum, with no decline in sustainability indicators.

The results from an ex-ante benefit cost analysis indicated a positive return across all the R&D pillars with estimated:

- ⊕ Net present value of \$105m over 30 years;
- ⊕ Benefit/cost ratio (BCR) of 7.1:1; and
- ⊕ Internal rate of return of 8.9%.

## Review of progress

### Overview

The following section provides a summary review of progress achieved by each of the themes within each of the six pillars, *as assessed against the specific recommendations of the program plan* (project B.PAS.0275 'R&D for the meat industry feedbase in southern Australia').

At the end of each theme review a brief summary of progress is provided. At the end of each pillar, there is a brief summary of progress within the pillar, incorporating commentary on research gaps that have been identified by the desktop review or the consultations.

### Pillar 1: Pasture breeding and evaluation (PBE)

#### Overview

The overarching goal of this R&D pillar is to increase producer profit through rapid development and delivery of superior cultivars and providing objective information on performance to build confidence to invest in pasture improvement. The intended outcome is to provide plants with superior attributes including yield, quality, persistence, and fit with animal system demands.

There are four themes within the pillar: species and variety evaluation (generating greatest value from and confidence in existing varieties), existing breeding programs (driving more rapid production of new varieties), new traits and technologies (identifying and delivering new traits into breeding programs) and novel species.

The plan estimated an overall investment of approximately \$1.5 million per year. The ex-ante benefit cost analysis indicated that the pillar should return a BCR of between 3:1 and 14:1 for the various themes.

#### Progress

The following tables provide a brief review of progress for the four themes within this pillar against planned activities (B.PAS.0275).

<b>R&amp;D Pillar</b>	<b>Pasture breeding and evaluation</b>	
<b>Theme</b>	Species and variety evaluation	
<b>Outcomes sought (from plan)</b>	Australian meat producers are able to increase productivity and profitability through making better informed pasture species and variety choices based on robust and accurate description of relative performance and degree of 'fit for purpose'.	
<b>Plan recommendations for theme</b>	<p>Invest in an "Auditing and Accreditation" framework to guide variety testing trials by the commercial seed companies, explore opportunities to co-fund forage quality testing (NIR) and animal production modelling with seed companies. Contract the Auditing and Accreditation &amp; EBV business plan implementation.</p> <p>Contract a scoping study on alternative processes to provide information on mixed sward performance, pasture persistence, and animal performance.</p> <p>Make an indicative allocation of \$500k per year for projects in this theme.</p>	<p><b>Current status of theme</b></p> <p>The auditing &amp; accreditation framework for Pasture Variety Trial Network (PVTN) was developed and trials sown 2011 and 2012 audited (B.PBE.0021 and B.PBE.0040), with feedback incorporated into the design. One issue requiring attention is how data from 'registered' PVTN sites (i.e. those run by seed companies), as distinct from 'independent' sites, will be published. Meanwhile a project between MDC, MLA and Pasture Trial Network (PTN) Ltd has been developed and contracts signed in August 2014 (B.PSH.0687). Seed companies will be paying for entry of their lines into sites managed by companies and independent trial operators. This recommendation is complete. Forage quality assessment is still a priority but has not been progressed due to lack of funds.</p> <p>B.PBE.0030 'Establishment and persistence of major temperate grasses and tropical pastures in Southern Australia: a review' has been completed and draft final report submitted to MLA in June 2013; an updated version of this report was submitted to MLA at the end of August 2014.</p> <p>\$1.7m is currently contracted for PVTN-related activities. Budget constraints have prevented further commitments. Another \$1.5m has been contracted through the MLA Donor Company for the PTN, half of which is paid by seed companies.</p>
<b>Additional (this theme only)</b>	<p>This theme needs to develop through overt linkages with theme 2 (existing breeding programs) and with grazing management and agronomy projects. A network of sites can provide an improved basis for selection across regions and provide common infrastructure to defray breeding program costs. Centralised data collection and analysis should also be developed to provide species x region evaluation. Related research (e.g. P efficiency, water use) could utilise this network rather than establishing separate sites. Web delivery of the analysed data needs development, linked to output from animal production models. The end result needs to be a much stronger integration of pasture variety evaluation with grazing management and on-farm knowledge of pasture variety and species performance.</p>	<p>A network of sites has been established under PVTN. A series of region-specific projects were funded from February 2012 to May 2014 or 2015 (B.PBE.0015-20, B.PBE.0022). The PTN (described above) will run over 6 financial years to December 2018. Centralised data collection and analysis for PVTN and PTN data has been contracted to University of Wollongong. Web delivery of the analysed data is in the development stage. MLA advises that work regarding related research is difficult as the sites are (largely) managed by private consultants who have been contracted to deliver the variety evaluation only.</p>
<b>Summary</b>	This theme has been established according to the intentions of the FIP plan, with the possible exception of integration of related research into the trial sites.	

<b>R&amp;D Pillar</b>	<b>Pasture breeding and evaluation</b>	
<b>Theme</b>	Species with existing public or private sector breeding programs	
<b>Outcomes sought</b>	Australian meat producers are able to increase productivity and profitability through the more rapid breeding of cultivars and the incorporation of novel traits into these cultivars.	
<b>Plan recommendations for theme</b>	<p>Adopt the investment model that focuses industry and public sector investments towards pre-breeding (see theme 3) and evaluation/extension (see theme 1).</p> <p>As a joint venture with theme 3 (traits and technologies) build industry support for the breeding objectives from 1000 minds project [NB: this is recommendation 5 referred to below].</p> <p>Utilise the MLA Donor Company funding model for public - private sector breeding programs. Review the recommended projects following the outcomes of recommendation 5.</p> <p>Re-assess projects submitted for this theme in the light of the outcomes of recommendation 5 above. Use the breeding objectives to re-assess project proposals for MLA investment.</p> <p>(In line with the workshop recommendations, see Appendix F [of the Plan]) allocate an indicative annual budget of \$250,000 for this theme in addition to MDC investments.</p>	<p><b>Current status of theme</b></p> <p>B.PAS.0350 ('Plant breeding traits and technologies prioritisation workshop') was held in October 2011. Investment plans for annual legumes and phalaris were developed in B.PBE.0028 &amp; B.PBE.0029. This recommendation has been implemented.</p> <p>This was done through B.PAS.0350. Priority species were identified as annual legumes and phalaris/cocksfoot. In developing the annual legumes pre-breeding R&amp;D plan, a workshop was held with over 30 industry experts to prioritise traits of importance in annual legume pre-breeding. The '1000 Minds' project is described in Smith &amp; Fennessy 2011, 'The use of conjoint analysis to determine the relative importance of specific traits as selection criteria for the improvement of perennial pasture species in Australia', Crop &amp; Pasture Science, 62:355-65.</p> <p>Two projects with MDC have been approved: B.PSH.0664, 'Evaluation of acid tolerant lucerne' and P.PSH.0687 (PTN – see theme 1). Both projects are on track. This recommendation has been implemented and will be ongoing.</p> <p>MLA advises that prospective project proponents who submitted project applications to MLA in February 2011 were notified of the possibility of resubmitting projects where MDC funds could be used. Recommendation has been implemented.</p> <p>There has been no investment of MLA funds (separate to MDC) in this theme (annual legumes and phalaris are considered in the following theme).</p>
<b>Summary</b>	Two significant projects have been funded by MDC under this theme (lucerne \$883k over 3 financial years), PTN \$1.483m over 6 financial years. The MLA investment has not hit the recommended target of an additional \$250k per annum.	



<b>R&amp;D Pillar</b>	<b>Pasture breeding and evaluation</b>	
<b>Theme</b>	New traits & breeding technologies	
<b>Outcomes sought</b>	Australian meat producers are able to increase productivity and profitability through MLA investing in pre-breeding activities that identify new traits for breeding programs or that provide breeding programs with better technologies.	
<b>Plan recommendations for theme</b>	<p>Focus half of direct (i.e. levy funded) investment in pasture breeding into this theme to improve rate of genetic gain in priority species. Scope traits/technologies to improve the rate of genetic gain in priority species.</p> <p>Initiate processes to maximise the incorporation of the resulting IP (new technologies and traits) from this theme in relevant public and private sector breeding programs. Explore 'open source' approach.</p> <p>Re-assess projects submitted for this theme (including the project on phalaris toxicity recommended by the feedbase project review workshop – see Appendix F [of the Plan]) in the light of the outcomes of recommendation 5 above. Implications of GM technologies should also be considered. Use the pre-breeding priorities to re-assess project proposals for MLA investment.</p> <p>Allocate an indicative annual budget of \$600,000 for projects in this theme.</p>	<p><b>Current status of theme</b></p> <p>A 'Plant breeding traits and technologies prioritisation workshop' was held in October 2011 (B.PAS.0350). Phalaris and annual legumes were prioritised. Investment plans were developed for annual legumes (B.PBE.0028) and phalaris (B.PBE.0029). Projects B.PBE.0037 (annual legumes) and B.PBE.0038 (phalaris) were contracted in Dec 13 and Mar 14 respectively.</p> <p>Both B.PBE.0037 and B.PBE.0038 are on track, each with two milestones due and submitted to date.</p> <p>MLA advises that pre-breeding plans are to include recommendations for IP management and engagement with private companies. IP will be freely available. Recommendation has been implemented.</p> <p>MLA advises that this has been done. GM technologies are not being considered. Phalaris toxicity may be better placed within MLA's animal health portfolio.</p> <p>B.PBE.0037 budget is \$1.503m over 4 financial years from 2013/14. B.PBE.0038 budget is \$1.447m over 5 financial years from 2013/14. The recommendation has been implemented.</p>
<b>Summary</b>	This theme is well established with projects underway and on track.	

<b>R&amp;D Pillar</b>	<b>Pasture breeding and evaluation</b>	
<b>Theme</b>	Novel species	
<b>Outcomes sought</b>	Australian meat producers are able to increase productivity and profitability through the incorporation of novel species into their feedbase.	
<b>Plan recommendations for theme</b>	<p>Contract development of generalised framework to assess commercial feasibility of novel species, starting with tederas. Use the framework to re-assess project proposals for MLA investment. Advise project proponents of the need to develop a skilled and realistic assessment of benefits and risks before requesting funds. Consider co-investment in this market analysis subject to perceived demand.</p> <p>Allocate an indicative annual budget of \$200,000 for this theme.</p>	<p><b>Current status of theme</b></p> <p>The tederas proposal was reviewed externally in May 2011 (B.PAS.0285). This review developed a general framework for novel species assessment. Projects on grazing management of tederas (B.PBE.0027) and increasing the quantity of tederas seed (B.PAS.0304) were funded as a result of review. B.PAS.0304 was completed in June 2013 although it fell short of the target quantity of seed (138 vs 200kg). B.PBE.0027 is on track; site visit and review meeting were held in June 2014 by MLA and go/no go milestone approved.</p> <p>B.PBE.0027 budget is \$552k over 4 financial years from 2012/13, slightly under the recommended quantum of investment.</p>
<b>Summary</b>	This theme is on track against the original FIP plan, although some concern has been expressed that no novel species will be delivered, just the tools.	

## Additional projects:

- ⊕ B.PAS.0265, November 2011, 'Developing supply chain capacity in pastures' (AbacusBio). This project scoped and developed a 'Pasture genetics manual' of 'agreed definitions of genetic terms that may be used to promote or describe new cultivars, the development of teaching tools for pasture plant genetics at undergraduate level' and conducted a review of the teaching of pasture plant breeding at undergraduate level.
- ⊕ B.PBE.0011, July 2012, 'Understanding pasture re-sowing decisions for meat producers' (RMCG). 'The project method has used a social research approach to better understand producers' decisions associated with two key decision points during pasture sowing and re-sowing – the decision to sow or re-sow a pasture, and the subsequent decision(s) associated with choice of species, varieties and mixtures' across Victoria.

## Status and opportunities

- ✦ The MLA Board approved \$6,490,000 for projects in this pillar and as at September 2014, \$6,087,927 had been contracted. An amount of \$402,073 is uncontracted and may not be available for allocation due to MLA budget and timeframe restrictions.
- ✦ This pillar is well underway, with major projects contracted in all themes and progressing to plan.
- ✦ Gaps have been noted in plant disease (notably root rot) resistance in the pre-breeding projects of the 'Species with existing public or private sector breeding programs' theme. There has also been a suggestion that the 'Species and variety evaluation' theme could have been linked to dairy (DA) projects which are developing a 'forage value index' to assist farmers in making informed seed selections.

## Pillar 2: Productive and sustainable pastures (PSP)

### Overview

The goal of this R&D pillar is to increase pasture performance and reduce the cost of production per unit of forage, through the development of new tools and technologies to better manage the soils and the pasture feedbase for productivity and sustainability.

The pillar contains three inter-related themes – productive soils (nutrient management and use, soil carbon and soil health); pasture agronomy and management (increasing yield, persistence, improved legume performance and sub-tropical species); and pasture health (pests and diseases, symbiotic relationships).

The plan estimated an overall investment of approximately \$2 million per year. The ex-ante benefit cost analysis indicated that the pillar should return a BCR of between 5:1 and 7:1.

### Progress

The following tables provide a brief review of progress for the three themes within this pillar against planned activities (B.PAS.0275).

<b>R&amp;D Pillar</b>	<b>Productive and sustainable pastures</b>	
<b>Theme</b>	Productive soils	
<b>Outcomes sought</b>	Australian meat producers have access to the knowledge, tools and skills to identify and profitably overcome soil based limitations to pasture performance. The focus is on key soil nutrients such as nitrogen and phosphorus, soil biology (including soil carbon) and soil physical limitations to pasture production.	
<b>Plan recommendations for theme</b>	<p>Build 'productive soils' into Productive &amp; Sustainable Pastures rather than having a separate Soils R&amp;D Pillar.</p> <p>Immediately fund two projects:</p> <p>a) "Improving the efficient, effective and economic use of phosphorus in pastures" (\$650,000 p.a.)</p> <p>b) "Optimising nitrogen (N) supply to grass based pasture systems" (including addressing legume content and persistence - \$300,000 p.a.).</p> <p>Monitor progress of Federal legislation re the Carbon Farming Initiative</p> <p>Scope out a Productive Soils program including soil health and soil carbon</p>	<p><b>Current status of theme</b></p> <p>This has been successfully completed as soils is part of this pillar.</p> <p>For a) there are four substantive projects seeking to improve the effectiveness of phosphorus in pastures.</p> <ul style="list-style-type: none"> <li>• B.PUE.0102 'Phosphorus reactions and fluxes in pasture soils'. Jointly funded with AWI. MLA 75% of total project costs of \$1,358,755 over 3 years. On track and suggested that showing very good results that could be applied elsewhere.</li> <li>• B.PUE.0103 'Root disease constraints to pasture production'. Related to pasture health theme. MLA \$495,438 over 3 years. On track. Due for completion February 2015. Refer also below.</li> <li>• B.PUE.0104 'Phosphorus-efficient legume pasture systems'. Related to pasture agronomy and management pillar. Jointly funded with AWI. MLA 50% of \$2,189,802. On track.</li> <li>• B.PUE.0105 'An assessment and benchmarking of phosphorus nutrient use efficiency and industry management practice in Southern Australia'. MLA - \$366,191. Project completed in 2013.</li> </ul> <p>An update for the 'Five Easy Steps' tool under phosphorous use efficiency (PUE) has also been funded.</p> <p>For b), see also B.PSP.0013. MLA advises that a specific legumes project (N fixation) has not been progressed due to lack of funds.</p> <p>The CFI initiative is being monitored by the MLA Climate Change Manager.</p> <p>This was completed via B.SBP.009 'Soil biology review and project prioritisation for the Feedbase Investment Plan'. A major recommendation was then supported via project B.PSP.005 'Managing soil-borne root disease in sub-clover pastures'. MLA expenditure of \$1,280,772 over 5 years.</p>
<b>Summary</b>	'Productive soils' has been firmly established within this pillar. There has been a significant focus on phosphorus. Some work is being done on N supply but MLA has advised that further work has not been supported due to budget and timeframe constraints. A scoping study on soil biology has been completed and a project commissioned as a result.	

<b>R&amp;D Pillar</b>	<b>Productive and sustainable pastures</b>	
<b>Theme</b>	Pasture agronomy & management	
<b>Outcomes sought</b>	Australian meat producers are able to improve the productive capacity of their pastures (quantity, quality and timeliness) and to maintain those pastures in a productive state for longer.	
<b>Plan recommendations for theme</b>	<p>Work with agencies to do collaborative project on the performance of sub-tropical pasture species (and companion spp) for both sub-tropical and more southern regions (\$250,000 p.a.)</p> <p>Develop with FFI CRC packages to deliver new temperate perennial grasses of cocksfoot, tall fescue and phalaris cultivars to the commercial partner (\$250,000 total)</p> <p>Working with the Productive soils theme, develop a project to optimise the consistency of N fixation for legumes/companion species (\$250,000 p.a.)</p> <p>Develop with partners a project to explore the issue of 'understanding and achieving persistence' in southern pastures (\$250,000 p.a.)</p>	<p><b>Current status of theme</b></p> <p>A major review, B.PSP.0008 'Sub-tropical pastures for southern meat producers' was undertaken and published in January 2012. Project B.PSP.0001 'Increase feedbase production and quality of subtropical grass based pastures' was contracted in June 2012. MLA expenditure of \$1,412,000 is over 5 years. The project is on target although some failed sowings have been experienced.</p> <p>Commercialisation of new cocksfoot, tall fescue, phalaris and panic cultivars has taken place with Heritage Seeds as part of FFI CRC.</p> <p>MLA advises that this has not been progressed due to a lack of funds.</p> <p>Project B.PSP.0006 'Reducing the cost of pasture establishment' was completed in 2012. There were 3 main recommendations, including one recommending a focus on sowing rates. As this was largely an extension approach project, B.PBE.0030 'Establishment and persistence of major temperate grasses and tropical pastures in Southern Australia: a review' was commissioned. MLA has advised that a close-to-final version of this report has been received. Persistence projects were to be based on the review but this has only recently been finalised and now budget limitations will no doubt preclude further immediate progress. One of the key recommendations strongly offered was that the Prime Pasture Project conducted in NSW in the 90's and focussed on establishment be updated and implemented across southern Australia.</p> <p>Project B.PSP.0013 'Pasture legumes in the mixed farming zones of WA and NSW: shifting the baseline' straddles all 'Productive and sustainable pastures' pillars. It examines the establishment, management and persistence of hard seed annual legumes in mixed farming areas. This is a joint project with AWI of \$1,747,872 over four years (MLA \$1,094,975). The project is on track.</p>
<b>Summary</b>	There has been good progress with sub-tropical pasture. Similar to above, further N work would be desirable. The review regarding persistence has been received and recommended projects can be implemented should funds become available. A project with a focus on hard seed legumes has been progressed.	

<b>R&amp;D Pillar</b>	<b>Productive and sustainable pastures</b>	
<b>Theme</b>	Pasture health	
<b>Outcomes sought</b>	Australian meat producers are able to maintain healthy pastures and therefore be more productive, persistent, and make more efficient and effective use of resources (soil, water, manpower, fertiliser etc).	
<b>Plan recommendations for theme</b>	<p>Note: Plan says Pasture Health least developed of all themes</p> <p>Work with partners and the private sector to fully understand the challenges for the meat industry associated with improving pasture health</p> <p>Allocate indicative annual budget of \$200,000 to support project developments</p>	<p><b>Current status of theme</b></p> <p>A major review was completed on the opportunities for investment in pasture health (B.PSP.0007 – ‘Research and development priorities for Southern Australian pastures and lucerne’).</p> <p>B.SBP.009 ‘Soil biology review’ (see ‘Productive soils’ above) was also completed – the highest priority from this review was covered by project B.PSP.005 ‘Managing soil-borne root disease in sub-clover pastures’.</p> <p>Project B.PUE.0103 is also relevant, ‘Root disease constraints in pasture production’ which involves a budget of \$495,438 over 3 years (related to ‘Productive soils’ phosphorus work).</p> <p>MLA advises that an amount of \$1.4m has been allocated over five years, with two areas of work not progressed due to budget constraints:</p> <ul style="list-style-type: none"> <li>- A high rainfall zone (HRZ) legumes project which would have been focussed on pasture health.</li> <li>- A variable rate fertiliser project.</li> </ul>
<b>Summary</b>	Pasture health was always acknowledged as the theme least developed across the whole FIP. A review was completed on soils from which a project on soil-borne diseases arose. A review on pasture health was conducted but no further projects have been contracted. Commentary received indicates that few people can accurately identify existing pasture health (plant pathology) issues so a communication tool in this area may be warranted.	

## Status and opportunities

- # The MLA Board approved \$8,940,000 for projects in this pillar and as at September 2014, \$7,152,096 had been contracted. An amount of \$1,787,904 is uncontracted and may not be available for future allocation due to MLA budget and timeframe restrictions.
- # It appears that good progress is being made in this pillar, especially in relation to phosphorus, alternative legumes in mixed farming, sub-tropical pastures and scoping of soils research.
- # Nitrogen supply projects and pasture persistence and pasture health projects may be areas requiring greater focus.

## Pillar 3: Grazing systems management (GSM)

### Overview

Not surprisingly, consultation with industry undertaken as part of the FIP preparation found that producers nominated pasture utilisation and grazing management as the highest priority for ongoing research, most likely because of the critical need to understand the plant/animal interface.

This pillar builds on recent projects such as Evergraze and Enrich (which had already been funded but were assimilated into the FIP), but also focuses on understanding how meat producers can make use of 'the dramatic increase in 'precision agriculture' possibilities (involving remote sensing, individual animal identification, GPS mapping and computing power) to make better day to day decisions'.

The pillar has three themes: pasture and livestock indicators; livestock systems design; and integration of additional feeds (crops, shrubs, niche pasture species and containment feeding) into productive systems.

The plan envisaged an investment of \$1.1m per annum over 4 years. The ex-ante BCA estimated a BCR of 4:1 to 10:1 for the various themes.

### Progress

The following table provides a brief review of progress for the three themes within this pillar against planned activities (B.PAS.0275).

<b>R&amp;D Pillar</b>	<b>Grazing systems management</b>	
<b>Theme</b>	Pasture and livestock indicators	
<b>Outcomes sought</b>	Meat producers are able to make much better informed tactical grazing and other management decisions to optimise stocking rate, livestock and pasture performance and livestock health and welfare despite seasonal and market fluctuations, through the effective collection (with an emphasis on remote collection) and use of objective data/indicators.	
<b>Plan recommendations for theme</b>	<p>MLA and the RMCiC partners undertake a major 'background investigation process' with the aim of identifying the potential for a significant R&amp;D investment (MLA ~\$500k/yr+) in the general area of 'precision agriculture'</p>	<p><b>Current status of theme</b></p> <p>MLA commissioned a review (B.GSM.0004, 'Potential for information technologies to improve decision making for the southern livestock industries') which identified the following opportunities for producers:</p> <ol style="list-style-type: none"> <li>1. Improved pasture production through soil fertility assessments and variable rate fertiliser application</li> <li>2. Improved feed allocation – allocating appropriate quality and quantity of feed to different classes of stock in a timely manner</li> <li>3. Pasture yield mapping – understanding, managing and optimising pasture production within and between paddocks</li> <li>4. Feed prediction – the mitigation of risks associated with adverse climatic conditions and opportunities associated with good seasons</li> </ol> <p>One project (B.GSM.0010 'Real time pasture biomass estimation' - \$410,000 over 4 years) has been contracted to address points 2 and 3 above through the development of tools for real time estimation of biomass and allocation of pasture resources to meet feed supply demands.</p> <p>No other projects to address this theme were viewed. However, MLA advises that a site-specific fertiliser management project proposal was received and considered in detail with partners but the project did not proceed.</p>
<b>Summary</b>	A background review has been performed and one project commissioned. MLA has advised that funding is not available at this time for further work within this theme.	



<b>R&amp;D Pillar</b>	<b>Grazing systems management</b>	
<b>Theme</b>	Livestock systems design	
<b>Outcomes sought</b>	Meat producers are able to capture and interpret remote and local data into the design of more profitable livestock systems. These improved systems integrate grazing and other management inputs into a focus on optimising enterprise mix and meeting market targets despite seasonal and market fluctuations.	
<b>Plan recommendations for theme</b>	<p>The major 'industry investigation of remote and precision technologies' that was recommended in pasture and animal indicators be broadened to include data capture to support strategic (systems design) as well as tactical decisions</p> <p>MLA explores other options (other than the remote and precision technologies in recommendation 2 above) to improve systems design and resource allocation in livestock system design with the overt aim of reducing costs of production and achieving the required NRM and social outcomes (e.g. negotiate with the FFI CRC to modify the EverGraze native pasture site at Orange to include assessment of high density grazing and opportunities to reduce inputs and costs with a budget of up to \$150kpa)</p> <p>EverGraze systems modelling be focussed on addressing seasonal variation and ensuring market specifications, by incorporating sub-tropical species, and new temperate grasses and management tactics</p>	<p><b>Current status of theme</b></p> <p>It is understood that B.GSM.0004, 'Potential for information technologies to improve decision making for the southern livestock industries' included considerations of data capture to support decisions.</p> <p>MLA has advised that the EverGraze native site at Orange was funded for two years by Australian Wool Innovation (AWI) which later withdrew funding support. MLA was requested to continue funding this project but declined due to funding constraints.</p> <p>In relation to EverGraze, MLA advises that IP has been jointly assigned to the Department of Environment and Primary Industries (DEPI) Vic, AWI &amp; MLA. A proposal is in preparation to continue to develop the Whole Farm Grazing Strategies training course and take that nationally – if approved MLA advises that this will be funded outside of the FIP. In addition, other training will be developed and taken further, as appropriate. A total of \$1.1m has been spent on EverGraze during the timeframe of the FIP (this is in addition to the previous MLA investment of \$4.3m). MLA's total investment in EverGraze was \$5.4m with AWI contributing \$4.7m and CRC (cash and in-kind) \$19m.</p> <p>Significant work has been done on modelling of seasonal variation and meeting market specifications. Parameter sets are not currently available to allow inclusion of sub-tropical pastures or new temperate grasses in modelling.</p>
<b>Summary</b>	<p>EverGraze was assimilated into the FIP and completed under that banner. The EverGraze 'Impact report July 2011 – March 2014' has a range of outputs listed along with extrapolated practice change impacts and consequent benefits. Additional modelling work has been conducted on seasonal variation, but this was not possible on other new pasture species.</p> <p>It is noted that the 'Livestock systems design' theme is highly dependent on outputs from theme 1 (Pasture and livestock indicators) and integration into recently completed projects.</p>	

<b>R&amp;D Pillar</b>	<b>Grazing systems management</b>	
<b>Theme</b>	Integration of additional feeds (crops, shrubs, niche pasture species, conserved fodder and containment feeding) into productive systems	
<b>Outcomes sought</b>	Meat producers are able to select and integrate additional forage options and management tactics (including containment feeding and forage conservation) into production systems to reliably meet livestock market specifications more profitably than conventional pasture based systems.	
<b>Plan recommendations for theme</b>	<p>MLA and CSIRO begin negotiations around the project "Achieving a step change in HRZ livestock production by capitalising on dual purpose cropping" with the objective of sharing the cost with GRDC and making linkages to extend the geographical reach of the project around an indicative budget of \$350k/yr. Negotiations with GRDC and other researchers should be progressed to expand the intent of this project into the cereal zone of utilising crops for livestock production</p> <p>MLA negotiates with the FFI CRC to progress part of the 'Enrich' project – to focus the project on integration and to reduce the budget from ~\$920k to ~\$250k/yr. (Also suggested that Additional funding for the methane assessment from shrubs investigations (currently DAFF funded) should be sought from the MLA methane program, rather than feedbase investment</p> <p>MLA and the RMCiC partners collectively invest to explore the question of how to most effectively utilise crop stubbles in mixed farming operations without damaging soils and the yield potential of future crops and potentially fund a project in this area</p>	<p><b>Current status of theme</b></p> <p>The project B.GSM.0008 'Step changes in meat production systems from dual-purpose crops in the feed-base' has been contracted (\$1,594,514 over 4 years). GRDC is not involved. There has been good progress with this large project at 3 sites.</p> <p>Germplasm that was evaluated and propagated through the shrubs component of Enrich has been assigned to AWI, South Australian R&amp;D Institute (SARDI) &amp; CSIRO in equal portions. This includes the anti-methanogenic work. While the work showed promise MLA advises that it was not sufficient to commercialise some of these shrubs.</p> <p>There is however one line of 'old man saltbush' that is being commercialised with the IP assigned to CSIRO which is working with a nursery in WA to propagate this line.</p> <p>\$557,000 was spent by MLA on further Enrich activities (2011-2014) with additional funds from FFI.</p> <p>Project B.GSM.0005 'Making better use of crop stubbles on mixed farms' was completed in December 2011. No additional projects have been commissioned to address the opportunities identified by that report.</p>
<b>Summary</b>	Dual-purpose crops project is progressing well and will provide useful information in relation to plant/animal interface. Considerable progress has been made with final elements of Enrich with one line of old-man saltbush being commercialised. Funding will limit additional progress.	

## Status and opportunities

- ⊕ The MLA Board approved \$4,450,000 for projects in this pillar and as at September 2014, \$3,832,040 had been contracted. An amount of \$617,960 is uncontracted and may not be available for future allocation due to MLA budget and timeframe limitations.
- ⊕ Much of this pillar seeks to build on the previous EverGraze ('Putting the right perennial plant in the right place for the right purpose with the right management') and Enrich ('Profitable shrub-based systems for the low-medium rainfall (250-500 mm) mixed-farming region of southern Australia') projects. The Enrich and EverGraze extensions were subsumed into the FIP as planned.
- ⊕ Valuable scoping studies have been conducted (e.g. 'Potential for information technologies to improve decision making for the southern livestock industries'; and 'Making better use of crop stubbles on mixed farms').
- ⊕ Two interesting projects have been contracted ('Real time pasture biomass estimation'; 'Step changes in meat production systems from dual-purpose crops in the feed-base') the latter of which will provide plant/animal data.
- ⊕ There has been some, but fairly limited, progress with the development of pasture and livestock performance indicators (except for biomass) and budget constraints will limit further project development.
- ⊕ Concern has been expressed that there is a gap in low-cost establishment options for forage shrubs.

## Pillar 4: Weeds and biodiversity

### Overview

As noted in the 'Development of the program' section, 'Weeds and biodiversity' was approved as a 'concept pillar' when the FIP was approved by the MLA Board, but it was noted at that time that the pillar was not well developed and additional funding may be needed once it was scoped. An initial allocation of \$1 million over 5 years was made for weeds in southern Australia.

As a result of the delayed implementation, this summary of the Weeds pillar takes a different form to the assessment of the three earlier pillars.

Since approval of a 'concept pillar', the Weeds pillar has been progressed as follows:

- ⊕ The FIP's broad-based industry consultation project provided supporting information on the issue for industry, RD&E capacity and a relative priority assessment.
- ⊕ MLA commissioned a situation analysis and options paper for RMCiC entitled 'Weed research, development and extension in Australia as it relates to meat and livestock production' (April 2011). This report (WEE.0007) made three recommendations specifically aimed at increasing the focus on the issue.
- ⊕ The development of a 'Weed RD&E strategy framework for the grazing industries' followed consultation from the FIP processes, national RD&E strategy development, weeds R&D strategy and current government strategies on biosecurity. The strategy framework was packaged as a discussion

paper and developed from a workshop involving industry, RDCs, State and Federal Governments and producers. This framework changed the focus for weed RD&E by 180 degrees to concentrate on addressing weeds in a livestock production system rather than a weed ecology and management context.

- ⊕ An investment plan for the Weeds pillar was outlined and was to be submitted to the MLA Board seeking an annual investment of ~\$2m pa across Australia. However, an on-farm portfolio balance review was undertaken across all on-farm work areas, and the Weeds pillar budget request was not supported to go to the Board. Individual theme areas in the Weeds pillar and underpinning projects were to be progressed instead. The overall vision of the weeds RD&E framework was *'Better decisions being made on the properties of leading livestock producers because they have available the tools and knowledge that allows them to tap into weed R&D (past and present) so as to prioritise, define and customise their livestock/pasture/weed management approaches. The key issue is that a grazing systems focus is required and this focus is the context into which weed management decisions must fit.'*
- ⊕ Four focal strategies were identified to ensure greatest benefit to end users, relevance and leverage:
  - 1) Developing linkages and co-funding with other agencies;
  - 2) Effectively engaging with producers and meeting their needs;
  - 3) Focussing weed R&D on existing weeds; and
  - 4) Undertaking R&D on surveillance to assist with sleeper or emerging weeds.
- ⊕ Further development of the Weeds pillar was undertaken resulting in a refined four-theme approach:
  - 1) Weed management in production systems;
  - 2) Biocontrol of impacting weeds;
  - 3) New approaches to management & monitoring; and
  - 4) Improving recommended practices.
- ⊕ To provide direction in theme 1 above, a review was undertaken to collate information on previous R&D, prioritise the importance of particular weeds and then make recommendations on potential RD&E project areas. This was project WEE.0132, 'A review of recent weed research and management relevant to Australian livestock industries and proposals for future investments'.
- ⊕ To provide direction in theme 2 (biocontrol) and in recognition of multiple investors and capability, the MLA project WEE.0129 convened all organisations across Australia involved in biocontrol to collectively agree on a prioritisation process and then apply that to weeds of significance to the grazing industries. This led to the report 'Prioritisation of weed species relevant to Australian livestock industries for biological control' (WEE.0129, November 2013).
- ⊕ To provide direction in theme 3 (new approaches) a project 'Review – new approaches to weed management: blue sky thinking with plants and animals' was undertaken and resulted in the report WEE.0150 'New approaches to weed management' (February 2014).
- ⊕ Non-MLA reports (specifically Rural Industries R&D Corporation (RIRDC) (2013) – 'Mapping Australia's weed management system' (publication No. 13/019)) and anecdotal evidence showed a very large investment over the years in weed RD&E had delivered some successes, but that

Australia's weed management system could be improved and that a new 'business model' was warranted.

- ⊕ A call for projects was made specifically in relation to developing improved research and extension processes (theme 4 – improving recommended practices) and involved the active engagement of producers in partnership with service providers (researcher/ advisors/ regulatory/ agribusiness) helping to implement current recommended practices. Three projects were endorsed for support by the application review, of which two were funded (both in the southern cereal zone): B.WEE.0141 (best management practices for silverleaf nightshade in 5 states), and B.WEE.0143, 'Reducing uncertainty with weed management outcomes – Applying a risk management approach to RD&E' (\$146,350 over 18 months; draft final report received). The third project, WEE.0142 'Coordinated "grass-roots" network to concurrently test and develop improved best management practices for unpalatable grasses' was not supported, but would be reconsidered following early reports of the 'different' RD&E business model being explored in WEE.0141.
- ⊕ A benefit cost analysis was performed (B.WEE.0012, 'Weeds R&D investment analysis') which estimated that an indicative MLA investment of \$1.5 million pa (7% discount rate, 30 year analysis period) would yield a BCR of 22:1.
- ⊕ The background preparatory work (consultation / reviews / ideas) and recognition of MLA's driving improvements to the weed RD&E business model prompted an invitation to MLA onto the Australian Weeds Committee Working Group tasked with 'facilitating the establishment of a collaborative national system undertaking high priority weeds RD&E to reduce weed establishment, spread and impacts'. Three of the four weed pillars (biocontrol, production systems and getting research adopted) are mirrored in the Working Group's output, while the fourth (new approaches) will be implicit in the way the research may be conducted.
- ⊕ More recently, specific projects have been progressed in all theme areas, as budget has allowed:
  - ⊕ Weeds in systems: WEE.0146 with GRDC co-investment examining weeds in mixed farming systems and addressing herbicide resistance (\$938,000 over 5 years). Herbicide resistance levels to key pasture species will be defined, as well as non- or low-chemical approaches developed for incrop-pasture systems.
  - ⊕ New approaches to management & monitoring: see WEE.0146 and WEE.0150 above.
  - ⊕ Improving recommended practices: see B.WEE.0141 and WEE.0142 above.

### **Status and opportunities**

It is apparent that progress with the Weeds pillar has been impacted by a number of inter-related issues:

- ⊕ The detailed thinking behind the pillar was at a far less developed state when the FIP was initially approved by the Board. The initial focus for the FIP – and what the Board approved – was the three pasture-focussed pillars.
- ⊕ An initial budget (\$1m over 5 years) was approved, with the view that additional funding may be required once further scoping for this pillar had been finalised. An opportunity to seek additional funding through the submission of an investment plan for weeds was not supported due to prevailing (and likely future) budget limitations.

- # A huge amount of planning and consultation has been undertaken with weed agencies and the Federal Government, as well as commissioning scoping studies which have been important in getting priorities right.
- # More recently, some projects have been developed and commissioned.
- # Since then, the pillar has run into the reduction in available RD&E funds.
- # Weeds is a cross-industry issue (meat, wool, dairy, natural resource management) and requires cross-sector collaboration which tends to slow progress. Information from MLA's development work may now be gaining traction among other investors (GRDC, RIRDC, PISC agencies, Federal Government via the Australian Weeds Committee Working Group).
- # Of interest is that project WEE.0141 has 'a baseline survey targeting 500 growers conducted, including growers' awareness, knowledge base farming history, climatic and soil conditions, infestation level, management practices, weed impact, drivers and barriers for BMP adoption', that will be useful in subsequent evaluation.

## **Pillar 5: Decision support systems (DSS)**

As noted earlier, the originally-proposed DSS pillar is currently on hold due to a lack of sufficiently attractive investments in this area and, more recently, reduced funds. The MLA Board allocated \$1 million to this area of which \$265,263 has been spent on background projects (modelling, integration and data collection). Further investment in this pillar is unlikely.

## **Pillar 6: FIP delivery**

Whilst not a formal pillar in the FIP plan, there are significant investments in the delivery of the program to producers and in the governance and management of the program.

### **Producer Research Sites**

The principles and philosophies that underpin the FIP placed great emphasis on participatory R&D wherever possible in all themes as a key way to engage leading producers. There has been considerable progress in this regard:

- # A report was prepared which developed some of the practical details needed to implement participatory R&D within the FIP (project B.FDP.0008 (Kahn et al (2013), 'Developing and implementing participatory R&D').
- # A range of documents to help guide the Producer Research Sites (PRS) have been developed including detailed 'Participatory R&D site project application guidelines', 'Milestone reports', 'Project plan templates', along with the provision of key findings from EverGraze, e.g. 'EverGraze Quickchecks Pasture Monitoring Tools' and 'EverGraze demonstration and case study learnings'.
- # Participatory R&D coordinators have been established in each state and 24 PRS have been established. A further one is awaiting contracting. Sites are located in NSW – 5; VIC – 7; TAS – 2 (one to be contracted); SA – 2; and WA – 9. The sites cover a range of themes.

- ✦ A simple 'participatory R&D benchmarking questionnaire' has been developed to assist in monitoring and evaluation of the FIP (although the questions are very focused on 'attitudes' rather than practices and outcomes). MLA advises that this will form part of the longer-term monitoring process.
- ✦ Each PRS is required to provide MLA with an annual operating plan which includes information about field days, written articles and other activities. During the period May to October 2014, 20 field days were conducted.
- ✦ Contracts are in place for this component of the program.

From the consultation it appears that:

- ✦ The Producer Research Sites are quite well established, given that most have only been going for less than a year. It is reported that the projects are generally progressing well.
- ✦ There have been some limitations (sometimes geographical) in the level of interaction between research leaders and the research site undertaking the work in that particular field.
- ✦ In particular, it is recognised that this was a new way for MLA to engage farmers in research projects. While the implementation of the PRS was leveraged from MLA's Producer Demonstration Sites (PDS) program, PRS differs significantly in that the coordinators' role is to act as a facilitator between the researcher and the producers so as to develop a shared planning and learning environment. MLA reports that there are differing levels of interaction between the researchers and the groups. Some researchers felt that their research was not 'ready' for trialling and some research projects are less amenable to producer research and trialling than others. The additional responsibility for producers has also been daunting for some. As a result, delegation of responsibility from lead researchers to other PRS team members has not happened uniformly across all the projects and this has led to some researchers having significant additions to their workload.
- ✦ There has also been some conflict between available budget for projects and the technical input needed to provide robust data and successful outcomes.
- ✦ There has been relatively limited contact between state coordinators since two initial meetings. The delivery contract specifies a meeting of state coordinators to review the process and capture key learnings but this has yet to happen. There is some support for this among some PRS co-ordinators but while potentially a useful activity the cost of such would require justification.

The MLA Board approved \$4,650,000 for projects in this pillar and as at September 2014, \$2,616,021 had been contracted. An amount of \$2,033,979 was uncontracted. MLA advises that budget reductions restricted recruitment of new groups into the program following the withdrawal of a number of groups from the program at late stages.

## **Management and governance**

### **Overview**

The FIP was established under the National RD&E strategies. At the time of its development, it was envisaged that there would be a 'Team Australia' approach to pastures R&D involving co-investment by

MLA and the PISC agencies. A governance model built upon this principle, which was largely consistent with the outcomes from a workshop held in November 2011<sup>3</sup>, was proposed in the R&D Plan:

- # An overall portfolio management 'committee' with producer representation should be established;
- # Each pillar should have its own advisory group with producers and agency representation (including the suggestion that the group meets annually with the research teams for idea generation and cross-theme interactions);
- # Delivery initiatives should be developed within each pillar but aligned with those at a national level;
- # Monitoring & evaluation should play a key role with all projects being reviewed every two years by a group involving an external scientist, a producer and a consultant (the group could work across pillars providing recommendations to the pillars and the overall management group). In that regard it was recommended that:
  - φ All projects should list expected outputs and outcomes and report against annual operational plans;
  - φ Evaluation processes (outside project agreements) should be based on a uniform process; and
  - φ A baseline survey / investigation was needed against which practice change could be assessed.
- # Communications should be developed by the Portfolio Management Committee and include:
  - φ Researcher technology sharing forums to enable research teams to interact;
  - φ A broad-based producer survey conducted every two years to solicit industry needs; and
  - φ Development of a pathway to allow existing programs (More Beef from Pastures, Making More from Sheep) to be updated with research outputs.
- # Ideas generation:
  - φ A process to allow routine idea generation was proposed.
  - φ An open call would only be made on targeted issues to address a known gap or problem.

The governance processes for the FIP have been the subject of considerable discussion since the original plan was developed and a modified model was ultimately adopted<sup>4</sup>. The cost of the proposed governance model has reduced significantly since the development of the initial FIP.

There are differing opinions amongst stakeholders as to how successful the governance arrangements have been, but these tend to be more focussed on the commencement of the plan implementation.

### **Budget considerations**

To date, MLA has invested \$20.5m cash into the FIP. This investment includes the development of the plan including the numerous reviews along with investment into projects and program governance. It does not take into account MLA's in-kind contribution for program management and communication activities nor its investment into 'pasture update' events (\$150k/year). In addition to MLA's investment, AWI has

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<sup>3</sup> SED Consulting (November 2011). Governance of the Feedbase Portfolio – final report

<sup>4</sup> Internal document (November 2012). Feedbase Investment Plan (FIP) proposed governance arrangements



invested \$3.6m directly into FIP projects, not including its investment in EverGraze, which it is funding separately.

From project contracts, MLA advises that in-kind contribution from project partners is in the order of \$15.9m but the robustness of this figure is uncertain as calculation and reporting are not uniform across agencies.

Recognition of in-kind contributions is important for the program as a whole, both currently and historically. However at present such contributions are not well documented or applied consistently.

### **Status and opportunities**

Project governance is progressing adequately. Current arrangements include:

- ✦ Steering Committee (SC): Purpose, membership, time commitment and funding of the SC were agreed by the Steering Committee meeting in August 2012 and approved by the MLA Board soon afterwards. While it was initially proposed to meet once per year, meeting frequency has been twice per year (meetings held in July 2014, November 2013, July 2013 and December 2012). One meeting is held by teleconference. Members of the SC do not represent all partners within the program.
- ✦ Pillar Advisory Groups (PAGs): Purpose, membership, time commitment and funding of the PAGs were agreed by the Steering Committee meeting in August 2012 and approved by the MLA Board soon afterwards. It was proposed that the PAGs would meet twice and potentially three times per year. To date, though, each PAG has met once. Within the 'Profitable and sustainable pastures' pillar, two meetings of the 'phosphorus use efficiency' group have also been held. As yet no producers have been appointed to the PAGs, as MLA has been waiting for the PRS to be established before identifying and inviting key producers.
- ✦ Pillar Leaders: Purpose, membership, time commitment and funding of the Pillar Leaders were agreed by the Steering Committee meeting in August 2012 and approved by the MLA Board soon afterwards. The time of the Pillar Leaders is contributed by their respective agencies, with MLA providing \$5000 each for operating expenses. Leaders have been appointed and contracted: PBE – Kevin Smith, University of Melbourne; PSP – Richard Simpson, CSIRO; GSM – Joe Jacobs, DEPI.
- ✦ Contract management: Contracts sighted by the review are all with MLA which is consistent with the outcomes from the November 2011 workshop. In some cases, there is co-funding with organisations such as AWI.
- ✦ Monitoring & evaluation (M&E): MLA advises that an M&E framework is still to be developed and that this will occur within a broader MLA M&E program. A key activity specific to the FIP will be to identify for each project what outputs and outcomes are likely and what needs to be captured to 'feed into' the MLA M&E plan. It should also be noted that the majority of FIP projects (with the exception of EverGraze and Enrich) will not deliver outputs until the end of the FIP and most M&E will need to occur after the completion of this phase of the FIP. The Producer Research Sites will act as a significant part of the FIP M&E plan as their specific purpose is to test if and how the FIP R&D fits into a farming system. Data capture for this component of the FIP will be important.
- ✦ Communication: A comprehensive communication plan for each pillar has been developed. Program communications is jointly managed with the MLA Communication section. The majority of budget comes from the central Communications area, although there are two specific items funded under

the FIP – the communications coordinator and the PVTN web-tool. While the Plan indicated that communications should be managed by the Portfolio Management Committee (or the SC) this would seem unrealistic and this is far better positioned within MLA, with the SC playing more of an oversight role. The suggestion that ‘every 2 years a broad based producer survey will be conducted to solicit industry needs’ has not been progressed (but a similar outcome is being achieved via PRS benchmarking surveys) and the developing consultation process currently underway at MLA. Linkages to MLA Communications materials are evident in vehicles such as Feedback and Tips & Tools. The Pasture Updates appear to be a valuable communication tool. A pathway to allow existing programs (More Beef from Pastures (MBfP) and Making More from Sheep (MMS)) to be updated with FIP research outputs will require development as these start to be delivered.

## Key findings

### RD&E program: key findings

1. There is a widespread view that the establishment of the FIP has been a very positive development for the red meat industry, for pastures research and for the human capacity to undertake pasture research in Australia.
2. The background consultation and intellectual input to develop the initial ‘Feedbase Investment Plan’ and the subsequent ‘Feedbase R&D Plan’ were very comprehensive. The achievement of developing, reviewing, contracting and commencing such a broad range of complex projects across the FIP is a credit to researchers and administrators alike.
3. The Program is progressing well. Projects that have been contracted appear to be on track to deliver the outcomes envisaged.
4. The overall structure of the Program is sound. Many directly involved in the program want the ‘scaffolding’ of FIP to be preserved as far as possible so that, if the opportunity presents itself for more projects to be commissioned (either now or in the future), there is logic to the selection and management of those projects, and the human capacity to undertake them is available
5. There are of course some concerns but these are mainly directed at project areas that have not been progressed – predominantly as a result of budget restrictions after the commencement of the Program. These restrictions are likely to have an impact on the ability to meet key targets for the FIP, but for reasons listed below, it is not clear precisely how.
6. There are also differing views regarding the process used in the selection of the initial portfolio of projects. There is some feeling that decisions were taken in advance of any governance structures being put in place, that the collaborative process resulted in a lack of transparency and that in-kind contributions have not been sufficiently acknowledged in the FIP partnership.
7. As noted above, the impact of budget restrictions on the FIP is widely acknowledged and accepted. However, some stakeholders expressed the view that a more open discussion about possible alternative funding models could be valuable.
8. Pillars/projects were at different levels of development when the Program started. This has led to differing stages of implementation and complexity across pillars:

- # **Pasture breeding & evaluation (PBE)** is well established with major projects contracted across all four themes. A concern raised by several stakeholders is a lack of focus on disease resistance (especially root rot) within this pillar, but it is noted that there are two large root disease projects being funded under PSP (although they take *'quite different approaches to the problem'*) and that AWI is investing separately in this area. There are concerns too that there is a lack of focus on digestibility / economic value of traits.
  - # **Productive & sustainable pastures (PSP)** is well advanced especially in relation to phosphorus, sub-tropical pastures and scoping of soils research. However, nitrogen supply and pasture persistence (for which a review has been completed) may be areas requiring greater focus if additional funds become available. There are indications that phosphorus work (B.PUE.102) may have relevance to nitrogen supply.
  - # **Grazing systems management (GSM)** is predominantly based on the assimilation of EverGraze and Enrich projects which were already operating at the commencement of the FIP. Separate to these two projects, scoping studies have been performed and a small number of projects contracted (e.g. pasture biomass estimation, dual-purpose crops). However, while there has been some progress, the development of pasture and livestock performance indicators (except for biomass) has been limited. There has been quite widespread commentary that the animal / plant interface is largely lacking across the program (the exceptions being EverGraze and B.GSM.0008, 'Step changes in meat production systems from dual-purpose crops in the feed-base').
  - # **Weeds/biodiversity** was initially the least developed pillar (as expected) but has undergone a huge amount of detailed thinking and scoping to correctly position the pillar and identify key priorities. A small number of projects have since been contracted but this pillar in particular has run into issues as a result of reductions in available RD&E funds, as have other pillars. Virtually no feedback about this pillar was received during the consultation phase.
  - # **Decision tools** has not progressed after relevant scoping projects were performed in relation to modelling, and integration and data collection. This pillar is on hold due to a lack of sufficiently attractive investments in this area and (more recently) reduced funds.
  - # **Participatory R&D** coordinators have been appointed in each state and 24 Producer Research Sites (PRS) have been established. The manner in which these sites are managed is different to that in which many producers have been involved in R&D in the past, and this has introduced some challenges. However, feedback suggests that most sites seem to be performing well. This 'pillar' holds an important place in the FIP as it provides a key interface with producers. It is understood that the intent was for state coordinators to meet to review the process for work in this area. While some support exists for this amongst PRS co-ordinators, the cost would need to be justified.
9. Several R&D gaps have been identified by participants during this mid-term review as described above. The potential for these gaps to be considered and funded in the short term is expected to be limited, at least by MLA. It is possible however that these could be funded through the consultative process that is currently under development by MLA when it is implemented (see also point 7 above).

10. While contracted projects across the FIP are progressing well, how these projects contribute to the overall objectives of the program is not clear (see also point 11 below). A program the size of FIP should have its own M&E framework including a program logic that shows clearly how each project and pillar contributes to the overall goals of the program (i.e. an additional \$25m in on-farm value by 2020; 2.5% annual increase in beef/Ha). This would in turn show what data need to be captured throughout the program to monitor progress and demonstrate outcomes. The Producer Research Sites will play an important role in the FIP M&E plan as they can contribute valuable commercial data by testing if and how the R&D fits into a farming system.
11. As an M&E plan has not yet been implemented, how well the program is on track to meet its key targets is unclear.
12. A detailed communication plan has been developed and is in the process of being rolled out across the program.
13. The overall future of FIP is a subject of some concern among stakeholders. As noted earlier there is significant support for ongoing effort in the area of feedbase RD&E. One of the stakeholders interviewed talked about the need for 'creative conversations' about investment models that mitigate the problem of declining MLA funding. This might be an important future role for the Steering Committee.

## **Governance: key findings**

1. The Steering Committee (SC) does not see itself as such. Members describe it instead as a group that receives information on the program from MLA – it does not 'steer' as there are few decisions to be made. Members believe that the Committee should in future provide greater direction to the program, for example in relation to elements such as oversight of the M&E and communication plans. There was also commentary that the SC should be active in planning for future feedbase investments.
2. Many of the members have not been on the Committee from the start and confess to a relatively limited knowledge of the program. This is unsurprising.
3. Pillar Advisory Groups (PAGs) have been established, with a charter to provide the technical expertise to ensure research is tracking successfully, that the latest science from around the world is brought to bear on the program and to identify gaps for future projects.
4. However, the PAGs are very uneven in their level of activity and engagement. A similar situation to that described for the SC is operative: when there is less than a critical mass of activity within a pillar, and no apparent capacity for members of the PAG to influence anything, there is a lack of clear purpose. Of the three main pillars, only PSP appears to have a functional PAG – members of other PAGs do not see their relevance, which is understandable given the number and type of projects within those pillars. The question is whether just the one PAG should be continued, even if it is successful, which would leave other pillars as 'orphans'.

## Recommendations

This review makes the following recommendations in relation to future arrangements for the FIP and associated work:

1. While MLA budget restrictions have impacted, good progress has been made towards delivering on the Feedbase Investment Plan. Projects that have been contracted are progressing well. Except for those areas identified by this review, substantive operational change is not required.
2. Notwithstanding Recommendation 1, budget reductions have had an impact on the scope and coverage of the FIP. As a result, the SC should review the FIP targets (key performance indicators) and make an assessment as to whether these should be changed and, if so, in what way.
3. Recognition of in-kind contributions is important for the program as a whole, both currently and historically. At present, though, such contributions are not consistently calculated, well documented or audited. The Steering Committee should determine the importance of this issue and if deemed appropriate agree on a definition of 'in-kind' and provide updated figures for projects.
4. To a large extent, no emerging research and development gaps (that is, areas of R&D not identified as priorities when the FIP R&D plan was developed but now important) have been identified. The priorities identified by the FIP remain valid.
5. There are gaps within the existing program of R&D – not because they were overlooked during the development and implementation of the FIP but because funding restrictions have prevented their progression. When funds become available (see Recommendation 6 below) the following general areas have been identified as priorities:
  - i. Inclusion of disease resistance within the PBE pillar. This was considered at the time of the FIP development but was removed due to budget limitations. It is recognised that this is a technically difficult issue and high risk science. For that reason, if funds become available, a review of this issue should be commissioned to assess if additional research is justified. This review also requires input from other RDCs to ensure that all investments in this area are taken into account as, for example, AWI is funding root disease resistance in sub-clover with a focus on phytophthora.
  - ii. The productive soils theme within the PSP pillar was largely based around soil phosphorus and nitrogen. Numerous P projects have been commissioned but none concerning nitrogen. A project concept 'Optimising nitrogen (N) supply to grass based pasture systems (including addressing legume content and persistence)' was considered at a workshop but not progressed (note: project B.PSP.0013 does cover 'Pasture legumes in the mixed farming zones').
  - iii. Pasture persistence has been identified as a key priority. A review of this area (B.PSP.0030) was completed and it made several recommendations for projects. Such projects should be considered a priority should funding become available.
  - iv. Data at the animal / plant interface – at breeding, pasture and grazing system levels. There were numerous general references from stakeholders across the FIP that from a red meat perspective this is a gap and that there should be more data captured on how pasture projects impact on animal performance (Note: the EverGraze and Enrich

projects have contributed to this objective and each project had its own recommendations for further R&D.)

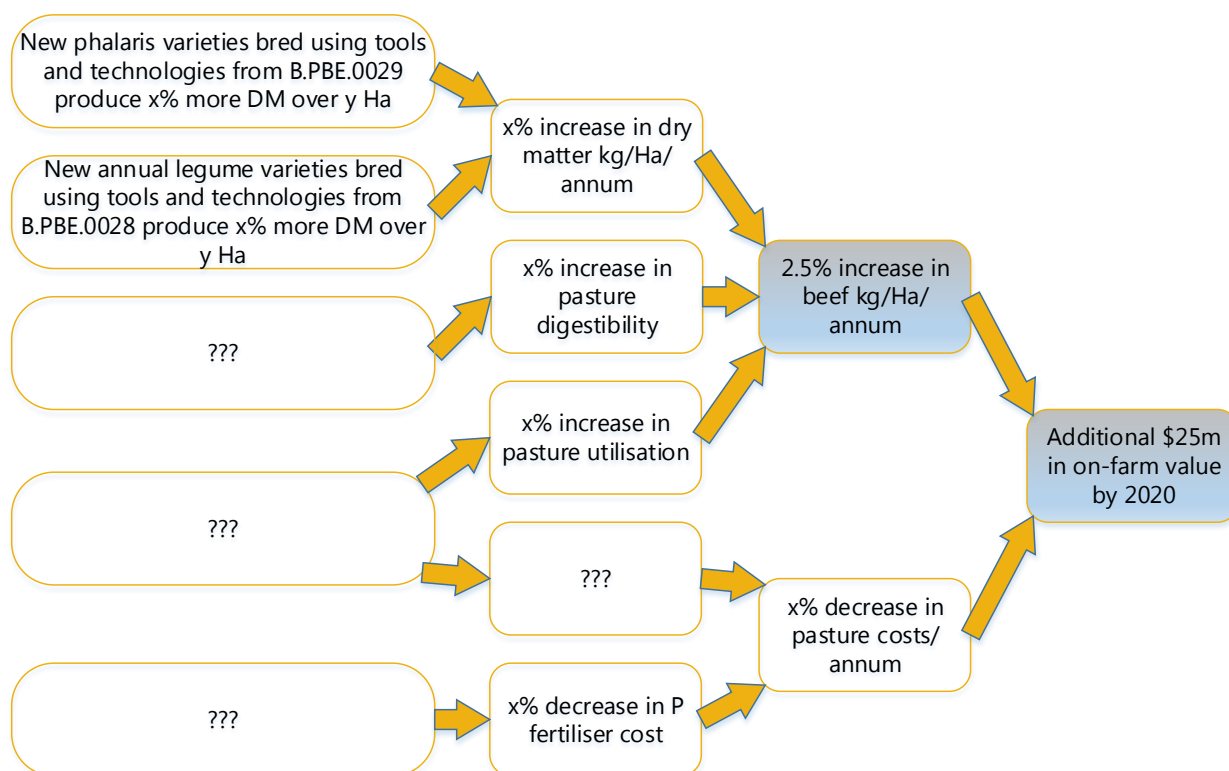
- v. Within the GSM pillar a key theme was 'pasture and livestock indicators'. A review has been completed (B.GSM.0004, 'Potential for information technologies to improve decision making for the southern livestock industries') however, apart from one 'biomass' project no other projects in this area are being undertaken.
- vi. Weeds – as a late starter within the FIP, this pillar has been seriously impacted by budget restrictions and remains a gap in the program.

Phalaris toxicity and endophyte (ryegrass and tall fescue) were also raised as important R&D gaps by one respondent. It has not been possible to assess their level of priority from this review and it is understood that these are being covered by MLA's animal health program.

6. Alternative funding opportunities should be explored (e.g. through the Australian Research Council (ARC) or other sources) to address some of these RD&E gaps, assuming MLA's further investment over the next three years will be limited.
7. The Steering Committee should critically review its role and purpose, with particular regard to:
  - i. Overseeing the development and implementation of key FIP enabling activities including M&E and communication;
  - ii. Considering alternative funding sources for relevant projects within (and related to) the FIP and identifying projects being conducted outside the FIP which have relevance to it (e.g. the identified R&D gap in disease resistance in the pre-breeding portfolio given that AWI is making investments in this area);
  - iii. Identifying how to best capture key learnings from the operation of the FIP;
  - iv. Putting in place a process to identify the future feedbase RD&E needed to drive red meat industry competitiveness; and
  - v. Considering the implications of MLA's proposed new funding models, including an open call, which is seen as a useful new process.
8. The PSP PAG should be retained, because it is successful, and membership should be supplemented with producers (likely from PRS).
9. The Pillar Advisory Groups for PBE and GSM are unlikely to be beneficial to members of these pillars. They should be retained in name only and reactivated if needed.
10. To boost engagement across the program, consideration should be given to holding an FIP 'mini-conference' during the next 12 months. The mini-conference should be open to Pillar Leaders, Project Leaders, PRS coordinators and key producers and its purpose would be to:
  - i. Critically review progress across the portfolio;
  - ii. Allow participants to learn from each other's experiences;
  - iii. Attend to critical program matters such as implementation of the communication plan and M&E framework;
  - iv. Identify areas for resource sharing and reduced duplication between projects;
  - v. Identify RD&E gaps in the portfolio and capacity gaps across the sector; and
  - vi. Further build networks.

This approach would hopefully create some of the '1+1 = 3' outcome that an integrated program should deliver and supplement the SC with the technical expertise that would assist in determining portfolio gaps. If this was progressed, it would be useful for PRS coordinators to meet at the same time.

11. An M&E framework/program logic (consistent with the broader MLA M&E framework) should be developed immediately and implemented across the program. Should it decide to assume this responsibility (see Recommendation 7), the Steering Committee should provide the framework and 'high level' indicators to Pillar Leaders and Project Leaders so that they can demonstrate how their projects will contribute to program outcomes. An example of such a program logic is provided in Figure 1. Please note that this is only an example, and a partial one at that – but it endeavours to show how the contribution of the various projects of the FIP to the program's overall goals might be mapped. The benefit of a well-constructed logic is to validate the long-term goals and to identify the main gaps in activities to achieve them.



**Figure 1. EXAMPLE ONLY partial program logic for FIP, showing how two selected projects might contribute to the delivery of the program goals**

12. The FIP communication plan should be further implemented, with oversight being provided by the Steering Committee should it decide to assume this responsibility (see Recommendation 7).

## Appendix 1: List of documents reviewed

### Project-related documents

Project code	Title	Documents
B.DSS.0002	Farming systems R&D and modelling for the southern feedbase	Final report
B.DSS.0005	Integration and data management for the Feedbase Investment Plan	Final report
B.FDP.0008	Developing and implementing participatory R&D	Final report
B.FDP.0021	Coordination of Participatory R&D for the Feedbase Investment Plan in Victoria	Agreement
B.GSM.0002	Economic evaluation of investment in EverGraze	Final report
B.GSM.0003	Enrich Phase 3: Demonstrating resilient, healthy and profitable livestock systems with multipurpose shrubs	Final report
B.GSM.0004	Potential for information technologies to improve decision making for the southern livestock industries	Final report
B.GSM.0005	Making better use of crop stubbles on mixed farms	Final report
B.GSM.0006	Evergraze VI	Final report Impact report
B.GSM.0008	Step changes in meat production systems from dual-purpose crops in the feed-base	Milestone 5 report Final report
B.GSM.0010	Real time pasture biomass estimation	Agreement
B.PAS.0265	Developing supply chain capacity in pastures	Final report
B.PAS.0275	R&D for the meat industry feedbase in southern Australia	Final report
B.PAS.0285	External evaluation of tedera proposal	Final report
B.PAS.0297	Analysis of feed-base audit	Final report
B.PAS.0304	Tedera seed increase	Final report
B.PAS.0350	Feedbase plant breeding traits and technologies prioritisation workshop	Final report
B.PBE.0011	Understanding pasture re-sowing decisions for meat producers	Final report
B.PBE.0015	Pasture variety testing – SW Victoria	Agreement
B.PBE.0021	Pasture Variety Trial Network Audit 2011	Final report
B.PBE.0023	Statistical analysis for the FIP Pasture Variety Trial Network	Terms of reference Agreement



Project code	Title	Documents
B.PBE.0027	Sheep production from tederas in medium and high rainfall environments in Western Australia	<ul style="list-style-type: none"> <li>✚ Agreement</li> <li>✚ Milestones 2&amp;3 reports</li> <li>✚ Presentation from project review meeting June 2014</li> </ul>
B.PBE.0028	Development of R&D plans for annual legumes	<ul style="list-style-type: none"> <li>✚ Agreement</li> <li>✚ Final report</li> </ul>
B.PBE.0029	Development of R&D plans for phalaris/cocksfoot	<ul style="list-style-type: none"> <li>✚ Agreement</li> <li>✚ Final report</li> </ul>
B.PBE.0030	Establishment and persistence of major temperate grasses and tropical pastures in Southern Australia: a review	<ul style="list-style-type: none"> <li>✚ Final report</li> <li>✚ Addendum</li> </ul>
B.PBE.0037	Pre-breeding in annual legumes	<ul style="list-style-type: none"> <li>✚ Agreement</li> <li>✚ Milestone 2 report</li> </ul>
B.PBE.0038	Pre-breeding in phalaris	<ul style="list-style-type: none"> <li>✚ Agreement</li> <li>✚ Milestone 2 report</li> </ul>
B.PBE.0040	Pasture Variety Trial Network Audit 2013-15	<ul style="list-style-type: none"> <li>✚ Agreement</li> </ul>
B.PSH.0664	Acid tolerant lucerne	<ul style="list-style-type: none"> <li>✚ Agreement</li> <li>✚ Milestones 3&amp;4 reports</li> </ul>
P.PSH.0687	Pasture Trials Network	<ul style="list-style-type: none"> <li>✚ Agreement</li> </ul>
B.PSP.0001	Increase feedbase production and quality of subtropical grass based pastures	<ul style="list-style-type: none"> <li>✚ Agreement</li> <li>✚ Milestone 6 report</li> </ul>
B.PSP.0005	Managing soil-borne root disease in sub-clover pastures	<ul style="list-style-type: none"> <li>✚ Agreement</li> </ul>
B.PSP.0006	Reducing the cost of pasture establishment	<ul style="list-style-type: none"> <li>✚ Final report</li> </ul>
B.PSP.0007	Research and development priorities for southern Australian pastures and lucerne	<ul style="list-style-type: none"> <li>✚ Final report</li> </ul>
B.PSP.0008	Sub-tropical pastures for southern meat producers: planning for new R&D investments	<ul style="list-style-type: none"> <li>✚ Final report</li> </ul>
B.PSP.0009	Soil biology review and project prioritisation for the Feedbase Investment Plan	<ul style="list-style-type: none"> <li>✚ Final report</li> </ul>
B.PSP.0013	Pasture legumes in the mixed farming zones of WA and NSW: shifting the baseline	<ul style="list-style-type: none"> <li>✚ Agreement</li> <li>✚ Milestone 3 report</li> </ul>
B.PUE.0102	Phosphorus reactions and fluxes in pasture soils	<ul style="list-style-type: none"> <li>✚ Agreement</li> <li>✚ Milestone 3 report</li> </ul>
B.PUE.0103	Root disease constraints in pasture productivity	<ul style="list-style-type: none"> <li>✚ Agreement</li> <li>✚ Milestone 4 report</li> </ul>
B.PUE.0104	Phosphorus-efficient legume pasture systems	<ul style="list-style-type: none"> <li>✚ Agreement</li> <li>✚ Milestone 6 report</li> </ul>

Project code	Title	Documents
B.PUE.0105	An assessment and benchmarking of phosphorus nutrient use efficiency and industry management practice in Southern Australia	<ul style="list-style-type: none"> <li>✚ Agreement</li> <li>✚ Final report</li> </ul>
B.WEE.0007	Situational analysis and options paper for RMCiC: Weed research, development and extension in Australia as it relates to meat and livestock production	<ul style="list-style-type: none"> <li>✚ Final report</li> </ul>
B.WEE.0112	Weeds R&D investment analysis	<ul style="list-style-type: none"> <li>✚ Final report</li> </ul>
B.WEE.0129	Prioritisation of weed species relevant to Australian livestock industries for biological control	<ul style="list-style-type: none"> <li>✚ Final report</li> </ul>
B.WEE.0132	A review of recent weed research and management relevant to Australian livestock industries and proposals for future investments	<ul style="list-style-type: none"> <li>✚ Final report</li> </ul>
B.WEE.0141	Facilitated RD&E in weed management – improving strategies for summer perennial weeds	<ul style="list-style-type: none"> <li>✚ Deed of access and variation</li> <li>✚ Milestone 2 report</li> </ul>
B.WEE.0143	Reducing uncertainty with weed management outcomes – applying a risk management approach to RD&E	<ul style="list-style-type: none"> <li>✚ Milestone 5 report</li> </ul>
B.WEE.0146	Addressing herbicide resistance – options and non-chemical approaches for mixed farmers	<ul style="list-style-type: none"> <li>✚ Agreement</li> <li>✚ Proposal</li> </ul>
B.WEE.0150	New approaches to weed management	<ul style="list-style-type: none"> <li>✚ Final report</li> </ul>
E.INF.1311	Pastures Update NSW	<ul style="list-style-type: none"> <li>✚ Terms of reference</li> <li>✚ Variation deed</li> </ul>
Not coded	Applying resilience thinking to improve weed management in grazing systems	<ul style="list-style-type: none"> <li>✚ Final report</li> </ul>

## Other program-level and pillar-level documents

- ✚ Feedbase Investment Plan: R,D&E priorities for the southern Australian feedbase (including 11 appendices), January 2011
- ✚ Feedbase R&D Plan: Approved draft, May 2011
- ✚ Feedbase Investment Program (FIP) benefit cost analysis: Plant breeding and evaluation, Grazing systems management, Agronomy and management, draft report, April 2011
- ✚ A weed RD&E strategy framework for the grazing industries, MLA, August 2012
- ✚ Draft weed R,D&E investment framework, MLA paper and presentation, December 2012
- ✚ Draft white paper: Weeds and feral pests for 2015 and beyond, MLA, February 2014
- ✚ Weeds pillar 2015+ under development, presentation, undated
- ✚ MLA Feedbase Investment Plan Participatory R&D program, MLA, undated

- ✦ Briefing paper: MLA National Research Development & Adoption (RD&A) consortium investments (longer term and larger co-operative investments), MLA, undated

## **Governance-related documents**

- ✦ Governance of the feedbase portfolio, final report on outcomes of workshop, November 2011
- ✦ Steering Committee decision paper: Management of the FIP, undated
- ✦ FIP Steering Committee minutes, August 2012
- ✦ Feedbase Investment Plan (FIP) proposed governance arrangements, November 2012
- ✦ FIP Steering Committee minutes (draft), December 2012
- ✦ FIP Steering Committee minutes (draft), July 2013
- ✦ FIP Steering Committee minutes, November 2013
- ✦ FIP Steering Committee minutes, July 2014
- ✦ PBE pillar meeting notes, December 2013
- ✦ GSM pillar meeting notes, December 2013
- ✦ FIP Pillar Leader agreement, example
- ✦ Summary of budget and expenditure allocation, spreadsheet, November 2013
- ✦ FIP expenditure commitment by pillar, spreadsheet, September 2014
- ✦ Feedbase Investment Plan update, presentation to Steering Committee, December 2012
- ✦ Feedbase Investment Plan capacity audit, November 2013

## **Other**

- ✦ Terms of reference: Weeds – review of priority weeds and linkages with the major weed initiatives
- ✦ Terms of reference: B1 – Getting existing and new weed knowledge adopted by different users (producers, advisors, regulatory staff, product providers)
- ✦ Terms of reference: Prioritisation of species for biocontrol
- ✦ Terms of reference: New approaches to weed management – ‘blue-sky thinking’ with plants and animals
- ✦ FIP Participatory R&D, example agreement
- ✦ EverGraze Quickchecks: Pasture Monitoring Tools
- ✦ Draft MLA Participatory R&D survey questions
- ✦ Participatory R&D Site project application guidelines
- ✦ Participatory R&D Site milestone report template
- ✦ Participatory R&D Site project plan template
- ✦ Producer Research Site projects summary, MLA, September 2014

- ✚ PVTN flyer
- ✚ Heritage Seeds – CRC FFI production update, presentation, August 2014
- ✚ Peer-reviewed published paper: Smith KF and Fennessy PF (2011), The use of conjoint analysis to determine the relative importance of specific traits as selection criteria for the improvement of perennial pasture species in Australia, *Crop and Pasture Science*, vol 62, pp. 355-365.
- ✚ Feedbase Investment Plan pillars 3, 5 & 6: communications implementation plan snapshot, MLA, September 2014

## Appendix 2: Consultation list – individuals invited to provide feedback

Doug Alcock	Graz Prophet, Producer Research Site coordinator
Angela Avery	Department of Environment and Primary Industries Vic
Martin Barbetti	University of Western Australia
Graham Bonnett	CSIRO
Sue Boschma	NSW Department of Primary Industries
Delia Dray	NSW Department of Primary Industries
Brian Field	Tasmanian Institute of Agriculture
Michael Friend	Charles Sturt University
Bill Fuller	Australian Seed Federation
John Howieson	Murdoch University
Joe Jacobs	Department of Environment and Primary Industries Vic
Gus Manatsa	Australian Wool Innovation
Mike McLaughlin	University of Adelaide
Lisa Miller	Southern Farming Systems, Producer Research Site coordinator
Pauline Mooney	South Australian Research and Development Institute
Andrew Moore	CSIRO
Bruce Mullan	Department of Agriculture and Food WA
Allen Newman	Heritage Seeds
Phil Nichols	Department of Agriculture and Food WA
Nigel Phillips	NSW Department of Primary Industries
Mel Rae	PRS coordinator
Daniel Real	Department of Agriculture and Food WA
Clinton Revell	Department of Agriculture and Food WA
Graeme Sandral	NSW Department of Primary Industries
James Sewell	PGG Wrightsons
Richard Simpson	CSIRO
Ron Smernik	University of Adelaide
Kevin Smith	University of Melbourne
John Squires	Rural Directions, Producer Research Site coordinator
Alana Starkie	Planfarm
Warren Straw	Department of Environment and Primary Industries Vic
Mark Trotter	University of New England

## Appendix 3: Pro forma questionnaire

The following was included at the back of the consultation paper developed and circulated as part of the review. The questions listed were also used as the basis for interviews with key stakeholders.

*In responding to this consultation paper, stakeholders are invited to consider the objectives of the mid-term review, which are to summarise:*

1. *Progress towards delivering on the Feedbase Investment Plan;*
2. *Emerging research and development gaps that may not have been considered as priorities when the FIP R&D plan was developed;*
3. *The relevance of priorities that were identified in the Feedbase Investment Plan Research and Development plan in the context of existing projects, new science or issues that are emerging in existing projects within the red meat industry and in other industries;*
4. *Gaps that exist within the existing program of research and development; and*
5. *Strategic direction and support and governance provided by the Steering Committee and Pillar Advisory Groups.*

***Without in any way limiting commentary on the above***, respondents may wish to address **some or all** of the following:

1. *Please briefly describe your / your organisation's role in the FIP program.*
2. *Are the goals and KPIs of the program and pillars well-articulated and understood?*
3. *In the view of you or your organisation, will the program achieve the goals that were originally set?*
4. *If not, why not? Are there current or looming obstacles that need to be addressed? Are there opportunities to improve or hasten program outcomes?*
5. *Are the original RDE goals of the program still appropriate? What changes (if any) should be made to the current portfolio or to individual projects?*
6. *Are there gaps in any pillars – projects that are in the plan but not yet commissioned or projects that have only recently arisen as priorities?*
7. *How will you know if the program / pillar / project has succeeded? What information is or should be available to assist this process?*
8. *How would you describe the level of collaboration between projects within pillars and between pillars?*
9. *How effectively and efficiently is the program supported by the existing governance structures? You may wish to comment on:*
  - 9.1 *The effectiveness of the Steering Committee and Pillar Advisory Groups (membership, frequency and conduct of meetings, delivery against TOR etc)*
  - 9.2 *The capacity of the program's governance to respond strategically, tactically and operationally to changed conditions*
  - 9.3 *The opportunity for all voices to be heard*
  - 9.4 *The efficiency of structures, roles and processes (i.e. value for money)*

*Please direct your response to one of the consultants below. Feel free to contact either Scott or Russell if you require any clarification or if you would simply prefer to speak to someone.*

- # Scott Williams: 0413 059 190, [shw@scottwconsulting.com](mailto:shw@scottwconsulting.com)
- # Russell Pattinson, 0419 872 684, [miracledog@bigpond.com](mailto:miracledog@bigpond.com)