

final report

Project code:	B.COM.1084
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Date published:	August 2014
ISBN:	9781740362566

PUBLISHED BY Meat & Livestock Australia Limited Locked Bag 991 NORTH SYDNEY NSW 2059

Review of LPI R&D portfolio

Meat & Livestock Australia acknowledges the matching funds provided by the Australian Government to support the research and development detailed in this publication.

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Abstract

Meat and Livestock engaged ACIL Allen Consulting and The CIE to develop an agreed tool for assessing and balancing investments in the Livestock Production Innovation (LPI) portfolio against key selection criteria. The project found that existing criteria need to be realigned against a common measure of value to provide a cost-effective tool for assessing and balancing the portfolio. The common measure should be based on impact and remit which are the key determinants of whether MLA should invest. The measure can be used to balance the portfolio against other criteria such as LPI-MLA-industry priorities, RD&E continuum categories and risk. A qualitative approach is recommended to overcome data limitations and ensure all investments in the diverse portfolio can be assessed and balanced in a comparable manner. The tool should be positioned around the deliberations of the industry R&D Committee's which is the key decision making point in LPI's processes. Assessments should include a confidence rating to highlight which investments have higher levels of uncertainty and to target more detailed investigations. Adoption of the tool can streamline existing processes, strengthen decision making and improve transparency.

Executive summary

Purpose

Meat and Livestock Australia engaged ACIL Allen Consulting and The Centre for International Economics to develop an agreed assessment tool for the Livestock Production Innovation (LPI) investment portfolio.

The original project objectives were to propose and apply a suitable means for assessing and defining the weighting of the LPI portfolio across a number of key criteria. The findings were to form the basis of recommendations on the balance of the portfolio in the context of MLA's strategic plan and stakeholder requirements from on-farm research investments.

During the project scoping phase it became apparent that using quantitative weighting of the LPI portfolio was neither appropriate nor feasible and the required information to apply an assessment was not available. As a result the project objectives were varied to propose a tool to assess the R&D portfolio which takes into account key criteria and provide recommendations on how the tool fits into LPI's business functions and how it should be used.

Findings

The project found that LPI uses multi-criteria analysis to assess and report the balance of the investment process which is consistent with good practice and comparable to other rural Research and Development Corporations.

The assessments are delegated and distributed across LPI's business functions. Unfortunately, many of these criteria are variably and poorly defined and require quantification that is not readily achievable, leading to repeated or no assessment of many criteria. LPI lacks a cost-effective way of measuring the value of all projects - the leading criteria for assessing and balancing portfolios - which has led to an increasing number of proxy criteria being used.

The net result is that LPI does not have cost-effective and on-going access to data on all of the key criteria used to support transparent assessment and reporting across the current business functions. None the less the foundations exist to position and implement a portfolio assessment tool that will assist decision making and reporting based on fewer and easier to measure criteria within LPI.

Recommendations

Effective assessment and subsequent balancing of the LPI portfolio requires greater alignment between the criteria that need to be considered and focusing the proposed tool at the key decision points. To that end the project recommends:

- 1. The proposed tool should focus on assessing and demonstrating LPI investment portfolio's value using impact and remit to align the range of criteria that need to be considered. This does not require a prior benefit-cost analysis
- The portfolio assessment tool should be used by LPI at the decision point(s) in the process of development of investment priorities and in implementation of investment strategies to inform the R&D Committee's recommendations and subsequent approvals and reporting.

Furthermore the proposed assessment tool needs to be qualitative and applied across all investments to be feasible and useful. As such we recommend:

- 3. The tool is based on qualitative assessment and reporting of 3 key categories value, cost and specified obligations
- 4. All proposals and projects are measured against seven criteria and rated for confidence
- 5. All projects should be screened and analysed through multi-criteria analysis to balance the LPI portfolio

In order to embed the tool and improve process efficiency the project also recommends:

- 6. The (project) issue for determination and portfolio reporting templates should be based on the recommended criteria
- 7. LPI should use the assessment tool results to identify proposals and projects for further investigation at the point of investment and independently evaluate the whole portfolio over 5 to 10 years.

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1 Introduction

1.1 Purpose

Meat and Livestock Australia (MLA) engaged ACIL Allen Consulting and The Centre for International Economics (The CIE) to develop an agreed assessment tool for the Livestock Production Innovation (LPI) investment portfolio.

The original objectives of this project were to:

- 1. Propose a suitable means of assessing the weighting of the R&D portfolio across the dimensions
 - a) LPI's core areas and sub-programs
 - b) productivity, environmental and social outcome parameters, and
 - c) time long term strategic basic research, strategic applied, to shorter term development, adoption and commercialisation investments
- 2. Using the recommended approach, assess and report on the current portfolio balance, and define the most appropriate balance of projects across core areas and sub programs, timeframes taking account of productivity, environmental and social outcomes. Further this assessment should address issues including
 - a) risk in R&D portfolios
 - b) the potential benefits and risks of longer-term, "blue-sky" research; and
 - c) concerns about maintenance of scientific capability

The analysis should be informed where possible by evidence of past success in

- a) developing new knowledge and tools, and
- b) achieving adoption and hence industry change
- 3. Provide recommendations on the balance of the portfolio in the context of MLA's strategic plan and stakeholder requirements from on-farm research investments.

During the project scoping phase it became apparent that using quantitative weighting to assess the R&D portfolio (objective 1) was neither appropriate nor feasible and the required information for objective 2 was not available. This in turn made objective 3 unachievable. As a result the project objectives were varied to:

- 1. Propose a tool to assess the R&D portfolio which takes into account
 - a) LPI's core areas and sub-programs
 - b) productivity, environmental and social outcome parameters
 - c) time long term strategic basic research, strategic applied, to shorter term development, adoption and commercialisation investments
 - d) risk in R&D portfolios
 - e) the potential benefits and risks of different types of investments, and
 - f) concerns about maintenance of scientific capability
- 2. Provide recommendations on how the tool fits into LPI's business functions and should be used
- 3. Establish how the tool (project B.COM.1084) links to and can be operationally integrated with approaches for evaluating defensive investments proposed in the parallel project B.COM.1085.

1.2 Approach

The key design considerations for the tool were a clear purpose, appropriate fit and feasible methods. A clear purpose is required to establish what the tool should be used for and any associated limitations and assumptions. The tool will be located within rather than replace LPI's existing structures and systems, as such it needs to align with and support them to be effective. Finally LPI wanted the recommended methods to be practically feasible and not incur additional expense to make the tool efficient.

The tool was developed in two phases - scoping and refinement.

The scoping phase was completed in 2013 and involved developing a discussion paper to create a set of principles based on a review of portfolio assessment principles and LPI's current portfolio profile and assessment practices. The discussion paper was workshopped with LPI managers and peak industry bodies to clarify the purpose of the tool and range of potential assessments from which a preliminary portfolio framework was developed.

The refinement phase involved additional analysis of portfolio assessment literature and practices and further consultation with MLA to refine the purpose of the tool and design methods which fit into LPI's business functions.

The project did not assess the appropriateness, effectiveness or efficiency of LPI's business functions given they were being assessed by separate reviews. Rather the project only focused on identifying where the tool should be located within LPI's functions as they currently exist to achieve its agreed purpose.

1.3 This report

This report presents the recommended purpose, fit and methods for the LPI portfolio assessment tool. The rationale for each recommendation is outlined along with implementation details. The report is structured as follows:

- Chapter 2: Portfolio balance outlines the key concepts used to establish the principles for the tool
- Chapter 3: Purpose defines what could and should the tool be used for
- --- Chapter 4: Fit identifies where the tool should be used within LPI's functions
- Chapter 5: Methods outlines what processes should be used to implement the tool
- Appendix A: Tool provides the worksheets for implementing the tool

2 What is meant by 'portfolio balance'?

2.1 What is a portfolio?

MLA spreads resources across major 'portfolio' areas including programs and business units. LPI is one business unit, alongside: global marketing, industry communication and engagement, industry systems, trade and economic services. These business units operate across the 7 program areas (maintaining and improving market access, growing demand, increasing productivity across the supply chain and supporting industry integrity and sustainability etc.)

The LPI business unit operates across 4 of these program areas focusing on on-farm productivity. Within the LPI portfolio, there six core areas (2-digit) and sub-programs at the 3-digit (eleven) and 4 digit (twenty four) levels which against which 433 projects (2012/13) are aligned and need to be "balanced".

At a company level, the entire collection of MLA RD&E investments is regarded as a portfolio. Indeed, the collection of RD&E activities going on, within MLA and in other organisations in Australia and overseas could also be viewed as a portfolio, within which MLA funding plays an important role. In principle, MLA complements investments and should address gaps where there are opportunities to derive high value from incremental resourcing. Both these perspectives are valid and, indeed, relevant to the current study, but they are not its focus.

2.2 What is a balance?

This project focused on the spread of resources within LPI. MLA has indicated an interest in considering, in the future, possible extension to other areas of its investment, but this project is focused on the balance within LPI. Of course, related work going on outside of LPI, whether in MLA or elsewhere, may have implications for the best balance across LPI.

There are various ways of looking at, and accounting for/reporting on, the way resources are spread across a portfolio. The project objectives identified a number of dimensions where MLA is seeking advice as to balance across:

- LPI's core areas and sub-programs
- productivity, environmental and social outcome parameters
- time long term strategic basic research, strategic applied, to shorter term development, adoption and commercialisation investments
- risk in R&D portfolios
- the potential benefits and risks of different types of investments, and
- concerns about maintenance of scientific capability.

Portfolio balance can therefore be viewed as the broad **structure of resource assignment** – across and within projects and programs, through time (specifically in relation to the mix of research of different degrees of commerciality) and across a 'triple bottom line' view of value. In this sense, any portfolio has a 'balance'.

This view is valid, but the real point of looking at portfolio balance lies in the implicit assumption that it is reasonable to **ask whether the balance is 'good' or 'bad', or 'could**

be improved' by shifting resources. If this were understood, then it opens the opportunity for guiding better resource management through time – delivering greater value.

Portfolio balance then can be viewed as the structure of the investment portfolio, across the above dimensions, set out in a way that allows (and even encourages) **systematic consideration of whether greater value could be derived from the available resources through some redirection of resources** – between programs; between and within projects within programs; in directions that shift the balance across economic, social and environmental values; or in directions that shift the balance of effort along the basic to commercial research spectrum.

A truly balanced portfolio would then be one where it appears unlikely that LPI could be made to deliver greater value by shifting resources in any of these ways. In effect, if resources are assigned to deliver maximum value, then this should imply that the portfolio is 'balanced'. In reality, this view of balance is likely to find itself somewhat constrained, by real world politics and expectations of how levy funds and government contributions are directed. But it still makes sense to take this as a sensible starting point, and to then bring in any practical constraints that need to be accommodated.

2.3 How is one balance better than another?

It flows from the above that one form of portfolio balance might be considered better than, and preferable to, another if the proposed shift in resources would result in **greater value** being derived from the overall portfolio strategy.

Given that MLA is starting with a major portfolio, with large investments in capability and systems, and with programs well under way, it is not useful to think about best portfolio balance as something absolute. There might be an absolutely 'best portfolio balance' to be had if MLA were starting from scratch, though even then the best balance would invariably evolve over time. But the LPI program has been operating for a long period; so it is sensible to think in terms of the **best directions in which the portfolio balance should evolve**, and how rapidly this should be done to deliver maximum value. This will involve a mix of exploiting the work already completed and the capabilities already assembled, while steering the portfolio in directions that seem likely to support the delivery of improved value.

The need for such 'steering' can emerge in several ways:

- realisation that **past decisions** were not the best that could have been taken, and adjustment to correct for this
- reaction to external conditions (markets, technologies, policies etc.) that might be seen to have changed in ways that make some prospects more attractive, others less attractive – favouring some redirection of resources to reflect these changes
- completion of (or even progress with) projects within the portfolio may have produced **new** information that favours the reassessment of the best way to get value out of the subprograms or projects currently – perhaps a breakthrough in one area, or another area may be looking less promising
- pressures from stakeholder could evolve to favour a shift in balance possibly driven by the above changes, and
- the natural **evolution** of a program through time could favour a changing balance; for example, early work might involve greater pre-commercial research, probing possibilities, but later evolving towards more commercial emphasis as more certainty is established.

It is crucial to recognise that the very process of **moving resources involves costs**. Capabilities already assembled, and research that has already been done, almost always have value – at least in the form of 'options' over possible future beneficial developments. Abandoning research that still has some promise, or otherwise shifting the balance of a portfolio in directions that will favour a different mix of skills, effectively involves extinguishing (or mothballing) these options. Even if it is now clear that it would have been better not to have started some projects, given alternative uses for the resources, it will typically remain true that there are significant opportunity costs in rapidly winding down investments that are well under way. It may be appropriate, but in many cases it will not. These opportunity costs should be factored into any judgments about whether it is appropriate to move resources, and may justify keeping resources in areas that are not as promising as others, precisely because doing so allows these opportunity costs to be avoided.

Box 1 provides an analogy of how a range of options can be balanced in choosing a transport route. The same is true in looking at improving portfolio balance. In some cases, the sunk costs of existing research and capability development will favour a more gradual transition towards the ideal, possibly including orderly completion of many projects already underway. There can be a solid economic case for this gradual approach, given the costs of changing direction rapidly. Alternatively, it is possible that these costs will make it inappropriate to move towards the 'ideal', even gradually. It may make sense to pursue a different approach to value, that can better exploit the sunk investments.

Box 1 Balancing options

By analogy, consider the case of someone trying to drive from A to B. Along the way, the turnoff for the most direct route is missed, and this is not detected until sometime later. Should the driver turn around, back to the missed turnoff, and resume the intended route? Possibly, but not necessarily.

The distance covered since the turnoff was missed, might suggest going on, and using a less direct route, but one that is now quicker, given the sunk investment in travel beyond the turnoff. Whether this is the case will, of course, depend on the alternative routes available. In some extreme cases, it might even make sense to reconsider how important it is to get to B. Given the miles covered, maybe an alternative destination – say C, would now offer a better overall result than the now much longer route to B.

Source: ACIL Allen Consulting and The CIE

These arguments strongly suggest that portfolio rebalancing is not going to be about working out the 'ideal' R&D portfolio, viewed as a target, and then plotting a direct route to it. Instead, it is likely to favour a strategy that focuses on the best direction to steer in at each point of time, taking into account the possibilities and the sunk investments in R&D and associated capabilities. This will produce an evolving 'path' of portfolio balances and the key question is not whether balance at any point in time is ideal, but rather whether the path being followed will deliver the greatest value over time – given the sunk costs, the opportunities and the inevitable uncertainties.

2.4 Is balance an input or an output?

It follows from this argument, that portfolio balance is possibly best viewed as an *outcome*, at a given point in time, from ongoing sensible adaptation of a research portfolio, using sound rules for reallocating resources and by taking into account sunk costs as well as opportunities.



In fact, given the way that conditions external to a research portfolio are evolving, and the inevitable uncertainties, it is possible that an efficient strategy over time will often need to proceed with no clear understanding of a desired 'end-point' (i.e. outcome).

There may be no such ideal balance to be reached (because it is constantly changing) or the ideal may be unknowable. However, **maximising the expected return** from total funds invested, while addressing activities that are consistent with MLA's roles and responsibilities, **must be the starting principle** in 'steering' the portfolio balance.

Box 2 Balancing in the face of uncertainty

An analogy could be drawn with attempts to climb a mountain in conditions of thick fog. Given the fog, even the direction of the mountain peak may not be known with any precision – and this does create a risk that the peak will be missed. Guessing the direction of the peak, and doggedly heading on that direction, almost certainly means the peak will be missed. On the other hand, adopting a 'gradient rule', that involves moving steadily upwards, and changing direction as the direction of the steepest gradient changes, could support a high chance of getting to the top. These chances might be further bolstered by the addition of wider probing, to protect against the risks of scaling a foothill. This type of dynamic, and adaptive, steering, with explicit investments in information to address specific risks, is the essence of an options-based approach to managing uncertainty.

Source: ACIL Allen Consulting and The CIE

This does not prevent a strategy being followed that works efficiently, with changing knowledge and with unavoidable uncertainty, to produce a soundly based evolving strategy that yields a sensible, and defensible, portfolio balance at each point in time. But this balance will almost always be **an outcome from the evolving management process – not a 'target' to be pursued**.

Indeed, under a broad range of operational conditions it can be shown that any strategy that *estimates* the right balance, and then proceeds to move to it, without a suitable strategy for **reassessing** the direction over time, cannot be efficient if there is any uncertainty. Under these conditions, an efficient strategy must include evolving strategy that learns as it goes and adapts in ways that result in a changing portfolio balance. It often needs also to make pre-emptive investments in getting additional information, such as the scouting operations needed, in Box 2 to guard against the risks of inadvertently scaling a foothill and believing you have scaled the main peak.

These arguments do not preclude the use of **indicators of expected portfolio balance**; such indicators are currently quoted by MLA in relation to the balance across the spectrum from basic to commercial research. These indicators may be useful for monitoring purposes and may assist in reporting and accounting to stakeholders. However, there would be real risks in trying to lock them in as targets, as opposed to reporting them as estimates of what is likely to emerge as a sound adaptive strategy is pursued.

In some cases, the need to report to **multiple stakeholders**, with different expectations, may introduce constraints on portfolio balance, requiring that at least minimum levels of investment occur in some areas – even where meeting these minima appears likely to lower overall portfolio performance and value. Were this to be the case, then two points are worth considering:

— is it still reasonable to talk about the most efficient evolving strategy within these constraints? The presence of the constraints implies only that there is need to look for a constrained optimum

- it may also be reasonable to ask whether these constraints are particularly costly, in terms
 of limiting the value derived from the program for the sector as a whole
 - for example, is a requirement for expenditure in one area (say on-farm) to exceed some minimal level constraining the investment strategy in a way that substantially lowers overall value delivered?
 - if so, this information might be useful in negotiating different arrangements that better address stakeholder interests while avoiding some of these costs
 - by this could entail either or both of negotiating a relaxation in the constraints, or negotiating a modified form of funding.

2.5 Value of, or value added by, the portfolio

Defining value

MLA commands a range of resources and seeks to invest them in R&D in the best interests of its stakeholders. This does not necessarily mean investing in the highest value projects/programs, or doing so in the highest value ways.

MLA should be constantly reviewing what would happen if it were not to invest, or were to invest less or differently. This is appropriate, because MLA will deliver greatest value from its resources if it looks mainly at the **extra value** its stakeholders derive from its involvement in a space that will, in any case, include other participants and suppliers of R&D services. MLA is one of many funding agencies who are all looking to maximise leverage off each other's investments. Innovation through collaboration is a strong theme through MLA planning documents.

The highest value projects may well be attractive to a range of players, apart from MLA. The effect of MLA coming in could be:

- to crowd out research from other sources that would otherwise have occurred and that might have delivered comparable benefits
- to crowd out research from other sources that would otherwise have occurred and that might have delivered comparable benefits, but to restructure the prospects in favour of IP that might be better managed by the Australian industry, increasing their share of benefits, or to restructure the research in favour of early Australian application
- to add one more players to a busy field, possibly with only a modest impact on the timing and value of outcomes from the combined research effort, even in the case where this combined effort delivers very high value.
- to create new opportunities for tapping into synergies across the range of activities being undertaken by multiple organisations.

The RDCs have been the subject of extensive scrutiny, over many years, looking at the case for public support (through both the compulsory levy mechanism and direct provision of public funds). If a RDC were to focus all its efforts on 'commercially attractive' R&D investment opportunities, the case for support would commonly be weak. A key reason for this is that such a strategy would effectively maximise the extent to which the investment was competing with, or crowding out, other investment. Commercially attractive research will tend to encourage commercial investment.

The primary case for creating and supporting the RDCs has been to deal with concerns that some forms of high value research will not prove sufficiently commercially attractive, for

reasons of either or both of market and regulatory failure, and that there may therefore be a case for supporting work in these areas.

In weighing portfolio balance, it would therefore seem appropriate to take account of these **public policy principles**, and the **industry economics** that underpins them, that is considering the degree to which investments lie within an RDC's **remit**. Just because MLA is not investing in an area of potentially highest value, it does not follow that its portfolio is unbalanced. If it chooses to enter an area by leveraging, and better focusing, resources from elsewhere, caution would be needed before concluding that it is investing insufficiently in a given area.

The question of whether a differently weighted MLA portfolio would result in higher value outcomes for stakeholders, inclusive of changes in the investment strategies of other R&D firms and market participants, is a complex one. Nonetheless, in looking to derive the best value from MLA's resources, it would seem an important question – much more important than a narrower focus on the value of MLA's R&D outcomes. This narrow focus could seriously overstate the value delivered by MLA investment and could encourage investment strategy that is substantially lower in value than some alternatives.

MLA has already developed sophisticated mechanisms for encouraging sensible collaboration, and there will be an important role for these mechanisms in guiding the evolution of the best portfolio balance in LPI.

Role of marginal values in steering investment

Consider a portfolio that has two programmes of research, both currently funded. Under current funding and management arrangements, Program or Project A is estimated to deliver benefits of \$50m from an investment of \$1m. Program B is estimated to deliver benefits of \$10m from a forward investment of \$2m. Should the balance be changed? If so, in which direction should the resources be moved?

The simple answer is that there is insufficient information. Program A might be delivering its \$50m out of a single project, costing only \$100,000, with the remaining \$1.9m being effectively wasted'. It would still be a high value program, but it would not be an efficient program.

Similarly, the \$2m investment in Program B might, in itself, offer a much lower benefit-cost ratio than Program A. But what if the investment was going to provide a platform from which a range of additional investments could be made in the future, each with high returns because of access to this platform? In these circumstances, additional funding to Program B could be fully justified, while reduced funding to Program A makes good sense even though the program is a 'star performer'.

If portfolio balance is to be approached as an exercise in steering the evolution of the portfolio, shifting resources if and only if this is assessed as increasing portfolio value, then it turns out that good estimates of program benefits and costs is relatively unimportant.

What is really important is a good understanding of the **marginal value of increases or reductions in funding**. Often however, very little effort is directed at tracking this information. Sometimes the best use of additional funds would lie in adding a new project to a program. In other cases, it might favour accelerating the work being done in one or more projects, or bringing to bear a different approach or technology within a project area. It might favour taking some tough decisions, and withdrawing funds that are underperforming, even if they have been falling in an area that includes some star performers. To illustrate these points, Figure 1 shows a hypothetical relationship between the level of expenditure on an R&D initiative and the expected benefit. The higher the level of expenditure, the more likely it is that the maximum benefit of that program will be realised. At each level of expenditure there will be an expected benefit and hence benefit–cost ratio. As more is spent on a particular program, after some point the effectiveness of each additional dollar of funding will decline due to diminishing returns. Diminishing returns and risk will set limits to how much should be spent on any one program.





There is also likely to be a minimum critical level of expenditure below which nothing effective can be achieved. This will also have a bearing on how to allocate funds. Some initiatives may not be worth funding at all, because no benefit will be received until a great deal of money has been spent. Spreading funding too widely, across a wide range of prospects, can be very costly if it results in sub-critical funding across many of these areas. Focusing the effort may deliver high benefits because it allows the critical mass to be achieved, even if the areas of focus are not inherently more attractive.

Reaching the maximum expected payoff of some initiatives will provide a higher benefit-cost ratio than reaching the maximum expected payoff of others.

But if there were only two initiatives, this does not imply that all the scarce funds should be allocated to the program with the highest benefit–cost ratio — initiative 1 (illustrated in Figure 2). This is because it may take only two-thirds of the total budget (\$50 million out of \$75 million) to adequately fund that program and to get most of the maximum benefit (\$600 million rather than the maximum of \$650 million) – giving a benefit-cost ratio of 600:50 (12:1).

Source: ACIL Allen Consulting and The CIE



Figure 2 Equating the marginal benefit-cost ratios gives maximum payoff

Source: ACIL Allen Consulting and The CIE

Spending the remaining third of the budget on that initiative may provide a relatively low benefit–cost ratio (50:25 or 2:1) due to diminishing returns — the additional \$25 million of spending will be much less effective than the first \$50 million. With the full \$75 million allocated to initiative 1 the total benefit–cost ratio would be 650:75 or 8.67:1.

It would be far better to spend the \$25 million on initiative 2. This would provide a benefitcost ratio of 250:25 or 10:1 and give a total benefit-cost ratio for the budget of 11.33:1, a 30 per cent higher return than allocating all funds to initiative 1.

As a general principle, the best allocation will be made when, after all funds are allocated, the marginal expected benefit–cost ratios are the same for all initiatives — indicated by the slopes of the benefit curves being equal in Figure 2. Of course, the real world can introduce complexities here. Not all opportunities allow for smooth increases in funding – many investments are 'lumpy' in nature. This requires greater sophistication than the above rule, but remains consistent with the principle that incremental funding should be directed where it delivers the highest pay-off.

Discount rates

A key decision variable at MLA board and program manager level is the 'appropriate' discount rate for use in evaluation. This concept extends to a threshold internal rate of return that is used to assess programs or projects within MLA.

The real discount rate not only is the basis of the calculation required to establish the relative size of benefits and costs in present values terms but it also indicates the 'opportunity cost' of funds invested. This latter concept is linked to the discussion around 'value' and the roles and responsibilities of MLA in choosing to invest in some areas while not investing in others. The discussion above concluded that investing in 'commercial' activities is not consistent with the role of MLA or the Corporations more widely. Therefore, it would be unreasonable to expect that investing in other areas would earn a 'commercial' rate of return.

- A significant driver of the 'commercial' rate of return requirement is the opportunity cost of contribution individual levy payers where they can invest in other activities or pay off debt
- However, from an *industry perspective*, the rationale for investing jointly is significantly different, implying a lower target discount rate.

A well-structured adaptive strategy supports the use of lower discount rates compared to larger investments that involve significantly less uncertainty. For example, while a mining project faces considerable risks, the magnitude of these risks are generally well known. For MLA, the fact that uncertainties in the future are large does not imply a high risk premium if key uncertainties can be addressed early, at modest cost, and higher costs only committed after this has happened.

Given the focus of the current study, it is appropriate to ask whether the long term interest of the sector would favour shifting resources between pre-commercial and commercial work. Shifting resources into pre-commercial work might lay a stronger foundation for future large impacts; shifting resources into more commercial work could be expected to extract more, earlier, from research already done.

Decisions of this type cannot be based soundly in an assessment of the value of precommercial versus commercial research. Both are clearly needed but arguably, following the principles identified above, the case for MLA involvement is greater for pre-commercial work. Such investments should be cost effective, after appropriate treatment of risk. But because they are pre-commercial, it is difficult to observe payoffs in any market. Benefits should therefore be based on systematic review of the performance of the pre-commercial investments over a period of time.

Instead, consideration needs to be given to the question of whether the combination would have greater value if funds were withdrawn from the poorest performing parts of one of these areas, and shifted into the other to fund the extra activities with highest value. This involves shifting resources, at the margins, based on an assessment of marginal values across the programs.

Design principles

Based on the discussion above the following principles were identified as key considerations in designing the tool:

- allocation of funding with a program such as LPI is fundamentally a portfolio question. This means that projects and streams of research need to be assessed in terms of their contribution to the whole portfolio, taking into account interactions and constraints within the portfolio
- when considering this, it is the marginal (or incremental) impact of changed investments that are crucial. The average impact, while of historical interest, is less important for portfolio allocation.
 - Often the historical average impact is the default without a more informed estimate of the true marginal impact going forward
- valuation within a portfolio requires a method to consider how apparently incommensurate values can be placed on a common basis. How are environmental values and industry production values to be compared?
 - Recognising, of course, that protecting some environmental values may constitute high value insurance against future damage to productive capacity – directly or via regulatory response
- valuation of a portfolio requires definition of whose value is to be incorporated. Is it industry returns, or is it returns to the whole economy (including consumers)?
- portfolio allocation requires information on both benefits and costs of particular research proposals. From a portfolio perspective, costs must include opportunity costs within the portfolio
- as a part of forward looking portfolio allocation, measurement of benefits requires a fundamental understanding of the 'prospectivity' of research streams. What are the likely outputs from proposed research? Can these be translated to specific industry or consumer benefits? How does the research interact with other elements of the portfolio?
- portfolio analysis requires continual review and rebalancing of portfolio expenditures. This implies disciplined and careful benefit cost analysis of the impact of projects throughout their lifecycle. As noted, these benefit cost analyses need to be understood in the context of the whole portfolio (that is, their marginal contribution)
- portfolio analysis is fundamentally forward looking: considering the expected contribution of particular research to the future structure of the portfolio
- what are the effective political constraints on what sorts of balance would be acceptable?
 - to what degree are these constraints linked to the net value across the portfolio?
 - what would happen if the use of the principles above suggested that the majority of investments should go into one sector (say, lamb) or one part of the value chain (say, post-farm gate research)?
 - while it is not impossible that this would be in the best interests of the red meat industry as a whole, the fact that there will be major winners and losers would impose significant constraints.

3 Purpose

Recommendation 1

The portfolio assessment tool should be used to assess and demonstrate LPI investment portfolio's value - based on impact and remit. This does not require a prior benefit-cost analysis.

3.1 Rationale

LPI invests \$20 to \$34 million per annum in research development and extension (RD&E) to improve the sustainability, productivity and competitiveness of the Australian red meat industry. The sources of funds are red meat industry levies and partnership funds matched by the Commonwealth. Investments are often leveraged against cash and capability contributions from organisations that provide the RD&E.

Each year LPI must assess and allocate these funds to create the greatest possible value from existing and new investment opportunities available. This includes deciding which current investments should continue or cease and what new investments can be made with available funds. LPI must also report to demonstrate the (expected and actual) impact of the investments and how they align with the remit of the funds provided by MLA, industry levies, Commonwealth and other sources.

Portfolio assessment best practice recommends using value as the key discriminating criteria for setting targets and selecting investments to create a balanced portfolio. This focuses investments on outcomes (i.e. results) rather than secondary – but still important – criteria such as rationale (e.g. market failure) inputs (e.g. available budget), outputs (e.g. types of R&D) or goals (e.g. proportion of funds spent towards achieving a specific goal).

In practice determining the value of LPI investments is difficult because the portfolio:

- focuses on multiple and often intangible priorities that are hard to compare
- priorities change due to changing industry circumstances, new technologies etc.
- involves R&D with different levels of risk and value which are not fully known beforehand
- operates alongside other investments which contribute to the value sought
- can use a range of measurement tools which vary in cost, complexity and applicability

These challenges are not unique to LPI. They are common across MLA, rural RDCs, research and organisations with a public good or not for profit focus. In response LPI (

Table 1), and others, use a wide range of criteria to assess and demonstrate the nature and value of their investment portfolios. It is also apparent that many of the criteria are mandated as governance requirements by the MLA board and external stakeholders rather than improving decision making in LPI.

This trend stems from greater scrutiny of MLA, concern over the decline in public RD&E funding and LPI's obligation to integrate the objectives of MLA, industry and government into a balanced portfolio. While it is reasonable to expect the trend will continue, using more criteria makes it harder assess and report LPI's portfolio performance due to an increasing number of variables that need to be "balanced".

To that end we recommend that the portfolio tool should only focus on assessing and demonstrating (reporting) two aspects of LPI investment value: impact and remit. The other criteria will either form part of determining value or can be used alongside the tool to assist decision making and reporting on the portfolio balance as required (Table 1). This approach will ensure the tool is worthwhile, feasible and consistent with best practice. The tool must be applied across the whole LPI portfolio and ultimately can be adapted for use across the whole MLA portfolio.

Criteria	Comment	*Tool input	*Tool output
Rationale			
Priority alignment	Tabulating projects and/or expenditure proportions to MLA, industry and government priorities and LPI core areas (animal welfare; sustainability and environmental stewardship; optimising eating quality)	×	\checkmark
Industry support/contribution	Proposed projects and programs are recommended for investment by LPI industry R&D committees based on the potential benefits the can contribute to industry	×	\checkmark
RD&E continuum	Proportion of expenditure contributing to each part of the RD&E continuum based on the ABS definition (strategic applied research; development; adoption and commercialisation; capability building)	×	\checkmark
Market failure/counterfactual	Assessment of public benefit and degree to which RD&E would occur without LPI investment (generally qualitative unless economic assessment is completed which is not always the case). The RD&E continuum is used (incorrectly) as a proxy for market failure in some cases	\checkmark	×
Capability assessment	Assessment of whether maintaining capability is important in addition to the contracted projects and program being delivered by providers	\checkmark	×
Benefits			
Economic value	Economic assessment to determine internal rate of return, benefit- cost ratio and/or net present value (where appropriate)	\checkmark	×
Additional BCA information	Benefit: e.g. profit \$/head/hectare Adoption: time to peak adoption (years) and peak adoption (e.g. percentage of total units/farms/DSE/hectares) RD&E investment: total RD&E costs (\$), MLA contribution to total RD&E costs (%) and R&D timeline (years)	\checkmark	×
Contribution to other values	Scoring of contribution to other stakeholder values (environmental, animal welfare and social) using an 11 point likert scale (-5 to +5)	\checkmark	×
Outcome statements	Narrative summaries of the purpose and issues being addressed by a project or program	\checkmark	×
Risks			
Risk to industry and MLA	Narrative summary of likelihood and consequence	\checkmark	×
Technical risk	Service provider rating/project management rating Technological risk (Clear objectives. How much is technical risk unknown? Is there a Plan B option? Are there successful examples of similar innovations) Project complexity – how many and how complex are the technical hurdles?	√	×
Sensitivity test	Breakeven price of technology cost or benefit per head or hectare and/or minimum adoption level required Percentage change in key variables (e.g. maximum adoption, benefit \$ per head or hectare)	√	×
Costs			
Investment commitment	Total previous, current and expected RD&E costs	\checkmark	×
Investment alignment	Tabulating projects and/or expenditure proportions to industry levies, matching funds and external funds (co-contributions, grants etc.)	×	\checkmark

Table 1 LPI portfolio assessment and reporting criteria

*Note: Not all the criteria are determined or used in deciding or reporting on the LPI investment portfolio. **Tool input** indicates where current criteria can provide information for the assessment tool to score the value of

investments

Tool output indicates where the distribution of projects' scores can be analysed against that criteria as part of portfolio balancing

Source: Issue for Determination Template, Project Assessment Template and Market Failure Review of MLA's On-Farm RD&E Investments and Project Evaluation and Approval Policy, MLA 2014

3.2 Features

The purpose of the tool is to assess and demonstrate LPI's investment portfolio value – based on impact and remit. This is consistent with best practice in using value as the discriminating criteria in managing a portfolio.

Using impact and remit as the basis for value will allow LPI to integrate the criteria it must consider (Table 1) into a simpler and transparent framework (Figure 1) that addresses the two key asked questions asked of the portfolio:

- 1. How will LPI investments improve industry (i.e. impact)?
- 2. Is this something LPI/MLA should invest in (i.e. remit)?



Figure 3 LPI portfolio value hierarchy

Source: ACIL Allen Consulting and The CIE

Impact is divided into two parts – industry benefit and likelihood. Industry benefit will involve defining and measuring the potential benefit and distributional (e.g. proportion of businesses, area etc.) impact, while likelihood will consider the probability that the desired outcomes will be realised (i.e. chance of success).

Remit covers assessment of the degree to which investments generate other benefits (e.g. intangible outcomes or spill overs in areas such as broader environmental and social benefits) and to what extent these investments and the resulting capabilities and outcomes (both industry and public benefits) would not be realised without LPI investment (i.e. industry failure).

This will provide a single measure of value which can be used to balance the portfolio by ranking investments and analysing distribution of investments against LPI priorities and other criteria (i.e. tool outputs in Table 1).

The tool is deliberately designed to be qualitative to address limitations around accessing suitable cost effective quantitative data that is relevant and comparable across the portfolio's investments and criteria. As a result the portfolio can be "balanced" dynamically by adjusting the project mix across impact and remit. This overcomes constraints around simply balancing

by allocating to fixed criteria targets where the optimum is extremely difficult and expensive to determine and varies across the portfolio. For example expenditure targets for RD&E continuum categories reflect the MLA board's preferences for strategic over applied research rather than an optimal investment balance.

4 Fit

Recommendation 2

The portfolio assessment tool should be used by LPI at the decision point(s) in the process of development of investment priorities and in implementation of investment strategies to inform the industry R&D Committee's recommendations and subsequent approvals and reporting

4.1 Rationale

As a general principle a portfolio tool needs to be used at the point where there available resources are allocated and can be adjusted. Reporting can then occur at any time after that point. In practice the LPI investment portfolio is balanced using a combination of top-down and bottom-up allocation processes (Figure 2 overleaf).

The top-down process involves the MLA board and executive team allocating the LPI budget and providing guidance on where to target expenditure. The guidance includes high level direction through MLA's priorities (e.g. the objectives and key performance indicators in MLA's plans) and instruction on what proportion should be spent across the RD&E continuum. The board and executive also direct LPI to invest in particular strategic initiatives or to adjust expenditure in response to emerging priorities and budget forecasts. The ability of LPI to adjust the portfolio is currently limited by the lack of a single comparable measure for the value of investments that can be used to rebalance the portfolio.

The bottom-up process involves LPI developing strategic plans for each of the core areas in the portfolio including: on-farm productivity; animal health and biosecurity; animal welfare; sustainability and environmental stewardship; optimising eating quality; and ensuring R&D capability for the industry. The plans are developed by LPI in consultation with LPI's industry R&D Committees, the rest of MLA and key stakeholders such as Cattle Council of Australia, Sheep Meat Council of Australia and Australian Lot Feeders Association. The plans take the MLA strategic plan and wider industry plans, such as MISP, into consideration. There is also an expectation that investments will proportionally align with the industry levies funding LPI.

Collectively the LPI, MLA business plans and industry plans and MLA board provide LPI the following criteria to use in selecting investments and balancing the portfolio:

- priorities for investment stated as objectives, KPIs and outcome statements
- investment allocations based on RD&E continuum and industry levies

LPI then uses a dynamic allocation process to balance the portfolio over the five year strategic planning cycle (Figure 4 overleaf). The process involves LPI periodically reviewing the portfolio of investments against contracted projects, LPI-MLA-industry priorities and budget forecasts. Decisions to adjust-stop existing and commission new projects or

programs are made at this stage. Two thirds of LPI's expenditure is generally committed over a year, meaning that only one third is available for new projects or programs.

The terms of reference for new projects or programs are developed by the relevant LPI program manager and once approved; proposals are sought from service providers. The proposals are assessed by the program manager, industry R&D committee and MLA management-Board in line with financial delegations (Figure 5). MLA managers' consulted report that a project or program recommended by a LPI industry R&D Committee has a 95 per cent probability of being approved by MLA. As such the tool needs to be positioned around the industry R&D Committees.







Figure 5 Details of the LPI project approval process

Source: MLA

LPI managers consulted also indicated that industry support and alignment with LPI priorities are the most important criteria in decision making. These are largely determined by the individual assessment of the relevant program manager and review by the industry R&D Committees, LPI management team, and where required the MLA executive and board.

A key frustration faced by LPI managers is that many of MLA assessment template criteria (Table 1) are hard to measure because they are subjective, variably defined, lack the required data, inconsistently applied, difficult to interpret or not relevant to particular projects. Managers report this makes the process time consuming and bureaucratic.

The three most challenging criteria are: benefits, the RD&E continuum and industry failure. LPI has explored a number of methods to establish a repeatable, cost-effective, quantitative and rigorous ex-ante approach to measuring these criteria. These include in-house assessments, using independent economic consultants, weighted multi-criteria analyses and checklists. In practice LPI has found that all the initiatives struggle for sufficient baseline data; access to the required capability and resources and/or technical integrity to generate timely and comparable quantitative assessments to inform project selection and portfolio balancing. The key to addressing these challenges is to:

- --- agree on a clear purpose for assessing and balancing the portfolio (see chapter 3)
- --- use value -- based on impact and remit as the key discriminator for balancing the portfolio
- recognise that the criteria assessment will be qualitative rather than quantitative
- develop technically sound, cost effective methods that are repeated and consistently applied (see chapter 5)

A direct consequence of having distributed decision rights, like LPI does, is that the decisionmaking process is not transparent to others inside MLA, outside the organisation or even within LPI itself. This is accentuated by many of the objectives and KPIs in LPI's plans being general and enduring in nature - making it hard to determine how project(s) and program(s) align with them and whether the total investment portfolio is balanced.

Measurement of the LPI investment portfolio does not end at the point of investment. LPI needs to oversee implementation and report progress to MLA and industry. This includes validation of benefits through independent ex-post evaluations which can occur up to 25 years after the initial investment.

The upshot of stakeholder transparency concerns and lagged ability to validate investment is an increasing demand for more assessment criteria and reporting of the LPI investment portfolio. At present this equates to more than a dozen criteria (see Table 1 on page 21) against which the portfolio can be balanced.

The success of using the range of available criteria to justify LPI's portfolio balance and report progress to date has been limited, requiring considerable additional effort. The opinion of LPI staff on the value of the complete range of criteria range from frustration ("they create work rather than work for me") to resignation that they are simply another compliance requirement that must be met. Comments on the Health Check and other reports provided to MLA and external stakeholders include the challenge of dealing with the sheer volume of information provided and questioning whether they provide the required analysis and insight. These challenges highlight that irrespective of the efficacy of LPI's processes, which are beyond the scope of this project, the portfolio tool assessment and reporting uses are linked but separate.

4.2 Features

The LPI portfolio tool's primary purpose is to assist project-program investment decisions within LPI – focussed around the decision point(s) in the process of development of investment priorities and in implementation of investment strategies. To be effective the tool must effectively and efficiently:

- collate information on the key criteria to inform the R&D Committees' recommendation and subsequent approvals within MLA
- provide the baseline information to justify the portfolio balance to stakeholders and target subsequent evaluations

5 Method

Recommendation 3

The LPI portfolio tool is based on qualitative assessment and reporting of three key categories – value, cost and specified obligations.

5.1 Rationale

The key to successful portfolio assessment is to repeatedly use of a limited set of consistently applied criteria. This allows decision makers to maximise the potential value of investments given available resources and other considerations. For LPI the criteria are:

- --- value based on industry impact and the degree to which investment lie in MLA's remit
- --- costs based on the current and forecast budget available to LPI
- specified obligations that LPI must meet such as priorities, risk, RD&E continuum allocations and aligning expenditure with income sources (e.g. industry levies)

Measuring the value criterion

Of the three criteria value is the most challenging to measure because there is no single method generating a quantified metric that can be easily applied to all the diverse projects in the LPI investment portfolio.

LPI uses in-house assessments (RM model) or independent consultants (CRRDC BCA model or bespoke model) to assess the value of projects. Both approaches struggle with accessing sufficient data and counterfactual cases to conduct ex-ante assessments with sufficient rigour to inform investment decisions. LPI has found that the RM-model lacks the granularity and scope to assess all the types of LPI investments – particularly: fine scale farming system enhancements; improvements to multi-commodity enterprises; post-farm gate impacts and defensive investment/non-productivity (e.g. social and environmental) benefits. Independent assessments can provide the required granularity and scope, but come at a cost that cannot be justified for ex-ante economic assessments of all projects¹.

In addition a market failure test is often embedded in the economic assessments used. Market failure is a key determinant of whether a particular investment lies within MLA's remit. While important, combining impact and remit makes economic assessment harder and the results difficult to interpret leading to only partial use of economic techniques.

This has led to sustained criticism of LPI using economic techniques as the key criteria in assessing and selecting investments and promotion of alternatives such as program evaluation and multi-criteria analysis. In practice LPI is aware of the limitations of economic techniques and actually uses multi-criteria analysis (see Table 1). It is also apparent that program evaluation is embedded in the economic techniques and criteria used – albeit not as a discrete framework.

The key question on measuring value is not so much what is the right technique for LPI or whether multi-criteria analysis should be used? Rather the question is what are the essential criteria and organising framework? For LPI this is using both impact and remit to determine value in a way that caters for a variety of techniques.

Measuring costs and specified obligations criteria

LPI has well established processes for measuring the source of income and income budget (current and forecast) which can be easily used for budget analysis from a project to whole of LPI portfolio levels.

The contribution of projects to priorities is measured by individual program managers allocating a proportion of each project's budget to priorities in LPI's planning hierarchy, MLA plans and industry plans. This practice is adequate for both assessment and reporting purposes provided the allocations are periodically peer reviewed within LPI.

LPI must also balance the budget to meet allocations targets across the RD&E continuum. This is also measured through proportional allocation of project budgets across the ABS definitions. The targets are set by the MLA Board and reflect their strategic preference for different types of RD&E investment. The basis for the allocations is not documented and there is considerable conjecture within LPI, MLA, the wider RDC community and literature as to what the target allocations across the RD&E continuum should be. While there has been some work outlining how the allocations could be set (e.g. Pannell, 2013) in practice LPI has found there are practical limitations driven by accessing suitable data and a recognition that the optimal allocation will vary across the LPI portfolio.

¹ These issues were identified during the project and are also noted by Mullen (2012) and Agtrans (2013).

There is general agreement that strategic research is less certain and will take longer to realise potential benefits than development or extension focused investments. In this case the allocations provide an indication of the MLA board's risk-reward appetite.

However there is less agreement as to how they should be practically interpreted and used within LPI. Many projects include more than one of the RD&E continuum categories and there is no clear basis for establishing a desirable allocation given the diversity of priorities and types of RD&E that LPI pursues. The RD&E continuum has also been used (incorrectly) as a proxy measure for market failure to develop checklists and even review market failure (LPI, 2014).

The practical approach for LPI to assess and report on the RD&E continuum is to continue to use the proportional allocation of expenditure approach and to balance the total portfolio against the board targets. The RD&E continuum should not be used for measuring market failure because the reality is that market failure may be present in any of the categories. Rather it should be replaced with the assessment of remit which explicitly considers market failure in terms of public benefits and the degree to which there is failure within the industry to attract appropriate investment and capability.

The current LPI templates assess risk on the basis of risk to industry and MLA, technical risk and the sensitivity of key variables (Table 1). All the risks are important but should be integrated into a scoring measure to facilitate comparison with other criteria to facilitate project assessment and balancing of the LPI portfolio.

Applying and reporting the portfolio assessment criteria

The three criteria categories discussed above need to be determined for all proposals and projects to assess, balance and report on the LPI investment portfolio. This equates to assessing more than 400 projects to establish a profile of the current portfolio. Each year the criteria for each continuing project will need to be updated and new proposals assessed. It is reasonable to assume that at least 200 new proposals will need to be assessed each year given that a third of the budget is allocated to new projects and that not all proposals reviewed will be successful.

The combination of having to assess a large number of projects and proposals and the challenges in sourcing and generating information for each criteria can create a considerable and unsustainable burden for LPI. This indicates that the portfolio tool must have a sound framework with processes that allow each project to be readily scored and reported while catering for more detailed analysis where required. This is discussed in the following section.

5.2 Features

The recommended LPI portfolio tool consists of four elements: project assessment, multicriteria analysis (project screening and portfolio balancing), project-portfolio reporting and targeted investigation.

Project assessment

Recommendation 4

All proposals and projects are measured against seven criteria and rated for confidence.



The purpose of project assessment is to measure each proposal-project against a consistent set of criteria (Table 2) which can be used to screen projects and balance the portfolio.

Value will be measured through series of qualitative matrices where the score for impact and remit can be analysed independently or combined to create an overall value score. The risk criterion should also be measured by a qualitative matrix.

A series of questions have been developed for each matrix along with supporting information and techniques that can be used where available or required (Appendix A). The remaining criteria will be measured by allocating the proportion of project expenditure to MLA, LPI and industry priorities, costs and RD&E categories.

Criteria	Comment Application
Value	
Impact (matrix scores)	Qualitative assessment of impact based on industry benefit and likelihood of it being realised (including technical risk)
Remit (matrix scores)	Qualitative assessment of public benefit and industry failure
Costs	
Investment commitment (AUD)	Total previous, current and expected RD&E costs
Investment alignment (projects and AUD)	Tabulating projects and/or expenditure proportions to industry levies, matching funds and external funds (co-contributions, grants etc.)
Specified obligations	
Priority alignment (AUD)	Proportion of expenditure allocated to LPI, MLA and industry priorities
RD&E continuum (AUD)	Proportion of expenditure allocated to RD&E continuum categories defined by the ABS
Risk (matrix score)	Qualitative assessment of risk to MLA and industry and provider risk

Table 2 LPI portfolio investment tool criteria

Source: ACIL Allen Consulting and The CIE

The measurement process is qualitative for all the criteria, other than investment commitment. The lack of supporting independent and quantitative information for many projects means that measurement is subjective and open to individual interpretation. As such we recommend:

- the value criteria for each project are scored by multiple people
- the remaining criteria are subject to periodic peer review to ensure consistency and quality, and
- each project assessment be accompanied by a confidence rating (Appendix A)

Introducing a confidence rating provides decision makers within LPI not only a reference point for where uncertainty lies in the assessments but a guide as to where the limited resources for more detailed evaluations should be targeted.

Multi-criteria analysis to screen projects and balance the portfolio

Recommendation 5

All projects should be screened and analysed through multi-criteria analysis to balance the LPI portfolio.

The purpose of conducting a multi-criteria analysis of the LPI portfolio is to screen out projects not suitable for investment and then balance mix of available projects.

Project screening

The purpose of screening projects is to determine which projects are not suitable for investment based on the criteria assessment.

Projects which do not align with LPI's priorities should be excluded at this time. Projects scoring lower on both axes of qualitative matrix assessments (value and risk criteria) should be excluded. Projects scoring lower on one axis should be reviewed as to whether they should be excluded at this time or when the total portfolio is balanced.

Figure 6 provides an example of how projects can be screened using the value scoring matrix. A project with a lower remit and impact scores should be excluded while LPI should invest in a project with higher remit and impact scores. A project with a higher remit but lower impact score should be considered for investment. A project with a lower remit score but higher impact indicates that while the project will generate benefits it is not within MLA's remit. LPI could chose to exclude the project or seek co-investment through the MDC or other partners to deliver the project.

		Imj	pact
		lower	higher
mit	higher	consider	invest
Ren	lower	exclude	partner

Figure 6 Example project screening matrix on the value criteria

Source: ACIL Allen Consulting and The CIE

Portfolio balancing

The purpose of analysing portfolio balance is to determine the optimal project mix (portfolio balance) at the point of decision – which for LPI is the R&D Committees' recommendations.

A number of key analyses should be conducted at this time, although there is nothing to prevent other analyses. Indeed LPI should encourage as much analysis as possible based on the recommended criteria because the portfolio mix is continually changing and the additional analysis will assist with assessments and portfolio balance. The key analyses are:

- generating value, risk and priority profiles of the LPI portfolio's projects and proposals

- mapping the distribution of all the projects and proposals against the value matrix
- mapping the distribution of all the projects and proposals against the confidence rating scaletabulating the value and risk scores for each project against LPI's priorities

- reviewing how profiles change in relation to available funds and other considerations

- analysing the profile distributions given the available budget
- analysing the profile distributions given the RD&E continuum allocation targets

The profiles can then be used to inform the decisions of LPI managers and the R&D Committees.

The portfolio balancing can also be used in setting indicators and demonstrating compliance with expenditure targets. For example where targets are specified (such as RD&E continuum categories or industry by industry expenditure) the value scores can be used to demonstrate the range of low to very high investments which in turn can be used to adjust the project mix or targets within themselves.

The value scores can also be used to set indicators for other criteria such as LPI's own priorities, core areas etc. The approach should take the existing distribution of project value scores as the starting point. LPI can then adjust the project mix by adding new and removing existing projects to change the distribution of project scores (e.g. by choosing to only invest in projects with a medium or higher value score or only projects with a high remit score) which in turn creates the basis for setting expenditure targets.

Project-portfolio reporting

Recommendation 6

The (project) issue for determination and portfolio reporting templates should be based on the recommended criteria.

The purpose of reporting is to provide information on industry R&D Committee recommended projects that require additional approval and report on the overall portfolio as per Figures 2 and 3. The (project) issue for determination template should be updated based on the portfolio tool criteria (Table 3). The narrative summaries of purpose-issue should be retained but sections related to value (benefits/industry failure), risk, RD&E continuum, priorities etc. should be replaced with the criteria and a comment field for each one.

The precise format of reports on the overall LPI portfolio will need to be determined in consultation with the MLA executive team, Board and peak industry bodies. The reports should focus on demonstrating how the value (impact and remit) and risk criteria (measures) align with expenditure and their priorities. This will require a specific communication strategy to socialise and explain the value (impact and remit) criteria.

Further investigations and reference base

Recommendation 7

LPI should use the assessment tool results to identify proposals and projects for further investigation at the point of investment and independently evaluate the whole portfolio over 5 to 10 years

As a research focused unit, LPI will always have proposals that are hard to assess and project's whose value will only become known through implementation. These proposals and projects should be targeted for further investigation by LPI, external reviewers or independent evaluations. This is consistent with existing MLA evaluation policy.

The principles and practices defined in B.COM 1085 provide guidance on how to approach evaluation on defensive types of investment which have proven to be challenging to assess in the past.

Proposals that are assessed as having potential value but significant risks or uncertainties may be further investigated rather than excluded immediately. Investigations can be further analysed by LPI, external peer review or independent evaluation. Once the investigations are completed the project should be re-assessed against the criteria and included in the next decision round.

Projects whose value will only become known through implementation or focus on a new priority or type of research should be subject to independent review as part of the broader MLA evaluation series. The review should be scheduled when sufficient progress has been made to evaluate performance and before LPI needs to commit to continued funding.

LPI must also continue to implement a schedule of independent evaluations that review the entire portfolio over 5 to 10 years. The evaluations need to be scheduled and planned at the time of investment to ensure the relevant baselines are determined and collected in time to information the evaluations.

The combination of targeted investigations and independent evaluation of the whole portfolio will provide validation and a reference base for future assessments.

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Appendix A Project assessment tool worksheet

The purpose of measuring the value criterion is to establish a single score for each proposal and project that are analysed to balance the LPI portfolio. The value score is based on separate assessment of impact and remit. The impact and remit assessments are based on industry benefit-likelihood and public benefit-industry failure variables respectively (Figure A1).

The tool provides questions to assist rating each variable and a series of matrices to establish the scores for remit, impact and value. A rating system to determine the confidence of each project value score is also included.



Figure A1 Value criteria components

Source: ACIL Allen Consulting and The CIE

A.1 Impact scoring

Circle the assessed project according to industry benefit and likelihood in the Figure A2 using the questions in Table A1 and benefits reference list (Table C3) as a guide.

Likelihood (Likelihood of the RD&E being successful)	Industry benefit (How will this add value / improve productivity, profitability and/or provide environmental & social benefits to red meat producers?)				
	1 No benefit	2 Minor benefit	3 Moderate benefit	4 Major benefit	5 Very high benefit
A Almost certain	Low	High	High	Very High	Very High
B Likely	Low	Medium	High	High	Very High
C Moderate	Low	Low	Medium	High	High
D Unlikely	Very Low	Low	Low	Medium	High
E Very unlikely	Very Low	Very Low	Low	Low	Medium

Figure A2 Impact scoring matrix

Table A1 Impact questions

	Industry benefit	Likelihood
Definition	Potential economic, environmental and social benefits to red meat producers	The probability that the industry benefits will be realised
Key considerations	 Market (economic) and non-market (environmental and social) benefits to red meat producers Proportion of industry that will realise the benefit and over what time Marginal benefit (additionality and counterfactual) 	Environmental and market conditionsTechnical risk
Questions	 What are the benefits (including costs avoided) to red meat producers? Which producers will benefit? (geographic location, enterprise type, production system) What proportion of the industry will adopt the associated technologies and practices to realise the benefits? How long will it take to reach full adoption? How large is the benefit? (low – medium – large) How much of the benefit will be due the project (or what would happen without the project)? 	 Will the policy, environmental, social and technological assumptions hold during the project and until the benefits are realised? Will the project directly lead to producer benefits or is subsequent RD&E required? Is the project reliant on other RD&E to be successful? What is the quality of the organisations and people who will deliver the RD&E? Does the project use proven techniques or involve high levels of technical innovation?

A.2 Remit scoring

Circle the assessed project according to public benefit and industry failure in the Figure A3 using the questions in Table A2 and benefits reference list (Table A3) as a guide.

Figure AS Remit Scoring main	Figure A3	Remit	scoring	matrix
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Industry failure	Public benefit				
Degree to which LPI required supports R&D investment and capability that would not happen otherwise)	(How will this add va benefits to consume	alue / improve produc ers and society and o	tivity, profitability and ther industries?)	/or provide environme	ental & social
	1	2	3	4	5
	No benefit	Minor benefit	Moderate benefit	Major benefit	Very high benefit
А	Low	Hiah	Hiah	Verv High	Verv Hiah
Almost certain	2011			1 or y 1 ng.1	10. y 1g.i
B Likely	Low	Medium	High	High	Very High
С	Low	Low	Medium	High	High
Moderate	2011	2011	Wooddin	riigii	riigii
D	Venclow	Low	Low	Medium	High
Unlikely	Very LOW	LOW	LOW	Wedium	riigit
E Very unlikely	Very Low	Very Low	Low	Low	Medium

Table A2 Remit questions

	Public benefit	Industry failure
Definition	Potential economic, environmental and social benefits to consumers and society	Degree to which LPI support is required for R&D investment and capability that would not happen otherwise?
Key considerations	 Market (economic) and non-market (environmental and social) benefits to consumers and society and over what time Market (economic) and non-market (environmental and social) benefits to other producers consumers and society and over what time Marginal benefit (additionality and counterfactual) 	 What would happen if LPI did not invest (counterfactual)? Sustaining core RD&E capability
Questions	 What are the benefits (or costs avoided) to consumers and society? Will other agricultural industries benefit from the project? How long will it take to realise the benefits? Are the benefits likely to be realised? How large is the benefit? (low – medium – large) How much of the benefit will be due the project (or what would happen without the project)? 	 Would industry businesses or other stakeholders invest in the RD&E if LPI didn't? What are the impediments to industry and other stakeholders investing without LPI? Who would capture the benefits if LPI didn't invest? What core red meat research capability is being funded by the project? Would the red meat lose access to the core research capability if LPI didn't invest?

A.3 Value assessment based on impact and remit scores

Circle the assessed project value in Figure A4 based on the impact (Figure A2) and remit (Figure A3) scores.

Figure A4	Value	scoring	matrix
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Remit	Impact				
	1 Very low	2 Low	3 Medium	4 High	5 Very high
A Very high	Meidum	High	High	Very High	Very High
B High	Low	Medium	High	High	Very High
C Medium	Low	Low	Medium	High	High
D Low	Very Low	Low	Low	Medium	High
E Very low	Very Low	Very Low	Low	Low	Medium

Table A3 Industry and public benefit reference table

Benefit categories

Market and non-market benefits received by levy-paying industry (industry benefit variable)

- improvements in productivity or other economic advantages from the adoption of new technology embodied in services, equipment or machinery based on RDC R&D;
- improvements in productivity or other economic advantages from the adoption of PBR-protected plant varieties commercialised from RDC-funded breeding programs;
- improvements in productivity and profitability through improved management and husbandry;
- reduction in financial risk or in undesired income variability;
- improved on-farm environmental outcomes from changed cropping and pasture systems;
- improved market access;
- increases in specific research capacity or ability that enables progress on particular research targets;
- improved safety for producers and their employees
- reduction in damage or risk to the productive resource base.

Non-market (spillover) benefits to non-levy-payer industries (public benefit variable)

- improvements in productivity, profitability, risk profile or resource security in other rural industries that have not contributed to the cost of the R&D;
- improvement in productivity, turnover, profitability or risk in non-rural industries that did not contribute to the costs of the R&D;
- future benefits from incorporating the research outputs into related research fields that deliver subsequent new technologies and products;
- longer-term improvement in research capacity likely to benefit future levy-payers and upstream or downstream industries.

Market benefits received by the broader community (public benefit variable)

- benefits to buyers and final consumers of food and fibre products from improved product quality, variety, reliability, food-safety, or lower cost;
- availability of new or improved consumer products derived from research-based rural technology such as safer or otherwise improved household pesticides, herbicides and veterinary medicines.

Non-market benefits received by the broader community (public benefit variable)

- general improvements in research capacity that enhance Australia's technical capabilities across a range of disciplines;
- environmental benefits, including:
- improvements in water quality, environmental flows and salinity in both surface and groundwater;
- improvements in natural resource management including wetlands, nature reserves and cultural values;
- improvement in the sustainability of areas of conservation value;
- improvements in air quality;
- improvements in soil conservation and management;
- preservation of endangered species;
- sustainable management of biological resources;
- reduction in emissions of greenhouse gases;
- reduction in toxic waste;
- reduced off-site and residue effects of agricultural and veterinary chemicals.
- social benefits, including:
- occupational health and safety;
- public health and mental health;
- creation of resilient regional communities;
- building innovation skills for other industries or communities;
- building research skills;
- animal welfare;
- biosecurity.

Source: Council of Rural Research and Development Corporations Impact Assessment Guidelines (Consultation Draft), 2014

A.4 Project confidence rating

There are three major criteria underpinning the confidence rating for project assessments: number of people involved, information adequacy and independent external review. In terms of people the key considerations are:

- diversity of people completing the assessments (e.g. LPI managers, technical specialists, industry representatives)
- difference in assessment scores (i.e. degree to which scores are the same)

Information adequacy covers the amount and quality of information available to answer the questions in Tables A1 and A2 on which the ratings are based. Independent review means that the proposal or project has been reviewed by an external party who does not have an interested in whether it proceeds or not.

The table below provides a scoring sheet which should be used to establish the confidence rating.

Criteria	Rating definition	Score
Rating inputs		
Number of people	1 person = 0 2-3 people = 1 4+ people = 2	out of 2
Diversity of people	1 person = 0 2-3 diverse people = 1 4+ diverse people = 2	out of 2
Convergence	Scores diverge greatly = 0 Scores differ slightly = 1 Scores are the same = 2	out of 2
Information adequacy	Limited information of variable quality available = 0 Some information of reasonable quality available = 1 Quality information available = 2	out of 2
Independent review	No review = 0 Independent review = 1 Detailed independent review = 2	out of 2
Total		out of 10
Confidence ratings		
A – very high	Confidence rating of 9 to 10	
B – high	Confidence rating of 7 to 8	
C – medium	Confidence rating of 5 to 6	
D – low	Confidence rating of 3 to 4	
E – very low	Confidence rating of 0 to 2	

Table A4 Confidence rating scoring sheet

Source: ACIL Allen Consulting and The CIE