Section 4: The Financial Case

"The funding sought will generate a return and represents good value for the taxpayer."

A seven-year investment of $34.125 million is sought from the CRC Programme to operate the Future Farm Industries CRC. The CRC will manage a planned total resource of $114 million, including 902 FTEs over seven years.

Return on Investment

Independently verified benefit cost analysis (BCA) estimates that the most-likely Net Present Value (NPV) generated from the proposed CRC will be **$1.3 billion**[27], with benefits being 12 times the full cost of the proposed CRC, or 40 times the CRC Programme funding requested (all in present value terms). The estimated internal rate of return is 45%.

The BCA included detailed sensitivity analyses of each component area of research, examining the influence of multiple risk factors. The table below summarised these results for NPV, with the sensitivity analyses aggregated under the headings "Conservative", "Most-likely" and "Optimistic". These cover commercial risks, including changes in market prices, research success and adoption parameters, and technical risks. Based on these calculations, the internal rate of return varied from 26% (conservative) to 47% (optimistic). Under the optimistic assessment contribution to industrial and commercial growth would more than double our 'most-likely' estimate, and this would occur if adoption rates are faster, favoured by higher economic returns and better technical performance of new farming systems, adding 30% to undiscounted benefits.

Alternative Real Discount Rates	**Estimates**		
	Conservative	Most-likely	Optimistic
7.5%	$500m	$800m	$1,180m
5.0%	$810m	**$1,270m**	$1,850m
2.5%	$1,370m	$2,120m	$3,120m

The mix of benefits changes over time (figure 6), with the largest coming from productivity growth and new industries. The contribution of salinity protection measures to the overall valuation of outcomes increases steadily in discounted terms for about 20 years. There is an initial benefit peak due to an improved information base for policy processes, particularly benefiting the cost-effectiveness of activities funded by governments and catchment management organisations (CMOs).

[27] Pannell D 2006, "Benefit-cost Analysis of Proposed CRC for Future Farm Industries", The University of Western Australia.

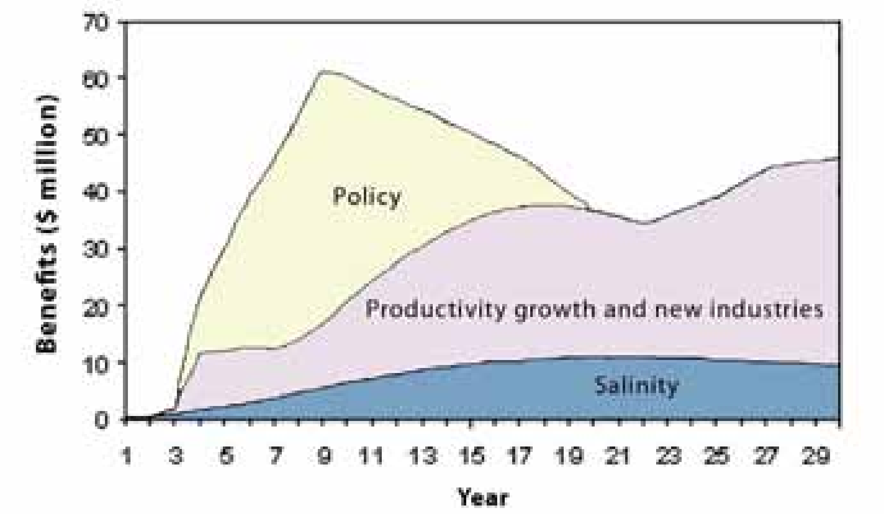

Figure 6. Gross benefits for FFI CRC discounted at 5%. Year 1 = 2007.

Compliance with application principles

The benefits of FFI CRC have been modelled over a 30 year period (50 years in the case of salinity containment) and discounted in line with the principles required of the application 5% as the reference discount rate (risk-free bond rate) with 2.5 and 7.5% considered in sensitivity analysis (above). A vast number of specific assumptions and estimates were used in the analysis (documentation exceeds 200 pages), and it is only possible here to show how these principles have been applied in several examples.

Adoption: Adoption costs are fully accounted for in the estimation of net benefits to land managers.

For each technology, an area of potential adoption was estimated, based on factors like the area of suitable soil types, and then peak adoption levels were specified as a conservative proportion of the potential area. For example, for the perennial pasture, winter active cocksfoot, the potential area was estimated as 1.2 million ha, and the area of peak adoption was set at 0.18 million ha (15% potential area). Peak adoption was specified considering evidence about other agricultural technologies in the past. Agricultural technologies are typically adopted over 10 to 60% of their potential range, depending on a well understood range of factors, including economics, the complexity of the technology, and its compatibility with current management systems. The FFI CRC's networked approach to commercialisation and utilisation, supported by the Adoptability Index will put its adoption rates towards the upper end of this range.

Lags until the commencement of adoption by landholders were 1 to 5 years; and further lags until the peak level of adoption were around 10 years in many cases. For example, for Lotus, one of the proposed perennial pasture species, the combined lags mean that peak adoption will not be reached until 2020. These lag assumptions are consistent with those typically observed in agriculture; as one example, research to develop the new crop lupins commenced in the early 1970s, and adoption peaked in the mid to late 1980s.

Research lags: Lags until the delivery of viable new technologies from the research ranged from 3 years to over 10 years, depending on the technology.

Quantification of benefits: The analyses to quantify benefits were highly sophisticated, and made use of a set of internationally recognised economic models that are at the cutting edge for this type of analysis. The MIDAS modelling illustrated above has been applied for over 20 years and is now available in several states[28]. It is a powerful tool designed for assessing impacts of new technologies on the economics of farming.

Regional models were developed with close collaboration from farmers, the end users of CRC technologies, so their application combines end-user knowledge with powerful economic analysis. Estimated improvements in annual profit per hectare varied widely depending on the technology, and examples include $10 to $30 per ha for new perennial pastures, $46 per ha for new salt-tolerant wheat, and $40 to $170 per ha (depending on the region) for new high-intensity grazing systems.

To illustrate MIDAS application, it was used for pre-feasibility modelling of the EverGraze project in CRC Salinity (figure 7)[29]. Results showed how farm profit can be increased by combining multiple perennial pasture species into an integrated farming system, rather than relying on a single species. In addition, the profit-maximising area of perennials is increased. If lucerne is the only perennial grown in this farming region, the profit-maximising area of perennials is 500 ha, and the maximum whole-farm profit is $54,000 per year, on average. If additional herbaceous perennial species (kikuyu and tall fescue) are integrated, the maximum profit increases to $81,000, and the optimal area of perennials increases to 1,400 ha. The farmer benefits directly from increased profit and, in time, from reduced salinity due to the larger area of perennials grown.

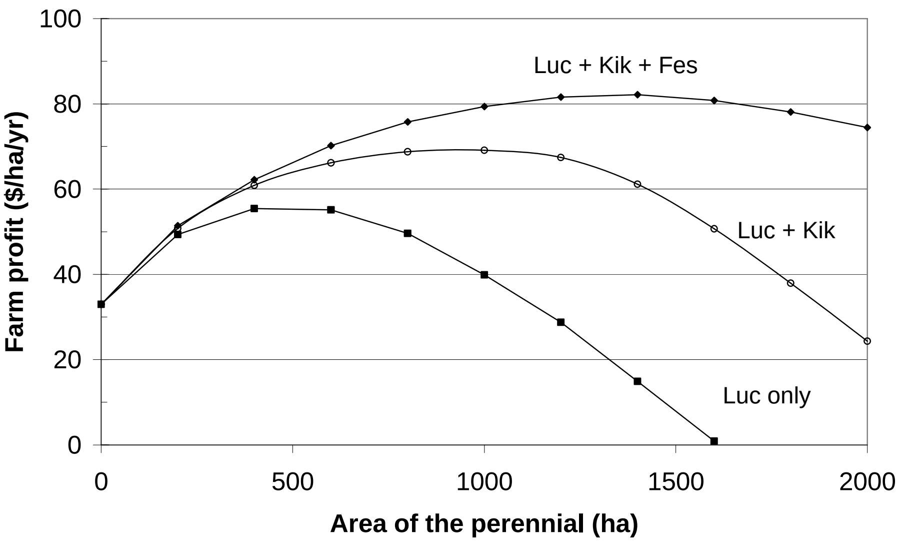

Figure 7. Whole-farm profit as a function of the area of perennial pastures, singly and in combinations.

(Luc = lucerne; Kik = kikuyu; Fes = tall fescue)

The capacity to conduct analyses like this will allow the FFI CRC to target its activities to regions where they can have the greatest commercial and economic impact, and to achieve targets for adoption of FFI CRC products.

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[28]Morrison DA, Kingwell RS, Pannell DJ and Ewing MA 1986, A mathematical programming model of a crop-livestock farm system, *Agricultural Systems* 20(4): 243-268; Pannell DJ 1996, Lessons from a decade of whole-farm modelling in Western Australia, *Review of Agricultural Economics* 18: 373-383; and John M., Pannell DJ and Kingwell, RS 2005, Climate change and the economics of farm management in the face of land degradation: dryland salinity in Western Australia, *Canadian Journal of Agricultural Economics* 53: 443-459.

[29] Young J 2005, unpublished report to CRC Salinity, University of Western Australia, Crawley.

A second example relates to the integration of salt-tolerant shrubs into farmer's whole-farm grazing system[30]. These shrubs provide good quality feed in the period of the year when feed is most lacking. Figure 8 shows the results of a series of MIDAS model runs in which the area of saltland pasture is varied. It shows that highest whole-farm profit is attained when saltland pastures are sown on 120 hectares of this farm type. It is supported by sensitivity analysis of how the marginal value of increasing the area of saltland pasture is affected by the area of saltland pasture and the prices of animal products. Results also provide details of which soils should be sown to saltland pastures, and when they should be grazed to maximise profit.

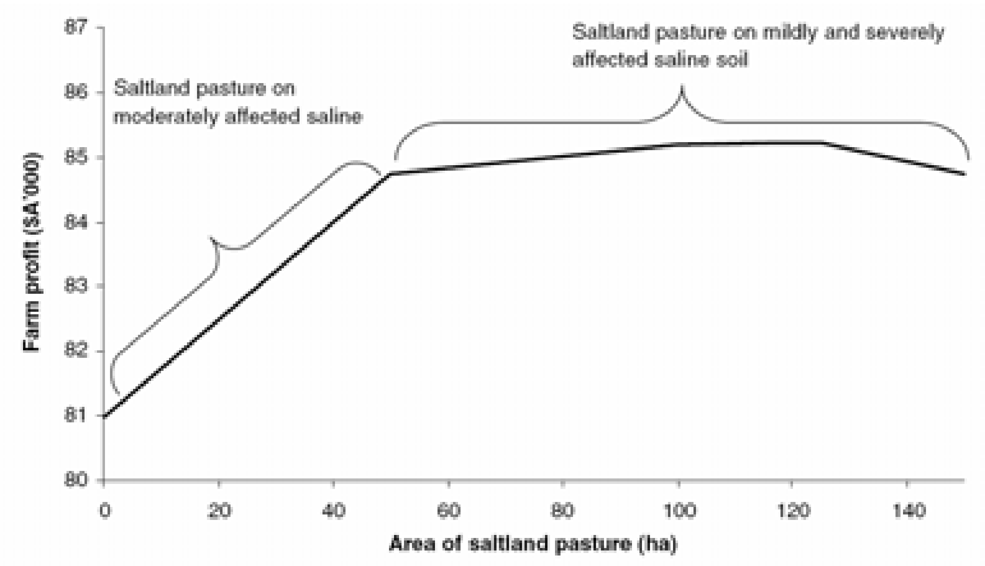

Figure 8. Change in whole-farm profit with different areas of saltland pasture. (Whole-farm profit is profit at full equity before tax, minus the opportunity cost of capital.)

More generally, estimates of benefits were based on conservative assumptions, such as that any land already salinised will not be recovered, or that farmers will not consider salinity-related benefits when considering adoption of perennials.

Risks and uncertainties: For each technology, specific risk factors were identified and subjected to detailed sensitivity analysis. For example, for salt-tolerant wheat, the analysis examined risks associated with market prices of outputs from the new crop and from its competitor land uses; grain yields; the area of land to which the new wheat will be applicable; the peak level of adoption by growers; the speed of adoption by growers; and the discount rate. The weighting of these variables changes across technologies and this is captured in the sensitivity analysis summary presented earlier.

For different technologies, different variables had the biggest influence on results, but overall, the key factors tended to be the area of physical environments (especially soil types and rainfall) suitable for that technology, and the assumptions made about adoption. The reality of different environments requiring different technologies is managed by pursuing a diversified portfolio of plant types, each suitable for different environments. Adoption risks will be minimised by engagement of industry and end-users in project development, by participation of farmers and other end-users in field research, and by the close involvement of social scientists and economists in the assessment of prospective technologies early in the research process, and then again prior to extension/commercialisation.

[30] O'Connell M, Young J and Kingwell R 2006, The economic value of saltland pastures in a mixed farming system in Western Australia, *Agricultural Systems* 89: 371-389.

Risk related to the response of the off-farm sector was also included, for example, by assigning probabilities of processing plants being established to service new woody perennial industries. This is a higher risk/return area for investment, requiring detailed analysis. Figure 9 illustrates the possible scenarios regarding the success of integrated wood processing (IWP) plants and wood panel plants. The probabilities shown are for the “with CRC” scenario. Without the CRC, they are adjusted (e.g. to 30, 45, and 25% respectively for the IWP Plant) and the evaluation is based on the difference between the two probability distributions.

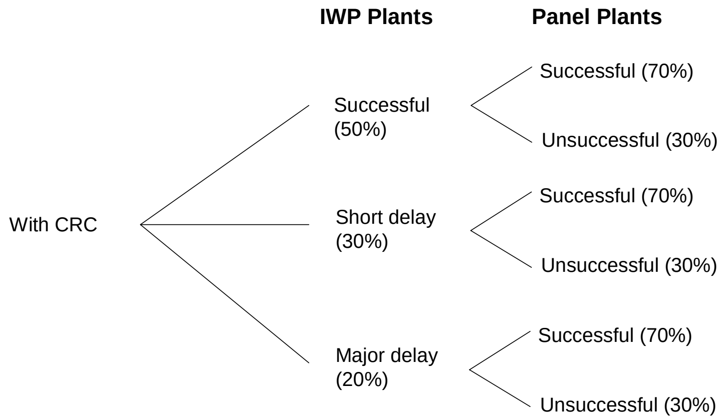

Figure 9. Probability distribution for success of integrated wood processing

Risks around the likely success of the research process are included by specifying probabilities of success, or of different levels of success. For example, it was estimated that there is an 80% probability of breeding a lucerne variety that is slightly more acid tolerant, and a 30% probability of breeding a substantially more acid tolerant variety.

Attribution: This was carefully considered for each element of the research. The analysts assessed the marginal difference to economic outcomes resulting from the CRC’s research, allowing for the contribution of other research activities. For example, the following attribution rates were estimated: 30% for high-rainfall Lotus; 10% for danthonia wallaby grass; 15% for strawberry clover; 40% for winter-active cocksfoot.

Justification of Commonwealth funding sought

This business case seeks $34.125 million of Commonwealth investment that will contribute 30% of the planned total resources budget. The companies, industry and research providers have made a substantial commitment of resources to the new CRC, with the Commonwealth’s investment leveraging about more than 3.5 times researcher and infrastructure in-kind resources. This is a viable R&D collaboration with a clear strategy that will now exceed the $5 million target for additional participant contributions after July 2007 (in the business concept case) starting with innovative grazing systems projects already agreed or under development (‘expanded EverGraze’ and Sustainable Grazing on Saline Land Phase II – see below), and followed up by woody crop industries and NRM solutions ‘market opportunities’.

The CRC’s investors are highly committed and regard the CRC as a professional, well-managed organisation that will achieve its planned outcomes. The potential to achieve these benefits is significantly increased by the CRC’s planned structure, which directly involves and engages key industry investors, agribusiness, new knowledge brokers and research, education and training providers. The returns on investment are expected to increase in line with the CRC’s strategy to further increase the level of investment and total resources, accelerate the commercialisation and adoption of its research outputs, and achieve greater outcomes under a business growth strategy. The CRC Salinity’s track record and these new grazing systems projects under consideration demonstrate this capacity to build resources and accelerate outcomes from an already viable base.

The detailed planning of research activities, including identification of products and prediction of adoption rates, shows that achievement of our planned outputs and milestones will require the resources identified, particularly the amount of CRC grant requested. Without the CRC funds the integrated nature of this program of activities would not happen because no single participant has the remit to deliver such an integrated and sweeping program to address the industry needs and opportunities for agriculture in southern Australia.

When operational, FFI CRC will apply the rigorous approach to research planning and management that has been an important strength of CRC Salinity, including pre-experimental impact analysis, as described in Selection Criterion 4. This is a critical factor in managing technical risk, maximising returns to the CRC Programme and participants, and providing value to the taxpayer.

Budget and resource allocations

The planning for this CRC has sought to maximise the potential for adoption of new products and technologies by increasing the allocation of resources to commercialisation and communication:

- 78% of the CRC's resources will be directed to integrated and industry-aligned research commercialisation and communications programs to maximise value from Profitable Perennials™ development
- 12% of resources will be allocated to education and training in support of uptake and diffusion of the Profitable Perennials™ brand
- 548 contributed FTEs will be supported by the purchase of 354 FTEs; and
- Management and administration costs will be limited to 10%.

The estimated operating budget for FFI CRC is based on careful matching of program investment with contribution to outcomes (see table below), following analysis of the potential for product adoption in the three areas of market opportunity – innovative farming systems, new woody crop industries and NRM solutions for catchments. The table below excludes resource allocation to management and communications activities across all programs.

Investment across FFI CRC outcomes:	Program	Total Resources	Per annum	% total resources
Productivity growth in existing industries	P1, P2	$44.8m	$6.4m	48
Profitable new regional industries	P3	$8.5m	$1.2m	9
Salinity damage reduced	P4	$10.6m	$1.5m	11
Other environmental benefits	P5	$9.9m	$1.4m	11
Capacity building	P6,P7	$8.7m	$1.2m	9
Commercialisation/Utilisation		$11.5m	$1.6m	12

It is acknowledged that the CRC Programme will value staff in-kind resource at nominal values to ensure matching resources are provided. However, the core participants' contributions, and the value of overheads for cash-funded positions, will be valued at market rates for purposes of determining equity in the research company. The non-staff in-kind contributions in the resources estimates table have been valued at the CRC Programme's nominal rate for staff in-kind contributions. This removes from industry and research provider in-kind FTEs salary related on-costs and retains the imputed cost of rent and the value of specialist equipment, as well as operating and support costs according to Program guidelines.

The management and administration component of the budget is based on the planned organisational structure (estimated salary costs) and estimated costs for operating a company with a skills-based board. It is a flat structure with key program leaders cash funded in part by the CRC in order to exceeds 50% time commitments to ensure delivery of milestones.

Firm commitment of cash and/or in-kind contributions

The CRC's committed cash resources from Industry ($14.35m) and Public ($5.7m) demonstrate strong support for the FFI CRC bid. Compared to the CRC Salinity, the new CRC will commence with higher industry funding to be further increased with contracting of the grazing systems projects under consideration. This reflects growing commitment to pushing the boundaries of productivity growth within strategic natural resource management objectives. The confidence to deliver this is built upon the development of core expertise from the existing CRC. Industry funders are providing three times the level of cash from research providers, a ratio that will increase during the life of the CRC. State agency participants will play a dual role through involvement as research users in industry extension activities and as research providers. They will contribute $2.1m million in cash and $34m of in-kind resources. Universities and CSIRO will also make substantial contributions accounting for $21m of total resources, including $1.82m in cash.

The FFI CRC participants resolved in May 2006 that the new CRC would be headquartered at UWA, building on the strength of the current hosting arrangements for the CRC Salinity. A non-staff inkind contribution from UWA of $546,000 has been included to provide for use of office space and facilities at UWA. Other firm cash of $1.7m has been included in the Stage 2 bid. This reflects the WA State Government's commitment to CRC's headquartered in WA.

Strategies to obtain additional participants and resources

The CRC's business growth strategy will generate additional resources to accelerate the planned timelines for delivering program outputs and lay the foundation for larger scale adoption beyond the life of the CRC. Several projects currently under negotiation (discussed above) have also been excluded from the financial tables in the Stage 2 application. For example, the grazing systems projects under consideration total $5.9m. The CRC will revise its original business performance targets ($5m in the business concept case) with a focus on company investments in woody crop industries (at least $3m for harvester development) and additional revenue from consulting activities and royalties ($1m). The Stage 2 bid has retained the original seven year target of $33m of income from industry and public sources derived from business growth and performance.

This growth strategy is matched to the commercialisation and utilisation strategies in Selection Criterion 2. It comprises:

- Consolidating investment into the major CRC programs by the key industry R&D corporations – adding to the core participant resources
- Attracting additional private sector companies into commercialisation of business opportunities, products and services – typically bilateral research contracts with the research company, some involving non-disclosure agreements
- Earning revenue from services provided, where these activities are highly compatible with achieving the outcomes
- Additional investment by CMOs and farmer groups to applied R&D projects, and commercialisation and adoption activities – projects and activities that will often be regional in scope, and
- Drawing additional public sector R&D providers in Queensland to the collaboration, to ensure the best expertise in the agro-climatic zone shared with NSW.