Submission to the Productivity Commission Inquiry into the Australian Research and Development Corporations

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June 2010

1. Background of contributor

Dr. McGregor has 35 years experience in applied scientific research focused on new industry development. He has also been interested in farmer decision making in relation to investment in new industries. He has supervised project work of students from various universities and has been employed in state Department of Primary Industries, universities and as a private consultant.

His direct experience relates primarily to new industry R,D & E funded by the Rural Credits Development Fund, Commonwealth Special Research Grants, Australian Special Rural Research Fund and the Rural Industries Research and Development Corporation (RIRDC) but he has also made submissions to other RRDCs and worked with others to access funding from Australian Wool Innovation and Meat and Livestock Australia.

Over the past 4 years he has spoken with over 80 scientists on issues directly related to this submission.

2. Rationale for Government funding

2.1. Some comments on rationale

In my view, the fact that about 80% of the Australian land mass is unalienated Crown land is an important issue. Only about 20% of the land area is privately owned freehold, most of the rest is Crown leasehold and public land. The manner in which land has been subdivided by government and sold as freehold has had large impacts in farm viability over time. Thus soldier settlement schemes and other land reforms in the past still impact on the capacity and future social landscape of Australian land use. The hand of government is everywhere in the Australian landscape so government needs to provide support, both financial and otherwise, in the future stewardship of the land.

As a taxpayer I regard it as essential that the Government invests sensibly and rationally to develop sustainable land management practices which do not endanger our unique biodiversity as well as land health and productivity.

2.2. Benefits from government funding which flow to the community

In a number of places the issues paper asks if there are other benefits which flow from government funding to agricultural RD&E. In my experience the following benefits have occurred:

- Community development accelerated. Skills transfers have occurred from scientists who apply their funding development skills to community projects. This has resulted in millions of dollars of community development projects which would not have occurred otherwise.
- Farmer competencies increased. Projects which have involved direct farmer participation in experimental management and data collection have increased the skills of farmers who apply these skills to other aspects of their life and business.
- Improved feelings of self-worth. A number of participants in my projects have reported increases in their feelings of self-worth and commented that they have remained farmers for longer or stayed living in rural areas longer as a result of their involvement in agricultural research projects.
- Less staff turnover and family disruption. Relatively long-term funding streams for projects results in greater family stability for people involved. I have seen many experienced staff resign in the face of funding uncertainty to take up poorer paid jobs in non-agricultural industries. None of these people return. If increased levels of funding were available to assist scientists to move about, then I am sure that there would be more relocations and less loss of experience.

- In many cases information I have provided to potential new investors in new industries has resulted in a decision not to invest. This is a good outcome if it prevents unsound decision making and leads to investment in better alternatives.

2.3. Loaded logic

The question asked in the Issues paper on page 8 is loaded viz: "In addition, there needs to be evidence that, without the government contribution, some socially valuable investment in R&D would be permanently discouraged."

How can evidence be provided that something which has not happened has been permanently discouraged?

If the research is socially valuable, why is any level of discouragement contemplated?

3. Underlying assumptions of the Productivity Commission Issues Paper which need addressing for progress in New Industries

There are several underlying assumptions which I feel the Productivity Commission needs to address before it can properly deal with many of the questions in its Issues Paper.

1. The focus of future research and development to be at universities;
2. The assumption of inefficiencies of duplication in agricultural science;
3. The assumption that 'the Australian environment' is similar to other countries;
4. The risk profiles of all agricultural industries are the same;
5. That information asymmetry can be ignored;
6. There are careers in new industry agricultural research;
7. There are facilities available for new industry research.

3.1. The focus of future research and development to be at universities

University research is heavily focussed on NEW ideas and technology. Many university research staff are focussed on gaining ARC grants, which are reviewed to ensure that cutting edge and innovative ideas are funded. Staff promotion is heavily geared to ARC grant success and Ph.D. student completions.

On the other hand, the requirements for many new agricultural industries are for basic agricultural production and quality research, processing research and economic assessments of production. For some industries the focus is on attracting new investors to increase scale of production to achieve critical mass or reduce overheads in processing and marketing. Little of this is NEW research attractive to university staff. The connection between university based research with the intent of new agricultural industry business plans has not been research to my understanding.

Most university activity is geared to 3 year cycles. As almost all agricultural industries are heavily affected by significant within and between year climatic factors, funding a project where the first year is lost in setting up research and the third year is spent in writing up reports results in only one or two years at best in field work. This is inadequate to quantify year effects on new agricultural industries.

The currently funded university model has serious problems as funding is project specific and staff time is not funded for other collaborations or for national co-ordination.

3.2. The assumption of inefficiencies of duplication in agricultural science

Throughout the Issues Paper the inefficiencies of 'duplication' in agricultural R,D & E are highlighted and it appears that this is accepted as the basis of continued rationalisation within the agricultural R and D sector. I disagree with this assumption. My reasons are:

- Duplication of multiple service providers (competition) has been regarded as essential in all other sectors of the economy e.g. telecommunications, airlines, health, frequently driven by the Productivity Commission's own reports. Why is science any different? Why is duplication a problem in science?
- Even within the Issues Paper, new types of competition are being promoted or suggested for certain types of funds for science projects. Competition by its very nature requires duplication, in airlines, banks, retail and every other sector. However if there is no duplication of service providers in agricultural research then there can be no competition for funds.
- The assumption of 'duplication' appears to rely on the fallacy that one experiment or development trial in one part of Australia will be sufficient to address all issues in all parts of Australia. This is not the position in medicine, mining, or any other industry. See point 3.3 for further discussion.
- The assumption that duplication is bad in agricultural science directly contradicts best practice of good scientific research that duplication is essential in order to quantify biological variation and statistical differences. This applies not just within experiments but between locations.
- This argument appears to imply that duplication is the only form of waste. My experience suggests that the more time spent in competition the less time is spent in collaboration, the greater the time wasted in administration and the greater the delays in actually doing research. Delays in starting projects of a few months can effectively result in the loss of an entire year due to the seasonal nature of biological systems. For every successful project there will be unsuccessful proposals, all of which are wasted unpaid effort. All these areas of waste cost money. The current models are increasing costs and reducing effective services.

It appears that the issues paper confounds two important issues: 1. the essential role that duplication plays in professional scientific practice and the need to verify scientific results in a range of environments and management conditions with wasteful; and 2. inefficient management of resources.

3.3. The assumption that 'the Australian environment' is similar to every other country

The 'eurocentric' type thinking that every place is like Europe or USA is a biological disaster for Australia. Both North America and Europe evolved very differently from Australia. These continents are part of the Neoarctic and Palaearctic biofaunal regions and were heavily glaciated in the past 50,000 years, which significantly simplified their flora and fauna. Once Australia separated from Gondwanaland about 55 million years ago she was isolated from all other land masses and developed unique biodiversity. Australia escaped the worst ravages of the Ice Age in terms of flora and fauna extinctions (Smith, 1986; Cracraft, 1991).

The assumption that Australia is like everywhere else does not accord with:

- Our very complex set of ecosystems (> 200) and unique biodiversity, neither of which are found overseas.
- Australia has ancient and nutrient-poor soils which erode easily.
- Australia has generally low and very erratic rainfall.
- Australia is vulnerable to invasion by numerous weeds, pests and diseases.
- A long legacy of agricultural disasters being left for future generations to clean up. Many weed and pest problems in Australia can be traced to a failed agricultural or pastoral activity

which introduced exotic pests including rabbits, blackberries, cane toads, camels, feral goats etc.

Thus any new industry proposed for Australia needs to be:

- screened for potential future pest status, especially new plant introductions. A recent example is the promotion of olive plantations with little regard to their environmental weed status. Other examples are new pasture species including phalaris, kikuyu, tropical pasture plants.
- Evaluated in a range of environments to determine the most suitable environments.

The Productivity Commission is concerned about the 'free rider' issue in agricultural research. However attempting to 'free ride' on overseas research in new industries is very dangerous as our environment, social and economic systems are very different. We need greater investment not less to evaluate new agricultural systems.

3.4. The risk profiles of all agricultural industries are the same

Most RRDCs work with established commodity industries. Only RIRDC is focussed on a portfolio of new or emerging industries. The risk profiles of the commodity and new industries are clearly different.

Further, people external to agricultural science appear to assume that science always succeeds and experiments do not fail, which is far from the real situation in new industries. Risks I have needed to manage in new industry research conducted while with the Victorian Department of Primary Industries include:

- Funding declines over time, often with short-term implementation timeframes particularly with reductions in field and technical staff when priorities were moved to 'new technology science';
- Changes in management and the type of decision and priorities they make which regard new industries as not important compared with larger commodity industries;
- Different susceptibilities to climate and drought risks;
- Unknown health risks to animals in new industries.

High risks for new industries include failure to properly understand traditional systems of production overseas (competitor analyses), the weed/pest potential of new crops/animals, the length of time required to establish sound agricultural production systems, the time required to obtain a skilled workforce, the time required to identify the best environmental niches for efficient agricultural production, difficulties in reaching critical mass for cost effective processing and marketing and the difficulties that new investors face in acquiring the necessary information to justify an investment into a new industry.

Consequently higher investment is required in new industries to:

- Reduce the time required to acquire the objective information required to justify an investment;
- Identify best practice production systems;
- Reduce the time between investment into new industries and obtaining economic returns.

3.5. That information asymmetry can be ignored

One major justification for government investment in agriculture R, D &E is market failure which includes information asymmetry. In my experience, problems caused by information asymmetry in new industries have been ignored by decision makers, who appear to assume that they have all the information required and so should everyone else.

Thus information asymmetry related to new industries is highly relevant to:

- decision makers within the various levels of government;
- decision makers on RRDC boards; and
- potential new investors into rural industries.

Consequences of economic dislocation from information asymmetry include:

- Failure of existing landholders to take up new profitable enterprises thus reducing their income;
- Suboptimal investment decisions by RRDC boards and by government officials reducing economic growth;
- Loss of capital and income by investors and superannuation funds e.g. blue gum plantations, vineyards.
- As a consequence of the previous point, profitable industries have had reduced investment and are affected by unfair competition for resources. These issues reduce their growth and the competitive position of alternative profitable industries.

If information asymmetry is to be the ruling paradigm then it feeds on myth and misconception to guide and direct agricultural investments.

Is myth what the Productivity Commission sees as the future for guiding Australian rural investment?

Information asymmetry is assisted by poor publication of research findings as discussed in 3.6. Thus funding to ensure proper publication of research outcomes must be a necessary part of the Productivity Commission recommendations.

These information asymmetry problems are worse in agricultural industries for several reasons including:

- Large distances in Australia between farmers and processors;
- Reluctance of many farmers to read reports, use the internet or use research skills in locating information;
- The continued application of 'myth' is self reinforcing as it is 'what has always been done';
- Promotion of many research managers whose research experience and/or publication record was limited i.e. they do not appreciate the real impact of information asymmetry;
- Lag between discovery of new information and peak adoption returns (Alston et al., 2010).

The Productivity Commission should focus on public good regarding greater access to the provision of information. This includes publication of refereed scientific reports.

3.6. There are careers in new industry agricultural research

The Productivity Commission needs to define what they mean as a 'career' in new industry agricultural research and how long it may last.

If the prevailing view that everyone will have 7 careers in their working life of say 35 years is to be accepted, then a career in new industry agricultural research will last 5 years, or just less than two 3-year funding cycles.

Why would scientists wish to risk a more permanent career on a 5 year tilt at new industry research?

Does this imply that only early stage researchers will be attracted to new industries until something more permanent comes onto the horizon?

Why would new industries want to fund only early career scientists in such a scenario if such scientists are inexperienced and likely to leave within 5 years?

My experience working directly with 6 new animal industries over the past 30 years has highlighted a number of issues [most also faced by professionals in many industries]:

- Rarely does funding pay for 100% of your time at any time.
- Most of the time you have to juggle 4 to 6 projects.
- Most of the time no project has primacy of importance with regard to funding, meaning that there is not one large project and numerous smaller projects.
- Projects start and finish in almost random arrangements.
- When working for government, if funding for projects is such that at some stage you are not 100% committed then your entire position becomes risky.
- There is a strong pressure to over-commit to avoid become less than 'fully funded'.
- Within government, overheads have been increased with minimal warning and can be applied 'retrospectively' to existing projects. Thus a fully funded project can be part completed when new overhead charges are introduced, thus reducing the project to underfunded status.
- Researchers have been made responsible for contracts, i.e. they are signatories to contracts and yet there have been too many financial issues outside their control.
- Strategic directions of government organisations can change during a project. Scientists are accused of not following new strategic directions, yet are signatories to contracts which have not been completed.
- Over the past 20 years, stress levels have been high and increasing, reducing work performance, commitment and desire to continue within the research sector.
- Progression as a research scientist in universities and Government is related to publication of work in reviewed scientific journals.
- Overwork, lack of control and stress do not facilitate publication of research.
- Investigation into 'traditional' research areas of agricultural research, essential for new industries, are not favoured by science management who focus on the NEW areas of science.
- Early career scientists are less efficient at publishing their research than later career scientists.
- Mentoring of early career scientists assumes that there is a later career scientist skilled in the area and who is available.

The Productivity Commission should develop strategies to overcome the problems associated with uncertain and discontinuous funding for salaries if it is to confidently provide manpower for research into new agricultural industries.

3.7. There are facilities available for new industry research

All scientists need access to facilities. Many university and government agricultural research facilities are either being closed or charged to projects at high rates. Thus assumptions regarding the availability of facilities for new industry research are just that, assumptions.

My experiences relating to access to facilities for research into new industries over the past 30 years include:

- As a scientist you may have spent years obtaining funding and building/maintaining a facility only to have it taken out of your control and either lost or be charged to use the facility.
- The time spent by a scientist in building a facility is not rewarded in scientific publications.
- It has been very difficult to access capital to build new facilities for new industries over the past 25 years.
- In the recent decade, unless applications for capital target the latest and NEWEST science areas you are wasting your time to apply for capital to investigate other issues for new industries i.e. DNA research will win, everything else loses.
- Charges to rent/hire access to facilities are driven by management's fund-raising desires rather than the actual costs to provide the services. For example, why charge a high user-fee if

the facility was paid for by a RRDC in the past, and the facility is scheduled for demolition within 5 years (such as when a site is being closed)?
- Inexperienced scientists do not have a clear idea of the facilities that they need for experiments.
- In the early years of new industries it may be very difficult to access on-farm facilities to conduct research given the high replacement cost of animals or access to resources provided by private farmers.
- On-farm research in new industries has greater risks given: the unknown biological and ecological risks; the reluctance of many farmers to agree to control-treatments required in research based on their perception that such treatments cost money; or the practice of abandoning control treatments when the result of an improved treatment becomes 'apparent'. These problems have happened to me several times, thus destroying the scientific experiment and preventing publication. Private benefit has become public loss.
- For new industries, how can they establish new facilities requiring intensive capital injections when they have not proven their ability to be profitable?

The Productivity Commission need to determine how funding for facilities in new industries are to be provided and where the facilities will be located.

4. Funding issues in current RRDC model

I have been very fortunate to have had a 35 year career supported by various funding agencies. However such a career would not be possible now. For the first 25 years my salary was covered by the Victorian State Government. Funding for such work is not now available. For the first 20 years technical support staff were available but this funding has not been available for 15 years. For the first 17 years, farm stockmen were available and these have not been funded since 1992.

The amount of funds available from the RRDCs has not increased to cover salaries previously funded by various levels of government, be that scientific, technical or field staff. Assuming that private funds will cover the shortfall assumes that private donors have funds or know the procedures required to gain tax relief for their contributions. It also assumes that researchers can facilitate the process whereby funding is channelled to the project. These assumptions are not robust.

Given the funding cuts from Federal and State Government, the funding of research within these organisations using new RRDC funds will provide part funding for salaries only or result in permanent funding of salaries to be moved to "soft" funds. The increasing focus on short-term budgets and funding positions takes the focus of staff away from research.

The issue of scientist and support staff salary funding is not understood or appreciated by most members of advisory panels to whom I have spoken, many of whom are farmers. However justified that their views may be, it does nothing to attract or retain research staff. In my direct experience, most research scientists contribute well in excess of standard 'award' hours to complete their work, including significant out of hours work at night, on weekends and holidays. Many family Christmas holidays have been interrupted to complete essential funding submissions due in early February, for the convenience of bureaucrats returning from their holidays. One may conclude that the project budgets were poorly prepared or one may conclude that in their desire to obtain funded projects that scientists have been squeezed by market forces managed by the funding RRDCs and managers within their organisations. This may be 'efficient' in the short term, but counter-productive in the longer term.

The 'co-funding' of projects by scientists donating significant amounts of their own unfunded labour has a limit and leads to several related problems including:
- A widening gap over time between available funds and required funds;
- Increasing levels of stress and burnout of staff;

- Deferred publication of scientific reports;
- Family problems;
- Increasing cynicism by scientists of their managers and 'policy economists' over the difference between evidence based farm practices using scientific research and 'lack of evidence' based economic policy.

Many of the issues discussed in Sections 3.6 and 3.7 are funding related.

There is no secure career for scientists in new industries research. The Productivity Commission should seek objective data on this issue, and hope that disillusioned scientists will contribute. One can see from the submissions to date, that the scientific community is disconnected from the current process, even though it could be crucial to their livelihood.

Who is going to undertake the R&D if the existing experienced scientists have lost faith and left?

How can the reforms to research funding to date be efficient if there are few professional scientists able to participate?

In my experience many farmers and small companies are not clear on how to claim tax benefits for their support of research. Their tax agents are also not confident. These information asymmetries translate into either less research funding or loss of tax benefits.

The Productivity Commission should develop clear procedures for RRDCs to provide a standard and clear position on how farmers and others can contribute to agricultural research. It should consider providing tax benefits up front so that funding can be facilitated without penalties to smaller research investors.

5. Decline in agricultural productivity over the past 15 years

The Productivity Commission has asked why agricultural productivity has fallen over the past 15 years. The following issues are suggested as being linked to a decline:

1. Failure of economists to properly account for improvements in agricultural product quality.

   This is exemplified by the example of wool productivity changes over the past 20 years. The decline in mean fibre diameter of the wool during this time, its main quality parameter and significantly related to value of wool, has been ignored. A kilogram of typical wool today is not the same as a kilogram of typical wool in 1990. Thus conclusions about the demise of the wool industry and reduced investment into wool research have been distorted by sloppy methodology.

   What other critical false assumptions undermine the assessments of agricultural productivity?

2. Reduced focus on agricultural productivity issues in industry plans.

   The changing focus of industry plans away from almost exclusively production issues to other issues, such as safety, compliance and marketing, while all important, has resulted in less absolute and less relative investment into productivity. The Commission is not comparing apples with apples.

3. Failure to implement industry business plans.

   There are many fine industry business plans designed with the best available information on increasing productivity but are they actually implemented?

What is needed is an independent public review of the implementation of business plans of RRDCs and how lack of implementation affected long-term productivity gains.

In many small and new industries important aspects of business plans are not implemented as there is not enough funding. Why would anyone make a submission to undertake a project for which there is clearly too little funding? There are conflicting grants made by various Government departments, both State and Commonwealth in relation to industry business plans.

4. Reduced productivity of scientists by too great a burden of reporting and compliance issues.

   This issue is discussed elsewhere in this submission. Scientists spend more time on reporting and compliance issues than they did 25 years ago. Thus less time is spent on research and publishing. Further, the reduction in support staff also means less time spent by scientists in intellectual work and more time in the field.

5. Failure of scientists to publish research papers.

   Failure of scientists to publish their research means that when people do literature searches that no publication can be found. Thus good results and new technology is lost and is not applied. Further, some of this 'old' research is repeated years later at a higher cost. Many farmers and managers are cynical of the need to publish but the publication process improves the outcome more times than not. Publication also increases the visibility of scientific output.

   I know from my experience that it does not matter how many industry field days, industry conferences, industry farm visits and radio interviews, newspaper articles and advisory bulletins that I undertook in the 1980s as a 'proactive researcher', the lack of science papers has led to some people saying that nothing is known about a topic and lobbying for repeat research.

   I also know of many former supervisors and colleagues who have left active research, leaving behind filing cabinets of completed field work which has not been published in science journals. Some of this work is being repeated 30 years later at significantly greater cost than publishing the completed work.

   Some scientists do not publish as they jump ship because of uncertain funding or because a project is about to end along with their job. They resign and take up another position. As a result research is left languishing and the knowledge and potential productivity gains are lost or project work may be assigned to other staff so interrupting their work.

6. Increasing barriers (silos) preventing collaborative agricultural research.

   The introduction of new managers in the 1990s across many levels of government and RRDCs focussed on their silos almost killed off collaborative research. The flexibility of scientists in allocating their time to new and important collaborative opportunities has been delayed significantly or stopped. In my own experience I had far more collaborations with other scientists before 1992 than since. Part of the change is the increase in scientists who sign IP agreements (discussed later).

   In response, CRCs have been developed to facilitate collaboration. There appears to be huge differences in how CRCs in different industries operate in relation to funding salaries. Many CRCs in agriculture assume co-investment by another agency to provide the labour costs of scientists. With declining government support and declining numbers of government scientists, there has been little funding for salaries of scientists at other locations, such as universities. If the CRCs in agriculture do not fund salaries and the universities do not fund salaries for project work then what does the future hold when the future model for agricultural research is to be university focussed?

For new industries there is little or no funding from CRCs.

7. The view that the 'scientists are the problem'.

   This arises from several different issues but one important one is the lags in the funding system. Take an idealised system as shown in Table 5.1, which assumes that funding happens the first time a submission is made and that drought does not interfere with your project, both of which frequently delay agricultural projects, and that science papers are published within 2 years. Further, the project targets an industry priority. In this example a projects takes 7 years to publication. If there are delays in each of these steps a project may take 10 years to complete. I have had a project which took 32 years from first proposal, resubmission, drought and other delays to full science publication (McGregor, 2010).

   Table 5.1. The time lag in an idealised 3-year research project and a project with common delays ino the ideal process

Stage of research	Ideal time lag	Delays in process
Research proposal submitted to RRDC	Year 1	Year 2 (rejected in first year)
Funding agreed	Year 2	Year 3.5 (problems with contract)
Project starts	Year 2	Year 4 (have to wait for season)
Project 'finishes'	Year 5	Year 8 (a year lost to drought)
Science papers published	Year 7	Year 10

Any change to industry priorities in the first 5 years is often assessed as the scientists concerned not working on industry priorities, yet in all likelihood the scientists concerned are struggling under reduced budgets to complete projects committed to 4, 5 or 6 years earlier. This type of outcome is very aggravating to scientists involved, particularly when funding bodies or managers publish such conclusions.

The need for scientists to work on research papers after projects have finished also leads managers to criticise scientist for not working on current priorities. I have experience managers stating publically that they are not going to fund the publication of science papers. This has resulted in different responses from staff including:

- Co-investment by staff in their own time to complete publishing;
- No further work to publish the report; and
- Information asymmetry for managers and industry.

A direct result of this common management blind spot has been that many research outcomes have not been published and so are not on the scientific record. In other words, the scientific outcomes have not occurred.

There has been a further problem in that many managers have moved into the agricultural area who are not scientists and do not appreciate the lags and biological limitations under which field scientists work.

It is easy to shorten the perceived time lags. Do not do field work instead do modelling, do not replicate experiments or only do one year of field work and do two years of writing. This results in projects which do not have statistical validity.

The Productivity Commission should assess if any of these outcomes affect agricultural productivity?

8. Rise in confidential agreements preventing scientists from speaking about their work.

   Over the past 20 years there has been a significant increase in emphasis on intellectual property (IP) arising from scientific research. Scientists involved in IP work sign agreements preventing them from discussing their work with others.

   I have worked in 5 different locations where some of the scientific staff have signed IP agreements. The consequence is that many colleagues will not discuss any professional work issues (football maybe but science, no). Scientists from non-agricultural backgrounds have confided that they have made mistakes which could have been prevented if they had more agricultural knowledge or discussed issues with colleagues who had some agricultural insight. Further, potential applications or collaborations are not forthcoming as these discussions never occur.

   The productivity of both those scientists who sign IP agreements and other scientists is reduced. Private wealth is seen as more important than productivity gains.

9. Push for extension of results to farmers before research is complete.

   The recent fashion to promote the 'results' of agricultural research experiments while they are in progress has been promoted as a way to speed up adoption.

   This approach assumes that the results are known before the research is completed, analysed and published. The approach also assumes that the results of early year(s) of field experiments represent the final result. Both assumptions can lead to excessive claims made for particular experiments [to impress the funding agency] and adoption by farmers of the wrong practices.

   I have been involved in many experiments where I have had no idea what the final treatment effects have been until 1 to 2 years after the 'successful field day'. The reasons for such delays relate to:
   - The time between field days and harvesting of products (up to 6 months);
   - The time required to test samples after harvesting (up to 6 months);
   - The time required to properly statistically analyse the data (up to 1 year or more);
   - The frequent need to transform data during statistical analysis means that untransformed means used in many field day presentations are unsound and potentially counter-productive.

   In my view, the push to extend 'results' while experiments are in progress could lead to adoption of incorrect practices and reduce productivity.

10. Increase in PIRDs at the expense of real research

    More funds in industry plans seek to involve farmers in 'Producer Initiated Research and Development' (PIRD). This is very appealing to RRDC boards such as MLA, as well as farmers, and millions of dollars have been spent on these projects. It assumes that farmers can be scientists, and no doubt there are many farmers trained as scientists.

    However, many of these PIRDs cannot be statistically analysed so why do them? It is also possible that farmers have adopted the wrong practices as discussed above.

    The process highlights two common myths: scientists are the problem; and there is too long a lag to obtain the benefits. The 'problem of scientists' is discussed elsewhere. The problem of what is a typical lag is explored by Professor Alston (2010).

11. Lack of up-to-date knowledge in training providers and extension staff.

    Many people lack the skills and endeavour to undertake proper literature reviews before they either start new projects or when they create training materials. The investment in undertaking literature reviews is often regarded as a waste of time or is curtailed as ‘we know what is required’. There is also an assumption by many young people that all the information they need is on the internet, which overlooks the substantial body of information in books, unpublished reports and theses, or in science papers unavailable to the public.

    Many training packages do not incorporate the latest technology as they are based on the modern fashion of asking the farmers what they want to learn and what existing farmers think new farmers should know about their industry. It is all too easy for training providers and extension staff to repeat and promulgate myths within industries and ignor new information.

    Are farmers the best ones to know all the latest technology?
    Do farmers and training providers read all the scientific journals?

12. Too many gaps in cross industry areas and lack of funding for long-term research

    Who funds long-term research into landcare, weeds, role of different animal species on aiding weed control, resource degradation? Given the great range of ecosystems in Australia and our variable and low rainfall and potential impacts of climate change how can long-term studies be funded under current arrangements which focus on 3 year projects, not on long-term studies.

    In Texas, scientists in the range country concluded that they needed 75 years in order to properly assess the outcomes of management systems, primarily owing to rainfall variability between years. This is 3 careers of the full time committed scientists or 15 careers of scientists employed for 5 years. The university 3 year model or election style funding of research does not cope with such requirements. This must lead to suboptimal farming practice.

6. Role of new industries in reducing rate of rural decline

Large areas of the coastal strip between Adelaide and Brisbane and inland to the Hume Highway are already or are becoming uncommercial for agriculture. The trends for this change are increasing and will accelerate with increasing population and the baby boomer retirements (Hollier and Reid, 2007). These areas are among those with the most reliable and highest rainfall in southern Australia.

Thus 50 years of farmers being told to ‘get bigger or get out’, which resulted in farm amalgamations, are being reversed with farms now being subdivided and acquired titles being sold. This trend has been clearly demonstrated in RIRDC work and that of DPI Victoria (Figure 6.1). Figure 6.1 shows that much of Victoria is already classed as rural amenity or transitional (draw line from Mt Gambier to Yarrawonga).

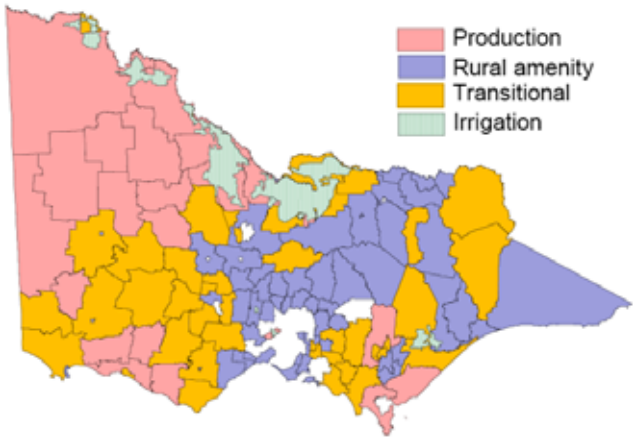

Figure 6.1. The social landscape in Victoria (Barr et al., 2005).

Owners of properties in the amenity and transition zones are faced with more complex decisions relating to how they intend to manage their land and resources compared with owners in the production zone. As traditional farming industries are increasingly uneconomic in the amenity and transition zones, more and more owners are obtaining work off their property. These people become time poor as they are trying to work two different jobs and the increased travel increases stress. Property management options include:

- Introducing low labour enterprises.
- Introducing enterprises where labour demands can be contracted to others.
- Agistment of other people's livestock.
- Share farming or share cropping.
- Lease their land to others.
- Subdivision and sale.

There are other options including establishing labour intensive industries on the farm, such as intensive horticulture, processing activities etc and conservation activities such as revegetation and native timber production. Many options are not economically viable as economies of scale will not allow small farms to compete with industrial enterprises elsewhere e.g. wine, olives, forestry.

The role of new industries has potentially increased prominence in the future social landscape of rural south-eastern Australia. The challenges are large. RIRDC is the only RRDC which has an interest in these issues and their funding is limited.

There are huge opportunities to assist land owners and managers to change their practices. There is an urgent need to prevent unsustainable land management, weeds and bio-security risks being introduced into these areas. Funding for 'extension' staff who understand these issues is unreliable, part-time and erratic.

There is also great scope for cross industry studies to develop new agricultural systems in these landscapes but funding for this work is difficult to obtain, with long lead times and uncertain outcomes. Who has the salary to commit to this work?

7. Evaluating the benefits of research and of scientists

Professor Alston and colleagues have clearly demonstrated that the currently applied models for assessing the benefits from agricultural research are seriously flawed and provide skewed and unreliable evaluations of projects. They concluded that benefits can arise to at least 100 years after research, with benefits starting from 5 years after the research and the peak benefits occurring around 20-30 years after the research.

This work suggests that for most agricultural research scientists the peak benefits from their research will arise after they have retired, and most probably after their managers and the managers' economic advisors have also retired. A major problem is that most science staff assessment programs assess the scientist on their outcomes of their work, yet the benefits will not be known for decades.

Thus the opinion of management then becomes the critical issue for scientists working in new industries and given most of them come from traditional commodity industries this can become a significant issue in the development of new industries.

8. Issues affecting the establishment of new animal industries

Issues associated with the important drivers of profit and the growth of a new animal industry are provided as examples of the complexity of the situation in new industry development (Figure 8.1). Each of the four main impediments to growth is critical to address because growth at the industry desired rate is unlikely to occur unless all four impediments are overcome at a similar time.

The current funding for RIRDC rare natural fibres program is inadequate to address all these critical issues. Despite recent gains in the study of the economics of mohair production, the weight of information from other sources on enterprise profitability ignores new enterprise opportunities. Frequently smaller new industries such as mohair are completely overlooked when economic studies are undertaken in agriculture. This systematic bias is unhelpful to commodity farmers as well as to other potential investors.

Small industries' future viability is undermined by a bias towards old commodity industries, most of which are uneconomic for small landholders. For example, the recent deregulation of the Australian dairy industry did not provide any help for farmers interested in producing sheep or goat milk for known and identified export markets to the Middle East. The only new enterprise to establish in Australia for this market came from New Zealand investors. This was despite the fact that cow dairy farmers have skills in milk production, have smaller holdings suitable for intensive dairy operations and are ideally placed in favourable environments.

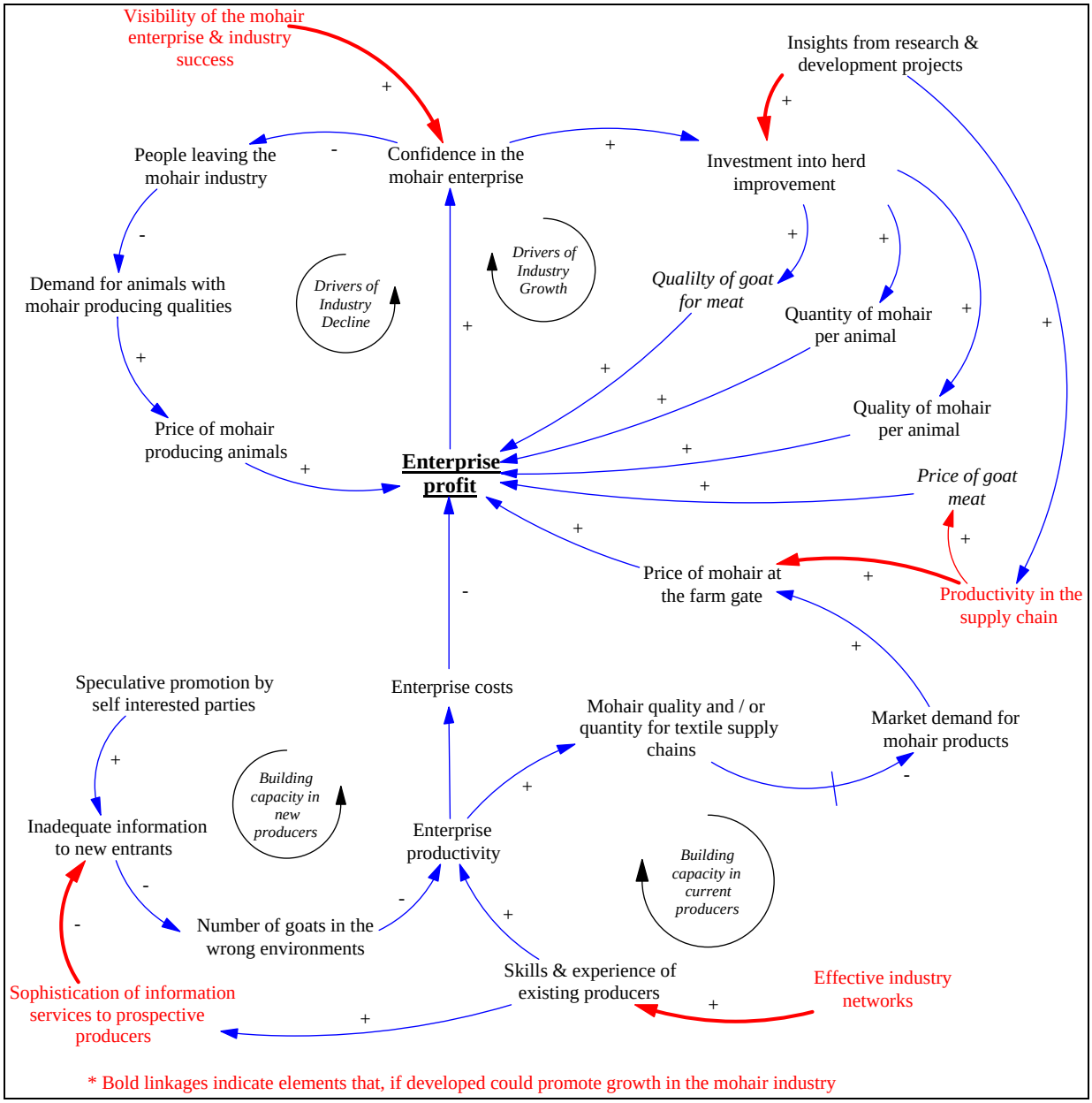

Figure 8.1. A causal loop diagram illustrating the connection between important drivers of profit (shown by the circular black arrows) and confidence in the mohair enterprise (Chaffey and McGregor, 2004). Bold linkages indicate elements which if developed could promote growth in the mohair industry.

9. Working with RIRDC

In my experience of working with RIRDC since the early 1990s I have found their processes to be efficient. The amount time spent on administration has been reasonable and not wasteful or intrusive. RIRDC has also been very industry focussed with clear industry plans and a commitment to the communication of project outcomes with industry. RIRDC have also been accommodating when factors outside of the project manager's control, such as climate factors, adversely affect projects.

As discussed earlier in this submission, for many new industries, there are frequently important issues within business plans which cannot be progressed without greater funds. Funding for new and emerging industries available for R,D &E are limited by the size of the cake. Some issues cannot be progressed.

It is now not possible to fund medium term grazing studies in new industries as the funds for such work cannot be obtained (stockmen, technical support, scientific salaries). Thus a fundamental aspect of new industry development, the identification of economic and efficient production systems cannot be scientifically investigated.

10. References

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