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

Australian Honey Bee Industry Council

May 2010

1. Industry Background

The Australian Honey Bee Industry Council is the representative organisation for the industry in Australia. The Australian Honey Bee Industry Council represents all states and all sectors of the industry. Its members include:

- New South Wales Apiarists' Association Inc. (NSWAA)
- Queensland Beekeepers' Association (QBA)
- South Australian Apiarists' Association (SAAA)
- Tasmanian Beekeepers' Association (TBA)
- Victorian Apiarists' Association Inc. (VAA)
- Western Australian Farmers Federation (WAFF) Beekeepers Section
- Honey Packers' and Marketers' Association
- National Council of Crop Pollination Associations
- Australian Queen Bee Breeders Association
- Associate Members

The industry has an estimated gross value of production of $80 million per year and has approximately 1700 commercial beekeepers with more than 50 hives according to the ABARE classification. Beekeepers with more than 250 hives number approximately 700 but account for 83 percent of production. There are also a significant number of amateur beekeepers, of which not all are registered, who though large in number produce only a small proportion of industry production.

The major income sources for the industry are honey bee products, comprising honey, wax, propolis and Royal jelly, and the growing activity of providing pollination services. There has also been an increase in recent years of Queen Bee and honey bee colony exports.

The industry is characterised by beekeepers chasing honey flows. Some of this is migratory as there are certain regular occurrences during the year for both collecting honey flows and undertaking pollination services and in other cases it can be semi-nomadic as the irregular flowering of native flora requires flexibility in moving hives to the appropriate locations.

The honey bee industry has long recognised and supported the need for research to ensure the long-term competitiveness of the industry and profitability of its members. The industry first achieved government support for research activities with the passing of the Honey Levy Act of 1962. This Act imposed a levy on honey sold for domestic consumption of one half penny per pound. The proceeds of the levy could be spent in various ways for the benefit of the industry but specifically included research activities. The industry has long been committed to research and continues to be so.

The Australian Honey Bee Industry Council wishes to make observations on parts of the Productivity Commission Issues Paper from the perspective of one of the smaller long established agricultural industries.

2. The effectiveness of the Rural Research and Development Corporation Model

2.1 Priority setting and assessment

The honeybee industry is a relatively small industry in the Australian agricultural sector. The industry believes the current arrangements work effectively for it in being part of the RIRDC.

The industry uses the formal arrangements applying generally to the RDC's and has developed a system of informal arrangements to ensure effective priority setting for research projects that the industry wants and also feedback to ensure the results of the research are well understood by beekeepers.

The formal arrangements include the requirement for the Honeybee Research and Development Council to consult with the peak industry body, the Australian Honey Bee Industry Council and industry's involvement with the Research and Development Council through providing nominations for the selection panel for directors of the Research and Development Council. The industry is also involved in the setting of the five year operational research plan, both directly at peak industry organisation level and also through RIRDC soliciting information directly from industry members.

A set of informal arrangements, that are not ordained by legislation or regulation, have been developed over time to ensure effective communication between the industry and the researchers and their output. These informal arrangements include:

- attendance at industry state conferences, where there is two-way communications between industry members and RIRDC;
- a newsletter is now being published which is available to industry members keeping them informed of developments affecting their industry; and
- RIRDC has attended industry field days and researchers have provided information and demonstrations of their work at them.

The seasonal nature of the beekeeping industry ensures that there is a very good attendance at conferences and field days, which are generally held in the off-season. The industry believes that there is very effective two-way communication with the researchers in this model.

The industry does not however have the size to justify detailed analyses, such as benefit cost studies from outside participants, to assess the effectiveness of its research programme. The industry is very involved in the setting of the research priorities and utilises the results of that research and is therefore very much abreast of the performance in delivering on our research priorities. Though these are informal mechanisms for assessing the value of our research there are other signals indicating that our research is first class and in many cases world leading. An example of the regard that Australian honey bee researchers are held in, the peak international scientific Congress on honey bee research, Apimondia was held in Melbourne in 2007. This is a

proxy variable for indicating the ranking of Australian honey bee research but their international peer group obviously regard Australia's research capacity very highly.

It is understandable that governments would want quantitative evidence and detailed reporting mechanisms and analyses on public programs. These requirements of governments cannot be met by the informal networks of communications and assessment of research that is characteristic of the relatively small honeybee industry. The information contained in these informal processes has helped ensure the effective research priorities for the industry.

2.2 Adapting to change

The model for the honey bee industry has proven itself capable of evolving to undertake changes in the research environment. A recent example has been the creation of Pollination Australia, whereby pollination dependent industries are providing funds for research into aspects of the honey bee industry affecting their industries. There has been recognition by these industries that their prosperity is dependent upon a viable domestic honeybee industry and the spread of *Varroa destructor* and its extreme damage to *Apis mellifera* honey bee colonies around the world was a signalling event to the industries that depend upon insect pollination. This is an evolving mechanism for dealing with changed priorities by different agricultural industries. The relatively small size of the honey bee industry could not fund all the necessary research that pollination dependent industries required to keep out the arrival of *Varroa destructor* or try to minimise the consequences of the damage it would do to Australian agriculture. The industry expects under current arrangements that it will be able to convince more agricultural industries, across the broad range of commodities and production types, of the importance of funding research in our industry.

Reducing the level of funding to other agricultural Research and Development organisations is likely to have a deleterious effect on their ability to fund research in the honey bee industry which will have significant impact not just for the honey bee industry but also for the achievement of other societal goals.

Research into the honey bee industry has been undertaken by universities, State Departments of Agriculture and the CSIRO. These researchers are regularly utilised in various means by the Honeybee Research and Development Council and there is regular interchange of information and knowledge of research projects being undertaken by the different institutions in Australia.

2.3 Administration

The industry believes the administrative arrangements under RIRDC for the Honeybee Research and Development Council are working very well. It is unclear from your Issues Paper on what you categorise as administrative costs when you question the extent of them. Of the costs incurred, some non research costs are regarded as essential by the industry for ensuring the effectiveness of the program. Examples include the costs of the advisory committee and communications of research. The explicit administration costs of levy collection costs and program management fees are well under 10 percent of the total program costs for the last two years and are regarded as reasonable by the industry. The industry monitors and compares the performance of all bodies that it puts funds into.

3. The beneficiaries from honeybee research

The honey bee industry is not the only beneficiary of the research funded by the honey bee industry. Significant benefits flow through to pollination dependent industries in agriculture and as will be demonstrated, potentially major benefits to public health.

Table 1 presents all the research projects completed in 2008-09 and an allocation by the industry of who the primary and secondary beneficiaries of the research are likely to be. As would be expected the beekeeping industry were the prime beneficiaries from the majority of projects. However in two cases, if the research should prove fundamental as building blocks for future research developments, then public health will be the prime beneficiary from those projects with the beekeeping industry a secondary winner, with certain types of honey achieving higher prices. The pollination industries, as customer industries, are prime beneficiaries in one case and secondary beneficiaries in two other cases. Benefits will accrue to the honeybee industry as there is likely to be a gradually increasing stream of income for the industry from pollination services. However the dependence of the pollination dependent industries on pollination services is so great that the value of output from the service in those industries far exceeds the value of output from the honeybee industry. In one case there was a spin-off in providing greater environmental knowledge, which is a public good for all Australia.

Table 1: Honeybee Research and Development Council completed projects -- 2008/09

Honey Industry Survey 2006/07	Policy makers	Pollination industries
An investigation into the therapeutic properties of honey	Public health	Beekeeping industry
Feasibility study into in-hive fungal bio-control of small hive beetle	Beekeeping industry	
Development of treatment options for European foulbrood	Beekeeping industry	
Biological control of chalkbrood by anti-fungal bacterial symbionts of bees	Beekeeping industry	
Evaluation of anti-Varroa boards for increase in honey production	Beekeeping industry	Pollination industries
Pollination Five Year R&D Plan	Pollination industries	Beekeeping industry
Forest plantations and honeybees	Beekeeping industry	
Tasmanian floral database	Beekeeping industry	Environment
Investigate the value added potential of the prebiotic components of Australian honeys	Public health	Beekeeping industry

Source: RIRDC, Annual Operational Plan 2009 – 10

Table 2 presents the same analysis for the proposed projects in 2010 -- 11. Again it can be clearly seen that it is a regular component of the Honeybee research program to undertake research where beneficiaries include the public as well as the industry.

Table 2: Honeybee Research and Development Council proposed projects -- 2009/10

Rapid method for measuring the antimicrobial activity of honey	Public health	Beekeeping industry
The prebiotic components of Australian honeys: Stage 2	Public health	Beekeeping industry
In hive fungal bio-control of small hive beetle	Beekeeping industry	
Commercialisation of the small hive beetle harbourage device	Beekeeping industry	
Pollination Aware: Its importance to Australia	Pollination industries	Beekeeping industry
Managing honeybee hive strength and vitality under netted cherry orchards	Pollination industries	Beekeeping industry
Assessment of a hive based levy for the Australian Honeybee Industry	Beekeeping industry	
Australian Honey: expanding the market for a multifunctional, natural food	Beekeeping industry	Public health
Use of sniffer dog in detection of American foul brood in beehives	Beekeeping industry	
The CSIRO rapid measurement of GI and its application to honey	Beekeeping industry	Public health

Source: RIRDC, Annual Operational Plan 2009 -- 10

Undertaking a comprehensive benefit cost analysis of the honeybee research portfolio would be a relatively expensive exercise and a diversion from achieving genuine research benefits. Notwithstanding the requirement for ensuring a return to the public from the expenditure of taxpayers' funds in this case it would be a government imposed transaction cost upon the industry. To demonstrate the potential public benefits that accrue from honeybee industry research a simple case study on some of those potential benefits is presented which showed that if the research fulfils its initial indications of success, the returns to the public in terms of benefits will far exceed the costs of funding research in this industry.

4. Public Health Benefits From Honeybee Research

As shown in Table 1, for two of the projects completed last financial year, the major beneficiaries of the research would be public health. This is not to say that the honey bee industry is doing this out of purely altruistic reasons, as there is evidence from New Zealand that when Manuka honey was found to have antibacterial properties, prices of that particular type of honey were said to have increased tenfold. This would not be completely to the bottom line of producers as there are additional costs in the production of medicinally valuable honey. Not all honeys exhibit the appropriate antibacterial properties. The investigation in Australia was to find the honeys, based upon the flora from which they were primarily derived, which exhibited the best antibacterial properties.

Finding alternative antibacterial medicines is becoming more important over time as many common bacteria that can cause health problems are developing resistance to the current range of manufactured antibiotics.

As the Commission has stated in its Research Report on Public and Private Hospitals:

"Hospital-acquired infections also place a significant burden on the health system, with an estimated 180 000 cases in Australia each year that occupy almost two million bed days."

One example is the increasing impact of methicillin-resistant *staphylococcus aureus* (MRSA) which according to the Productivity Commission:

"Research undertaken for the ACSQHC found that MRSA infections were the second-most costly adverse event per patient (after post-procedure endocrine and metabolic disorders), adding an extra $19 892 to the cost of an episode of care (based on 2005-06 data for Victoria and 2006-07 data for Queensland ."

The estimate for MRSA is much lower than that derived from a study in the United States which came up with an additional cost of over $US60, 000 per patient in 2002 due to MRSA infections. A study from Germany in 2008 shows "that MRSA patients stay in hospital 11 days longer, exhibit 7% higher mortality, are 7% more likely to undergo mechanical ventilation, and cause significantly higher total costs (€ 8,198)." Though there is very little data there is a strong indication that health costs for treating antibacterial resistance in hospitals are high in a worldwide context.

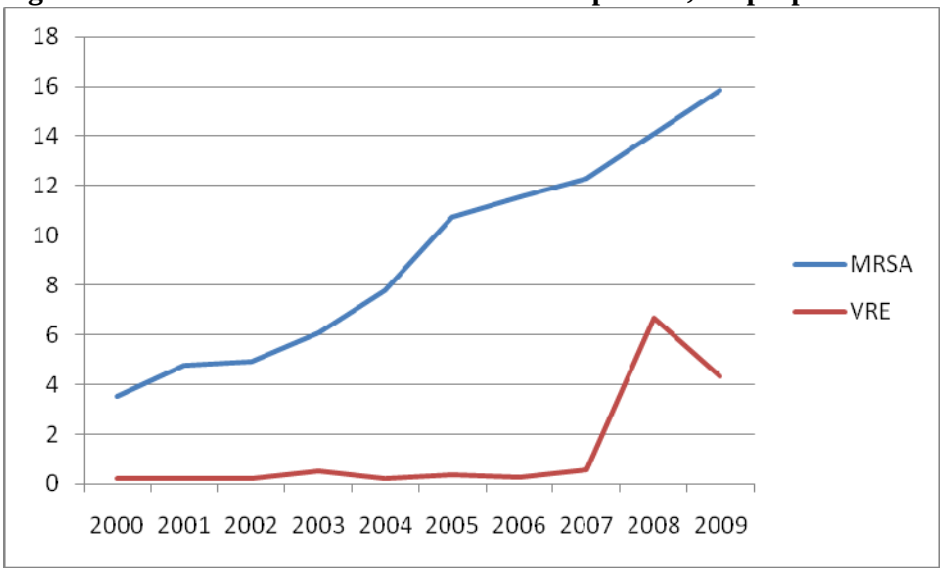
RIRDC funded a project investigating the therapeutic properties of honey and:

“The results of this project show that there are many Australian honeys with therapeutically beneficial levels of antibacterial activity...(and) have shown that honey has potent activity against numerous problematic microorganisms, including bacteria and fungi that can resist other drugs, and bacteria growing in biofilms.”

The previously cited Productivity Commission Research Report did not give the total number of patients affected by MRSA, however there is data from a comparable country, Sweden, which

has an extremely good database and the impact of it is shown in Figure 1. Also to demonstrate that it is not just MRSA that is on the increase, the increase in vancomycin-resistant *enterococci* (VRE) cases is also shown and the very rapid rates of growth of patients being affected is clear. The growth rates are an indicator for all modern health systems of potential future problems and their scale.

Figure 1: Growth in infection rates in Sweden per 100,000 people



As demonstrated in the RIRDC project, many other bacterial and fungal infections could be effectively treated by medicinal honey products other than MRSA alone.

This research is a building block in a long process to develop effective antibacterial medical treatments not dependent upon the diminishing capabilities of antibiotics developed through the pharmaceutical industry. As shown in Table 2, the industry is continuing to make its contribution to this major potential public health issues. There could be problems in private sector investment in this field of research because of the inability to patent or otherwise protect the intellectual property developed in this field.

An additional project completed last year in the research programme was to investigate the value added potential of the prebiotic components of Australian honeys.

As the Productivity Commission has noted in its Research Report on Public and Private Hospitals, *"The next most costly adverse event was Clostridium difficile that caused enterocolitis (inflammation of the colon and small intestine), costing $19 745 per episode."*

Clostridium difficile has become a problem as prolonged use of antibiotics tends to kill the "good" bacteria in the gut, along with the bad ones. *Clostridium difficile* being resistant to most antibiotics is greatly helped by the absence of other species of bacteria in the gut with which it would normally compete.

This Honey Bee industry study is aimed at providing an alternative means of combating this rising health problem. Again this study demonstrated that certain types of Australian honeys contribute to public health. The potential gains to public health from this research project have not been estimated in this submission but could again be substantial. The industry plans to continue to make its contribution in this area as shown in Table 2.

Box 1 presents scenarios of the potential public health benefits from research undertaken by the honeybee industry. As there is no certainty as to the outcomes of the benefits of nearly all types of research, the estimates provided here are for breakeven points for the taxpayer for making contributions to honeybee research. These are minimal estimates on what could be extremely high rates of return to the public. It is acknowledged that this is precursor research and more work will have to be done but it does provide a solid indication of potential gains.

Box 1: Scenarios estimating the Public Health Benefits from Honeybee Research Projects

Scenarios of the potential public health benefits from these Honeybee Research and Development Council projects are presented in Table 3.

Table 3: Proportions of patients receiving honeybee-based research treatments for public payback

Infection	*Time available*	*Percentage of patients treated for payback*
MRSA	5 years	1.25
MRSA	10 years	2.0
Hospital acquired infections	2 years	>.001

Assumptions

- Commonwealth Government contributions to the Honeybee Research and Development Council for the last four years and the current year are indexed by the CPI to present the cost to taxpayers in today's dollars;
- Swedish rates of infection from MRSA are applied to the Australian population (potential future higher rates from growing antibiotic resistance were not calculated);
- the time when these honey-based treatments are available for general use are provided as a range in the MRSA case;
- the cost per patient for MRSA cases in Australia is derived from a Productivity Commission report and assumed at $20,000 per case; and
- the cost per patient for hospital-acquired infections is assumed at 11 days at $1000 per day derived from Productivity Commission information and a German study on hospital costs.

Methodology

Net present values were calculated over a 50 year time period with a 5 percent discount rate.

Results

As can be clearly shown in Table 3, the public benefits breakeven point is extremely low. If only 1.25 percent of patients suffering from MRSA can be treated in five years time, the entire taxpayer contribution to honeybee research for the last five years is repaid. If the treatment only becomes available after 10 years it still only requires 2 percent of patients suffering from the infection to be successfully treated to repay the investment. For all hospital acquired infections, less than one in 10,000 patients being successfully treated will repay the taxpayer investment.

5. Reducing the government contribution

The option flagged by the Productivity Commission of reducing the matching government contribution for rural research can have additional costs for the undertaking of valuable research to the benefit of the industry and society generally that are difficult to measure but exist nonetheless.

The costs can be long term and encompass a much greater variety of costs than those incurred by either the taxpayer or the industry in strictly direct monetary terms.

This is especially the case where long-standing arrangements such as the matching grants from the Commonwealth Government for industry contributions to research and development are overturned.

This is primarily because the signals being sent from a reduction in government support can be interpreted negatively, on a rational basis. This would be despite statements to the contrary by ministers, officials and academics that the research requirements for agricultural industries remain a high priority for future productivity improvements to deliver to the affected industries. There is a divergence between the stated preferences that the research and development funding, though reduced, still delivers significant benefits and the revealed preferences of the actions of cutting funding for this research and development.

No doubt industry leaders will be making the case for continuing the levies to provide a base level of research. The levies are a genuine cost to farmers. However they could be seeing the actions of the government in reducing their contribution as a sign of reduced confidence in the benefits provided by this research. The broad base of support amongst farmers for research and development could easily be eroded by the signal sent by reducing the matching grant.

There can be other ramifications from this signalling which impact upon the long term research capabilities in agriculture. Scientific and other researchers, starting out in their careers or even planning their careers before undertaking studies, will see the reduction in resources devoted to research and development in these fields and choose not to go into a career in agricultural research. This is not to deny that there needs to be market signals for appropriate responses for all inputs into agricultural production, including scientific researchers. However the very long lead times in training and developing the appropriate experience to deal with problems can lead to an exacerbation of future problems.

The problems of the future by their very nature are unpredictable. However, certain trends can already be seen which will have an impact which could be exacerbated by a reduction in rural research in Australia. World population is forecast to reach 9 billion people by 2050, with an increasing number of those people with much higher disposable incomes and therefore perceived higher quality diets required with consequent impacts on the composition of agricultural production. For example, there is likely to be a greater demand for animal protein products and more diverse ranges of other crop products than the current reliance on grain and tuber foodstuffs. This will require significant productivity improvements in agricultural production to ensure not just market demands are met but food shortages in some regions of the world are

alleviated. This trend is occurring at the same time that there are indications of a slowdown in agricultural productivity improvements, not just in Australia, but internationally as noted in your Issues Paper. Short term policy changes in Australia that do not recognise this major international context can contribute, at the margin, to longer term international problems.

This international context of foreseeing potential future problems in agricultural production with rising populations and demand is already having real impacts in international markets. This is best demonstrated by the concerns of food security amongst many nations. This has lead to the acquisition, by some of their sovereign wealth funds, of farmland in other countries with the produce dedicated to supplying the country of ownership rather than other markets. This application of food security as a criterion for future agricultural policies, both domestic and international, can impact upon Australian agriculture. Customer nations, seeing a reduction in the research efforts in Australia could discount the future reliability of supply and seek alternative sources to supply their future demand. The speed at which this could occur is unknown and also the effects on international trade negotiations whereby food security issues could supplant opening markets as future driving forces, with consequent impacts on the export oriented Australian agricultural industries.

6. Other Public and Private Benefit Issues

The portfolio of research projects changes regularly and the balance between projects that benefit the honey bee industry directly and other industries such as the pollination dependent industries, the environment or public health will be regularly changing according to problems arising in Australia and internationally and opportunities that may also arise. In some periods there may be much more significant benefits to society arising from research projects undertaken within the honey bee industry than in other periods. Therefore the mix between public and so-called private benefit can change over time. It would not be administratively or economically efficient to be consistently changing the ratio of matching government funds to industry contributions, as the ratio of public or private benefit changes, as would be expected to happen with the uncertainties surrounding research projects, especially in more basic areas.

Where there are potential changes and uncertainties as to the mix of benefits, governments have adopted the simple rule of a 50-50 split in the costs. A simple example of this is in the operations of HECS in the tertiary education sector where there is a general acceptance that students obtain a benefit from the subsidised education, but that also society obtains a benefit from having a better educated populace. There have not been changes to the ratio or attempts to assess changes in the mix of benefits between the different study disciplines.

The precedent of 50-50 sharing is long established in the Research and Development Corporations and in the higher education system and can be seen to have achieved the objective of maintaining public and private contributions to expenditures where the outcomes are variable and uncertain.

7. Maintaining core research skills

It is essential that core research skills in the honey bee industry be maintained. One reason not canvassed by the Commission in its Issues Paper is the increasing number of biological problems arising from a globalising world economy. New pests and diseases are regularly arising and an urgent response, whether identification or advice on dealing with the problem is becoming more common and likely to happen more often in the future. Without the necessary research skills and infrastructure in place, there can be delays or failures in dealing with these responses with major consequences not just for industry, both beekeepers and pollination dependent industries, but also for public health and the environment.

A recent example was the incursion of Asian honey bees into North Queensland. It was fortunate that there was enough expertise in Australia to provide analysis and advice on helping to deal with the incursion which otherwise could have had very deleterious effects on the honey bee and pollination dependent industries as well as causing public health and public nuisance costs.

Maintaining this resource base is the equivalent of an insurance policy for these kinds of problems. Estimating the value of this insurance policy is extremely difficult as major beneficiaries include unpriced variables such as the Australian environment and biodiversity.

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