Chapter 4

Innovation and productivity

Introduction

4.1 The productivity of Australian agriculture, which refers to the efficiency of using inputs to produce a specific level of outputs, is critical to the viability of farming given the reduced terms of trade outlined in Chapter 1. This section of the report briefly discusses the importance of agricultural research and development to drive innovation and productivity gains in the agricultural sector.

4.2 The Department of Agriculture, Fisheries and Forestry (DAFF) explained that:

> Productivity growth has been the main driver of growth in agricultural output in Australia, enabling farmers to remain internationally competitive and sustain their businesses and incomes.[1]

4.3 A combined submission from red meat industry organisations stated that 'rising input costs and the Australian dollar are severely impacting on producer margins and viability', and that 'productivity improvements are essential to maintain affordability for consumers and viability for producers'.[2]

4.4 The Commonwealth Scientific and Industrial Research Organisation (CSIRO) also commented that a long-term decline in terms of trade meant that 'increases in productivity are essential to maintain the viability of production'. The CSIRO submission stated that improvements to input use efficiency and yields are essential:

4.5 To increase, or at least maintain, the economic viability of production agriculture a number of major issues need addressing. In essence, the immediate economic viability of agriculture is determined by the balance struck between the farm gate returns obtained as a result of yield and quality of the commodity produced, and the total cost of inputs needed to generate that yield. Hence, economic viability for growers may be achieved by tackling either of these factors, but only by controlling or reducing input costs per unit of product and increasing farm gate returns (by greater yield and or quality) are we likely to maintain economic viability as well as tackle the problem of food security.[3]

4.6 In this chapter the committee considers research and development (R&D) as a productivity driver; current agricultural R&D arrangements in Australia; recent

---

1 *Submission 93*, p. 17.

2 *Submission 29*, p. 10.

3 *Submission* 27, p. 6.

productivity trends; concerns about declining investment in R&D; and proposals for specific areas of R&D need. At the end of the chapter, the committee discusses concerns raised about the effect of plant gene technology and related patenting activities on future food production.

Research and development driving productivity

4.7 The Rural Industries Research and Development Corporation (RIRDC) told the committee that innovation through R&D is a key driver for diversifying into new rural industries and achieving strong productivity growth in traditional ones:

> In the face of climate change, new industries may provide greater resilience for Australia's agricultural regions, through:
>
> - greater diversity of agricultural options better suited to future climates
>
> - greater water use efficiency
>
> - better heat tolerance
>
> - a lighter greenhouse footprint.
>
> Through well-targeted R&D, new industries can also provide alternative crops and farming systems for irrigation areas in crisis; more drought resistant crops and animals for dryland situations; and more greenhouse efficient and heat tolerant crops and systems to enable us to make better use of our water-abundant tropical northern areas.[4]

4.8 The DAFF submission explained the contributing factors to productivity growth, highlighting the importance of technological advancement through innovation as a key component:

> Productivity growth has come from expanding outputs, while increasing efficiency in input use. This may include using fewer inputs overall, different input combinations, changing the output mix (e.g. shifting into cropping, away from sheep). Factors external to farm businesses that have influenced long term productivity over the past thirty years provide an indication of potential drivers of future productivity growth. These include:
>
> - Drought, which has caused significant downturns in productivity
> - Overseas demand - significant growth in overseas demand for Australian agricultural products has provided strong incentive to innovate and expand output
> - Policy - for example, deregulation during the 1980s and 1990s caused dramatic adjustments in the agriculture sector, and policy action can stimulate or slow down productivity
> - Water allocations and water markets, which continue to influence farm decision making and potential productivity gains

4 *Submission 42*, p. 1.

- Access to new technologies - facilitating access can enable productivity growth

> Technological progress in particular is a major driver of productivity gains through shifts in the composition of inputs used. Most notable, labour use in agriculture has fallen at an average rate of 1.7 per cent a year over the last thirty years. Rates of growth in capital and land use (per unit of output) have also fallen. In contrast, there has been a notable rise in the use of materials and services in agricultural production. Use of these inputs - including fodder, seed, fuel, chemicals and fertiliser - have increased by 2.4 per cent a year over the last three decades.[5]

4.9 CSIRO told the committee that wheat productivity is comprised of two elements:

> ...when you look at historical productivity trends—this is in terms of yield of the Australian wheat crop—we do about a two per cent increase in productivity per year. About one per cent of that is in direct genetic gain for yield. The other per cent or so is from improved management practices.[6]

Agricultural research and development in Australia

4.10 DAFF outlined the Commonwealth's contribution to agricultural innovation through research and development funding:

> Through diverse programs and organisations the Commonwealth contributes over $500 million to the more than $1.3 billion worth of primary industries R&D conducted annually in Australia. The principal vehicles are:
>
> - Rural Research and Development Corporations and Companies (RDCs) ($224 million in Commonwealth funds in 2007-08);
> - Cooperative Research Centres (CRCs) ($105 million in direct funding);
> - The Commonwealth Scientific and Industrial Research Organisation (CSIRO) (>$250 million);
> - The Bureau of Meteorology (BoM);
> - Australia's Farming Future administered by DAFF: the Australian Government's climate change initiative for primary industries. It provides $130 million over four years for a number of programs to help primary producers adapt and respond to climate change.[7]

5 *Submission 93*, p. 18.

6 *Committee Hansard*, 12 October 2009, p. 85.

7 *Submission 93*, p. 25.

4.11 Industry levies on producers are also a major contributor to research and development funding through rural research and development corporations and industry owned companies.[8]

4.12 CSIRO is a major source of innovation utilised by Australian producers for productivity growth through its Livestock Industries and Plant Industry divisions, as well as its Food Futures and Climate Adaptation National Flagships.[9] In evidence to the committee, CSIRO provided an overview of research undertaken in the following areas, as part of its 'new focus' on food security:

- improving water use efficiency in wheats to improve yields under dry conditions;[10]
- transferring genes to improve fertiliser use efficiency of wheat and barley;[11]
- protecting wheat from stem rust;[12]
- improving plant yields by manipulating photosynthesis and making roots deeper and more efficient;[13]
- genetic markers in livestock to help select for productivity, quality, net feed intake, tick resistance and methane production traits;[14]
- research on livestock efficient feed conversion and reducing methane emissions;[15]
- researching carbon sequestration in soils, particularly effective measurement;[16]
- improving aquaculture techniques to maximise yield.[17]

Recent productivity trends

4.13 DAFF outlined recent productivity trends in Australian agriculture:

---

8 *Submission 93*, p. 25.

9 *Submission 27*, p. 8.

10 *Committee Hansard*, 12 October 2009, pp 59-60

11 *Committee Hansard*, 12 October 2009, p. 85.

12 *Committee Hansard*, 12 October 2009, p. 60.

13 *Committee Hansard*, 12 October 2009, pp 60-61.

14 *Committee Hansard*, 12 October 2009, p. 62.

15 *Committee Hansard*, 12 October 2009, pp 63, 65.

16 *Committee Hansard*, 12 October 2009, p. 65.

17 *Committee Hansard*, 12 October 2009, pp 80-82.

> Agricultural productivity growth consistently exceeds productivity growth in other sectors with agriculture, fisheries and forestry productivity growth averaging 3.1 per cent over the past 20 years, compared with 1 per cent economy wide.
>
> Productivity of Australian farms.. has risen strongly for cropping specialists and the mixed crop-livestock industry - averaging 2.1 per cent and 1.5 per cent a year respectively from 1977-78 to 2006-07. Beef specialists achieved the same average performance level as the mixed crop-livestock industry over the past three decades. Their productivity growth coincided with high output growth and relatively marginal growth in input use. The sheep industry continues to lag behind the broadacre sector in terms of long-term productivity growth. Between 1977-78 and 2006-07, the industry has experienced a decline in both output and input use...[18]

4.14 Unfortunately, productivity growth has slowed recently following a spurt, with drought a major contributor:

> Broadacre productivity growth appears to be slowing since around the turn of the century. Similar to most industries, agriculture experienced a growth spurt in the 1990s, with broadacre productivity growing by 3.4 per cent on average during the 1990s compared to an average of 1.5 per cent over the last 30 years (1977-78 to 2006-07). In the last decade (between 1997-98 and 2006-07), there appears to be a possibility that productivity growth has slowed, falling to an average rate of 1.4 per cent a year. Recurring drought has most likely had a significant impact on productivity growth with severe downturns in output during drought years 1994-95, 2002-03 and 2006-07.[19]

Declining agricultural research and development

4.15 Although drought has had a significant effect on agricultural productivity in the past decade, evidence to the committee conveyed considerable concern that funding for research and development had reached insufficient levels to maintain necessary productivity improvements in the future.

4.16 Dr Barry McGlasson, Adjunct Professor with the Centre for Plant and Food Science at the University of Western Sydney, expressed his concern over recent cuts to CSIRO funding for agricultural research:

> In the May 2008 budget, CSIRO's budget was cut by $63 million over four years. CSIRO announced that it was closing some research stations including beef cattle at Rockhampton Qld, the 90 year-old Horticultural Research Centre, Merbein, Victoria and further reducing its footprint at the Food Science Laboratories at North Ryde, NSW. CSIRO no longer conducts work on the postharvest physiology and technology of fresh foods, and technology of refrigerated transport. CSIRO management justified these cuts by stating that it spent 29 per cent of its budget on

18 *Submission 93*, p. 17.

19 *Submission 93*, pp 17-18.

> agriculture whereas agriculture only contributes 12 per cent of GNP. This ignores the fact that agriculture generates 30 per cent of Australia's export income and provides many jobs in food services, processing and distribution.[20]

4.17 He commented that important scientific capability in the area must be retained:

> These short term responses of Federal and State Governments to reduce spending on agricultural R&D ignore the fact that our agricultural success and competitiveness depends on comprehensive and cumulative programs, over decades. It cannot be traded from year to year in CRCs and CSIRO Flagships. Once these capabilities are lost it will take decades to recover.[21]

4.18 The Rural Industries Research and Development Corporation (RIRDC) suggested that recent R&D cuts could limit essential alternative agricultural options:

> Research capacity for rural industries has declined in Australia over the last five years and there is concern that this is worsening. State agencies are rationalizing and concentrating their R&D interests, in some cases resulting in reduced co-investment in research. This will have a significant impact on the provision of pertinent R&D for food industries, and will have a considerable negative impact on the delivery and development of alternatives to current food industries that are becoming unsustainable.[22]

4.19 A combined submission from red meat industry organisations claimed that declining public expenditure on R&D threatened future productivity growth:

> Public expenditure on rural R&D grew strongly from the 1950s through until the late 1970s but has been flat (on a constant dollar basis) since then. As a percentage of agricultural GDP, public expenditure on rural R&D has declined from five percent in 1986 to three percent (Mullen, 2007). Notably, the contribution of rural RDCs to public rural R&D expenditure has grown from 15 percent in the 1980s to currently 50 percent. This indicates that there has been a very significant decline in direct expenditure in rural R&D by Federal and State Governments. If, as is likely, trends in expenditure on R&D in the red meat industry reflect those in agriculture overall, then given the long lags involved in the take up of R&D results there is a real possibility that the acceleration in productivity growth achieved over the past 10 to 15 years may not be maintained in future decades.
>
> ...
>
> If the Australian red meat industry is to take advantage of the opportunity offered by growth in global demand for meat over the next few decades then the relative decline in expenditure on R&D, especially by Federal and

---

20 *Submission 47*, p. 1.

21 *Submission 47*, p. 2.

22 *Submission 42*, p. 4.

> State Governments, must be reversed to ensure productivity growth is at least maintained.[23]

4.20 Growcom stated that:

> There has been a slide in government investment in R&D over the last, I would say, 10 to 15 years. There has been greater emphasis put on industry contribution to R&D. That has happened and it is still happening—and that is happening at both a state level and a federal level. Most state departments of agriculture around the country have had their budgets slowly eroded, so their R&D capacity has been decreasing. Federally, an organisation like CSIRO has found it difficult to continue a major investment in agricultural R&D. We see that as a challenge in itself, but it also misses the opportunity that is coming in front of us for Australia to position itself as an agrifood producer into the future. We see it as a real risk for the future, and also we are missing opportunities for the future, if there are not substantive increases in R&D.[24]

4.21 Agforce claimed that the global food task and looming supply constraints justified increased R&D investment:

> With the impact of climate change, increased population growth, reduced land available for agricultural production and global food shortages, there is an urgent need for the Government to increase its investment into research and development.[25]

4.22 Further, Agforce argued that rural research funding is vital to ensure exporting industries can compete internationally:

> It is clear that growth in the productivity of rural production systems can be directly connected to the percentage value of production versus investment in R&D, For example the grains industry has one of the highest investments to value ratios of any commodity in Australia and also has a high productivity growth, The livestock industries of beef and wool have relatively low investment levels and similarly low productivity growth.
>
> ...
>
> This trend of reduced productivity following reduced investment is evident in the fodder industry. This is the forgotten industry of Australia's food producing enterprises as no statutory levy exists for the production of fodder and investment from organisations such as GRDC, MLA and AWL is also very low in the fodder industry...[26]

4.23 The Grains Research Foundation Ltd also argued that declining R&D needs to be addressed, and proposed that growers increase their contributions to R&D in the

---

23 *Submission 29*, p. 18.

24 *Committee Hansard*, 4 March 2009, pp 19-20.

25 *Submission 51*, p. 5.

26 *Submission 51*, p. 6.

face of state governments exiting the field.[27] Kondinin Group Ltd (KGL) told the committee that R&D spending needs to be driven more by the end users (farmers), rather than by scientific institutions and the bureaucracy. KGL also suggested that there is too much duplication of R&D.[28]

4.24 From a global perspective, Professor Julian Cribb recommended international spending on agricultural research be quadrupled, as this could reduce defence spending necessitated by conflicts related to food shortages:

> We are currently spending about $30 billion or $32 billion a year on agricultural research. If I could contrast that, we are spending $1.3 trillion a year on weapons. Weapons presumably are intended to prevent wars, or maybe to cause them. But if we invested more in agricultural science—I am suggesting about $130 billion or $140 billion worldwide per year—we would have the capacity to prevent wars. So this is actually a form of defence spending. It is an investment that every wise country needs to make if we are to prevent the sort of population displacements and the conflicts that arise from them.[29]

Research and development proposals

4.25 The committee heard evidence proposing that increased investment be directed to R&D in specific areas, as well as some recommendations for alternative R&D structures.

4.26 To improve innovative solutions from scientific research, CSIRO suggested that the following areas require further development:

- Ensure greater co-operation and integration of the science capacity and capability of research groups in State and Commonwealth agencies and in the Universities. Such integration is essential to generate critical mass, to ensure effective use of limited resources, and to ensure problems of major significance are tackled. ...
- Integrate the flow of information between basic and production science ... The transition of information and breakthroughs along the chain from genome studies to applications in breeding is often incomplete or fractured with small groups working in isolation to one another. ...
- Achieve greater acceptance by industry of the global nature of agriculture and the need to work with other countries and multinational companies to achieve aims.[30]

---

27 *Committee Hansard*, 4 March 2009, p. 3.

28 *Committee Hansard*, 24 March 2009, p. 60.

29 Private capacity, *Committee Hansard*, 12 October 2009, p. 5.

30 *Submission 27*, pp 6-7.

4.27 CSIRO also noted that declining advances in cereal yields need to be addressed with further research:

> Over the past 10 years, annual gains in yield from cereal breeding programs have plateaued to less than a third of those seen between 1960 and 1988. There is a clear need for a transformational advance in cereal yields over and above the incremental annual increases afforded by current plant breeding technologies. Evidence is mounting that cereal yields are now becoming limited by the capacity for the plant to fix sufficient carbon during its lifecycle and translate this carbon in to harvestable grain. A major focus needs to be aimed at maximizing yield in a water-limited environment.[31]

4.28 With regard to animal production, CSIRO noted that 'technology adoption by growers is often a larger hurdle to productivity gains than is scientific discovery'. However, a focus on leading enterprises rather than the whole farmer population would be the more effective R&D approach.[32] CSIRO also identified as priorities research into more efficient fertiliser use and agronomic and genetic responses to climate change. On crop productivity, CSIRO noted:

> Studies of climate change effects on crop productivity and quality have not investigated the opportunities for plant breeding solutions, and have only superficially investigated the interactions of the multiple climatic effects with each other and with agronomy. Based on existing knowledge, there is a reasonable expectation that some of our wheat varieties will differ in their yield response to climate change conditions. However, our understanding is currently poor regarding the key morphological and physiological traits that will definitively contribute to high yield and quality under conditions of elevated CO2.[33]

4.29 A combined submission from red meat industry organisations emphasised the need for further research on livestock emissions:

> Although the current measurement and accounting standards for net greenhouse gas emissions from livestock are underdeveloped, the red meat industry acknowledges that emissions is an issue for the industry to further research. Almost all of the emissions from livestock are in the form of methane released during the digestion of feedstuff in the rumen of cattle and sheep. A key to reducing emissions is to maximise an animal's growth rate through converting as much as possible of the energy lost through methane emissions into meat – i.e. through more efficient feed conversion.[34]

---

31 *Submission 27*, p. 7.

32 *Submission 27*, p. 7.

33 *Submission 27*, p. 8.

34 *Submission 29*, p. 2.

4.30 Professor Cribb called for a more concerted research effort towards providing more efficient water use systems for irrigation farmers:

> The amount of science going into making them more water use efficient or giving them alternative enterprises is pretty small. I think we should be investing massively. It is our opportunity to be the first country in the world to solve the problem of critical water shortage in agriculture. We have that opportunity, but we will not do it without science.[35]

4.31 The Victorian Farmers Federation (VFF) warned against too much R&D funding going towards carbon reduction measures:

> We are a bit concerned at the moment that the majority of the R&D funding will end up going towards carbon mitigation programs, which we are not suggesting is unimportant but we cannot avoid adaptation. We are adapting now and we need to make sure that our capacity to adapt or the R&D that is aimed at adapting and increasing productivity is also looked at and is not forgotten in the push to reduce the carbon footprint.[36]

4.32 Murray Goulburn Cooperative commented that producers should be provided assistance to utilise and benefit from innovations on the ground once they have been developed:

> ...the government should really start to look at helping us out with and encouraging and supporting farmers to try out [new irrigation] technologies because there is an equity issue, a cash availability issue and there is the issue of confidence to go ahead with technologies. We are not going to get rapid uptake of that kind of thing with the way we stand today.
>
> ...
>
> Governments tend to underestimate the market failures when you get quite close to doing something. We have used the example of liquid natural gas. It is a proven technology. It reduces emissions and reduces cost, yet it is really struggling as a sector to get off the ground because there is no production infrastructure and no pumping and filling station infrastructure. The market for innovation can fail quite close to where the technology is going to be adopted, and that is true with some of the irrigation technologies. It is particularly so when you get into drought and get cash strapped, that can slow it down even further.[37]

4.33 Other evidence proposed altering the structural arrangements for conducting agricultural R&D in Australia, in order to obtain as much scientific innovation as possible from each dollar invested. Food Chain Intelligence proposed a central strategic organisation to co-ordinate the introduction of new technology into the

---

35 *Committee Hansard*, 12 October 2009, p. 12.

36 *Committee Hansard*, 25 March 2009, p. 11.

37 *Committee Hansard*, 25 March 2009, p. 74.

marketplace and strategic direction for public R&D.[38] Dr McGlasson recommended that agricultural R&D be consolidated in one Commonwealth department, including that currently residing in CSIRO, and co-locating research laboratories and staff on or adjacent to university campuses.[39] The Tasmanian Institute of Agricultural Research noted the benefits of its own model, a joint venture between the Tasmanian State Government and the University of Tasmania, and proposed that a similar approach be utilised nationally.[40]

Plant gene technology issues

4.34 The committee also heard strong concerns about the implication of plant gene and related biotechnology patents on the availability and cost of the base materials used for food production.

4.35 Genetically modified (GM) crops are a key aspect of the technological advances that will increase agricultural productivity by reducing the need for inputs such as fertiliser and pesticides, and increasing yield. A number of individuals wrote to the committee expressing concern about these developments, primarily about the consequences for human safety and the contamination of non-GM crops.[41]

4.36 DAFF emphasised the importance to food producers of the use of genetically modified crops:

> Biotechnology is expected to play an increasing role in helping farmers produce affordable food, while remaining competitive and viable, ensuring farm sustainability and adapting to the challenges of climate change. Biotechnology has already provided benefits in many countries around the world, including Australia, particularly through the uptake of genetically modified (GM) crops.[42]

4.37 The committee acknowledges the concerns people have about the safety of GM food and a perceived lack of consumer information that would assist people to choose foods that do not contain GM ingredients. The committee is of the view, however, that GM technology has the potential to make food more affordable and nutritious for the world's population, as we enter a time in which global food security is likely to become increasingly tenuous.

4.38 However, the committee was particularly interested in evidence provided to the inquiry concerning the patenting of plant gene and related biological technology,

---

38 *Submission 1*, p. 2.

39 *Submission 47*, p. 3.

40 *Submission 62*, p. 2.

41 See Mothers are Demystifying Genetic Engineering, *Submission 18;* Ms Madeleine Love, *Submission 32*; Mr Murray Brooker, *Submission 56*; Ms Diane Evers, *Submission 58*; Ms Bee Winfield, *Submission 59*; and Ms Linda Andrews, *Submission 116*.

42 *Submission 93*, p. 23.

and the implications this may have for future food supply and pricing. These concerns relate specifically to plant seed suppliers potentially being able to restrict competition by using the intellectual property system in ways it was never intended to be used, by patenting biological discoveries (rather than inventions) and preventing others from commercially utilising critical plant research infringing on that patent.

4.39 Professor Richard Jefferson emphasised that 'every patent must reflect an invention—a human creative step'. He indicated that patents unable to demonstrate this characteristic are not validly granted.[43]

4.40 IP Australia explained that the law is applied in the following way:

> An isolated gene sequence for which an industrial or practical use has been identified is considered an invention under the Australian patent law.
>
> ...
>
> ...if you have isolated a molecule, and you have identified a practical use, an industrial use, for that molecule, then you are entitled to claim that molecule.
>
> ...
>
> ...If all you did was isolate the molecule, then all you have is a discovery. It is the application of the molecule with a practical use that puts in into the field of invention.[44]

4.41 Professor Luigi Palombi told the committee that patent regulation in Australia is guided by a 1959 High Court decision on the ability to patent a weed control method.[45] According to IP Australia, their approach to granting patents in this field is founded on existing legislation and legal precedent.[46] Respectively, these are the *Patents Act 1990* and the Australian High Court's decision in *National Research Development Corporation v Commissioner of Patents* (1959).[47]

4.42 Professor Peter Drahos suggested that patent offices were approving patents invalidly because they had been overwhelmed with applications:

> All offices are struggling with the quality issue. The problem is that the large number of patents puts pressures on patent examiners in terms of time. Most patents at the most will get about 20 hours of attention from a patent office. That it is not very much time in which to do a careful analysis

---

43 Chief Executive Officer, Cambia; Director, Initiative for Open Innovation; and Professor of Science, Technology and Law, Queensland University of Technology, *Committee Hansard*, 30 April 2010, p. 8.

44 *Committee Hansard*, 30 April 2010, p. 25.

45 Private capacity, *Committee Hansard*, 30 April 2010, p. 17.

46 *Committee Hansard*, 30 April 2010, p. 30

47 *National Research Development Corporation v Commissioner of Patents* (1959) 102 CLR 252; *Committee Hansard*, 30 April 2010, pp 30-31.

> of the many complex patent claims contained in a patent relating to a gene sequence or a biological process.[48]

4.43 Professor Drahos added that a poor patent decision in a larger country would tend to be followed in Australia:

> Most companies do not begin patent applications in Australia. The Australian patent office is not an office of first filing. Most companies will begin a patent application in the United States, within a country in Europe or in Japan, and will then proceed to obtain other patents in other countries, usually using a process known as the patent cooperation treaty. Australia's office is a second tier office and it is a follower rather than a leader. If the patent quality work of the major offices is poor then Australia will tend to follow that poor quality.[49]

4.44 Professor Palombi provided the committee with an example of a patent granted by IP Australia where no actual invention exists, but the patent holder can control how that gene is used by others. The patent related to an environmental stress tolerance gene sequence.[50]

4.45 The Network of Concerned Farmers expressed concern that GM technology is being used as a vehicle to create a supply monopoly of plant seed:

> The drive stems from multinational corporations, such as Monsanto, manipulating control of seed supplies and food supply. The research industry is trading knowledge and germplasm in exchange for funding and alliances with multinationals, enabling corporate companies to own patents over farmers' crops.
>
> Competition is currently retained in the food supply because farmers have the choice to buy and sell from their business of choice. If plant breeders have agreements with Monsanto to add a Monsanto gene to all new varieties released, and farmers are required to purchase new seeds every year, all farmers could be locked into being a contract grower for a single supply chain. This would effectively remove all opposition, as no alternative supply chain will be able to access food. What will be the choice and price for food if controlled by a single supply chain?[51]

4.46 Similarly, Ms Frances Murrell argued that GM technology provides opportunities for market control rather than productivity benefits for farmers:

> …the credible scientific and research literature shows that genetic modification does not increase the productivity or health of crops...There are only two commercial traits:

---

48 Private capacity, *Committee Hansard*, 30 April 2010, p. 15.

49 *Committee Hansard*, 30 April 2010, p. 15.

50 *Committee Hansard*, 30 April 2010, pp 18-19.

51 *Submission 33*, p. 3.

- Herbicide resistance – the crop can be sprayed with a herbicide and not die
- Insect resistance – the crop is poisonous to certain types of insects

> Herbicide resistance can be created by non-GM breeding for example Triazine Tolerant canola is resistant to the herbicide Triazine and is a non-GM crop.
>
> Insect resistance has been created by the transfer of a gene from a soil bacterium...[52]

4.47 With regard to publicly funded research, Professor Jefferson warned against upstream researchers being driven by the incentive of recovering money for their institution:

> If intellectual property is looked at as a tool to monetise at the expense of the ability to create wealth downstream then it is doing a disservice to society. [53]

4.48 Professor Drahos advocated greater transparency for existing plant technology patents, via a register system:

> ...a country like Australia, which is an importer of technology, should create a transparency register system. Under this system, what would happen is that a regulator or a policymaker could declare a register of technology in a particular area. For example, the department of agriculture could choose a particular crop and require under law all patent owners to disclose the technology that they hold in relation to that particular plant or that particular process, so that the department of agriculture would know exactly what the position was. And there would be penalties for failing to disclose. This would be a simple and dramatic way in which to increase the transparency of the system.[54]

4.49 Professor Drahos also suggested that Australian patents should be audited by an external committee of experts to ensure patents are granted appropriately.[55]

Committee view

4.50 Innovation through research and development is a key driver of productivity growth in the agricultural sector, which is in turn absolutely critical in ensuring that agriculture remains a viable commercial pursuit in the face of declining terms of trade. It is of considerable concern to the committee that productivity growth may be affected not only by drought, which is beyond anybody's control, but by a declining commitment from governments at both state and federal level to agricultural R&D. It

---

52 Private capacity, *Submission 37*, p. 7.

53 *Committee Hansard*, 30 April 2009, p. 11.

54 *Committee Hansard*, 30 April 2009, p. 15.

55 *Committee Hansard*, 30 April 2009, pp 15-16.

is also worth noting that innovation is in fact a critical element required to maintain productivity in climatic conditions that Australian farmers have not experienced for one hundred years. The committee especially encourages greater investment in water use efficiency techniques and developing plant varieties better equipped to resist dry conditions.

Recommendation 2

4.51 The committee recommends that the Rural Industries Research and Development Corporation (RIRDC) report to the Senate on the current level of agricultural research in OECD countries as a percentage of GDP and the trend for investment over the last ten years.

4.52 The committee is also concerned about the potential for plant gene and related biotechnology patents to be misused, thus limiting the competitiveness of the market supplying base materials used for food production. It is of great concern that the evidence to this committee suggests that patents are being granted with respect to biological discoveries, rather than inventions, which is clearly contrary to the intended purpose of the intellectual property system. This issue appears to have been allowed to escape unchecked by intellectual property regulators, including those in Australia. Whether this is a function of IP Australia being unable to properly investigate the deluge of patent applications they receive, or a lack of legal clarity in this area, it is an issue that must be resolved immediately to ensure that patented biological discoveries do not prevent important technological innovation.

Recommendation 3

4.53 The committee recommends that IP Australia advise the Senate what patents, if any, have been granted over biological discoveries as opposed to inventions, with reasons for them being granted.