

# Agricultural Competitiveness Issues paper

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*Comments by*

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In this submission I will comment using the lens of “Innovation”.

## **1      Innovation**

*I want to start with a little bit of theory:*

People make innovates all the time to generate ‘solutions / partial solutions’ for their problems. They do this by applying existing technologies and social arrangements and which usually require some degree of scientific understanding to be effective. The accumulation of innovations that are effective in advancing the well-being of the population are the ‘nut and bolts’ of prosperity.

The best investment for innovation is developing ‘human capital’ especially having the entire population well (1) educated and also (2) healthy.

(1) Education needs to run to higher degree education and be open to all including poorer families. The content of education is important if it is to provide the basis for solving problem via innovation<sup>1</sup>.

(2) Physical health requires being well-nourished and mental health requires low stress levels (including a stable economic and safe environment) and a degree of empowerment. Good health contributes to the resilience needed to deal with shocks and turn them into opportunities. I will come back to these ‘best investment’ points later on.

From the first paragraph above, we can see that innovators require two ‘**ground-works**’ and a ‘**process**’.

**Ground-work No 1:** The clarity of their understanding of the problems and the veracity of this understanding is the first groundwork for the success or otherwise of their endeavour to innovate.

**Ground-work No 2:** The second groundwork depends on their access to and understanding of existing technologies, science and arrangements in society.

**The process:** This is the actions the potential innovators take to put the groundwork information together and create and test alternatives and decide which way to go at every turn. It depends on the innovators’ determination, intelligence, diligence and personal circumstances. There is often, of course, a component of luck throughout.

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<sup>1</sup> The international Commission report in 2008 may be relevant.

<http://globalmdp.org/sites/ei.civicaactions.net/files/InternationalCommissionReport.pdf>

Further comment on the 'process' is warranted because very often initial success is followed by failure in the longer term. We see this with every major technology which results in companies rising to fame and fortune on the back of a particular technology only to crash as other rising technologies (and firms) take over (one can check out the 'adaptive cycle' in resilience theory to get a good picture or even Joseph Schumpeter's term "creative destruction").

The innovation process is not always successful. There are a number of ways the process leads to failure early on. The simplest way is that the process is not rigorous enough and the 'innovators' fail to keep doing their 'ground-works': perhaps not properly understanding their problems (or new problems) within the systems that are in operation, or not keeping up with science and technology. The second way the process leads to failure is when the 'innovators' understand the 'ground-works' but then 'pull the levers' (make changes) the wrong way. (Meadows had quite a lot to say about this in systems theory).

### ***So what? What relevance has this in agricultural policy?***

Public policy can make a difference (positive or negative) on innovation in the private sector in agriculture through facilitating an understanding of both kinds of ground-works; understanding the problems within the systems (via research) and understanding the relevant science and technology (via education and research) and also in some aspects of the process.

Government perspectives of the 'ground-works' (what the problems are for government<sup>2</sup> and what science, technologies and social considerations are relevant to these government problems) ought to be different from those of farmers. The government's perspective should also differ from those of businesses and organisations involved in areas related to farmers' activities and products and 'resources' used / produced, (such as agribusinesses in the supply chains). This is because the government ought to be considering its obligations to all Australians to give them all the opportunity (i.e., Amartya Sen's capability) to become well educated and healthy throughout their lives<sup>3</sup>. Governments also have to meet its international obligations.

It is therefore quite legitimate for governments to have a different appreciation of the two 'ground-works' compared to others in society and quite legitimate for business people to push their own interests to the exclusion of others.

To be able to make public policy that creates positive outcomes for all Australians, the government itself has to be running an 'innovation process' in which the two ground-works (from its own perspective) are kept up-to-date. Public agricultural policy therefore should be focused on developing human capital that will facilitate innovation leading to an improving prosperity for Australians by (1) achieving high levels of health in throughout the Australian population by ensuring lifelong healthy diets. (2) Achieving high levels of education in the sciences and technologies relevant to agriculture, foods and nutrition. (3) Achieving high levels of maintenance of natural capital relevant to agricultural production in the long-term. (4) Achieving reliable, fair and progressive arrangement in regard to agricultural businesses. (5) Reducing the collateral damage of agriculture

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<sup>2</sup> 'Government problems' are those that the society as a whole has in the long term. So poverty, poor education, ill health, stress, environmental degradation etc. are 'emergent properties' of how the country is being run and so represent 'government problems, that governments need to address.

<sup>3</sup> It is useful to check out Nussbaum's list

and establishing a program to repair the current level of damage within a set and meaningful time frame (say 20 years).

**1 Ground-work No 1: understanding of their problems.**

Problems abound in agriculture; the ‘problems’ that the drafters of the *Issues Paper* saw can be listed (notably via the terms of reference and list of measures on pages 3 – 4 and suggested questions) although some may be thought of as ‘opportunities not to be missed’ rather than a problem that requires innovation. It is not clear whether the drafters saw these as problems from the government, farmers or agribusiness perspective.

I shall briefly run through the “scope...Box 1” and tentatively list what I think the drafters identified as ‘government problems’ since the outcome of this process will be government policies. Before setting out this table I should say that the exclusion, in the terms of reference (page 36), of not dealing with at least some aspects of “human nutritional health issues” makes it difficult to deal with food security in Australia as the Australian diet is central to food security issues here.

Table 1 Implicit Problems relevant for Innovation (Ground-work No 1: know the problems)

Scope No.	Problems implicit (I think) in this scoping statement	Explanation: why it is a problem for the governments agriculture sector
1a	<p><i>Food security in Australia</i></p> <p>Poor diet is implicated in 56% of deaths in Australia.</p> <p>About 5% of Australians are food insecure and in some groups the % is much higher (e.g. remote communities and older Australians).</p> <p>Mal-nutrition in Australia is huge and relevant to ‘obesity and diabetes epidemics’. The food security issue is relevant to most Australians as most Australians have poor quality diets. Poor diets are not just a social issue to be dealt with by social policy.</p> <p>Expanding agricultural production will not help food security in Australia, unless it leads to a dramatic fall in domestic food prices in the supermarkets. It would also have matched by diet education programs.</p> <p>Agricultural prices in Australia are set by the international prices (which are set by the wealthiest people in the world) this is likely to make a good diet increasingly unattainable to poorer Australians as income inequity increases.</p> <p>Food security in Australia has very little to do with global food insecurity.</p>	<p>This is an ethical problem of equity that impacts a majority of Australians. A health giving and lifelong diet is a ‘merit good’. The agriculture sector, as the producer of food basics has to participate effectively in supplying this merit good and agricultural policy can help them do this.</p> <p>It may become a political problem if people start to see the link between the libertarian (neo-liberal) policies of government and the inability of the poorer half of Australians to buy a ‘health giving diet’.</p> <p>Australian food security is also an economic problem as diet is central to maintaining a healthy workforce and preventing a ‘blow out’ in the health budget and disabilities insurance.</p> <p>It is also an inter-generational issue as poor diet in families leads to ill health in the adults of ill-fed families. This will give current governments a negative ‘political legacy’ of allowing poor diets to continue as the dorm during their watch.</p> <p>Poor diet (especially as people come to appreciate that they have a poor diet) breeds resentment against farmers and the food system who are seen as creaming the system at ordinary people’s expense (as opposed to the traditional view of the ‘Aussie farm battler’....that image has gone). The new view will have political consequences as the public</p>

	<p>Commercial Australian food exports do not go to the absolute poor (living on \$1.25 a day or less). Australia would do best in regard to global food security by developing truly sustainable agricultural technologies for dry climates and giving this technology to developing countries.</p>	<p>will resent the public money spent on rich farmers (and increasingly corporatized and sometimes foreign owned). (The public are well on the way to resenting the big super-market oligopoly position). Poor diet could be seen as an emergent property of the food / economic system and as such, has multiple causes and probably needs multiple solutions.</p>
1b	<p><i>More competitive agriculture sector</i></p> <p>There may be many problems underlying a lack of competitiveness that vary with different markets and different farm arrangements.</p>	<p>These are mainly private problems for individual businesses. The government should stay out of telling farmers what to do in developing good business contracts. However, improving educational opportunities in rural areas is a very good way of increasing capabilities of rural people (capabilities provide the freedom to choose). Which in the longer term will help them, help themselves, in developing better business arrangements. Opportunities for education may be delivered via regional tertiary institutions including regional universities. While they should offer agricultural science and management programs they should also offer training in other professions to ensure that young people can leave agriculture and obtain a good living in cities. The government need to get over the idea that tertiary institutions are the 'enemy' or at least a 'necessary evil' and decide that they can be involved cooperatively with government and industry to help devise new technology and implement planning programs.</p>
2a	<p><i>Returns at the farm gate</i></p> <p>There may be many problems underlying low returns that vary with different farms, regions, products and production methods etc. Low returns are a symptom of these problems. The actual problems need to be identified clearly before innovation processes can become effective. One need to undertake an economic diagnostic program. Some of these factors may call on government policy to resolve; for instance, low educational levels and poor business skills may be a factor for some.</p>	<p>Low returns may be a problem for government if governments decide that higher output of agricultural products is required in the national interest. But without a market in which the customers are wealthy, higher yields are likely to result in lower unit prices and lower profits at the farm gate (although returns at the farm gate may be higher because of the increased volume). A systems-thinking approach would seem necessary to identify the underlying issues. It would seem especially important to remember that farming families work cooperatively and that a woman is often the main business person in the farming family 'team'.</p>

	Farmers need to be weary of adopting technologies that increase the market / economic strength of other parts of the supply chain.	
2b	<p><i>Drought</i></p> <p>Drought as well as other weather events is a problem for agriculture. Weather events can also damage natural capital and landscape ecological systems and put back the stewardship efforts of farmers. Weather events can reduce farm income and damage market reputations as reliable suppliers. Agriculture needs a new national assessment to indicate regional climatic suitability for a range of agricultural pursuits.</p>	<p>Drought is a political problem. There is an expectation that government will support farmers in drought areas financially. This may allow farming in areas that should be abandoned, especially with more dry weather to come because of climate change. Heat waves may be a problem for production that is overlooked because of a focus on water (drought).</p>
3	<p><i>Access to finance etc.</i></p> <p>There can be many problems related to finance for individual farm business. Finance may be problematical if the perception risk is out of kilt with reality. The problems relate to risk bearing. Farm businesses may want lenders to be more liable for defaults and lenders may want more security for loans.</p>	<p>Finance is a political problem as traditionally farm finance corporations have provided finance at low cost. The reasons for doing this have diminished as now most farm products are exported so it is not about helping feed Australians. Foreign ownership is generally not publically acceptable and has to be hidden. Foreign government corporation buying farms have very deep pockets and hence significant financial resilience. However there may be little economic benefit (such as taxation receipts) to Australia if these businesses are run for food security reasons in the foreign country. Perhaps a land tax or increased local government rates would help Australia economically. Farmers are generally not willing to borrow overseas because of currency fluctuations especially as the Australia dollar is falling in value. They may also have problems with providing collateral. Climate change may increase the variability of farm production year on year. This may mean farmers will have to have enough money to survive more lean years then previously. The government should encourage the banking sector to tackle this problem in some creative ways.</p>
4	<i>The competitiveness of the Australian agricultural sector</i>	Competition really needs a level playing field to be effective. The various subsidies and

	<p>This is the same issues as identified in 1 and 2 above.</p> <p>This could be (1) competitiveness between farm businesses to buy from and supply the supply chains (2) competitiveness with overseas farm businesses.</p> <p>The suggestion is that farm gate prices are too high.</p> <p>Bio-fuel production should be subject to independent LCA as it will be in competition with other GHG mitigation systems.</p>	<p>concessions to agriculture and related industries need to be removed.</p> <p>Farmers are in a relatively weak position in the supply chains. Creating cartels and Unions with increased marketing power could help farmers but would tend to result in higher domestic food prices in supermarkets which may be a political problem as poorer Australian families would suffer and ill health increase.</p>
5	<p><i>Contribution of agriculture to regional sectors and communities</i></p> <p>The problems relate to economically declining rural towns and increasing rural poverty<sup>4</sup>.</p> <p>The farming community no longer has markets in regional sectors and communities and communication and productivity improvements mean that agriculture no longer seeks inputs from regional sectors and communities except for a small and declining workforce.</p> <p>Ongoing trends in globalisation and in agricultural, communication and transport technologies are making the provision of local services irrelevant for more and more aspects of agricultural business. Increasingly farms do not serve local communities. Overall, declining welfare in rural town is a declining problem for farm businesses but on ongoing social issue for government.</p> <p>Rural depopulation (in small towns) may lead to dis-investment in infrastructure important for farm businesses such as roads.</p>	<p>Declining rural economies and increasing rural poverty is a political problem especially where town population (and poverty) is increasing.</p> <p>The drive for farm profitability means the agriculture sectors is unlikely to ‘rescue’ rural communities from increasing poverty.</p> <p>Reducing wages for farm workers would encourage farmers to take on more staff.</p> <p>Improving technology that improves human productivity may help overcome labour problems.</p> <p>Rural prosperity in no longer the bailiwick of agricultural policy as the connection between farms and communities in rural regions is diminishing both economically as communications and technology improves and socially as more people leave farming.</p> <p>The people involved in agriculture are usually a small minority of people living in rural areas.</p> <p>Rural prosperity need to be based on other industries. If the government embraced climate science then the renewable energy could provide some economic stimulus.</p> <p>Although farmers are much older than the average person in the workforce this relates to the time needed to accumulate capital as well as knowledge and diverse skills needed. Perhaps the best way government has of reducing the age of farmers would be to make it difficult financially for farming families to continue in business (using taxation for example) forcing them to become corporations employing professional managers. Government should concomitantly increase the opportunities for agricultural training to compensate from the loss</p>

<sup>4</sup> One can check the work of John Martin, T. Budge and Maureen Rogers on country towns.

		of skill and 'ownership incentive' that goes with farming families.
6	<p><i>The efficiency and competitiveness of inputs to the agriculture value chain—such as skills, training, education and human capital; research and development; and critical infrastructure.</i></p> <p>There are problems related to the provision of inputs that may be greater than problems related to efficiency and competitiveness of inputs. Efficiency in the training of say 100 farm managers may have a smaller national impact than say running a MOOC course (with a low completion rate) that may reach and stimulate the interest of 10,000 people who manage farms. The lack of inputs (as opposed to the efficiency of provision) that would assist the welfare and well-being of farming families and the viability of farm businesses is a problem that is likely to continue and probably deepen as a consequence of globalisation and changing technology.</p>	<p>Skill training and education are seen as 'merit goods' in economics. Providing them in an effective way that meets social requirements is thus a political problem for government. Technology is coming to the rescue of poorer people and people on the farm by facilitating cheap or free internet based learning such as MOOC courses. But agricultural / primary industry educational institutions need Australian government support to roll this out. (Although MOOC courses run by overseas universities are available to Australians mainly free of charge; perhaps the Australian government can do deal with US universities to provide agricultural management courses for Australian farmers). Building or ensuring that critical infrastructure is built by private capital is seen by many as a government responsibility, even though paying for it becomes the responsibility of users (i.e. road taxes, tolls, freight charges, education fees, user charges etc.).</p> <p>The natural capital on which agriculture depends has been and continues to be degraded by agriculture. The problem is political in that some of the damage occurs to public assets such as river systems, estuaries, coral reefs, and adjacent lands (especially via the spread of weeds and pests). The idea that government should help farmers prevent soil / land degradation on private property has fallen away although 30 years ago government interventions were quite effective in soil conservation.</p>
7	<p><i>Effectiveness of regulation affecting the agriculture sector including the extent to which regulations promote or retard competition, investment and private sector-led growth.</i></p> <p>Regulations in themselves are not problems. Some regulations are more effective and efficient than others but it seems to be that what specific regulations might be achieving / not achieving is where the problems lie. (This is different from what the regulation might have intended to achieve). Before regulations are changed it</p>	<p>Economic problems: Neo-liberal policies should promote regulations that facilitate business such as regulations to protect the value of the dollar (against inflation) and protect the rights of contract holders and prevent corruption and so forth.</p> <p>Ethical problems: These vary from animal welfare, to environmental protection to poverty etc. They can morph into economic and political problems. In dealing with the political problems effectively means that the solutions must also deal with the underlying ethical problems. If the ethical problems cannot be clearly identified then the political solution is unlikely to be effective. It is important to appreciate that there are different ethical systems of belief.</p>

	<p>should be necessary for the government to set out the intended purpose of the regulation and describe its context. Political differences are likely to identify the ‘necessity’ of regulations differently. This implies that regulation reform is usually the implementation of a political position and cannot be dismissed a purely “unnecessary”.</p>	<p>Political problems ---an example: Animal welfare is an ethical issue such that many oppose the live export of cattle and sheep for slaughter and their slaughter in wet markets in very alarming circumstances. Live exports for slaughter are likely to increase substantially because it avoids infrastructure expenditure, retains production flexibility and avoids the effort of developing long term markets. Whether the ‘Exporter Supply Chain Assurance Scheme’ is enough to satisfy the ethical problem is unlikely. A political solution would have to take into account the ethical and economic issues and well as reputational issues for Australian agriculture.</p> <p>Loss of native biodiversity in rural areas (collateral damage of agriculture) is an ethical problem that will grow politically.</p>
8	<p><i>Opportunities for enhancing agricultural exports and new market access.</i></p> <p>The industry problem may be poor returns from current export markets. It may be useful to work with importing country consumers to find ways of increasing the dollar return to Australian producers.</p> <p>Increasing production will be accompanied by increasing externalities. While not paid for by the agricultural exporters and so not included in the calculation of profit, externalities accumulate at the expense of the Australian general public and future generations.</p>	<p>The government problem may relate to developing trade arrangements with foreign governments.</p> <p>Associated problems relate to the reduction in resilience as more marginal land is brought into production and more natural resources and natural capital is consumed.</p> <p>Increasing production dramatically will exacerbate economic externalities and exacerbate ethical problems including animal welfare, biodiversity loss, loss of natural capital and increasing inequity in society.</p>
9	<p><i>The effectiveness and economic benefits of existing incentives for investment and job creation in the agriculture sector</i></p> <p>Technologies and market trends, as well structural adjustment policies, result in employment decline in the agriculture sector and a movement of population to the cities where opportunities are greater.</p> <p>Both investment and employment are the consequences of other actions. They are ‘outcomes’ and may be viewed</p>	<p>Political problems: experience in many western countries indicates a tendency for government support to encourage the development of larger farm businesses and hence the decline of rural communities as farm land is amalgamated. Higher paying and long term jobs are most likely in ‘value adding’ activities rather than in agriculture directly.</p> <p>Governments have little capacity to encourage ‘value adding’ industries except through R, D &amp; D and the trend has been to reduce this kind of investment.</p>



	<p>as fortunate / unfortunate depending on one's point of view, rather than as problems suitable for innovation.</p> <p>Summer jobs on farms tend not to be of a 'career' nature.</p> <p>Higher paying and long term jobs are most likely to be created in 'value adding' activities rather than in agriculture directly.</p>	
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While these nine 'problems' areas listed above are comprehensive they do not directly address some issues that may very well become the source of enormous innovation for agriculture in coming decades.

## 1 Price of oil and gas

One substantial issue is the likely high level of price inflation for oil and gas and their products such as nitrogen fertilizers in the coming decades<sup>5</sup>. When prices of particular inputs increase businesses tend to seek ways of reducing their purchases in order to maintain profit levels. The central role of these fuels in both agriculture and the upstream and downstream supply chains suggest that quite dramatic changes are likely in the coming decades as businesses seek to adapt. These changes may not be 'good' for the country if they result in a dramatic decline in production, productivity and investment. On a broader front, the consequent increase in domestic food prices is likely to increase domestic food insecurity and reduce the ability of lower and middle income families to access a balanced diet. The consequent ill health within the community will negatively impact all business and increase the pressure on the government's social security payments (such as health). One would expect the life expectancy of Australians to fall (as it did in the UK under neo-liberal policies of austerity, increasing poverty and declining jobs and relative income of working people<sup>6</sup>).

Government policies are required as soon as possible to encourage the development of adaptive responses to oil and gas price rises. This could range from encouraging electrification of agriculture (and reliance on renewable supplies of electricity) to farming practices that reduce the need for nitrogen fertilizers. The lead time for new technologies is very tight given the time needed for adaptation to Australian conditions and their development and field deployment. Successful adaptation will keep the price of fuels within bounds.

Relying on the markets to set the conditions (without business adaptation) will ensure Australian agriculture will become increasingly uncompetitive when compared to agriculture in other exporting countries.

<sup>5</sup> Interestingly some optimistic commentators have recently suggested the price of oil will reach \$100 a barrel by 2050. Yet today it is already at \$114 a barrel.

<sup>6</sup> See <http://pcwww.liv.ac.uk/~alexss/thatcherism.pdf>

## 2 Climate change

Agriculture is a substantial source of CO<sub>2</sub>e and this will need to be addressed in the coming decades and new farming systems developed to reduce GHG production. The faster this is achieved the greater the likelihood of Australia benefiting from patents for the new technologies. Leaving it to someone else will mean increased costs as Australian farms as they will be buying the technology and paying royalties (i.e. catching up), or just not adapting to the need to reduce GHG and shifting the cost of overall GHG reduction to other industries in Australia. It may be that importing countries will include a GHG reduction requirement on agricultural commodities.

Climate change will also change the kinds of farming practices in different regions. In general, one would expect to see farmers moving their production to lands further south and perhaps east to compensate for higher temperatures.

Production will be more variable as a consequence of storm events, heat waves and droughts in addition to higher temperature exceeding the optimum growing temperatures for the main crops. While there may be technical adaptations possible (some adaptation like breeding to increase heat tolerance in crop plants may take too long to be useful in the coming decades) others adaptations may be possible in the administrative and marketing areas of agriculture. Government policies will be important in stimulating these changes.

Government tendency to consider the short term in policy development and the protection of existing infrastructure and large businesses is likely to be a hindrance to the kinds of adaptation and new technologies that may be needed. The government will also need to overcome the tendency to be sceptical of climate science and technology and support the kinds of development that will address the long-term problems of climate change. Climate change poses a huge and increasing problem for many existing organisations and established technologies but it also posed a huge positive opportunity for innovation. It would seem important to be clear about the problems (ground-work No 1) and not pretend that climate change is not happening.

It is important to ensure that all government sponsored or accepted climate change adaptations and mitigation programs are scientifically sound. For example there is doubt that using wheat / corn for bio-fuel production is actually reducing the overall production of CO<sub>2</sub>.

## 3 Other Environmental Problems

### 3-1 Soil and water:

Agriculture in Australia has been degrading the resources on which it depends, notably soil and water. Both these require concerted government action. Government should establish an interactive website (sites) that set out research findings on soil and water management using farmer friendly language to encourage serious farmer interest and participation. The interaction could be undertaken by universities for a fee.

### 3.2 Biodiversity

Agriculture is also responsible for a substantial change in habitat and for other pressures on native biodiversity. Much of the native plants are adapted to dry condition and represent a genetic resource for the future. Some work has been done by CSIRO on native plants with agricultural potential (e.g. Dr Maarten Ryder) but much more is required.

Many farming families want to maintain native vegetation and spend considerable time and money trying to do so. To build on these efforts the government should develop a process of getting agricultural scientists and management expert to work with ecologists and farm representatives on landscape scales to address specific environmental / biodiversity issues that are relevant to farming and land management in those landscapes. These arrangements should not be given to CMAs.

#### 4 Equity

Agriculture exists within the broader social system in Australia and as such is impacted by and has an impact on Australian society at large. Most of Australian agricultural production is sold overseas and so the prices and opportunities for selling are independent of Australian demand. The international prices set the prices for agricultural commodities within Australia. Increasing overseas demand from middle and upper socio-economic classes will probably continue to outstrip local domestic effective demand (ability to pay). This will lead to a further decline in the Australian diet as people seek cheaper ways to eat. Increasing inequity in Australia has the tendency to reduce the effective demand for day to day products such as food. Gradually, the pressure for lower (relative) food prices will filter through to lower (relative) farm gate prices for those farmers who sell on the domestic market, thus reducing supply. In the longer-term, policies that maintain the spending power of local consumers in Australian cities will facilitate a healthy domestic agricultural industry.

Innovation requires the attention and participation of all capable people, ideally all people in Australia. In some countries, women are not allowed to participate in jobs and this is recognised as a loss of resources for economic development. Similarly, inequity in society reduced the pool of capable people as poorer people are less likely to reach high level of education and more responsible positions in society (they lack opportunities and they also tend to lack encouragement given the low educational attainment of family members). Policies that facilitate the education of all Australians (i.e. financially support poorer people and do not load them with debt) will pay off in terms of innovation and the contribution to the overall economy. Since this issues paper is about Agriculture it may be appropriate to place an emphasis on agricultural science and management training. However, rural people are much below par when it comes to general education (e.g. high school) so a big effort is needed right through the system.

Supporting agriculture for the domestic market will not only improve welfare of city living Australians but will provide a bolster to farmers who grow products for the domestic as well as for export. The skills and knowledge developed through innovations for local supply will tend to encourage an increase in value adding and this will provide examples to exporters on how to go about value adding to export agricultural products. Given that climate change and resource constraints may well reduce the consistency or even total volume of agricultural exports, value adding may be a useful way of increasing revenue and local jobs in the Australian agricultural sector.

Applying this knowledge (how to value add) to increase revenues may be useful even if the proposed development of Northern Australia goes ahead and Australia is able to double exports. Increased revenue per ton of commodity may be needed to pay for the trillion dollars needed for capital expenditure to support Northern Australia agricultural development.

Increasing the quality domestic food supplies to improve the Australian diet and to cater for population increase is likely to be a challenge not only for innovation in agricultural systems but also

in the supply chains. This includes the supply of agricultural land around cities and water resources for irrigation crops (such as vegetables).

Greater political interest in rural communities should also include a greater emphasis on human capital development. I have mentioned education but health (mental and physical) is also important. Rural policies (including agricultural policies) should include an objective of increasing health and life expectancy of people living in rural areas to the match city dwellers life expectancy.

### **Conclusion**

Innovation is an absolute necessity. It requires a comprehensive process that identifies accurately problems within the systems that are operating (ground-work No 1) and identifies accurately the relevant sciences, technologies and social situation (ground-work No 2).

The innovation process requires the collaboration of many different people and organisations including governments in networks capable of transferring both information and money.

Although the Issues Paper has identified 9 areas or problems, the paper has not identifies clearly looming problems of likely oil and gas price rises and climate change. Nor has the paper set the agricultural problems into the systems context of poverty, national diet, declining resource bases, and collateral damage to biodiversity.

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