FARMING IN THE 'NEW ECONOMY'
AN AUSTRALIAN PERSPECTIVE

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ABSTRACT

Barriers to trade between countries have reduced through the general Agreement on Tariffs and Trade (GATT) and the World Trade Organisation (WTO). The nature of trade between businesses is also changing dramatically through developments in Information Technology but also due to adoption of quality assurance and new approaches to supply chain management. The impacts of this 'New Economy' vary around the world. This paper considers the implications of these developments for Australian farmers. Whilst these changes can be regarded as generally advantageous to Australian farmers, they may be disadvantaged in some areas because of the relatively small size of the Australian farming sector, its geographical dispersion, the advent of a range of new technologies and the structure of agribusinesses. The potential changes to the nature of farming and farm management skills are discussed.

INTRODUCTION

Australia is a large country measuring roughly 5000 km by 3000 km. The majority of the population of 20 million is concentrated into cities close to the coasts of the Pacific, Indian and Southern Oceans. Population density in rural areas is extremely low. Agricultural production is widely dispersed, and much of Central and Northern Australia are extensive pastoral ranches or desert.

Although agricultural productivity is not as high as in most of Europe and North America, the area devoted to production is high relative to the domestic population. As a consequence Australia is a significant exporter of many agricultural products. Traditional main products of the Australian agricultural sector have been wheat, wool and meat (principally sheep meat and beef). Minor and growing exports sectors have included cotton, wine, oilseeds and pulses, and horticultural and dairy products.

Australia is an importer of a number of agricultural inputs, including machinery and agrochemicals.

Although man has had an impact on the Australian landscape for thousands of years, most of this impact has been delicate and in harmony with the resulting ecosystem. Widespread use of Western agricultural practices has been for less than 150 years and, in many areas, land has only been cultivated for a generation. The impact on the environment has therefore been dramatic and frequently deleterious.

Australian agriculture is therefore relatively young, export-focused and geographically dispersed. Changes in international trade and communications – the new economy - will therefore have a different effect on agriculture compared to other parts of the world.

In this paper we consider the impact of reductions in barriers to business across boundaries. These boundaries include international boundaries as well as boundaries between individual businesses. International treaties have reduced some of these boundaries and some have been reduced by information technology. We also consider the implications of new technologies in the operation of farm businesses.

TRADE BARRIERS

World Trade Organisation (WTO)

Reductions in barriers to trade and levels of agricultural subsidies across many parts of the globe have occurred as a result of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) and the WTO treaty. These changes are vitally important to the Australian agricultural sector. As mentioned in the introduction, Australia is a major exporter of many agricultural products. These are largely produced without subsidies, export incentives or significant government support. Increasing trade liberalisation and reductions in agricultural support in Europe and the United States have resulted in greater access to international markets and, probably of equal importance, fairer competition. Australian exporters are becoming increasingly sophisticated in targeting their markets. The Australian government has demonstrated a willingness to defend market access, the most recent example being the attempts by the US government to restrict the importation of Australian lamb.

Trade liberalisation has had some effect on Australian imports. Tariffs on imports of machinery, agro-chemicals and fertilisers have been reduced, giving Australian farmers access to cheaper inputs.

Intellectual property

A framework of rules on minimum standards for the protection of intellectual property rights came into effect in 1995 through the WTO Trade-Related Aspects of Intellectual Property (TRIPS) Agreement. Increased trade liberalisation and protection of intellectual property rights provide opportunities for some companies to increase their spheres of operation. This is particularly recognised with regard to biotechnology.

Phyto-sanitary barriers

The majority of Australian agricultural products have a reputation for being clean and green. Australia enjoys disease-free status in a number of sectors and stringent quarantine procedures are enforced to keep diseases, pests and weeds from being introduced into Australia. These quarantine restrictions will continue to be vigorously maintained as the absence of introduced diseases has several benefits. Low disease and pest incidence usually leads to higher productivity and less cost of crop protection and remedies. The final crop and animal products inevitably have much lower residue levels than products produced where these problems are encountered. The absence of certain diseases and pests has been greatly beneficial to Australian entry into a range of markets in recent years. The most notable examples are probably in the meat sector following outbreaks of swine fever and foot and mouth disease in different parts of the world.

Whilst these quarantine restrictions protect some industries from importation of diseases and pests, they may also result in protection from international competition on domestic markets. In some sectors this lack of competition has resulted in lower performance and poor quality and product development. In a few instances the inability to import new germplasm has probably slowed down rates of genetic progress. Some parts of the livestock sector believe that quarantine restrictions on grain imports severely disadvantage them, as they do not have access to a range of cheaper exports from North America and Europe or by-products from around the world.

It should be noted that quarantine regulations do not only restrict imports into Australia, they have an impact on movement of agricultural products between states within Australia.

Quality assurance

Improvements in export performance can be partly attributed to reductions in trade barriers. It is also likely that developments in supply chain management also play a key part. Most sectors of Australian agriculture, horticulture and viticulture are in the process of introducing a range of Quality Assurance schemes (Fabiansson and Cunningham, 2000). The requirements of the schemes vary from commodity to commodity and can even vary within a commodity. The levels of uptake vary considerably depending on a range of factors. In many sectors there is a degree of scepticism. Benefit-cost ratios have rarely been calculated and are usually unfavourable at the farm level.

Regulatory harmonisation

One of the main concerns about increases in trade liberalisation and globalisation is that multinational companies will search the world to source inputs and processing capacity from areas with less costly environmental, labour and animal welfare regulations. It is likely that once trade barriers are reduced harmonisation of these other areas will follow. Harmonisation is necessary to ensure fair competition and equity, and this has certainly been a major driving force behind harmonisation in the European Union. Australian agriculture is unlikely to be adversely affected by harmonisation of workers' conditions. However closer scrutiny of our environmental and animal welfare performance may result in changes in production techniques and increased costs. Salinity is recognised as a major problem in Australian agriculture that is already beginning to be addressed. Animal welfare, particularly on large-scale, extensive and remote properties is likely to also need some attention.

GLOBALISATION

The term globalisation has been interpreted a number of ways over the past ten years but here we refer to the internationalisation of agri-food industries. It is worth noting

that globalisation of the agri-food industry is not a new concept, but one that has been a feature of the sector since well before Marco Polo bought spices back to Europe from the East. However, international trade of agricultural products and commodities today is far more extensive than ever before. Three factors have contributed significantly to this development. First, there have been substantial reductions in a range of institutional barriers to trade between countries and trading blocks. Second, the speed and quality of information flows between trading parties have been greatly enhanced by rapid advances in information technology and adoption of new business practices such as quality assurance. Third, improvements in logistics and food technology have resulted in speedier and more efficient distribution of products with longer shelf lives. International trade is no longer limited to dry, frozen or canned products transported by sea. Today chilled and specially packaged products can be airfreighted practically anywhere in the world within 24 hours of harvest. These developments mean that supply and demand can now be met globally as well as locally. One of the other consequences of these developments is an increasing concentration in all sections of the agribusiness chain

What are the implications of these globalisation pressures on Australian farmers? Globalisation has and will inevitably lead to fewer, larger and more sophisticated farm input suppliers, finance and other service sector organisations, primary processors and manufacturers, retailers and food service firms. But it has also led to significant changes in landuse and the way in which business is transacted. On the whole Australian farmers have been impacted in much the same way as other farmers in the industrialised world. Some examples of those changes and the reaction of the agribusiness sector as a whole include:

- There are now fewer farmers producing ever-higher proportions of the output. Recent ABARE statistics (see Table 1 below) show that nearly half the gross agricultural production is coming from farms classed as large or very large family farms, or to a lesser extent from non-family farms (ABARE 2002a).

- The number of establishments in Australia has increased by 5% (from 111,356 to 116,873[1]) in the period 1992-2000 (Table 2). A further change has been the growing polarisation of farmers into those who are lifestyle oriented versus those who have a clear commercial focus and are targeting international rather than local markets.

Table 1: Share of gross receipts by farm category.

Category	Annual Gross Receipts	Percentage of Total Farms	Percentage of Gross Production
Small family farms	< A$200k	65%	25%
Medium-sized family farms	A$200k – A$400k	29%	25%
Large family farms	A$400k – A$1m	11%	29%
Very large family farms	>A$1m	2%	17%
Non-family owned farms		1%	<5%

Source: Australian 16/03/2002

- The changes being wrought by globalisation are not all negative. A recent study by Chudleigh (1999) found that although the number of full-time farmers had fallen since the mid-1980s, there had been an additional 30,000 jobs created in the agriculture and agribusiness sector in the three years to June 1998. These positions ranged from skilled and semi-skilled positions in the viticulture and horticulture industries and management positions in larger farming enterprises, through to skilled positions in technical and marketing areas.

- Competitiveness in the supply of farm inputs has reduced because of significant restructuring (aggregation) in the farm input and service sector. A recent report (Salomon Smith Barney, 2000) has suggested that the financial returns from the sector were unacceptably low at 8% return on assets (earnings before interest and tac/total assets) and that the sector would need to raise this to 15% via the removal of A$7.2b in costs or A$48b in assets. They also pointed out that rationalisation of

[1] Establishments undertaking agricultural activity with an estimated value of agricultural operations greater than A$22,500.

the sector through vertical and horizontal consolidation plus the impact of E-commerce could deliver 20% of the savings needed. This restructuring has occurred with the takeover of IAMA by Wesfarmers/Dalgety and the demise of many smaller operators.

Table 2: Number of establishments with agricultural activity >A$22,500pa.

	1993	1995	2000	Change 1993-2000
Plant nurseries	1487	1655	2156	+45%
Cut flowers & flower seed	670	700	965	+44%
Vegetables	4396	4164	4557	+4%
Grape	3335	3690	5924	+78%
Pip fruit	1271	1187	1145	-10%
Stone fruit	1005	1037	993	-1%
Grain	10927	10140	15578	+43%
Grain & livestock	18281	17216	17492	-4%
Sheep & beef	9080	10351	8014	-12%
Sheep	15031	12635	10853	-28%
Beef	16484	20470	19582	+19%
Dairy	13502	13870	13566	-
Poultry	1275	1202	1299	+2%
Pigs	1496	1400	1040	-30%
Other animals	2071	2690	2057	-
Sugar	4863	5025	4909	+1%
Cotton	816	821	974	+19%
Other crop	1192	2263	1289	+8%
Total	111356	114536	116873	+5%

Source: ABS (1994, 1996, 2001)

- De-mutualisation of many long-standing farmer cooperatives as they too build structures which can compete head-on with international competition. The major example here has been the restructuring that has occurred at the Australian Wheat Board in anticipation of the removal of the single desk for grains. The move to

develop business and marketing structures that can not only compete locally but also globally has recently seen the merger of the Grain Pool of Western Australia (a State corporatised entity holding a single desk right over non-prescribed grains such as barley and pulses) with the Cooperative Bulk Handling cooperative who handle all grains in Western Australia.

- Changing focus of land-use. Table 2 shows the number of establishments by production sector for 1993, 1995 and 2000. It is clear from this data that there have been significant changes in production focus over the seven years. The major increase in numbers has occurred in the wine industry[2] where the number of establishments has grown by 78%. This has led to a rapid expansion in the production from the viticulture industry in Australia, which has risen from 798 kilotonnes in 1996-97 to 1,395 kilotonnes in 2001-02 ABARE (2001). What is remarkable about this development has been the way in which the industry has planned for its growth; shown ingenuity in its processing side; and has had a sound business and export-oriented marketing strategy. This has meant that Australian wines now outsell French wines in the UK market. The viticulture industry has also managed, unlike the traditional livestock and cropping sectors, to attract considerable amounts on non-rural capital as it has expanded. This has not only helped drive the capital development but has also meant that new management skills have been brought into rural industries.

- The success of new market development has not been the sole preserve of the so-called "new industries" such as viticulture, aquaculture and horticulture, but has also been observed in the traditional grains and livestock industries. This has been based on sound market analysis matched with well-resourced local breeding programs. In the 1980's significant noodle wheat and lupin industries have been developed in Western Australia. These industries have developed as a result of a partnership between farmers, marketeers and the state Departments of Agriculture; the latter having supported the industries with market information but more importantly with a well-supported plant breeding program. It is also worth noting that the Prime Minister has established a group – Supermarkets to Asia – which reports directly to

him to advise him on how Australia can develop new markets for its food, fibre and beverage industries (http//www.supermarkettoasia.com.au).

NEW TECHNOLOGIES

Information Technology

Recent data (ABS, 2000) show that in June 2000, 58% of Australian farms used a computer which was an increase of 48% on usage recorded two years earlier in March 1998. Similar spectacular growth has occurred in the number of farms using the Internet, which has risen from 11% in March 1998 to 34% in June 2000 with an approximate doubling in the period 1999 to 2000. These figures are comparable to the same statistics collected in urban areas but slightly lower than micro-business usage. It is also worth noting that there was a strong relationship between farm size (measured by value of agricultural production) and adoption of IT with larger farms showing greater usage.

How are Australian farmers using information technology? The major uses still revolve around the more traditional business functions such as record keeping and accounting but increasingly linked to Internet for banking and bill paying. However, an increasing number of farmers are using the Internet to gather information about markets and inputs. The use of the Internet for business-to-business transactions has been limited at this stage at the farm level but at the post-farm gate level there have been significant developments. Most notable is the changes that have occurred in the wool industry. The process of selling wool has remained unchanged for upwards of 150 years with the majority of wool sold in traditional auctions. This system has now been revolutionised with the introduction of Eclipse by the Australian Wool Exchange, which now sees more than one third of the Australian clip sold on-line. Further developments in the wool supply chain have seen Australian wool growers involved with a pilot project involving European spinners which is exploring the potential savings from the use of electronic transponders that record the relevant characteristics of the wool (DFAT, 2001).

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[2] Growth has also occurred in the traditional agriculture sector such as grains but this has been at the

There is also no doubt that advances in information technology have opened new markets for Australian rural businesses. Mick's Whips is an interesting case study on how the information technology revolution is opening up new markets and opportunities for entrepreneurs in regional Australia (DFAT 2001). Michael Denigan has been producing, and selling on-line, high quality hand-made whips from an isolated property 80 kms south of Darwin since 1996. While there is nothing remarkable in this statement, what makes it different is that it was 1999 before the Denigan property was connected to power, telephone and water. The Mick's Whips Internet site is hosted by an Internet service provider in Darwin, who initially relayed orders via a mobile phone, which was connected to a car battery. The provision of power and telephone has helped Mick's Whips improve their business efficiency leading to a tripling of the workforce and opening of new markets[3].

Despite these changes there are still some major underlying issues that need to be addressed before our rural communities can truly become fully integrated into the Internet age. The major issues relate to poor access to telecommunications infrastructure in the majority of our rural areas and the low levels of IT training and awareness of the benefits of E-commerce. These issues are currently being addressed through targeted funding from the Federal Government through programs such as Networking the Nation (see http://www.dca.gov.au/ntn/) which has taken funds from the privatisation of Telstra and used them to develop infrastructure, new portals and provide training for rural communities and businesses.

The other major area of development with Information Technology is in precision farming. Much of Australian broad-acre framing is on relatively heterogeneous soils and landscapes and is generally low-yielding and extensive when compared to European and American crop production. The potential economies of precision farming have probably been lower in this context than in Europe and the US. However reductions in the cost of the technology (some equipment is now standard on new machinery, rather than an optional extra) and the development of applications more suited to our environment are prompting a greater interest in the possibilities. Government and grower funding for

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expense of sheep farming which has suffered poor returns especially from wool.

[3] It is worth noting that significant numbers of whips are sold into metropolitan areas of Europe and the US! The Mick's Whips web-site can be found at http://www.mickswhips.com.au

research in this area have greatly increased in the last year or two. Remote sensing and remote control are particularly suited to extensive systems. Variable rate technologies offer the prospects of 'trials-on-the-run' that are essential for calibration of crop growth models which can form the engine of decision support systems.

These technologies offer the potential for more accurate and economical application of inputs, reduced environmental impacts and improved management of quality and chemical residues. There is still much to be done, and the role of the farmer as a decision-maker and the skills that will be required may change significantly.

Biotechnology

The release of genetically modified (GM) crops in Australia has had a mixed response. The introduction of GM cotton in 1996 occurred with only minor problems, which related to the cost of seed for Australian farmers being higher (A$210 cf A$155 in 1997/98) than that for US farmers. With the advent of the controversy surrounding the widespread introduction of GM crops in the US and EU there has been a need for the Australian industry to develop a response suitable for Australia. There is no doubt that GM crops will affect the Australian grains industry irrespective of any Australian decision to adopt them (ABARE, 2002b) but what should that reaction be? The initial reaction has been to adopt the precautionary principle and ensure that any commercial release of GM food crops will account for not only the agronomic and environmental factors, but also the market-based factors such as access and price. Of interest is that the major reaction against GM crop introduction has come, not from consumers, but from farmers who have expressed concerns about the impacts of their introduction on hard fought for markets. A ground swell of concern at local levels manifest itself in bans by local Shire councils on the growing of GM crops in their districts. The aggregate effect of these bans meant that State Governments were forced to implement bans on commercial introduction.

Australian agribusiness has also been slow to become involved with GM crop development for two reasons. The first is that high costs of entry have tended to exclude the smaller research and development budgets held by the state departments of

agriculture and our local input businesses[4], although the farmer-based Grains Research and Development Corporation (GRDC) has initiated partnerships with major international players. Secondly, the strong (but perhaps misguided) belief by many in the industry that consumer resistance will continue and as a result, non-GM commodities will receive a price premium. While GM commodity markets are still in a price discovery phase this may be a valid response but one fraught with uncertainty.

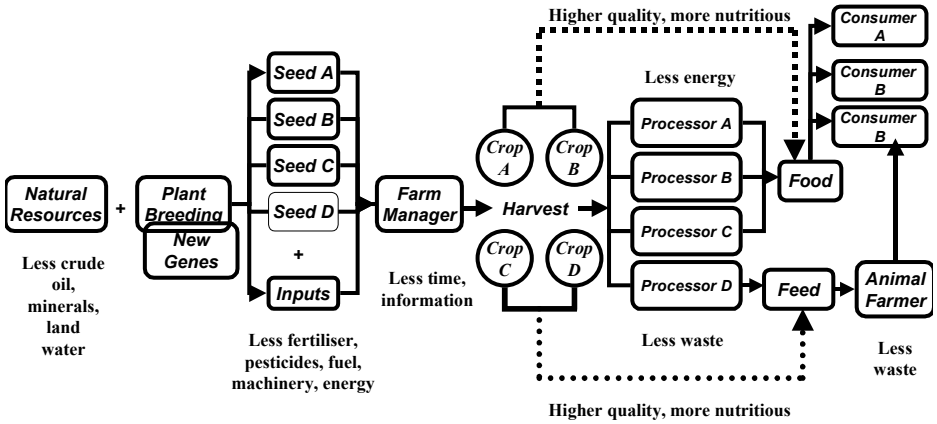
A recent ABARE report has concluded that if premiums for non-GM grains do not develop then GM grain crops will dominate world production (ABARE, 2002b). Should premiums develop then there will be a need to develop secure segregation systems to ensure GM grains do not mix with non-GM grains. The Federal Government allocated A$3.65 million over four years in the 2000-1 Budget to develop effective segregation and traceability procedures as a step to ensure the Australian industry is at the forefront of developments in this crucial area. A major announcement is expected in July 2002. Irrespective of adoption of GM crops, the development of segregation and traceability procedures are necessary to comply with quality and supply chain requirements.

In the scenario that consumer resistance to GM crops dissipates, then Australian agriculture faces a further looming issue. This is that the majority of the intellectual property rights associated with this new technology reside in the private sector and in the US and, to a lesser extent, the European Union. As noted above the Australian agribusiness sector has been slow to move in developing an international capability and/or partnerships with the major international intellectual property right holders. If the scenario developed by Monsanto in their 1997 Annual Report (see Figure 1) eventuates the impact will be a shift in power further away from farmers (and not to consumers as is the case at present). This will mean that for the first time in history the power in the grain supply chain will be wielded by farm input suppliers. The flow-on effect is likely to be a highly specialised and fragmented grain sector controlled by those

[4] Perhaps in realisation of this problem a new joint venture – the National Wheat Breeding Program – has been formed to bring together the intellectual property, plant breeding technologies and the germplasm in the Departments of Agriculture in three states (Western Australia, New South Wales and Queensland) with the resources of the farmer-based Grains Research and Development Corporation. Source: Countryman, (2002).

holding the intellectual property. The Australian grains industry could develop in a way not dissimilar to the highly vertically integrated poultry industries we see today.

Figure 1: The de-commoditised farming system (Monsanto, 1997).



WILL WE NEED FARMERS IN THE 'NEW ECONOMY'?

Two major themes emerging from both discussions may cause one to stop and asked the question - will we need farmers in future? Developments in information technology will continue to produce sophisticated decision support systems. Increased use of remote and digitised data collection and the application of expert systems could mean that much of the day-to-day decision-making farmers are involved in will be done by computers. Increased computerisation of mechanical processes and monitoring machinery will significantly change the skills required by farmers to operate and maintain machinery. Superimposed on this reduction of intellectual input by farmers will be the potentially prescriptive practices imposed by large multinational biotechnology companies who will control not only the production processes but also the input and output marketing. In this scenario, we question whether the farmer will be actually managing the farm or will they merely be performing the functions of a contractor. Certainly the skills and functions of farmers in this scenario will be significantly different. One might even ask where will be the satisfaction that motivates many farmers, and will there be any fun left in farming?

Following a recent conference where these issues were discussed, one of the authors returned to his farm mildly depressed at the potentially soulless future of farming. Whilst handling some cattle that evening he realised that no machine would be able to gauge the temperament of an animal by the look in its eye. Similarly the development of machines to handle the incredible heterogeneity of soils and landscapes is still a long way off. On reflection, it appears that where there is homogeneity of environment and biological populations, there is scope for more industrial and prescriptive processes. Where there is heterogeneous environment, biological populations and staff there is likely to be a need for more human skills and intuition for a long time.

Whilst there appears to be increasing economic pressures towards concentration of businesses and a reduction in borders between countries, there is a backlash. Increased standardisation of agricultural products and a concentration of retailing into a small number of multi-national retailers would appear to have sparked an increase in awareness of regional and ethnic identities. Whilst many corner shops have disappeared in the wake of the super- and mega-markets, there is an increasing interest in speciality, local and gourmet food outlets.

Thus whilst the 'new economy' pushes us towards concentration and standardisation, nature and individual humans appear to conspire to say '*Vive la difference!'* This may give us hope, if that is what we want, that the skills and values of traditional farmers will be required for some time yet, though the range of skills needed will continue to change.

Paradoxically producers and consumers who want or need to operate outside the highly concentrated global supply chains will require a means of communicating and trading with one another. Reductions in institutional trade barriers that allow corporate concentration and globalisation will also allow more transparent one-to-one trade. Information technology will provide cheap, efficient and comprehensive system for communication and business transactions. Thus the final irony is that the 'new economy' that may appear to threaten individuality and choice also provides their salvation.

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