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What will Australian farms look like in 2020

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Introduction

Forecasting the future is something that humans have been trying to do ever since writing and speech were invented, and although the tools used for forecasting have become more sophisticated, there is not a great deal of evidence to suggest that forecasting accuracy has improved greatly. Dr. Brian Fisher, formerly Executive Director of ABARE, and in that role responsible for many forecasts about the future of agriculture, explained in a recent speech (Fisher, 2008) that the reason that forecasts are inevitably wrong is that forecasters can take into account all the known factors that may influence future events, but cannot anticipate the unexpected events. Yet it is these unexpected events that inevitably have a major influence on the future. The 1987 stock-market crash, the Asian financial crisis of the 1990s, the 2001 attacks on the World Trade Centre, and the current sub-prime mortgage crisis in the USA were not predicted, yet are major factors in changing the direction and trajectory of national and international economic growth, and with it the future of Australian farms.

For that reason, attempting to predict what Australian farms might look like in 2020 is an exercise that is fraught with difficulty. Projections of the future can really only be an extrapolation of current trends and cannot incorporate the 'unknown unknowns' that will inevitably result in change in the sector.

That qualification noted, there are a number of significant factors that are likely to continue to drive change in agriculture. These include global agricultural demand and supply trends, the emergence of developing nation agricultural exporters, changing global energy systems, and agricultural productivity and technological trends. All these factors will undoubtedly have an influence on what Australian farms will look like in 2020.

Global agricultural supply and demand trends.

For those who have been involved in agriculture in Australia during the period since the second world war, a seemingly inexorable trend has been that the real unit value of agricultural commodities declines over time. This has certainly been the case in Australia for the period from 1960 to 2000, even though there were upward trends in the prices of specific agricultural commodities for parts of that period. However, since the year 2000 many forecasters and commentators have noticed a change in this long-term trend, with agricultural commodity prices, especially for globally-traded commodities, generally trending upwards since that time. There are a number of factors that have been identified as contributing to this turnaround, and many commentators expect that those factors will continue to have an upward influence on agricultural commodity prices for much of the next decade.

First and foremost in contributing to this trend is the growing wealth of consumers in developing nations, and the resultant dietary changes that occur as wealth increases. As per capita income increases above $US 5,000, changes start to occur in the types of food that are eaten. Consumers change away from a carbohydrate-dominated diet, to one that includes a greater proportion of animal protein – including fish and dairy products – and also fruit and vegetables.

Some research indicates that this trend becomes more pronounced as per capita income exceeds $US 10,000 per annum and consumers start to purchase refrigerators that enable animal protein products to be safely stored in the home (Senauer and Goetz, 2003). Highlighting this trend, available data for China reveals that over the period since 1990, per capita daily intake of animal protein has almost doubled, while per capita daily carbohydrate intake has reduced by approximately 20% (FAO, 2008). The reason that this change has a significant impact on global demand for agricultural commodities is that the production of a kilogram of animal protein requires between 1.5 (poultry) and 7 (beef) kilograms of animal feed – principally grain. An increase in per-capita animal protein consumption therefore has a multiplier effect on demand for feed grains, and the substitutability of different grains means that this added demand impacts on grain prices more generally.

A number of other factors have also contributed to increased demand for agricultural commodities over the past year. These include reduced grain production due to adverse seasonal conditions (Europe, Australia, Canada), the fact that international governments no longer hold large stockpiles of grain; urbanisation resulting in a loss of available agricultural land in some nations – particularly China, and biofuel policies in both the USA and Europe which, although not accounting for large volumes of grain, have accounted for a large proportion of the extra demand for grain over the past one to two years.

These factors in combination are thought to have resulted in the extreme spike in global grain prices over the past twelve months. This, in turn, has had a flow-on impact more generally across agricultural commodity markets due to substitution between commodities, and the reliance of industries such as poultry, pork, aquaculture, beef and to a lesser degree sheepmeats on grain as an input.

Global agricultural forecasting agencies such as the Food and Agriculture Organisation of the United Nations (FAO), the World Bank and the European Union (EU) have all proposed that while the current historically high global agricultural commodity prices are unlikely to be sustained, demand conditions and limitations on the ability of global agricultural systems to expand production quickly mean that future agricultural commodity prices are likely to be higher than long-term averages for much of the coming decade. (OECD-FAO, 2008)

Developing nation agricultural exporters

While demand for agricultural commodities by consumers in developing nations has been an important part of the current strong demand conditions for globally-traded agricultural products, it should not be overlooked that by far the largest share of growth in global agricultural output over the past few decades (on either an aggregate or a per capita basis) has been in developing nations which have emerged as major agricultural exporters.

Amongst the nations that have been significant in this regard are Brazil, Argentina, Chile, South Africa, China, India, a number of south-east Asian nations, and the nations of the former Soviet Union. These have all become significant producers of a range of agricultural commodities, with Brazil, for example, now one of the world's top three producers of sugar, beef, chicken meat, soybeans, maize, oranges, coffee and bananas. Just as surprising is the fact that China is now the world's largest producer of almost forty different agricultural commodities, including many different fruit and vegetable products, as well as rice and wheat. India is one of the world's largest producers of dairy products, and has become a significant exporter of a range of different vegetables and nuts, as well as live animals.

The size of human populations in many of these countries means that supplying domestic markets is generally a first priority, however at the same time the sheer scale of production means that even a small surplus available for export can have a very significant impact on global markets.

China's accession to the WTO in 2000 seems to have resulted in a major change in agricultural trade patterns for that nation. Prior to 2000, China was generally close to self-sufficient, with agricultural exports and agricultural imports being approximately equal. Since that time, China has become a net agricultural importer, although disaggregated trade date show that China has become a significant net exporter of fruit and vegetables, and an even more significant net importer of stockfeeds and grain, and in particular soy beans from Brazil. The soybeans are for human consumption (soy oil) but also used as stockfeed for China's rapidly expanding pork and poultry industries.

Most of the emerging developing nation agricultural exporters have important impediments that to some extent limit their agricultural growth. These include lack of transport infrastructure (Brazil), economic and policy instability (Argentina), large populations of poor and generally minimally-educated farmers (China and India), and weak government and institutional structures (nations of the former Soviet Union). However, the recent spike in agricultural commodity prices and the resultant large increases projected in global grain production have highlighted the latent agricultural potential of these nations, and the potential of that production capacity to act as a buffer to long-term increases in real agricultural commodity prices.

A key point in relation to the agricultural sectors of virtually all these nations is that their costs of production are generally much lower than those experienced by Australian farmers, and the relative disadvantage of Australian farmers is likely to increase further as climate change policies are introduced in advance of any multilateral policies.

Global energy systems

The changing nature of global energy systems will be a significant factor that will contribute to changes in the Australian farm sector over the next two decades. Much of the agricultural development that has occurred over the last half century has essentially occurred as a consequence of the ready availability of fossil fuels, and the subsequent advances in mechanisation and chemical technology that the availability of cheap fuel has made possible.

Australian cropping systems in particular have been heavily reliant on fuel and energy inputs – either in the form of fuel for tractors, or indirectly through the fuel and energy used in the production of farm chemicals and fertilisers – and in particular nitrogen fertilisers.

Advances in tillage and agronomy have enabled Australian crop producers to reduce their reliance on fuel inputs, although ABARE statistics highlight that at present, somewhere between 40 and 50% of the average total cost of farm inputs for specialist crop producers is either energy, or energy-dependent farm inputs.

While recent developments in energy markets have resulted in a decline in oil prices, there is reason to believe that this should be regarded as a temporary lull in the longer-term upward trend in fossil fuel and energy prices, as global oil stocks decline. The imminent introduction of an emissions trading scheme in both Australia and New Zealand will add a further premium to fuel and electricity prices, and also indirectly increase the price of other forms of energy such as gas.

A critical question for agriculture will be the nature and cost of future energy supplies. Biodiesel and grain ethanol industries are already well established in Europe and North America, and although their total use of grains and oilseeds is small relative to global production, the extra demand created is considered by many to have been significant in 'unbalancing' grain markets and driving up global grain and oilseed prices over recent years. While this potentially points to a further strengthening of demand in global grain and oilseed markets, it is already evident that governments are having second thoughts about expanding grain and oilseed biofuel production, if it results in additional increases in food prices.

Much hope is held for so-called second-generation biofuels which use plant wastes or biomass as a feedstock. Any large scale development of an energy industry based on this technology would have implications for agriculture. It could result in increased competition for agricultural land, new markets for farmers engaged in biomass production, and may also result in a need for changed agronomic practices if, for example, crop wastes became valuable as a feedstock for the biofuels industry and were no longer incorporated into cropping soils to maintain soil organic matter and structure.

Agriculture's role as both a consumer and a potential producer of future energy supplies means the impact of changes in the energy sector on farming is somewhat difficult to predict.

Agricultural productivity and technology.

The relatively rapid rate of adoption of new technologies in Australian agriculture over the last fifty years has enabled the sector to maintain a rate of productivity growth that is close to the highest of any sector in the Australian economy over that period. Technology has effectively transformed many aspects of farm operations, especially in the cropping sector. Much of this technology has been developed as a result of agricultural research and development, and much of it has also involved the adaption of technologies that were developed in other sectors of economies.

Technologies now routinely used on many Australian farms include GPS navigation and mapping systems, computerised telemetry control systems, portable communication systems, electronic tagging and identification systems, computerised grading and packing systems, mechanical harvesting systems, high-capacity cropping and harvesting machinery, precision sub-surface irrigation systems, and precision soil and moisture analysis and monitoring systems. In addition, the continuing development of reliable and efficient petrol and diesel motors and solar

power generators has enabled dramatic changes to occur in on-farm transport, and made advanced technologies available in the field, that were previously only available in a laboratory.

The adoption of new technology has occurred more quickly in the plant and the intensive livestock industries than in the broadacre livestock industries, but in most subsectors of agriculture these technologies have enabled very impressive productivity growth rates to occur.

This has, in turn, changed both the demand for labour, and the nature of the labour required by the farm sector. Total employment in the agriculture sector declined by 25% over the period from 2001 to 2006, with much of this decline seemingly related to the drought that has been experienced over that period. However, there are indications that the drought may have been a triggering factor that accelerated what was a structural change that had been occurring over a longer period. In relation to the nature of training and skills required, it seems that there is a trend towards more highly trained and skilled employees, an exception perhaps being the seasonal harvest labour required in the horticulture sector. It also seems that there is a trend towards more part-time and contract labour, as distinct from full-time employment.

These changes in farm sector employment obviously have implications for regional communities, especially smaller towns that are some distance away from larger regional centres, and which have limited non-farm employment opportunities.

Impacts at the farm level.

These key factors are likely to have a significant impact on Australian farms by 2020. The changes they will bring seem more likely to be a continuation or an acceleration of current trends rather than a dramatic change in direction, although there will almost certainly be some 'unknown unknowns' that have an impact over that period.

In projecting potential changes, it is important to note that Australian farms are by no means homogeneous, and it is likely that changes will be more substantial in some sub-sectors rather than others. Approximately 40% of all Australian farm businesses have gross annual output valued at less than $100,000, collectively account for around 6% of total gross farm output, and this group of farm businesses derive on average more than 90% of their net annual income from off-farm sources. Many in this group could perhaps be categorised as 'second-career farmers' and are a very important part of both farming and regional communities. However, their motivations and business decisions are likely to be different to those of larger-scale full time farm business managers. While it is dangerous to generalize, it seems likely that this group will be less motivated by farm profitability considerations than the managers of larger-scale farm businesses that rely more completely on farm income. As a consequence, it could be anticipated that change may be less pronounced amongst this group over the next decade than for other categories of farmers.

The expansion of agricultural output by farmers in developing nations will accelerate, which will undoubtedly mean that the pressure to increase farm productivity will continue to be a big challenge for Australian farmers over the next decade, despite current concerns about global food shortages. In the event of a global economic slowdown this will be even more likely, as the resulting moderation in oil prices will reduce demand for grain by the biofuels sector, and also slow the rate of growth in consumer wealth and thereby food demand in developing nations.

The need to continue to improve farm productivity will mean that structural adjustment pressures will persist and perhaps increase over the decade, and this will result in fewer and bigger farms, especially in the grains sector where scale efficiencies are readily available. The result will be a continuation of the current trend towards a bimodal distribution of farm sizes, with a large proportion of small-scale enterprises, a growing proportion of large-scale enterprises, and diminishing proportion of farm enterprises in the mid-size categories.

Improved crop varieties will undoubtedly be important in future productivity growth, and there is little doubt that the biggest gains will be available for those farmers using GM crop varieties, which it seems reasonable to suggest will be an uncontroversial feature of Australian farming by 2020. Substantial productivity gains over the next decade will also arise from the application of precision technology to broadacre cropping enterprises. GPS-linked yield mapping, and auto-steer tractors combined with computerised seeding, fertiliser and spray equipment are already delivering efficiencies in excess of 20%, and the wider adoption of such technologies will be a key factor in continuing grain sector productivity growth.

Increased competition from low-cost developing nations will also mean that Australian agriculture will need to continue down the path of aiming to service higher-value markets, rather than trying to compete solely on price in bulk commodity markets. The beef and sheepmeats industries have already progressed in this direction, the wine industry has long recognised it, the dairy industry is moving away from bulk, unbranded commodities to branded quality products, and the horticulture sector is also advancing in that direction by targeting seasonal and fresh markets internationally. There is some move towards specialization in the grains industry, but less so than in others sectors.

Success in higher-value consumer markets requires closer linkages between farmers and consumers, and more precise quality and supply arrangements which require more intense management by farmers. Accreditation and trace-back systems are also more critical for success in these markets, as the beef industry has experienced in the Japanese market in recent years.

The need for increased productivity and the desirability of higher-value markets, coupled with changes in labour availability and skills requirements means the broadacre farmer of 2020 will more closely resemble a current-day project manager in the construction industry, rather than the 'jack-of-all-trades' farmer of the present time. The 2020 farmer will undoubtedly utilise more specialist contractors to carry out specific farm tasks, and rely more on technical advisors to provide advice and technical services in support of farm decision-making. This will enable broadacre farmers to manage multiple enterprises more efficiently, without the increased risk associated with changing to more specialized single-enterprise farms.

The trend towards closer linkages between farms and downstream segments of the marketing chain is likely to continue, which will mean a continued reduction in the use of Fair-Average-Quality marketing systems such as sale-yards and fresh produce markets. It will also mean that farm accreditation and quality assurance requirements will increase, as will farm-level accountability for the environmental impacts of farm operations. The implementation of a national emissions trading scheme will undoubtedly accelerate this development by directly requiring farm businesses to account for their emissions by 2020, but also indirectly by raising consumer awareness and expectations in relation to this issue.

There are not strong grounds to believe that farm business structures in 2020 will be markedly different from what they are today. There has been an apparent increase in corporate investment in farming over recent years, driven by a combination of increasing farm land prices, strong agricultural commodity prices, a prolonged period of strong economic growth, and concerns about future trends in equities markets. However, corporate investment seems likely to remain a feature of sub-sectors of agriculture which have less variable returns and which can exercise a greater degree of control over farm inputs – such as intensive livestock, irrigated crops and plantations, and in northern Australia where large-scale businesses require owners with deep pockets. The highly variable returns available from dryland broadacre farming, combined with the very 'lumpy' nature of changes in land values means that very patient investors – such as family farmers – are more suited to the sector than impatient investors who demand steadily increasing annual returns on investment over an extended period.

Trends observed over recent decades highlight the increasing diversity of farm production in Australia, and it seems probable that the trend will continue. Products like olives and sandalwood were virtually unheard of a decade ago, and glasshouse horticulture production was in its infancy. The share of gross farm output accounted for by the major commodities such as beef, wool and wheat continues to decline, while horticulture and other more specialized products are slowly increasing their share. If new opportunities emerge such as biomass production for biofuels or new biopharmaceuticals, the farm sector will be even more diverse in 2020 than it is at present.

One unresolved issue in relation to future changes in farming is whether farms of the future will need to rely on less artificial inputs or not. Increasing energy prices, an emissions trading scheme and the expansion of agriculture in developing nations means farm inputs such as nitrogen fertiliser will become much more expensive, and this will force farmers to look for alternatives including a re-evaluation of legumes and better crop/pasture rotations as an alternative to increased nitrogen fertiliser use. A need to move away from the use of other artificial fertilisers and pesticides might also arise if these become more expensive as a consequence of diminishing supplies or expanding developing nation demand.

The potential extent of a trend towards lower-input farming systems is difficult to judge and will depend on changes in farm input prices, but it seems reasonable to conclude that the need for greater efficiency in artificial input use in farming systems in Australia will become greater over the next decade.

In conclusion, Australian farms in 2020 will rely heavily on precision technology and management systems, will be highly accountable for their environmental and other impacts, will be managed by people who utilise a wide range of specialist contractors and technical advisors, will still predominantly be owner/occupied family farms but will be bigger in size and smaller in number, will need to be much more efficient in their use of artificial inputs, will be more closely integrated into marketing systems, and will produce to market specification rather than turning off fair-average-quality commodities. Despite all these changes, however, rain will still be the most prominent topic of conversation when farmers get together!

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