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Economic trends and drivers affecting the Wheatbelt of Western Australia to 2030

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Abstract. Most of the farm businesses in Western Australia remain profitable, with rates of return comparable with non-farming sectors. However, there is continuing pressure on poor-performing farms, as well as a range of social pressures, which mean that there will continue to be a steady fall in the number of farms in the Wheatbelt of Western Australia. Most remaining farms will continue to be profitable, due in significant part to successful research and development (R&D). Farms will continue to be highly diversified. We expect the real prices of most agricultural commodities to continue to fall, although we note predictions for meat prices to rise in the medium to long-term. Key uncertainties about price trends include: future levels of agricultural protection in developed counties; the levels of price premia for 'green' products; the rates of productivity improvement for agriculture in developing countries; and energy prices. Key uncertainties about R&D/technology include the availability of funds for R&D, and the contributions of biotechnologies. Use of information technologies will increase, although not as much as some expect, and in some cases driven by shortages of skilled farm labour rather than production advantages. The fundamental elements of managing a farm have altered little, and we do not expect them to change in the next 30 years. Successful farm management will continue to depend largely on good decisions about the farm's enterprise mix, machinery replacement, land leasing or purchase, labour hiring, and off-farm investments. Agricultural R&D should continue to address a diversified portfolio of issues, including attention to environmental issues, but not neglecting the need for ongoing productivity improvements in agriculture.

Additional keywords: future, R&D, social, farming systems, markets, environment.

Introduction

Agriculture in the Wheatbelt of Western Australia (WA) has changed substantially over the past 3 decades, and the pace of change is likely to be maintained in the next 3 decades. Many of the changes, past or prospective, have an economic dimension: either economic factors feature as causal contributors, or economic effects occur as a result. Some of the changes that have occurred are not consistent with common perceptions, and some of the future changes will not be predicted.

The purpose of this paper is to review and discuss recent and prospective changes in the WA Wheatbelt. We present evidence about changes and trends over recent decades and discuss likely and possible further changes ahead. Our focus is on factors that do and will affect the business decisions of farmers.

We recognise the great difficulty of making accurate forecasts about any economic activity over a time frame of 25 years. In preparing the paper we noted several forecasts about the Wheatbelt made by respected authorities in the past 10 years that have already proven strikingly inaccurate. To reduce this risk, we avoid making specific quantitative predictions, but we recognise that changes unforeseen, at least by us, are likely to play important roles.

The paper begins with general background information on extensive dryland agriculture in Western Australia, and then discusses likely drivers of change in the future. Changes that currently appear relatively likely are suggested. The paper ends with discussion of some implications for agricultural research and development (R&D).

Background on broadacre agricultural businesses in Western Australia

Profitability and farm numbers

Most of the farm businesses in Western Australia remain profitable (BankWest 2003). For example, in spite of the poor seasons in 1998, 2000, and 2002 in many agricultural

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districts, farm businesses in the broadacre region of Western Australia averaged a rate of return to capital of around 2% over the period 1998–99 to 2002–03 (BankWest 2003) (e.g. see Fig. 1). The top 25% of farm businesses averaged a rate of return to capital of 8.1% over the same period.

Carroll (2003) has compared the relative capital gain of an investment in farm land compared with one in listed property trusts or a diversified share portfolio represented by the all ordinaries index. He found that for the period 1987–2002 the compound growth rate for farm land value was 5.1% per annum compared with a compound growth of 2.9% per annum for the listed property trusts and 5.4% for the all ordinaries index. Hence, on capital gain alone, investment in farm land is a relatively attractive investment.

Although Carroll used national data, local ABARE farm survey data (e.g. ABARE 2003) and Valuer-General data show that broadacre farms in Western Australia achieve average rates of capital appreciation typically of 3–7% per annum. For example, the shires of Merredin, Moora, Narrogin, and Kojonup shown in Fig. 2 recorded compound growth rates in farm land values of 5.6, 6.8, 4.6, and 4.5% per annum, respectively, over the period 1985–2004 (based on fitting an exponential growth curve).

Although broadacre farming in Western Australia has been profitable for most businesses, there has been a slow but steady decline in the number of farm businesses operating (Fig. 3). There are now around 6030 farm businesses in the broadacre (Wheatbelt) region (ABARE 2003). The bottom quartile of farm businesses is under sustained financial pressure and many of them will eventually leave the industry (Alexander 2002). BankWest (2003) data show that the bottom quartile of broadacre farm businesses in Western Australia generated a rate of return to capital of −4.9% per annum over the period 1998–99 to 2002–03. Average equity for this group was 82%, so if they are forced to sell up, most have sufficient equity to ease the family's transition.

The other main driver of farm sales is a lack of family members seeking succession of the farm business.

The distribution of wealth and size of farms is highly skewed. Grain delivery data reveal that around 14% of grain growers deliver over a third of the State's grain and that a quarter of grain growers deliver over 54%. Similarly, over the period 1997–98 to 1999–2000, WoolDesk data reveal that approximately 14% of woolgrowers in Western Australia produced half of the State's wool.

Increasing farm size increases the demands on farm management. So too do increases in the range of crop

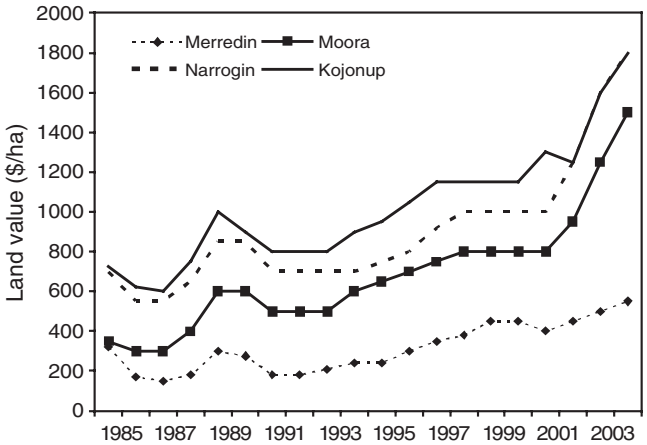

Fig. 2. Land values in key shires in the broadacre region of Western Australia: 1985–2001 ($/ha). (Source: based on data supplied by the Office of the Valuer General.)

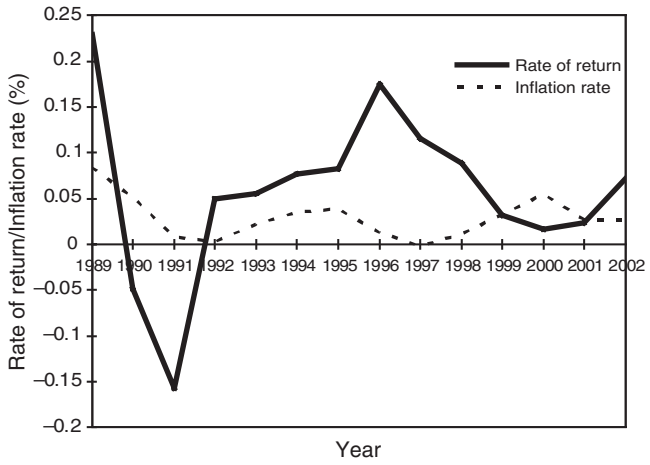

Fig. 1. Farm businesses' average nominal rate of return to capital in the central agricultural region: 1989–2002. (Source: based on ABARE farm survey data.) This region contains 3124 farm businesses and the data in this figure are based on an annual sample of 50 farms.

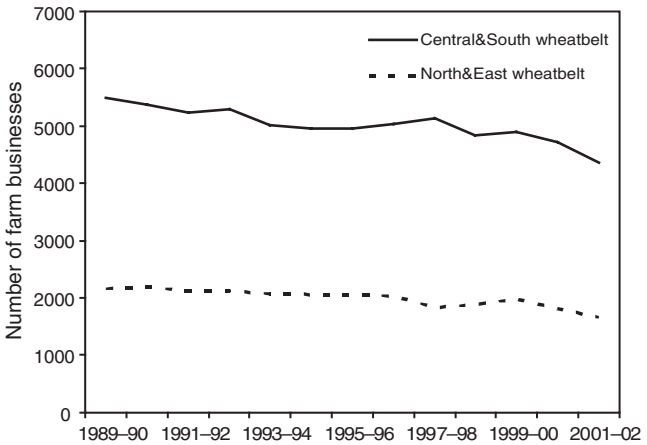

Fig. 3. Number of farm businesses in the broadacre region of Western Australia: 1989–90 to 2001–02. (Source: based on ABARE farm survey data available on AgSurf.)

types, crop management methods, and animal breeds now available. The resulting tendency is for farming systems and farm businesses to become more complex, requiring more sophisticated management or at least greater reliance on advisory services.

Enterprise diversity

Most broadacre agricultural businesses engage in a portfolio of enterprises. The following factors influence this diversity, and all of these will operate into the future.

(*1*) Product complementarity can increase the benefits of diversification. Examples of positive interactions in broadacre farming include nitrogen supplied by leguminous pastures or crops to following cereal or oilseed phases, the disease and weed break advantages that one phase of a rotation bestows on a subsequent phase, and the wind-break and shelter benefits for livestock provided by tree belts (Morrison *et al*. 1986; Pannell 1987).

(*2*) Most farmers are averse to risks (Bond and Wonder 1980; Bardsley and Harris 1987), and diversification can be an effective risk management strategy (Samuelson 1967), although in Western Australia this is probably a less important driver of diversification than the other factors described here (Pannell *et al*. 2000).

(*3*) Land heterogeneity results in certain enterprises being agronomically better suited to different parts of the farm landscape.

(*4*) Fixity of some farm assets, at least in the short run, restricts the profitable range of selection of some enterprises and thereby encourages diversification. For example, a farmer with relatively small machinery (and hence a relatively long seeding program) may find that the lower yields obtained for later sown crops are insufficient.

The trend to increasing farm size tends to reinforce the last 3 of these factors in their influence on diversification.

Diversified farm businesses in Western Australia have proved resilient and profitable. Diversity has enabled businesses to cope with variation in climate and to capitalise on changes in the relative prices of agricultural commodities. It has enabled generations of farmers to be equipped with a range of management skills, created flexibility, and supported entrepreneurial action. These positive outcomes are likely to continue and will encourage farm businesses in the future to remain mostly characterised by enterprise diversity.

Notwithstanding its size, success, and focus on external markets, the region's agricultural industry is only a minor contributor to world agriculture and commodity trade. The region produces less than 1% of the world's wheat, less than 6% of the world's apparel wool, and less than 1% of most other major products such as sheep meat and canola. For this reason, farm businesses in the region may be able to exploit niche markets at times, but in general they will be price-takers on international markets.

What will drive farm-level decisions?

Prices and costs

Prices for freely traded commodities are determined by the balance between international supply and demand. Globally, demand for agricultural products has risen steadily over time, reflecting increases in population and wealth but, in general, increases in supply have been even more pronounced, so that over the long-term, the ratio of output prices to input costs has tended to fall (Fig. 4). This phenomenon is variously referred to as the 'cost-price squeeze', declining terms of trade since, or falling real output prices. The trend is a decline of around 2.2% per annum.

There have at times been predictions that this long-term trend had run its course and would soon be reversed, but so far all such predictions have proven wrong. With moderation in world population growth now evident, continuing technological progress in developed countries (e.g. biotechnology), and evidence of improving agricultural productivity in many parts of the developing world, we judge that continuing declines in real prices of agricultural commodities over the next 30 years are likely. This creates an imperative for continuing productivity improvements (see next section) to ensure the ongoing economic health of broadacre farming.

If there are real price increases, they appear most likely to occur for meat products, in response to increasing demand in developing countries. For example, CIE (2001) predicts the following increases in meat prices by 2020: beef 72%, sheep 33%, pork 27%, poultry 6%.

Apart from the general trend and fluctuations in different prices, in recent decades there have been the following key

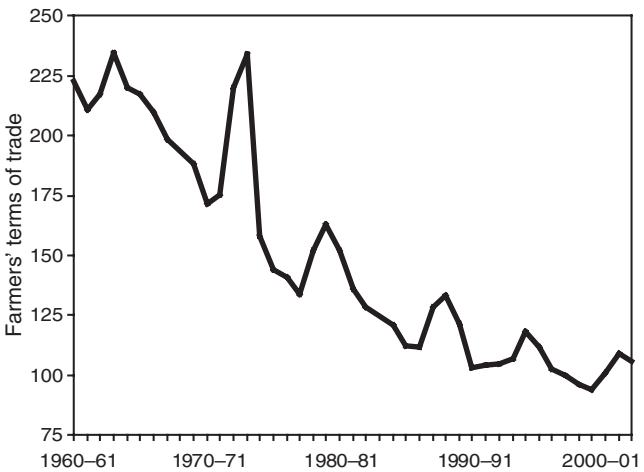

Fig. 4. Farmers' terms of trade. Base year 1997–98 = 100. (Source: ABARE 2003.)

changes in markets and marketing that will have an enduring effect on broadacre agriculture.

- Increased segregations for grain crops, especially wheat. New segregations (e.g. Australian Soft, Australian Noodle, Shochu barley, Hi-Pro lupins) based on end-user requirements were introduced along with payments for protein.
- Increased price volatility for many farm commodities. With the collapse of the reserve price scheme for wool in 1991 and cessation of the guaranteed minimum price scheme for wheat, price risk management now has an increased importance for many farmers.
- Greater deregulation of commodity marketing and other sectors. Deregulation of domestic grain marketing and opportunities for licenced exports of grains have increased the number of players in the marketing of grain produced in the broadacre region. The Productivity Commission (1999) identifies modest benefits so far for rural and regional areas from the reforms of National Competition Policy, affecting a wide range of services including transport and communication. Future benefits are expected to be greater.
- Establishment of substantial export markets for live sheep. In the 1970s, export markets for live sheep emerged. Despite some disruption of the trade to Saudi Arabia, the live export trade has grown, with 3.2–4.3 million head being exported annually over much of the last decade. The live trade has accounted for around 50% of the State's sheep turnoff.
- Greater retail and consumer concerns about food safety and increased demands for quality assurance in production, processing, and distribution of commodities (Focused Management 1998; Grain Pool 2001, 2002). For example, chemical residues in wool, meat, and grain and the hygiene status of meat products became topical concerns at various times, reflecting the heightened requirements for food safety. The increased emphasis on food safety, quality, and identity preservation is leading to an increased use of contracts in farm production. As a result, farmers' production options and management regimes are increasingly prescribed.
- A shift in market focus towards Asian and Middle-East markets, due to their increasing demand for agricultural imports. The value of agricultural exports from Western Australia in 2003–04 was AUD4.9 billion, with the bulk of these exports going to the North-East Asian region, followed by the ASEAN region, Middle East, and Europe. Key export markets for agri-food products are Japan, China/HongKong, Indonesia, and South Korea. According to UN projections (United Nations 2005), large population increases will occur in the Middle East and Asian region. Population and economic growth in these regions will fuel their importation of food and agricultural products, from which many Australian agricultural industries will benefit.

We identify the following main unknowns in the area of prices and costs over the next 30 years.

- Whether there will be substantial progress in reducing agricultural protection in Europe, the USA, and Japan. Recent changes in Europe are encouraging. If this is maintained and generalised, the benefits to Australian agriculture will be substantial.
- Whether the trend towards greater environmental awareness among consumers will translate into price premia for 'green' products that are sufficiently large to affect production decisions.
- The rate of development of agriculture in developing countries. If there is an acceleration of progress, there will be further downward pressure on prices.
- Changes in energy prices. Dunlop *et al*. (2004) note that, 'Evidence suggests that in the coming decades oil consumption will overtake global oil supply capacity'. Will alternative energy sources become available at comparable cost? Will agriculture be a source of bioenergy?

Yields, new technologies, and productivity

Broadacre farmers in Western Australia have experienced particularly high levels of productivity growth (i.e. total factor productivity) in grain production compared with producers from many other regions, with average per-grain-farm productivity growth of 3.5% per annum, over 21 years up to 1998–99 (Ha and Chapman 2000). By contrast, sheep specialist, beef specialist, and sheep–beef specialist farms recorded annual productivity growth of only 0.6, 2.1, and 1.4% over the same period, respectively.

Improvements in yields and productivity may arise through technological advances, improvements in management, and through exploiting economies of size. Major technical and management changes in the last 2 decades have included the following.

- There has been an increasing array of herbicides, reducing the need for tillage, and improved spray technologies supporting the earlier sowing of crops. However, the problem of herbicide-resistant weeds, not widely anticipated initially (Perry *et al*. 1980), became important in the 1990s.
- New crop and pasture options and varieties have become available over the past 3 decades. These include high-yielding wheat varieties suited to a range of season lengths and market classifications (e.g. noodle, hard, and soft), new crop types (e.g. canola, lupins, field peas, and faba beans), and new legume pasture species (medics, serradellas, clovers, and subterranean clover selections) (Nichols and Nicholas 1992; Nutt and Paterson 1998;

Nichols 2004). Tagasaste became more widely grown, particularly in the West Midlands, and lucerne has gained greater acceptance in recent years (Bennett *et al*. 2004).

- Improvements in farm machinery for tillage, spraying, and harvesting have increased the ease and efficiency of many farm operations. Farmers have invested in larger machinery with work rates that offer economies of size and have markedly increased their capacity to store grain on the farm. Interest in controlled traffic technology has also emerged over the last few years (Blackwell *et al*. 2004).
- Usage of fertilisers (primarily nitrogen) in the WA Wheatbelt, increased steadily through the 1970s and 1980s and dramatically through the 1990s (Pat Gethin, CSBP, personal communication, 2004), reflecting similar changes at the national level (Chudleigh and Simpson 2001). In part this contributed to higher yields, but it also was a consequence of other factors, including (*a*) improvements in other aspects of the farming system that increased potential crop yields and made higher fertiliser levels economically attractive, and (*b*) a trend over most of that time away from livestock production and towards cropping.
- Improved communications (fax, mobile phone, internet) and computer technology have increased the speed and range of information received by farmers.
- A greater variety of sheep breeds (Awassi, Damara, Dorper) is now grown and preferred to Merinos in some markets.

The crucial role that increasing productivity plays in the economic viability of agriculture is starkly illustrated in Fig. 5. It shows that productivity growth in Western Australian agriculture has more than offset falls in real prices since 1953. In other words, productivity growth has meant that farm returns have grown in real terms over time. Accumulated productivity improvements since 1953 now constitute most of the gross value of production for agriculture.

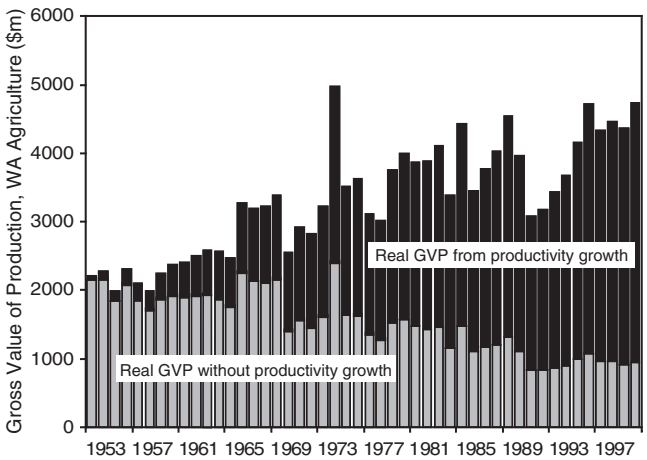

Fig. 5. Gross value of agricultural production (GVP) in Western Australia, showing that portion due to accumulated productivity improvement. (Source: John Mullen, pers. comm., 2004, based on Mullen 2002.)

Among current efforts to develop agricultural innovations, those of the Cooperative Research Centre (CRC) for Plant-Based Management of Dryland Salinity appear particularly significant. If successful, they will initiate a significant shift towards the production systems based on new perennial plants (pastures, shrubs, trees, and possibly grain crops), partly replacing existing annual plants that currently dominate agriculture. They will also provide improved options for production on salt-affected land, which is forecast to continue to increase in extent. How successful the CRC is in moderating productivity loss due to salinity remains to be seen.

Another prominent environmental concern is the potential for climate change. Change in rainfall has already been detected for south-western Western Australia (Foster 2004). Potential further changes (Foster 2002) include the following.

- Decreases in rainfall in autumn and spring. Increased evaporation. Shorter growing seasons.
- Warmer winters and springs. Higher CO_2 concentrations, increasing crop yield in some seasons, but perhaps decreasing grain protein.
- Rising temperatures. Changes in heat or chill accumulation and the frequency of temperature extremes.
- Reduced risk of frost. More hot days during grain filling could reduce yields.
- Effects on on-farm water storage. More intense, but less frequent, rainfall. Need to increase storage capacity.
- More frequent extreme weather events (e.g. consecutive days of extreme heat, extreme thunderstorms).
- Altered risk from insect pests, weeds, and plant diseases.

Of course, there are considerable uncertainties about the extent, timing, and details of any climate change. Given that the predicted onset of climate change is gradual, incremental technological improvement and plant breeding improvements will lessen the severity of many of the effects on agriculture.

Other key unknowns in this area over the next 30 years include the following.

- Funding levels for R&D. There is some doubt as to whether the Australian Government will continue to match R&D funds levied from farmers. It is conceivable that there could be dramatic reductions in the level of funds offered through the existing rural R&D corporations, perhaps with changes in the number and operation of those corporations.

- Biotechnology. Notwithstanding its relatively modest effect so far, there may be dramatic breakthroughs in the application of biotechnology. Whether the current public resistance to biotechnology continues in Australia will probably depend on the nature and advantages of any future breakthroughs.

Environmental policy

We have discussed policy changes in relation to marketing bodies and a potential change in R&D funding. Another area where policy may change is in relation to environmental issues. There is a well-documented tendency for rising living standards to result in greater emphasis on environmental concerns, and this trend appears to be playing out in Australia, at least over the long term.

There is plenty in agriculture to concern those who are sensitive to the environment, including the following.

- Dryland salinity (Ferdowsian *et al*. 1996; National Land and Water Resources Audit 2001).
- Loss of soil structure (Howell 1987).
- Soil acidity (Glencross and Clarke 1984; Porter and Wilson 1984; Dolling and Porter 1994).
- Water-repellency of some soils (Blackwell 1993).
- Waterlogging (Bligh *et al*. 1983).
- Wind erosion (Marsh and Carter 1983) and traffic hard-pans (Bowden and Jarvis 1985).
- Deterioration in remnant vegetation (Hussey 1993).
- Nutrient run-off causing pollution problems (Yeates *et al*. 1984; Prout 1993).
- Western Australian agriculture contributes ~32% of State emissions of greenhouse gases, due primarily to livestock and burning of savanna and temperate grassland (National Greenhouse Gas Inventory Committee 1998).
- Loss of biodiversity. Among OECD countries, Australia has a relatively high percentage of threatened mammals and a high number of extinct or threatened plants. Land use change for agriculture has caused nearly 90% of temperate woodlands and mallee to be cleared (Industry Commission 1998; Productivity Commission 2001).

Efforts to enhance the environmental performance of agriculture through the National Landcare Program, the Natural Heritage Trust, and the National Action Plan for Salinity and Water Quality have been criticised on various grounds, including their failure to deal effectively with the more substantial of the above issues. One can easily imagine social and political pressures for a further raising of the environmental standards expected of agriculture. Resulting policy tools, whether positive (subsidy based) or negative (penalty based), if substantial enough, could play a major role in shaping future agriculture.

On the other hand, the cost of dealing comprehensively with the above set of environmental issues would be many times greater than the public funds currently available through the main policy programs. It may be that public funds continue to play a marginal role in protecting or enhancing the rural environment. We would not be surprised to observe this. We also do not expect a dramatic increase in environmental regulation governing agriculture. The economic and social costs to rural areas would be so high that the political costs seem likely to outweigh the political benefits.

Personal and family goals

Many farming families enjoy the rural lifestyle. Indeed Shields and Wooden (2003) note that many people in rural areas express greater satisfaction with their lives than do city people. Nevertheless, several factors have contributed to an exodus of families (both farming and non-farming) from rural areas. Most farm businesses continue to be owned and operated by farm families. However, farm families have needed to make decisions from which they hoped to benefit financially. Among these decisions have been those involving the adoption of labour-saving technologies and increases in farm size that together have reduced opportunities for on-farm employment and reduced the number of farm families. Further, the dominance of agriculture in the broadacre region has meant limited employment opportunities outside of agriculture in the region.

Rationalisation of government services in rural regions has further lessened employment opportunities, and this, combined with the decline in agricultural employment, has fuelled de-population pressures in many inland rural areas of Western Australia. For example, on the national scale, total employment in small inland towns dependent on agriculture declined by 7% from 1986 to 1996 (Garnaut *et al*. 2001).

Other factors contributing to the exodus of labour from rural areas include:

- lower average earnings in inland regions relative to metropolitan regions (Garnaut *et al*. 2001);
- much less industrial diversity compared with metropolitan regions (Hogan *et al*. 1999);
- lower educational opportunities in rural areas.

Countering the social, economic, and government policy pressures that encourage depopulation is extremely difficult. Attempts to reverse a local decline can often be at the expense of some other adjacent region.

One observable trend is for some farm families to reside in metropolitan areas or large coastal regional centres, with the farm manager commuting to the farm for only part of each week. Perhaps this trend will increase if inland rural areas continue to become less attractive places for families to live.

A further consequence of lower rural populations is likely to be even greater difficulty in delivering environmental outcomes that are not closely linked to production benefits.

The traditional reliance on voluntary contributions to environmental protection is less tenable as the resident population falls.

Some speculations

After examining the views of various futurists and the findings of management studies (e.g. Coopers and Lybrand 1995*a*, 1995*b*; Karpin 1995; Coates *et al*. 1998; Kohl 2001), Kingwell (2002) concluded that in coming decades, broadacre farming is likely to become characterised by the following.

- Fewer, larger farms and fewer people employed directly in farming.
- Maintained diversification of farm businesses (cereals, pulses, oilseeds, pastures, livestock, fodder shrubs, perennials, and off-farm investments).
- Agricultural commodity prices continuing to decrease in real terms (Pinstrup-Andersen and Pandya-Lorch 1998; Tweeten 1998).
- More volatile agricultural commodity prices (Tweeten 1998).
- Increased demand for and supply of animal feeds.
- Continued production growth from yield improvement and an increased proportion of the landscape sown to crops (grain and fodder). Biotechnology, particularly in the plant sciences, will underpin productivity improvement and new product development. Market acceptance of many biotechnologies, now negative, will improve with emergence of plants offering environmental and health benefits.
- Changing dietary patterns, increasing incomes, and shifts in population structures in many countries will be increasingly important market drivers.
- Broadacre farming will maintain its emphasis on exports, productivity improvement, and product and market development. Farmers will continue to invest in improvements in technical and scale efficiency, and pursue input and product innovation.
- Participation in supply chains as an equity partner as well as a raw product supplier will be an emerging option for farmers.
- The relative importance of agriculture in the nation's economy will continue to decline.
- Greater commitment to sustainable farm practices due to regulatory and market incentives.
- Greater emphasis on quality assurance, production certification, identity preservation, environmental amenity, supply chain management, and food safety.
- Risks surrounding contract and marketer relationships and changes in consumers' perceptions of food health, safety, and environmental effects will become more prominent.
- Greater use of contract services by farmers (e.g. machinery management, plant and animal health services, information management services, labour training and management).
- Greater separation of land ownership and land management.
- Increased difficulties in gaining access to reliable and skilled labour will see further use of labour-saving technologies, in-built skilled technologies, and robotic and intelligent technologies.
- Greater dependence on electronic technology (AFMS 1997) and electronic management.
- Effects of climate change largely addressed through incremental technological improvement and plant breeding.

The combination of high equity of many farm businesses, smaller family size, family break-up pressures, and more investment choices outside the business, means a fine balance will have to be maintained regarding the financial and social viability of the farm business. Tensions between the achievement of financial and social goals will prompt some farmers to leave the industry. Others will adapt in an attempt to achieve both ends (e.g. fly-in-fly-out farm management).

Future farm management may depend to an increasing extent on sophisticated information technology. However, on the basis of history, we suggest that change in this direction will not be as great as some expect. As Malcolm (2000, p. 40) observes: 'A glance through history suggests that in the most important ways, the fundamental elements of managing a farm has altered little'. Successful farm management will continue to be dependent largely on good decisions about the farm's enterprise mix, machinery replacement, land leasing or purchase, labour hiring, and off-farm investments.

Implications for R&D

We suggest that the foregoing discussion has the following key implications for agricultural R&D in Western Australia.

- A healthy R&D sector remains crucial for continuing productivity improvements to ensure the ongoing economic health of broadacre farming. The implications of Fig. 5 are stark. If productivity growth, driven by agricultural R&D, is maintained at sufficiently high levels, agriculture is likely to maintain access to a flow of innovation and knowledge that will assist it to remain successful. If the performance of R&D falls, the long-term prospects for agricultural prosperity are worrying.
- The combination of increasing farm sizes, social pressures for farm families to reside off-farm, and rising costs of skilled farm labour will reinforce the benefits of labour-saving technologies. The main benefits from automated precision agriculture systems may be from a labour-saving perspective. This insight may influence the direction of R&D for precision agriculture.

- Our discussion has conflicting implications for the relative emphasis on cropping and animal production. Social and employment trends and ongoing yield increases will tend to encourage increases in the area sown to crops. On the other hand, environmental pressures, new pasture types, and perhaps long-term trends in meat prices may encourage animal production. R&D should not attempt to focus on one area but should continue to address cropping, animal production, and animal feed production. It should remain flexible and responsive to emerging problems and opportunities.
- Increased farm sizes, increased enterprise diversity, and increased use of advanced technologies have added to the complexity of farm management. R&D that can moderate or help to deal with this complexity will be highly valued.
- The community's attention to the environment will be maintained or increased. R&D to develop new systems and technologies that are both profitable and environmentally beneficial will remain of high importance. Research to support regional planning and decision making for environmental works will also remain important.

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