

Connections

Farm, Food and Resource Issues

Volume 3

August 2002

Connections - Winter 2002

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The 'Domain' for Levy-Funded Research and Extension: General Notions with Particular Applications to the Australian Dairy Industry

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General Musings on Efficiency and Equity Aspects

More-Specific Ideas on Levy-Funded Research in the Dairy Industry

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In Australia, a variety of institutions are engaged in providing funds for agricultural research and extension, and making decisions about the allocation of those funds among alternative research and extension programs. These institutions are intertwined in complicated ways. In dairy research, for instance, the Dairy Research and Development Corporation (DRDC) combines levy-based funds with matching funds from the federal government to provide partial funding support for research and extension programs conducted by state-government agencies (such as Victoria's Department of Natural Resources and the Environment, DNRE), by federal agencies (such as CSIRO or ABARE), and by private firms in Australia as well as some overseas research bodies. The fact that most of the projects funded by the DRDC are in some sense joint ventures (involving a mixture of federal funding, levy funding, and other funding) adds complications to the problem of defining the appropriate division of labour between the DRDC and the other agencies engaged in dairy industry research—the R&D “domain” for the DRDC.

General Musings on Efficiency and Equity Aspects

In beginning to broach this topic, let us abstract from the joint-funding aspect and consider the DRDC as though it were a stand-alone enterprise, funded entirely using levy funds, and ask a question in principle: What should be the scope of its research portfolio, and which lines of research ought to be left to other sources of funds? In addressing this question, a reasonable starting point is to acknowledge that there are both economic efficiency and equity dimensions to the issue. A simple economic efficiency rule is that the DRDC ought to allocate its funds so as to maximize the total benefits—but whose benefits (and costs) ought to be counted, benefits to all Australians or just benefits to the Australian dairy industry? And within the industry, should we count benefits just to dairy farmers or benefits accruing to processors and manufacturers as well? Should they count equally, or should farmer benefits get more weight? It is not trivial to separate the equity and efficiency issues.

It is reasonable to define economic efficiency in terms of the benefits to Australia as a whole. Further, under a reasonable simplifying assumption—that, under the recently deregulated market structure, DRDC research has a negligible impact, if any, on world prices, and thus on prices paid and received for dairy products in Australia—it is a reasonable approximation to equate industry benefits with Australia's benefits (i.e., there are no consumer benefits and no optimal trade-tax arguments to bother about). The remaining equity issues concern the distribution of the benefits and costs of levy-funded research within the industry, between dairy farmers and other participants in the marketing chain—including input suppliers as well as processors, manufacturers, and retailers—and among farmers (and others) depending on the extent to which they can adopt new technology resulting from the levy-funded research. These can be thought of as vertical and horizontal dimensions of the distributions of costs and benefits of levy-funded research.

First, consider the vertical dimension. One result from the literature is that, under commonly made assumptions, the benefits from research at one stage of a multistage production system will be distributed up and down the production-marketing chain in the same proportions as the cost of a levy

¹ I am grateful for helpful comments on drafts, provided by Paul Donnelly, John Freebairn, Rick Lacey, John O'Connor, Phil Pardey, Roley Piggott, and Alistair Watson, as well as some workshop participants.

collected at the same stage of production (e.g., see Alston and Mullen 1992). This result leads to the conclusion that it would be both fair and efficient to finance commodity-specific industrial research entirely using commodity levies. Moreover, if the production technology across the stages of production is of a fixed-proportions nature, the research could apply at a different stage than the levy and yet the benefits would be distributed in proportion to the costs.

A breakdown of the congruence (or concordance) between the distribution of benefits from research and the distribution of the costs of a levy used to finance it could arise from several sources, individually or combined. These sources include:-

- i. variable factor proportions in production, with research results applicable at a different stage of production than that where the levy is collected,
- ii. imperfect competition among processors or retailers, or
- iii. a non-parallel research-induced supply shift (the perfect matching of incidence of costs of a levy and benefits from research requires that the levy-funded research reduces average and marginal costs by the same amount per unit, such that the supply curve shifts down in parallel).

Since we cannot rule out these elements altogether, we cannot be sure that benefits from levy-funded research will be distributed vertically among participants along the supply chain in proportion to the costs of a levy borne by participants along the supply chain. This uncertainty means that an industry group (such as an RDC) is likely to opt for a rate of levy that is less than the social optimum. In an extreme scenario Arrow's 'impossibility' theorem would imply a levy rate of zero. An industry RDC is likely to opt for a mix of research programs that gives up some economic efficiency in exchange for more equity. This observation provides a theoretical basis for (i) multiple levies to fund different lines of research collected at different stages in the system (on both equity and efficiency grounds), and (ii) some matching grant support from the government (on efficiency grounds). In the case of dairy research in Australia, vertical distributional issues are muted to some extent by the important role of farmer-owned cooperatives in the processing and manufacturing sector.

Next, consider the horizontal dimension of the distribution of benefits and costs of levies collected to fund research. A milk levy falls initially on all producers according to the amount of milk they sell but some of the levy cost is passed on, up and down the marketing chain, through induced changes in prices that depend on relative elasticities of supply and demand and so on, to be borne by individual middlemen and consumers according to the amounts of milk they buy. Every dairy farmer bears a cost in proportion to their individual production regardless of whether they adopt new dairy farming technology that is generated by the research funded by the levy. If prices were lowered as a result of productivity gains and supply increases deriving from adoption of new technology deriving from the research, non-adopting farmers would be made worse off by both the new technology and the levy used to fund it. (Non-adopters can be hurt by any new technology that causes prices to fall, but the injury is greater if they have had to help pay for the research that gave rise to the technology.) Even if price did not fall as a result, innovators would gain cost savings and in due course would expand while laggards would continue to move out of the industry.

In an inter-temporal variation on this theme, horizontal inequities can arise between generations of dairy farmers. The incidence of the levy is immediate, whereas the incidence of the benefits from research may take 20 years or more to affect beneficiaries. Only in the best of all worlds is it likely that the current levy payer will be entirely convinced that the future benefits—to be collected by his successors—will be capitalized fully into his current asset values. In such a case the temporal aspects of agricultural R&D would be irrelevant to the issue of who benefits when relative to who pays when. If doubt exists about the extent to which future benefits from research will be capitalized, in practice, into farm assets, then levy-funded research may be less oriented towards longer-term research (i.e., that will take a relatively long time to yield a payoff) than efficiency alone would dictate.

Horizontal inequity occurs when levy-funded research and extension is only narrowly applicable within the industry. That is, applicable in a certain geographical region only; or applicable for only certain types of farmers (e.g., irrigated versus non-irrigated or very large versus small; or applicable only for farmers eligible to participate in a particular extension program versus non-participants). An extreme form of horizontal inequity would be if levy funds were used to finance research that did not have any benefits within the industry but benefited other members of the society. For instance, this might occur if levy funds were used to finance research into environmental issues with a view to generating environmental benefits not confined to the industry or its participants.

Further, in a similar manner to the effects of vertical market mismatches between the distributions of costs and benefits, perceived horizontal inequities too are likely to give rise to under-funding of research overall (i.e. some potential efficiency benefits foregone in exchange for some hoped for equity gains). This observation provides a theoretical basis for: (i) multiple levies to fund different lines of research collected from different (horizontal) subsets of the industry (on both equity and efficiency grounds), defined spatially or in terms of the nature of their technology, and, (ii) perhaps some matching grant support from the government (on efficiency grounds).

More generally, on equity and efficiency grounds, levy funds ought not to be used to fund private goods such as those provided by narrowly focused extension (or research) programs and for which there is no *prima facie* evidence of a market failure. Such activities ought to be funded privately. Conversely, on equity grounds commodity levy funds should not be used to finance programs for which the group of beneficiaries extends far beyond the group bearing the major incidence of the levy. These activities ought to be funded publicly, using more broadly based taxes.

Because of (real or imaginary) horizontal and vertical equity problems, given the role of 'democratic' processes in setting the levy rate and research priorities, levy-funded programs left to their own devices are likely to under-fund commodity-specific research overall, and to under-fund certain types of research in particular. Curiously it is likely that both research for which the benefits may be narrowly confined within the industry and research for which the benefits are only partially confined to the industry, will be funded at less than optimum levels.

One correction for a problem of under-funding of research may be to provide supplementary (perhaps matching) funding from general government revenue, but the provision of supplementary funding might not correct the distortion in the mixture of types of research preferred because of the 'democratic' processes involved in setting levy rates and research priorities. (On the other hand, we ought to give some consideration to the possibility that commodity levies might provide a relatively cheap source of research funds, and what that implies. For instance, see Alston and Mullen 1992.)

More-Specific Ideas on Levy-Funded Research in the Dairy Industry

Why does it make sense for the Australian government to delegate its taxing powers to an organization, such as the DRDC, that represents the interests of a small, narrow group in society? Presumably it is because this is seen as a reasonably fair way of achieving the economic efficiency objective of reducing the under-investment in dairy research that would otherwise take place. It would appear to have been successful from that point of view (see Alston, Harris, Mullen, and Pardey 1999). This is an example of the use of hypothecated (or earmarked) taxes (rather than general revenues), which can be a fairer and more-efficient way of financing certain types of collective goods. A general problem with this type of approach is that, because of heterogeneity in the industry and the Research and Development (R & D) outputs (and their applicability and economic impacts inside and outside the industry), the 'ideal' tax base will vary across research projects and programs. The 'efficient jurisdiction' varies among projects and programs, as will the optimal rate of matching support from the federal (or state) government.

As a practical matter, it makes sense to have a single institution that aggregates across all of these possibilities (in terms of parts of the marketing chain and parts of the country), partly because it would be too costly administratively to have multiple programs. Realistically speaking, we are not looking for an 'ideal', perfectly fair and efficient structure and cannot precisely optimize every element. Instead, we seek reasonably to draw generally sound distinctions and rules of thumb that are not grossly at odds with the notions of fairness and efficiency. From that standpoint, we can try to delineate those lines of dairy industry R&D that are more- or less-appropriately financed and conducted using levy-based funding, and rules of thumb for determining how much to do and perhaps on what basis.

As a starting point, consider the following four broad criteria:

- i. The dairy industry share of total benefits. If this is not high, then the research ought to be funded using broader-based funding;
- ii. The odds that the benefits are privately appropriable either because of property rights protection or trade secrecy, or because the benefits accrue to a small group. If these odds are high, then the research ought to be funded privately by the beneficiaries;
- iii. The odds that the private sector in Australia or overseas will invest in the area, which is related to the idea that the benefits are appropriable. If these odds are high, then there is no case for under-investment;

- iv. The odds that overseas governments will invest in the area. If these odds are high, then Australia can free ride on this activity and concentrate on other research areas.

The examples below illustrate how these criteria can be applied to draw inferences about who should do what in relation to different elements of related types of work, such as different types of extension, as well as between unrelated types of work, such as farm management extension versus food processing R&D.

Extension.

It is generally accepted nowadays, although it was not always so, that individual farm management advice ought to be left to the private sector. On the other hand, broader-based farmer education-cum-extension programs might be funded in part by a combination of, say, DRDC funds, state-government funds, and private funds, depending on the details of the programs.

The extent to which education activities should be the subject of collective action or government action is a critical question. Theory suggests that much of such activity is the domain of a well-functioning private sector. For example, there is a substantial private-sector role in educating farmers about technologies and management practices that will assist them to meet private sector objectives. Some may argue that there is a potential market failure from lack of knowledge or failures of the capital market to lend for human capital creation. This would not justify the provision of programs funded by the DRDC, although it might justify government action to address such market failures directly. The possibility of a net payoff to collective action by the industry or by government will be greater for components of education-cum-extension programs that have more important public-good elements. For instance, there might be a public-good component in the development of materials or the training of staff to provide education services, where the cost would not be recovered by fees for participation that cover only incremental costs. Alternatively, in a setting in which private incentives are distorted, an education program might have consequences for other public goods, such as the rate of land degradation or environmental pollution arising from dairy waste. Or, we might be able to justify the public or collective provision of services to facilitate the organisation of private activities that might otherwise not be developed because of high individual transaction costs. Management clubs may be one example. This justification would require, of course, that the transactions costs are lower for the collective action than for individuals.

Farming Technology.

The case for supporting research into pasture production using DRDC funds is strong, more particularly as the research relates to Australia-specific issues, and more particularly as it relates to pasture production issues specific to dairy rather than, say, beef or sheep production systems. More general research into pasture production might be financed by a combination of dairy industry and other industry funds and general revenue funds, for instance. Similarly, there is a case for the DRDC supporting research into Australia-specific dairy genetic issues (such as fertility of cows). There is less of a case for using the same funds for supporting more-general dairy genetic research that might be applicable anywhere in the world. There is no support for any case for using dairy levy funds to support general biotechnology research that might be applicable anywhere in agriculture, anywhere in the world.

Processing Technology.

Given the multinational nature of dairy processing and manufacturing companies and the worldwide applicability of much of the technology, the case is weak for using levy funds for supporting research into milk processing and dairy products manufacturing. The case for using general revenue funds for such research is even weaker. One funding option might be to use a combination of levy funds and matching support from dairy processors or manufacturers, with appropriate treatment of the intellectual property issues.

Environmental Issues.

The case for obliging the DRDC to finance research into general environmental issues such as global warming—even if they are associated with dairy production—is weak, given the relatively small share of any benefits or costs attributable to Australia, let alone the dairy industry (see Edwards (1989) for instance). On the other hand, a reasonable case can be made for using DRDC funds to address actual or potential pollution problems associated specifically with dairy production, such as livestock waste management or irrigation-based salinity problems.

Economics and Policy.

Although the dairy industry might be a major beneficiary from economic research that leads to reductions in agricultural trade barriers, it is hard to separate the dairy industry from other industries in the context of WTO negotiations and analysis of their impacts. The beneficiaries from such 'transparency analysis' are widespread within Australia and among countries, and the dairy industry ought not to be asked to pay more than its fair share for such work.

New Product Development.

The private sector has reasonably strong commercial incentives to develop new products, where intellectual property can be protected by both trade secrecy and patents. Moreover, when product innovations are applicable in other countries, not just Australia, multinational firms involved in dairy processing and manufacturing are in a comparatively good position to appropriate the returns to investing in product development R&D. It is difficult to make a case for collective action by Australian dairy farmers, or for intervention by the Australian government, on the grounds of a private under-investment in this type of research.

Other Collective Actions.

Levy funds also might be used in future, as they have in the past, to finance other activities such as generic commodity promotion and industry public relations. In either of these cases, the justification for the use of any matching support is weaker than for most types of R&D, even though the problems of heterogeneity of interests and mismatching of the incidence of benefits and costs within the industry are likely to be significant. The real issue is that in such activities there might no longer be a strong link between the national interest and the collective industry interest. This raises doubts about whether it is appropriate even to allow the use of levy funds for promotion or public relations. The issue is whether in such activities 'self help' translates into 'help yourself', such that any industry benefits from this type of collective action are being achieved only at the expense of the nation as a whole. In any event, generic promotion is expensive folly in the current dairy market setting. Given the deregulation of the milk markets that was implemented in recent years, the only remaining price premia are constrained by actual or potential arbitrage within Australia, or between Australia and international markets. Hence, generic promotion mainly acts to shift sales from export to domestic markets, with no gains to producers (e.g., see Alston, Carman, and Chalfant 1994 or Hill, Piggott, and Griffith 2000). The same deregulation has also had implications for the benefits from different types of research, especially the distribution of the benefits (e.g. see Freebairn 1992).

These examples illustrate the ideas that all of the options involve mixed signals and different potential mixtures of funding approaches. A single policy approach such as funding based on an all-milk levy with 1:1 matching support is not likely to be the right recipe for most cases. Some approaches call for this recipe in combination with additional support from the federal or state government, or from the private sector. In other cases levy funding alone without the matching support, or some other different rate of matching support, might be apt. Some problems might call for broader-based industry funding (e.g., a levy on all the grazing industries). This funding could be raised by either a supplementary levy, or by using existing levy funds in a joint venture among RDCs. In some situations it might be (or at least perceived to be) more efficient and equitable to have a separate pool of funds based on levies on manufactured dairy products, as opposed to levies on milk. Furthermore, and importantly, some actions ought to be ruled out as not being in the national interest and thus not being a justifiable application of the government's taxing powers.

Questions about the optimal levy rate, or the optimal matching arrangement, and thus 'how much funding', are empirical questions that cannot be answered with in-principle arguments. If we believe that the 'democracy' problem continues to be an impediment to achieving an efficient total amount of funding, then a higher *marginal* rate of matching support from the federal government may be warranted on economic efficiency grounds. This could be achieved in a budget-neutral way by setting a lower rate of matching support for inframarginal spending, which is the converse of the approach of reducing the matching support at the margin that was recommended by the Industries Commission. As a practical matter, it is useful to look at the portfolio of recent past, current, and proposed (but unfunded) projects and ask of each: was it (or would it have been) a profitable investment from the national point of view, and who in the nation would have received the benefits? The answers to those questions ought to give guidance about the total funding base and priorities for support using DRDC funds.

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Impact of a Foot and Mouth Disease outbreak on Australia

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Control And Eradication Costs

The Impact Of Trade Restrictions

Loss Of Livestock Industry Revenue

In 2001, an outbreak of Foot and Mouth Disease (FMD) in the United Kingdom (UK) had a dramatic effect on rural areas in that country. This article looks at the possible effects that an outbreak of FMD would have on Australia. It draws on the Productivity Commission's recently completed study of the *Impact of a Foot and Mouth Disease outbreak on Australia*. The study is an input to the review that all governments and the livestock industries are currently undertaking into the prevention, preparedness for and management of major animal disease outbreaks such as FMD.

The study considered the economic, social and environmental impacts of three hypothetical FMD outbreak scenarios which were developed by the Commonwealth Department of Agriculture, Fisheries and Forestry — Australia (AFFA) in consultation with State Governments. The outbreak scenarios were:

- A small single point outbreak in the wheat-sheep zone of south west Western Australia, primarily affecting sheep. It lasts for around 3 months and results in the slaughter of 38 000 livestock to stamp out the disease.
- A medium outbreak lasting 6 months, which has been depicted as starting in north Queensland and spreading to central Queensland and the Northern Territory. The outbreak results in the slaughter of around 50 000 animals.
- A multi-state outbreak taking 12 months to control, which has been assumed to begin in southern New South Wales and to spread to Western Victoria and South East of South Australia. The outbreak involves the slaughter of around 750 000 animals.

Broadly, the impacts of an FMD outbreak arise from two sources:

- the costs of control and eradication of the disease itself; and
- the loss of revenue from the closure of export markets to Australian products.

While there would be some similarities in the economic and social impacts of an outbreak in Australia compared to the UK, there would also be some key differences. In particular, the far greater importance to Australia of livestock exports — almost \$10 billion in 2000-01, or 6 per cent of total exports — means that the trade effects of an outbreak would be far greater in Australia than was the case in the UK.

Control And Eradication Costs

A nationally agreed strategy to control an FMD outbreak is set out in the Australian Veterinary Emergency Plan. This strategy — known as 'stamping out' — includes:

- establishing a quarantine area around all known infections;
- slaughtering all infected herds and other herds that have been in 'dangerous contact' with them;
- disposing of animals;

² I am grateful for helpful comments on drafts, provided by Paul Donnelly, John Freebairn, Rick Lacey, John O'Connor, Phil Pardey, Roley Piggott, and Alistair Watson, as well as some workshop participants.

- disinfecting properties; and
- compensating stock owners for the livestock slaughtered as part of the stamping out activity.

Significant government and industry resources would be required to 'stamp out' FMD. The Commission estimates that control and compensation costs could range from around \$30 million for the 3 month outbreak scenario, to up to \$450 million for the 12 month scenario. Compensation for livestock slaughtered to control the disease could cost between \$4 million for a small outbreak scenario up to around \$40 million for a large outbreak.

Measures to control the disease could have an impact on other industries. For example, in the UK, control measures had a large effect on the tourism industry, although the relationship between the livestock and tourism industries is not as strong in Australia.

Control and eradication measures would have a significant social impact. Within control zones, there would be significant added pressures on individuals, communities and emergency workers from: loss of income; the trauma associated with the compulsory slaughter and disposal of livestock; the disruption and inconvenience associated with movement restrictions; the long hours of work (such as by emergency workers), often in stressful circumstances and the need to provide emotional support.

Drawing on the experience of previous animal disease outbreaks in Australia, the Productivity Commission noted that stresses arising from an outbreak, and the subsequent control and eradication procedures, could lead to a range of personal and family problems. In addition there could be disruption to the cohesiveness of affected communities. In many instances, the elimination of the disease would reduce the sources of stress and people's wellbeing would quickly recover. But some of the impacts identified above would result in longer-term problems. For instance, previous experience suggests that community divisions and antagonism can persist long after the event.

The potential environmental impacts of an FMD outbreak would be largely associated with the disposal of animal carcasses. Burial can lead to contamination of ground water by leachates from the disposal pit, while burning can also potentially contaminate soil. Despite the need for some remediation work on early disposal sites, monitoring of sites in the UK to date has found that no water sources used for public supply have been affected by FMD disposals. The key to minimising potential environmental problems is good preparation. Given the considerable work on carcass disposal that is underway in Australia, the Commission concluded that significant environmental problems could be avoided. However, this would involve ongoing monitoring and remediation costs as necessary.

The Impact Of Trade Restrictions

For a country such as Australia with major exports of livestock products, the loss of revenue from the trade restrictions which would result from an FMD outbreak would be far greater than costs arising from the control of the disease. This is in contrast to the UK which only has a small livestock product trade. Trade costs would be large because countries that are free from FMD will not import meat (or a range of other agricultural products) from FMD-infected countries for fear of importing the disease. This effectively divides the world market for meat in two — an FMD-free market (in which meat attracts a price premium) and an FMD-endemic market. Currently, Australia exports over 85 per cent of its beef and around 40 per cent of its sheep meat to FMD-free countries.

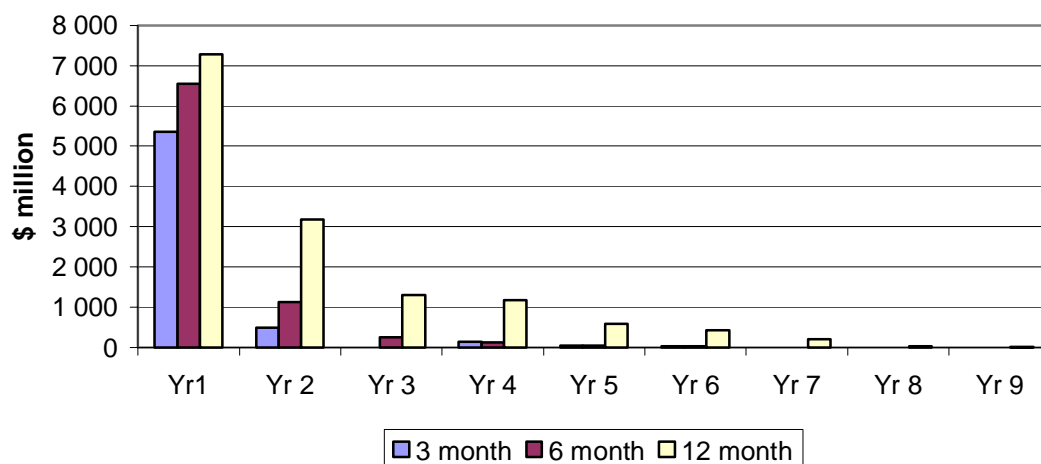
If there were an FMD outbreak in Australia, all markets for livestock commodities would immediately close. Countries that do not have FMD, and even some that do, would not reopen their markets to Australian meat products until at least three months after the disease was eradicated in Australia. Some exports to FMD-endemic countries could resume if they were satisfied that the risk of introducing a new strain of FMD was low. Because wool and dairy products can potentially also carry the virus, it is likely that there would be an initial disruption to exports of these commodities until assurances could be given that they had been treated to inactivate the virus.

The closure of export markets would have a severe effect on the livestock industry throughout the nation, irrespective of the location of the FMD outbreak within Australia. Export prices and returns to exporters would fall dramatically. A glut of meat would cause the domestic price of all meats to fall. This would further lower returns to producers and processors although, at the whole of economy level, it is largely a transfer to consumers. In turn, low prices would affect both farm production and domestic consumption of meat. Notwithstanding the reduction in prices, it is unlikely that all livestock production could be sold, raising the spectre of some on-farm culling of animals beyond that required to eradicate the disease.

Loss Of Livestock Industry Revenue

The Commission estimated that the cumulative loss in export and domestic market revenue to the livestock and meat processing industries would be around \$5 700 million for the single point outbreak scenario, rising to around \$12 800 million for an outbreak lasting 12 months. In each scenario, the period of revenue loss would extend well beyond the time taken to eradicate the disease owing to the need to rebuild international markets (see figure 1 and table 1).

Figure 1. Estimated revenue losses to the livestock industries for each outbreak scenario Annual loss in export and domestic market revenue



Source: PC estimates.

Table 1 Direct losses from the FMD outbreak scenarios

Outbreak	Livestock industry revenue loss ^a			Compensation and control costs	
	Exports	Domestic	Total	Compensation	Control
	\$m	\$m	\$m	\$m	\$m
3 month	3 333	2 373	5 706	4	20 – 25
6 month	4 611	2 994	7 605	19	130 – 150
12 month	9 480	3 332	12 812	41	360 – 420

^a Net present value of losses at the wholesale level over the outbreak.

Source: PC estimates.

With exports of around \$4 billion annually, the beef industry would be the hardest hit in each outbreak scenario, although there would also be significant costs to the sheepmeat and pigmeat industries.

As Australia's major beef producer and exporter, Queensland would be more affected than other States in absolute terms. While the losses in other States would be smaller, the effects would, nevertheless, be significant. For example, a number of the regions likely to suffer the largest relative losses in output would be in South Australia. The effects within States would not be uniform, but would generally be concentrated in inland rural areas where livestock intensity is greatest and where a high proportion of people are employed in livestock production and related businesses.

The revenue losses to the livestock and meat processing industries would have wider impacts on the national economy. The Commission estimates that the 12 month outbreak scenario would reduce Australia's Gross Domestic Product (GDP) by around \$2 000 million in the first year and by between \$8 000 million and \$13 000 million over 10 years. The effects of a 6 month outbreak on GDP would be around half that of the 12 month scenario (table 2).

Table 2 Impact of the outbreak scenarios on Gross Domestic Product

Outbreak scenario	Loss in the first year	Total loss ^a
	\$m	\$m
3 month	900	2 000 – 3 000
6 month	1 400	3 000 – 5 000
12 month	2 000	8 000 – 13 000

^a Net present value of losses at the wholesale level over the outbreak.

Source: PC estimates.

Reflecting the direct impacts, activity and employment levels in the livestock industries would be substantially reduced. For instance, employment in beef production and meat processing could fall by up to 30 per cent. The indirect impacts would also be significant. Employment in industries supplying inputs to livestock production would also fall, such as the workforce in road transport and in the agricultural equipment industry.

However, the Commission's modelling also shows that activity in some industries would increase, partially offsetting the livestock industry losses. For example, the loss of export markets for livestock commodities would add to pressure for a depreciation of the exchange rate. This could result in higher exports from other sectors of the economy, such as the mining industry and some manufacturing industries. It could also result in any initial adverse effect on tourism being offset over the recovery period.

Previous outbreaks and natural disasters have identified financial stress or hardship as one of the main causes of adverse social impacts. In the case of FMD, significant social effects would not be confined to the control zones — an outbreak would cause financial stress throughout rural communities in Australia. Many more people would be adversely affected through trade losses than through the disease control measures.

The Commission's study found that the economic and social effects of an outbreak could be significantly reduced if FMD-free trade zones could be established in Australia, which would allow unaffected areas to continue trading. It also found that emergency ring vaccination of livestock is likely to be an appropriate policy option whenever it could materially reduce the length of an outbreak.

The full report is available on the Productivity Commission website at www.pc.gov.au

Going On The Land – and Getting Off It: Farm Incomes And Farm Adjustment

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Introduction

Rural incomes are not farm incomes

Income instability and the high media profile of farm income issues

Are low farm incomes a welfare or work satisfaction issue?

Is the persistence of small farms due to a lack of exits or too many entrants?

Conclusion

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Introduction

The movement of people out of farming, and into it, and the livelihood of farmers relative to non-farmers have long been subjects of considerable interest and importance in agricultural, political, social and economic debate in Australia. This paper was a response to a request for some reflections on the "farm income problem". It reviews some of the findings of recent research into the patterns of structural adjustment in contemporary Australian agriculture. Readers seeking further detail are directed to (Barr and Karunaratne 2002; Barr, Wilkinson and Karunaratne 2002; Barr 2001).

Rural incomes are not farm incomes

In my work for the National Land and Water Resources Audit I was asked to consider 'capacity to change' to more 'sustainable' farming systems. One way of approaching this question was to look at farm family income. Deciding to take the simple approach I used the Australian Population and Housing Census. The most recent census in 1996 was a period of 'average' real commodity prices for many industries. Wine grape prices were clearly above the long term price trend and wool was below the long term trend (Figure 1).

A simple histogram comparison of farm family and Australian family incomes showed a great deal of similarity. The reaction to this was surprising. Reviewers questioned the results. When I asked for reviewers to send me the evidence that this data was wrong, two issues emerged. One was the obvious widespread media image of hard times on the farm.

We have all heard these stories in the general media. I am now hearing many of the good income stories, but mostly on the Country Hour. While many of my colleagues had heard the general media stories, few listened to the Country Hour. I also received a number of articles that reported a substantial difference in income between rural and urban Australia.

It became clear that for some of my reviewers the terms 'rural' and 'farm' were inter-changeable. Farmers are not only a minority of Australians, but also a minority of rural Australians. Farmers as a group also generally have higher average incomes than the rest of the rural population that includes many low income earners in rural towns (Figure 2 portrays income distributions for Victorian farm families, Melbourne families and other rural Victorian families).

³ This article was presented as a paper to the AARES 2002 Pre-Conference Workshop, "Rural Livelihoods and Adjustment."

Tony Gleeson has written of the widespread unjustified interchangeability of the words “rural” and “farm” in popular policy debate (Gleeson 2000). This confusion is to the advantage of some players in this debate. There is poverty in both farm and non-farm sectors of the Australian community. The farm constituency is in danger of overplaying its hand if it argues for special consideration

Figure 1: Indexed prices received for major agricultural commodities 1981-1999 (Source ABARE)

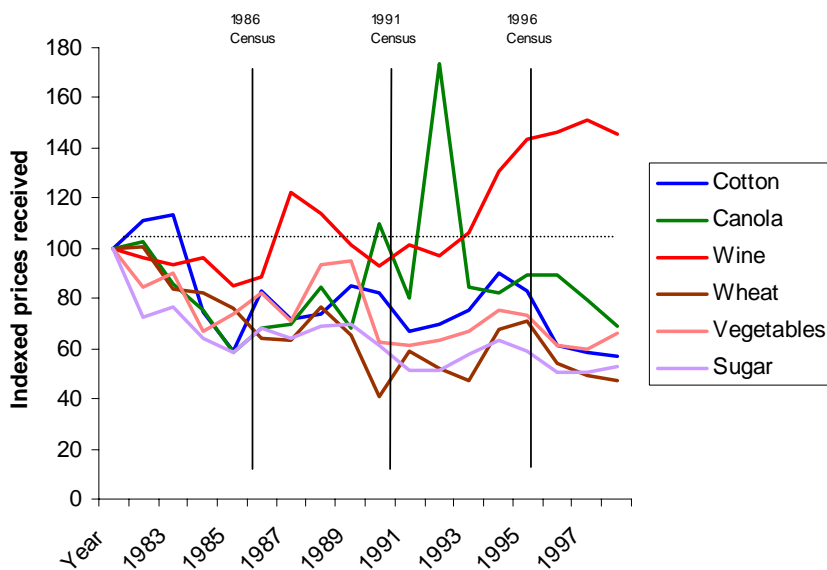
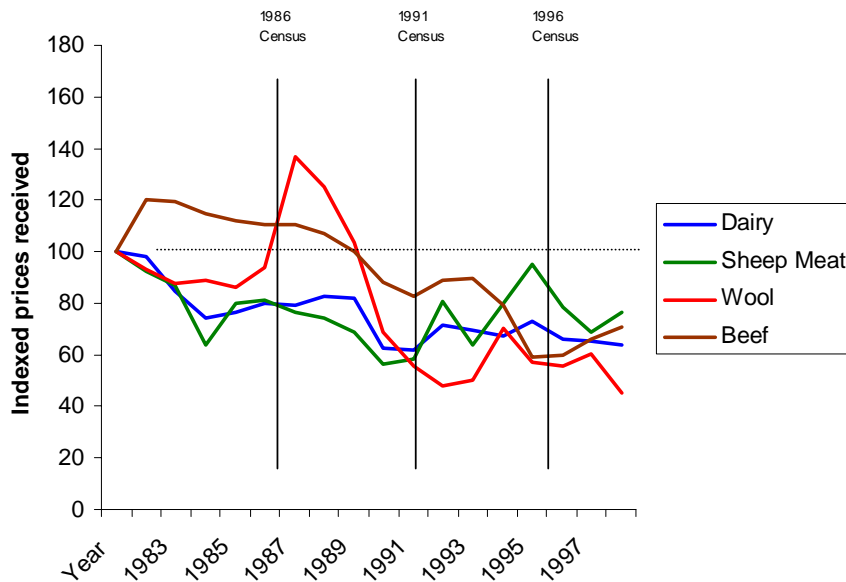
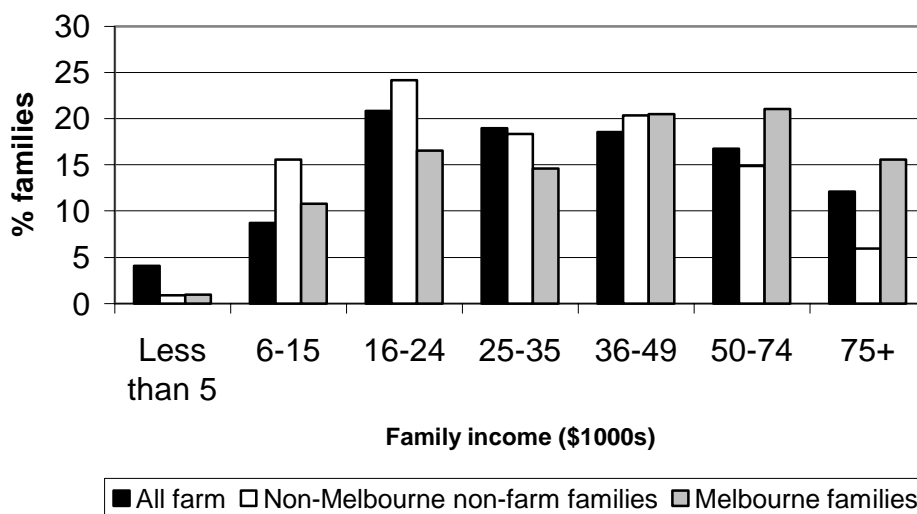


Figure 2: Victorian family incomes and farm family incomes 1996 (Source: ABS Population and Housing Census 1996)



Income instability and the high media profile of farm income issues

There is a wealth of research literature establishing a link between low incomes and indicators of well-being including raised mortality (Kaplan and Lynch 1997). Research on the link between income stability and well-being is uncommon because of the paucity of data sets with longitudinal income and well-being information. One of the best data sets is the Panel Study of Income Dynamics that has tracked the trajectories of 5,000 US families over more than 30 years (Duncan 1999). The PSID data has shown that income variability also significantly increases mortality risk, but only in the middle classes (McDonough *et al.* 1997).

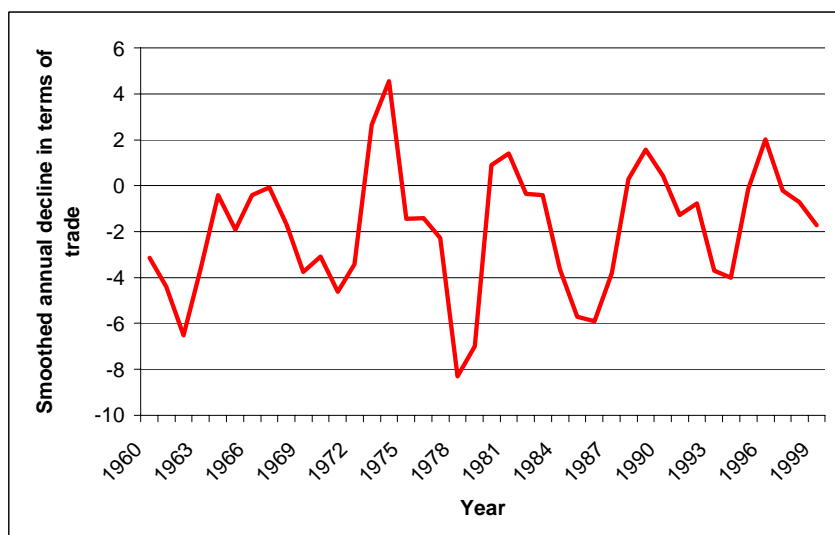
One explanation of this is that the disadvantages of low incomes and the advantages of high incomes overwhelm the effect of income variability. The risks of income variability are greatest for the middle classes. Presumably increased risk of mortality is an indicator of less severe disorders such as stress and depression.

This research finding is particularly relevant to the farm community. Farm families can be described as having a middle class income profile. Farm incomes are characterised by high variability (Figure 3). As part of the National Land and Water Resources Audit John Cary used income and farm practice data from ABARE to look at predictors of adoption of changed farm practices. He found perceptions of future income stability was a better predictor of behaviour than actual income (Cary *et al.* 2001). In previous work with Victorian dairy farmers Ruth Weston found stress attributed to poor incomes was only marginally related to income, but was strongly related to how incomes were construed (Weston and Cary 1979).

The sense of income future and security is strongly mediated by personality factors as well as the environment. There is some emerging evidence that farmers may well have a limited number of personality sets, some of which may be incompatible with current policy towards both risk management behaviour and community group program delivery (Shrapnel and Davie 2000).

These findings raise an interesting question for both industry policy and natural resource policy. Industry deregulation is justified by its potential to increase aggregate industry income. Presumably increased income is justified by the improvement in quality of life this affords. Is it possible we may increase income overall, but may increase dissatisfaction and sense of well-being at the same time? It may also explain the media profile of farm family welfare issues.

Figure 3: Rate of change in Australian farmers terms of trade (5 year smoothed)



(Derived from ABARE data)

Are low farm incomes a welfare or work satisfaction issue?

Small farms dominate the count of Australian farms. Despite their numbers small farms contribute little to total value of production. Using data from the 1997 Agricultural Census we can talk about a 10-50 rule. The largest 10 per cent of farms produced 50 per cent of the total value of production. The obverse was also true. The smallest 50 per cent of farms produced ten per cent of the total value of production.

Despite the large number of small farms, it cannot be assumed this indicates the existence of a welfare problem. In Victoria there is very little relationship between farm family income and farm size. Areas with larger numbers of small farms often had the largest average farm family incomes (Figure 4 and Figure 5).

During much of the 1990s farm family incomes were dependent on off-farm employment in many industries during much of the commodity price cycle (Rasheed, Rodriguez and Garnaut 1998). In industries such as beef or wool production, rural concern over poor commodity prices might have been construed not as an income problem but as a job satisfaction problem.

Figure 4: Comparison of the geographic distributions of small farms and low farm family incomes averaged over three censuses (1986, 1991 and 1996)

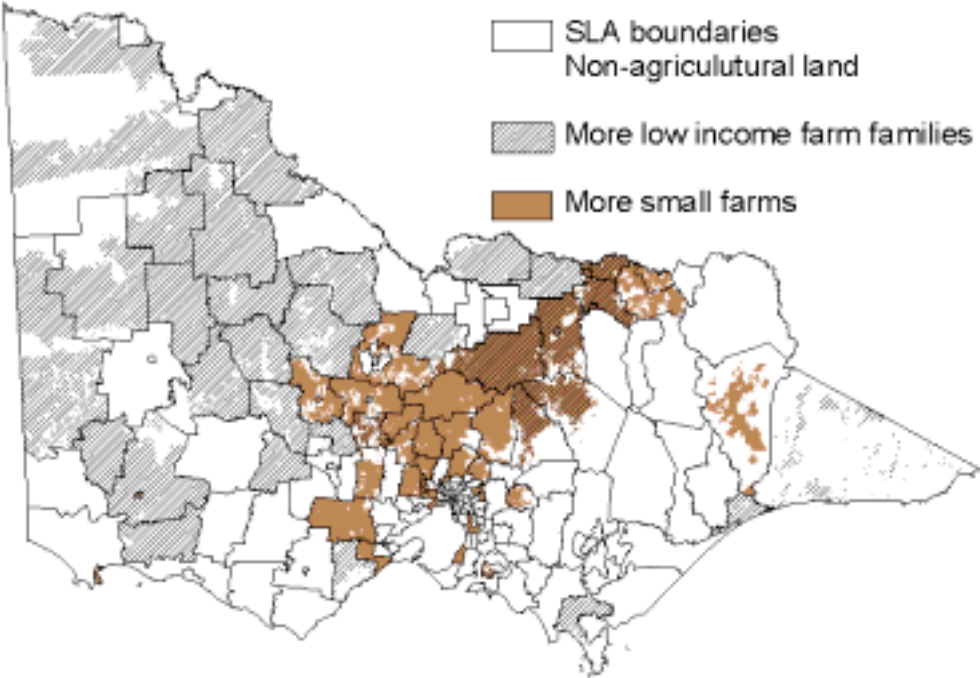
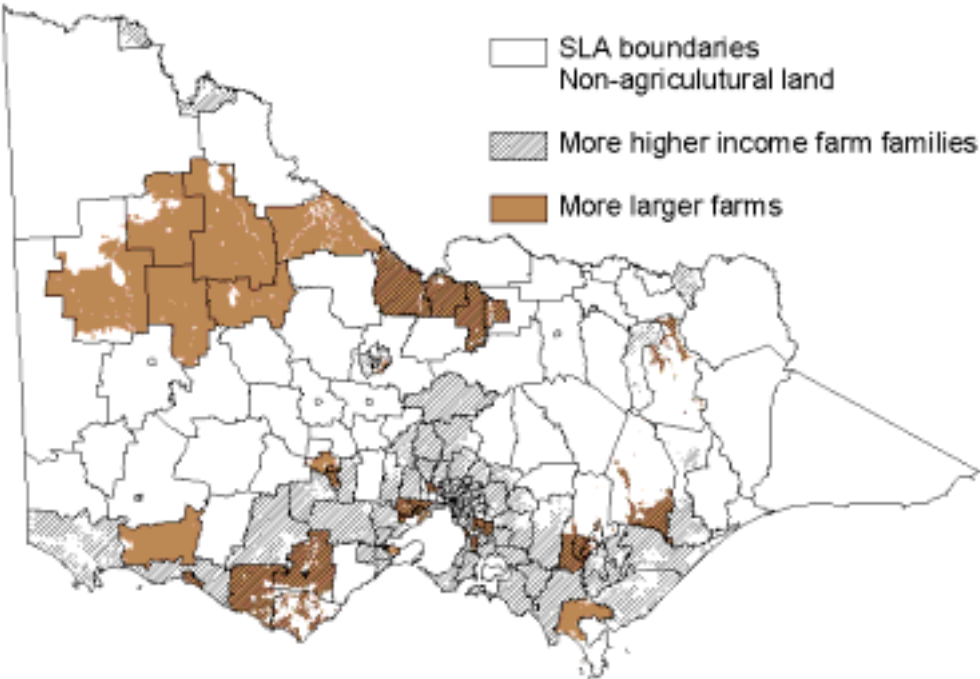


Figure 5: Comparison of the geographic distributions of larger farms and higher farm family incomes averaged over three censuses (1986, 1991 and 1996)



Is the persistence of small farms due to a lack of exits or too many entrants?

The inexorable pressure of terms of trade in agriculture is generally downwards in the longer term. Continuing productivity improvements in agriculture, competition for resources and relatively inelastic demand for many agricultural products drives this pressure. Farming has been likened to surfing in front of the terms of trade wave. Striving for productivity improvements keeps one in front of the wave. But the aggregate effect of the striving by agricultural producers is to fuel the wave's continued progress (Owen 1966).

Capturing productivity gains is one means of keeping ahead of the terms of trade decline. For broadacre businesses productivity improvements can come in many forms. There is accumulating evidence that it is the largest Australian farms that are capturing much of the productivity improvements in agriculture (Ha and Chapman 2000; O'Neill and Strappazzon 2000; Australasian Agribusiness Services 1997; Knopke, Strappazzon and Mullen 1995). These researchers estimate much of the productivity improvement is captured by the largest third of farms or even the largest 10 per cent of farm businesses. The smallest third of farms are capturing very little productivity increase.

Conventional analysis of agricultural adjustment would suggest that the lack of productivity gains in the small farm sector will lead to the gradual disappearance of the sector. (Jackson-Smith 1999) described this implicit model thus:

Over time most analysts have adopted an implicit model of structural change that is driven by the relative economic viability of different types of farms. A focus on competition in the market place as a key mechanism for structural change has led to the common, but largely untested, belief that most change occurs via the involuntary exit of farmers who could not compete, and the (inevitable) adaptations of those who remain in business.

Farm entry is a major factor inhibiting farm amalgamation.

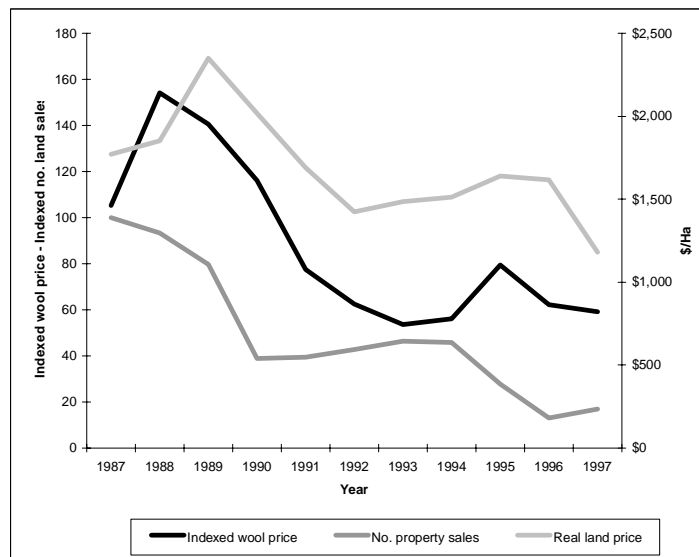
While the average annual rate of decline in the number of Australian farmers was 2.1 per cent between 1986 and 1996, the national annual rate of entry was 3.5 per cent and the national annual rate of exit was 5.7 per cent. The pattern of entries and exits is not consistent across rural Australia. Rates of entry and exit in the cropping zone are low. These areas can truly be described as 'tightly held'. Rates of entry are high in the rangelands and in higher amenity regions where there is an abundance of small farm establishments (for example in proximity to many major regional centres).

The high rates of entry to farming in amenity regions are consistent with the finding of researchers in north America and Europe that the desire to enter farming is strong despite the riskiness of the profession. New entrants have lower equity and are less buffered against fluctuating commodity prices and seasonal conditions. Higher levels of debt make these new businesses much more likely to fail (Lindsay and Gleeson 1997). Despite these risks, there is a continuing interest in entering farming, often based upon unrealistic expectations of the chance of success (Stayner 1997; Reeve and Kaine 1996).

Poor commodity prices will not immediately accelerate exits from farming

Figure 6 shows the behaviour of the land market in Victoria's wool producing areas during the 1980s and 1990s. This gives another insight into the selling behaviour of owners of small properties. What we see in this graph is potential vendors hanging on through the lows of the price cycle till they get their superannuation cashed out when commodity prices rebound. Farm amalgamation was limited. Reasons for this limited occupational mobility can be explained by rational behaviour choices of Victoria's wool producers.

Figure 6: Wool prices, wool property values and property sales in Victoria for the period 1987-97



There are clear family life-cycle and labour market based explanations for this limited occupational mobility. Many wool producers are in the middle stages of their career. An attempt to change career may well be a poor investment of their human capital. Their skills are in the sheep industry, many have limited formal education and few remaining years in which to capitalise on an investment in new skills (Clark, Kreps and Spengler 1978).

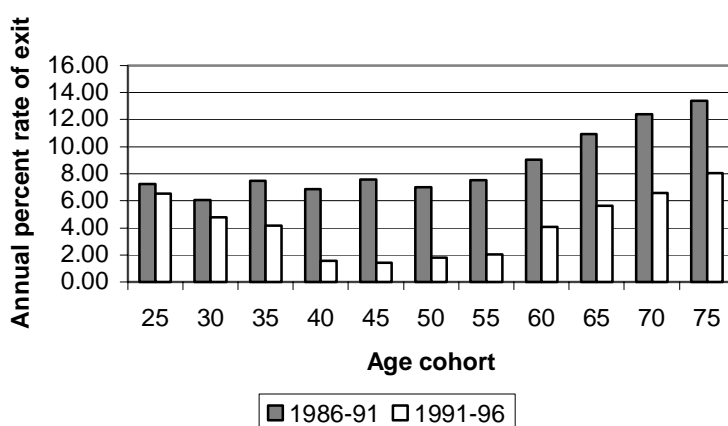
During the 1990s the regional job market offered little prospect of farmers improving their incomes. Those with off-farm work would be unlikely to improve their financial position by quitting the farm. The resulting immobility is portrayed in Figure 7. It is probable that relationship breakdown rather than direct financial pressure is the major reason for farm exit in this age group during lows in the commodity price cycle. In a study of the decision to exit farming in northern Victoria, spouse satisfaction with marriage and family life was found to be the strongest indicator of future exit decisions (Barr 1999).

For the many sheep farmers in their late career years, the farm is the asset that can provide income security in retirement. With limited prospects of improving incomes by quitting farming, any decision to sell the farm during a period of low demand for farmland would threaten retirement security. Many older farmers sensibly delay plans to sell land during periods of poor commodity prices.

Older farmers whose children have decided not to enter farming as a career do not have an incentive to step aside from the farm to allow their children to take over its management. Their easiest course of action is to remain in farming for as long as they are healthy and able to enjoy it.

Decisions to leave woolgrowing, or to not even enter the industry, have thus become concentrated during the early career of the following generation. For these young people, career and lifestyle opportunities in the city are much greater and more enticing than they were for their parents whose formative years may coincided with more favourable wool prices.

Figure 7: Estimated annual per cent rate of exit from Victorian sheep farming by age 1986-91 and 1991-96



It is not necessarily the owners of the smallest farms who will leave in response to economic signals.

An important means of capturing productivity increases is the adoption of more efficient methods of farming. These practices often require increasing the scale of farming enterprises to capture their advantages. This is particular difficult for small farms. They have a lesser capacity to generate a financial surplus and will find it difficult to compete against larger farm businesses or other new entrants.

Secondly, small farms are often in regions where amenity-based land values render land purchase a poor business option. Figure 8 shows the ratio of land value per hectare to the gross value of production per hectare for agricultural land during the 1990s. Areas of high ratio correspond closely to areas where small farms occupy a relatively larger proportion of the landscape.

These high ratios reflect both a high amenity value for land with attractive topography and proximity to urban services, and also the greater housing component in property values created by the closer settlement. It is logical to assume that in these areas the path to improved farm productivity through land purchase is unlikely to be an economically attractive option for broadacre agricultural activity. Interviews with Victorian farm financial counsellors generally confirm that the greatest threat to the short to medium term survival of a farm business is an ill-timed purchase of over-priced land (Madden 1996).

The resulting pattern of land ownership in these areas is a combination of unstable tenure associated with farm business aspirations or stable tenure associated with lifestyle choices. An example is the Nyah irrigation district as discussed in (Barr and Cary 1992).

This behaviour helps explain the observation that the extinction of farm businesses is greatest amongst mid-sized farms (see Figure 9). The disappearance of these middle-sized farms is relative rather than absolute. Bifurcation of the Australian farm sector is being caused by differential rates of farm number decline in differing areas of rural Australia.

The area contributing to the relatively low rates of decline in small farm numbers is along the slopes of the Great Dividing Range and the cropping zone from North East Victoria to central Queensland. The number of small farms in this region fell little, or even rose locally between 1986 and 1996. The decline in the number of farms with Estimated Value of Agricultural Operations between \$50,000 and \$160,000 was most apparent across much of the 'broadacre heartland' of Australia.

This includes the wheat belts of Victoria, South Australia and Western Australia. In these areas, farms with EVAOs between \$50,000 and \$160,000 are considered small farms. There are very few farms with EVAOs below \$50,000. Where farm aggregation is occurring, the farms being purchased for aggregation are the middle sized rather than the smaller, mainly because there are no truly small farms in many of these areas.

Figure 8: Ratio of land value to value of production in 1997 (based upon parish data supplied by ABS and the Victorian Valuer General's office)

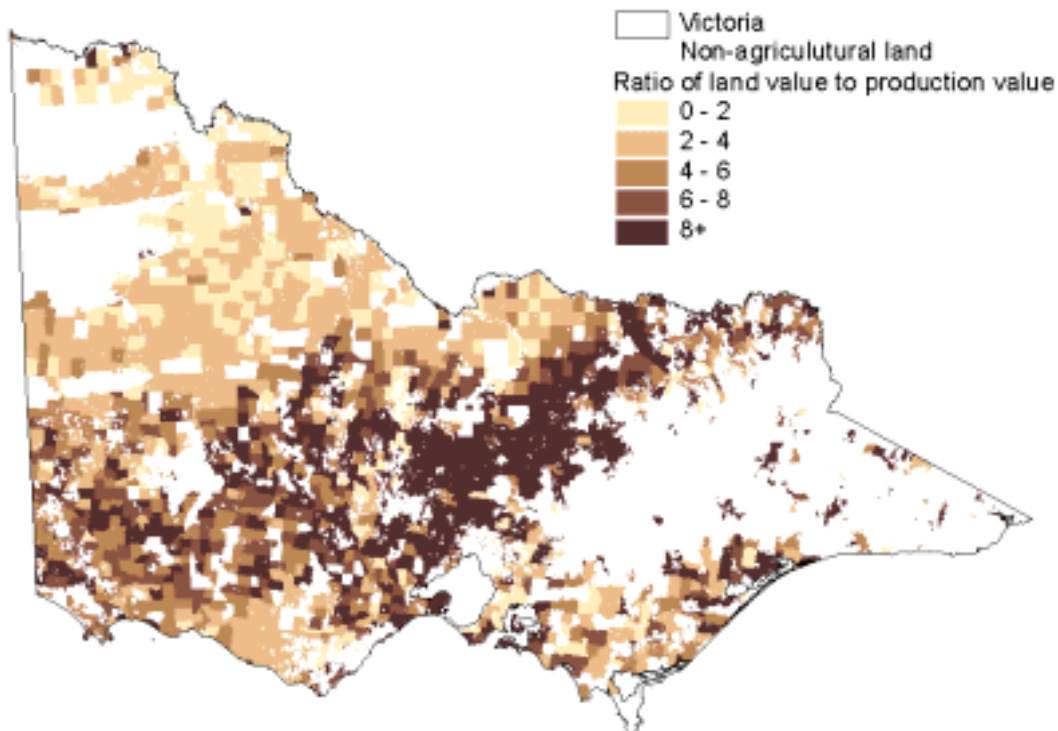
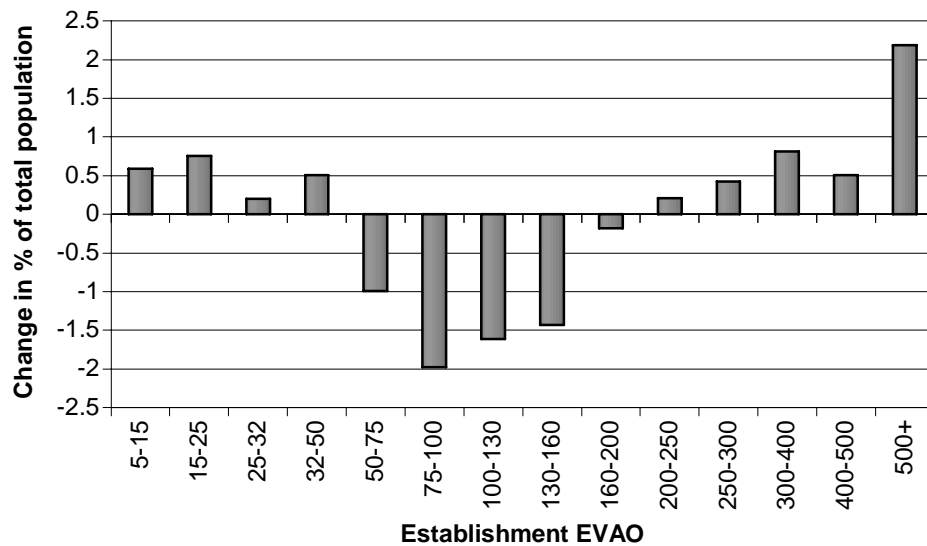


Figure 9: Change in number of farm establishments by Estimated Value of Agricultural Operations cohort as a per cent of all farm establishments within cohort: 1986-96(using constant 1996 dollars)



Conclusion

The continuing abundance of large numbers of small Australian farms has been a target of agricultural policy for a number of decades in the late 20th century. The objective of successive rural adjustment policies has been the facilitation of a restructured agriculture characterised by a far smaller number of much larger farms capable of providing a reasonable return on capital.

It is now recognised that many of the policy tools used in the past to pursue this objective have been unsuccessful (McColl, Donald and Shearer 1997). Thirty or more years of persistence with these tools is perhaps an indication of a misunderstanding of the nature of agricultural adjustment. Boehlje has summarised a number of implicit models of agricultural adjustment used by policy makers (Boehlje 1992):

- the technology model emphasises the long run cost curve and the pressure to innovate to decrease marginal costs;
- the human capital model emphasises managerial capacity, household economics and relative incomes in industries;
- the financial model emphasises the objective of maximising farmer wealth;
- the institutional model emphasises market competitiveness and the ideal of the market; and
- the sociological model emphasises family dynamics, life cycles and their impact upon farm business decision-making. It is ironic that much of the serious work on the 'sociological' model has been reported in the economic literature.

Boehlje argued that a full understanding of the process of structural change could not be achieved by relying upon less than the insights of all five models. Australian policy on agricultural adjustment has accommodated the insights of the first four of Boehlje's models, but has often had trouble accommodating the insights of the sociological model of structural change.

It is possible to argue that the lack of a comprehensive understanding of the rural adjustment process has allowed thirty years of policy to be based upon unrealistic expectations of agricultural regions' potential futures and unrealistic expectations of policy interventions.

With our nation having set a new policy challenge for rural regions based upon natural resource management imperatives, it would be advisable to more fully inform ourselves of the nature of adjustment in our agricultural industries and potential transformations of rural areas. Good policy will be well informed about, and deal with, real phenomenon - not poorly informed perceptions of the farm sector.

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Triple Bottom Line Accounting: How Serious Is It?

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What is TBL?

Current environmental accounting efforts

New prospects

Quantification

Just technicalities or ethics?

References

It would be a provocative statement these days to assert that 'triple bottom line' (TBL) accounting is just empty rhetoric. The question is, what do we actually mean by TBL? Can it be operationalised, and if so, how?

What is TBL?

TBL is an expression referring to three key dimensions of business performance: financial, environmental and social. In the private sector, financial performance reflects success in the marketplace and stewardship to shareholders. Environmental performance reflects compliance with government regulations and stewardship to a growing class of customers. Social performance reflects stakeholder management, or partnership - in particular the workforce and local and neighbouring populations.

Current environmental accounting efforts

Within the current practice of business accounting, there is, strictly speaking, no such thing as TBL. What we have is, first, what Schaltegger and Burritt (2000) call environmentally related financial accounting (ERFA). This includes the cost accounting of on-going environmental management activities and the financial accounting of environmentally related investments. Neither is simple. For both, accountants face the longstanding problem of cost allocation.

How are we to know how much of an investment was 'environmentally related'? Replacing old polluting equipment with a new cleaner one could have happened irrespective of pollution considerations if the equipment needed replacing anyway – because it had become obsolete or dysfunctional. Different rules can be, and have been, imagined, but without standardisation they are bound to appear to some degree arbitrary.

Secondly, we have ecological accounting, or environmental impact accounting. While ERFA is done in monetary terms, ecological accounting is done in physical units, such as tonnes of CO₂ or SO₂ emitted per year, kilolitres of wastewater into water bodies, hectares of land disturbed through logging, mining or clearing, etc. ERFA examined the impacts of environmental management on the firm's financial status; ecological accounting examines the impacts of the firm's activities and products on the environment.

Schaltegger et al. (1996) develop the concept of environmental impact added (EIA). An obvious problem is consolidation and aggregation. How do you add up different physical quantities? One – partial – solution is to use what we may call (Lesourd and Schilizzi, 2001, p. 118) 'functional aggregation'. An example is in terms of global warming potential (GWP), where e.g. one kg of nitrous oxide is equated to 310 kg of CO₂. However, different environmental functions cannot readily be aggregated (e.g. GWP, and soil and water acidification potential).

Another aspect of ecological accounting appears when the focus shifts from activity-based to product-based accounting. The former leads to so-called eco-balance accounting, where a given economic unit uses an accounting framework in the form of an input-output materials-balance to track all potential pollutants and environmental impacts.

On the input side you have natural resource use and on the output side you have emissions to land, water and air, as well as biological disturbances. Product-based environmental accounting has led to so-called product life-cycle assessment (LCA). Here the firm tries to account for the environmental impact of its products in terms of manufacturing, packaging, use and final disposal. Interestingly, this apparently technical issue has correlated with an intense debate on the firm's responsibilities: just how far does its responsibilities extend beyond its field of direct control?

Instructions on packages about how to use and dispose of the product have become a focus of attention. Unfortunately, the legal aspects have far outperformed the technical ones: LCA is still a controversial technique that lacks the necessary level of standardisation, partly because it is so hard to standardise!

Ideally, we would like to integrate both types of environmental accounting, as well as any system of social accounting, with financial accounts. We are a long way off. There are efforts, in particular in the German-speaking and Scandinavian countries, to implement eco-financially integrated accounts, stemming from Müller-Wenk's seminal work on 'environmental impact points' in 1978.

These countries have mainly focused on integrating cost accounting and ongoing environmental impacts. Recently, Schaltegger and others, mainly in Switzerland, have tried to link financial accounting to 'environmental investments' (and disinvestments), but the reality of potential liabilities – both environmental and social – still eludes current solutions.

New prospects

TBL accounting - translating environmental and social liabilities into financial terms - can become a reality, however, provided current accounting techniques and frameworks evolve in a specific manner.

Technically, only financial performance is measured in a clearly regulated and quantitative way. Environmental accounts do exist, but they are not (yet?) regulated and are not easily comparable across sectors or companies, or between countries. And social accounting is still in its infancy. Most importantly, there is no accepted framework to bring all three dimensions consistently together.

In this context, what is TBL accounting supposed to mean? Reminiscent of the use of the term 'sustainability', it signals a willingness to show concern for the three dimensions of business performance, as opposed to a single-minded focus on 'just profits'.

At worst, TBL may be seen as a spin doctor's exercise in PR. At best, however, it signals a genuine desire to perform well in all three areas – motivated by what customers, consumers, government and society at large think and feel.

Because, very simply, upsetting customers, consumers and government is likely to bring on extra costs. This may happen as reduced market share, new and more stringent regulations, or loss of access to key resources, leading to a likely fall in the value of company shares. In the process, a company will lose some of its clients' trust or loyalty, and suffer image and reputation damage: in other words, a loss of social capital.

There is growing evidence that good reputation in terms of environmental and social management pays when it comes to investors' choices on the stock market, even if the link is more of a correlation than a clear causal relationship.

For example (Lesourd and Schilizzi, 2001: p. 232-9), stock indexes such as the Domini 400 Social Index have slightly outperformed the Standard and Poor 500 Index over the last decade or so, and this generalises to most 'sustainable business' indexes.

Environmental and social impacts, then, are materially important to a company insofar as they are likely to lead, sooner or later, to higher costs or liabilities. Indeed, disgruntled stakeholders constitute just such a liability. This liability is a contingent liability, however: it eventuates only if government or civil society take action.

As a result, a proactive, strategic attitude is needed that clashes, in many ways, with the standard approach to business accounting. But then, standard accounting, and financial accounting in particular, is, as Kierkegaard (1997) and others have been increasingly pointing out, in crisis. There is as yet no accounting system which reliably and timely predicts bankruptcy!

Quantification

The crux of the matter is that it is very difficult, at present, to measure and quantify a contingent liability. It is in the future and it is uncertain: financial losses may never eventuate, or they may be huge. This redefines what TBL accounting should be all about, if it is to mean anything real.

What initially started out as a philosophy of social duty must now be seen as a technical challenge. Currently, there is no easy way to translate environmental and social liabilities into financial terms. And yet, such liabilities are as real as any other. All that is needed is to pin a number on them.

The good news is that there is hope. It should be possible to develop techniques to estimate and quantify such liabilities. The bad news is that it is not easy, at least not yet. The solution to the problem should come from bringing together insights from financial economics and from environmental economics: by combining option valuation techniques with non-market valuation techniques.

The approach holding most promise, it seems, is that of real options valuation. The standard reference to this approach is Dixit and Pindyck's (1994) remarkable book, "Investment under Uncertainty". The next step should be to include consideration of unpriced assets, whether natural or social capital.

In the public sector, TBL accounting can involve three areas of separate accounting; but in the private sector, it can only mean an end result in terms of financial outcomes. From the company's point of view, implementing new accounting techniques that reflect TBL concerns will also reflect stakeholders' level of satisfaction.

Just technicalities or ethics?

Will ethics disappear behind technicalities? No. In considering an uncertain future, the rate at which decision makers discount future financial impacts, and their willingness to take risks when others' interests are at stake, both involve ethical aspects. It may then be up to government, the legal system or consumer organisations to influence managers' risk attitudes and approaches to discounting. There seems to be as yet an unfathomed link between risk attitudes, discounting of the future and equity considerations!

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WTO Doha Round: the opportunity of a century to liberalise farm trade

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The new negotiations in the World Trade Organisation (WTO) are a unique opportunity for the world to fix a global problem that has persisted for half a century. Protectionism in world agricultural trade is an enduring and costly mess that causes social and economic damage in developed and developing countries alike.

Director General of the WTO, Mike Moore, said at the United Nations' 'Financing for Development Summit' in Monterrey this year, "If governments put their minds to it, the new trade round launched at Doha can bring huge benefits. The World Bank's Global Economic Prospects report estimates that abolishing all trade barriers could boost global income by US\$2.8 trillion and lift 320 million people out of poverty".⁴

Agriculture is the backbone of almost all developing countries. Yet, massive agricultural support in the rich world undercuts developing countries and forces even the most efficient producers out of the marketplace. The return to developing countries from agricultural trade liberalisation would be eight times all the debt relief granted by the developed world thus far.

Some people say that it is not 'politically realistic' to expect free trade in agriculture. That view is wrong. The troubles with agricultural trade have not occurred by accident. They are a man-made problem. Therefore, they can be un-made. Playing the 'politically realistic' game is irresolute and narrow-minded and more suited to the actors in the 'Yes Minister' television series. What was yesterday's politically 'impossible', such as the fall of the Berlin Wall, is today's common sense. Liberal trade for agriculture is a possibility. We know that it is a difficult thing to achieve, but assertions that it is not politically feasible should be rejected.

The disappointing and untimely outcome of the 2002 farm bill debate in the United States might also seem good enough reason to think that agricultural trade liberalisation is out of reach. Although understandable, such a reaction is mistaken.

It is true that the 2002 farm bill represents a significant departure from the 1996 'Freedom to Farm' policy designed to wean farmers off the public purse. Described by the Washington Post as "the mother of all pork"⁵ the 2002 farm bill increases government support for American agriculture, which damages the proper functioning of world agricultural markets. Nevertheless, it would be wrong to walk away from Washington.

The formal position of the United States Government in the current round of negotiations in the World Trade Organisation (WTO) is closely aligned with that of the Australian-led Cairns Group. A cluster analysis of the negotiating positions of all 145 members of the WTO by the Danish Research Institute of Food Economics⁶ shows that the United States and the Cairns Group have many similar objectives for agriculture reform. It is the European Union (EU) that is isolated in its position of opposing substantial reform of agriculture policy and in seeking negotiations on so-called multifunctionality, animal welfare and the environment.

In market access the European Union's negotiating proposal would do little to address tariff peaks or tariff escalation, areas that the United States, the Cairns Group and developing countries have targeted for reform. The United States and the Cairns Group have proposed the elimination of the special agricultural safeguard, while the European Union wishes to retain it. The United States, the Cairns Group and developing countries have lined up against the EU with robust demands to reduce and eventually eliminate export subsidies. In domestic support the United States, the Cairns Group and developing countries have called for the blue box to be subject to reduction commitments followed

⁴ Moore, M. (2002) Summit-level opening speech, Monterrey, 21 March, UN Financing for Development Conference.

⁵ Editorial, (2002) "The Mother of All Pork", Washington Post, Monday February 18, page A22

⁶ Bjornskov & Lind (2002) "EU Isolated from the Rest of the World", WTO Negotiations and Changes in Agricultural and Trade Policies, Policy Brief 1, Danish Research Institute of Food Economics.

by elimination. The EU wants to retain the blue box, which it considers critical to the multifunctional role of agriculture.

None would suggest that Australia and the United States see eye-to-eye on every issue in the WTO. For example, Australia is likely to line up with the developing countries in seeking constraints on the green box, a move that will be opposed by the US. The bottom line, however, is that the Cairns Group and the United States have mostly compatible policy objectives and both groups have greater potential to achieve their objectives by cooperating than by working alone.

Throughout the farm bill debate there were many brave and sensible voices calling for reform of US agriculture policy. In the Congress, Senator Richard Lugar, Ranking Republican Member of the Senate Agriculture Committee, said in an editorial in the New York Times, "If agriculture policy is to change, new forces must become engaged".⁷ Senator Lugar is correct. For farm policy to change, new political forces inside the United States must become engaged in the debate.

There is no more powerful country than America to fight for the broad mass of people in the world and it is in Australia's interests to support the American leadership that wants to see change. The issue for Australia, therefore, is to find ways of working with Washington to build and consolidate a consensus in favour of agricultural trade reform. US leadership is the key to reforming the international trading system for agriculture. The US has provided strong international leadership for trade reform in manufactured goods and with the election of the Bush administration there remains a strong ideological commitment to free trade.

Negotiations on agriculture have been taking place in the WTO over the past two years and in November 2001 those 'sectoral' negotiations were consolidated into the broader 'Doha Round'. But just as a horse can be dragged to water and not made to drink, so negotiations can be started but not made to yield results. It was US leadership under Ambassador Zoellick that brokered the deal at Doha. What the world needs now is another injection of American leadership to put some horsepower under the talks. Without a further injection of leadership we run the risk of repeating the results of the Uruguay Round, where overall reductions in protection were limited, largely because of loopholes in the Agreement on Agriculture. In short, the Uruguay Round outcome permitted countries to meet the letter of the agreement but not its spirit.

By working together, the United States and the Cairns Group can overcome the defensive stance of the European Union and provide global leadership to support a visionary and bold result for agriculture in the Doha Round. To encourage this process, Australian agribusiness leaders and the National Farmers' Federation (NFF) are working with agribusiness leaders in America to support the Cordell Hull Institute in Washington, D.C. in an effort to start and promote a process for overcoming the hurdles to agriculture reform in the WTO.

In May 2002, the Cordell Hull Institute, which is a non-profit educational foundation dedicated to fostering initiative and leadership in international trade policy, hosted a trade policy roundtable in Washington, D.C. NFF and Australian agribusiness leaders participated in the roundtable, which developed a process for ongoing trade policy engagement throughout the Doha negotiations.

This important initiative has shown that Australia and the United States have placed agriculture at the 'heart' of the Doha negotiations and that there will be no progress in other parts of the Doha Round until serious progress is made on agriculture. The WTO's credibility as a trade liberalising body is at stake with this issue. In the 21st century the world deserves nothing less than to extend to agriculture the same treatment that it has extended to trade in manufactured goods. Turning the minority in the US who are campaigning for reform of world agricultural trade into the majority and securing US leadership is the place to start.

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⁷ Lugar, R. (2002) "The Farm Bill Charade", New York Times, Monday January 21, 2002.

Growing Pork Trade Enhances the Significance of Quarantine and Disease Status

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Introduction

Prior to the easing of quarantine restrictions in 1990, the international competitiveness of the Australian pork industry was not critical to its profitability. The focus of the industry then was almost solely on the domestic market. But a few years ago all that changed and the industry stood on the brink of devastation. The combination of falling prices and changes in domestic quarantine in 1994-95 caused more than 1000 (23 per cent) producers to leave the industry with hundreds more leaving over 1997 and 1998, forcing a radical restructure and rethink by the industry of its future (*Productivity Commission Pig and Piguemeat Industries 1998*). The question was where to from here?

Today the picture is far different. The Australian pork industry now competes in a global market and is influenced by world trends that influence supply and demand with profitability determined by the relationship of input costs to pricing. The Australian pork industry is unlikely to be competitive in price based commodity markets; it has proved competitive in growing niche markets based on its freedom from disease. It is Australia's unique and unparalleled health quarantine health status that underpins the future of the industry.

The recovery and continuing growth of the Australian pork industry, as witnessed by the near record prices and profits in the last 18 to 24 months, has been due as much to good fortune as to good management. The challenge for the Australian pork industry will be to continue to increase both its export and domestic markets in a reliable and cost-effective manner against strong competition from not only other pork producing nations but from other protein sources as well.

The power of pork

Globally, pork is the most widely consumed form of animal protein at around 40 per cent of world meat consumption (*Federation of Danish Pig Producers and slaughter houses, 2001*). It is the world's most popular meat – followed by poultry, then beef and veal and then mutton and lamb.

Pork has seen solid growth in both total production and per capita consumption terms in the past ten years, creating an increased trade of pork within regions and between countries. International trade in pork has increased at the rate of six per cent per annum over the last five years and is projected to keep rising, with strong demand from China, Japan, Russia and Mexico. Nevertheless, trade in pork is still at a relatively low level at around four per cent of total production compared to 11 per cent for other meats (*Rabobank International, 2001*).

The growth in international trade is driven by:

- Trends in world population growth.
- Strong economic growth in developing and transition economies.

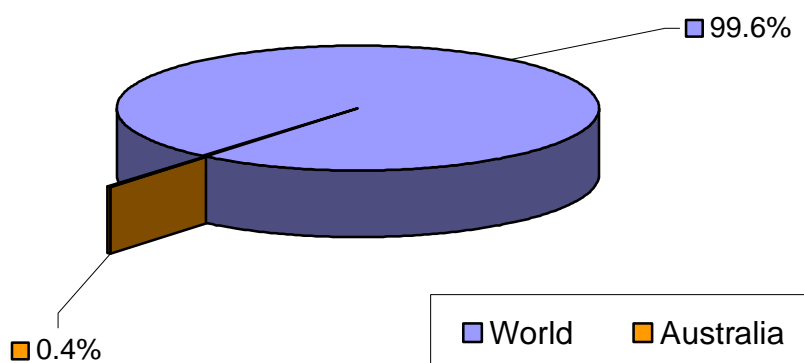
- Changes in dietary patterns, with demand for meat increasing in developing countries in line with increasing wealth.
- A differentiated pattern of production and consumption in developing countries, where increased production may not keep pace with increased demand.
- Continuing trade liberalisation.

This growth is further reinforced by the fact that international trade remains the lowest risk cross border strategy compared to foreign direct investment which requires more extensive capital and human resource requirements (*Rabobank International 2001*).

Australia's share in the global market

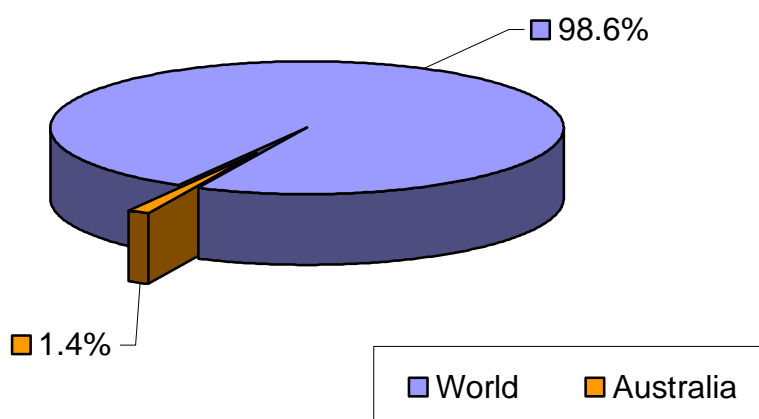
Producing only 0.4 per cent of world pork production and accounting for only 1.4 per cent of world exports, Australia is close to being the "runt of the litter" in the global pork industry.

Figure 1: Australian production as a Portion of World Production (2000)



Source: (*Macarthur Agribusiness 2001*).

Figure 2: Australian Exports as a Proportion of World Exports (2000)



Source: (*Macarthur Agribusiness 2001*).

In trade terms, the industry is dominated by the European Union (notably Denmark and the Netherlands), Canada and the USA, while in production terms, China is a clear leader against the USA, the EU, Canada, Poland and Russia. Leading pork-importing countries are Japan, Russia, USA, Eastern Europe, China and South Korea.

Table 1: World pig meat production – 2001 (Forecasts)

Country	1,000 tonnes
China	43,300
EU	17,393
USA	8,790
Brazil	2,060
Canada	1,800
Poland	1,500
Russia	1,490
Others	
Australia	375

Source: USDA, as cited in Dankeslagterier Statistics 2000

To meet the challenges of the changing business environment, Australian producers have looked to invest in and applied leading global technologies, gain economies of scale and scope to vertically integrate. This has seen the number of farms reduced from 20,000 to less than 3,000 within a ten year period and yet the average herd size has increased six fold to 115 sows accompanied by a 30 per cent increase in slaughter weight to 72 kilograms. The industry now has 300,000 sows, 15 per cent less than in 1981, but produces five million pigs per year, a 20 per cent increase. The gross value of pig production in 1998-99 was only \$690m compared to \$792m in 1999-00 and forecast of \$855m in 2000-01.

While modern technology, genetics and production lines and the processes yielding lower costs are quickly copied, there is little chance that the Australian pork industry can ever match the Canadians, the Danes or the US in export volume or on price.

Pork's share in the domestic market

Although prices have risen considerably in the domestic market in the last two years, overall consumption compared to other meat competition has remained relatively static. The trend in the consumption of beef and lamb has continued to decline, while poultry has made the fastest gains in its share of Australian stomachs in recent years.

Table 2: Australian meat market share (%)

Year	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01
Beef & Veal	35.7	36.6	38.3	37.3	35.4	35.4	34.3
Lamb & Mutton	18.3	16.9	16.1	16.4	16.1	16.7	17.1
Pork	19.6	19.1	17.9	17.8	19.2	17.9	17.9
Poultry	26.4	27.4	27.7	28.4	29.3	30.0	30.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: ABARE & APL

This static demand for pork reflects the relative size and maturity of the domestic market. Nevertheless there has been a fundamental change in the demand for pork based products reflecting increased consumption of fresh pork, processed bacon products in fast food and a decline in bacon consumption in the home. Demand for ham from supermarkets and butchers has fallen whilst use in convenience foods is static.

Shaping the industry

In developed markets where there are limited options for independent growth, consolidation in the domestic market has been the traditional way for producers to expand – and that is exactly the approach the Australian industry has taken in the past.

But now the industry is building 'productive capacity rather than chas(ing) production increases just to reduce costs of production.' (APL Chairman, APL AGM 2001).

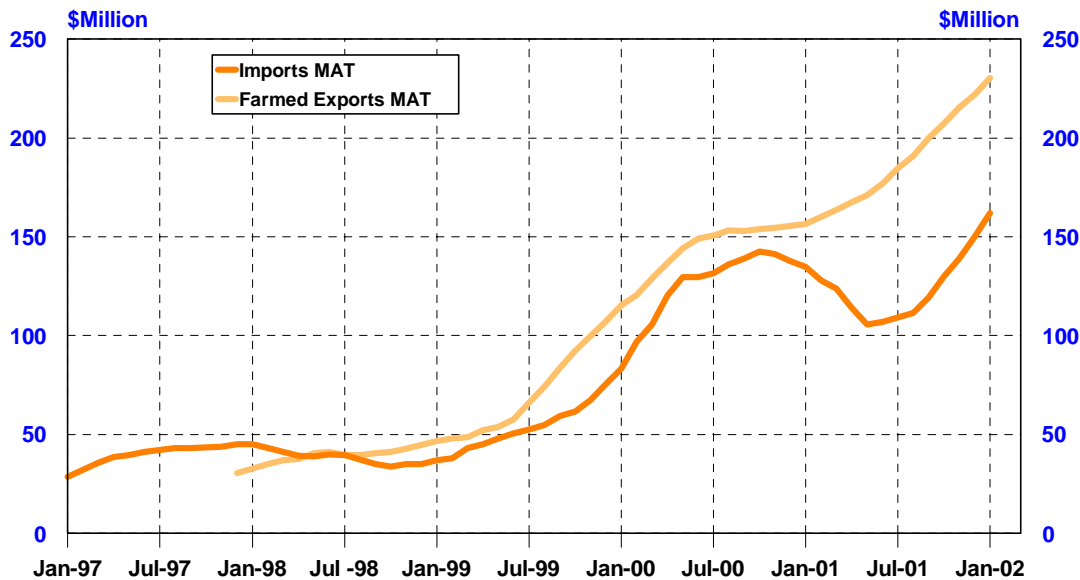
The Australian pork industry has seen a dramatic change in its market dynamics in recent years with a rapid expansion of its export trade while concurrently facing considerable import competition. The domestic market, while of critical importance to the sustainability of the industry, is mature and therefore offers limited growth opportunities. It is the export industries and value added industries that offer significant growth opportunities.

In the last four years the industry has moved to capture and build export markets. Since 1997 demand from overseas markets for Australian pork has increased substantially from just 1.9 per cent of Australian pork production to 14 per cent in 2001. Growth in farmed exports has been spectacular, increasing from \$45m in 1998 to \$107m in 1999, more than doubling to \$221m in 2001. The industry is set to achieve 20 per cent exports by 2002.

Figure 3:

Value of Pig Meat Traded

January 1997 - January 2002

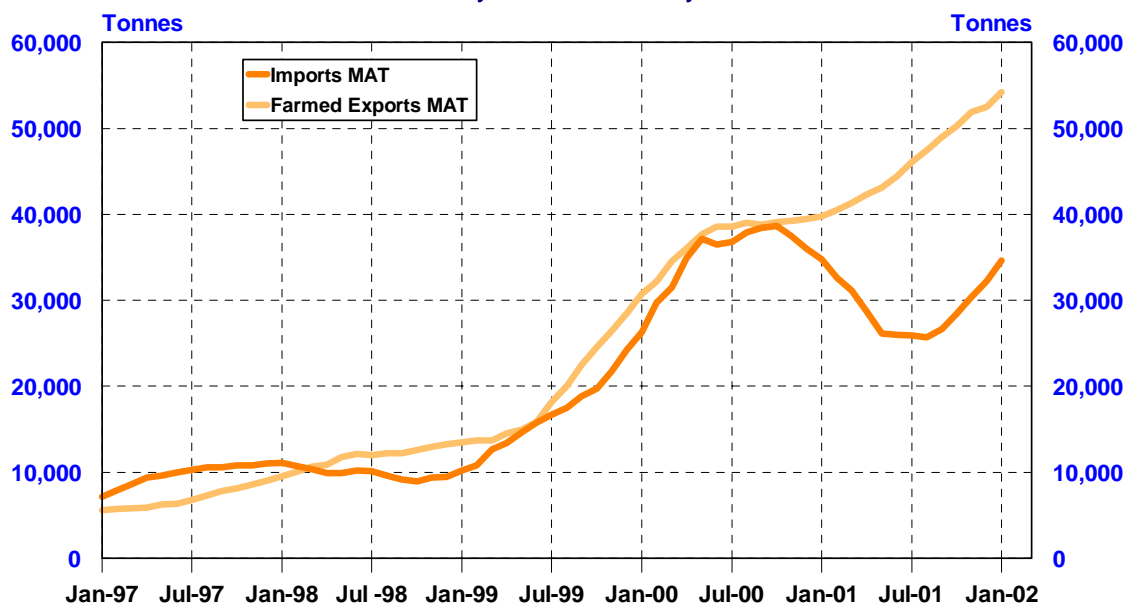


Source: ABS

Figure 4

Volume of Pig Meat Traded

January 1997 - January 2002



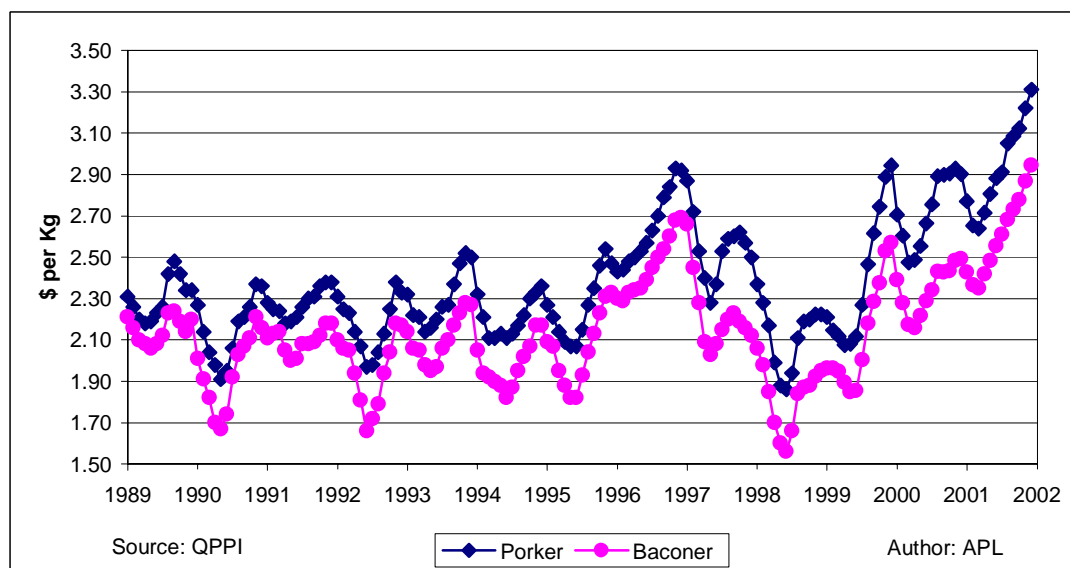
Source: ABS

However, this rapid growth has not come without a price, albeit a positive one. The cumulative effect of growing export demand has reduced the supply available for the Australian domestic market, leading to a recovery in domestic prices over the last two years. The industry now finds itself in a position where the demand for Australian pork, particularly in export markets, is outstripping the capacity of the industry to supply. Whether these prices are sustainable in the near future will depend very much on:

- How quickly production can be increased.
- Competition from international competitors in the terms of import replacement.
- The industry's production growth relative to growth in export markets.

Australian pork producers and their associated processors will need to continue to respond to the export challenge by progressively increasing supply whilst ensuring that there is adequate domestic supply to counteract the aggressive marketing of major world pork exporters like Denmark and Canada who export \$140m of pork into Australia annually. The level of imports and their price has had a significant impact in the past on Australian pig meat prices, particularly in 1992, 1997 and 1998.

Figure 5: Australian Pig Meat Prices



In its 2002 Outlook, ABARE forecast that prices in the pork industry would be less favorable towards the end of this year due to rising global production following the current level of higher prices. People in the industry, however, take a more positive view. The APL's production surveys confirm that Australian pig producers will be expanding their operations in the coming year, spurred on in part by high prices. They also indicate that this expansion is being aimed at specific markets.

Maintaining competitiveness in a global market

The Australian pork industry has been experiencing near record profits in the last two years. Most of the increased margin being enjoyed by Australian producers is from higher prices, at the expense of the domestic customers and processors. It is only natural that these businesses will attempt to reduce the cost of their inputs, leading to an increase of pork imports into Australia.

High prices also make the Australian domestic market attractive to our international competitors and there will be strong competition for both Australia's domestic and export markets from other countries. It is therefore vital that the Australian pork industry identifies and extends its current competitive advantages and/or removes its constraints to global competitiveness.

When compared to pork industries of the major producers and export competitors the Australian pork industry's key competitive advantages appear to be:

- Its relative freedom from diseases.
- Proximity to Asia and capability in exporting fresh chilled pork to those Asian markets.
- Research and innovation.
- Favorable exchange rate conditions.

The industry's weaknesses are:

- The small domestic population.
- Grain feed prices and security of supply.
- The need for further development of the processing industry.

Disease and grain supply prices are probably the biggest constraints to the pigmeat industry. Feed inputs account for about 60 per cent of the total cost of pig production (the single largest input cost) and during times of regional or national shortage it has the potential to significantly impact on the viability of the industry and its ability to compete internationally. Australian pork producers need feed grain security to ensure their capacity to satisfy export and domestic demand. APL is working closely with other intensive livestock industries through the Feed Grain Action Group to find effective and workable solutions to this critical issue.

Exotic and zoonotic disease will play a major role in determining where pork will be produced globally and market accessibility. As a result of geographical isolation and the application of sound quarantine procedures for imported livestock, genetic material and animal products, Australia remains free of the major epidemic diseases of livestock and many of the serious diseases of swine.

A high standard quarantine status and disease freedom enables Australian producers to produce pork differently than rivals. High health status provides a key competitive advantage in accessing and securing Asian markets, as well as preserving the domestic market. Thus disease prevention is a key priority for the industry. The APL currently spends about 50 per cent of its research and development budget on meeting consumer demands for safer, higher quality pork. There are strong incentives for Australia to prevent the introduction of diseases that affect either the cost of production or the desirability of the product produced.

Australia's proximity to Asia also enables the industry to concentrate on supplying Asia's preference for fresh (chilled) pork. Australia mostly exports fresh chilled (73 per cent), or frozen pig meat (21 per cent) but also exports preserved or processed pigment and offal. Fresh chilled pork is predominantly exported to Singapore and Japan. Although Australia currently supplies only 1 per cent of Japanese pig meat imports it has the capacity to significantly increase exports to this market. If Australia succeeds in just doubling this market it would have a major impact on the Australian pork industry and in turn be a significant factor to its further expansion.

Finally, the Australian pig industry is globally acknowledged as a leader in pig research and development. Producers have gained advantage from the research investments of APL and many of the technologies developed have been a world first and some (such as Pig Pulse and Auspig) remain exclusive to Australian producers. The challenge is to continue to develop R&D programs that further enhance profitability, productivity and quality of the product.

Discrete barriers to efficiency

Although the Australian pork industry supply chain has undergone considerable structural change, the efficiencies that have been achieved overseas are yet to be fully realized here. While the processing infrastructure is no longer a constraint to industry growth in export markets, it is nevertheless less advanced and less progressive compared to competitors such as the USA.

For example, payment in the USA is based on a lean meat yield rather than the P2 payment grid system used in Australia (P2 measures the thickness of backfat and there are price penalties if backfat does not meet this specification). The P2 payment system tends, however, to lead to the redistribution of fat, and this can have international marketing implications since a carcass that appears lean (based on P2) may have unacceptable amounts of fat in other parts of the carcass. This also results in the genetic selection of animals in which improvement in lean content is more cosmetic than when based on lean meat yield.

While the industry continues to pay on the basis of P2, genetic selection programs will be determined by the correlation between P2 and growth rate. However, in developing its selection procedures and technologies, Australia must also consider that its future now rests on both the international and domestic market place and that the current approach may adversely effect its international competitiveness by potentially affecting cost and product quality.

This issue is further complicated by the concept of 'rind on' or 'rind off'. Australian small goods manufacturers (i.e. ham and bacon) still prefer to sell rind-on bacon rather than rindless rashers. Yet Australia is one of the few countries left in the world that has rind on bacon. In the US and the rest of the world bacon is from the belly and not from the loin.

P2 and 'rind-on' both exert significant influence on Australian pig carcass weights. At present the supply of bacon to the domestic market requires a lighter leaner pig (than some international markets such as Japan) and also requires the use of a choice cut, the loin area, to supply the domestic bacon market. Processors will not buy fatter pigs because they want to process products with the rind still on, and until Australian consumer perceptions in this area change, the purchasing power of processors are unlikely to affect significant change.

Consideration must also be given to the industry's export expansion plans. For if Australia producers are to continue to expand into Asian export markets (which demand sows and gilts) and take advantage of increased carcass weights, net profit is limited by the use of boars rather than barrows, as both growth rate and feed efficiency decline rapidly at heavier weights.

The issue of castration needs to be handled carefully because of the effect on P2 and pricing grids. Castration inevitably increases carcass fatness and therefore actively discourages producers from castrating males (in addition to increased cost of production and animal welfare concerns.) It is also part of an even wider industry debate concerning eating quality, boar taint and growth performance and the merits of castration versus immuno-castration versus single sex genetic selection technologies.

There has been considerable industry research conducted in the area of pork eating quality and as part of its 2001-04 strategic plan, the APL is reviewing the results of this program to identify strategic interventions and target further research.

Responding to the challenges – strategic imperatives

While Australian Pork Limited may not be a commercial trader in the pork industry, it is and will continue to provide significant influence in the market. The APL was formed as a unique organisation able to deliver strategic policy development, research and marketing services, and having the capacity to fully integrate all services and thereby focus on members. The APL is one of the first such organisations in agriculture and other industries (like the egg industry) are keen observers of the APL approach.

The APL's first strategic plan, released to industry in November 2001, focuses on industry growth and competitiveness through:

- export and domestic market development;
- fostering of networks and alliances within the industry;
- integrated approaches to quality assurance;
- technical and business systems innovations;
- improved information analysis and distribution; and
- enhanced industry leadership and human capital infrastructure.

The task of the industry's peak representative body is to understand the dynamics and forces affecting supply and demand in the Australian (and global) pig industry, so that pigmeat producing members can make appropriate business decisions in the short and longer-term.

Conclusion

Australia has a small but excellent pork industry, with great potential for continuing growth. Its future success rests on export and competition for Australia's domestic and export markets, but competition will be fierce.

Continued expansion is inextricably linked with the maintenance of Australia's quarantine status. Consumers worldwide are becoming increasingly concerned about food quality and safety. The importance of promoting and protecting Australia's 'clean green' image has never been greater. The pork industry and the nation can ill-afford to erode its most competitive advantage, namely the unique health status of Australian agriculture.

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