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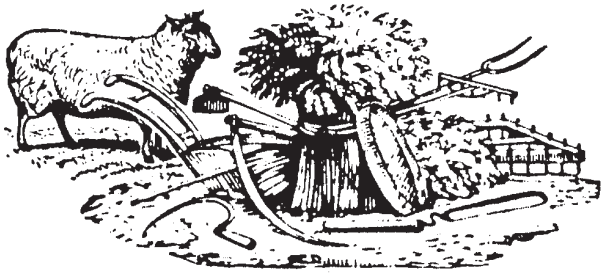
ORGANIC AGRICULTURE

- a serious form of agriculture



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ORGANIC FARMING IN AUSTRALIA: AN ECONOMIST'S PERSPECTIVE

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INTRODUCTION

Until quite recently in Australia, organic agriculture was largely viewed by scientists, economists and policy analysts as having little relevance to achieving broad social and economic goals associated with agricultural production. This consensus is, however, increasingly been challenged. The rate of increase in Australia during the 1980s of the number of commercial organic farmers in Australia was estimated to have been 22 per cent per annum (Hassall and Associates 1990), suggesting at least that there are environmental and marketing niches in which organic farming is financially competitive. From a survey in which fully-converted organic cereal-livestock farms in south-eastern Australia were compared with non-organic counterparts with otherwise similar characteristics, Wynen and Edwards (1990) found that the profitability of the two groups of farms was not significantly different.

Claims that organic farming results in less environmental side-effects than other approaches to farming suggest that its financial competitiveness may increase if, as seems likely, policies significantly increasing the cost to farmers of contributing to environmental degradation are introduced. Expansion of niche markets for organically-grown produce is also contributing to the viability of organic farming, as is the increasing availability of technologies complementary to organic farming, and of services assisting farmers to apply them. (A more detailed discussion of how trends such as the above are affecting organic farming viability can be found in Marshall (1992)).

Organic agriculture has thus emerged as an important contributor of ideas in the continuing Australian search for environmentally and financially sustainable farming systems. Recognising this, choices arise regarding the extent to which society should intervene through public expenditure and policy to foster the development of this innovative approach to Australian agriculture. Even if the choice is made to not directly foster development of organic agriculture, an understanding of how voluntary conversion to this way of farming is likely to proceed would better equip governments, farmer organisations and agribusiness to meet the demands of farmers for knowledge, inputs and services in the medium to long term. The aim in this paper is primarily to assist informed resolution of these questions.

WHAT DISTINGUISHES ORGANIC AGRICULTURE?

Organic agriculture is one of a number of `alternative' approaches to agriculture, so-called because they offer a clear alternative to the agricultural methods predominantly now used in industrialised economies. Mainstream approaches to agriculture evolved through a process whereby technological progress progressively resulted in land and labour (primary inputs) becoming more expensive relative to commercially-available land- and labour-saving inputs. The economies of scale associated with application of land- and labour-saving inputs meant that their increasing substitution for primary inputs necessitated farmers specialising in the range of farming activities they could undertake competitively (Boeringa 1980).

`Alternative agriculture' has emerged in reaction to this mainstream trend. Whereas the impetus for the technological changes occurring in mainstream agriculture came from the reductionist scientific method of the era, practitioners of the alternative approaches have held to more holistic approaches to problem-solving. Proponents of alternative agriculture regarded deleterious environmental side-effects of mainstream approaches not as aberrations amenable to control by fine-tuning but as normal reactions by nature to agricultural systems relying too much on land- and labour-saving methods of production (Boeringa 1980).

There are various organisations representing alternative farmers which differ in their emphases and in their prescriptions of practices and inputs that their constituents should and should not make use of. The awareness of sizeable numbers of Australian and overseas consumers that `organic farming' involves farming without application of synthetic chemicals has led to the appellation `organic' being commonly used when referring to alternative farmers who eschew synthetic chemical use.

There remain, however, significant differences of emphasis among organisations representing these farmers. These differences mean that the constituent farmers of each organisation operate under somewhat dissimilar technological constraints. Furthermore, as new technological possibilities arise for increasing the profitability of farming without synthetic chemicals, the differing emphases may lead to a widening of the constraints faced across the whole set of organic farmers. Uncertainty regarding the future definition of organic farming obviously complicates prediction of its future financial viability or environmental effects.

Organic agriculture is one of a range of approaches available to Australian farmers striving to balance private imperatives of financial viability and quality of life with society's conflicting demands for environmental conservation and competitively-priced high quality produce. To be of use in informing farmers and public administrators, evaluations of organic farming need to involve comparisons with each of the other feasible approaches. Evaluations of organic agriculture to date have normally involved comparing averages of performance measures for organic farms with those for a single non-organic group of farms. Such evaluations are of limited value because either:

(i) the non-organic group contains only farms considered to be practising the `conventional' approach to farming. Apart from the problem of defining what is conventional, these evaluation do not assist farmers and public administrators to compare organic farming with farming approaches that are non-organic but also non-conventional; or

(ii) the non-organic group contains farms practising a variety of approaches to farming (some of which may be non-conventional without being organic). By averaging the performance measures of this diverse group of farms, interesting information regarding how each approach compares with the organic approach is lost.

The distinguishing appellations `conventional' and `alternative' may in fact be most apt in characterising the nature of the approach to farm problem-solving, where `conventional' describes a more reductionist approach and `alternative' describes a more holistic approach. It seems that most farmers use solutions derived using both approaches. A so-called `alternative' farmer will be highly inclined to look for solutions derived holistically whereas a so-called `conventional' farmer will be more inclined to utilise solutions derived using the reductionist approach. The inclinations of all farmers will at any time be dispersed along this continuum.

It seems that at the outset of the organic farming movement, adoption of holistically-derived solutions was motivated mainly by philosophical considerations. However, it seems likely that the increase in the number of farmers choosing holistically-derived solutions in recent years is

explained less by farmers changing their ethics than by changes in external circumstances. Changes in external circumstances have included emergence of premium markets for organically-grown produce, wider awareness by farmers of the occupational health risks of applying biocides and increasing availability of knowledge, services and inputs complementary to devising holistic solutions.

ECONOMICS AS AN ARBITER OF THE VALUE OF ORGANIC FARMING

Economics is concerned with assisting humans to maximise their welfare by providing information regarding the benefits and costs to them of alternative courses of action. Value is thus measured solely from an anthropocentric perspective. When choices by society are being evaluated, alternative paths under consideration are ranked in terms of their impacts on the welfare of society, subject to the assumption that welfare of society is equal to the sum of the welfare of all its current members. Each individual is assumed to be the best judge of his or her own welfare.

The acceptability of economics as a framework for guiding choices required of individuals and society will differ among individuals according to their agreement with these premises. Three objections, at least, could be raised by those advocating greater adoption of organic agriculture for the sake of environmental conservation. The first objection may be that preferences of many individuals are based on a lack of understanding of the importance of environmental conservation for their own future welfare and that it is therefore inappropriate to measure value according to these `misguided' preferences. The second objection is based on a claim that current members of society act with insufficient regard for the value of environmental conservation for future members and that society has a responsibility to consider this neglected value when evaluating options affecting environmental conditions for future members. The third objection comes from those who believe that the environment has an intrinsic value which is independent of human preferences.

These objections will not be discussed further here. The important point is that economics is not a value-free arbiter. It should therefore complement, rather than substitute for, other methods of evaluation.

THE EXTERNALITY PROBLEM IN AGRICULTURE

Significance for Expansion of Organic Farming

Institutions governing property rights over land and water-related resources used by Australian farmers often allow individuals to avoid incurring the full costs of detrimental side-effects of their activities on others or prevent them from obtaining full recompense from others receiving their beneficial side-effects. Economists refer to these uncompensated side-effects as externalities. To the extent that farmers do not volunteer to fully account for externalities when choosing their production methods (and thus ignore a significant part of the social benefits and social costs of each option), the aggregate pattern of adoption of production methods will diverge from that which would maximise social welfare.

Russell *et al.* (1990) looked at the off-site cost in Queensland of agricultural soil erosion, but focussed only on the costs of remedying damages inflicted by erosion upon a range of government and semi-government facilities such as urban water supply infrastructure and roadways. The authors suggested that the calculated $31.3 million average annual cost of these impacts be considered as a very conservative partial estimate of the total off-site costs of agricultural soil erosion in Queensland. Evidence of externalities from agriculture of such magnitude suggests a prima facie case for government intervention designed to shift adoption of farming methods closer to the pattern that would occur if all farmers had to account fully for the social benefits and social costs of their actions. Such intervention would increase the ability of farmers using methods with

relatively beneficial off-site effects to financially compete with farmers using methods with less beneficial off-site effects.

Proponents of organic agriculture assert that it has significant off-site advantages over other approaches to farming. This assertion has been supported in Australia by a qualitative comparison of the off-site effects of organic and `conventional' agriculture undertaken by Wynen and Edwards (1990). If this assertion is accepted, it follows that government intervention internalising off-site effects in farmers' decision-making would be likely to increase the competitiveness of organic agriculture (Marshall 1991). Depending on the degree of this effect, the share of total agricultural production accounted for by organic farming would increase.

The standards with which organic farmers are expected to comply aim to maximise the compatibility of their activities with environmental conservation and human health. Farmers complying with the standards are effectively volunteering to internalise some of their off-site effects in their calculations of how best to farm. The empirical question remains, however, regarding how generally superior farming systems devised within the constraints set by the standards are in protecting the environment and human health in relation to other approaches to farming.

There appears to be little documented empirical evidence to support the asserted off-site superiority of organic farming in Australia. Crosson and Ostrov (1990), reviewing the evidence available in the United States, raised doubts regarding the significance of purported advantages of organic agriculture in terms of lowering nitrate pollution of surface water and groundwater and reducing the threat to human health of pesticide residues in food. It is evident that further empirical evidence of the environmental and health advantages of organic agriculture is required.

The Role of Government

The textbook economics solution to the problem of externalities is for government to directly internalise them by using policy instruments such as taxes, subsidies or regulations which financially incorporate the value of each type of externality in the production decisions of all farmers. Farmers remain free to choose the farming methods which best serve their aspirations, except that the incentive structure more closely reflects social values.

If such a solution cannot be implemented, due to resistance from vested interests or there being insufficient information available to adequately set policy instruments, the `second best' approach of government supporting particular farming methods can be considered. One method of support is to offer a subsidy to encourage adoption of farming methods deemed to resolve trade-offs between financial, environmental and human health goals most efficiently. For example, the Australian Conservation Foundation recommended that the New South Wales Government provide grants to farmers with approved plans to convert to low-input farming (Cameron and Elix 1991).

Justification of this `prescriptive' approach to government intervention requires, *inter alia*, empirical evidence regarding the superiority of organic farming over other types of farming in terms of its external effects. As mentioned above, however, such evidence is lacking in Australia. In the United States, where there has been considerably more research into the environmental effects of agriculture than in Australia, the issue remains controversial. For instance, Crosson and Ostrov (1990 p. 38) concluded:

"The argument that American agriculture should shift to the alternative system over the near term because the existing system is not sustainable is not well-supported. Soil erosion under the existing system is not a serious threat to long-term productivity. The existing system may reduce soil biota, in some cases severely, relative to alternative agriculture, but there is no evidence that the damage is permanent. Finally, the dependence of the existing system on exhaustible energy sources implies

that the system must eventually be abandoned for one, such as alternative agriculture, that relies mainly on renewable energy resources. But the relative prices of exhaustible and renewable energy sources clearly indicate that `eventually' is not now".

SOME FACTORS AFFECTING ADOPTION OF ORGANIC FARMING

Current Competitiveness of Organic Farming

The extent to which organic farming is financially competitive with other approaches to farming is often deemed to be a major factor influencing its adoption by farmers. For example, Lampkin (1990 p. 491) stated: "One of the major factors which has limited the expansion of organic farming in the past is the belief that such systems are not financially viable". A number of studies have attempted to test this belief. These studies have largely been undertaken in Western Europe and the United States, and have compared the financial performance of farms based on organic (or alternative) production methods with that of farms based on the more mainstream production methods. Lockeretz (1989) noted that an outcome of these studies has been that generalisations have increasingly appeared in the literature to the effect that the profitability of organic farming is comparable with that of `conventional' farming. Crosson and Ostrov (1990 p. 36) demurred, concluding: "The literature reviewed leaves little doubt that at the farm level alternative agriculture, as it is now practised, is less profitable than conventional agriculture".

Despite the continuing controversy, Buttel *et al.* (1986 p. 60) are probably right in arguing that these types of studies "have already largely accomplished what they can accomplish at this level of analysis: to demonstrate the feasibility of a significant reduction in input usage consistent with minimising per unit production costs . . .". Regardless of whether organic farming is currently financially competitive with other approaches, these studies have shown that expansion of organic farming in the future cannot be ruled out of contention.

There have been criticisms of these types of studies and of the way general inferences have been drawn from them. Lockeretz (1989) suggested that generalisations of the kind made are premature, given that the limited number of comparisons have pertained to specific regions and specific enterprise combinations. Furthermore, Lampkin (1990) argued that most of these studies failed to sufficiently isolate the effects of the farming system *per se* from effects of localised factors (eg., climate, soil type, cheap sources of organic fertilisers, management skills) which are not determined by choice of farming system.

Future Competitiveness of Organic Farming

A number of economic arguments suggesting that the adoption of organic farming will increase in the future have been presented in the literature. Lampkin (1990) argued that the continuing cost-price squeeze is making organic farming, with its lower requirements of purchased inputs, more competitive over time. However, reducing input purchases by converting to organic farming is only one of the options available to farmers seeking to maintain viability. For instance, a large number of Australian farmers adopted minimum tillage techniques during the 1980s, considerably increasing their expenditure on herbicides. Hence it is not clear that continuation of the cost-price squeeze will in itself cause a significant increase in the rate of conversion to organic farming.

Marshall (1992) concluded, on the basis of an examination of some current and likely future trends, that adoption of organic farming in Australia was likely to increase significantly in the future. However, only a relatively small proportion of the range of factors affecting the future evolution of Australian agriculture was considered in that study, so further examination of the question is warranted.

Scale of Organic Industries

It is often the case that the profitability of individual farms is significantly affected by the size of the industry of which they are a part. Aggregation economies arise where increases in the size of an industry reduce the input costs of industry constituents. This raises the question of whether organic farming might be more financially competitive if it were more widely adopted.

It can be expected that the costs to organic farmers of many inputs and services would decline significantly if the size of an organic farming industry increased. This is because inputs and services required by organic farmers are often of use only to them, so attainment of economies of scale in their supply is prevented while an organic farming industry remains small. This is likely to be of relevance for inputs such as organic fertilisers, soil conditioners and natural pesticides and for services such as processing of outputs, wholesaling and retailing. In some cases the size of an industry may not be sufficient to make it profitable to supply an input or service at all. Individual farmers may then be required to provide their own inputs and services. For instance, they may prepare their own compost or undertake their own processing, packaging and distribution.

Aggregation economies can also arise in more indirect ways. As the number of organic farmers increases, knowledge of value to organic farmers collectively can be expected to accumulate at a faster rate, thus accelerating reductions in costs of production per unit of output. Increasing commercial significance of organic farming can also be expected to increase the regard with which it is held by governments, farmer organisations and banks whose policies can have an important impact upon the relative profitability of different types of farming. As the proportion of a local area managed by organic farmers increases, aggregation economies can also be expected to arise because each farmer's efforts to control pests and weeds by ecological manipulation is likely to be enhanced by the complementary actions of neighbours.

Increases in the size of an industry can also affect the prices received or paid by constituents. For example, the lucrative price premiums currently available for various organic produce may diminish considerably as the number of organic suppliers grows and the market for organically-grown produce becomes saturated. Alternatively, supplies of a by-product of local industry (eg., poultry manure) which initially may be available to organic farmers at a nominal cost become increasingly scarce as the local scale of organic farming grows, with the result that the price charged is increased.

Given the variety of factors involved and the different situations of various organic industries, generalisations regarding the effect that expansion of organic agriculture may have on its financial competitiveness are not in order. Cost and price effects of aggregation can be expected to have a significant impact on competitiveness, but they should be considered within the context of each organic industry.

Effects of Increased Diversification

Conversion to organic agriculture in general entails increased enterprise diversification so as to provide the latitude within which pests, weeds and pathogens can be managed through ecosystem manipulation (Boeringa 1980; Lampkin 1990). It is possible that on some farms increased diversification entails reduction of enterprise sizes such that there are losses of economies of scale within enterprises. In these cases, increases in enterprise costs attributable to this factor must be offset against the whole farm cost savings arising from substituting ecosystem manipulation for input purchases before the net financial effect of increased diversification can be assessed.

Management Skill

Crosson and Ostrov (1990) claim that alternative agriculture entails "more demanding" management than other approaches to farming and that this is a major non-financial obstacle to expansion of alternative agriculture. This is because managers need to obtain a good enough understanding of complex ecological relationships to be able to maintain crop and livestock productivity without relying on synthetic fertilisers and pesticides. Increased enterprise diversification within a farm in itself increases demands on management, purely because of the greater number of operations to be mastered.

Lockeretz (1989) suggested that the fact that skill requirements differ between farming systems in itself may be a significant barrier to adoption of organic farming (even if the combination of skills required for organic farming is actually no more demanding). Even if managers of organic farms are currently judged to have capabilities above the average for other farms, he argued, it does not follow that organic farming practices will not perform as well if adopted more widely. Expansion of organic farming would be associated with an acceleration of knowledge accumulation among organic farmers as well as an increase in the technical support available from departments of agriculture and other farmer advisers. Thus the need for a manager of an organic farmer to be above-average would be lessened considerably.

Social Considerations

Breimyer (1984 p. 163) concluded: "Organic practices are neither so costly nor so cut-rate, not so clear a path to cornucopia nor, at the other extreme, so certain a route to destitution, that their economics dominates all else and becomes controlling". There are indeed social factors which influence farmers sufficiently that they do not always act to maximise private wealth. One important social factor is peer group influence. Individuals may be inhibited from converting to organic farming because of the risk that they may alienate their colleagues. In those cases where individuals' peers mainly lie outside the mainstream farming community, peer group influence may instead make it more likely that they choose organic farming over other approaches to farming.

CONCLUDING COMMENT

Perhaps the most important contribution in this paper has been to highlight the wide range of factors that need to be considered in predicting the future viability of organic agriculture and in considering how governments in Australia can achieve a mix of farming practices which resolve trade-offs between farm profitability and environmental conservation most efficiently. A corollary of this is that better information, particularly with regard to the off-site biophysical effects of different farming approaches, is required before economists will be able to confidently advise policy-makers regarding the merits of addressing environmental problems by promoting particular approaches such as organic agriculture.

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