Towards Environmental Management Systems in broad-acre agriculture: rhetoric, reality and future possibilities

A.M. Ridley
Agriculture Victoria Rutherglen, DNRE, RMB 1145, Rutherglen, Victoria 3685.

ABSTRACT

This paper gives an overview of applying Environmental Management Systems (EMS) in broad-acre Australian agriculture with a focus on grain and beef production. The meaning of EMS is explained and the main drivers affecting grain and beef enterprises are analysed, followed by a discussion of what we can learn from previous experience. A view is presented of what EMS will and will not deliver with respect to farmers embracing more environmentally acceptable ways of farming, including a simple framework to assess progress towards future farming systems. The paper concludes with the view that EMS will become an important tool for the purposes of public accountability and marketing. However, without accompanying mindset and policy changes, EMS will not necessarily guarantee an acceptable environmental outcome for broad-acre agriculture or the broader community.

KEYWORDS

Environmental Management Systems, EMS, extensive agriculture, grains, beef.

INTRODUCTION

As the world becomes more polluted, many people are becoming increasingly concerned about the way food production occurs. Intensive or 'high tech' production systems (such as cattle feedlots, piggeries, battery hens, genetically engineered produce and raised bed cropping) are all causing community debate currently. Increasingly the focus is broadening to all food and fibre production systems.

The terms 'clean and green' are increasingly being used for marketing purposes. 'Clean' means that food is produced free of contamination (eg. residues), while 'green' means that food is produced and processed through environmentally acceptable means (12) and can be extended to packaging and distribution of products, freedom from genetic engineering and to ethical considerations (11). Quality assurance (QA) schemes address food safety and product specifications of the customer (such as consistency of product and supply). Thus, in terms of 'clean and green' concerns, QA only addresses the 'clean' aspect of food production. EMS can be used to help address the 'green' aspects by helping to answer the question 'Is the product or food produced in an environmentally acceptable manner?' Addressing the second question can be many times more difficult to achieve than QA. Truly 'green' food must honour the design rules for ecological acceptability (12) such as the nurture of land and water resources, preventing loss of biodiversity, using energy from renewable resources, minimising pollution and re-using resources. Whilst the terms 'clean and green' are bandied about a lot in Australian agriculture, most farming systems are a long way off being acceptably 'green' at present. 'Greenwash' describes the confusion and cynicism felt by consumers about unjustified green claims used for marketing purposes. Credible eco-labelling is the ultimate extension of EMS into the market place. Issues involved in labelling are discussed elsewhere (21).

WHAT ARE ENVIRONMENTAL MANAGEMENT SYSTEMS (EMS)?

The topic of Environmental Management Systems (EMS) is popular at present in the rural press and amongst the scientific community. As with many relatively new concepts, much confusion and rhetoric surrounds EMS currently.

So, what is EMS? Like QA systems, EMS is a methodical approach to organisational structure, planning activities, implementation and review of an organisation's or business's attempts to manage its impacts on the environment. The focus is on the environmental impacts of production, not on the quality of the end product. EMS aims to achieve "continuous improvement" of the system (which hopefully will also lead to continual improvement in environmental management performance). EMS is a management tool for

managing day to day environmental hazards that are occurring or may potentially occur. Documentation, record keeping and assessment are crucial components of both EMS and QA systems so that a business can manage itself better and also prove it does what it says it does. A regular process of self-assessment is a critical part of EMS implementation, to determine progress toward environmental objectives and targets. A business using EMS can progress to external auditing if this is useful for marketing or the consumer demands it. External auditing is, however, not essential if the business chooses not to do so.

The fundamentals of EMS have been outlined elsewhere (1,7, 9, 10). There are many different frameworks for EMS, however the ISO 14000 series of standards is the major internationally recognised approach and has been adopted by Australia and New Zealand as the preferred standard. ISO 14001 specifies the components of an EMS that are required for ISO 14001 certification and ISO 14004 provides guidance and interpretation to ISO 14001 (7,8). Although many industries successfully use ISO 14001, it has not been widely adopted in agriculture because of lack of necessity, perceived complexity, cost and time consuming requirements. Some simplifications of an EMS and certification framework for agriculture based on ISO 14001 have been proposed by both NSW Agriculture and Agriculture WA and are already being used in NZ. In WA this framework is likely to become a voluntary component of the SQF (safe, quality food) quality management codes (L. Taylor, pers. comm). The steps involved in the development of an EMS include:

1. *Environmental review:* Impacts of farming activities on the environment are identified such as legal and other obligations, including industry guidelines and environmental codes of practice.
2. *Significance assessment:* The importance of each impact is assessed to prioritise management.
3. *Objectives and targets:* Management goals for each significant impact are established for an environmental policy in a series of objectives and targets.
4. *Management practices and procedures:* Practices are developed to control significant impacts. These practices are written down as formal procedures to provide consistency between operators.
5. *Action plans:* Tasks are set out with timeframes and responsibilities to meet objectives and targets.
6. *Monitoring:* A monitoring program is used to assess progress towards targets.
7. *Documentation:* Keeping appropriate records (e.g. spray records, procedures and monitoring results) makes sure there is a consistent and traceable approach and enables auditing should this be pursued.
8. *Audit and review:* Self-audits of the EMS show if the required management actions are occurring and where improvements can be made. Reviews of the whole system assess if the EMS is an effective way of meeting goals and achieving continual improvement.
9. *Optional third party audit:* Once EMS is running, a business may choose to undergo a third-party certification audit so that they can have their claims of environmental responsibility independently assessed. This can be compliant with ISO 14001.

DRIVERS FOR EMS IN AUSTRALIA

The major factors responsible for the interest in EMS can be summarised under headings of general community concerns as reflected by changing government policy, corporate responsibilities and world trade fears.

General Community Concerns

There is increasing community awareness of and concern about the degradation of natural resources as a result of agriculture amongst other factors. Concern is increasing in both in Australia and overseas (23).

In Australia this concern is reflected in current policy debates at both Federal and State levels. Governments want increasing accountability with regard to agriculture's impact on the environment, but do not want the cost of increased regulation. This makes adoption of more responsible management a preferred option for governments and also meets the requirement of industry to manage their own businesses responsibly. Since the 1997 Industry Commission report on ecologically sustainable development (3) there have been a number of policy statements about future management of natural resources. Examples of increased accountability include the proposed purchase of conservation contracts being developed in NSW (18) and Victoria (20), the Murray Darling Basin Commission's (MDBC) 'end of valley salinity targets' (5) and MDBC's integrated catchment management framework which

recommends future targets for water quality and sharing, riverine ecosystem health and terrestrial biodiversity (6).

State and Federal governments are contributing directly to the development of EMS. There are projects in NSW, Queensland, SA, Tasmania, Victoria and WA. Most have funding from industry, State and Commonwealth sources. Thus, governments are now acutely aware of and working towards changing environmental management and policies to more adequately address community concerns. Farmer groups, such as the Land Management Society in WA and the Kondinin group, as well as some Catchment Management bodies are also taking an active role in development of EMS. The accountability being asked for by governments and the ability of EMS to provide formalised accountability suggest that there are (or will be soon) domestic drivers for EMS. An example would be that an EMS might be necessary before farmers are eligible for land stewardship payments for the provision of ecosystem services.

Corporate Responsibilities

The Corporations Law, Section 299 (1)(f) requires that companies operating under any environmental legislation must report on their performance in relation to the legislation. Such reporting provides an opportunity for a formalised management system that can be used to both show corporate responsibility and also be used as a marketing tool to gain competitive edge.

Retailers are reacting to pressure for 'clean and green' products by requiring food from their suppliers that is verifiably safe and, increasingly, produced in an environmentally sustainable manner. This trend is most apparent in Europe and Japan and being led by large supermarket chains (such as Sainsburys and Tescos in the UK) (11, 13). The concern of multinational companies becoming involved in 'green' interests as operating out of 'enlightened self interest' in response to global concerns has been discussed elsewhere (12). Thus, for corporate farms, given that they have to report on environmental performance, there is additional motivation compared with that for family farms. In addition, corporate farms are more likely to be able to devote the administrative resources necessary to establish EMS.

World Trade Fears

The World Trade Organisation (WTO) is increasingly focussing on the broad relationship between trade liberalisation and the environment and how trade rules relate to environmental protection policies and to international agreements. Canada, the US and European countries are leading the debate. The US stresses that members should have a high level of environmental protection and Canada wants an environmental review for the next round of trade negotiations. The Federation of German Industries highlights the spreading of EMS as a key issue. The United Nations Environment Program, the World Bank and World Conservation Union (IUCN) are also becoming pro-active in the environment and trade debate (23).

AUSTRALIAN BROAD-ACRE INDUSTRY CONSIDERATIONS FOR ADOPTION OF EMS

Grain Regions and Access to Domestic Markets

Broad-acre grain farms have declined from about 45,000 in 1977-78 to 34,000 in 1998-99. Currently around 75% of wheat and canola are exported. Larger farms (average area cropped 1240 ha) account for around 66% of total crop receipts, compared with 21% from medium (312 ha cropped) farms, 6% from small (78 ha cropped/year) farms. The remaining 7% are produced from predominantly livestock enterprises. Larger farms are commonly in the western region (average area cropped over 1,000 ha) and more than double the average cropped area in northern and southern regions (14). The western region produces almost 1/3 of the Australian grain crop, the southern region around 44% (farms are often smaller with more diversity of crops) and the northern region about 17%. Almost all grain from the west is exported, whereas in eastern Australia, particularly in the south, there is a larger domestic market for producers including demand for feed grain as a result of increased intensive livestock production (14).

Larger farm size, potential for domestic markets and perceived environmental issues, particularly political ones (such as salinity and genetic engineering in most areas, nutrient contamination of waterways in the high rainfall zones, atrazine contamination from leaky soils) could all possibly result in regional differences in the motivation for farmers to consider adopting EMS.

Grain Export Market Considerations

The world's wheat trade is dominated by the USA (32%), Canada (20%), the European Union (EU, 16%), Australia (15%) and Argentina (8%) (Table 1) (4). Apart from the EU, all are predicted to increase production to 2009 (15). The USA, Canada and the EU are ahead of us in the move towards EMS for broad-acre industries. In terms of world importers, Asia, Africa and South America have dominated (4). Major destinations for Australian wheat are Japan (a relatively consistent market) and Indonesia (a consistently large purchaser). China, Egypt, Iran and Iraq are important but highly variable purchasers.

Table 1: The percentage share of world wheat exports, imports and major destinations for Australian wheat exports averaged over the 5 year period 1994-95 to 1998-99 (4).

Major exporting countries		Major importing countries		Australia's major grain export destinations	
Country	% world share	Country	% world share	Country	% world share
Argentina	8	EU	6	China	12
Australia	15	Baltic region	4	Egypt	12
Canada	20	North & Central America	7	Indonesia	30
EU	16	South America	11	Iran	24
USA	32	Near east Asia	14	Iraq	9
Others	9	Far east Asia	33	Japan	14
		Africa	24	Former USSR	0

Beef Industry Considerations

Of the approximately 70,000 farm units in beef production, almost 21,000 are specialist producers. The average herd size is 740, but nearly half of properties carry less than 300 head. Large corporate properties inflate the average, producing 19% of the beef, but using nearly half the total land area. Australia is the world's leading beef and veal exporter, with the Japanese and US markets accounting for over 70% of exports. Japan is the foremost high-quality beef market, taking most chilled and grain-fed exports. Meat is largely purchased through licensed processing companies. Australia's share of the Japanese market is 47%, the US has 48% and New Zealand is the other main supplier. The US market for Australian exports is mainly for manufacturing lean grade beef used for hamburgers which is blended with US beef. Other major markets include Korea, south-east Asia, Canada, Taiwan and Europe. Major export competitors are North America, South America and New Zealand (17). There are a few examples also of major producers attracting price premiums in European (30% premium for cattle fitted with electronic trace-back tags) and Japanese markets where a co-operative achieved a 20% premium for products based on their clean and sustainable production system (2, 11).

The domestic market is also crucial, contributing around 40% of the total value of the cattle industry. The majority of domestically consumed meat is sold to butchers or supermarkets. Meat Standards Australia has developed a comprehensive trace-back scheme with the focus on tenderness, food safety and QA. The National Livestock Identification scheme uses 'whole of life' electronic ear tags enabling accurate and prompt control of livestock and meat products with disease, chemical contamination or quality defects (17). Although the scheme only addresses the 'clean' part of production it is a good step towards EMS.

Corporate versus Family Farms

The family farm remains the dominant unit in Australia, accounting for 99.6% of all broad-acre and dairy farms. However, corporate farms contribute an estimated 6.5% gross value of production. Their

contribution is most significant in the beef industry, with many of the pastoral stations in northern Australia being corporately owned as well as most large feedlots (16). The drivers for EMS are thus likely to be larger for the beef sector, particularly in the northern pastoral zone, than for other broad-acre industries.

Participation Rates in Monitoring and Quality Assurance

TopCrop: TopCrop, a production-oriented farmer group-monitoring program, has approximately 6,000 members (or about 18% of farmers based on ABARE figures). There are approximately 200 groups in NSW, 30 in Queensland, 65 in SA, 6 in Tasmania, 45 in Victoria and 90 in WA (R. Cutler, pers. comm).

Cattlecare: Cattlecare is an accredited QA scheme, with emphasis on minimising risk of chemical contamination, minimising bruising and hide damage and effective management and herd improvement through better record keeping. Approximately 4000 herds (4 million cattle) are accredited (L. Stephens, pers. comm), representing approximately 15% of the national herd.

Overseas and Australian Experience towards EMS and What We Can Learn

The UK, USA, Canada, New Zealand and the cotton industry in Australia have all commenced environmental assessment systems, and are heading in varying degrees towards a formalised EMS. Table 2 gives a brief summary of these schemes and the lessons learnt can be summarised as:

- Acceptance by the agricultural industry and leading farmers is essential. This is much more likely through a voluntary than regulatory approach (provided the system is embraced rapidly enough).
- Acceptance is most likely if farmers are involved in (and preferably drive) both the direction and content, the approach is gradual and staged and if there is a readily identifiable driving force.
- Resistance to change by farmers is less likely if the issues are well defined.
- The benefits of heading towards EMS are improved management skills, reduced risk of regulation, health protection, maintenance of credit ratings with lenders, maintenance of public confidence and access to financial assistance for on-farm works.
- Participation rates increase markedly when there is financial incentive (see participation rates in the Canadian EFP compared with the US and UK schemes in Table 2).
- For most family farmers ISO 14000 is not yet practical, but encouraging interested farmer 'champions' can be very successful in leading the industry towards EMS.

Can Australia Afford Not to be Involved in EMS?

The messages from the above discussions and experience with farmers are:

- Many of the major importing regions and most of the Australian bulk customers are unlikely to pay premiums for grain produced in an environmentally acceptable manner, with the exception of a very small amount of organic product (J. Woolfe, pers. comm.).
- Market signals are stronger for beef than grains due the importance of Japanese, US and European markets, corporate farms and the importance of supermarkets as meat purchasers.
- Major export competitors (USA, Canada and the EU in the grains sector) are highlighting environmental concerns and raising EMS as being important. Fear regarding future market access is a strong driver.
- Drivers for EMS are weaker for grains than the beef industry, given the dominance of family farming operations and higher reliance on exports. For both, however, there are relatively strong domestic drivers, given the current policy debate and increasing demands by governments for accountability.
- The will for the majority of farmers to adopt EMS currently appears low, given the relatively low participation rates in QA and production monitoring schemes. It can be argued that this could be in part due to the proliferation of various QA schemes and the confusion between some conflicting or incompatible requirements (G. Carruthers, pers. comm).
- Better paddock record keeping is needed on many farms.

It seems clear that Australia cannot afford to be left behind in developing EMS, although farmers should be under no illusion that rewards for environmental performance are likely to come from overseas markets.

What EMS Will and Will Not Deliver

EMS will help address the demands being put on agriculture to be more environmentally accountable but is not a guarantee that its environmental performance will be acceptable to discerning consumers or society at large. EMS is based on continuous improvement – the system is certified not the actual outcome. Such systems, based on 'current best practice' can potentially encourage only incremental improvements on what is largely an unsustainable system. If, for example, a farmer is starting from a poor environmental base or has limited acceptance that current farming systems are not sustainable, although he/she could show improvement using EMS, degradation could continue (albeit at a lower rate than currently). Although not the intent, EMS can be used to market products of questionable environmental credentials ('greenwash') and could become little more than a cynical marketing tool.

Because of the deficiencies in using only continuous improvement (such as ISO 14000), it can be argued that establishment of appropriate benchmarks or a environmental standards should be also incorporated in some facets of the EMS assessment. By seeking to apply environmental standards to operations, primary producers can more convincingly signal that they want their environmental performance to meet an acceptable level than using only continuous improvement. When applied in this way, the environmental standard is the organisation's environmental goal and the EMS will assist the organisation to achieve that goal.

EMS is essentially an individualistic activity about managing 'on-farm' environmental issues. Thus, although it will help, EMS will not necessarily deliver appropriate land use at a larger scale. This much larger goal needs a long-term commitment to education of rural and urban communities about the importance of agriculture and the 'trade-offs' between production of food and protection of the environment. Altered government policy is needed to reward farmers for provision of appropriate public good environmental stewardship, to cost and trade in ecosystem services and to penalise those who degrade natural resources unacceptably. A mind-set change is needed to include farming within ecological principles and causing minimal 'off-site' impacts (both spatial and temporal). It will be the mix of policy tools (some existing and some new) that will realise these goals.

The concern and attitudes of some farmers is very encouraging. A group in the NSW southern Riverina were surveyed about their motivation for being involved in an EMS pilot project. Collated responses were:

- Farmers should be responsible for their management where it affects someone or something else. Farmers should have a 'caretaker' role of land for future generations and wildlife.
- Longer time scales are needed for environmental issues than economic ones; there is a usually a trade-off between farm viability and environmental management.
- Farmers have a strong sense of community responsibility, including the need to maintain viable communities, concern for the long-term future of farming and an ethical obligation to care for land.

Some of the changes needed, which go well beyond the scope of the EMS, are summarised in Table 3, using a four-step framework suggested by Pretty (19). For an acceptable environmental outcome the mindset changes in stage 3 are probably needed. Leading farmers are commonly at stages 1 or 2 in some areas, with many farmers still at stage 0.

EMS is useful and will probably become part of the future for Australian broad-acre industries. Ideally it should be developed as a partnership between farmers, grain marketers, processors, conservation groups and scientists and promoted to the wider community. Overseas experience has shown that steps towards EMS produces a number of benefits such as increased management skills and helps to work towards developing more environmentally acceptable farming practices. It will also help to preserve the environment in a more objective way than currently occurs.

For farmers to embrace EMS requires an understanding of and acceptance that farming's current environmental performance is unlikely to be acceptable in future. The capacity of farmers to adapt to the changes that will be required is crucial; farmers with high management skills are most able to respond to the challenges needed. At present only a few percent of farmers (at best) would even consider adopting EMS.

EMS is unlikely to deliver price premiums (with the exception of niche markets) but will help to prevent market access restrictions. Market signals to reward farmers' environmental performance are currently weak. This gives farmers time to prepare for EMS (increase paddock record keeping, identify issues of major environmental concern and work towards improving performance) in future. At present, broad-acre farmers likely to consider EMS and/or be part of its development are likely to need to have sound economic performance, a long-term vision of passing the farm on to future generations, a degree of altruism and/or a fear of future market access restrictions or legislation.

Stronger domestic market signals, through governments paying for provision of public good environmental services and demanding greater proof of accountability will encourage farmers with high managerial skills to embrace EMS. Furthermore, such pressure will also contribute to structural adjustment pressure on farmers who do not have such capacity.

CONCLUSIONS

The drivers for adoption of EMS are not yet strong for broad-acre agriculture, but will increase over time both domestically and internationally. Broad-acre industries should work towards developing EMS because of agriculture's current unacceptable environmental performance and the need for greater public accountability. Development of EMS is both environmentally responsible and politically wise. It can potentially help to re-build the confidence of consumers about the land management skills of farmers and re-dress the divide between urban people and farmers who supply their food. This is provided that EMS is used as a genuine attempt to reduce the environmental impacts of agriculture rather than mainly as a marketing ploy. Canadian farmers' comments summarise why farmers should be involved in developing a self-assessment and action planning process that will lead to development of EMS:

- Take change by the hand before it takes you by the throat!
- The best way to change the future is to invent it!

EMS provides a useful tool to justify and improve farmers' environmental performance but is not a panacea; continuous improvement does not necessarily guarantee an acceptable environmental outcome in an acceptable time frame. Mindset changes about the way we farm are needed and such fundamental change goes way beyond issues of EMS. Involvement of farmers is essential to develop a practical system that can be implemented once the drivers (either domestic or international) provide sufficient market signals for farmers to adopt EMS. Existing group structures such as TopCrop and Landcare could be used as the basis for training of farmers and delivery of EMS to help farmers prepare for the future.

ACKNOWLEDGMENTS

I am grateful for the funding and support of GRDC to be able to work with farmers on development towards EMS for the grains industry. Thanks to Genevieve Carruthers for constructive comments on the paper, and to both Genevieve and Cameron Weeks for many discussions. Thanks to John Woolfe for the AWB perspective, to John Harvey (GRDC), Tim Paramore, Andrew Jeeves (Go Mark Foods), Ian Brown (Noslam), Craig Hunter (Ontario EFP), Julie Currey, Veronique Froelich, Philip Newton, Jeff Hirth and Kim Lowe (DNRE) and Caroline Drummond (LEAF) for comments, to Ross Cutler for TopCrop figures and Len Stephens and Peter Loneragan for Cattlecare and beef industry figures. Thanks to Lucy Taylor and Gerard Hogan for comments and for providing information on WA and SA.

REFERENCES

1. Alexandra, J. 1999. Briefing paper for *Environmental management systems in agriculture: Proceedings of a national workshop* May 26-28, 1999. (Eds G. Carruthers and G. Tinning). RIRDC Publication No. 99/94.ISBN 0 642 57934.
2. Anderson, S. Lowe, K and Preece, C. 2000. Incorporating Biodiversity into Environmental Management Systems for Victorian Agriculture: a discussion paper (Parks, Flora & Fauna Division, *Department of Natural Resources and Environment* East Melbourne).
3. Anon. 1998. A full repairing lease: Inquiry into ecologically sustainable land management Report no. 60. (*Industry Commission:* Canberra).
4. Anon. 1999. *Australian Grain Yearbook 1999.* pp. 23-36
5. Anon. 2000a. Murray-Darling Basin Ministerial Council 2000, Draft Basin Salinity Management Strategy 2001-2005. (*Murray Darling Basin Commission:* Canberra).
6. Anon. 2000b. Murray-Darling Basin Ministerial Council 2000, Draft Integrated Catchment Management in the Murray-Darling Basin 2001-2010. (*Murray Darling Basin Commission:* Canberra).
7. AS/NZS ISO 14001: 1996. Australia/New Zealand Standard®. (*Standards Australia/Standards New Zealand*). ISBN 0 7337 0837 4.
8. AS/NZS ISO 14004: 1996. Australia/New Zealand Standard®. (*Standards Australia/Standards New Zealand*). ISBN 0 7337 0838 2.
9. Carruthers, G. and Tinning, G. 1999. *Environmental management systems in agriculture: Proceedings of a national workshop* May 26-28, 1999. RIRDC Publication No. 99/94.ISBN 0 642 57934 2
10. Carruthers, G. and Tinning G. 2000. *Proceedings of the National Landcare Conference,* Melbourne
11. Currey, J. 2000. Draft paper for the Victorian Food Industry Advisory Committee (FIAC). (*Department of Natural Resources and Environment:* East Melbourne).
12. Ellyard, P. 1998. Ideas for the new millennium. (*Melbourne University Press,* Carlton). ISBN 0 522 84819 2.
13. Finlayson, I. 1999. *Environmental management systems in agriculture: Proceedings of a national workshop* May 26-28, 1999. (Eds G. Carruthers and G. Tinning). RIRDC Publication No. 99/94.ISBN 0 642 57934.
14. Knopke, P., O'Donnell, V. and Shepherd, A. 2000. ABARE Research Report 2000.1 (*Australian Bureau of Agricultural and Resource Economics: Canberra).* ISBN 0 642 76413 1.
15. Koo, W.W. and Taylor, R.D. 2000. Agricultural Economics Report No. 438. Northern Plains Trade Research Centre. (*North Dakota University*). http://agecon.lib.umn.edu/ndsu.html
16. Martin, P. 1996. Australian Farm Surveys Report. (*Australian Bureau of Resource Economics:* Canberra). pp. 46-47.
17. Meat and Livestock Australia website. http://www.mla.com.au/mis/industry/
18. NSW Government Treasury website. http://www.treasury.nsw.gov.au/salinity/experts.htm
19. Pretty, J. 1998. The living land. (*Earthscan Publications Ltd:* London). ISBN 1 85383 516 1.
20. Stoneham, G., Crowe, M., Platt, S., Chaudhri, V. Soligo, J., and Strappazzon, L. 2000. (*Department of Natural Resources and Environment:* East Melbourne). ISBN 0 7311 4572 0.
21. Ure, G. 1999. *Environmental management systems in agriculture: Proceedings of a national workshop* May 26-28, 1999. (Eds G. Carruthers and G. Tinning). RIRDC Publication No. 99/94.ISBN 0 642 57934.
22. Williams. A. 1999. *Proceedings of the National Workshop on Environmental Management Systems in Agriculture,* Ballina (*NSW Agriculture,* Wollongbar). (Eds. G. Carruthers and G. Tinning). RIRDC Publication No. 99/94.ISBN 0 642 57934.
23. World Trade Organisation website. http://www.wto.org/english/news_e/pres99_e/environment.pdf

Table 2: Status of some environmental assessment schemes in progress.

Scheme name	Key features
Linking Environment and Farming (LEAF), UK	*Commenced:* 1991, non-profit organisation, less than 10% UK farmers participating. *Key components:* The LEAF audit (self assessment or LEAF can audit); Practical guide to Integrated Farm Management; Demonstration farms to educate a wide range of people from school children, other farmers, conservation groups, and politicians; Developing tools and guidelines for farmers; Training and technology. *Future progress:* Not progressing to ISO 14000 as not worth the effort for farmers; Progressing towards brand marketing using a LEAF logo with external verification. *More information:* Caroline Drummond leaf@farmline.com
Farm*A*Syst, USA	*Commenced:* 1987, operates in 46 states, partnership between governments, university and farmers, 85,000 participants (less than 1% of US farmers). *Key components:* Fact sheets (to give background education to the topic, listings of programs available for farmers to access), questionnaires or worksheets (either self assessed or assessed by a consultant), action plans and support from agencies (such as the EPA and USDA) to assist implementation. *Future progress:* Progress to brand labelling has not been successful as there is no price premium for produce. Farm*A*Syst is likely to progress down the ISO pathway with a recent major funding application (US $20 million+) submitted. *More information:* http://www.uwex.edu/farmasyst, email Gary Jackson: gwjacks@facstaff.wisc.edu
Ontario Environmental Farm Plan (EFP), Canada	*Commenced:* 1993, run by farmers (Ontario Soil and Crop Improvement Association) in partnership with government. Over 15,000 (43% farmers) participants. *Key components:* Step (1) Attend a local EFP workshop where farmers are given an EFP Workbook; (2) Complete self assessment – 23 modules; (3) Develop an Action Plan (time-bound); (4) Submit EFP for a confidential review by a locally appointed group of farmers, government personnel do not see the information; (5) Implement the EFP Action Plan. Each farm is eligible for $1,500 from government as an incentive following peer review by farmers. *Future progress:* Third party audits, on-farm Hazard Assessment Critical Control Points (HACCP). *More information:* http://res2agr.ca/london/gp/efp, email Craig Hunter research@ofvga.org
North Otago Soil and Land Management (Noslam), NZ	*Commenced:* 1994, farmer driven to ensure system is practical. *Key components*: Group accreditation to ISO 14001. Most of the system requirements are handled at the group level, making the on-farm component much simpler than if all of ISO 14001 attempted individually. Noslam is audited as a group and 10% of individual farms are externally audited. Through the group process costs to the farmer are minimal and can be further reduced by using other farmers as auditors. The system is very flexible and can include animal welfare and product quality parameters as well as environmental parameters. *Future directions:* Industry acceptance and promotion of system, setting of bottom lines to ensure minimum standards achieved, training for farmers interested in being plan providers, and the linking of produce from accredited farms with markets. More information: http://www.noslam.co.nz , email Ian.Brown@orc.govt.nz
Australian cotton 'Best Practice'	*Commenced:* Best practice manual released in 1997 following pressure from regulators, the community, environmental activists and catchment users. *Key components:* A 'Best Practice Manual' incorporating; (1) background information; (2) Self-assessment worksheets based on best practice, focus on pesticides; (3) Development of On-Farm Action Plans to address risk areas. Solutions documented as are the monitoring and review processes implemented; (4) Worksheets can be audited *Future directions:* Industry working towards ISO 14001 certification and auditing; Addition of other modules to address other environmental issues. *More information:* email Allan Williams allanw@mpx.com.au, (22).

Table 3: **Four steps towards developing sustainable agriculture, Environmental Management Systems (EMS) and brand labelling based on the concept outlined by Pretty (19).**

Steps towards sustainability	**Sustainable agriculture**	**Environmental Management Systems**	**Brand labelling**
Step 0: Conventional modern farming	Conventional farming; maximise production, improved economic efficiency by reducing labour costs, no consideration of off-site impacts of agriculture. Increased impoverishment of social capital.	Family farmers have little knowledge about EMS, some rhetoric in the press about ISO 14000. A few corporate farms lead the way with EMS for individual market advantage (enlightened self interest).	Belief that current agricultural systems can produce 'green' products, little serious thought about the meaning of 'clean and green' or have associated 'clean and green' only with food safety (i.e. 'clean').
Step 1: Improved economic and environmental efficiency	Understanding of environmental problems and the magnitude of the changes needed. Tentative steps towards changing the farming system – e.g. sowing several paddocks to lucerne, adoption of precision farming. Fundamental values and principles unchanged.	Corporate farmers motivated to use EMS for market advantage. Family farmers keeping good paddock records, participation in Quality Assurance schemes, development of an understanding of EMS.	Marketing issues associated with brand labelling well understood.
Step 2: Integrating regenerative technologies	Major commitment and implementation of the farming system aimed at minimising off-site impacts of agriculture. Large use of both local and outside knowledge. Town-based rural people still relatively uninvolved in farming.	Family farmers participating in self-assessment and associated monitoring and some using EMS, good understanding of market requirements with respect to environmental concerns.	Brand labelling based on external assessment, audit or performance standard (e.g. ISO 14000), but products not necessarily produced in an environmentally acceptable way. Food can be credibly marketed as 'clean' (but not necessarily 'green'), although marketing attempts to promote products that are both 'clean and green'.
Step 3: Re-design with communities	Major change to whole farming system and re-assessment of values. Mindset change from individual to community values driving change. Vision-centred approach to farming rather than solving the problems of current farming systems. Farming practised within ecological principles including nurture of land and water resources, utilisation of energy from renewable resources and no preventable loss of biodiversity within the region. Personal commitment to life-long learning, extensive use of	EMS with third party auditing is relatively common. More importantly there is a mindset change from EMS being used mainly to gain 'on-farm' advantage to one of seriously addressing environmental problems beyond the farm level. Move from EMS as an individual to a community activity – development and implementation of Local Action Plan in	Credible eco-labelling, fully accredited to have minimal impacts on preventable loss of biodiversity and farming within ecological principles. Brand labelling encompasses both 'clean and green' and can be genuinely marketed as both.

	electronic technology to source information and solve problems. Recognition that there is much local people can do by themselves, natural and social capital regenerated.	region.