Environmental Management Systems and ISO 14000 in Australia – on and off-farm implementation and policy development.

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Awareness and adoption of environmental management systems and farm planning approaches is growing rapidly in Australia. In part this is due to the urgent need to address resource degradation issues, but is also largely driven by the need to maintain markets in an increasingly competitive marketplace. Many Australian farms are, of necessity, operated on a low input regime. Carrying capacity is often low and thus Australian agriculture often less intensive than in many other areas of the world. Due to climatic conditions, Australian farmers often face a very different suite of environmental issues to farmers in the Northern hemisphere.

The age and low nutrient content of our soil, the harsh and unpredictable climate and lack of agricultural subsidies available to many of our competitors have forced Australian farmers to become highly efficient. Another consequence of the competition in earning income from farming is that many farm families have now become increasingly reliant on income generated off-farm. In the past, much Australian marketing has been strongly based on Australia's "Clean and Green" credentials. Demands for 'proof' of sustainable production methods are now growing worldwide and the provision of 'proof' seems to be driving the adoption of credible systems approaches. In many cases, overseas programs appear to have been integrated with practices that have been subsidised, and which are associated with existing structures of bureaucracy and documentation. To a great extent, Australia has not subsidised farming in the past, but rather left farmers to manage farms as they see fit. Australian farmers tend not to have a culture or mind-set which supports record keeping. Farm records are frequently used overseas as a way to demonstrate stewardship of land, but in Australia the use of such methods for demonstration of stewardship are rare. Thus, the challenges facing those trying to promote and encourage adoption of environmental management systems in agriculture are complex and stimulating, to say the least! Australian farmers appear to face numerous barriers when considering the adoption of environmental management systems (EMS). Foremost amongst these is the perceived cost of developing EMS, and the associated record keeping. Concurrent with this is the doubtful status of market advantage for 'environmentally sustainable' goods. Vertical marketing chains will need to be strengthened for farmers to take full advantage of any marketing benefits that accrue from adoption of EMS. Other issues inhibiting widespread adoption of EMS by the farming sector are uncertain regulatory implications, lack of sound knowledge about EMS (both as a concept and implementation), concern about integration with other management systems (such as quality assurance), and lack of time and/or expertise for farmers to develop their own EMS approach.

Despite these constraints, it is apparent the use of EMS in Australian is growing. Several of the approaches are based on existing farm management practices, but many also incorporate ISO 14001 principles. The following information is a summary of current activity in Australian

agriculture and some related industries in the adoption and implementation of environmental management systems, farm planning programs and resource management approaches. Some information about activities in New Zealand has also been included.

New South Wales (NSW)

New South Wales Agriculture first appointed an officer (Genevieve Carruthers) dedicated to the research, development and implementation of EMS for agribusiness in January 1997. It appears that NSW was the first state agriculture department to take this step in Australia. Since that time, other state agricultural departments having slowly begun appointing EMS staff, however in many cases these officers play many roles and do not always focus solely on EMS development. In addition, often these other state officers are actually working on integrated or whole farm planning approaches, rather than on EMS *per s*e.

The first national workshop on the use of Environmental Management Systems in Australian Agriculture was held in May 26-28, 1999, at Ballina NSW. The workshop was organised by Genevieve Carruthers and Gavin Tinning of NSW Agriculture, and funded by NSW Agriculture, the Rural Industries Research and Development Corporation and the Land and Water Rural Research Organisation. Several research and development corporations, certification and auditing companies, the WorldWide Fund for Nature, the Australian Fertiliser Industry group and various grower organisations also provided sponsorship.

160 delegates from all sectors of agri-industry, retail, consumer, research and certification sectors attended the workshop. For many it was their first introduction to the concepts and principles of EMS. The presence of several speakers from overseas (Canada, the UK, and New Zealand) added to the steep learning curve of delegates, as they were exposed not only to ISO 14000, but to the Ontario Farm Environmental Plan, The UK Linking Environment and Farming program, as well as to the National Association of Sustainable Agriculture Australia (NASAA) Standard for organic production. Delegates heard how to develop an EMS, what labelling requirements were allowed, how indigenous Australians felt they could contribute to sustainable land management, how partnerships could be used to further the process, the benefits of group certification and auditing requirements. However, delegates did not merely listen. Through a series of facilitated discussion groups, the issues of importance and in need of more consideration were developed over the three days. Delegates attempted to define the desirable features of any EMS, discussed whether there should be a national approach to the use of EMS in agriculture, and considered roles of various stakeholders throughout the process. A series of recommendations and agreed principles were developed (see below).

Principles

- keep it simple - clear achievable
- voluntary
- criterion based - measurable - gives feedback for progress
- dynamic - evolving
- partnership based
- vision
- integrate with existing systems & processes
- communicated & marketed upwards - downwards - sideways

- . requires a clearly defined purpose and objectives.
- . industry led
- . credible and transparent to markets and user

1. Recommendation
That EMS, its purpose, objectives, roles and responsibilities be clearly defined.

2. Recommendation
That international and domestic case studies, market analysis and EMS processes be documented and distributed.

3. Recommendation
That benefits and costs of an EMS to enterprise owners and the environment be defined.

4. Recommendation
That a credible inclusive process of consultation be undertaken, managed by RIRDC, to establish the level of support for EMS and the form EMS should take.

5. Recommendation
That a representative, national, funded body be established to champion EMS being introduced into agriculture.

6. Recommendation
We believe that EMS offers opportunities for advancements in agricultural sustainability & productivity. We call on industry groups to move this process forward & call on government to support partnerships to progress EMS.

7. Recommendation
. That any EMS:
- . be built on existing systems and processes
- . be industry led
- . involve extensive consultation with stakeholders
- . be voluntary.

The proceedings may be purchased at a cost of Aus$15.00 from:
Publications Section
Rural Industries Research and Development Corporation
PO Box 4776
Kingston ACT 2604

Bulk orders (10 or more copies) receive a discount of 20%. On-line ordering of the proceedings is possible through the RIRDC website http://www.rirdc.gov.au/pub/cat/contents.html. The proceedings may also be downloaded from this site. Search on the site for EMS to locate the proceedings. Since the workshop, a group has now formed to examine a way forward to the development of a national approach to EMS for Australian agriculture. This group is currently chaired by Mr. Lui Marcelli of the Kondinin group, a farmer research and information exchange group with membership across the country. Whilst still in the formative stages, this group will

attempt to engage farmer associations across the country, and will begin the process of setting a framework for further work in this area. It is anticipated that a number of groups will form that have a more technical focus on a number of the issues that will need to be addressed (for example – training, funding, communications etc.). For further information contact Genevieve.Carruthers, Environmental Systems Specialist, NSW Agriculture at:
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Genevieve Carruthers is the also project leader for a three-year pilot project to develop on-farm environmental management systems for grain farms in NSW and Queensland. It is hoped that the project will form a prototype for the rest of Australia's grains industry. This project is one of several that have been funded by the Grains Research and Development Council of Australia, the peak research body for grains in Australia. The project aims to incorporate all legal requirements of grain growers, as well as community expectations, agronomic best management practices and risk assessment features into workable systems approaches. While the systems developed will be aligned with ISO 14001, there is no requirement for farmers participating in the study to seek certification. In addition, features of Farm*A*Syst, the Ontario Environmental Farm Plan and the Linking Environment and Farming program will also be incorporated into the final program. Farmers are being asked to firstly identify those features that they wish to be included and secondly to trial the programs of their farms as part of their normal farming operations. Progress to date has included: a review of the environmental, social and economic issues of concern to both farmers and the wider communities of the two catchments involved in the project; the development of a self review/audit process to determine priority areas of resource management; and introductory training program development. A prototype EMS manual has been developed and will be trialed on two farms in the first half of 2000. Mike Logan in New South Wales (1st farmer in the world to gain certification to ISO 14001, in March 1997) has highlighted the following points arising from his experience in utilising ISO 14001 on his farm. In relation to marketing, Mike believes that the three most crucial things are:

1. There is no such thing as premiums - only access through differentiation.

2. Consultants will constantly slow the process so make sure you manage them and they don't manage you - they will tell you why you should look at it, not why you should roll up your sleeves and get on with it.

3. The name of the approach should not be limited to ISO 14000; it needs to be something that can be used in marketing. "ISO 14001is a terrible name designed by a committee who have never sold an ounce of produce in a marketplace in their lives".

A water utility in NSW, Coleambally Irrigation Limited has recently been awarded both ISO 9002 and 14001 certification, and is believed to be the first water utility in the world to receive

such certification. 11 environmental staff are employed by Coleambally Irrigation to assist with the management of land and water planning.

The Coleambally area produces $7 million worth of agricultural produce, largely grown using irrigation waters. As a result, Coleambally Irrigation Limited believes that the stage is now set for the Coleambally Farm Management package, which will assist growers in developing and implementing certified sustainable land practices, to be developed by the district's community.

Funding the development of a land and water management plan for the area will come from both government and private sources. One of the features of the land and water management plan will be a benchmarking survey to monitor preservation of local flora and fauna. At least two threatened species, the Superb Parrot and the Southern Bell Frog are known form the area, with a further two species (the Greater Long-eared Bat and the Inland Forest Bat) believed to also be in the region.

Coleambally Irrigation is currently investigating the use of labelling to certify the area's commitment to food safety, environmental management and quality systems.

Contact Mark Bramston (mbramston@colyirr.com.au)

South Australia

Primary Industries and Resources South Australia (PIRSA) is seeking funding and currently putting up several proposals in respect to EMS and is currently developing a State EMS Strategy specifically for the agricultural industry (contact: moran.paul@saugov.sa.gov.au).

The wine industry is recently employed an EMS Officer to specifically develop and implement and EMS for South Eastern Australia. This industry is seeking currently investigating industry wide adoption of EMS for all growers and processors, and this may ultimately involved ISO 14000 certification (contact: Dr. Anne-Maree Boland: Anne-Maree.Boland@nre.vic.gov.au) In addition, funding was recently received for the wine industry to establish "Viticare" a cooperative research and EMS development. Several of Australia's major wine companies (eg. Southcorp) have been working to develop sustainable practices for widespread use within the viticulture industry and another company, "Banrock Station' recently received an environmental award for its work in restoring degraded wetlands as part of its' winery development. Most of the development in the wine industry may be centred on ISO 14000. Contact HughArmstrong@msn.com.au or hogan.gerard@saugov.sa.gov.au.

The piggery industry in South Australia is also investigating the feasibility of introducing an EMS and ISO 14000 accreditation.

The forestry, mining and petroleum and fishery industries are all currently investigating the development of EMS for their industry sectors. Early indications are that all will choose ISO 14001 as their model. For more information contacts are as follows:

Forestry (contact: www.pir.sa.gov.au).

Mining and Petroleum. (Contact: dwyer.elliot@saugov.sa.au, www.pir.sa.gov.au or stone.michael@saugov.sa.gov.au, www.pir.sa.gov.au)

Fisheries. (Contact: neveraskus.vic@sau.gov.sa.au, www.pir.sa.gov.au).

Western Australia

Activities on EMS are being largely directed by AGWEST, the state's Department of Agriculture, but are also being followed up by the Land Management Society in that State and by a number of community groups such as the Kondinin group – a farmer directed research and education agency.

AGWEST has an agency-wide EMS working group which includes staff from the Meat, Grains, Wool, Dairy, Horticulture, Trade, Sustainable Rural Development, and Industry Protection programs. An internal policy and a range of "issues papers" on a wide range of topics are being developed. Discussions about EMS have also been held with external stakeholders - catchment groups, other agencies, grower organisations, Kondinin, Land Management Society and similar groups.

AGWEST is developing "Best Management Practice" and "Codes of Practice" with various industry stakeholders in a range of industries. Some are more advanced than others.

- Broadacre is in its infancy but will start in earnest early in 2000
- Dairy has commenced
- The pork industry is advanced nationally with their quality assurance programs and they are including in that a range of environmental issues; AGWEST staff are very involved with this
- A code of practice is being developed for intensive beef

AGWEST are developing an "Environmental Farm Plan" - using adaptions of other examples from around the world, with a view to eventually developing an EMS product that is linked to our QA product (SQF 2000). Accommodating concepts such as hazard analysis, targets, indicators, monitoring systems, continuous improvement concepts etc into the farm plans is under consideration. AGWEST believes believe that a local product will have some advantages over the ISO system - in terms of applicability, affordability, and incorporation of sustainability principles.

WA also has a quality assurance scheme (SQF 2000 – Safe Quality Food 2000) that is being used throughout Australia, predominantly with horticultural produce. Integration of EMS with SQF 2000 programs is currently under investigation.

Contact Jill Wilson: (jwilso@agric.wa.gov.au).

Victoria

Anna Ridley and Veronique Froelich, Agriculture Victoria Rutherglen are working on a project to examine the sort of EMS and how to implement and EMS that will suit the farming community in Victoria. This project is being funded by the Grains Research and Development Council, and is working collaboratively with Genevieve Carruthers in NSW, and is following similar pathways. They are encouraging farmers to establish farm policies for environmental management including principles and goals. The principles include ideals such as 'at least partial restoring of the water balance', 'matching plant demands with nutrient supply', 'maintenance of adequate biodiversity and protection of threatened species', 'minimal impacts on natural ecosystems'. Farmers are also expected to identify the significant effects farm operations on the environment, allocate responsibility and commit resources to carry out an action plan of improved environmental management and develop procedures, documentation, tools and training to ensure the program is carried out properly (these could be record keeping and simple tools for monitoring performance). Finally, it is expected that farmers will review and check that the system is operating effectively.

Farmers have been presented with summarised information on a range of farm planning approaches used overseas and have been asked to choose which scheme they wish to follow. Two of the major targets to be developed from the project are a self assessment questionnaire to be used on farm and appropriate monitoring tools to help assess whether on-farm environmental performance is improving. To assist with the progress in this project, the self-assessment audit developed by NSW Agriculture has been forwarded for comment to Ann Ridley. This should provide valuable information for both projects.

Depending upon farmers' interests and progress, the project will then possibly proceed to develop a Local Action Plan to address off-farm issues (such as rising groundwater caused by regional groundwater, adjacent irrigation areas).

Another feature of the project is to evaluate the requirements for auditing and/or certification. The project recognises the value of third-party audits for credibility for product labelling. As with the NSW Agriculture grains project, the needs of participants will be canvassed in this study to determine whether participants wish to proceed with third-party certification audits or not.

Contact Anna Ridley (anna.ridley@nre.vic.gov.au)

Dairy processing

Bonlac Foods Limited is Australia's leading Australian owned and controlled dairy products manufacturing and export company. The company has over 3400 dairy farmer supplier shareholders. The company generates revenue of over $1.2 billion (Australian) annually. Bonlac has gained certification to ISO 14001 at all of their Victorian plants (with systems for plants other areas under development). This has been done as a means to manage all environmental aspects of the company's business. Existing quality and occupational health and safety management programs are integrated with the EMS programs. The decision to develop and implement EMS's has been taken not only as a way to demonstrate due diligence with respect to environmental management of their processing plants, but also as both a way to gain market differentiation and to respond to community concerns about environmental matters generally.

Bonlac are now "closing the loop" and have commenced work on the development of on-farm EMS approaches that extend the work conducted at Bonlac's factory sites. Six areas are seen as integral to farm EMS approaches – effluent management; water management; soil, health and pasture management; nutrient balance; native flora/fauna protection; farm roads, shedding and animal welfare. Eventually it is anticipated that Bonlac will develop a self-audit based on best management practices that will integrate with QA, occupational health and safety, animal welfare and energy management programs.

Further information about Bonlacs' environmental management systems can be obtained from Graeme Rogers (RogersG@bonlac.com.au).

Goulburn Murray Water is another water utility that has done considerable work in developing an EMS based on ISO 14001. Originally the work commenced using British Standard 7750, and a Register of Significant Environmental Effects was developed. Since that beginning, a number of audits have been conducted, and have revealed the full extent of the environmental laws applicable to Goulburn Murray Water's activities. In addition, a much fuller knowledge of the levels of environmental impacts and risks have been identified. Whilst the initial work appears to have been largely undertaken to protect Goulburn Murray Water from legal risk, the business is now communicating more with farmers in the catchment areas to attempt to work together to address environmental management.

Queensland

The Sustainable Industries Division (Sustainable Industries Division) is a solutions-driven Queensland Environmental Protection Agency initiative assisting Queensland industry to achieve higher levels of environmental performance while boosting profitability and competitiveness. The division does not have a regulatory role.

The SID Agribusiness and Food Processing Team will identify, or implement processes to: - value-add potential for products, manage risk areas, build strategic partnerships, encourage efficient resource use, examine and exploit market opportunities, improve profitability, minimise off-site impacts and to current and emerging social, economic and environmental factors which influence agribusiness-food chain logistics, and interactions with regional communities.

The Division has been operating for less than 12 months, and already has established partnerships with key Queensland agribusiness sub-sectors, with a range of activities underway including R&D, pilot projects, and industry workshops. Linkages are also being established with programs of other state agencies such as the Departments of Primary Industries, and Natural Resources. The Division is currently examining the possibility of supporting the on-farm grains EMS work being done in Queensland by NSW Agriculture.

An Environmental Code of Practice for all Queensland farmers was released in 1998. This has been followed up by "Farmcare: Cultivating a Better Future. A Code of Practice for Sustainable Fruit and Vegetable Production in Queensland", 1998. Whilst neither document deals greatly with EMS, they do at least provide the baseline required practices that allow farmers to

demonstrate their "Duty of Care" required from all Queenslanders, with respect to natural resources. Such codes could be expanded into an EMS with some work. The need for integration of farm business and environmental issues planning is raised in both documents.

Contact: Queensland Fruit and Vegetable Growers Brisbane Market, Sherwood Rd. Rocklea. PO Box 19 Brisbane Market Queensland Australia 4106.

Recently in Queensland, a Shire Council development approval for a piggery and slaughterhouse included the requirement that the developer seek and obtain certification to ISO 14001 as part of the development consent. The piggery management has already decided to undertake such a move, as they were finding that pressure from overseas customers for demonstrably 'clean, green' produce was growing, and they saw ISO 14000 as one way to demonstrate this status. Dr Mike Spence, from the University of Southern Queensland has been working with the pork industry to develop EMS modules for piggery managers, and environmental awareness training has commenced for piggery operators throughout Queensland and NSW. Quality assurance program usage is growing rapidly in piggery operations in Australia (with most research funded through the Pork Research and Development Council).

Contact Mike Spence (spencem@usq.edu.au)

Tasmania

There has been considerable work in Tasmania lately involving purchasers from the UK requiring the use of production protocols for produce (particularly onions). The first official audits for 'Fresh Field' onion producers were commenced in December 1999, and are planned to be finalised by February 2000. The State government is assisting in covering audit costs for the first year of the program, and 70% of onion growers who supply Fresh Filed shave opted to have their properties audited.

There are two levels for farmers to aim at – basic and gold. Basic category farms means that 100% of criteria relating to human health and safety and 65% of criteria related to pollution, wildlife conservation and enhancement must be met. To be assigned gold status, 85% of the pollution and wildlife criteria must be met, in addition to 100% in the heath and safety areas. A bonus of $10 per tonne of onions is paid to growers participating in the scheme.

Adoption of sustainable systems approaches has been advancing in Tasmania, partly through a program known as APACE/SAFER. This program has developed a self-check list approach intended to guide farmers in identifying environmental issues they should address.

Tasmania benefits from being one of the most scenic places in Australia, and so there is much community support, and economic benefit in protecting habitats. The Tasmanian scheme could be considered as a first stage towards and EMS. It is a self-assessment questionnaire, developed initially from the LEAF program. There are 7 modules; Soil, Water, Landscape, Pests, Weeds and disease, Animal health and welfare, Enterprise management and Human resource management Questions are not scored by number but at ranked from 'most sustainable' to 'least

sustainable'. Many of the issues relevant to Australian agriculture have been thought through. It covers both broadacre and row cropping horticulture.

Contact Liz Bond (liz.bond@dpiwe.tas.gov.au)

Australian Capital Territory

Nothing specific to report, other than that the Territory is the home of Federal government, and thus there is much high policy development done there.

Federal/Across State Boundary Works

The Murray Darling Basin Commission Project

The Murray Darling Basin Commission (MDBC) has recently commenced a project examining the feasibility of using certification and auditing processes in fostering the adoption of best management practices throughout the Murray Darling Basin in Australia. This area covering much of Australia's eastern states and stretches from Queensland in the North, passes through NSW and Victoria before the two river (the Murray and the Darling) eventually run to the sea in South Australia. Therefore, many of Australia's agricultural enterprises are affected by, and impact on the health of this riverine system. Over the years the system has become very with salinity, erosion, algae and other problems occurring over much of the length of the system. In addition, increasing competition for the use of water from the system has seen the introduction of a water use 'cap' and the growing use of Land and Water Management Plans to attempt to ensure the water is used sustainably. Water is also now charged for at much higher prices in the past, and this has driven a greater efficiency in use.

The MDBC project is initially targeting four major industries – cotton, viticulture, rice and dairy, and also the 'water industry' - public utility providers within the Basin. The project aims to:

- determine the international and domestic drivers for the adoption of quality and/or environmental standards,
- to determine potential standards and models that might be used, to determine any constraints and drivers to implementing an industry based certification and audit process that incorporates natural resource management features,
- to determine whether natural resources management features are an integral part of, or desirable features that could be incorporated into a certification /audit standard for each of the industries mentioned above,
- determine the level of understanding and receptiveness/willingness of the industry and community leaders to adopting appropriate certification/audit processes to an agreed Standard to suit their respective markets.

The project is has a steering committee made up of representatives of agricultural and resource management agency staff. Genevieve Carruthers represents NSW Agriculture on this committee. The project is expected to be completed by February 2001. The project leader is Mr David Marston of Dames and Moore in Sydney, who can be reached at sydd@mail.syd.dames.com. His phone number is 61 29955 7286.

CSIRO (Commonwealth Scientific and Industrial Research Organisation)

Market research identified a role for CSIRO (Commonwealth Scientific and Industrial Research Organisation) in the development of EMS for agriculture, principally in the following areas: -

- identifying the key biophysical elements which underpin sustainable agricultural production in Australia;
- developing appropriate environmental standards at the catchment/regional scale;
- developing biophysical validation procedures that are implementable, verifiable and can be shown to work over time;
- application of the above to specific production systems;
- identifying 'paddock to plate' requirements and linkages to ensure product integrity for eco-labelling and total product certification;
- in collaboration with relevant agencies, identify options for linking existing catchment management planning and Landcare initiatives to EMS; and
- exploring national and international policy and regulatory options, and potential accreditation frameworks that are relevant to EMS in Australian agriculture;

CSIRO conducted a scoping study to identify the key national and international market, ESD and regulatory drivers and constraints determining the need for an internationally consistent EMS and impacting on its successful implementation. A paper entitled "Credible 'Clean and Green'; investigation of the international framework and critical design features of a credible EMS for Australia agriculture" describing this work was published February 2000.

CSIRO has also conducted a national consumer survey to identify key consumer preferences and trends presenting future R&D challenges to the Australian food production and processing industries. This research has provided evidence of consumer trends towards a desire for food that is produced and processed using environmentally sustainable methods.

Contact Kathy Heinz (Kathy.Heinze@adl.clw.csiro.au)

The Cotton Industry Efforts

The feasibility of introducing an appropriate audit and certification model to foster better management practice in natural resource management in the irrigated cotton industry.

Involvement:
Australian Cotton Growers Research Association Cotton R & D Corporation
Murray Darling Basin Commission
Oakville Pastoral Company

Objectives:

- determine the drivers, constraints and opportunities associated with introducing a more rigorous certification/audit standard for the cotton industry
- determine whether ISO 14001 or another standard is appropriate for introduction throughout the cotton industry

- determine the extent to which ISO 14001 or any other identified standards throughout the cotton industry will the MDBC's natural resource management objectives
- determine the understanding and receptiveness of the various sectors of the cotton industry to the adoption of an international standard based certification and audit system
- gain a better understanding of the learning and better management practice adoption practices of cotton growers
- undertake a detailed analysis of the requirements of the nominated standard (with a focus on ISO 14001) making particular reference to how these requirements may be different to those of the existing BMP Manual, and current pilot audit process
- develop an implementation strategy and action plan identifying how the learning patterns of the various industry sectors will be accommodated and the timeframe needed for implementation
- identify the key performance indicators by which the success of the introduction of the certification and audit model can be measured, including the natural resource outcomes.
- identify and R&D requirements to enable the introduction of the nominated standard to occur and for cost effective measurement of the nominated KPI's
- determine the cost and requirements for the introduction and on-going operation of the certification and audit system
- investigate and document the options for cost sharing model suitable for recovering both the implementation and on-going cost of a certification and audit system in the cotton industry

General Comments:

The focus of the study will be two-fold

1. A detailed analysis of the practical requirements for cotton farms to become ISO 14001 certified (drawing in particular on the experiences of Oakville Pastoral Co. in achieving ISO 14001 certification)
2. An assessment of the requirements, for a range of farms, to be able to meet the identified practical requirements. This assessment will be an actual assessment of cotton farms, with cotton farms with a range of management structures, crops, geographic location, size and circumstances to be surveyed.

The cotton industry has also commenced a pilot project (involving approximately 50 growers) to develop and trial the implementation of a best management practice manual that deals with the use of pesticides and herbicides. Self-assessment worksheets based on best practice guidelines (based on the Farm*A*Syst and Canadian EFP schemes). Currently the areas assessed are limited to Farm design and management, Pesticide application, Integrated pest management, Pesticide storage and handling, Development of on-farm Action Plans to address the high-risk areas. The solutions are documented as are the monitoring and review processes implemented to evaluate the effectiveness of the plans.

Further resources to assist farmers in the planning process are also listed under each self-assessment heading, including other published material and relevant legislation. The worksheets can be audited (one farmer has been ISO 14000 certified), but the industry is only now becoming ready for this to occur. Certainly 4 years ago, the industry was not ready for auditing.

The cotton industry decided to have its initial focus on pesticides, the rationale being that this was clearly politically sensitive. The industry believed that it had more chance of gaining acceptance of the majority of farmers if it took a gradual and staged approach. Addition of other modules will occur in future. It is planned to extend the subject area to other resource management issues over time. The BMP manuals are to be aligned with the principles of ISO 14000, and options for certification and labelling of cotton grown using these protocols are under investigation. The project discussed above will of course draw upon the BMP development extensively.

Contact Allan Williams (allanw@mpx.com.au).

Developments with Agriculture Fisheries and Forests Australia (AFFA)

A discussion paper 'Managing Natural Resources in Rural Australia for a Sustainable Future' for developing a national policy on resource management issues has recently been released by AFFA. The paper outlines a possible overarching national policy framework for natural resource management in rural Australia and discusses sustainable natural resource management from a regional and catchment perspective. (The development of a national strategy for EMS in agriculture was one of the major reasons for holding the EMS in Agriculture workshop mentioned above in the section on NSW). The paper suggests a wider mix of policy instruments and influences to encourage improved management practices and more effective investment in rehabilitation activities. The paper also makes specific reference to the use of EMS as a suitable way to achieve sustainable resource management within Australia's farm industry.

The Discussion Paper recognises that it will be impossible, economically and/or technically, to restore all degraded areas and that there will be areas where natural resources will decline further. The challenge is to develop new commercial opportunities, production systems and innovative technologies to optimise economic, environmental and social outcomes and to help communities identify new opportunities and adjust to changed circumstances. The paper will be available for public comment for four months, with *the closing date for comment 31 March 200*0.

The following paragraphs have been supplied by AFFA staff, and describe the rationale behind the production of the discussion paper.

"In the past decade or so we have made considerable advances in understanding natural resource issues. But despite some recent successes, continuing degradation of our natural resources is costing Australia dearly. This is in terms of lower agricultural yields and higher costs of production, costs of rehabilitation, threats to Australia's market advantage as a producer of 'clean and green' goods, and increasing expenditure on repairing infrastructure damaged by salinity. In addition, there are increased biodiversity losses, poorer quality water and declining aesthetic value of some of our landscapes.

Natural resource management poses unique challenges because the managers and users of natural resources are widely dispersed - there are 115 000 farmers and pastoralists across the continent, for example - and there is a complex mix of public and private benefits involved.

With the conclusion of the Decade of Landcare [a national, community participatory program aimed at promoting resource management which includes a farm planning component, and which is now in its 10th year - GC], a new national strategy for managing natural resources in rural and regional Australia is needed for the next 10 to 15 years to guide and influence decision making and actions of governments, landholders, communities and industry.

The Commonwealth, State and Territory governments believe the problem can only be tackled effectively through a partnership of landholders, community, industry and government. For this reason, a detailed (90 page) Discussion Paper has been released and comments are invited from interested groups, individuals or organisations. The paper was developed over 12 months by Commonwealth, State and Territory government agencies in collaboration with landholders, rural community leaders, scientists and industry and conservation interests."

Copies of the Discussion Paper are available from the internet at: www.affa.gov.au/nrm_paper.

New Zealand

The North Otago Sustainable Land Management Group (NoSLaM) has been operating since 1994, and encourages the uptake of environmentally preferable farming methods, through information exchange. The group has developed the "ENVIRO-AG" Farm Environmental Certification Scheme, which is modelled on ISO 14000. Farmers utilise a generic proforma and customise it to suit their own operations. The group sees that such an approach allows participants to be able to verify claims of environmental management. Six farms have been certified to the Standard so far. The certification is conducted as a partnership between the NoSLaM group and SGS New Zealand Ltd. The farm plans incorporate Hazard Analysis and Critical Control Point (HACCP) planning. It is believed the by following the ENVIRO-AG process, farmers will be well placed to demonstrate claims made in the market place, and to take advantage of increasing market trends for 'proof' of claims about the sustainable practices being followed by farmers.

Contact North Otago Sustainable Land Management Group (http://noslam.co.nz/)

Unité Mixte de Recherche INRA - ENESAD
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ENVIRONMENTAL MANAGEMENT SYSTEMS (ISO 14001) A PROMISING TOOL FOR FARMS?

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Society's expectations towards farmers are becoming more and more complex. New requirements (to improve intrinsic qualities, ethic and environmental requirements, fair trade[1], …) are added to the past requirements (to produce more crops and cheaper, to provide quality and variety). In France, the gap between the consumer-citizen and the productivist model is going wider because of the lack of trust of the industry (i.e. mad cow, agricultural use of mud), the authorities (i.e. contaminated blood, asbestos) and even scientists sometimes (GMO). There are variable answers to these factors. There are political decisions (i.e. tightening of regulations, "eco-conditionality" for payment of public subsidies). The requirements of the food chain (food processors, retailers[2], and consumers) and of interested parties (i.e. banks, insurances, and investors) become more and more severe by including environmental guarantees. This situation can lead to consumer's boycott of some products. Behind the marketing information "environmentally friendly system or/and product" provided by farmers, food processors or retailers, the experts discover various realities ranging from a real environmental management to false declarations. The marketing of environmental claims are often checked by various and multiple tools whose credibility is sometimes difficult to assess in a competitive market where everyone seems to be particularly aware and critical towards the weaknesses of rival firms systems. Besides, these several factors can have contradictory requirements towards the same farmer.

In such a context, the ISO 14001 standard is a generic and consensual model of environmental management systems (EMS) which can be used on farms. Several countries are interested in developing environmental management systems in agriculture (Wall, 1997a; 1997b; Wall et al., 1999; Carruthers et Tinning, 1999; Gottlieb-Petersen, 1997; 1999; MAF, 1998). In France, this kind of research is barely emerging. Some European farms have already obtained ISO 14001 certification and one of them is in France. The small number of certified farms indicates that there are significant obstacles to farmer participation in development of EMS in French agriculture (Grolleau, 1997, 1999; Montel, 2000). The first aim of this brief paper is to provide some references. This work is not a deep and exhaustive analysis of ISO 14001, but can be a relevant basis for researchers and practitioners interested in this field. After an overview of the ISO 14001 standard in the French agricultural context, we identify some opportunities and barriers for developing EMS on French farms. Finally, we propose some strategies to overcome the

[1] Some of these requirements (environmental and ethical requirements) cannot be detected on the product even after consumption ("credence goods"). At the very outset, this situation is favorable to opportunism and leads to a crucial information management. An economic analysis of credence attributes can be found in another paper (Grolleau, 2000).

2 Some French retailers – Carrefour, Auchan– have recently introduced environmental claims in food advertising, and need to substantiate them by a credible and generally applicable certification system (Le Monde, March, 1st 1999).

barriers and to encourage the implementation of EMS. These propositions could become promising avenues of research.

1. Critical overview of the ISO 14001 standard applied to French farms

We present a critical overview of the ISO 14001 approach applied to farms. These critics are mainly based on an analysis of standard requirements in the French agricultural context and on a synthesis of the literature. We also use results of a prospective survey done among farmers in Burgundy (Grolleau, 1997). Finally, we use information from interviews among significant agents[3] of the agro-food chain (1999-2000). These data allow a qualitative approach, giving nevertheless interesting results for our work.

1.1. Basic principles and application criteria

The international ISO 14001 standard[4] proposes a voluntary scheme to prove the implementation of an effective and documented EMS. This standard is based on minimum requirements i.e. compliance with environmental laws and regulations, prevention and continual improvement. ISO 14001 is a management standard, it is not a performance or product standard. The principle of continual improvement constitutes the strength and the weakness of the standard. Indeed, this continual improvement is dependant on the farm's own situation, not on an external level. This approach allows no comparison between environmental performances of farms. It is a personal and progressive way in relation with the farm's own performances. This means that two similar farms, both certified according to the ISO 14001 standard may have different environmental performances. While it may be difficult to understand, it allows a lot of farms to apply the ISO 14001 approach. It seems better to get the participation of a lot of farmers than only a few because of the global character of environmental impacts (Paillotin, 2000).

The ISO 14001 standard concerns every organization that wishes to set up an EMS and to get a certification by a third party.[5] In a previous article (Grolleau, 1998), we argued that the organization corresponds to the complete farm (with exception of farms with several independent areas). Indeed the ISO 14001 certification would lose its credibility and pertinence if it is applied only to a workshop because the farm's workshops are interdependent. The definition of the field of application is one of the dilemmas of AgriConfiance® volet Vert.[6] Indeed, this approach, initially conceived for the food chain of a product, loses its pertinence with regard to environmental aspects, which need to consider the farm as a whole. A solution could be the definition of a national common base[7] that allows consideration of the farm as a whole in regards to the environmental.

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[3] For reasons of confidentiality, we do not mention the names of interviewed people or firms.

[4] A European regulation (1836/93) called "Ecoaudit" about implementation of an EMS looks like the ISO 14001 standard. Initially this regulation was for industrial activities only. According to the regulation, an experimental implementation can be applied in other activities. A try to implement "Ecoaudit" in farms is described in Life (1998).

5 According to the ISO 14001 requirements, labeling this certification on the products is forbidden.

[6] Agri Confiance® is an application of the ISO 9002 quality assurance system in the relation between farmers and their cooperative. Agri Confiance® is promoted by the French Confederation of Agricultural Cooperatives. It certifies quality, information and service flows in the farmer/cooperative relationship. This approach provides consumers with more guarantees about safety, health, and traceability. It will be applied to environmental guarantees by adapting the ISO 14001. In February 2000, 129 cooperatives were working to implement an Agri Confiance® system and 28 cooperatives are certified today i.e. 7900 farmers.
(Web site: http://www.cooperation-agricole.asso.fr/qualite_reglement_alim/agri_confiance/agri_confiance.htm)

[7] For example, in December 1999, the Forum for environmentally friendly Integrated Farming (Farre) has published its "common base of integrated and environmentally friendly farming" that corresponds partly to the requirements of the initial environmental analysis (by using the self environmental diagnosis of Farre) and of the environmental policy according to the ISO 14001 approach. Farre is a non-profit inter-professional association. The purpose of

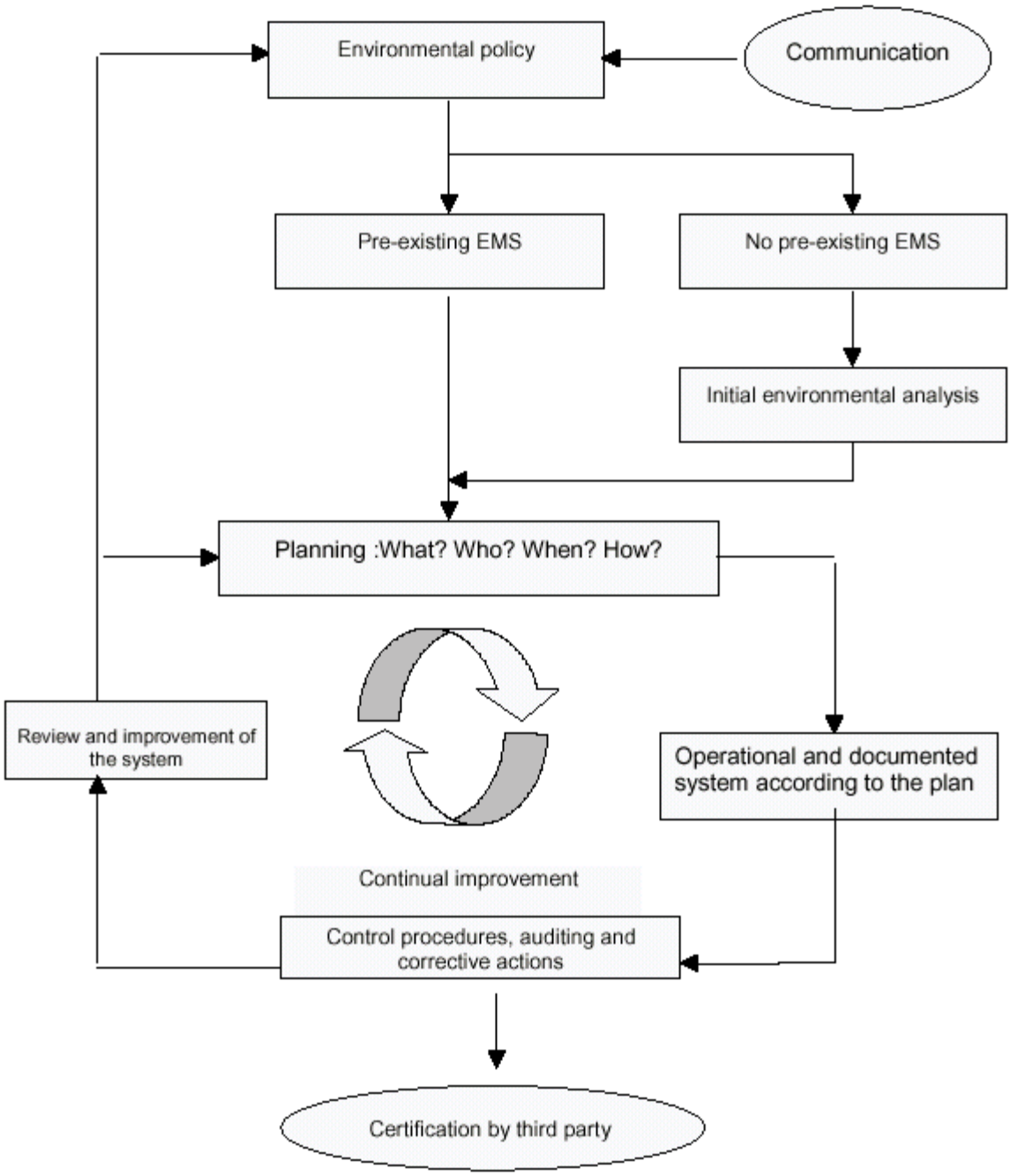


Figure 1 : General model of the ISO 14001 standard

FARRE is to promote Integrated Farming in order to increase public awareness of the practice (Web site: http://www.farre.org/).

1.2. Attempt of application of EMS to farms

Even if our description is in accordance with the ISO 14001 approach, it does not describe precisely all the requirements and recommendation of the ISO 14001 standard. To make understanding easier, we have chosen not to stick to the strict sense of the terms and the degree of precision met in the standards, i.e. in ISO 14001 and ISO 14004.[8] Lussier and al. (1998) give a detailed model of EMS applied to farms with explanations and examples.

1.21. Defining an environmental policy

This environmental policy explains the essential principles and the environmental commitment decided on by the top management of the organization, that is to say the farmer in most cases.

Example of a brief environmental policy of a farm

- *commitment to be in accordance with environmental regulations*
- *search of continual improvement of the global environmental performance*
- *prevention and reduction of pollution by adopting as much as possible, environmentally friendly agricultural practices. Every evolution (activity, equipment upgrades) will be considered trying to minimize the negative environmental impacts*
- *improvement of the environmental services offered by agriculture (use of non-agricultural effluents, landscape and wildlife conservation*
- *Promotion of sustainable agriculture*
- *Communication with partners (i.e. customers, insurances) and the other interested parties (i.e. neighbors, environmental associations) of the farm*

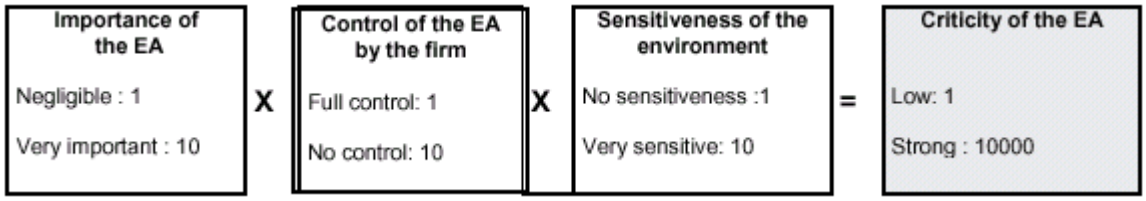
This environmental policy is communicated to all employees and is available for interested parties. This policy is the framework of the following steps.

1.22. Making an initial environmental analysis

Without previous EMS, this initial environmental analysis is both a preliminary inventory and an environmental diagnosis. It identifies the regulations which applies to the farm (for example, European directive about "nitrates", "biotope decree" protection of water sources and legal requirements to get implementation permits). It identifies the significant environmental aspects,[9] the environmental effects of current practices and their significant environmental impacts. These significant environmental impacts could be real or potential, beneficial or harmful. Indeed, agricultural activities can provoke beneficial and harmful effects on the environment whereas for industrial activities, the reduction of harmful impacts is the main purpose. For example, farming can lead to ecosystems' disappearance, air and water pollution and soil contamination. At the same time, farming can also contribute to reduce greenhouse gases, to manage landscape and to limit some natural risks such as avalanches and floods.

[8] The ISO 14001 standard gives the "what", i.e. the structure of an EMS and the elements allowing certification. The ISO 14004 standard clarifies the "how" that is to say recommendations and helpful suggestions to implement the EMS described in the ISO 14001 standard.

[9] No method is required to identify the significant environmental aspects (EA). Prats et Nominé (1998) proposed a calculation method to put an coefficient of criticity from 1 (i.e. insignificant criticity) to 1000 (i.e. very high criticity). This method has been adapted to agro-environmental analysis and it is called DIAGE.



Practices	*Impacts*
- *Exposed soil during winter* - *Ploughing in the slope direction*	- *Lixiviation and water contamination* - *Soils erosion and water pollution*

Moreover, this initial analysis lists the past environmental problems and accidents. This step allows producers to be aware of their environmental responsibilities.

Problems	*Management of the problems*
- *Overflowing of a treatment tank* - *Mix of rain water and animal waste*	- *Use of an absorbent substance* - *None*

1.23. Establishment of an environmental plan

This environmental plan, coherent with the main principles of the environmental policy gives a concrete substance about the EMS set by the farmer. It takes into account regulatory aspects, significant environmental aspects, commercial requirements and the concerned agents opinions. These interested agents are often other users of the biophysical area where the farm is located (hunters, neighbors, environmental associations, ...). Thus, the opinion of the different actors who are concerned by the farm's environmental management is closely linked to decision making process and that increases the system's credibility. Indeed, the inclusion of other parties' opinions avoids potential conflicts and promotes mutual understanding on both sides.

This environmental plan specifies notably:

- the choice, the quantification and the time frame to achieve the pertinent environmental goals
- the choice of the best available and economically viable practices (notably referring to various codes of agricultural good practices and advice organizations)
- the selection of indicators which can measure the environmental results

***Target** : Reduction by 10 % of the quantity of nitrates used on cereals crops*	***Indicator** : units of nitrates used / quintal of harvested cereals*

An important difficulty concerns the indicators, which must be reliable and adapted to farms. These indicators have to be easily measurable and be appropriately related to the followed goal. Indeed, the agricultural practices are factors of environmental impacts because the relation between agricultural practices and real environmental impacts is not linear. This relation can depend on other factors like pedological and climatical conditions, economical conditions and available technologies. Some environmental impacts can vary from an area to another and it is very hard to provide performance criteria for all farms. Despite the definition of global and generic principles, an environmentally friendly agriculture can not be easily defined in a uniform way for all kinds of farms. For example, the previous indicator, while being attractive, can at the same time support intensive and extensive practices.

Moreover, it does not mention the period in which the comparison takes place, and does not deal with the division and the type of nitrates used.

1.24. Effective implementation of the environmental plan

This step answers to the following questions: who makes what and how? When and with what kind of means?

Environmental target	***Responsible party***	***Procedure***	***Time and place of procedure's achievement***	***How to achieve this procedure?***
Reduction by 10% of the quantity of herbicides' used in the main crops compared with the period 1998 - 1999	*M. Martin*	*- choice of herbicides'* *- dose reduction* *- sprayer adjustment*	*At each field cultivation*	*Descriptive check list of procedures enclosed in annex I*[10]

The answers correspond to:

- allocation of responsibilities and means to achieve them;
- organization of the farm workers concerning environmental responsibilities which they will be in charge of;
- internal communication with the farm workers and external communication with suppliers, consultants, neighbors, hunters,...(i.e. posting of the environmental results and their evolution, outstanding events,...)
- documentation about the EMS operation maintained daily and easily accessible;
- prevention of urgent situations and the capacity to react (i.e. what must be done in case of accidental overflowing of a treatment tank?)

This effective implementation concentrates many standard requirements on a few people because French agricultural structures are usually composed of 2 or 3 workers.

1.25. Control, corrective actions and possible modification of the EMS of the farm

The farm has to establish and keep documented procedures allowing it to observe, to regularly measure and to register the main characteristics of its activities which are able to have a significant environmental impact. In case of non-conformity, the farm can make use of procedures to identify the reasons of these gaps and set up corrective measures.

The internal and/or external audits realized in regular time-gap, by competent and impartial persons, allows a systematic checking of the EMS conformity as regards the ISO 14 001 standard requirements and the effective establishment of the EMS.

This step is especially expensive and discouraging since according to Bergstrom and al. (1999), the external audit (occurring every 3 years) costs approximately $3,500 and the annual internal audit approximately $1,200. According to the Noslam (2000), "the cost of certifying an individual farm to ISO 14001 are currently around $5,000 - $7,000 for the initial certification audit and $2,000-$4,000 per annum thereafter. These costs are interesting approximations, but their transposition in other contexts implies that the structures concerned are known.

[10] For references concerning the best application of reduced herbicides rates confer to Dole and al. (1992) and the internet site of P. Lachance.

1.26. Direction review

After each time-gap that is determined by the top management of the farm, the top management must review the EMS and determine if it is still appropriate, sufficient and efficient. This documented review envisages some modifications of the environmental policy and of the other components of the EMS farm to improve the global environmental performance of the farm and to adjust better to external requirements.

A few researchers and practitioners have elaborated practical application documents for the ISO 14 001 standard for farms (Lussier and al., 1998, Noslam, 2000). Complementary tools and concrete examples are even available on line on Noslam's web site (2000).

2. The ISO 14001 standard: a generic and differentiated approach of environmental management

2.1. A generic and recognized environmental management

Nowadays, farmers respond to a multiplication of the specifications based on different systems which claim similar aims. In some cases, the farmer is confronted with several "environmental" requirements, whose mutual compatibility and coherence are debatable. Moreover, those with the power to give orders don't have the legitimacy and the experience to advocate the kind of environmental management that is applicable to the whole farm, which yet makes the credible entity from an environmental point of view. For example, a firm, which buys milk from a farmer, will have difficulties to making valuable environmental requirements concerning cereal crops. From this developing situation, emerges a suspicious context leading to a loss of credibility for the entirety of the approach (Pujol and Dron, 1998). In this context, the ISO 14001 standard should form a base document adaptable to various kinds of farming. In France, only one farm is currently certified according the ISO 14001 standard (Champagne Pommery), despite of the elaboration of systems (AgriConfiance® volet Vert and Quali'Terre - Certi'Terre[11] notably), which ambitiously refer to ISO 14001. In his report on integrated farming, G. Paillotin (2000) shows the importance of setting up a "formal quality insurance procedure based on written and transparent elements, which can be set against thirds". According to Paillotin, "the only solution" to give credibility to these pro-environmental systems, "consists in transposing the approach of the ISO 14001 standard to agriculture". "The agricultural system will find its entire credibility relying on a trust contract, which means in practical terms use of an adapted standard from the ISO 14001 one". This point of view is shared too by the National Commission of Food Products Labels and Certifications, which proposes to write "an ISO 14001 standard transposition guide, to describe the integrated farming principles, the concrete processes being specific to each production". (CNLC, 1999). These analysis recommend too an ISO 14001 certification of the whole food chain concerned by the considered food product. Thus, Paillotin (2000) recommends use of the ISO 14001 standard to objectively substantiate the environmental allegations of food products.

[11] Quali'Terre is a common system of the quality assurance and the environmental management aiming at providing guarantees to the different partners of the farm and to the customers. This process is built according to 2 axis:
- the elaboration of an agricultural good practices referential which is the base of the guarantees provided and of the communication,
- the procedures for monitoring and auditing associating audits of all voluntary farms involved in the system by development agents and an audit of services provided by development agents by a third party.
Certi'Terre is more restrictive and allows an individual certification by using the ISO 9000 or ISO 14001 standards.

Moreover, the international and generic characteristic (that is to say it is applicable to all kinds of organizations) of the ISO 14001 standard gives it a stronger credibility compared with local systems, especially in terms of recognition in the export markets.

2.2. The ISO 14001 standard: a useful tool for a differentiation strategy?

On the intermediate market (business to business), the agents of the food chain have more expertise than final consumers (Grolleau, 2000b), enabling them to understand the real implications of an ISO 14001 certification. Thus, the ISO 14001 certification could at the end become selection criteria of agricultural suppliers. For example, according to Wall and al. (1999), in the case of Sweden, "a number of certifications have been carried out because expectations are high for the food service/retailers (Mac Donald's) to start making demands". In their report to the French Minister of the Environment, Pujol and Dron (1998, p. 433) say that "farmers are currently strongly urged by their customers to involve themselves in this way, knowing that farmers in others countries conform themselves to it".

Moreover, when marketing eco-labelled products,[12] food processors and distributors should have to prove that their raw materials, in this case, farming products, really come from environmentally friendly production systems. In this perspective, "the ISO 14001 certification could constitute a reliable means" to provide this guarantee (Wall, 1997b).

On the final market, the product represents one of the main informational vehicles for the consumer. Nevertheless, differentiation of products coming from ISO 14001 certified farms is especially complex, because the consumer can not detect environmental characteristics ("credible characteristics"). Products coming from certified farms do not necessarily have intrinsic characteristics higher than the classical products. In some cases, the environmental differentiation of the farming process can generate positive effects on these classical qualities i.e. lower pesticides and heavy metals contents. On the other hand, an ISO 14001 certified farm can inherit a polluted environment. This situation can lead to produce whose quality level doesn't correspond to the "green image" the consumer expects. An environmental food product differentiation is strongly based on a process differentiation. The relation between ISO 14001 certification of farms and eco-labelled food products is particularly complex and ambiguous. Moreover, the French world of official and non-official quality signs, is often unknown by the consumers. The consumers can not always understand the difference between what the products claim and their real meanings.

Public authorities do not want to destabilize this precarious equilibrium by introducing a new sign, whose message concerning environmental impacts of the production system, could be not well understood by consumers. In another way, this lack of official sign based on a credible referential is an opportunity for marketing allegations without real environmental significance.

[12] The idea to create a specific ecolabel for food products is highlighted in the resolution by the European Parliament (OJEC C328, 26/10/98), to the European commission and the Europe Council which :
- asks for the creation of a third quality category based on environmental criteria in a large sense (including animal welfare) ; wishes since then as for organic agriculture, a European code of good farming practices and a European regulation of integrated farming to be adopted; finally, makes it clear that the adoption of a European quality label will allow to inform, in a uniform way, the consumer of the existence of this new quality category.
- expects this third quality category, on one hand, to answer to the demand of the consumer wanting environmentally friendly farming and food products, and on the other hand, to promote ecological agriculture; invites the Commission to study the possibility to elaborate this label by using life cycle analysis (LCA) of the concerned product (...)".

3. Some obstacles to setting up EMS on farms and propositions

Several authors have identified favorable factors and obstacles to the adoption of the ISO 14001 standard by farmers (Baker and al., 1999; Carruthers and Tinning, 1999; Grolleau, 1999; Wall and al, 1998; Ljung, 1998; MAF, 1998). These works must be considered in the agricultural framework (i.e. country, kind of production, farm size, organization model) where they have been achieved. Indeed, the term "farm" can mean various kinds of organizations from very small farms to very big and industrial farms. For example, the Del Monte firm got ISO 14001 certification for some banana farms consisting of about several dozen thousand acres. This variance the achievement of a standard transposition difficult. We postulate that farms likely to set up an environmental management system have specific characteristics.[13] We will identify these characteristics in our next works.

3.1 Transcription of the ISO 14001 standard to agriculture

One of the first barriers to the adoption of the ISO 14001 standard is the lack of knowledge of French farmers. Indeed certain words associated with ISO 14001 can provoke negative responses or confusion. For example, for some farmers, the French term "norme" - which means "standard" in English – evokes the "legal requirements about livestock buildings". Moreover, the ISO 14001 standard uses a generic vocabulary and a style peculiar to international standards. These aspects could become obstacles for its understanding and adoption. A transcription of the ISO 14001 standard for agriculture and a linguistic adaptation should allow for a higher interest and participation of farmers (Grolleau, 1998). Thus, a technical document (ISO/TR 14061) provides specific information to help forest managers in the implementation of an ISO 14001 environmental management system.

Terms used in the ISO 14001 standard	Propositions
Processes	Practices
Organization	Farms
Standard	Referential, Charter
Top management of the organization	Farmer

Figure 2: Some propositions for ISO 14001 word adaptation

Moreover, an environmental communication referring only to the ISO 14001 standard will be hard to understand for consumers. According to Mike Logan, the first farmer in the world to gain ISO 14001 certification (March 1997), farmers must "change the name ISO 14001 to something that we can use in our marketing - it is a terrible name designed by a committee who has never sold an ounce of produce in a marketplace in their lives" (Carruthers, 1999).

3.2. The ISO 14001 requirements are costly and heavy

For French farms, the ISO 14001 requirements (training and awareness procedures, monitoring and regulatory and technical update, communication,…) would be achieved by only one or two people.

[13] We found a stronger interest for ISO 14001 standard among winegrowers of Burgundy and Champagne (wines with high added value, more direct contacts with the retailers and consumers who search for environmental qualities) and farmers who have an industrial management (big size farms, food processing workshop i.e. industrial pigsty and milk farms with a cheese workshop). In their recommendations, Pujol and Dron (1998, p. 85) say that "we can consider applying the Ecoaudit regulation (1836/93) to farms which are in the first quarter with regard to size for each agricultural sector." In the case of the Brittany pigsties, Montel uses the concept of "opportunity threshold" (Montel, 2000). This concept needs further research. It could be tested and validated a posteriori on certified farms in accordance with the ISO 14001 requirements.

Moreover direct costs (i.e. environmental investments, audits) and indirect costs (training, time) are one of the main barriers to the adoption of the ISO 14001 by farmers, notably in small farms. This implementation generates too a cut in costs. This reduction results notably from lower inputs and a better management of these inputs. Nevertheless, the costs of the implementation of an environmental management system are not fully compensated by the cut in costs.

To solve the previous problems, we suggest some ideas, which need further research:

- Promotion of products originating from ISO 14001 certified farms

The ISO 14001 certificate applies to farms, not to products. Normally, producers can not advertise the ISO 14001 certificate on their products. The promotion of food products originating from ISO 14001 certified farms could be achieved by eco-labelling the product (Van Ravenswaay and Blend, 1997). Environmental quality of agricultural products often implies the certification of practices, as in, for example, organic products or more exactly, product originating from organic agriculture. This strong interdependence between production practices and product environmental quality raises questions about an EMS product label (Grolleau, 1999). This ISO 14001 certification could become a differentiation strategy in business to business relations. This subject has been dealt in a previous paper highlighting the various conceptions of green food products (Grolleau, 2000). According to Mike Logan, "there is no such thing as premiums", only access through product/farm differentiation. This differentiation opens access to new markets i.e. markets sensitive to environmental qualities (Carruthers, 1999; Warren, 1997).

- Group management of certain ISO 14001 requirements

Small farms can participate in the implementation of an environmental management system thanks to group management of certain ISO 14001 requirements (Grolleau, 1998, 1999; Montel 2000; Noslam, 2000). Some ISO 14001 requirements are generic (environmental policy's model, monitoring tools, updating, audit, …) and they can be achieved by an intermediate structure without attacking farmers' autonomy. The identification of this intermediate structure and its roles needs further research. This intermediate structure could be various organizations who are closer to farmers. Sharing of standard requirements can be found at various levels in AgriConfiance® volet Vert and in Quali'Terre, the qualification program of the Chambre d'agriculture of Picardie. This promising idea could be considered and studied by focusing on the forestry experiences and on the systems that use similar approaches. According to Noslam (2000) the benefits of a group accreditation scheme are:

- costs are limited - farmers who have been trained as auditors can assist with internal audits
- control of the scheme is maintained by the umbrella group
- bureaucracy is limited
- the umbrella group decides who qualifies for inclusion in the scheme (not a third party)
- members can pick up on others' good ideas.

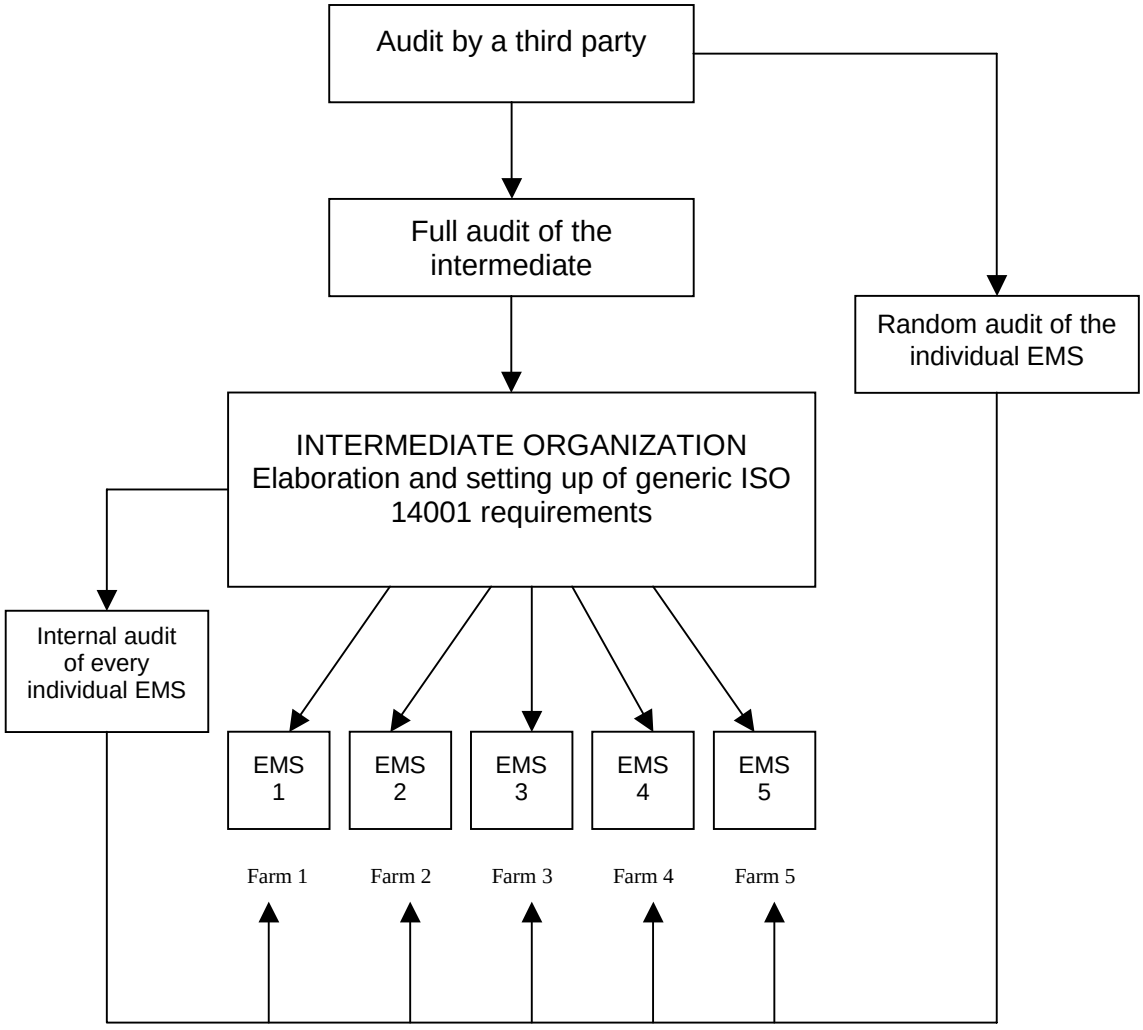


Figure 3 : Group management model for establishing an EMS (adapted from Noslam, 2000)

☞ *Listing the tools likely to correspond to ISO 14001 requirements*

Several tools are available and can correspond to certain ISO 14001 requirements. Indeed, some tools (i.e. self-environmental diagnosis, practical guides to environmentally friendly farming, tools of the sustainable development plans [PDD]) are available and can be used to achieve some ISO 14001 requirements. There are specific guides to implement EMS in small sized organizations (EPA, 1996) and they could be adapted for use in agriculture as well. This inventory could reveal shortcomings and help focus research on areas of improvement. A synthetic document similar to the ISO 14004 standard could be elaborated to help farmers in implementation of an environmental management system (Carruthers and Tinning, 1999).

detail and complexity of the environmental management system, the importance of documentation and the level of resources allocated will depend on the size of the organization and the nature of its activities. This is particularly the case for small and medium sized firms" (AFNOR, 1996; Translated from the French text). A remaining question is how this flexibility of the ISO 14001 standard could be really expressed in farms.

3.3. Bypassing the constraining image of the environment to encourage individual commitment

In regards to companies' environmental practices, the public authorities have often played a constraining role by using the regulatory and economic policies. The stakes involve the existence of the firm as well as minimizing costs. Without questioning the justification of these policies, they are often intended as partial objectives in which the perverted effect could be a transfer of pollution from one environmental compartment to another, or from one step of the life cycle to another and even from one place to another. These policies are often have adverse effects on the agricultural producers, giving them the feeling of being "scapegoats". The managerial tools offer new perspectives by encouraging the operations to go beyond a purely reactive attitude (i.e. satisfy the regulations), to take a step in a global trend of voluntarily pro-action, susceptible of becoming strategic stakes (market share, product differentiation...) In addition, these approaches could become valuable and motivating instruments for farmers, allowing them to recapture a green image, such as Sweden's slogan "Swedish agriculture, the cleanest agriculture in the world."

The public authorities can play a role in promoting these managerial tools by providing information, training, research, financial and technical assistance, consistency between voluntary systems and the content of other regulatory instruments, and economic incentives. For example, the ISO 14001 standard with the minimal requirement of respect of the regulations could lead to a lighter control for certified farms, and that is already the case in the industrial sector. "It is clear that the frequency of controls achieved by authorities in the frame of the law of July 19, 1976 about "Installations classées" must be proportional to the significance of pollution and the risk of each establishment: the setting up of a EMS in accordance with the ISO 14001 or Eco-Audit will be taken into account in the establishment of control programs (MATE, 1997).

By taking into account all these factors, the public authorities could play a preponderant role in the adoption of EMS by farmers (Pujol and Dron, 1998).

Final Remarks

We have discussed the ISO 14001 standards without considering the strong links that unite it with the quality management system of the type ISO 9000. These systems are very close and most of the operations aimed at encouraging and accompanying the projects towards the ISO14001 standard are mixed approaches associating quality assurance and environmental management (Gottlieb Petersen, 1997a, 1997b, Wall et al. 1999; Bergstrom et al., 1999). In addition, in the perspective of communication with the public, the group of experts do not correspond with the global perspective of consumers (Grolleau, 2000). A deeper analysis comparing systems established in France and abroad could constitute.a credible base to study the applicability of a mixed system of quality assurance—environmental management in French farms.

The interest in the ISO 14001 standard and its adoption by French farmers seems also linked to the type of backing considered. Certified ISO 14001 customers and customers with an environmental image can have a strong impact on development of ISO 14001 in farms. The study of these effects could be a pertinent track for further research. Indeed, according to Wall et al. (1998), the food processors who are

ISO 14001 certified could in the run choose only products from producers who have adopted ISO 14001 standards. This idea is in accordance with the principles of the ISO 14004 standard which considers the “encouragement" of the subcontractors and the suppliers to establish an EMS” to be one of the fundamental principles of the establishment of an EMS (AFNOR, 1996). This situation has already been verified in several industrial sectors where the ISO 14001 certified companies have a strong market power to force their providers (producers) to adopt the ISO 14001 standard.

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Environmental Management Systems in Agriculture

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From livestock production to pesticide-intensive cropping operations, agriculture is under considerable pressure to improve its environmental performance. While public policy options to reduce agricultural pollution have evolved to include increased regulation, they remain strongly committed to voluntary approaches centered on education, technical assistance and economic incentives (Napier and Johnson, 1998). Voluntary schemes have room for improvement as evidenced by the track record of early efforts such as soil conservation (Nowak, 1987). Market forces including a consumer demand for quality are creating incentives that may improve "voluntary" efforts to address water quality and other environmental impacts (Battie and Ervin, 1997).

Environmental management systems (EMS) are vehicles for farmers and their trade groups to take the major step forward in environmental stewardship. These systems, particularly ISO 14001, can bridge gaps in traditional voluntary approaches by integrating environmental responsibility into the business of farming, stressing continuous improvement and providing a reliable method to document adoption of environmentally-sound practices. While farmers face challenges in developing EMS's, they stand to gain benefits beyond reduced impacts on the environment. Farm*A*Syst, the Environmental Farm Plan and the Australian Cotton Best Management Practice Manual are related programs that share key components required to develop an EMS (Wall, 1998; Williams, 1999). Farm organizations and government agencies can play a supportive role in helping individual farmers develop effective management systems.

How Do Environmental Management Systems Work?

An EMS is a structured and planned approach for a business to manage its impacts on the environment. Typically it involves the following basic steps as part of a process of continual improvement: establish environmental policies, set goals and targets, adopt plans and procedures to achieve goals and targets, monitor implementation and institute actions to insure compliance, and review progress. An EMS is intended to improve an organization's compliance with local environmental laws but can have goals beyond this. Through independent certification, an EMS provides assurances to clients, consumers and government about the environmental performance of an organization.

ISO 14001 is the leading EMS model. The International Organization for Standards (ISO) developed the ISO 14001 as a companion to ISO 9000, a set of standards for quality management to insure customer service. Like ISO 9000, ISO 14001 is increasingly viewed as a passport for doing business in the growing world economy where markets are demanding assurances of quality (Farye, 1996). With over 70 countries that are members of ISO, ISO 14001 enjoys international acceptance and recognition.

Its strength is its flexibility. Since ISO 14001 focuses on the quality of an organization's management process, it offers a shell that a range of enterprises can adapt to meet environmental

needs they define as important. Management systems based on ISO can provide a framework for addressing many aspects of quality assurance beyond environmental concerns. One of these concerns involves food safety. Changing laws may require that producers document that they have an effective system for reducing risks of food-borne illness. In United Kingdom, the 1990 Food Safety Act introduced a "due diligence" defense available to food processors and others in the food supply chain involved in legal actions. This defense has been successfully raised by firms that can show that they have taken reasonable precautions to set up a system to prevent problems and employed due diligence to insure that the system works. Firms are exerting downward pressure to insure that others in the food supply chain are taking actions to minimize microbial contamination risks (Buzby & Frenzen, 1999). By following ISO procedures, producers can provide the necessary upstream assurances.

But ISO's flexibility is also its weakness. Beyond commitments to compliance with the law and continual improvement, ISO 14001 is not sufficiently prescriptive and does not have the precision to distinguish the best from the mediocre (Crooks, 1999). The limitation can be best appreciated by a comparison to a standard-based system such as organic certification. Both systems rely on principles of third-party auditing, certification and accreditation of certifying-organizations, but farmers seeking organic certification are all measured against the same external production-based standards. In the case of ISO 14001, an organization sets its own standards for environmental performance beyond basic compliance. ISO registration only confirms that the organization is exercising appropriate oversight and control over the environmental impacts of its operation.

This outcome does not mean that substance cannot be incorporated into environmental management systems prepared under ISO 14001. Through leadership from trade groups, for example, member organizations can subscribe to a range of environmental performance policies, goals and actions that could be included in each of their individual EMS's. In the area of forest management, a technical committee of ISO has worked to develop a "bridging document," *Information to assist forestry organizations in the use of Environmental Management System standards ISO 14001 and ISO 14004*, ISO/TR 14061, to provide guidance for forestry organizations in the application of generally accepted criteria for Sustainable Forest Management to establish performance objectives and targets as part of their EMS's (Hortensius, 1999).

What is the Future of Environmental Management Systems in Agriculture?

There are solid indicators that agriculture is moving to embrace ISO 14001. Considerable momentum is building in the Pacific Rim. Of note, there have been two recent national efforts in Australia (a May 1999 workshop entitled *Environmental Management Systems in Agricultur*e) and in New Zealand (a national research project entitled *The Role Of On-Farm Quality Assurance And Environmental Quality In Achieving Sustainable Agriculture And Sustainable Land Management Outcome*s). Among the early adopters of ISO 14001 featured in the Australian workshop were winemakers. A consortium of wine makers in New Zealand known as the Living Wine Group has realized multiple benefits to its group registration under ISO 14001 (Riddiford, 1999).

A New Zealand initiative called the North Otago Sustainable Land Management Group (NOSLaM) has received government funding to move dairy, vegetable and other area farmers to a new level of environmental management. NOSLaM developed an "ENVIRO-AG," a system that enables farmers to assess range of farm activities and prepare a plan to manage and correct problems. With a certification component, ENVIRO-AG incorporates audits to take the farm plans a step further. Farmers audit their operations annually to see if they are doing what they planned to do. Participating farms are subject to audits by NOSLaM every three years and to random audits by a certification organization affiliated with the New Zealand operation of the Societe Generale de Surveillance. This scheme has qualified farms for group certification under ISO 14001 (NOSLaM, 2000).

There are parallel activities in Europe and North America. In the United States, trade groups are actively pursuing quality assurance programs with environmental management components. The American Soybean Association has joined other commodity groups such as the National Pork Producers Council in developing such initiatives. Organizations such as the Wisconsin Milk Marketing Board are seriously evaluating the benefits of ISO 14001, drawing on models in Denmark and other countries. These efforts can serve as building blocks to fashion more advanced management systems.

The future of ISO 14001 will depend on how farmers and their member organizations view the short- and long-term benefits of ISO registration. Through its more focused approach, ISO registration enhances farmers' capacity to reduce their impacts on the environment. With third-party audits, farmers have credible documentation of environmental performance. This reliable documentation may be necessary to gain access to markets (especially export markets). It may open the door to premium prices. This competitive edge is of particular significance to farmers who negotiate contracts to sell their products. From an advertising standpoint, an organization that meets ISO 14001 standards can publicize this fact to consumers although ISO 14001 is not a "green label" that can be affixed to an organization's products.

On the other side of the ledger, ISO registration may also provide a competitive advantage by reducing the costs for pesticides, fertilizers and other inputs. This is the case because farmers who systematically evaluate their operations are in better position to waste and identify more efficient uses of inputs. These risks include legal actions, loan denials, and encumbrances on the sale of real estate. Farmers who can demonstrate that their operations pose reduced risks may qualify for lower loan rates and insurance discounts. One of more than 40 Danish dairy farmers registered under ISO 14001 reports this immediate benefit—a 15% discount on his insurance (Precision, 1998).

Verification of environmental performance can meet the growing demand for quality of consumers, retailers and others in the food distribution network. Retailers will be looking at ways to strengthen the credibility of marketing programs by requiring third party auditing (MAF, 1998). The move to third party auditing is a logical step for programs such as the IPM initiative developed by Wegmans Food Market.[14] Assuming that confidentiality concerns can be resolved,

[14] A description of the IPM program operated by this New York-based supermarket chain is available at: http://www.wegmans.com/features/growing_better.html.

an EMS may be recognized by government agencies as a form of self-policing, relieving farms of regulatory burdens and the costs they entail.

The path toward adoption has obstacles. Farmers face economic hurdles including declining prices and a lack of clearly observable short-term economic benefits. (Williams, 1999). Even though ISO 14001 standards recognize that an EMS must be appropriate to the scale of a business, administrative and transaction costs can be high for individual farmers. Auditing is a significant expense but much of the cost (as high as 80 percent) incurred is for setting up and operating a management system. For an Ontario farmer, Wall estimates a cost of $3,000 for an audit and $12,000 for implementation costs including improvements (Wall, 1999). Danish dairy farmers experienced significantly lower costs in a two-year government program that subsidized farmers in setting up management systems and conducting inspections (Precision, 1999).

While government subsidies can reduce economic barriers, more efficient private arrangements hold out promise for reducing costs. In particular, a group approach to registration can reduce auditing and other costs. When reviewing an EMS, an auditor only selects samples for evaluation. This principle can be used to some advantage by a group. If several farms coordinate to develop and manage their operations according to the same EMS, then an auditor can be reasonably confident in the overall management system without auditing each of the sites. The cost savings can be shared among group members as was done by New Zealand winemakers and NOSLaM (Spencer, B. 1999). Riddiford (1999) explains how winemakers in New Zealand successfully used this group approach to reduce auditing costs as well as obtain other benefits such as information sharing to speed up the certification process.

Is There a Foundation upon Which to Build Environmental Management Systems?

For most producers, the central challenge in meeting ISO 14001 involves systematically identifying the environmental impacts from their activities and developing plans to manage these risks (Walls, 1999). According to Wall and her colleagues, the Ontario version of Farm*A*Syst, the Environmental Farm Plan[15] satisfies basic elements required for ISO 14001:

> Those well versed in ISO 14001 who have reviewed the Ontario Environmental Farm Plan (EFP) agree that there is a great deal of compatibility between the two schemes ... EFP provides detailed and thorough guidance for planning and implementing an environmental management system so that farm operations meet the ISO requirements of:
>
> i) identifying the environmental impacts (aspects) arising from the organization's past, existing or planned activities, products or services;
> ii) identifying the relevant legislative and regulatory requirements;
> iii) identifying priorities and setting appropriate environmental objectives and targets (which includes taking into account the concerns of public interest groups affected by the environmental aspects of the organization);

[15] For more information on the Environmental Farm Plan, a farmer-driven program, visit this web site: http://res2.agr.ca/london/gp/efp/efpmenu.html. Information on Farm*A*Syst is available at: http://www.uwex.edu/farmasyst/.

iv) establishing a structure and program(s) to implement policy and achieve objectives and targets.

To meet ISO 14001 standards, these three modifications to Farm*A*Syst-based system are needed: addition of an environmental policy, third party auditing, and a commitment to continual improvement. In regard to environmental policy, Farm*A*Syst and the EFP embody the principles of pollution prevention and thus, point farmers to these values in developing policy. Policies might draw on other values that underlie the EFP and Farm*A*Syst framework such as commitments to peer support and partnership building within the private and public sector. In regard to auditing, the EFP provides for review by peers but this process is not sufficiently rigorous to meet ISO audit requirements (Wall, 1998). Regarding continuous improvement, this concept is implicit in the structure and delivery of Farm*A*Syst and the EFP. EFP offers 23 worksheets that enable farmers to assess every aspect of their operation from drinking water well condition to manure management. Every worksheet has questions that require farmers to match their operation to risk descriptions ranging from poor through fair, good and best. After completing each worksheet, farmers are encouraged to develop a plan outlining practices that move them to the next risk classification, e.g., from fair to good. They can take these actions by implementing the management practices described in the next classification. This can serve as a sound framework for continual improvement (Wall, 1999).

With respect to the Australian cotton industry, Williams (1999) observes that the Farm*A*Syst framework is a key step in the cotton industry's progress toward adoption of EMS's. This framework provides a way for farmers to apply best management standards. Using assessment worksheets, farmers have the capacity to evaluate their operations to identify areas of environmental concern. On this basis, they can develop plans for implementing corrective actions. This system of environmental management fits the ISO 14001 model. With its audit provision, ISO 14001 can provide legitimacy and credibility to this assessment framework by showing that it is being used, is being used properly and having a positive impact.

What Is the Role of Private and Public Sector Leadership?

Farmer adoption of environmental management systems will depend on leadership and support from different quarters. Farm organizations can work with university research and extension faculty to define and refine best management practices in an industry and revise assessment tools such as Farm*A*Syst and the EFP to meet commodity-specific needs of a group of farmers. They can identify opportunities and stimulate interest among members in EMSs. Farmers may not be ready to make the leap to a full-blown management systems, but farm organizations can facilitate movement of farmers in assuming increased responsibility for environmental management. Trade groups such as the cotton industry build on triggers such as public concerns about pesticide use to help growers gradually make the transition to EMSs (Williams, 1999). Farm groups can fill in the missing pieces needed to register for ISO 14001. Through environmental committees, they can build a consensus about key issues and concerns for inclusion in environmental policy statements and publish templates for use by farm members. NOSLaM has made available this documentation at its web site, http://www.noslam.co.nz/agvantage/. Farm groups can explore and support options to reduce the

costs of registration, particularly the third party audit (Walls, 1998). They can integrate environmental management into other quality assurance initiatives within a particular industry.

For government agencies, ISO 14001 offers the opportunity to move education and other voluntary programs to a new level of disciplined application and accountability. Wisconsin is among 10 states participating in a pilot program to evaluate the benefits of ISO 14001 for farms and other businesses. Jeff Smoller, of the Wisconsin Department of Natural Resources, sees ISO 14001 as a vehicle for government to more effectively address environmental concerns. Conventional command and control approaches can address no more than 10 percent of environmental concerns—remedying problems and capturing opportunities to protect environment (Begley, 1997). To promote EMSs in agriculture, government does not need to subsidize farmers as extensively as the Danish government assisted its dairy farmers. It could promote partnerships to insure that best management practices reflect the most advanced research and the practical experience of private sector groups in agriculture. Government could provide adequate support to programs such as Farm*A*Syst and EFP that simplify setting up management systems. Both federal and state agencies could increase cost-share programs to compensate farmers in part for their time as well as pay for improvements in structures and practices.

There are positive indicators that point to growth in environmental management systems in agriculture. The building blocks are in place with programs such as Farm*A*Syst, EFP and the Australian Cotton Environmental Management System. Research, pilot programs and the experience of early adopters will provide valuable feedback to shape future directions. Farmers will need to make a gradual transition. Participation in Integrated Pest Management (IPM) programs and other voluntary stewardship efforts are steps toward better management and documentation of impacts. Support from both the public and private sectors will be critical to stimulating individual adoption.

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ISO 14001 and Agriculture? Opinions of agricultural academics, agricultural consultants, and ISO 14001 registrars and auditors.

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Abstract: *The ISO 14001 voluntary international environmental management standard, mostly used in the manufacturing industry, could be used in agricultural settings to increase quality of environmental management and decrease risk of environmental problems. Associated benefits might include reduced operating costs, increased competitiveness, and circumvention of future trade barriers. To see whether experts thought such benefits were likely, I sent an Internet-based survey to 306 of them: 91 agricultural academic faculty in California, Colorado, and Wisconsin, 124 agricultural consultants throughout the US and Canada, and 91 ISO registrars/auditors, mostly in the US. I obtained 86 responses, a 28% response rate. All three groups agreed that dealing with environmental issues is an important aspect of agricultural management, and somewhat less strongly that there is a need for systematic management of environmental issues in agriculture. The consultants and registrars also agreed that most environmental issues at agricultural operations should be addressed with a formal environmental management system. The academics were generally unaware of the ISO 14001 standard, and hence were, of necessity, neutral on its utility, but none of the three groups was strongly familiar with the standard. Subsequent questions dealing with the utility of the standard generally met with lukewarm responses, with the registrars tending to be more positive than the consultants who were in turn, more positive than the academics. Most of the responses were highly variable within each group, however, indicating a range of opinion at this stage, and certainly no consensus.*

ISO 14001 is a voluntary international environmental management system standard, developed by the International Organization for Standardization (ISO), a consortium of most of the world's countries' national standards agencies. The committees that set the standards are primarily made up of representatives of industry. Hence, they are non-governmental and non-regulatory... essentially industry self-help groups that normally serve to keep manufactured product standards uniform worldwide. A few years ago ISO ventured into the management arena with its ISO 9000 total quality management series of standards. These have become widely adopted as indicators of systematic quality manufacturing. Essentially, ISO 9000 requires a company to document how it does things in detail, to work to achieve continuous improvement, then to monitor (audit) itself to be sure it continues to do what it says it is doing. Companies usually hire third-party registrars and auditors to formalize certification and to enhance credibility. ISO 9000 has been widely adopted and is commonly thought to pay for itself in cost savings and often, to provide competitive advantage.

Because of the success of ISO 9000, industry felt that a similar cost-saving and competitively valuable effort could be made in dealing with environmental issues. ISO 14001, promulgated in 1996, was the result. ISO 14001 provides general direction for setting up an environmental management system (EMS) to identify and monitor an organization's environmental aspects,

head off problems, and plan responses for incidents. It is a common sense notion but, like ISO 9000, it can become complicated and expensive to implement and to achieve third-party certification. Nevertheless it is much in the minds of large multinational corporations, and many are becoming certified, at least in some of their operations. MacDonalds Inc., for example, has certified all of its restaurants in Finland; IBM is certified at the corporate level and is in the process of certifying all of its manufacturing facilities world wide; Johnson & Johnson has committed itself to certification at all of its facilities world wide; Bristol-Meyers Squibb is gradually certifying all its facilities; and so forth.

Details of the EMS itself are not specified in the standard; depending on the complexity of the organization, it can range from a few pages of instructions in a loose-leaf binder to a complex computerized system of documents available world-wide over the web. However it is formulated, though, it must include an environmental policy, a commitment to meeting all regulatory requirements, an accounting of significant environmental aspects and a systematic way to identify them, a way to discover failure to meet regulatory requirements, and what to do if such a failure occurs. It also requires periodic revisiting, usually including formal audits.

There are at least three quite different reasons why organizations become certified:

1. They are already using environmental management systems and it is not much trouble to become certified.
2. They foresee the need to establish an environmental management system, and ISO 14001 seems like a reasonable vehicle.
3. They believe some competitive advantage will accrue.

It is usually large corporations that fall into the first category. They have already had or foreseen enough environmental problems to know they need to manage their environmental matters formally. Most design their own EMS, and ISO 14001 is sufficiently open that most of these meet the requirements of the standard or can be modified to do so.

Why would smaller organizations consider ISO 14001?

The latter two categories, particularly the need to formulate some kind of environmental management system, seem the most likely reasons in the near future. If there is a need for an environmental management system, why not develop it in accordance with ISO 14001 principles? ISO allows self-certification—no consultants are *require*d. And if any competitive advantages are detected, third-party certification could follow at any time.

Are there any competitive advantages? Probably not yet. But in my view, ISO 14000 will become very visible in the next few years, and some larger firms will refuse to do business with any firm not certified. This may become particularly important in international trade. When enough firms become certified, there will be no reason to do business with uncertified ones, and restricting business to certified firms will become an easy way to garner environmental respectability. The degree to which this may occur in the agricultural sector, however, is completely unknown.

How many agricultural operations are presently certified?

No one knows. An odd feature of the ISO certification process is that it is done by independent registrars. An organization becomes a registrar by being certified by a national certification agency, a joint program of the American National Standards Institute (ANSI) and the Registrar Accreditation Board in the United States, then is free to start certifying. There is no central database of certified companies. Various organizations including the Roberts Environmental Center (http://www.roberts.mckenna.edu) maintain listings, but it is impossible to keep the listings up to date or to know how complete they are. Web-based searches are the only practical way to find listed organizations, and in preparing this paper, I could turn up no evidence of agricultural operations being certified.

Should agricultural operations consider certification?

Who might be in a position to give advice? Three groups who might be expected to have useful opinions are agricultural academics, agricultural consultants, and ISO 14001 registrars and auditors. The academics teach future farmers and do research into the theory and practice of agriculture; the agricultural consultants help finance, manage, and develop strategies for agricultural operations; the ISO 14001 registrars and auditors make their livings certifying that organizations are in compliance with the ISO 14001 standard. The first two groups should be familiar with the types of environmental issues and economic constraints facing agricultural operations, and, to the extent that they are aware of ISO 14001, would be expected to have informed opinions as to its utility in managing them. The ISO 14001 registrars and auditors, while they may not have certified or audited an agricultural operation, would be expected to have opinions on the feasibility of doing so and on the value to be gained. This paper contains the results of an informal (non-scientific) survey to explore whether these suppositions are true.

Methods

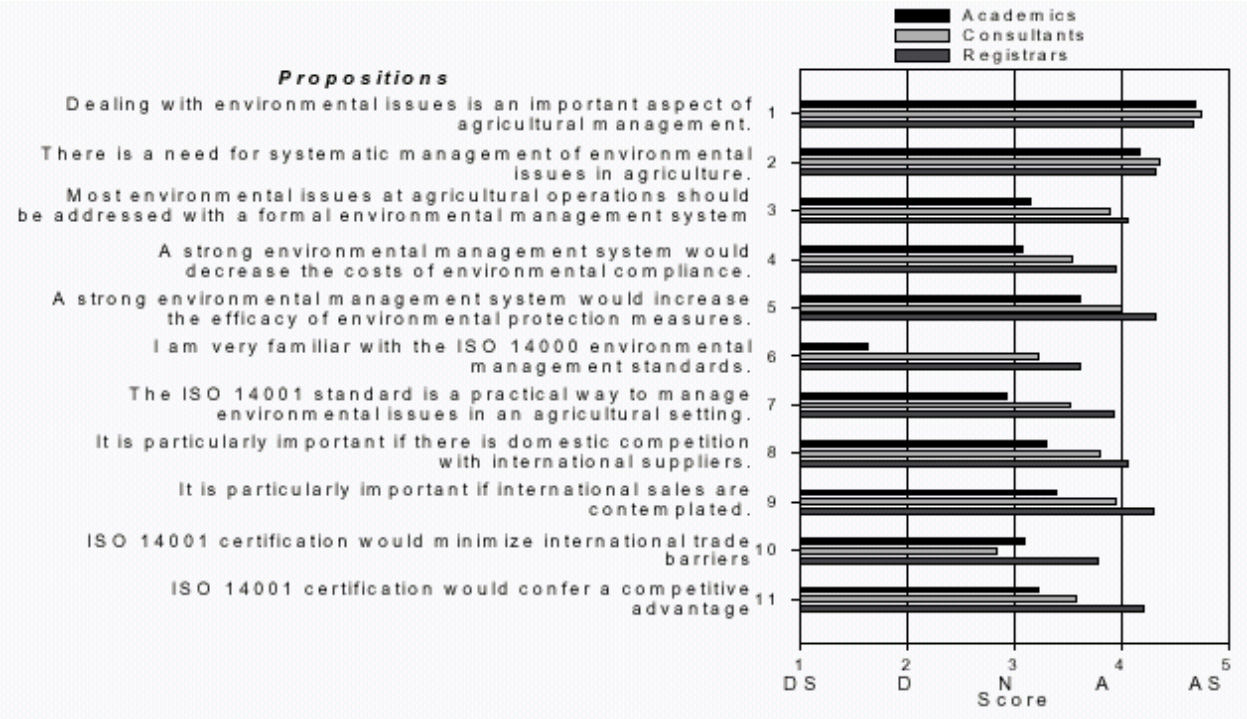
I sent a web-based questionnaire via e-mail to 306 individuals: 91 agricultural faculty at three arbitrarily chosen research universities—the University of Wisconsin, Colorado State University, and the University of California; to 63 members of the American Society of Agricultural Consultants and 61 members of the Canadian Consulting Agrologists Association; and to 91 individuals in consulting firms identified in their websites as offering ISO 14001 registration. All e-mail addresses were obtained from these organizations' official websites. Within these groups I.40 was selective in omitting individuals who confined their practices to financial aspects of agricultural management.

Eighty-six people responded, a response rate of 28 percent. Respondents were requested to state whether they disagreed strongly (DS, 1 point), disagreed (D, 2 points), were neutral (N, 3 points), agreed (A, 4 points) or agreed strongly (AS, 5 points) with a series of 11 propositions, and to choose among four options for a twelfth. I began with the academics, several of whom called for an additional option (abstain, don't know) which I subsequently added. Thus, some of the academic responses were made without abstention as an option, a shortcoming for which I did not attempt to make any correction but which may bias the academic data toward the neutral value.

Results and Discussion

The summary results are presented in Figure 1. Frequency histograms of all responses are presented in Figures 2 and 3.

Figure 1: Average scores of responses to the survey. Low scores indicate disagreement (DS = Disagree strongly, D = Disagree), high scores indicate agreement (A = Agree, AS = Agree Strongly). N = Neutral. For some of the academic responses the option of "abstain" was not available, leaving N as the nearest possibility.



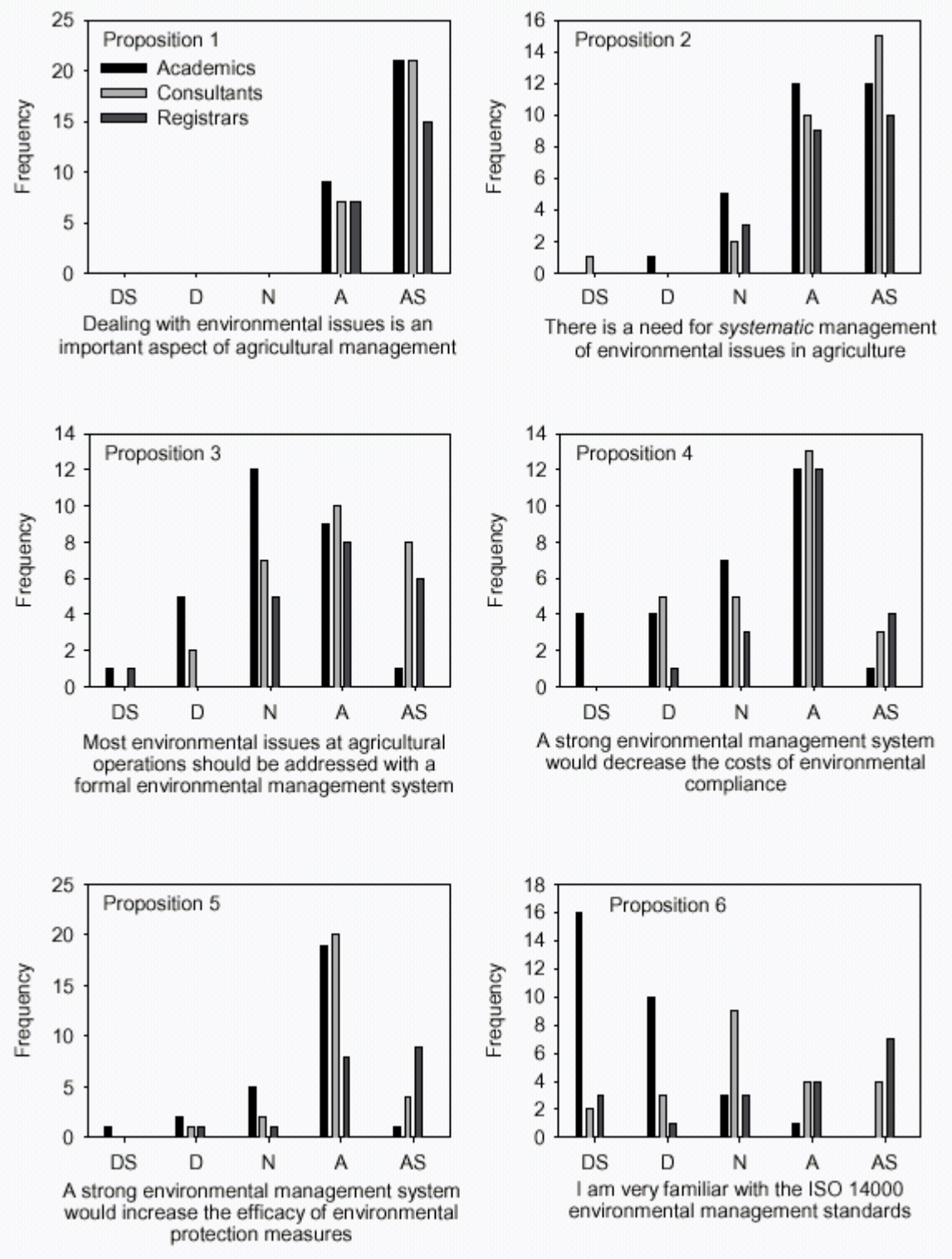


Figure 2. Frequency histograms of responses to survey propositions 1-6.

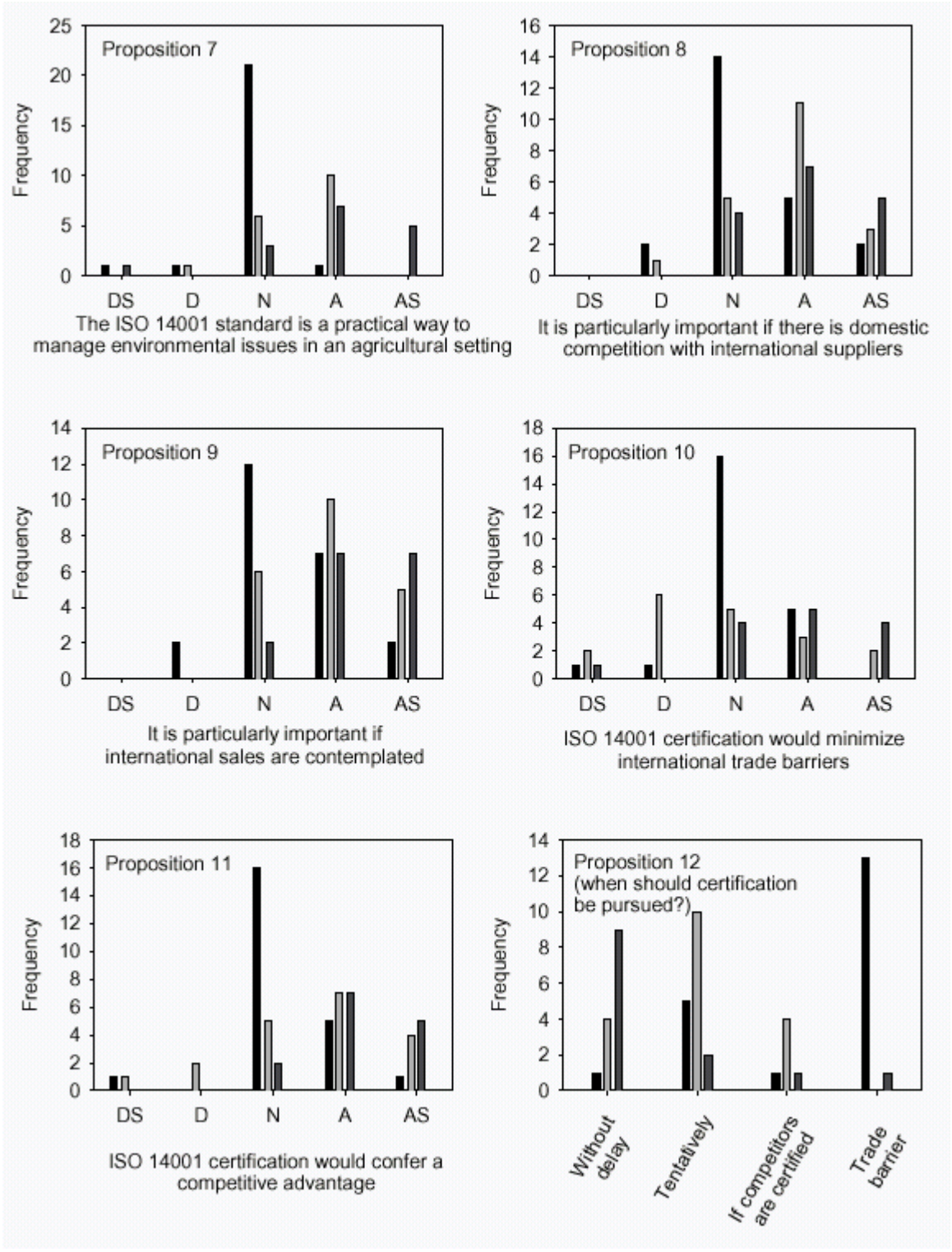


Figure 3. Frequency histograms of responses to survey propositions 7-12.

The propositions from the survey form and responses are discussed individually below.

1) Dealing with environmental issues is an important aspect of agricultural management.
This is the most basic proposition for anyone considering ISO 14001 certification. If the industry is not required to deal with environmental issues then there is no point whatever in contemplating certification. It seemed obvious that few agricultural operations were in that happy category, but to be sure I checked. This proposition brought the most uniform response and the three groups (academics, consultants, registrars) were all in close agreement with it.

2) There is a need for *systematic* management of environmental issues in agriculture.
As in proposition 1, the majority of responses of all groups were in agreement, but there was more variability, with a few responses toward neutrality and disagreement. Evidently, since it is important for agricultural operations to deal with environmental issues, it makes sense to do it systematically. Considering the uniformity of answers to the first question, the slightly diminished agreement is probably based on differing interpretations of the word "systematic." I did not attempt to define it.

3) Most environmental issues at agricultural operations should be addressed with a formal environmental management system.
Not surprisingly, this proposition received lower scores than the previous two from all three groups. I suspect that different respondents had widely different concepts of just what a formal environmental management system might entail, and were therefore cautious. The academics produced the least agreement with the proposition; they were, on average, just a little over neutral and less enthusiastic than the agricultural consultants. Because of the lack of an opportunity to abstain on many of the survey forms responded to by the academics, their strong neutrality may reflect a lack of an opinion about what an EMS is. The ISO 14001 auditors and registrars whose livelihoods depend on such systems were only slightly more enthusiastic than the consultants.

4) A strong environmental management system would decrease the costs of environmental compliance.
The peak response of all three groups was agreement with this proposition. Still, four of the academics disagreed strongly, not sure perhaps that the costs would not just be transferred from environmental costs to consulting and registration and auditing costs. The consultants and auditors, on the other hand, have probably observed that they generate cost savings in other arenas or they would not be able to continue in business. Some may have direct experience with cost savings resulting from developing environmental management systems but I failed to ask that question, and none volunteered any such experience. In any event, none of them disagreed strongly.

5) A strong environmental management system would increase the efficacy of environmental protection measures.
All three groups agreed much more strongly with this proposition than with the previous one. Costs aside, an environmental management system ought to improve environmental management and environmental protection. The group most familiar with such systems, the auditors and

registrars, agreed the most strongly but most of the academics and consultants were also in agreement.

6) I am very familiar with the ISO 14000 environmental management standards.
The most clear result of this proposition is that ISO 14001 is largely unknown to agricultural academics. This is not overly surprising. I did a formal literature search of journals using Uncover, the commercial document retrieval service used by the libraries of the Claremont Colleges to obtain technical articles not in the library journal collections. Using the search terms ISO 14000 and ISO 14001 returned a total of just 227 articles since 1980 (Table 1) well before ISO 14000 was even conceived, with most of them in trade publications or in environmental management and law journals; not the specialties of most of the academics I contacted. Only one article, (Spencer 1995), was on the subject of agriculture (in Australia) and it was only 3 pages long and written prior to the time the standard was implemented and hence both speculative and undetailed.

The responses from consultants and registrars was more-or-less evenly spread across the spectrum of possible answers. This is somewhat understandable for the consultants who generally do not include ISO certification in their practices. It is surprising for the registrars, however. This may be evidence that although every one of the registration firms I contacted advertised ISO 14001 certification as a specialty, the individuals responding to the survey were not necessarily the specialists. While most of the e-mail addresses of agricultural consultants, and all of the e-mail addresses of academics were those of the individuals involved directly in the work, many of the e-mail addresses of the registrars may have been to marketing and contact people, who may have decided to answer the questions without consulting their registrars and auditors.

7) The ISO 14001 standard is a practical way to manage environmental issues in an agricultural setting.
The academics were overwhelmingly neutral, but the consultants and registrars were cautiously optimistic. The only strong agreement came from five registrars.

8) It is particularly important if there is domestic competition with international suppliers.
Neutrality was the largest response from academics, but the responses from consultants and registrars were skewed toward agreement; no one disagreed strongly, and only one consultant disagreed at all.

9) It is particularly important if international sales are contemplated.
The response was similar to that for proposition 8 with many of the academics neutral, but with others in agreement and the majority of the consultants and registrars in agreement.

10) ISO 14001 certification would minimize international trade barriers.
Most respondents abstained from this question. The large peak of academic response at neutral probably reflects abstention as well. Evidently there are few informed opinions on this issue, and those that are seem to be about evenly spread across the range of possible answers.

Table 1: Number of articles in trade and technical journals by topic since 1980 found in the Uncover database using the search terms ISO 14000 and ISO 14001.

Environmental and Business Management and Permitting	41
Law	32
Chemicals, Bulk Transportation	24
Quality management, Standardization	21
Manufacturing Engineering	15
Foundries/Steel/Iron/Metallurgy	15
Pollution Engineering	7
Mining	7
Electric Utilities	7
Health and Safety	7
Electronics/Computer	7
Pulp and Paper, Forest Products	6
Auditing	5
Automotive	3
Ceramics	3
Governance	3
Petroleum Refining, Hydrocarbon Processing	3
Waste Processing	3
Civil Engineering	2
Risk Management	2
Trade	2
Pipeline and Gas	2
Textiles	2
Agriculture	**1**
Industrial Marketing	1
Aerospace	1
Ship Production	1
Batteries	1
Purchasing	1
Food Technology	1
Rubber	1
Total	227

11) ISO 14001 certification would confer a competitive advantage
Many respondents also abstained from addressing this proposition, but there was more agreement than on proposition 10.

12) ISO 14000 should be pursued without delay? Tentatively? If competitors are achieving an advantage due to certification? Or, if lack of certification is resulting in a trade barrier?
The academics, many of whom were agricultural economists, overwhelmingly supported becoming certified only if a trade barrier were to be erected. Due to the inadvertent hierarchical nature of this question, most of the consultants and registrars, who probably would have agreed that a trade barrier was sufficient cause for becoming certified and who might well have also agreed that competitors gaining advantage would also have warranted certification, had already concluded that certification ought to be undertaken without delay or at least, tentatively. A recasting of this question into a series of reasons that would trigger certification would make more sense.

The general tenor of the responses was an agreement that systematic management of environmental issues would be a good thing in agriculture, but uncertainty about whether ISO 14001 is a desirable vehicle for achieving such management.

The uncertainty seemed to result more from a lack of familiarity with the standard than from a careful consideration and rejection of it, although one respondent, Bill Mott of Agland Investment Services in Larkspur, California, observed that

> "ISO 14000 will be particularly difficult for the expanding group of small agricultural producers including organic producers. They already have a number of forms and regulations to comply with, yet they do not have the management staff to deal with it".

None of the respondents to the survey volunteered a single example of a certified agricultural operation. Thus, there may not yet be any in the US or Canada. A survey of certified small and medium-sized enterprises in Japan in 1968 (Terui 2000) turned up none there either.

Conclusions

Although academic experts, agricultural consultants, and ISO 14001 registrars and auditors agree that systematic management of environmental issues is a good idea for agricultural operations, they are not convinced that ISO 14001 is the correct vehicle to achieve such management. The uncertainty stems partially from a lack of familiarity with the ISO 14001 standard and its implementation, and partially from a lack of experience with its implementation in agricultural settings. Until there is some implementation experience the jury is likely to remain out.

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Terui, K. 2000. Implementation of ISO 14001 in small and medium-sized enterprises: the Japanese experience. Pages 315-324 in *R. Hillary (ed.*).Small and medium-sized enterprises and the environment. Sheffield, UK, Greenleaf Publishing Limited.

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The Fear of Change and How Companies Who React Rather Than Lead, Die

THE LIVING WINE GROUP – A GROUP APPROACH TO ISO 14001

Richard Riddiford
Living Wine Group - New Zealand

THE CLEAN & GREEN SEMINAR – THE WINE INDUSTRY
Adelaide 10th June 1999

Thank you for the opportunity to share our experience with you today. It is my belief that the environment and various products treatment of the environment will become the key issue of the next century. I hope today to simplify and demystify Environmental Management Systems specifically ISO 14001.

ISO 14001 is an international environmental management system recognised in 54 countries and audited by independent organisations. There has been in New Zealand's brief history a proliferation of quality marks and quality systems often created by the industries concerned. There is nothing wrong with creating your own quality system but to be effective in the international trading environment they must have international standing and recognition. What surprised our group – The Living Wine group (CJ Pask, and Vidals of Hakes Bay and Martinborough Vineyards and Palliser Estate of Martinborough) was not that we achieved the standard but that we were the first wineries in the world to achieve this standard. We were also the first to achieve the standard as a group.

WHY WORK AS A GROUP

Knowledge is generally recognised as power – ask any lawyer. In my experience those companies which share knowledge and have regular and free exchange of information and ideas are markedly more innovative, progressive and profitable than those that operate in isolation.

The four wineries involved are all small companies and we found the joint approach to accreditation reduced the costs of:

1. Consultancy fees
2. Certification
3. Auditing costs

The reduction in cost from the joint approach was significant.

More important than the significant savings was that the shared information (particularly of the different vineyard and winery practises) enabled us to speed up the process of accreditation considerably. Companies are naturally competitive and in the initial stages there was some resistance to the concept of shared information giving greater power. As the process developed what we discovered was that peer support drove us forward as a group. The collective knowledge and experience was a huge bonus.

Being the first wineries to meet ISO 14001 standard enabled us to create the standard within the parameters established by JAZ-ANZ. It is a process of continuous improvement and our peers within the group are our watchdogs as opposed to the auditors. Our manual will never be finished and we must remember that success is a journey not a destination. Peer pressure is a remarkable force. Imagine the feeling if Palliser Estate was the first winery in the group to fail to meet the standards.

OBJECTIVES

A) Achieve a sustainable balance between business and environment.
   i) Gain control over environmental or resource management issues.
      - Internalise the cost of environmental management through adequate planning and effective implementation of environmental improvements.
      - Reduce the effects of 'non-commercial' organisations, eg. Councils, NGO's, on business sustainability, by increasing Program participant's environmental understanding and environmental improvement outcomes.
   ii) Protect the value of the organisation's assets, eg. productive capability.
   iii) Demonstrate corporate citizenship.
B) Contribute to the preservation of the local and global environment
C) Encourage other organisations and individuals to follow suite.

BARRIERS

A. Time.
   i) Requirements to complete proper review of business activities and implement solutions.
   ii) Existing time commitment of senior organisational staff. For example, a Winemaker is a process manager, process worker, staff manager, laboratory staff member, research co-ordinator, responsible for Health & Safety, Resource Management etc. In a small organisation staff cannot be job specific they must be prepared and able to do a range of tasks.
B. Cost
   i) Staff time during set up and continuing operation. 21 days
   ii) Consultancy and external expertise.
   iii) Cost of monitoring and testing.
   iv) Ongoing certification costs (if required). $16-$18,000 over 3 years $4-$6,000 per annum
C. Complexity of environmental issues.
D. Demands for action on other more pressing projects such as Food Safety.
E. Current consumer apathy/lack of understanding with regards environmental management.
F. Interference from external 'non-commercial' organisations.

THE PROCESS (as per the LPEM program using ISO 14001 as the model)

1) Perform analysis of participant's sites and activities, using a HACCP based approach.
2) Review existing local and national legislation.

3) Pick a limited number of activities from the HACCP/site analysis and outline environmental objectives and targets and set out improvement project timeframes, set out operational control methods, measures and emergency responses.
4) Set out system administration policies.

Additional material for mid-1999.

1) Implement the environmental management system
2) Achieve ISO 14001 certification.
3) Join current or form new environmental network.

OUTCOMES FROM IMPLEMENTING AN ENVIRONMENTAL MANAGEMENT SYSTEM AS A NETWORK, (USING THE LPEM PROGRAM APPROACH).

a) Effective use of time.

i) The pre-set documentation requires less time to set up and implement, allowing more time to devote to increasing environmental outcomes.

b) Cost reduction

i) Staff time requirements. Last project, (Ata Rangi), required about 20 man-days by one staff member, to achieve ISO 14001 certification.

ii) Consultancy and external expertise. Where possible consultancy is provided on a group basis in workshops. External expertise is provided in the scientifically based material.

iii) Cost of monitoring and testing. Monitoring and test methods are generally low cost field measures using approved scientific methods (eg. USEPA approved Chemical Oxygen Demand methodology) or methods created for field measurement (eg. The Soil Science Society of America's, 'Methods for Assessing Soil Quality'). All monitoring and testing methods are backed up with pre-set records sheets and most are spreadsheet supported, for quick reporting.

iv) Ongoing certification costs (if required). The LPEM Program participants are the only companies to achieve a JAS-ANZ accredited group ISO 14001 certification. Certification cost reduction for a 250-500 tonne winery is from approximately $16-18,000 over three years, to $4-6,000, over three years.

c) Complexity of environmental issues.

i) The material provided by the Program attempts to assist participant's to address a wide range of environmental issues.

ii) The network approach allows for the participating companies to develop a pool of understanding and experience, a living library of practical solutions to complex environmental issues.

d) Demands for action on other more pressing projects such as Food Safety.

i) Increasingly regulators are requiring companies to instigate risk management programs that relate to their specific activities, eg. Health & Safety & Food Safety. The Program's HACCP based approach allows for the effective integration of environmental, food and health & safety systems.

e) Current consumer apathy.

i) The network approach allows for greater market awareness of participant's environmental improvement activities, eg. 'Living Wine'.

TARGETS FOR PALLISER ESTATE - 1999

Maintain a register of significant environmental impacts
Gather information on current soil structure and ion/nutrient content.50
Record and control winery and other wastes
Reduce energy and material wastes
Reuse and recycle packaging materials
Conserve biological diversity, water resources & ecosystems
Maintain & improve quality of surface and ground water
Maintain and improve air quality
Promote sustainable methods of pest, disease and weed control
Maintain compliance with ISO 14001
Train and educate staff
Investigate the impact of our products on the environment
Comply with legal & statutory requirements

BENEFITS OF ISO 14001

There is no argument that we all have a better understanding of our own company processes and the environmental consequences. In some instances the process has improved company structure with resulting cost efficiencies.

One of New Zealand's greatest trading advantages is the purity of product found within these shores. Tony O'Reilly. Chairman of Heinz Corporation, has often referred to New Zealand as an environmental oasis. Virtually all industries refer to the clean green image of New Zealand. Our countries natural beauty is one of our greatest assets. But the reality is that we as individuals and collectively as a country have done little to protect the asset that we have been given. Imagine that instead of having 3.5 million people living here we had 60 million – it is my belief that instead of an environmental oasis we would have a rubbish dump.

Previously we have never measured power, chemicals and water (inside of 10 years water will become a scarce resource). We have made measured savings in each of these areas. Staff have become aware of the environment and how we can protect it by our inputs.

The wider community have benefited through the groups approach to waste. We are in the business of reducing pollution and preserving the environment. Wherever possible we will use recyclable bottles, packaging, labels and capsules.

The next generation do read the label as to what is in the product they are about to purchase.

Non trade tariff barrier.

Consumers worldwide are becoming rapidly aware of the environment and those companies or products who abuse it. Supermarket chains worldwide are becoming increasing stringent in assessing the products they will stock. Most companies follow or are reactive to standards imposed by their trading partners. We have attempted to lead rather than follow.

Through the group approach we can have a collective marketing approach. It will give us more strength in the market and a more interesting package to present to potential customers. It is not a

matter of if but when the big international operators demand accreditation to ISO 14001 before they will consider purchasing your product. If any company is unable to trade internationally because they lack an environmental standard then the cost is huge. The potential value created by the Living Wine Group achieving ISO 14001 is considerable. The value created has far outnumbered the cost. We often look at cost in isolation without looking at the downstream value created.

The bottom up approach from the group meant that everyone had a strong sense of ownership.

WINE INDUSTRY APPROACH TO THE ENVIRONMENT

Recent publicity from some rogue elements of the industry have highlighted the need for professional and transparent record keeping. The industry is moving rapidly to address the current lack of systems and put in place systems that can be enforced. The ultimate penalty will be that winemakers who abuse the systems will have their licence removed.

The wine industry approach to the environment has been through the IWGP scheme – it's designed to complement ISO 14001. It is an industry driven initiative. Currently the IWGP has 140 members in its first year of operation (slightly less than half the registered winemakers). It is designed to reduce the impact on the environment by achieving best practise across all processes both in the winery and vineyard. It is aimed to reduce for instance:

1. Soil compaction
2. Sward management
3. The vineyard environment
4. Regular and continued record keeping of diseases and pests
5. Measured inputs of chemicals

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Evaluating a Technique used to Measure Environmental Performance within Agriculture - Case Studies

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J. Eco-management and Auditing Journal, Vol 5, part 3 November 1998, 126-135

ABSTRACT

A methodology has been developed which can be used to assess the environmental performance of a farm. The computer-based system, known as EMA, utilises a checklist auditing process based on both quantitative and qualitative data and looks, holistically, at the farm assessing a wide range of farming activities including crop production, crop protection, resource and waste management, livestock husbandry and conservation. The system relies on the use of eco-ratings which are activity based performance indices derived by comparing actual farm practices with what is perceived to be site specific best practice. The system utilises a similar approach to that used in standard environmental management systems, such as ISO14001, by providing a scale for performance measurement to allow monitoring of improvements and progress, and to permit performance highs and lows to be identified.

The system has recently under-gone piloting and evaluation in-house, on-farm and in collaboration with a major UK Retailer, Safeway Stores plc. This paper describes this process and presents the findings in the form of case studies. These include studies focusing on EMA's ability to assess fertiliser, lime and pesticide usage, plus another study on animal husbandry. A brief description of the system is included for completeness.

The case studies reported show the scope and ability of the EMA software. Piloting and validation are still on-going with various organisations and farmers themselves. There has been no shortage of volunteers and the feed back process has helped to ensure that the software is simple to use, provides the type and level of information required and is not over demanding with respect to the input data required.

Authors note:
The EMA-2000 software is now in wide-spread use throughout the UK. It provides the benefits of assessment and monitoring that formal environmental management systems such as ISO140001 offer without the prescriptiveness. Its release is supported by a consortium of UK organisations including the pesticide and fertiliser industry and a major food retailer. As public good software it is priced at just £35 (approx. $50) which includes access to an Internet site for free updating.

THE OPTIONS FOR INFORMAL ENVIRONMENTAL MANAGEMENT: THE AGRICULTURAL INDUSTRY HIGHLIGHTED

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Eco-Management and Auditing Journal, Vol. 4:1 March 1997 pp 22-27

ABSTRACT

The need for the agricultural industry to develop a sound environmental management system has become increasingly apparent over the last few decades, and has been emphasised by the problems at the moment within the UK cattle industry. There have been dramatic changes this century in terms of agricultural practices, numbers of farm workers, farm technology and the use of pesticides and fertilisers. Problems have been emerging of insect resistance to pesticides, eutrophication, partly caused by nitrate and phosphate losses, soil degradation, and loss of species diversity. Faced with these dilemmas, it is difficult for farmers to decide which actions to implement, there being a lack of simple diagnostic tools to evaluate the agronomic and environmental effects of agricultural practices.

Discussions are frequently found in the environmental press regarding the possible advantages to an organisation should they implement a formal environmental management system such as BS 7750, ISO 14001 or the EC Eco-Management and Audit Scheme (EMAS). It is also widely recognised that these formal systems, although theoretically applicable to all, are often seen by many organisations as being too unwieldy, too prescriptive, frequently too expensive and often too public.

However, there are many alternative options available to organisations which do not wish to commit themselves to a formal accredited system. This paper discusses the various options currently in use for informal environmental management in agriculture with particular reference to a computerised system being developed at the University of Hertfordshire. Application examples are taken from the agricultural industry.

This paper examines a number of different approaches including:

- Environmental Management Tools
- Environmental indicators
- Environmental Impact Assessment (EIA) / Environmental Risk Assessment (ERA)
- COSHH
- Life cycle Assessment (LCA)
- Environmental Auditing.

It concludes that although the formal systems are theoretically applicable, they are rather unwieldy, too prescriptive, frequently too expensive and often too public but are useful in themselves as tools. EIA's are used widely and have been extended to cover certain agricultural practices. COSHH regulations allow control and monitoring of health and safety risks, which tend to also reduce environmental risks, for example, from operator exposure to pesticides.

Similar benefits come from the use of ERA. Although LCA has been used by food producers, so far they have not been applied to any great extent in agriculture, and although individual applications can provide invaluable information, they do not provide an integrated approach. What is needed is an integrated approach covering all farm activities which needs to combined environmental auditing with environmental impact assessment or environmental indicators. This would allow assessment of current practices and prioritisation of areas in need of improvement, If carried out at field level and coupled with sound recording them not only would a process of review and monitoring be enabled but also product traceability to field level.

A computer-based informal environmental management system [16] for agriculture

K A Lewis & K S Bardon
Department of Environmental Sciences, University of Hertfordshire,
Journal of Environmental Modelling & Software, 13, 123-137, 1998

ABSTRACT

This paper discusses a practical, computerised eco-management system for agriculture which has been developed at the University of Hertfordshire, UK for use by farmers and their advisers to encourage more sustainable practices. The research and software development has been funded by the UK's Ministry of Agriculture, Fisheries and Food and the Milk Development Council. The computerised system helps to measure environmental performance by evaluating an eco-rating that compares actual farm practices and site specific details with what is perceived to be the best practice for that site using an expert system together with scoring and ranking techniques. The eco-ratings system utilises a positive-negative scale to aid transparency and interpretation. In practical terms this means that undesirable and unsustainable activities will lead to negative eco-ratings. Activities which adhere to the principles of best practice and sustainable agriculture will lead to positive eco-ratings. The zero position may then be interpreted as representing an environmentally benign activity. In support of the assessment, the system incorporates modules to explore 'What-If' scenarios and a hypertext information system. This paper describes the approaches and methodologies used to develop the eco-ratings and outlines the software which utilises these indices within a comprehensive decision-support framework.

[16] In press to Journal of Environmental Software.

Biography for Dr Kathy Lewis BSc PhD FIAP AMIEMgt

Kathy is a Senior Research Fellow and Research Leader of the Agriculture and the Environment Research Unit (AERU) at the University of Hertfordshire. She joined the Department of Environmental Sciences in 1995 and AERU was established soon after. Kathy's doctorate, which was awarded by the University of Hertfordshire, is in agri-environmental science. She is a Fellow of the Institute of Analysts and Programmers (IAP), an Associate Member of the Institute of Environmental Management (IEM) and a member of the Society of the Chemical Industry. Before joining UH Kathy spent 23 years at Warren Spring Laboratory as a Senior Scientific Officer responsible for environmental management implementation. Kathy also spent a year in industry working as an Environmental Manager for a major multi-national electronics company. Whilst at the University, Kathy has been responsible for managing the AERU and steering and carrying out research on numerous projects. Currently these include:

- Development of the Environmental Management for Agriculture (EMA) software. This project was originally funded by MAFF and the Milk Development Council and resulted in a software package for whole-farm environmental management that is now in active use by hundreds of UK farmers and advisers. The package uses environmental performance indicators to quantify how close farm activities are to site specific best practice. This software package has won several awards.
- EU CAPER (Concerted Action on Pesticide Environmental Risk indicators). This project involves 15 EU States and seeks to compare and contrast eight pesticide indicators of environmental toxicity.
- Development of a Risk assessment approach for field evaluation of pesticides. This MAFF funded research project seeks to upgrade the pesticide performance indicator in the EMA software. The methodology seeks to modify the regulatory approach such that it is responsive to the local site and farm practices.
- Design and impact assessment of an economic instrument for pesticide use in the UK. This project was funded by the DETR and carried out in collaboration with ECOTEC.
- Develop of an expert system to interpret the regulations on countryside access and advise on opportunities to encourage access. This project was funded by the Country Landowners Association and uses an expert system approach to identify on-farm opportunities.

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Biography for John Tzilivakis BSc MSc

John is a Research Fellow in the Agriculture and the Environment Research Unit (AERU), University of Hertfordshire. He has a BSc (Hons) in Agroforestry from the University of Wales, Bangor (1991), a MSc in Ecological Design from the Robert Gordon University, Aberdeen (1994) and is currently studying for a PhD related to sustainable agriculture. Before joining AERU in 1995, John was a researcher at the World Resource Foundation where he worked on projects related to sustainable waste management. These included the use of Life Cycle Assessment (LCA) and public perception issues. John has recently been selected to make a presentation at a special reception for young scientists, engineers and technologists in the House of Commons, London under SET2000 initiative. John has been involved in numerous projects related to agriculture and the environment. These include:

- Development of Organic Conversion Planning software in collaboration with the Welsh Institute of Rural Studies (WIRS) and Elm Farm. Funded by MAFF (1999 - current). This aim of this project is to provide continuous support to the farmer through the conversion period allowing analysis and planning of the economics, resource requirements and environmental consequences.
- Development of risk assessment software for pesticide use on farms, in collaboration with CSL and SSLRC. Development of a farm level indicator for pesticide use.
- Environmental Management for Agriculture (EMA) funded by MAFF and Milk Development Council (MDC). Development of whole farm environmental performance assessment software.
- Action for Growth in the Rural Economy (AGRE) funded by the European Social Fund (1998 - current). This project has focused on an area of East Hertfordshire. The analytical phase sought to identify the local issues arising from the need for rural sustainability. Following this a range of support programmes have been offered to farmers covering environmental management, planning for diversification, IT training and various other community based initiatives.
- The development of a strategic environmental assessment (SEA) method for agricultural policy, funded by Ministry of Agriculture, Fisheries and Food (MAFF) (1995-96).

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Farm Certification: Implementing and using quality and environmental management systems in Swedish agriculture

M Bergström[17], R Hellqvist[18] and M Ljung[19]

ABSTRACT

The implementation and use of quality and environmental management systems in Swedish agriculture has grown the last years. Today at least fourty-four Swedish farms are certified according to ISO 9002 and ISO 14001. In this paper we present a case study of the experiences made during implementation and use of these systems. The study reveals that there are many perceived benefits both from a managerial and environmental perspective. At the same time it is important not to confuse 'good management practice' with production under contracts. The paper emphasise the similarities between quality and environmental management systems and 'good management practice', and why these approaches in farm management are needed. Therefor we also analyse the potential for a broad implementation and use in Swedish agriculture, based on three different perspectives – a managerial, a communicative, and a systems perspective.

INTRODUCTION

This ongoing research highlights the implementation and use of quality and environmental management systems in Swedish agriculture. In this paper three research questions are emphasised:

1. What are the experiences of Swedish farmers implementing and using quality and environmental management systems?
2. What are the relations between good management practice, standardised management systems, and contract production?
3. If society aim for a broad implementation and a widespread use of quality and environmental management systems within the Swedish farming community, what are the most important factors to pay attention to?

First some facts about Swedish agriculture. Sweden has 8.9 million inhabitants and up to 200.000 people is permanently or temporarily employed in agriculture. Only 36.000 of the total number of 85.000 farms in Sweden are so called full-time farms, i.e., one person is employed more than 1.800 hours a year (Statistics Sweden, 1999).

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The total area of Sweden is app. 102 million acres (41.1 million hectare) from which app. 6.9 million acres (2.8 million hectare) are arable land. Most of the arable land (app. 65%) is used for production of green fodder and coarse grain to be used in the Swedish animal production. The most important crop for sale is winter wheat, which mainly is used as bread grain. The most important livestock are dairy cows and hogs. During 1998 there were app. 450.000 dairy cows and the total production of hogs were app. 2.2 million (Statistics Sweden, 1999).

Most of the products from the Swedish farms are purchased by the co-operatively farmer owned processing industries. During the latest years the total number of Swedish farms have decreased. The decrease is within farms of smaller or average size, e.g., 2.5-245 acres. The number of farms with 245 acres or more has increased, but still the arable land for an average farm is still app. 84 acres (Statistics Sweden, 1999).

Since January 1995 Sweden is a member of the European Union. The main differences, which strongly influence the development of Swedish agriculture, are the free European market and the Common Agriculture Policy (CAP). Because of the Swedish membership in the European Union the competition on the Swedish market has increased, but at the same time new opportunities to export Swedish food to other European countries have arised.

FARM CERTIFICATION IN SWEDISH AGRICULTURE

Farm certification (Gårdcertifiering ™) is a tool for quality and environmental management developed for Swedish farming. The system integrates the two international standards ISO 9002 (quality assurance) and ISO 14001 (environmental management). The similarities of the two systems makes it easy to integrate them into one concept. Therefore farms can be certified simultaneously according to ISO 9002 and ISO 14001, something that of course is voluntarily. By February 2000 forty-four (44) Swedish farms were certified according to ISO 9002 and ISO 14001.

To begin with the farm managers have to put together relevant laws and regulations, existing contracts (agreed contracts with customers), and all other demands which directly or indirectly affect the farm and its business. Based on such a situational map, including an understanding of the impact that the farm has on the environment, the company develop guidelines for future actions – in this case a quality and environmental policy, long and short term goals, action plans. By following up the outcome and doing internal quality and environmental audits one gather important information that is analysed, evaluated, and used in the continual improvement process. The data is also used in the strategic decision making when revising quality and environmental policies, objectives, and targets. Further, the information is used in the operative decision making that leads to immediate improvements by revising the actionplan. This is illustrated with the thicker arrow in figure 1. The management process in Farm certification is summarised in figure 1.

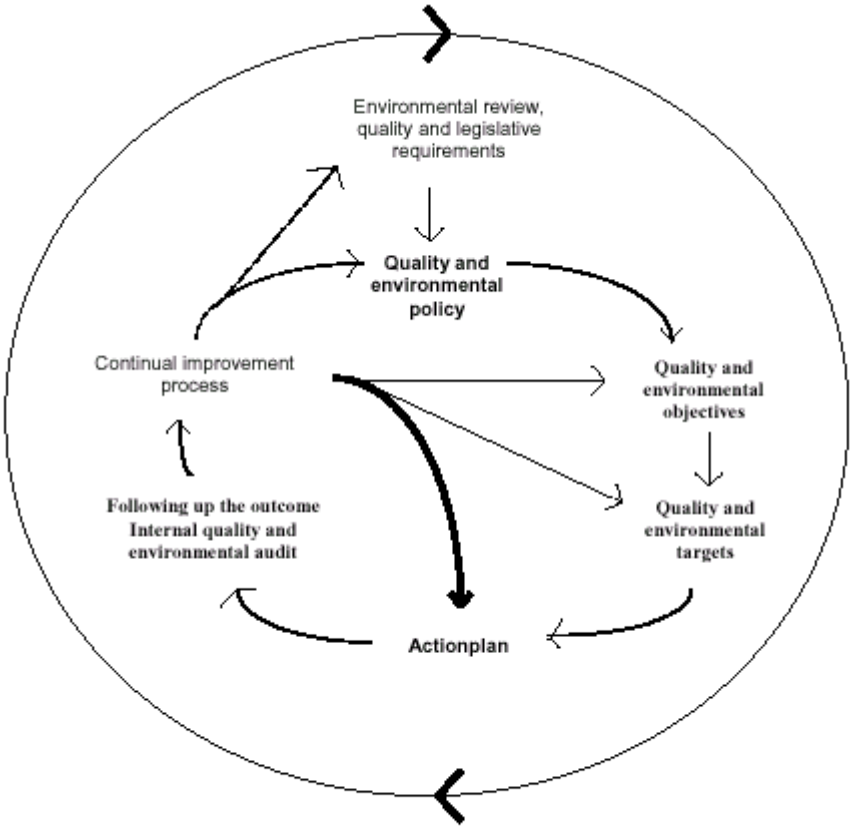

Figure 1. Conceptual model of the management process in Farm certification

The underlying principle is management by objectives, which means that the manager himself define the goals he wants to achieve. There is no prescribed level of compliance defined by the system itself, but existing laws and regulations are of course necessary to follow in order to be certified. In accordance with Farm certification the farmer commit himself to work with continuous improvements, thus when a quality or environmental goal is met it is time to set a new goal.

THE CASE STUDY

The Federation of Swedish Farmers (LRF) together with the two cooperatives Swedish Meats and Skåne Dairies started a project in 1997 called Swedish Farm Assured (SFA). A fourth stakeholder is Swegro (a vegetable retailer). The concept is built upon the idea that the production of food has to be certified all through the food-chain, from the farm to the processing industry, according to current international standards for quality and environmental management systems. The main purpose with the project is that products from certified farms will help the cooperative companies efforts on the international markets and to profile specific brands. In light of this concept the Federation of Swedish Farmers developed an integrated quality (ISO 9002) and environmental management system (ISO 14001) – Farm certification – to be used on farms. Initially there were 39 farms with different productions (hog, milk, and vegetables) participating in the project.

The experiences made and presented in this chapter are based on a master thesis 'Small Business Management with an Quality and Environmental Management Approach' (Bergström and Hellqvist, 1999).

The Farms

In order to identify some basic differences between the farms in the study and their response to implementing and using Farm certification, the studied firms were divided into different categories (table 1). The investigated farms had different production orientation – milk production, hog production, or vegetable production, but they also differed when it comes to if and, if so, how many employees (beside the family) they had.

	Category I (no external employees)	**Category II** (0.5-5 external employees)	**Category III** (more than 5 external employees)
Milk production	9	7	4
Hog production	5	7	2
Vegetable production	-	4	1
Total	14	18	7

Table 1. Number of farms in respective production orientation and category.

Especially there seems to be some correlation between how many externally employed the farm has, and how the farm manager perceive some aspects of the new management approaches. We will elaborate these issues in the following.

Motives

The motives for implementing Farm certification differed among the farm managers. Almost every farmer had been asked by an adviser if they were interested in participating in a project aiming to certify their farm. A financial support were given to those who participated, covering the cost for formal certification procedures. Farms in category I and II perceived the financial support as a prerequisite for them to work towards a certification at all.

But there were other reasons for the high interest. Some farmers believed that it could be a way of differentiating their products, and as a potential consequence get higher payment for what they produced. Some believed that a certification would be demanded from customers in the future. Thus, they argued, it is better to start out early and be pro-active, instead of being forced into these systems. Only some of the farm managers, and only those with big farms, i.e. category III, hoped that a certified system and the process of using it would help them improve their management practices and formal, strategic planning.

Documentation

A certified system put high and new demands on documentation, for instance written working routines, checklists, and goal-specifications. Most farmers perceived these demands as positive and had experienced benefits from working with them. When documenting, the managers felt that they gained more knowledge and control over what happened on their farm. Moreover, it would be easier for them to remember how they solved problems from one time to another.

By measuring environmental and quality performance, the manager were able to build a platform for future decisions. As such, documentation support the decision making process and decrease uncertainty. Also, the collected data and information is especially important for long term and strategic decisions.

But some managers were not all that positive. Some had difficulties in formulating what they experienced in a written and formalised form, for instance to write down what routines they used, which goals they had committed to, and how a policy should be formulated. In general, the farmers perceived it as problematic to really know what had to be documented, and in what detail.

Non-conformity report

An important part of the documentation is to write down the non-conformances that have occurred during the year. A non-conformance is by definition the difference between what is planned and what is achieved. The process of reporting non-conformances helps managers check and analyse problems that occur in the production system. As a consequence, preventive action can be taken.

Information about those environmental and quality goals that are not reached has to be reported, as well as all necessary corrective action taken in order to prevent the same non-conformances to occur again. Corrective and preventive actions, external reactions (complaints, but also praises) etc, have to be documented. At start, some managers felt that it was difficult to know exactly which non-conformances that ought to be reported or not.

Human resource management

The relation to the personal also changed. According to farm managers with employees, the relationships became more professional. Well defined and more accurate routines and job descriptions, created better guidelines, but this did not result in a stronger hierarchy between the employer and the employees. On the contrary, the farm managers perceived that this created more involvement and participation in the management process among all the employees. Two formal activities that support these statements, are the demands for regularly meetings with the personnel and the documentation of all measures and activities taken in the production.

Business relations

Being certified you have to be aware of and in control of all business relations. It is about putting together all customer contracts, as well as relevant information about your suppliers. The managers valued both these aspects, and some real benefits had already come out of it. Some stakeholders, for instance local authorities, banks, and insurance companies, have responded positively to farms being certified (e.g., local authorities giving subsidies when carrying through their legal controls on farms). Colleagues, i.e., other farmers, were perceived to be more hesitant.

Structure and status

When working through all aspects of the business and its relations, most farm managers perceived that they got a better understanding of their farm as a system. They also had been able to improve the structural conditions. This was especially evident among farms with employees.

Some farmers felt more self-confident, something that also characterised the feelings of many employees. As a result, the farm as a whole had higher status.

Environmental impact

All farms had started out by doing an environmental review. When doing such a review the most important negative (and positive) environmental impacts were identified (impacts being the consequences caused by the analysed farm). For many farmers this were perceived as a hard task. Especially the valuation and comparison of different environmental problems were difficult, and thus the trade-offs between different impacts. The question were: What is really most important to start working with in order to minimise the negative environmental impact, while at the same time fulfil product quality demands, and being viable?

A certified company has to show that it fulfils existing environmental legislation, and also how this is done. For many farm managers, not being used to reading law and especially not environmental law, this is difficult. To understand the purpose behind a certain legislation or regulation is one thing, to be able to understand how it effects your own farm, and perhaps also use it in practice, is even harder.

Implementation takes time

Some managers had problem understanding how Farm certification were designed, and why. The different demands were hard to grasp, especially how they would effect your own farm. Thus, the time for implementation often becomes long. Using systems like these are in many ways something completely new and unfamiliar – a new way of doing things and getting used to a new terminology. Our believe is that a farm manager wanting to implement these systems should not rush, but let the learning and decision making process take its time.

The case study also shows that the time needed for a full implementation varies a lot between companies. Important factors seems to be the amount of external employees, the diversity of on-farm production systems, and how structured and well-managed the farm were at the outset. Many small farms, and especially part-time farmers, lack time and capital to participate in this often time-consuming and information-intensive process.

Costs

An auditing process, in order to be certified, costs app. 30.000 SEK (app. 3.500 USD). The certificate is valid for three years, on the premises that you will do a yearly audit. A yearly audit costs app. 10.000 SEK (app. 1.200 USD).

But there are of course other costs that have to be taken into account, for instance, the time spent on implementing and using the system, both for the manager and the employees. How much time that is spent differs a lot, but according to our studies one should count with at least 200 hours a farm. In addition, the farm manager also must pay attention to the costs for the soft ware Farm certification (Gårdcertifiering ™) and advisory service.

These costs are too high for many farmers. The total cost correspond to two months salary for an average farm employee in Sweden. To many farmers two months labour is much more valuable then a farm certificate. Especially when the market signals still are weak.

FARM CERTIFICATION AND 'GOOD MANAGEMENT PRACTICE'

In Swedish food production contract production is becoming more common. It means that the farmers production is connected to a contract, in which specific conditions and requirements on the product and the business are defined, e.g., special quality or environmental care, or produced for a specific customer. Our opinion is that contract production is here to stay and will be increasingly common in the future. In light of this development it is interesting to analyse how contract production will affect the management of the farm.

Our opinion is that there are some risks that certain aspects of 'good management practice' could be lost when a farm is connected to contracts (see the summary in table 2). Contract production implies that the initiative comes from the customer and not from the manager of the farm, and the farmer wait for the contract and the conditions and requirement defined by it. This means that the farm is going to be managed by the conditions and requirement that the customer has expressed in the contract, i.e., management by regulations. Even the farmers' need of knowledge in different areas is controlled by the contract. The farmer becomes an executor and works in order to fulfil the demands in the contract. There is also a risk that the farmer do not notice the need to develop his business, i.e. find and take advantage of new opportunities. Instead, the farmer only value access to contracts. Another risk with contracted production is that all the actions on the farm, e.g., the allocation of resources, focuses on the fulfilment of the contract and thus there is a risk that the manager forget other important parts of the business. Further, the manager may tend not to observe the value of formal planning, why the manager do not develop his skills in this area. Because of the communication with only one customer the manager do not experience a strong need of having knowledge of what is going on in the world around the farm. Finally, there is a risk that the manager do not search any knowledge except the knowledge needed to fulfil the contract.

In this paper we define a manager that possesses a 'good management practice' as a manager that is in control of the farm and where the initiatives comes from the manager himself. Further, management by objectives and the managers supervision are fundamental elements of such a view. 'Good management practice' means that the farm manager has the ability to take advantage of different opportunities that occur in the surrounding world, on the market, and to solve problems in the business. Knowledge about the context is of great importance if one are to talk about 'good management practice'. 'Good management practice' also concern the capacity to co-ordinate all of the conditions and requirements on the farm and its products, as well as all processes in the business, e.g., crop husbandry and animal production, and to allocate the resources in an optimal way between these different processes. Its about taking the right decision at the right time (see also Nitsch, 1990). Other vital factors in 'good management practice' are the ability to use formal planning and actively search for knowledge when a specific need occur.

An important remark is that contract production may, or even often ought to be included in 'good management practice'. When a manager effectively work to fulfil a specific contract at the same time as he conducts and supervises the business as a whole, he is of course working in accordance with what we call 'good management practice'.

Important aspects	Production controlled by contracts	'Good management practice'
Initiative	From customer	From farm manager (always a step ahead of the customer)
Management	Management by regulation	Management by objectives
Business development	No own incentives	Ability to observe and take advantage of opportunities
Co-ordination	Focus on the fulfilment of contract	Optimal co-ordination for the business as a whole
Knowledge about the world around the farm	No experience needed when the manager only communicates with one customer	Vital for a successful business development
Formal planning	No perceived value	An essential ability
Knowledge in subjects concerning the production	Requirement for the fulfilment of the contract	An experienced and felt need leads to a search for new knowledge
Operative style	Executor	Problem solver

Table 2. Production controlled by contracts versus 'good management practice'.

When a farm use quality and environmental management systems according to ISO 9002 and ISO 14001 it implies that the farm has to have documented routines to check all the conditions and requirements on the business and its products, and the business' impact on the environment. The farm manager shall formulate a quality and environmental policy, objectives and targets from the conditions and requirements, and the impact on the environment. From policy, objectives and targets an actionplan is created, where resources, deadlines, responsibilities and authorities are distributed and co-ordinated. The follow up of the outcomes and an internal quality and environmental audit adds information that is analysed and evaluated for the use in the work for continual improvements. Management by objectives and formal planning are thus fundamental elements in quality and environmental management systems.

We are of the opinion that the components in quality and environmental management systems stimulates 'good management practice'. The use of quality and environmental management systems support the farm managers work with fulfilling different conditions and requirements, e.g., his personal aspirations, contracts and environmental legislation.

BENEFITS OF USING AN ISO-RELATED MANAGEMENT SYSTEM ON FARMS

To summarise, the use of quality (ISO 9002) and environmental management (ISO 14001) systems on farms help managers to (see also Mogensen, J et al, 1996);

- . get independent verification and thus gain credibility to their stakeholders,
- . communicate values on a market,
- . achieve better reputation in society,

- . demand high environmental and quality performance down the supply chain,
- . implement an approach which helps them reach their farm-specific and personal objectives,
- . lower their costs due to a better utilisation of on-farm resources,
- . use a systematic and business-like method for environmental work, and thus
- . minimise the negative effects on the environment, and
- . deliver high quality products.

A company that receives a certificate according to ISO 9002 and ISO 14001 show proof of competence and competitiveness which directly and indirectly will affect the employees, farm performance, as well as its overall image. Farm certification is thus also a potential to improve the popular perception of agriculture and farming, and raise its status in society at large.

THE POTENTIAL FOR A BROAD IMPLEMENTATION AND USE IN SWEDISH AGRICULTURE

From a management perspective

It seems that the potential for a broad implementation of quality and environmental management systems in Swedish agriculture, depends on the economical and managerial benefits that (mainly) a certification will have. The external benefits could, for instance, be improved relations with stakeholders and customers, and new potentials on existing or new markets.

Even though the farmer does not perceive an external benefit, for instance, higher payment or access to new markets, it still could be interesting to implement these managerial approaches for many farmers as shown earlier. Farm certification help the farmer develop a farm-specific, reliable and usable management system and tool, thus improving the internal efficiency and performance. Improvements could thus be less use of energy and other resources, and a more efficient organisation that save money and time for the farmer. If the farm choose not to apply for certification, the benefits could still be attained, at the same time as the costs of certification are avoided. Using ‘good management practice’ ought to be valuable for every farmer in Sweden.

Saying this, it's important to emphasise that if the farm will benefit or not from these management systems its crucial that the farm manager successfully adapt them to the specific conditions on the farm, and that they sooner or later become an integrated and natural part of the daily work and routines (a kind of habitualisation).

From a communicative perspective

There are some powerful actors on the Swedish scene that wants a broad and quick implementation of these systems. We have shown that there certainly are some important benefits for Swedish farmers, as well as the environment. But in order to successfully implement these management practices, while at the same time appreciating a democratic process and disconnecting the concept from contract farming, with its programmatic approach, we believe that one has to work with a broad strategy and in many respect communicatively grounded process. The success of quality and environmental management systems, such as ISO 9002 and ISO 14001, will, in both environmental, social and economical respect, depend upon an integrated, comprehensive approach to implementation. Therefore, a successful implementation

will hinge on the degree of comprehensiveness to which both the biophysical and socio-cultural systems affected by this policy are considered.

From a communicative perspective one has to start from the point of view of the farm manager. A farm manager has many different roles, for instance, working with external contacts and relations, internal leadership, and internal and strategic information management.

Working successfully with external contacts and relations are important if the farmer is to implement a certifiable management system. Of course he has to be aware of the potentials, but more so, the farmer has to be able to define and describe the environmental and quality performance on his farm, as well as all demands that external actors put on him. Nothing of this could be done with less than that he is aware of what is happening in the world around him. Also, in order to formulate a policy that enables him to be competitive he has to understand today's and tomorrow's market situation, ongoing and new trends, and what potentials there are to meet different consumer needs. Finally he ought to be interested in documenting and reporting what he actually does, and what he has achieved, either through relational marketing or advertising. All together, this role of the manager (farmer) show the need of good external contacts, with advisers, customers, and many, many more. If we are to succeed with a broad implementation and use in Swedish agriculture, we thus have to support the farmer in building and facilitating these contacts. The relevant information that the farmer need has to be accessible.

Being successful in ones internal leadership is neither that easy. It is often said that one is born a leader. Even though this perhaps is not all true, it is of course hard to change the style you have developed over the years as a manager. Therefore, it is necessary to support the farmers with educational opportunities and training in leadership and group dynamics.

Finally, being an information manager is for many something completely new. What many farm managers need are tools for gathering, systematising, and reporting the data collected. There seems to be a great need for developing such tools (soft wares), and also help farmers in the practice of using them effectively.

With the right support we believe that many Swedish farmers will be interested in and find it very helpful starting to work with formalised management systems, like ISO 9002 and ISO 14001.

From a systems perspective

Doing research in the field, its important to have a critical approach to the ongoing development, and thus also the idea of a broad implementation and use. By using a critical systems approach (Flood, 1999) we are able to better understand what structural preconditions that exists, as well as potential effects within the farming system. Sometimes the Swedish discussion about quality and environmental management systems is somewhat naive, in that one believe that the implementation process and use (especially in combination with production contracts) is unproblematic.

We believe that one can already identify adjustments to the new situation in the Swedish farming system (see also Ljung, 1998). First of all there seems to be a risk for a 'big farm' bias which

would contribute to the perpetuation of socio-economic inequality within the farming sector. It is the fully commercialised farms that adapt to the expected and supported behaviour. Secondly, the implementation of certifiable management systems on farms can also result in infra-structural changes on regional level, with negative environmental and social effects.

We conclude that some *potential negative effects* and *bottlenecks* are:

- Standardised management systems *combined with* contract production is perhaps the most clear-cut case of conflict with the autonomy of the farmers decision-making process. The system must therefore be developed in a way that enables a managerial freedom of farmers to continue.
- Managerial demands from external actors threatens the individual process of skills versatility, and thus threatens the diversity in farming community.
- For many farmers today the threat is not 'only' viability or less profit, the problem is to get access to contracts, e.g. to get access to the 'market'. It seems to be the big, fully commercialised farms that once again are the winners.
- Any system of regulation, even a standardised management system, depends on the ready compliance of the majority of the regulated if the system is to function smoothly. Paradoxically there is a need for a broad implementation, but in a short time. This could result in conflictual transformation process.
- Finally, the potential negative effects are presumed to arise on another systems level then the farm level. The possibility of infra-structural changes in Swedish agriculture could have negative environmental and socio-economic effects. If the ongoing structural changes continue, where marginal, small farms are forced out of business, the effect on landscape and biological diversity will be immense. Quality and environmental management system, applied on single farms will not help, but instead risk to enhance such a restructuring process.

Demographic factors, poor farm viability, a lack of interest from younger generations to continue farming etc, are perhaps the most important reasons for rapid structural changes in Swedish agriculture today, but the emerging trend described in this paper will probably in the short run enhance these changes. Thus, the overall aims with the implementation and use of certifiable management systems in Swedish agriculture will perhaps not be fulfilled. If only a limited number of farmers will gain from this development, the farming community as a whole and the environment will not be better of.

But applying a systems perspective one also can identify many potentially *positive* effects. As has been shown, there are a lot of favours and opportunities connected with the use of quality and environmental management systems on farms. They help farmers to manage their environmental work. In fact, one can already identify some positive effects. More filter strips, better energy-balances, and more nitrogen and phosphorus in circulation within the farm boundaries at the participating farms. 'What gets measured, gets done', and if the farmer has better knowledge about the resources used and the effect of different practices he or she is also able to improve the situation. It is clear that 'good management practices' improve the economic results of the farmer through better utilisation of resources like nutrients, chemicals, medicine, energy, water etc. Sometimes a simile is used which says that 'the modern farmer use less physical resources, but exchange it with knowledge'.

One strong argument for using these systems on Swedish farms, on a broader scale, is that it reduces immediate risk (risk of environmental damage), future risk (new legislation, economic incentives and consumer trends) and makes it possible to get access to new or changing markets. A formalised management system can be a workable way for the farmers to change their production methods and thus to become more environmentally friendly.

Certifiable management systems are information-intensive, mainly due to all data gathering, documentation, and analysis. Herein lies a great potential: Farms will, if gathering relevant data, be able to develop production systems that uses methods that meets the demand of a sustainable farming system, e.g., an agro-ecosystems centred and integrated with a variety of local, natural biotic communities, as well as specific markets. This would definitely be a great step toward a sustainable agriculture.

But to conclude our critical analysis: When analysing the gains from ISO certification in the UK meat sector Zaibet and Bredahl (1997, p 383) concluded that *"ISO certification could become a common business practice and a de facto conditions in doing business in the UK meat industr*y". This could be the case in Sweden also, and if such management systems are to become delivery-standards for farmers, it will certainly have big impact on the farming community. These changes have to be discussed by policy-makers as well as researchers.

CONCLUDING REMARKS

As many others, we believe that these systems will have a compounding impact on Swedish agriculture and the farming community. The components in quality and environmental management systems stimulates ‘good management practice’, and enhance the development of a more environmentally friendly agriculture. The use of quality and environmental management systems support the farm managers work with fulfilling different conditions and requirements, from his most personal aspirations to the environmental legislation.

If a broad implementation and use is to be achieved some core problems have to be managed successfully. The transformation of management practices takes time, costs money, and is dependent on a high quality advisory service. But this is not enough. There is also a need for the development of new methods and approaches to implementation, where the context-specific knowledge and experiences of the farm manager are valued and taken into account. To us, what is crucial is that the broad implementation is achieved in such a process that the quality and environmental management systems are perceived and applied by the farmers in way that develops their ability for ‘good management practice’. If so, ISO 9002 and ISO 14001, is a very welcomed contribution to Swedish agriculture.

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Best Management Practices in the Cotton Industry

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Introduction

The Australian cotton industry is committed to improving the environmental management of cotton farms in Australia. The main tool being used to drive improvements in environmental performance on cotton farms is the industry's Best Management Practices Manual ("Manual").

The Australian Cotton Growers Research Association ("ACGRA") and the Cotton Research & Development Corporation ("CRDC") are the two industry organisations responsible for the development of Manual—CRDC through its funding of the original research program and the on-going Manual maintenance and development, and ACGRA through its Executive Officer, who is the author of the document, and responsible for the on-going maintenance of the Manual. Cotton Australia, the peak cotton grower body, is responsible for the implementation of the Manual in the field.

The Manual provides cotton growers with a framework to help them identify the critical components of their farming operation from an environmental perspective, and then plan and record how they are going to manage those components in a way that minimises the risk of environmental harm. This framework involves growers assessing their operations against established best practices, and then developing farm-specific plans to address the significant identified risks.

Whilst the Manual currently focuses on pesticide management, it is planned to gradually expand its coverage to more general resource management issues. The decision by the cotton industry to focus on pesticides was quite deliberate—it was, and remains today a critical issue for the industry, the importance of which can be easily conveyed to growers, and thus used to induce improvements in farm environmental management. In developing the Manual, the industry considered that adopting an overly broad approach to resource management at the outset would run the risk of each issue being given only superficial treatment. Additionally, it was believed that to introduce change to cotton production practices, a clearly identifiable driving force for the need to change was vital, as opposed to diffuse or broad concepts against which resistance may be easier to muster. The change in thinking that may be required to begin adopting an Environmental Management System ("EMS") means that a focussed, relatively simple starting point such as the pesticide management focus of the Manual can act as an introduction to and building block for these more sophisticated systems. The cotton industry sees the use of an EMS as an issue worthy of full investigation—see the section headed ISO 14001.

Adoption and Compliance

The cotton industry is serious about demonstrating that it is capable of planning its own agenda for improving environmental performance (including responsible pesticide management), and it accepts the responsibilities associated with this. The first is the need for the documented analysis and planning approach exemplified by the Manual. The second is the need to gradually expand the coverage of natural resource management issues addressed by the Manual. Other issues for the cotton industry will be checking compliance, and certification of that compliance. In other words, gathering the evidence that the Manual is actually being used, being used properly, and having a positive impact. This evidence will most likely require some type of audit process.

The rationale behind introducing an auditing scheme is to have a means of demonstrating actual compliance with the contents of the Manual that combines industry control over the process, with a degree of external assessment sufficient to satisfy the various external stakeholders of the cotton industry. However, the many issues and complexities that are required to be addressed in developing such a scheme need to be recognised.

It also needs to be stressed that the audit process is part of the education program; audits offer 'opportunities for improvement' and will be the focus of rewards for achievement (the Cotton Industry Grower of the Year awards have an extremely strong focus on BMP compliance). Audits are voluntary and are **not** intended to provide the basis for regulatory action. The Manual was not designed to perform this type of role; indeed the core concept of planning and continuous improvement embodied by the Manual would be at odds with any attempt to use the Manual in this way.

The cotton industry is currently investigating the two concepts inherent in a move towards an industry based EMS—the general issue of auditing, and the appropriate system to use (in this case ISO 14001; however, other standards will be investigated). While in theory there are many advantages, there are many practical issues that need to be fully considered when contemplating introducing such broad schemes on an industry-wide basis. Some of these include:

1. The feasibility of introducing one standard across a large range of operations—is it practical or possible? how is this best achieved?
2. The cost of introducing and maintaining the system, including the direct costs involved in auditing
3. The internal bureaucratic structure required, and the cost of running this
4. The training (and availability) of appropriate personnel
5. Ensuring stakeholder involvement, including the setting of appropriate standards within the ISO (or other) framework.

Auditing

The Australian cotton industry recognises that credible verification of its chosen standards (i.e. the best management practices) of resource management is required. To help achieve this, the industry is developing the following infrastructure and expertise:

- Training people with cotton industry experience as auditors under the Best Management Practices Program
- Developing the necessary protocols for auditing compliance with the Manual.
- Establishing a dedicated 'Audit Office' to ensure the smooth running of the audit process.

The establishment of the auditing framework has been facilitated by a voluntary pilot program designed to investigate the issues and requirements associated with the development and implementation of an audit and certification scheme based on adoption of the best management practices contained in the Manual. Issues considered under the pilot program included the capability of the current industry infrastructure to accommodate an audit scheme, and financial and human resource requirements, including those associated with auditor training. Attention was particularly paid to the issue of ensuring that costs to cotton growers are kept within acceptable limits.

34 cotton farms were assessed under the pilot program, and a follow up audit of those farms is nearly complete. Every cotton-growing region has at least one farm involved in the pilot program and it is planned to hold field days on these farms once the program is complete. These field days will be used to disseminate information on the auditing process, as well as generating discussion on the issue within the industry.

The cotton industry, through CRDC and the BMP Management Committee, selected an external provider of environmental auditing and training services to assist in the running of the pilot program. This brought auditing and training expertise to the pilot program and also assisted the development of appropriate audit documentation and protocols. The industry now has 4 registered, fully trained, independent auditors who are currently operating in all cotton growing regions. It is hoped that up to 14 industry auditors will be trained by May 2000. To date, some 45 cotton farms have been audited, with another 13 planned in the near future.

ISO 14001

It is the ACGRA's position that ISO 14001should be investigated as the potential basis for future development of environmental management systems in the Australian cotton industry. Adopting an international standard has a number of advantages, including providing a common framework that would allow for integration between different agricultural commodities (given most growers produce more than one commodity), and increasing the likelihood of international recognition.

The process through which cotton growers are guided under the BMP Program fits with the generic "Plan, Do, Check, Review" concept which underpins any management system. However, the Manual is not comprehensive—it only covers pesticide management and does not offer any guidance on some of the specific EMS requirements, such as emergency planning or document control. It must be borne in mind that, as a generalisation, farmers are not particularly fond of paperwork. Thus it is critical that there is a gradual and staged introduction to the concepts embodied in a broad management system such as an EMS. This issue, and other issues associated with upgrading the Manual into an EMS, is being addressed by a specific research project, a description of which follows.

Investigation of ISO 14001

ACGRA, CRDC and the Murray-Darling Basin Commission are collaborating on a project titled "The feasibility of, and guidelines for, introducing an appropriate Audit and Certification model to foster better management practice in natural resource management in the irrigated cotton industry". This project has the following objectives:

1. determine the drivers, constraints and opportunities associated with introducing a more rigorous Certification/Audit Standard for the cotton industry,
2. determine whether ISO 14001, or another Standard, is appropriate for introduction throughout the cotton industry,
3. determine the extent to which the introduction of ISO 14001, or the other identified Standard, throughout the cotton industry will meet the MDBC's Natural Resource Management objectives,
4. determine the understanding and the receptiveness of the various sectors of the cotton industry to the adoption of an International Standard based Certification/Audit system,
5. gain a better understanding of the learning, and better management practice adoption, practices of the growers in the cotton industry,
6. undertake a detailed analysis of the requirements of the adopted Standard (possibly ISO 14001) making particular reference to how these requirements may be different to those of the adopted cotton BMP Manual and Auditing process,
7. develop an implementation strategy and action plan identifying how the learning patterns of the various industry sectors will be accommodated and the timeframe needed for implementation,
8. identify the Key Performance Indicators (KPI) by which the success of the introduction of the Certification and Audit model can be measured, including the natural resource outcomes,
9. identify any Research and Development requirements to enable the introduction of the nominated Standard to occur and for cost effective measurement of the nominated KPIs,
10. determine the cost and resource requirements for the introduction and ongoing operation of the Certification and Audit system, and
11. investigate and document the options for a cost-sharing model suitable for recovering both the implementation and ongoing cost of a Certification and Audit system in the cotton industry.

From the cotton industry's perspective, some the critical issues to answer through the feasibility study are:

- cost-effectiveness of the development and implementation of a certification standard
- what incentives may be available to cotton growers adopting such a standard
- how realistic is it to expect all cotton growers through out the industry to develop a comprehensive EMS

The last point is critical, particularly given that cotton in Australia is predominantly grown on family farms. As with most agricultural industries, the Australian cotton industry includes a diverse range of people operating under differing geographic situations and circumstances, with differing levels of resources, training and skills.

The final report for the project is due in September 2000. The report will then be the subject of widespread industry consultation. It needs to be stressed that before any decision is made on developing the Manual into a comprehensive EMS, the largely technical assessments that the above project will deliver will be subject to a full and comprehensive consultation process with cotton growers and other stakeholders, such as the various government agencies involved in natural resource management.

One of the critical assessments of the feasibility study will be whether any tangible benefits will accrue to cotton growers or the industry as a result of adopting an EMS. The benefits of the BMP Program to date have been generally realised at the industry level rather than the individual cotton grower level.

The Australian Cotton Industry has the advantage of having an individual cotton farm that has achieved ISO 14001 certification. That farm, "Oakville", situated in northern New South Wales is closely involved with the feasibility study, with its proprietor being on the project steering committee, and Oakville's environmental officer being seconded to assist with the project during the winter season. Oakville Pastoral Company has also kindly allowed the project team access to its ISO 14001 documentation.

Added Value

The benefits realised by Oakville through its implementation of an EMS are difficult to quantify, but have included the ability to access a market through product differentiation (ie environmental certification), and the improved ability to access finance as a result of being able to present itself as a professional farming operation.

It needs to be noted however that Oakville is one of the only cotton farms in Australia to actually spin and market yarn. Thus the first mentioned benefit may not realistically be within reach of the majority of cotton farms in Australia lacking this vertical integration.

While the potential may exist for an environmental premium to be paid by cotton merchants, to date no merchant has offered one in Australia. The markets that are likely to be influenced by an environmentally differentiated product are those that can afford to be choosy. However, a large percentage of cotton consumption occurs in parts of the world that are unlikely to pay a premium for an environmentally branded product. Furthermore, a large percentage of world cotton production is used for 'lower value' uses such as work wear, casual wear, under garments, and some manchester uses such as towelling, sheeting and blankets. These types of product are less amenable to differentiation than higher value uses, such as polo shirts, branded denims, business shirts and women's knitwear fashions. Thus there is little scope for premium pricing, and subsequently only very limited direct financial reward for cotton growers who are able to differentiate their product along environmental lines.

There is a strong argument that those farmers who are making a conscious and quantifiable effort to manage environmental risks whilst continuing to be productive may ultimately be rewarded for that practice through being ahead of the game if and when tighter controls over land use practices are introduced. They will be able to readily demonstrate their responsible management practices, and therefore be recognised for their commitment.

Background Information

The Best Management Practices Manual

The cotton industry has in place a comprehensive program to improve the management of pesticides. The program is focussed on the Best Management Practices Manual.

Introduction

In 1993, a joint research program between the Cotton Research & Development Corporation, Land & Water Resources Research & Development Corporation and the Murray-Darling Basin Commission ("MDBC") was established to study "The Impacts of Pesticides on the Riverine Environment using the Cotton Industry as a Model". It had total funding of $5.5 million and the following goals:

1. To assess the impact of pesticides used by rural industries on the riverine environment.
2. To understand the fate and transport of pesticides once applied.
3. To develop practical, cost effective methods to minimise the impact of pesticides on rivers; and
4. To provide a sound scientific basis for the development of management guidelines and regulations.

Cotton was chosen for the model program for several reasons, one of the most important being the cotton industry's willingness to participate and act on the outcomes of the studies, and an external review of the joint research program helped to identify a system of best management practices as the best way of achieving the third and fourth goals.

Development of the Manual

During the development of the Manual, extensive consideration was given not only to the technical content of it, but also the structure and delivery method. The joint research program that funded its original development also funded a project investigating appropriate implementation pathways. This study noted that the traditional methods, industry self-regulation and external regulation, both have their strengths and weaknesses.[20] Thus the approach has been to try and combine the strengths of both 'pathways'.

One of the cotton industry's core philosophies in implementing the Manual has been that self-directed initiatives are far more likely to work than command and control mechanisms of change. When farmers develop plans on their own initiative they will implement many more actions to maintain and enhance natural resources than they would with other policy mechanisms such as

[20] In one sense, this division is simplistic, and perpetuates a stumbling block that is generally encountered in discussions in this area. This stumbling block is the descent into arguments between which model, self-regulation or external regulation, should be used. A stand-off ensues between industry on one hand who argue that they are already over regulated, and those who maintain that self-regulation doesn't work, and that what is needed is more rules. Perhaps this debate could be progressed by more clearly defining self-regulation (has it ever been defined?) so that the real issue, what is the best way of improving resource management, is not overlooked. Is a better definition of self-regulation one that focuses on genuine industry involvement (leadership?) in how it is to manage itself? Thus the development of appropriate 'best practices' and certification schemes by industry result in them setting the standard of both the specific guidelines and how they will broadly manage the implementation or adoption, by industry members, of those guidelines (ie the framework). This industry development work needs to be backed up by a requisite level of stakeholder involvement to ensure the appropriateness of the standards, and of course is ultimately backed up by existing legislative requirements-i.e. co-regulation.

regulation or public-sector controlled planning. This approach was reinforced by the investigations undertaken during the Manual's development phase of various programs in Australia, the United States and Canada. A flexible planning approach (as opposed to an inflexible regulation based approach) is also able to recognise that management strategies must vary from farm to farm because of their diverse range of geography, size, financial circumstances and management skills.

Any program that attempts to bring about change means must have at least three fundamental requirements for its successful implementation. These are that it:

1. have direct industry involvement and leadership
2. have a clearly identifiable, specific driving force
3. be approached in a gradual, staged manner.

The first draft of the Manual was developed from a list of 'potential' best practices, which were culled from an extensive review of current literature (primarily existing industry publications, related guidelines, government reports, research papers and the research carried out by the joint research program). A workshop involving a range of interested parties, including cotton growers, researchers, regulatory agencies and community representatives, helped refine the list of potential best practices and also enabled the perspective of a range of stakeholders to be taken into account.

The best management practices ("BMP's") contained in the first draft were based on the philosophies of:

- minimising the amount of pesticide applied;
- minimising the amount of pesticide transported off farm; and
- minimising the impact of a pesticide if it does leave the target area,

and were divided into three chapters covering Farm Design and Management, Integrated Pest Management, and Application of Pesticides.

Prior to being sent for comment to all cotton growers, the first draft was reviewed by a small technical panel, consisting of people with a range of expertise and perspectives. The draft was also sent to other interested for comment.

Structure of Manual

The Manual has adapted a successful concept developed in the United States, and utilised extremely effectively in Ontario, Canada. The core of the Manual is a series of self-assessment worksheets, which enable growers to assess and document their own operation, based on the best practice guidelines and against a series of risk rated examples. These worksheets then lead to the development of action plans designed to minimise the risk in areas highlighted as being of high risk during the self-assessment process.

However, self-assessment sheets can't hope to be comprehensive, and aim to only highlight the most critical issues. For growers who want to take the development of best practices further, there is a process of hazard analysis described, which allows growers to identify in detail issues for their own farm.

Self-Assessment Worksheets

The initial stage of the Manual leads the grower through a series of self-assessment worksheets, which are grouped under four main headings: farm design and management, pesticide application, integrated pest management and pesticide storage and handling. Issues relevant to each heading and relating to the risks associated with the use of pesticides are highlighted on the self-assessment.

Each of these self-assessment worksheets is designed to allow the cotton grower to assess and rank the potential risks on their farm relating to the use of pesticides. These risk-rankings are then used to identify high priority areas for the development of action plans that will help minimise that risk.

The rankings go from low to moderate to high to extreme (from 1 to 4), and are designed to provide an indication of the relative risk that may result from an activity in the given circumstances. Thus a ranking of 1 for a particular issue means that that issue poses a relatively low risk; rank 2 could be a moderate risk; rank 3 a high risk and rank 4 a more extreme risk.

Rankings of 3 to 4 mean a higher level of risk, and any issue which attracts these rankings are prioritised for the development of action plans to reduce the degree of risk.

Hazard Analysis

Although the self-assessment worksheets address a number of important issues relating to pesticide use in the cotton industry, they are by no means complete or exhaustive due to the broad complexity of the farms, operating conditions and practices existing in an industry as diverse and sophisticated as cotton.

Thus a framework which will assist cotton growers to identify all the critical issues they face on their own farm, leading to the development of a more comprehensive farm plan (in effect a farm specific set of best management practices) has also been included in the Manual. This framework takes the form of hazard identification and is designed to break down the task of establishing farm specific best practices into a series of steps which are manageable.

The starting point is to list the activities that occur on a cotton farm and then identify the hazards associated with these activities and for which best management practices will be developed and applied. Rather than provide a prescriptive set of practices users are guided to develop their own best management practices and check these against established standards (included in the Manual). This process alerts people to the key issues and the potential problems while allowing them to develop a set of practices with accompanying monitoring systems that suit their specific circumstances and operations.

Planning

The key to success in using the Manual is in developing action plans for those areas or issues identified as posing a significant risk.

Once the self-assessment sheets (and the hazard analysis if applicable) have been completed, those areas requiring attention have been identified and ranked. The solutions chosen for the identified risk areas are documented, as are the monitoring and review processes implemented to

evaluate the effectiveness of the plans, together with the person responsible for seeing the plan is implemented.

Supporting documentation, which provides some guidelines or management options for the development of action plans, is included in the form of "Best Practice" booklets. Further resources to assist cotton growers in their planning process are also listed under each self-assessment heading, including other published material and relevant legislation.

The Manual provides a flexible framework for cotton growers. It recognises that cotton farming takes place under a wide range of environmental, commercial and social conditions. These varying conditions may place differing constraints on a cotton grower. By using a planning framework, cotton growers are able to identify any particular constraints that they may be operating under, and then plan the most appropriate method for them of overcoming that constraint.

By using the Manual, cotton growers will be developing practical farm plans that minimise any impacts of cotton farming on the environment, as well as demonstrating their commitment to responsible resource management.

The Manual therefore has two distinct components, one addressing the best management practice guidelines, while the second is directed at providing cotton growers with a framework they can use to document and plan the environmental aspects of their farming operation. In fact, BMP could just as easily stand for best management planning.

This planning framework aims to provide a flexible process that will address the need to manage the natural resource base, and also meet producer's need. It enables the user to

- objectively assess their current situation
- document decisions made to improve situations identified as being a potential risk
- monitor the effectiveness of those decisions.

A generic document will always have limitations—if there are say 1200 cotton farms, then there are probably well over 1000 variations to be taken into account regarding how to manage that operation environmentally. By focusing on grower developed action plans, based on a process which highlights the critical issues to be addressed, solutions are founded on a combination of common sense, sound science, economics and site specific management. Accordingly, the adoption of best practices is substantially improved.

Implementation

Implementation of the Manual is conducted by Cotton Australia through its Growers Services Managers, who are based throughout the industry. Specific meetings and workshops are organised through the local cotton grower associations, (the active involvement of growers at a local level is essential for the success of the Manual), and assistance is provided by other local cotton industry personnel including the local cotton extension officers, where appropriate. Centralised coordination and support for these activities is also provided.

The brief description of the process is as follows:

1. Cotton growers are made aware that the Manual is available. This is being done through the various industry publications and communications streams from the local grower association, as well as relevant media publications (eg the Australian Cotton Grower).
2. Generally, an introductory meeting is held, where the Manuals are distributed (together with a short "How to Use" guide, and a brief introduction to its development and content is given.
3. Once growers have received the Manual, a training day is organised where they are shown how to compete the Manual.
4. Once the cotton grower has completed the Manual, a follow up meeting is organised with the grower to ensure he has completed the relevant parts of the Manual.

A BMP Management Committee (operating underneath the Australian Cotton Industry Council) has been established to oversee the development of the implementation process, as well as being responsible for ensuring that the day-to-day work is being performed. The BMP Management Committee has representatives from the Australian Cotton Growers Research Association, Cotton Australia, Cotton Research & Development Corporation, the Australian Cotton Co-operative Research Centre and Cotton Consultants Australia.

Development Plans

The Manual is currently being reviewed, with the draft for comment due by the end of May this year. Issues to be included in the revised Manual are a dryland specific section, an upgraded pesticide storage and handling module, and a module on farm hygiene for disease and weed management.

Other issues highlighted for potential development include occupational health & safety, water management, and potentially, to be a recognised industry code of practice.

BMP Goals

The industry has set the following goals for cotton grower adoption of BMP:

June 1999	60% trained in BMP	30% implementing BMP
June 2000	80% trained in BMP	60% implementing BMP
June 2001	100% trained in BMP	100% implementing BMP

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Environmental Management Systems in Australia; Early Steps in the Grains Industry.

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Introduction

Environmental Management Systems (EMS) and ISO 14000 are becoming commonly used words in Australian agriculture, although as yet there are no widespread schemes in use. There are several farmer groups in both the eastern states and in Western Australia working on pilot projects developing an EMS for the grains industry. In this paper we summarise our progress after one year of working in partnership with a group of farmers in the Riverina region of southern N.S.W.

Australia in brief

Before describing the approach of our group, we would like to put the Australian grains industry in some context to help assess the likelihood of farmers voluntarily embracing whichever EMS might result from current work:

- Australia exports grain to a number of international markets, some of which are becoming increasingly concerned about the environment while others are currently unconcerned. In the short term there is not likely to be a price premium for grains produced in an environmentally acceptable manner, as has been found in other countries for broadacre agricultural produce.
- Australian farmers are amongst the most efficient in the world and, unlike U.S. and European counterparts, must operate with very few subsidies. Given our low population and large land area, this is likely to continue.
- In 200 years of European settlement, Australia has generated some large environmental problems. Amongst the most notable is land salinisation (Anon 1999b, Lovering *et al.* 1998). Australia also has the dubious honour of the highest species extinction rate of mammals in the world (Young *et al.* 1996).
- Australia wide grain productivity has increased by 4.6%/year from 1977-94 (Knopke *et al.* 1995), despite emergent land degradation problems.
- Australia currently does not produce genetically modified (GM) grain (canola is being trialed experimentally) and this currently offers us a competitive advantage in some markets. There is vigorous debate within both the urban and rural community about this issue, and regardless of whether Australia eventually produces GM grain, there is a demand for improved product labelling.

- Australia's population density is low (<3 people/km 2, ABS 2000) compared with the U.S.A and the European Union (28 and 118 people/km 2, respectively, EU 2000, US Almanac 2000).
- As in many developed countries, Australia's rural population is declining. In 1911 43% of the population was rural, compared with 14% now. Currently 84% of the population live in 1% of the land area, mainly on the southern coastline (ABS 2000). Many urban Australians still have little knowledge of the environmental problems in rural Australia. Given the above two points, the short-term pressure on the grains industry to develop an EMS from a domestic perspective is likely to be lower than in the U.S.A. or Europe.
- There is no financial assistance for farmers to adopt EMS.
- There are some regressive policies in Australia, which do not send appropriate environmental signals to farmers. There are also no markets for ecosystem services, such as agriculture supplying clean water in addition to food products. There is increasing policy debate on the environment (Anon. 1999a).
- Compared with grain production in many parts of Europe and the U.S.A., fertiliser and pesticide inputs used for grain production are relatively low. If the final form of the Australian EMS mainly concentrates on on-farm issues (as do current European and North American schemes), rather than wider ecosystem impacts, we could potentially market 'clean and green' grain successfully.

Developing a pilot EMS in the Riverina, southern New South Wales

The grains industry (through the Grains Research and Development Corporation, a statutory grower body to which all producers contribute a compulsory levy on grain production) has funded three research projects covering five farmer groups in both eastern and Western Australia. There are also other current pilot EMS projects within several industries and using other sources of funding, mainly from the public sector.

The philosophy of the project is for farmers to actively participate in developing an Australian EMS which will assist them in making better decisions about the effect of farm management on the environment and which may also pre-empt future market restrictions. The EMS we are working towards will be able to be adapted to meet international requirements as well as being complimentary to Quality Assurance programs already developed for the crop and livestock industries in Australia.

Our approach is initially to develop an environmental farm planning approach, with a move towards incorporating the systems elements contained within a formalised EMS. This approach, as has been found in the Australian cotton industry, UK LEAF, US Farm*A*Sys and Canadian EFP schemes, is more likely to be successful with farmers than attempting the process of EMS initially. We have not set out to deliberately model our work towards EMS on an existing scheme and have not formed alliances with other organisations such as agribusiness that could be perceived as having strong vested interests. We have not insisted that third party auditing is essential, although our self assessment and monitoring approach is compatible with auditing should farmers choose this avenue. To provide such restrictions could have resulted in lowered commitment to the project and/or may not have met farmers' learning needs about environmental problems. External auditing is expensive.

We are working with 17 farmers who volunteered in response to a public invitation to participate in the project. Our project covers a geographic area of approximately 100 km x 40 km (latitude 35°S, longitude 146°E) in the southern Riverina region of N.S.W. The rainfall is winter dominant and summers are relatively hot and dry. Average annual rainfall is 450-500 mm/year. This area contains highly productive agricultural land, some of which will be threatened by salinity in coming decades. The area has important conservation values and contains some large, high-quality remnants of native vegetation on private land. Many farmers have a strong conservation ethic but are constrained by market economics. Some of the degradation problems (such as salinity and nature conservation) transcend farm boundaries, whilst others have the greatest immediate effect on the individual landholder (such as soil loss and soil acidification). For these reasons the area is an interesting one in which to develop a pilot EMS.

The typical farm size is approximately 1,000 ha (range 400-6000 ha) and all farms are family operations. Cropping intensity is variable, commonly 50-60% of land is under crop and 40-50% under pasture (mainly wool sheep production) at any particular time. Almost all farms are dryland (non-irrigated). Winter crops are grown, commonly wheat, canola, barley or triticale in rotations with legume-based pastures. The most common legume is subterranean clover (an annual species) but increasingly the perennial legume alfalfa is also being grown. The nitrogen from 3-5 years of pasture commonly supplies N for two crops, with fertiliser N being used increasingly thereafter as needed.

Once we decided upon the geographic area, we mailed invitations to all farmers in the district (approximately 250) inviting them to participate in the research project. Seventeen farmers expressed interest and now participate regularly. The reasons for farmers wishing to join the group have ranged from:

- Concern about rising groundwater and salinity (water imbalance of dryland farming and effects of adjacent irrigation areas), soil acidification, soil erosion and herbicide resistant weeds.
- Strong concern for grandchildren being able to still farm.
- Concern about the impacts of intensifying agricultural production on remnant ecosystems and threatened native species.
- The wish to increase farm management skills.
- Wanting to learn more about agriculture's impacts on the environment.
- Interest in developing local brand and eco-labelling, given the area's relatively high environmental values.

To date we have discussed the experiences and features of several existing farm planning schemes including LEAF in the UK, Farm*A*Sys in the USA, the Ontario Environmental Farm Plan, and the best management practice approach used by the Australian cotton industry. We have also introduced farmers to what ISO 14000 means. Having worked through a number of issues we have now developed a draft self-assessment questionnaire and are currently developing monitoring tools for farmers to assess their environmental performance. Because some of our environmental issues (dryland salinity and remnant ecosystems in particular) extend well beyond the farm boundary, we also wish to develop a 'Local Action Plan' for the wider community, based initially on a successful model developed in the Coorong area of South Australia.

Experiences to date

It is only very early in our project (one year) but our experiences so far include:

- Although we mailed all farmers in the district, participants generally have higher levels of management skill and motivation than many 'average' farmers do.
- Farmers have not been exposed to structured environmental farm planning or EMS before and we are all still learning about what such systems might mean to the way people farm.
- There is a wide variety in the expectations from environmental farm planning, EMS and what farmers will learn from the project. Farmer involvement is motivated by a want to learn about the impact of agriculture on the environment rather than the specific process of developing an EMS.
- As has been the case with LEAF, there is understandable reluctance for farmers to adopt an externally audited EMS. Initially, record keeping may have to be improved before this would be possible. A direct move to ISO 14000 would not have worked well.
- The international farm planning schemes do not cover some environmental issues well enough for Australia (dryland salinity, water use efficiency, pasture management and remnant ecosystems being several examples). We hope our work will provide tools that will improve the skills of farmers in these areas and provide better self-assessment guidelines than those currently available.
- Our farmers have come up with a new scoring system for the self assessment questionnaire which they believe will work much better than the 'yes/no' used in LEAF or the 1-4 scoring system used in Farm*A*Sys. Single statements are used and farmers rank their answer from 1 (definitely no, or I do not use this management practice) to 5 (yes, I fully meet this statement). Farmers thought that the 'yes/no' approach was too 'black and white', and that the 1-4 scoring system did not always cover their management choices sufficiently well. The 1-5 scoring system allows farmers to answer questions rapidly.
- The monitoring tools will be a combination of calculation, measurement and observation skills. Given the importance of dryland salinity and water use in agricultural systems, we are initially focussing on developing tools to assess the frequency of deep drainage risk, the perenniality of farming systems and water use efficiency of the cropping enterprise.

Early conclusions

It is too early to make many conclusions about the direction of development of an EMS for the Australian grains industry. However, several likely ones might be:

- Overseas experience indicates that EMS schemes are only likely to be adopted widely if they have strong ownership by farmers and/or there are financial incentives to do so. As there are no financial incentives in Australia (either through governments to encourage adoption of EMS or through price premiums on grain) EMS is not likely to be widely adopted by farmers. There would only be limited adoption by farmers who can find niche markets, are altruistic and/or who see enough benefit from the increased farm management skills learnt from adopting EMS. These problems raise issues of how to achieve widespread ownership from farmers (beyond the pilot participants) and developing rewards or penalties for environmental management.
- Despite the interest that ISO 14000 is generating amongst scientists and bureaucrats, there is little likelihood that EMS will be adopted by many without financial incentives (or penalties).

- There is potential that an EMS based on continuous improvement (but not specifying acceptable so called environmental performance standards) could be used more to gain a marketing advantage rather than as a true commitment to environmental management.
- Development of appropriate government policy that sends better environmental market signals to farmers is as important as developing on-farm EMS.
- It is too early to say whether our work towards developing an EMS will have a lasting impact on the environmental management of participating farmers, but we are optimistic.
- We are a long way off credible eco-labelling in the grains industry.
- The process of co-learning and action research, rather than being led through a learning cycle in an organised and sequential way, has irritated some farmers, whilst others are enjoying the approach.

Acknowledgments

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Environmental Partnerships, EMS and Sustainable Agriculture*

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To achieve outstanding triple bottom line performance, new types of economic, social and environmental partnership are needed. Long-standing enemies must shift from mutual subversion to new forms of symbiosis. The resulting partnerships will help each partner perform traditional tasks more efficiently, while providing a platform from which to reach towards goals that none of the partners could hope to achieve on their own. i

Introduction

At the beginning of the 1990s, the idea of environmental partnerships was almost unknown. Relationships between business and non-governmental organisations (NGOs) were largely adversarial, and little attention was given to the prospect of constructive engagement between them. Relationships between business and government regulators, while sometimes less strained, were rarely based on the establishment of mutual trust, and the pursuit of "win-win" solutions.

Four things changed during the 1990s. First, many NGOs recognised that conflict and confrontation are not necessarily the best means of achieving the best environmental results. Second, governments and policy-makers increasingly lost faith in conventional forms of direct regulation (commonly referred to as "command and control"). Third, (and closely related to the last point above) there was a winding back of the regulatory state. Finally, and crucially, increasing number of business enterprises were influenced by the "greengold" thesis: the view that improving corporate environmental performance can be a net gain rather than a net loss. On this view, improved environmental performance has the potential to improve economic efficiency and business image, and generate new product and environment technology markets.

All this has created fertile ground for the development of more constructive relationships between major stakeholders, and in particular between government, business and environmental NGOs. These relationships will not necessarily be confined to agreements between business and NGOs, or between governments and business, but more broadly may embrace governments, NGOs, business *and* a range of other third parties, who, as we will see, held out the promise of acting as surrogate regulators and performing many of the functions that government regulation was no longer ready, willing and able to fulfil.

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The result is that, at the end of the 1990s, (notwithstanding the numerical domination of conventional regulatory approaches) there are numerous examples of environmental partnership approaches across a wide variety of countries and continents. A recent search of the US Department of Agriculture's website revealed over seven thousand references to such partnerships (broadly defined)! Successful partnerships include the Netherlands "environmental covenants" approach, the United States Environment Protection Agency's (EPA) "Partners for the Environment" program, and in Australia, Landcare and the Greenhouse Challenge Program.

Although many of the "first generation" of environmental partnerships were developed in the war-torn arena of industrial pollution, they have since evolved in a variety of other environmental contexts. Of these, none is more important than that of agricultural production, an area which faces a wide range of serious environmental challenges, including loss of biological diversity, loss of natural habitats, pollution of off-farm ecosystems, and on-farm pollution occasioning loss of productivity. Closely related are the risks to human health posed by direct or indirect exposure to agricultural chemicals. Yet notwithstanding the severity of the environmental problems confronting agriculture, and their potentially disastrous long term implications, in the past only a very limited number of policy instruments have been employed to address these problems and most of these (as we have documented elsewhere ii) have achieved only a very limited degree of success.

In contrast, the early evidence concerning environmental partnerships for sustainable agriculture, suggests that some partnerships at least, may achieve far more than the status quo. For example, Lori Ann Thrupp's exploration of nine collaborative sustainable agriculture initiatives focussed on the implementation of ecologically oriented integrated pest management, demonstrated very considerable improvements from this approach.iii All nine projects, in very different countries and cultures, significantly: reduced agricultural inputs and costs, as well as health risks; regulated pests and diseases to acceptable levels; maintained or increased yields; contributing to productivity and food security; increased "health" of the farming system (eg soil quality and resilience) and spread the benefits widely and empowered communities.

Yet despite the potential policy significance of environmental partnerships, our knowledge of, what works and what doesn't work, and or how best to design environmental partnerships, both as free standing arrangements, and more importantly, in combination with complementary policy instruments, remains very limited. The jury is still very much out on these questions. And much of the evidence that is in, (which relates mainly to the industrial sector and to the "first generation" of environmental partnerships), suggests that many of these may be seriously under-performing.

To summarise, the challenge of sustainable agriculture is not only one of the most important issues confronting humankind, but also one desperately in need of more imaginative, constructive and above all, successful, policy instruments. The central question for this paper is whether, to what extent, and in what circumstances, environmental partnerships in agriculture have these qualities. When, where and how can such environmental partnerships be used to achieve solutions which, at the very least, move us closer to the ultimate goal of sustainable agriculture? And what role should environmental management systems play in achieving successful partnerships? Until we have a much clearing understanding of how, why, and in what circumstances some partnerships apparently succeed, whilst others demonstrably fail, and how and when to use management systems to optimise performance, we will not be in a position to determine the most effective structure and application of future partnership arrangements.

The remainder of the paper consists of four sections. First, we define more precisely what we mean by environmental partnerships. Second, we examine the particular benefits of partnerships as a strategy to achieve sustainable agriculture. Third, and crucially, we explore the circumstances under which environmental partnerships are most likely to be successful in achieving both economic and

environmental goals. Here we envisage a central role for environmental management systems, including ISO 14001, and we examine at length, the contribution of EMS to successful partnerships and the value of ISO 14001 in particular. Finally, since successful partnerships will commonly not evolve spontaneously, we consider the role of government in encouraging, facilitating and developing such partnerships: a role which involves, in Osborne and Graebler's terms: "steering the boat rather than rowing it", and integrating partnerships with environmental management systems.

What are environmental partnerships?

There is no formal or objectively correct definition of environmental partnerships. The term is increasingly used to apply not just to a range of circumstances in which various combinations of business, government and/or other third parties enter into specific understandings with each other but also to include a regulatory philosophy under which inspectorates work cooperatively with industry rather than seeking unilaterally to impose minimum standards upon them, and even to encapsulate a more facilitative way of "doing business" with other stakeholders. Indeed, so popular has the term become that it is in danger of losing all meaning, and simply becoming a "catch-all" phrase embracing all voluntary or cooperative approaches towards environmental policy. Given these difficulties, we have adopted the following provisional definition:

> An environmental partnership is a cooperative agreement between, on the one hand, business, and, on the other hand, one or more second parties (government) and/or third parties (eg NGOs or commercial entities), whereby business voluntarily undertakes to achieve certain environmental improvements in exchange for some benefit provided by one or more of the other partnership participants.

There are three key components to this definition. First, there are the notions of "partnership" and "cooperation". A dictionary definition of partnership involves "players being on the same side or team". In this context, "partnership" implies that all participants agree to "cooperate" in contributing to the success of the program. This is a recognition that partnerships involve participants working together in a mutually supportive manner. That is, partnerships are a two way street, with reciprocal rights and responsibilities.

Second, there is the stipulation of "voluntary participation". Compulsion could never achieve the cooperation which is inherent in the concept of "partnerships", nor could it ensure that participants continue to strive for continuous improvement, or to foster cultural change such that participants integrate environmental sensibilities into their core business practices. In all these circumstances, volunteers perform immeasurably better than conscripts. In practice, however, it may be that some subtle forms of persuasion (bordering on coercion) are applied from a variety of quarters. For example, industry associations may apply pressure to their members to join; governments may threaten to apply harsher, more draconian regulatory standards; and NGOs may employ publicity campaigns. But how individual enterprises choose to respond to these outside pressures is very much up to them, and the agreements and partnerships they shape remain, in essence, voluntary.

Third, is the "exchange" of "benefits". This simply refers to a range of potential contributions from one group of participants which may induce participation from another group. For example, a producer may enjoy the use of a green label, conferred by an environmental NGO, in exchange for ensuring that certain mutually agreed environmental benchmarks are met. Or an industry group may negotiate an agreement on behalf of their members undertaking to provide improved environmental performance in exchange for various benefits and incentives provided by government.

Environmental partnerships in practice

Environmental partnerships may take many different forms. For example, "industry participation" may be individual or collective. Individual participation might involve several variations. For example, an umbrella partnership could be negotiated and implemented through an industry association, but participating companies could be left to establish individual targets. Or there may be a very broad partnership program which encompasses both individual companies and collective associations. And the agreement itself may also vary widely and take on many different features. For example, some may contain specific undertakings, whilst others may be largely devoid of such details. Then there is the question of whether agreements are legally binding. Many will be "binding in honour only" but some participants may wish to encapsulate their agreements into legally binding contracts. The form of an partnership will therefore likely depend on the particular structure and circumstances of the relevant industry sector and particularities of the environmental issue at hand.

Another reason why partnerships vary so widely is the diverse range of participants who might potentially be involved in such partnerships. These include: individual companies; a collective arrangement of companies, including industry associations; government (federal, state and/or regional); quasi government bodies (such as standard setting bodies and universities); retailers, wholesalers and consumers; and community organisations, including environmental and other public interest groups. There are also a very substantial number of possible partnership combinations, involving not only many possible permutations of bipartite partnerships, but also tripartite (or even multipartite) combinations.

It would not practical or particularly illuminating to describe in detail all the possible types of environmental partnership combinations. Instead, we provide an illustrative sample of some of the most common partnerships forms and combinations as a precursor to asking the key policy question: how, and in what circumstances do environmental partnerships work best?

Mothers and Others and Northeast Apple Farmers

This is a partnership between a non-profit consumer advocacy and environmental group, Mothers and Others, and the "apple farmers in the Northeast region to create a supportive market environment for farm products that are locally grown and ecologically responsible." In order for apple grower to gain access to an eco-label for their produce, that is "Core Values Northeast", they must conform to integrated fruit production practices. This includes a commitment to: train farm managers in environmental and safety practices; develop best practice methods for "site, rootstocks, cultivar and planting system for new orchards"; minimise groundwater pollution, especially of nitrates; use mechanical methods to minimise weeds over herbicides; minimise spray drift; and allow at least one scheduled visit by representatives of the partnership program to educate growers about environmentally preferred practices. In addition, participating growers must agree to keep detailed records of their practices which must be made available to upon request to a third party inspector.

The Food Alliance

This is a "non-profit organisation dedicated to promoting sustainable agriculture". It is made up of a collective partnership of farmers, consumers, scientists, grocers, processors, distributors, farm workers and environmentalists. According to The Food Alliance, sustainable agriculture is defined as "a farming system that emphasizes using alternatives to pesticides, protection soil and water, and caring for the health and wellbeing of farm workers". In response to an national survey of consumer preferences which found widespread support for produce from sustainable agriculture, which they commissioned, The Food Alliance established a sustainable agriculture recognition program. In essence, The Food Alliance acts as an independent third party to "endorse farms that meet our strict requirements". If they pass this test, then farmers may use The Food Alliance "seal" on their products.

Pesticide Environmental Stewardship Program

The United States Department of Agriculture and EPA have introduced the Pesticide Environmental Stewardship Program with the aim of having 75% of agriculture land in the United States operating under Integrated Pest Management by the year 2000. The program is based on voluntary participation, and all organisations that commit to pesticide reduction are eligible to join either as "Partners" or "Supporters". Partners are essentially organisations that use pesticides, and they agree to develop and implement formal pesticide reduction strategies, and to define and report on these strategies to the EPA on a regular basis. In return, partners receive technical assistance, seed money and public recognition.. Supporters are organisations that do not directly use pesticides, but who have considerable influence of the those who do. This includes principally purchasers of agricultural produce such as food processors and retailers, but may also include public interest groups. Supporters agree to promote pesticide reduction programs.

Landcare

Undoubtedly, the most prominent example of environmental partnerships in the Australian agricultural context is Landcare. In the present context, three particular partnership characteristics of Landcare should be emphasised.. First, at its genesis, Landcare was a partnership between the agricultural industry and an NGO: the NFF and the ACF jointly promoted the idea and subsequently obtained Commonwealth support and funding. Second, Commonwealth, State and Territory governments all play a cooperate role in the preparation of Landcare plans. Third, and most importantly, individual Landcare plans are developed and implemented at the local community level via partnerships between landholders, community groups, NGOs and local governments. In the past decade, the number of voluntary Landcare groups has expanded rapidly, and is now approaching 5000 across the country.

Creating successful environmental partnerships

Notwithstanding the almost exponential growth of environmental partnerships, very little systematic evaluation has been conducted as to what sorts of partnerships succeed and in what sorts of circumstances. In part, this may be because many partnerships have only recently been introduced, and it is too early to judge their success. It may also be that the diverse and disparate nature of environmental partnerships has worked against comparative analysis. Nevertheless, it is incumbent upon us, to the extent possible, to describe the relevant factors behind the success or otherwise of their operation. In so doing, we focus on those internal and external conditions which are most likely to generate a fertile environment within which partnerships can grow and prosper.

(i) A high coincidence between public and private profit

Partnerships have the greatest chance of success if they are accompanied by corresponding gains in productivity and profitability. For example, more effective and selective use of pesticides may reduce inputs costs. This is commonly referred to as "win-win": a "win" for the environment, and a "win" for productivity and profitability. In these circumstances, both of the main partners (industry and the one hand and NGOs/government on the other) are likely achieve the benefits they want from the arrangement. This does not preclude the possibility of successful partnerships in win-lose scenarios, but it certainly makes it that much harder (for example, under the 33/50 partnership in the United States, many companies agreed to reduce the release of toxic chemicals, and bore the associated costs).

(ii) Exposure to green markets

A prominent feature of a substantial number of the most successful environmental partnerships is that they involve an industry partner whose products seek to compete on green markets. In the Northeast region of the United States, for example, consumers have a strong preference for apples and pears with

minimal pesticide residues. Consequently, orchard growers participating in the Mothers and Others partnership program have a strong incentive to make their environmental partnership work. Green markets are not necessarily limited to the preferences of final consumers, with, for example, food processes in some cases favouring the purchase on low pesticide residue inputs, as is the case in the Wisconsin potato market (see below).

(iii) Companies which trade off their public image

Some companies and/or industries have high public profile which in turn is crucial to their commercial success. For example, large retailers, which deal directly with the public, are strongly motivated by pressures to maintain and enhance their corporate image. This may provide a strong incentive to highlight their green credentials, a process to which environmental partnerships are ideally suited to contribute. High public exposure may arise from a range of factors, including as mentioned above, direct dealings with the public, simply being a very large company with a high profile, and very sensitive environmental operations. This was the main factor behind the partnership of McDonalds and the Environmental Defence Fund in the United States.

(iv) Disparities in power along the supply chain

Where large commercial enterprises have a high degree of market control over both their upstream suppliers and downstream buyers, they may chose to exploit this power to influence their environmental behaviour. Their interest in doing so is primarily commercial: the risk of being tarnished by the poor environmental performance of ones close associates. If pressure is brought to bear in a highly coercive fashion it may not be considered a bone fide partnership. However, it some cases supply chain partners can play more positive mentoring role. For example, under Responsible Care, large chemical companies assist their suppliers to implement accredited environmental management systems.

(v) The burning deck: getting partnerships off the ground

It is rare for environmental partnerships to arise spontaneously. Individuals and groups are usually reluctant to let go of their traditional ways of doing things. They are only prepared to put energy and resources into developing a new partnerships, if they see a compelling need to do so. Usually, but not always, the impetus comes from some crisis or other external event, that is so compelling as to shake the players free from their customary behaviour: most of us are only prepared to jump when we are convinced the deck is burning. In the case of the Australian meat industry, for example, the rejection of Australian beef by the United States because of its too-high pesticide content, and the fear of losing export markets, was one such event. In the case of the American nuclear power industry it was the Three Mile Island partial meltdown, and in the case of the chemical industry, the Bhopal chemical explosion.

However, the best time to engage in environmental partnerships is before the crisis hits - because afterwards it may be too late to repair all the damage, and some commercial opportunities may have been lost forever. Once you sell tainted produce on an export market, it is very hard to recover either your reputation or the market. That is, the best time to form environmental partnerships is when there are commercial opportunities both to protect the environment and to improve the bottom line, where both partners will benefit from the arrangement, and prior to the irreversible damage often associated with a crisis. But what will give farmers and rural industry the impetus to take that first step? Here, perceptions are as important as reality, and what is crucial is persuading rural industry in particular, to change its spots. We address this issue further below under "implications for government".

(vi) Leveraging commercial third parties

Retailers, wholesalers or indeed any large commercial buyer, may initiate the formation of environmental partnerships. The opportunity for this role arises generally out of their dominant market position, and their strategically important position between upstream suppliers and final consumers. For example, in Australia, supermarket retailing is dominated by two national chains, which includes a the majority share of fresh fruit and vegetable sales. This provides them with considerable influence over their suppliers, in this case, market gardeners. Apart from the potential to apply coercive pressure over their suppliers, larger retailers are equally in position to provide assistance and technical expertise to upstream suppliers in order for them to improve environmental performance. In this way, they may be in an ideal position to sponsor the formation of environmental partnerships. The key question is whether they will see a commercial advantage in doing so. Here NGOs can play a crucial role in exerting pressure, and persuading them that this is indeed the case. Greenpeace, for example, has been highly successful in sensitising European consumers to unsustainable forestry practices and the logging of old growth forests, and out of this emerged (with the WWF initiative) the Forest Stewardship Council (FSC) and the role of "buyers groups" who have committed themselves to only buy certified FSC timber.

Key features of successful partnerships

While the circumstances identified above may be the most fertile in which partnerships can grow, experience suggests that they must also be structured in ways which maximise their chance of success. Here, a number of features can be identified as of particular importance.

(i) Environmental targets

Not all partnerships involve clearly defined targets, and some demonstrably successful partnerships have had much vaguer, aspirational goals. Landcare, for example, might appear to fit into the latter group. Many Canadian pollution prevention memoranda of understanding and some agreements negotiated in European countries also fall into this category. The case for such generalised agreements is often that concrete targets are impossible to achieve in the early stages and that it is better for both parties to feel their way, rather than resisting (and perhaps refusing to enter) an agreement which might commit them to non-attainable targets, or ones which, in retrospect, it is uneconomic to achieve. Far better, in these circumstances, to at least begin with good faith obligations of a general nature and an agreement to cooperate in broad terms to achieve them (or even to adopt broader, more qualitative goals). Indeed, in some circumstances, highly detailed and specific targets may actually handicap the evolution of environmental partnerships as environmental circumstances, and the technological ability of industry to adapt to these circumstances, change.

However, in the case of mature partnerships, and those capable of lending themselves to specific quantifiable targets, the adoption of such targets is highly desirable. Without them, there is the risk that the partnership may become vacuous, degenerate into "greenwash", and lose credibility. Since the essence of partnership is an exchange involving mutual gains, the absence of commitment by one partner to a particular target which the other regards as central, can threaten the entire basis of the partnership. In contrast, the establishment of negotiated targets in advance (perhaps in a memorandum of understanding signed by the partners) ensures that both sides have agreement and that a subsequent dispute will not arise from differing expectations. This also enhances credibility.

(ii) Accountability and transparency.

Those who are held accountable under the partnership agreement know they must explain and justify any questionable actions. This tends to both discipline and constrain decision-making. But how can accountability best be achieved? One of the principal mechanisms by which accountability can be fostered is transparency. Arguably the first step towards transparency is the public announcement of the principles and practices that the partners accept as a basis for evaluating and criticising their performance. When first promulgated these norms are often stated in very general terms, but can later be refined into detailed codes of management practice. The important point here is how a partner, by clarifying the standards it sets for itself, including performance indicators and implementation timetables, also provides more precisely defined measures for evaluating and criticising its performance. With increasing transparency, in short, accountability is more readily maintained.iv

The next critical step towards achieving transparency is the development of an information system for collecting data on the progress of implementing the partnership agreement. The process usually divides into two parts: reporting and data collection, and collation and analysis of data. Reporting requirements usually adopt some form of self-reporting. An obvious problem this raises is why would an enterprise report information fully or accurately if it reflects poorly on its performance. And what about enterprises that are unwilling or unable to respond fully to often cumbersome reporting requirements? This brings us to verification and monitoring.

(iii) Monitoring and Verification.

The third and final step in achieving transparency - monitoring performance - also seems to be the most demanding and controversial. What makes it so are several thorny questions: How will the monitoring be structured? How will it be financed? Who will do the monitoring? This prompts a more general question. In view of all the effort, resources, and controversy surrounding the creation and maintenance of a monitoring system, what might motivate an industry partner to take such a step? At least part of the answer is that claims made by an industry partner may lack credibility. And from this credibility gap follows the need for some kind of independent confirmation of the industry's claims, by checking their accuracy, by monitoring the actual performance of partner companies, and so on. In other words, the environmental improvement targets set under the partnership agreement may require the incorporation of a workable set of performance indicators. Again, these may take the form of quantifiable or qualitative measurements. In either case, it is arguably that they should be determined in advance of the scheme's operation, preferably in conjunction with the target setting process.

But monitoring alone will not necessarily overcome the credibility gap, if the industry partner is still measuring its own performance. Independent verification may also be necessary. This is often painful. Opponents of verification highlight the risk independent audits pose to business autonomy, the confidentiality of trade secrets, as well as the danger that verification results could make them increasingly vulnerable to regulators, environmentalists, and litigation. Yet, despite these and other concerns, the development of an independent verification capability is often of fundamental importance to the long term viability of the partnership. Only then are community groups, NGOs, or even government agencies who are not themselves partners, likely to be convinced of the value of the arrangement. Suppliers and other commercial third parties will also want reassurance which can be provided, at least in part, by subjecting the arrangements to outside scrutiny. Certainly the verification process could be conducted in-house (eg by an "arms-length" audit team) but the closer the verifier is to the industry partner, the lower the credibility of their findings. Thus third party audits provide far greater reassurance to environmental partners and outsiders than internal audits.

Environmental partnerships which include independent verification have a greater chance of success for two reasons. First, it builds in credibility and community/consumer confidence that the environmental claims are actually being delivered. This is important if industry intends to obtain a financial benefit from its environmental activities, even if this is not their primary motivation. For example, the consumers of environmentally preferred products require reassurance of the product's *bone fide*s. Independent verification is far more likely to provide this than in-house verification. Second, knowing that the results of the environmental improvement activities will be periodically subject to external assessment provides an ongoing incentive for companies to deliver on their commitments (which brings us back to accountability).

Partnerships and Environmental Management Systems

There is a striking similarity between the substantial majority of the factors identified above, as key features of successful partnerships, and the central ingredients of environmental management systems. Such systems follow a defined sequence of steps which provide a structure for planning, implementation, reviewing and revising a system to address those parts of an enterprise's operations that can have an impact on the environment. In the case of ISO 14001, the further aim is to provide an international standard and a common (global) approach to environmental management and the measurement of environmental performance.

To meet the ISO 14001 standard, an enterprise must have a coherent framework for setting and reviewing environmental objectives, for assigning responsibility to achieve these objectives, and for regularly measuring progress towards them. It must also have appropriate management structures, employee training, and a system for responding to and correcting problems as they occur or are discovered. This implies documentation control, management system auditing, operational control, control of records, management policies, statistical techniques and corrective and preventive action.

However, while identifying environmental targets, performance monitoring, measuring and verification are all central to ISO 14001, third party audits and transparency (also identified above as key features of environmental partnerships) are not. These omissions have resulted in substantial criticism of the standard by NGOs and may well be addressed in the currently contemplated revisions of the standard. However there is nothing in ISO 14001 that precludes greater transparency and third party verification and these elements can readily be incorporated by those who wish to do so. External pressures (eg public opinion or pressure from trading partners) rather than ISO itself, will determine whether enterprises opt for such transparency of verification. If the experience of the quality standard ISO 9000 is repeated, then supply-chain pressure (as large companies, and multi-nationals in particular, require their suppliers to enter into contractual agreements committing themselves to and become certified to the standard) may prove the most important determinant of companies seeking external certification, while NGO and community pressure may lead to greater transparency.

*To summaris*e: there are a number of key features of successful partnerships. Environmental management systems (including but not necessarily) ISO 14001, incorporate, or could readily incorporate, almost all of these features. So are environmental management systems a valuable vehicle for delivering the environmental and economic objectives of environmental partnerships? Absolutely!

Certainly they are not the only means of achieving improvements, but there is considerable evidence that EMSs can provide a powerful management tool, capable of enhancing an organisation's ability to attain, measure and monitor improvements, of delivering on its commitments (for example under a partnership) and of achieving substantially improved environmental performance.v If effectively implemented, such systems are capable of reducing environmental impact, delivering cost savings, improving operational

efficiency and opening up new markets.vi They also provide an objective basis for verifying a company's claims about its performance: a crucial consideration in international trade. Moreover, demonstrated adherence to ISO 14001 may also bring about improved community relations (insofar as information generated by ISO 14001 may be informative to local communities and enabling them to better judge the performance of ISO certified companies vii) and improved risk management. Notwithstanding the risks of implementation failure and the limitations of ISO 14001 viii , on balance there are very considerable attractions in the adoption of an EMS as an integral part of many partnerships.

For present purposes, three additional benefits of adopting an EMS, and perhaps ISO in particular, should be mentioned. First, ISO 14001 may become important, indeed essential as a vehicle for facilitating trade and removing trade barriers.ix This can be most readily illustrated by the behaviour of some of our Asian neighbours (and competitors). In Japan, exporters have responded by embracing ISO 14001 as the key to competitive global positioning. As one writer pointed out:

> Japanese exporters, caught out when the ISO 9000 quality standards were introduced in Europe ten years ago, were determined to lead the world in adopting the ISO 14001 environmental standard to ensure they would not be disadvantaged in important export markets. In this they have succeeded -more than 1,000 Japanese sites have achieved certification so far.x

A number of other governments in the region apparently also believe that ISO 14001 will become a "ticket for admission to global markets for their exporting firms".xi Largely for this reason, the Taiwanese environmental agency is developing a five-year EMS promotion plan, the Indonesian environmental ministry views EMSs such as ISO 14001 as a means of supplementing weak and inconsistent enforcement of regulations, and the Ministry of Environment in South Korea is developing an Environmentally Friendly Companies initiative (with participants required to have an EMS and a number of other ingredients consistent with "ISO 14001 Plus").xii

In contrast to the enthusiasm with which ISO 14001 has been greeted by a number of Asian countries, in Australia, take up of the standard - at least at certification level - has been described as "sluggish". Two years after the introduction of ISO 14001 only an estimated 130 company certifications had taken place.xiii Only very slowly are Australian enterprises recognising the core role that environmental management systems can play in reassuring overseas customers of the enterprise's environmental credentials, and in enabling them to meet the increasingly stringent environmental expectations of international customers. Put differently, those who cannot demonstrate a commitment to sustainable environmental management may be excluded from some international markets by non-tariff trade barriers based on environmental issues.

A second potential benefit of adopting an EMS (though not necessarily ISO 14001) might be that of obtaining regulatory flexibility. If firms are given incentives by government to adopt a management systems approach (eg less frequent inspections, reduced licence fees, more flexibility in how they discharge regulatory responsibilities), then they will be facilitated in going "beyond compliance" with existing regulatory requirements. Victoria and Western Australia have already begun to adopt precisely this approach in introducing "accredited licenses" and "best practice" licenses respectively. Both of these initiatives offer regulatory flexibility to firms which commit themselves to a series of measures including an EMS, meeting specified minimum criteria, a regular environmental audit, community dialogue and transparency.xiv

A third benefit may be in terms of satisfying the demands of others in the supply chain. For example, an important impact of the Japanese push for ISO certification will be through supply chain pressure, as many ISO certified companies have adopted ISO related procurement policies and plan to issue environmental guidelines to their suppliers, insisting that they too, perform to ISO related standards.

Elsewhere, the British retailer B&Q is requiring its suppliers to have an environmental policy backed by an audit, and the Body Shop has a supplier accreditation program with ratings of zero to five stars. Supply chain pressure is growing and ISO 14001 certification may increasingly become a key means of satisfying the environmental requirements of supply-chain partners. Agriculture is unlikely to be exempt from this development.

A case study: the Wisconsin Potato IPM Project

Many of the points made in the preceding sections can be graphically illustrated though the example of the Wisconsin Potato farmers' journey towards Integrated Pest Management (IPM).[xv] For some years, the Wisconsin Potato and Vegetable Growers Association (WPVGA) has been concerned to reduce the use of broad-spectrum, high risk pesticides. There are a variety of reasons for this, some at least of which fit clearly within the "burning deck" scenario described earlier.

Economically, the Wisconsin potato industry has been under considerable economic threat, exacerbated by a substantial increases in pest management costs. By 1996 the Wisconsin potato growers did not recover production costs. There were also compelling reasons of health for reducing pesticide use: high levels of pesticide spraying are associated with serious health problems for rural community residents, farmers and their families. Finally, reducing pesticide use would improve the purity of the region's shallow ground water and enhance the quality of wildlife habitat and diversity of species sharing the agricultural landscape.[xvi]

IPM addressed all of these issues. Its particular attraction for the potato farmers is: "its capacity to expand profit margins by avoiding unnecessary pesticide applications and reducing pest pressure through a variety of means, some of which entail little or no cost".[xvii] Means of achieving this included cropping systems which enabled less pesticide use while still achieving acceptable levels of control, the success of border sprays or partial field applications, cultural practices that reduce Colorado beetle survival and movement from field to field, the introduction of an effective, affordable and safer insecticide for Colorado potato beetle control, and innovative applications of global positioning systems and precision farming techniques to identify variability in pest pressure, enabling spot sprays and more effectively timed applications to achieve maximum efficiency with minimum applied product. Located in terms of our previous discussion, smart use of IPM achieved win-win outcomes whereby both farmers (financially) and the environment, benefited. (Significantly, in areas such as plant disease control, where no win-win solutions were available, very little was achieved.)

(i) The Partnership with WWF

The Wisconsin Potato Project began not as a partnership but as an initiative solely by the potato growers, but as it matured, so the need for broader involvement and an environmental partnership became apparent. WPVGA did not need a partner to develop IMP but it did need some means of marketing the environmental advantages of low residue Wisconsin potatoes, and help in developing a premium market for environmentally friendly potatoes. Enter the World Wild Life Fund (WWF), an international and high profile environmental NGO whose panda logo and reputation could potentially provide considerable public relations, marketing and credibility advantages to WPVGA. In particular, the potato growers hoped the partnership with WWF would:

- Document progress in the adoption of bio-intensive IPM and reduction in reliance on high-risk pesticides.

- Quantify public health and environmental gains achieved as a result of industry-wide commitment to IPM.
- Gain recognition for Wisconsin potato products, especially in quality conscious markets.
- Support policy reform and public and private investments needed to enhance the effectiveness and lower the cost of bio-intensive IPM.xviii

For WWF, the partnership also held considerable attractions. For some time, WWF had been concerned to lessen reliance on pesticides and had identified IPM as the surest way to achieve this objective. Through the project WWF hoped to demonstrate:

- the value of setting measurable pesticide use, risk, and IPM adoption goals, and ways to do so;
- how monitoring and rewarding progress toward concrete goals can build the momentum needed to overcome technical and marketplace hurdles;
- a cooperative model for partnerships involving environmental and commodity groups committed to common goals; and
- analytical tools and policy innovations that will help achieve national IPM, food safety and environmental quality goals.xix

Ultimately the WPVGA hoped to use the WWF panda logo on their bags of potatoes, thereby gaining a marketing edge, and increasing consumer demand. What WWF offered- its "Gift to the Earth" award - did have public relations and marketing advantages for the potato growers, but not ones as substantial as they had hoped for.

(ii) The potential for a tripartite partnership: what happened to the regulators?

The Wisconsin Department of Natural Resources, the principal government regulator, has in recent times, developed considerable interest and expertise in developing alternatives to traditional forms of regulation. Unsurprisingly, it has taken a considerable interest in the potato growers initiative. However, no partnership has so far emerged, notwithstanding the potential for the regulator on the one side to offer the benefits, (both financial and public relations) of regulatory flexibility, in return for environmental improvements which the growers are already well on the way to achieving.

This is disappointing to the regulators. It can, however, be readily understood in terms of history: the regulators of the previous decades had demonstrated a rigid, uncompromising approach to regulation and (in the growers eyes) had demanded unnecessarily costly and unreasonable action. This memory lingers on, giving rise to mutual suspicion which at this stage at least, has not been fully overcome. One positive role of regulators in the potato growers initiative can however be identified: an additional driver of IPM was the fact that the EPA is moving towards the implementation of the Food Quality Protection Act (FQPA) which will require a more proactive approach to food quality issues. In this sense, the IPM Project can be seen, at least in part, as an initiative which took place at least in part, motivated by and "in the shadow of the law".

(iii) The role of commercial third parties: lenders as communicators and facilitators

The Central Wisconsin Farm Credit Service was a key player in the project, educating Farm Credit lenders and loan officers about the economic advantages of IPM to the industry and to individual growers. Initially, growers feared that they would lose loans from bankers fearful of potential crop losses from growers using less pesticides, and so the attitude of lenders was seen

as a potential barrier to the success of the project. Gradually however, this role was reversed and "lenders came to view IPM as a positive form of risk-taking".

(iv) How the project succeeded

Three tools underpinned the success of the project. First, *risk reduction goals* were set. Specifically, the WWF-WPVGA Memorandum of Understanding spells out preliminary pesticide use and risk reduction goals for crop seasons 1997, 1999 and 2001. Two criteria were agreed upon in terms of these goals. Pesticides defined as causing an acute risk were to be reduced by 25% in 1997, by 50% by 1999 and to be phased out by end of crop season 2001, *and* pesticides defined as causing chronic risk. The latter had their reduction targets set at less ambitious levels (15% reduction) because of lack of evidence of human exposure in Wisconsin to their active ingredients, and because residues of these products are rarely found in fresh or processed potato products or drinking water.

Second, sophisticated mechanisms were put in place for *measuring progres*s. An index of pesticide toxicity levels was developed, encompassing the ecological, environmental, and human health risks, including a "toxicity factor value" for each pesticide active ingredient. These composite values allow comparisons across active ingredients on a pound for pound basis. Third, and finally, key *indicators of progress* were developed. These included the 11 active ingredients of chemicals subject to reduction goals, industry-wide toxicity units, and toxicity units per Planted Acre.

The early results from the project demonstrate a quite striking level of success. In the first two years on the average acre planted, Wisconsin Potato farmers were able to:

- reduce per acre toxicity units 25% across the 11 pesticides subject to the acute and chronic risk reduction goals (more than meeting the first year reduction goal);
- decrease insecticide toxicity units by 61%; and
- achieve a 20% reduction in the toxicity units across all herbicides, insecticides and fungicides.

According to one assessment of the program, the Wisconsin growers' accomplishment is all the more remarkable in that it contrasts sharply with national trends: "Wisconsin reduced use of high-risk insecticides by over 60% in a year when national insecticide toxicity units per acre went up 6%. Toxicity units associated with all herbicides, insecticides and fungicides applied in Wisconsin fell 20 percent between 1995 and 1997, but rose 16% nationwide" As WWF put it: "Toxic pesticide use has been dramatically cut on Wisconsin potato farms through a unique collaboration between environmentalists and farmers designed to protect human health, improve wildlife habitat, and help develop a premium market for environmentally friendly potatoes".[xx] WWF also pointed to evidence that farmers who use fewer pesticides significantly increase their profit margins.

(v) Would ISO 14001 help?

Although the initial phase of the Wisconsin IPM project has achieved very impressive results in the absence of ISO 14001 or indeed of any other formalised environmental management system, there would appear to be considerable benefits in incorporating ISO 14001 certification within the next stage of the project.

The success of the Wisconsin project depends upon either reducing the internal costs of production, or increasing demand and revenue for IPM potatoes. Adopting an EMS, and arguably ISO in particular, could make a substantial contribution on both these fronts. In terms of reducing production costs, the evidence shows that a management system approach can lead to considerable and continuous

improvement in both economic and environmental performance. This includes reduced waste, improved understanding of procedures, decreased costs and in the future (to the extent that export markets are important) overcoming a potential trade barrier.

Equally important, a certified management system (eg ISO 14001) can provide the sort of guarantee than third parties require in order to be reassured that claims about reduced pesticide use and improved environmental performance are indeed correct. These third parties include not only consumers (who are only likely to express a preference for IPM potatoes if there is some independent means of distinguishing these from other potatoes) and bulk purchasers who may see attractions either in reducing their liability risk or in presenting a green image. As such ISO accreditation might help to promote the benefits of and increase demand for potatoes grown by project members. However, it must be emphasised that ISO does not permit the fact of certification to be included on product labels.

ISO 14001 environmental management systems standard might be used as the key mechanism to ensure compliance with the standards agreed between the Growers Association and their NGO partner. ISO 14001 independent auditors might be used to confirm that growers meet the IPM targets set by the Growers Association and WWF, and to enhance public confidence by ensuring that growers are reviewed by independent auditors in an operationally verifiable process.

The advantages of ISO 14001 were put more broadly by a senior member of the Department of Natural Resources as follows: "ISO 14000 represents a holistic tool [for] improving the entire eco-system. It also enables improvement in unregulated aspects of environmental protection. It leads us away from "command and control" and towards market based and community based incentive system to protect the environment, not only mitigate losses".[xxi]

Significantly, the WPVGA are indeed looking to develop their partnership program into a more sophisticated environmental management system, eligible for ISO 140001 certification. This would entail addressing a wider range of environmental issues, in addition to pesticide management, such as water management, air quality, soot and diesel particulates, fuel and energy consumption, and spills and groundwater contamination.

Implications for government

In the previous sections we have argued that environmental partnerships can play important roles in environmental protection. However, agricultural producers, NGOs and others, will not necessarily organise themselves into such partnerships, even when they might provide win-win outcomes. Conservatism, lack of awareness of the opportunities, and practical barriers such as the absence of mechanisms for offsetting risk, or lender resistance, may all militate against change. In the absence of external intervention, many of the potential opportunities for environmental partnerships may never be realised. Thus there is an essential policy role for government in encouraging, facilitating, rewarding and shaping such partnerships. That is, at the same time as the state is retreating from may of its traditional regulatory functions, numerous opportunities arise to forge creative new roles, harnessing private institutions and resources in furtherance of public policy.

The main implications for government include the following:

- *Steering the boat rather than rowing:* Government's traditional role has been that of intervening directly in the affairs of rural industry, for example by regulation. In circumstances where the partnership model is likely to be successful, the role of government is likely to be a less intrusive one: facilitating, encouraging rather than directly intervening.

- *Kick-Starting environmental partnerships:* Many partnerships will involve substantial start up costs and other initial barriers to their adoption. Government can play an important role in providing incentives sufficient to kick-start promising new partnership initiatives. Even if this involves money or other resources, the investment will be justified given that I will minimise the subsequent need for government intervention and resources, and may well achieve substantially better environmental and economic outcomes than traditional regulatory tools.

- *Providing incentives:* The precise incentives that government might provide to encourage environmental partnerships will vary widely with the circumstances but might include preference in government procurement contracts, a less attractive regulatory backdrop for those who do not wish to participate in partnerships, a legal underpinning to prevent free riding, or the use of cross-compliance mechanisms.

- *Regulatory flexibility and EMSs:* If firms who commit themselves to a certified management systems based approach can largely be relied upon to self-regulate, (perhaps subject to performance standards and with some modest amount of regulatory and third party oversight), then more efficient and effective use can be made of regulatory resources, while facilitating far greater autonomy and flexibility for business.

- *Reducing risk:* One of the difficulties in developing partnerships is the risk involved in moving from one system of production (eg intensive pesticide use) to another (eg Integrated Pest Management). Government may have a short-term role in reducing these risks if the private insurance market fails to do so.

Conclusion

While an emerging concept internationally, only very few environmental partnerships have emerged in the Australian agricultural sector, Landcare being the most prominent. Yet the potential exists for agricultural producers to achieve major benefits through participating in environmental partnerships along the model we suggest, and incorporating environmental management systems. These include:

- demonstrably improving the environmental performance of agricultural producers;
- improving the commercial productivity of farms through a reduction in business input costs (such as using less chemical pesticides);
- reducing the costs associated with land remediation (such as addressing soil erosion);
- providing access to new markets, or market niches, which demand the highest environmental standards for both products and processes;
- providing a marketing edge to participating producers and retailers/wholesalers;
- improving the quality consistency of agricultural products;
- pre-empting the imposition of *de facto* international environmental trade standards (such as ISO 14001);
- anticipating and avoid the imposition of future mandatory environmental regulations; and
- improving the long-term viability of the land itself.

However, at this stage, the answer to many of the key questions identified in our introduction, remains unclear. What is clear is that there are no magic bullets, and that what works will vary substantially depending on the circumstances. As such, the next stage of our research will be to conduct two contrasting industry sub-sector case studies. It is through these that we hope to gain a deeper

understanding of the critical success factors and to provide practical recommendations concerning how partnerships can best achieve both their economic and environmental objectives.

Endnotes:

i Elkington, *Cannibals with Fork*s, 1998.
ii See Gunningham & Grabosky *Smart Regulation: Designing Environmental Polic*y, OUP, 1998.
iii Thrupp *New Partnerships for Sustainable Agriculture,* World Resources Institute, Washington, DC, 1996.
iv See Gunninham & Rees (1997) *Law & Polic*y.
v GEMI, *Total Quality Environmental Managemen*t, Washington DC, 1992.
vi Tibor & Feldman *Implementing ISO 14000: A Practical, Comprehensive Guide to the ISO 14000 Environmental Management Standards,* McGraw-Hill, USA, 1997.
vii Kleindorfer *Market-based Environmental Audits and Environmental Risks: Implementing ISO 1400*0, The Wharton School, University of Pennsylvania, 1996.
viii See Gunningham "Environmental Management Systems and Community Participation: Rethinking Chemical Industry Regulation" *UCLA Journal of Environmental La*w, 16(2), 1997/98.
ix Kleindorfer *Market-based Environmental Audits and Environmental Risks: Implementing ISO 1400*0, The Wharton School, University of Pennsylvania, 1996.
x Tanner "Asia's ISO Commitment" (1998) Nov-Dec 1(6), *Tomorro*w.
xi Krut & Gleckman *ISO 14001: A Missed Opportunity for Sustainable Global Industrial Development,* Earthscan Publications, London, 1998.
xii Krut & Gleckman *ISO 14001: A Missed Opportunity for Sustainable Global Industrial Development* (1998) Earthscan Publications, London, 1998.
xiii Regional Institute of Environmental Technology *ISO 14001 Implementation by World Wide Companies* (1998) http://www.riet.irg/research/iso-asian.htm and "EMS Certifications Still Slow" June, *Environment Business*, 1998.
xiv In terms of regulatory reform, we advocate that regulators focus on a broader set of environmental management benchmarks than is currently envisaged under ISO 14001, including provision for auditing, planning, performance objectives, monitoring, verification, transparency and community participation. Such benchmarks should be introduced in conjunction with a comprehensive mix of incentives.
xv According to a consultant for the WPVGA, IPM "is a science and knowledge-driven approach to managing biological interactions and growth cycles in farm fields. Pests are managed as one component within farming systems , drawing on an array of tactics and tools to keep populations below damaging levels. Pesticides play a role, but do not bear the full burden of managing pests.
xvi Benbrook, *Attainment of 1997 Industry-Wide Pesticide Risk Reduction Goals: Technical Report to WWF and WPVG*A, unpublished.
xvii Benbrook, *Attainment of 1997 Industry-Wide Pesticide Risk Reduction Goals: Technical Report to WWF and WPVG*A, unpublished.
xviii http://www.pmac.net/wwfwpvga/actvties.htm
xix http://www.pmac.net/wwfwpvga/actvties.htm
xx *Wisconsin Potato Growers Cut Toxic Pesticide Use by 25 Percent,* Press Release, WWF, 15 June, 1998.
xxi Smoller, Wharton Business School Seminar, 1997.

Making a Place for Environmental Management Systems in Domestic Corn and Soybean Production: Evidence From Abroad and From Home

A report presented to the Institute for Agriculture and Trade Policy Minneapolis, Minnesota

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Yale Environmental Protection Clinic
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Executive Summary

Our inquiry focused on the following questions and answers:

1. Question Would the ISO 14000 protocol enable corn and soybean farmers to generate a price premium for their products that cannot be achieved under the eco-labeling regimes that are already in place?
   → Answer We believe the answer to this question at present is "no". While there may be an unfilled niche for an eco-product that is less expensive than organic corn and soybeans, the third-party monitoring system that is currently in place seems more capable of filling this niche than ISO 14000. ISO 14000 would make eco-labeling too cumbersome and costly, owing to the do-it-yourself, process-oriented approach embodied in ISO 14000. However, if farmers could agree to an EMS with simple, substantive standards, such coordination might achieve a product differentiation (and a price premium) that is not currently occurring in the domestic marketplace.

2. Question Would an ISO 14000 protocol enable farmers to take advantage of long-term cost-savings that could result from farming in a more sustainable and environmentally sound fashion? Are these cost-savings sufficient to offset the high implementation costs of ISO 14000 and other EMSs?
   → Answer We have no sure answer to these questions. The potential for eco-grower cost-savings is not clear. To be sure, there are cost-savings associated with the operational efficiencies of EMSs, and there may be additional savings from loan and insurance discounts. But the costs of implementing ISO 14000 may be as high as $25,000 per farm, and that is rather high in a business where margins are razor-thin. The case studies suggest that the only way to surmount these costs is through some kind of public subsidy or regulation. A less formal, lower-cost EMS, in which compliance is verified at the group level rather than the individual farmer level, may be viable without subsidies.

3. Question Does conventional farming produce negative environmental externalities that would justify public subsidies or regulation, and if so, does a subsidized EMS represent a more effective governmental intervention than traditional command and control regulatory approaches?
   → Answer Here we believe the answer to both questions is "yes". EMS, and ISO 14000 in particular, would benefit from a subsidy helping farmers get over the initial cost hump. Subsidy-induced self-regulation allows farmers to tailor environmental goals to the ecological problems that are most pressing in their own fields. Moreover, more stringent command and control regulations are not on the political horizon.

4. Question What does the evidence from EMSs initiated by farmers abroad indicate about their potential use in the United States agricultural sector?
   → Answer The evidence suggests that 1), ISO 14000 is too expensive and 2), more informal EMSs work best where there is a government subsidy, regulatory pressure, and/or high levels of consumer interest.

I. Introduction

This paper analyzes the circumstances under which voluntary environmental management systems (EMSs) could be successfully implemented in corn and soybean production in the United States. While we draw on evidence from EMS regimes implemented all over the world, a principal focus is on ISO 14000. ISO 14000 is a set of protocols developed by the International Standards Organization, which allows any operation to identify the most appropriate way to measure its environmental performance, and to monitor and improve this performance over time. Our overall conclusion is that existing market incentives are not likely to make ISO 14000 cost-effective for corn and soybean farmers. Absent subsidies or a threat of new regulation, United States agricultural markets would be better suited to a lower-cost EMS that is simpler to implement and more likely to present a uniform standard of environmental quality to consumers than ISO 14000.

Section II describes the ISO 14000 standards in brief. Section III explores market mechanisms and economic incentives for voluntary environmental stewardship in corn and soybean agriculture. Section III also explores the theoretical basis for interventions by government to encourage adoption of ISO 14000 and/or other EMSs. Section IV of this paper surveys case studies to see how agricultural EMSs have worked elsewhere. Finally, Section V offers conclusions and recommendations for environmental management of Midwest agriculture.

II. Description of the ISO 14000 Program

Since our analysis is concentrated on assessing the viability of ISO 14000 for corn and soybean farmers, it makes sense to begin by describing some of the basic features of ISO 14000.

ISO 14000 is a series of internationally recognized standards, promulgated by the International Standards Organization in 1996 to address the environmental impacts of organizations. The series follows a process or systems approach and does not call for specific prescriptive measures. Instead, it provides general guidelines for developing an environmental management system (EMS) as well as guidance toward environmental auditing, environmental performance evaluation, life-cycle assessment, environmental labeling, and environmental aspects in product standards (ISO 14001, 1995).

ISO 14001 is the cornerstone, or the chief component of the ISO 14000 series, as it outlines the specifications for an environmental management system. There are several key elements within this section, all of which must be satisfied to gain registration. The following five principles are to be contained within an EMS: commitment and policy, planning, implementation, measurement and evaluation, and review and improvement. Each organization is required to issue an appropriate environmental policy statement consisting of a commitment to continuous improvement, pollution prevention, and conformance to the law and regulations. The planning portion defines and clearly communicates the organization's environmental targets and objectives. A management system must be designed for implementation and maintenance of the plan including information on roles and responsibilities. The measurement and evaluation piece is required to track performance and demonstrate conformance to objectives. A

final.management review verifies the operation of the EMS as originally planned and determines whether the target goals have been satisfied (Wall, 1997).

While ISO 14001 does not expect participants to achieve particular environmental outcomes, it does expect a commitment to continual improvement of the environmental management system. By following and improving management procedures, one will conceivably find improvements to environmental performance (Bell, 1995).

ISO certification, as granted through a third party auditor accredited by the International Standards Organization, signifies that the proper steps have been carried out toward the implementation of an EMS. It does not take the form of a green label indicating environmental specifications of a particular product for consumers, but instead certifies that a formal management plan has been put into effect. ISO registration does not come without a stiff audit cost, as extensive time and effort is required to review the proposed organization's conformance to ISO 14001 requirements. In addition, official documents, training records, EMS audit results, management review records, and results of monitoring and measurements are examined closely (Wall, 1997). These costs and burdens provide at least one explanation for the limited number of ISO 14000 certifications in the United States. By August 1997, only 25 United States companies had become certified under these standards. The fact that certification has been much more widespread in certain EU countries and Japan suggests that there are other factors driving the process.

ISO 14000 is not the only EMS framework that has been developed. A number of less formal voluntary EMS programs have been promulgated by non-profit organizations and governments in states and regions, domestic and foreign. Before considering such programs in detail, we will explore the potential incentives, as well as disincentives, for voluntary environmental management of Midwest agricultural lands.

III. Assessing the Viability of EMSs in Domestic Agriculture: Consumer Demand, Cost-Savings, Government Interventions

This section focuses on whether corn and soybean farmers would gain anything by adopting ISO 14000 or (to a lesser degree) other EMSs, absent a subsidy or the threat of new regulation. We consider the possibility of a price premium for eco-friendly crops, increased access to foreign markets, and potential cost-savings that might accrue from the more careful husbanding of resources that is associated with ISO 14000 and other EMSs. For most of this section, we defer consideration of new regulation or of a subsidy from an outside source. These types of interventions into the market are considered separately, in Subsection D.

A. Framework for analysis

For most private goods and services, we rely on the market to equate demand and supply. Without government intervention or regulation, appropriate quantities of products (or services) are produced according to the prices consumers are willing to pay. However, this convenient balancing breaks down when the products involved are public goods and services. Pollution is a public, jointly consumed good. It affects large numbers of heterogeneous victims. Absent

mandated control, in theory, the victims of pollution will pay for the levels of abatement that they desire. In reality, however, these payments or bribes do not take place. Each individual's harm is too insignificant to warrant action by that individual; and although cumulative harms are significant, it is too difficult and costly to bring about group action. With overburdening transaction costs, the market breaks down and provides for no pollution abatement.

Intervention is necessary to compensate for the lack of a "natural" market for pollution damage. Generally, it is the government that intervenes and sets regulations. It is possible, however, for NGOs, trade organizations, and other such groups to create the "artificial" market for pollution damage. In the case of United States agriculture, government intervention for environmental protection has been limited. United States agriculture remains largely untouched in terms of environmental regulations. The result is numerous externalities and environmental damages that are not assigned prices. Consequently, in most cases, there is a lack of a market for sustainably grown foods.

Where the government has intervened, for example in setting standards for organic foods, it has succeeded in creating a niche market. Could the same approach apply to sustainably grown commodities? Probably not, for two reasons. First, the environmental stewardship under study in this paper is fundamentally different from organic standards. This environmental stewardship involves standards of practice, known as Production Processes and Methods (PPMs), more than standards of product. Its provisions are less extreme than organics' and its benefits do not apply as directly to the individual consumer. Second, as the market stands now, it is extremely expensive to track commodities, such as corn and soybeans, through the long chain of custody from farm to market. As intermediate goods, corn and soybeans are often subject to numerous exchanges and frequent mixing, which makes it more difficult to separate sustainably-grown commodities from those that are conventionally-produced Thus, it seems that ecolabels for agricultural commodities are not feasible at the present time. Segregation does work for organics because the storage, transport, and processing sectors can adapt to meet a clear set of standards, given of course, sufficient time and adequate incentive.

The debate over genetically modified organisms (GMOs), however, may change this paradigm. As more markets reject food that contains GMOs (or includes components produced from GMOs), the momentum builds for "identity preservation" of commodities. For example, Land O'Lakes and Cooperative Business International recently formed a venture, Specialty Grains LLC, that will provide producers "improved access to foreign markets for value-added and identity preserved grains," with an initial focus on identity preserved soybeans and white corn (http://www.farmcredit.com – Reference Library Directory). Moreover, as economist Mike Singer predicts, "next year's GMO crops likely will need to be segregated, tested, labeled and regulated" (http://www.farmcredit.com – Reference Library Directory). If he is right, ecolabels for corn and soybeans may be a prospect in the near future. Nevertheless, the central question remains: Will consumers be willing to pay a price premium for an ecolabeled good?

B. ISO 14000 as a strategy to increase growers' revenues: an analysis of consumer demand

In this section, we assume that: 1) farmers' current practices are designed to maximize yield and quality and minimize production cost; and 2) it would be less efficient to engage in more environmentally friendly farming techniques. In fact, environmental management systems may result in cost-savings that were previously hidden, but we defer consideration of this contention until Subsection C, below. We also assume for the moment that state regulation or subsidies are not part of the equation: the question is thus purely whether consumers are willing to pay more of a premium than they already are for food that has been grown in more environmentally friendly ways. Our analysis of the problem indicates that:

- There *may* be a latent demand for corn and soy products that are not organic, but also not commodities. There currently seems to be a strong foreign demand for this sort of product, but very little domestic demand.
- Current labeling systems—largely organic—for field corn and soybeans, operate with third (or sometimes second)-party certification. The financial opportunities they offer have been a partially effective method of inducing some farmers to conform to the criteria behind said labels. As with conventionally produced crops, much of this environmentally differentiated corn and soybean is sold in foreign markets. It is possible that the lack of domestic demand is the result of a coordination problem; that is, the domestic market has failed to develop a coherent non-organic, environmental label.
- The main defect of the current regime is that it is too complicated and diffuse, particularly with respect to "life-cycle assessments" (practices not affecting the health characteristics of the final product).
- ISO 14000 would increase rather than reduce complexity and would not generate market power for farmers who undertook the expense of complying.

1. Consumer demand for eco-friendly corn and soybean production

Since there is already a rapidly growing market for organic crops—which the federal government is poised to standardize—the most promising new opportunity would seem to be in production systems that do not conform to organic standards, but that afford environmental benefits beyond those typical for a given commodity crop (e.g., chemical fertilizers used, but more restricted use of pesticides). The most important questions are therefore: Would some consumers be interested in such products? How much more would these consumers be willing to pay for them?

We have found no data answering these questions. However, more general facts suggest the potential viability of this niche. First, there are fairly good data indicating that people are beginning to think about the environment when they go shopping, at least up to a point. Although many consumers consider the relative environmental impacts when purchasing products, a smaller but still substantial number will actually pay a premium for such attributes. A data set gathered in 1991, during the first great wave of eco-labeling enthusiasm, was summarized by one observer as follows:

> [The] poll found that seventy-five percent of those surveyed considered important the environmental reputation of a product manufacturer, but only fifty-four

> percent actually selected a more expensive product for environmental reasons. Similarly, fifty-eight percent of adult men in a separate survey said that aerosols should not be used; yet, eighty-seven percent had purchased aerosols in the previous six months. Nevertheless, the number of consumers considering environmental impacts in their purchasing decisions remains substantial. Nearly one in every two consumers has altered his or her purchasing decisions to help protect the environment.
>
> (Church, 1994. pp. 253-54)

The high price of organic produce is another factor that suggests the viability of a non-organic niche for eco-friendly corn and soy products. On the one hand, food costs in the United States are such a small percentage of average personal income that there would seem to be some room to persuade consumers to pay something above the commodity price. This is supported by the 20% annual growth of the organic market during the last five years (Gutman, 1999). On the other hand, organic products cost considerably more than conventional—although the difference is becoming less pronounced. For example, food-grade soybeans sold for approximately $6 a bushel last year. Food-grade beans that were certified as having been grown chemically free (no pesticide or herbicide applied after planting) sold for approximately $7. Organic food-grade beans sold for *$19 to $22 a bushe*l. (interview with Pearcy Grain Services). While the chemically free food-grade soybean market has traditionally been served by small, family-owned processors, the large agribusiness companies have recently made a strong push in the direction of all niche markets (Pearcy, 2000).

We are primarily concerned here with that segment of the corn and soy crop that is destined for human consumption in the form of oils, syrups, tofu, corn, etc., as opposed to animal feed and industrial uses. The human food uses are a small part of the corn crop. Of the portion sold domestically, less than 17% of the United States corn crop is for human consumption. Much of that is in the form of high fructose corn syrup sold to food processors to incorporate into their proprietary beverages, breakfast cereals, etc. About 75% of the crop is dent corn used as feed for livestock. Much of the remainder is used to make ethanol (National Corn Growers Association, 2000). Most soy, however, is ultimately fed to humans in the form of oil and foods such as tofu (American Soybean Association, 2000).

It less likely that consumers will show the same level of concern for more highly processed food products such as corn oil or tofu, as they do for fresh or frozen fruits and vegetables. On the other hand, the link between health issues and environmental issues is unusually strong with agricultural products. This factor may serve to heighten consumer interest to a higher level than has been observed with other products (e.g., paper products).

A final distinction may be relevant in assessing consumer demand for more eco-friendly corn and soybean products. This is the difference between practices that actually affect the qualities of the crop at the time it reaches the consumer (e.g., less pesticide residue), versus farming practices that include environmental PPMs, (e.g., lower water usage, less cultivation of riparian areas), but do not change the end-product. The industry sources we spoke to were quite adamant that the latter sort of improvements, known in the literature as improvements flowing from “life-cycle assessments,” would not command a premium with consumers (interview with Keith, 2000).

However, “life-cycle” attacks have been successful on a few occasions, at least where the bad practice was visibly part of the product, as in the campaign to get McDonald’s to abandon polystyrene hamburger containers.

Some of these distinctions are borne out in the niche markets for more eco-friendly corn and soy products that already exist. These markets are discussed in the next subsection. Overall, we should stress that we have been unable to find any evidence confirming or denying the existence of still-unsatisfied demand for a more moderately priced, non-organic, eco-friendly corn and soybean crop. It is clear that there is cautious interest in this area among processors and retailers. The interest is even greater among growers—the sector least able to drive the market—as they are seeking opportunities to increase income and decrease reliance on undifferentiated commodities.

2. Is there a market failure?

Since consumer demand is the only driver being considered at this point in the analysis, it is logical to ask whether the market is already exploiting this demand effectively on its own. Three phenomena are relevant here: niche markets for eco-crops, identity preservation systems, and monitoring by third parties. Overall, the evidence suggests that markets are partially capable of matching the demand for moderately eco-friendly products with crops that meet that demand. However, as noted previously, this finding is limited to situations involving tangibly superior end products (e.g., fewer pesticides on the final product at the loading dock). Market mechanisms may be less capable of valuing “life-cycle” improvements that do not affect measurable qualities in the end product. However, it is not clear that consumers are interested in products that have been grown in a more environmentally friendly fashion, and yet are not tangibly or even symbolically better in terms of health characteristics.

a. Current eco-labeling practices: pesticide-free corn and soybeans

There are already small niche markets for post-harvest, chemical-free corn and certain types of soy products. "Chemical free" or "pesticide free" means that the raw product contains little or no pesticide residues when it is delivered from the farm. Laboratories offer testing so that crops can be certified "BDL," below detectable limits. Such products are sold primarily for export to Europe and Japan. They are extremely small fractions of the total crop purchased by the major food processing companies. Our main sources of information here have been Cargill and Pearcy Grain Services (Clare, Illinois). We note that an ADM grain merchandising specialist also confirmed that ADM passes on to farmers requests from food processors for crops with certain environmental characteristics (interview with Batchelder of ADM, 2000).

At Cargill, a food manufacturer or exporter may request certain environmental or other criteria, usually concerning pesticide residue (or use) or genetic modification. Cargill then passes on the criteria to farmers. Cargill also agrees to segregate the products, so they are not mixed with conventional products. In return for their added trouble, Cargill gets a premium, part of which is shared with the farmer. In addition to the identity preservation system, Cargill operates a verification system to ensure that the farmer has complied with the demands of the Cargill customer. Cargill performs tests to detect pesticides and GMOs. One interesting aspect is that Cargill believes this process adds enough value that it has branded it—“Century Corn.” This product has been available for approximately two years (interview with Pocock, Cargill, 2000.)

Pearcy Grain Services has shipped pesticide-free [our source used the term "chemically-free"], food grade soybeans to Japan since at least 1995. Mr. Pearcy ships a sample of the soybeans to labs in New Orleans and Missouri where they test for 500 of the more common pesticides. Special tags are affixed to the bags of raw soybeans when they are shipped to Japan, along with paperwork from the lab. Mr. Pearcy said that the tag served a function more symbolic than actual, since crops that have been grown in a conventional manner typically do *not* show any post-harvest residue of the many pesticides and herbicides that have been used on them (interview with Pearcy, 2000). For evidence of more small operators exploiting the ecological niche for food-grade soybeans sold to Japan, see the listing at: www.ag.uiuc.edu/~stratsoy/expert/niche95.html. [University of Illinois Extension, "Niche Market Soybeans - Opportunity for Some Soybean Growers in Illinois]. Judging by this listing, there seems to be no interest in life-cycle improvements to the farming process that do not result, symbolically or actually, in improvements in soybeans' chemical features when they are measured at the loading dock.

b. Current eco-labeling practices: life-cycle assessments

Despite its availability, life-cycle assessment (LCA) has not enjoyed much adoption. One of the testing groups, Scientific Certification Systems (SCS), is a privately held firm. Its testing procedures are laid out at www.scs1.com/nutrihome. Like its non-profit competitor, Green Seal, SCS performs life-cycle assessments of the entire operation that produces a particular product. Green Seal's program appears so far to have limited its LCA analyses to manufactured products (paper towels, automobiles). It is not clear whether SCS's life-cycle audits are limited in the same way. Moreover, the life-cycle assessments undertaken by these groups have been criticized for involving far more subjective policy assessments than either group lets on. Critics believe that such judgments are better left to democratically accountable public agencies such as the EPA.

Is it better to use genetically modified crops that require fewer pesticides and fertilizers? What is an acceptable level of water usage? Of riparian land use? These trade-offs between cost and environment protection and between different environmental impacts have not been worked out by experts, let alone by the public. Until they are, it would be difficult to create an easy-to-read, uniform life-cycle standard to which farmers could adhere (Staffin, 1996). In this area, there is a clear market failure, though it is by no means easy to see how cooperation by non-governmental actors could remedy the failure.

It appears that the market is less than adept at giving consumers information about PPMs or life-cycle information, i.e., information about the environmental impacts of agricultural practices that do not affect the quality of the end product. Some of the larger verification laboratories have indicated a willingness to undertake LCAs, but so far, these have proved to be more controversial than the verification business. The reasons for the limited acceptance of LCA, do not indicate that more private sector coordination is the solution.

c. Literature assessing private eco-labeling regimes

There are two views on whether the current, completely private eco-labeling regime is doing a good job. One view is that the replacement of the current panoply of private standards with a more unitary regime would actually result in less information being given to consumers and in

less choice in the market (Church, 1994; Gutman, 1999). The other view is that some kind of government standard-setting is needed because consumers are overwhelmed with misleading information and producers cannot find a single target to concentrate on hitting (Wynne, 1994). The latter view seems to be the majority view among scholars who have approached this subject (Gutman, 1999).

This view – that greater simplicity is desired – appeals to us as well, at least in this context. Once health issues related to the product itself are out of the way, on-farm pollution is not, as yet, a high priority with American consumers in the same way that, say, saving dolphins was in the tuna fish label campaign. Given the current low emotional investment by consumers in the on-farm pollution problem and given further, the highly processed character of most corn and soy crops (discussed above), it is reasonable to surmise that consumers will factor environmental issues into their corn and soybean product purchases only if these issues are crisply presented.

3. What does ISO 14000 add to the current labeling environment (assuming no government support or other cost-savings)?

The key question is whether ISO 14000 would help overcome information deficits in the existing private market that may be hampering the development of domestic ecological niches for corn and soybeans. But in terms of labeling, ISO 14000 adds very little. It allows for certified farmers to develop their own labels, if they wish, and requires that claims on the label be proved either beforehand by auditors, or afterward by interested consumer groups (Stauffer, 1997; Lathrop & Centner, 1998). However, ISO does not provide any mechanism for farmers to develop a *uniform* label; that is, to supply the key information deficit in the marketplace. If anything, the ISO process encourages farmers to make environmental improvements that are specially tailored to each particular farm, or at best to a group of farms. It is true that under ISO, individual farmers might achieve substantive, self-defined goals that would otherwise have eluded them. However, it would be extremely difficult to convey this achievement to consumers, since each farmer would have different goals.

Nor can an identity preservation system solve this problem. Even where an identity preservation system is used for a niche crop, within that niche the processor will need to mix one farmer's crops with the crops of many other farmers. All the farmers must come up to the standards of the niche if the standard is to have any meaning to the consumer. This would be impossible under the ISO 14000 regime, which operates on a pluralistic model antithetical to any ready summarization for casual consumers. Moreover, ISO 14000 has lots of (costly) requirements that would produce no tangible differences in the end product.

What about life-cycle assessments, that is, information about farming practices that do not affect the end product's health characteristics? The market failure here is serious, but again ISO's pluralistic model offers no real solution. Of course, ISO's focus on record-keeping and improving the whole organization is a distinct advantage in implementing a life-cycle auditing regime. Indeed, ISO requires a life-cycle assessment, an area where the private sector appears to have fallen down. But what is not clear is that consumers value improvements in this area enough to be willing to pay for it in the supermarket. Additionally, it is uncertain that, even if consumers were willing to pay, that ISO is the appropriate vehicle to "sell" products that are the same as any others in their health and pesticide characteristics (but have been grown in an

environmentally friendly fashion.) Again, the flexibility of ISO is the problem; consumers don't know what they are getting for the money, and we believe they will want a simple label to tell them. The information complexity of a life-cycle assessment will require a lot of tricky judgments and simplifications, and ISO provides no consensus mechanism to accomplish this on a mass scale. Moreover, ISO specifically prohibits using labels advertising ISO certification itself (interview with Castelnuovo, National Farm*A*Syst, Madison, Wisconsin, 2000).

Thus, we are pessimistic about the possible success of ISO 14000's in the absence of some kind of government intervention, whether in the form of additional regulation or a subsidy. One study of ISO 14001 registration in the business and institutional furniture industry concluded: "ISO 14001 registration is seen as a non-value-added process with uncertain benefits" (Ruddell & Stevens, 1998). It is hard to see why this conclusion would be different in the food business, where the purchasing decisions by end-users are much more casual and price-driven. While the domestic corn and soybean market may have failed to identify and market an eco-friendly product for which there is latent consumer demand, and while a low-cost, simple, and substantive EMS may cure this failure, it is fairly clear to us that ISO 14000 is not such an EMS. The market failure with respect to "life-cycle assessments" is much more obvious, yet here the complexity of the issue, and the amount of consumer education that will need to occur, are such that private coordination efforts are not likely to succeed.

C. Cost savings

In general, the ISO system is predicated in part on the notion that businesses can run more efficiently if they can gather information and process it more scientifically. ISO 14000 is perhaps something of an exception to the general ISO rule, since some improvements in environmental efficiencies do not *necessarily result* in cost reductions for the private businesses that have undertaken the improvements. Yet there are some areas where cost reductions are in fact likely to flow from better environmental performance. In this section, we attempt to identify those areas.

1. Operational efficiencies

Although environmental standards are generally perceived as additional economic burdens on farmers, many elements of EMSs, particularly those that aim at improving the efficiency of operations, present opportunities for cost savings. Conservation tillage, soil nutrient testing, and integrated pest management are examples of environmentally superior practices that may save farmers money (Runge, 1997). The former two practices reduce the need for fertilizer applications, while the latter practice reduces the need for pesticides. In addition, farmers who reduce their energy and water usage will save on utility bills. However, government subsidies counteract this incentive for water conservation.

Many small farmers do not have the resources to analyze and optimize their operations. With proper assistance, farmers who implement EMSs, are likely to identify wasteful practices. By reducing or eliminating these inefficiencies, farmers will realize cost-savings. "It is clear that 'good management practices' improve the economic results of the farmer through better utilization of resources like nutrients, chemicals, medicine, energy, water, etc." (Bergstrom et. al., 2000, p. 11).

If environmental management can translate into larger profits, why do Midwest farmers so rarely implement environmental management systems? First, it should be emphasized that not all elements of EMSs realize net cost savings. To the contrary, elements such as riparian buffer zones may significantly reduce production—in this case, by decreasing the acreage available for production. It is possible that more Midwest farmers would implement EMSs if the elements were restricted to those that generate cost-savings. However, the tradeoff would be a lower level of environmental protection for society, as certain, perhaps larger, environmental impacts are overlooked. The second barrier to EMSs is the large up-front cost of implementation. Our Cargill interviewee referred to an internal study indicating that it would cost a farmer $25,000 to win ISO certification – an amount approximately equal to many farmers' annual net incomes (Pocock interview, 2000). While collaboration among farmers may spread out the record-keeping and auditing costs of certification, and while some costs may be offset by long-term payoffs, the costs are still high enough to discourage experimentation. Initially, farmers must be convinced that it is worth exploring the potential benefits of EMSs. Then, they (and where, applicable, their consultants) will need training in environmentally superior farming practices. These barriers could be surmounted through a coordinating body (government, NGO, or trade organization) that provides loans or assistance with start-up costs, disseminates information, and offers training workshops.

2. Loan and insurance discounts

Another potential economic incentive for environmental stewardship surfaces through agreements with loan and insurance agencies. These agencies may be willing to offer discounted insurance and/or loan rates to farmers who adopt EMSs or other environmental PPMs, if it can be shown that these practices increase profits or reduce risks. An environmental audit, for example, may address safety risks associated with the handling of hazardous materials (e.g., pesticide storage), while groundwater stewardship and water conservation may reduce liabilities associated with groundwater contamination, runoff, and flooding. These programs are "at the forefront of preventive insurance." This is the conclusion that the North Pointe Insurance Company reached after investigating Farm*A*Syst (FAS) and the Michigan Groundwater Stewardship Program (e-mail from Ruth Kline Robach, via Castelnuovo). In fact, they agreed to offer lower insurance premiums to farmers who completed FAS assessments. Three progressive stages of environmental management entitled farmers to 5%, 5%, and 10% premium reductions, respectively. Although North Point Insurance no longer participates in the program (they ceased their farm insurance programs altogether), another insurance company, Auto Owners, now offers the same discounts over an eight-state region. Moreover, the Antrim Conservation District of Michigan has received an EPA grant to expand this program. The District hopes to sign on the Farm Bureau, for nationwide coverage, and would like to see the program applied beyond liability insurance to include all pollution prevention programs. However, the District notes that they currently have limited resources to run this program and that more publicity and more farmers are needed to ensure its success (personal correspondence with Janet Person, Antrim Conservation District).

Benefits of the Farm*A*Syst program have also been recognized by AgriBank, a regional funding bank for Farm Credit Services. [an 80-year-old, a $60-billion, nationwide network of lending institutions—the largest single provider of credit to American agriculture.] They have included FAS as part of their due diligence process and, in some cases, are offering lower

interest rates to farmers who employ "Best Management Practices" (personal correspondence with Castelnuovo, Farm*A*Syst).

Midwest farmers should work cooperatively, through a coordinating body and with the Antrim Conservation District, to locate insurance companies and banks that may be willing to offer insurance and loan discounts to farmers who implement EMSs.

3. Conclusion on cost-savings

Particularly at the implementation stage, EMSs are costly and ISO 14000 is very costly. Yet once farmers are over the implementation hump, thorough accounting and record-keeping of environmental practices may lead to some cost-savings, in the form of lower insurance costs, and more efficient and sparing use of soil, pesticide, and water resources. However, the critical question is about the *size* of these cost-savings and whether they outweigh the implementation costs and the cost of additional record keeping, year-to-year. The case studies (considered in section IV) are our best source of information on this question. They indicate that the financial benefits to the farmer do not greatly outweigh the bureaucratic costs – and thus, there is little incentive to go forward.

D. Creating a market for EMS: interventions by government and NGOs

Since consumer-driven environmental stewardship for agricultural commodities is problematic (at least for now), this section focuses on interventions by government and NGOs. Specifically, it explores the potential to create a market for environmental stewardship via taxes, subsidies, and/or tradeable pollution permits. Each of these mechanisms presents the opportunity to assign prices to environmental harms and internalize their associated costs.

1. Theoretical framework: cost savings to society through pollution prevention

EMSs are essentially a form of self-regulation, in which the farmer identifies his own environmental problems. This approach to fixing environmental problems has the advantage of early detection. For example, it is much cheaper to prevent a hazardous waste spill than it is to clean it up and pay for the damages it incurs. The proper handling of hazardous materials and reduced runoff and flooding has great potential to realize cost savings for society (or government) as a whole. Stated more generally, pollution prevention is cheaper than downstream (end-of-pipe) remediation (Runge, 1997). However, this is only true from the perspective of society as a whole. From the farmers' perspective, the costs of pollution prevention are very real, while the cost-savings are virtually imperceptible (since they are shared with all of society). Pollution prevention and EMSs place a disproportionate burden on farmers without corresponding benefits. For farmers to justify economically their implementation of EMSs, the benefits (cost-savings) to society must be returned to the farmer in some form of economic incentives.

2. Taxes and subsidies

A pollution tax assesses a fee for environmental damages. For agriculture, this fee may take a number of forms. It may, for example, be a charge per acre of fertilized (or pesticide-sprayed) soil, or it may be a tax on the fertilizers (or pesticides) themselves. Either way, if the tax is set

appropriately, it will drive at least some farmers to reduce their use of fertilizers (or pesticides). It will also create a revenue stream, which the government may in turn reinvest in environmental incentive programs, for example, in subsidies for superior environmental management.

While agricultural pollution taxes may succeed by economic standards, they are likely to fail in the political arena. Historically, in United States agro-environmental policy, penalties have been rare (Runge, 1997). The federal government has far more frequently offered cost-sharing programs or subsidies to reward progressive environmental management, land conservation, or investments in environmental technology. A subsidy could take the form of a price paid to farmers per acre of land farmed under an environmental management system, or per acre of land that is not farmed. In this way, the subsidy compensates the farmer for any losses in crop yield associated with environmental management or land conservation. The federal government's existing Conservation Reserve Program (CRP), "provides incentives and assistance to farmers and ranchers for establishing valuable conservation practices that have beneficial impacts on resources both on and off the farm. It encourages farmers to voluntarily plant permanent covers of grass and trees on land that is subject to erosion, where vegetation can improve water quality or provide food and habitat for wildlife" (http://www.fsa.usda.gov/dafp/cepd/12crplogo/page3.htm). This program presents an opportunity for Midwest corn and soybean growers. However, note that "only the most environmentally-sensitive land, yielding the greatest environmental benefits", will be accepted into the program.

Of course, the CRP aside, most federal subsidies have the effect of encouraging the over-utilization of resources, and thereby harming the environment. For example, by offering water to farmers at prices below market, government subsidies encourage over-irrigation and discourage water conservation.

3. Tradeable pollution permits

The difficulty with administering taxes or subsidies lies in setting the right prices to bring about the desired outcome or environmental target. This difficulty disappears when pollution rights are tradeable. In a tradeable permit system, a governing entity decides upon an aggregate level of pollution and then distributes "rights" to that pollution either freely or through an auction. This system creates a market for pollution (and abatement). The market, in turn, sets a price for the "right" to pollute. One could imagine such a system applied to agriculture. For example, farmers could be given permits for nutrient or fertilizer use. Farmers who reduce their usage below permitted levels could sell their excess rights to other farmers and, thus, increase their profits (Runge, 1997).

4. The potential role of NGOs and trade organizations

Although taxes, subsidies, and pollution rights are most commonly thought to come from government, it is possible for a private party to set up a similar system of incentives (and disincentives). A trade organization or NGO, for example, could offer its members cost-sharing or assistance for implementing environmental management systems. This alternative third party would need to generate revenue for such programs. They may seek funds from government or from outside investors, or they may set up a self-governing system. The latter option could be akin to the various Business Improvement Districts (BIDs) that have arisen in cities across the

United States. These quasi-government groups consist of private property owners in a specified geographic area. The group's members agree to impose a tax upon themselves and to use their tax-generated revenues for improvements to the neighborhood, including, for example, maintenance and lighting. It is reasonable to believe that a similar group and system could work for Midwest commodity farmers. A self-imposed tax could be collected and used to assist farmers with implementing EMSs or used to hire environmental consultants for group members. Although it is hard to imagine that farmers would choose to be taxed for the purposes of environment protection, it is possible that they would agree to such an arrangement if it were tied to other benefits. A BID-like organization may provide a forum for increased access to markets, information sharing, and other forms of assistance, tailored to sector and regional conditions.

5. Fear of regulation

Often, industries are motivated to implement EMSs for fear of additional regulation. By pursuing improved environmental performance, businesses hope to avoid regulations and maintain a greater degree of control over their operations. Alternatively, we can think in terms of "getting ahead" of regulations. If a farm or factory starts taking appropriate steps on a voluntary basis, then when the regulations are promulgated, they may already be in compliance or close to it. The fear of regulation is strong and gaining momentum in the farm community as well. As we mentioned earlier, genetically modified organisms (GMOs) are one area where regulation seems to be on the horizon. There has also been discussion of "an EPA proposal to strictly regulate timber harvesting and other segments of agriculture as point sources of pollution using its 'total maximum daily load' plan" (http://www.farmcredit.com – Reference Library Directory). In sum, there is some basis to believe agricultural products and processes will be regulated more in the future than they are now, perhaps enough someday to induce farmers to participate in EMSs as a way to avoid government interventions. EMSs can also be used as a means to ease transition to a new regulatory regime. In fact, it is possible that EMSs may become part of the regulatory framework.

IV. Case Studies: A Review of Existing Voluntary Environmental Management Systems

Our assessment of the domestic situation is largely corroborated by a review of EMSs that have been implemented on a micro-scale in the United States, and on a larger scale in certain foreign states. These programs have often succeeded, but not without carrot-and-stick interventions by government and NGOs.

We have examined a number of international and domestic case studies addressing environmental issues and management in agriculture, in an effort to learn more about the various voluntary activities underway. The use of voluntary environmental management systems seems to be growing and catching on abroad quickly, often to avoid future regulation, but also in response to rising community concerns and demand for sustainable agricultural practices. Despite the heavy workload and sometimes exorbitant costs required to implement these environmental management systems, there are a number of very real benefits and rewards that may be reaped. Among the benefits are improved environmental conditions on farms, the power of self-regulation, demonstration of responsiveness and confidence to consumers, promotion of market access, competitive advantage, brand image, recognition, and community responsibility.

To date, many on-farm strategies have evolved to minimize environmental impacts and maximize environmental performance in the agricultural sector. In an effort to learn from past and current lessons, methodologies and approaches to several environmental management plans were reviewed. The following case studies reveal the various approaches to design, planning, implementation, and review of environmental performance in agriculture. Common elements that emerge from these case studies are lower levels of bureaucratic formality and lower costs, compared to the ISO 14000 protocol. As one scientist with the Australian project on sustainable grain production said, "For most broadacre farms, hitting them with ISO 14000 first off is like asking them to do a uni[versity] degree when they have not finished secondary school" (Personal communication with Ridley, 2000).

The following subsections are divided in two: each describes a prominent agricultural EMS that has been implemented somewhere in the world and then summarizes the key issues that are relevant to domestic corn and soybean farms.

A. Ontario Environmental Farm Plan (Canada)

1. Description of program

The Ontario Environmental Farm Plan (EFP), a project of Canada, was developed in response to community environmental concerns. In an effort to forge ahead, local farmers, tired of continually falling short of governmental regulations, decided to mobilize themselves and set the agenda on environmental management issues on farms (Carruthers & Tinning, 1999). Farm leaders created the Ontario Farm Environmental Coalition (OFEC) and worked together with regulatory agencies and researchers in an effort to design a self-audit process for environmental management on farms. This process based on a whole-farm management approach is known as the Environmental Farm Plan, or EFP. EFP is a self-evaluation/best management practice approach whereby farmers complete a series of workshops on 23 modules related to environmental management. An action plan is then drafted, peer reviewed, and submitted for approval (Carruthers & Tinning, 1999).

OFEC requested and secured assistance from the government to provide technical assistance from field staff and development of printed information in the "Best Management Practices" series of publications. Federal funds were allocated for management of the plan, development of BMP publications, and financial aid to implement the plan in the form of an incentive payment to farmers. An incentive payment in the amount of $1500 per farm is distributed to those farmers who complete, implement, and secure approval of their participation in the EFP. To date, 15,000 out of 35,000 farmers have participated (Ridley et al., 1999a).

Interestingly enough, EFP has been directly compared to the ISO 14000 standard because of their similar elements and has been said to be quite compatible. The way it stands now, there are only a few changes that would be necessary in order to achieve ISO 14000 status, as the Ontario EFP is already very close to meeting the requirements. These additions would include the creation of an environmental policy, provisions for third party on-site auditing, and a continuous improvement commitment (Wall, 1998). Currently, Ontario is conducting a number of pilot projects with local farms to learn more about what is involved in actually certifying to ISO 14000 standards.

2. Key issues and policy implications

The Ontario Environmental Farm Plan is a particularly interesting EMS, since it was initiated by the farmers themselves in an effort to streamline and rationalize compliance with existing (and potential future) regulations. The program's success is likely attributable to three forms of government intervention: tough environmental regulations, technical assistance (with BMP publications), and financial assistance. The third intervention provides for management of the program, as well as $1500 incentive payments to farmers who adopt EFP. The structure and content of EFP, including self-evaluations, workshops (farmer training), and action plans could serve as a model for environmental management of Midwest agriculture. However, the motivations in the United States would vary from those in Ontario. Since Unites States farmers are subject to relatively little environmental regulation, government would need to compensate for this lack with greater technical and financial assistance. It is likely that the incentive payment to United States farmers would need to be greater than the $1,500 offered to Ontario farmers.

B. EMS in the Australian Grains Industry

1. Description of program

New South Wales (NSW) Agriculture in coordination with the Grains Research and Development Corporation of Australia has been facilitating a three-year research project with five farmer groups to determine the likelihood of the adoption of an EMS by the grain industry (Green Marketing Prospect, 2000). By trying out a flexible approach to a voluntary EMS, it is hoped that farmers will recognize the benefits in taking responsibility for long-term sustainability of their farms and in the area in which they live. Among the benefits are the possibility of improved grain marketability and increased access into expanding international markets (Ridley et al., 1999a).

The program is designed to take place in three stages. The first stage involves a review of the current legislation, regulation, and environmental planning issues. Stage two is the facilitation of workshops to develop EMS guidelines for grain production management. This is followed by a third stage where farmers first review generic EMSs and then become involved in customizing and streamlining them for their own use through farm operation plans, monitoring programs, and corrective actions (Green Marketing Prospect, 2000).

By implementing such a program, grain growers may rest assured knowing that they are supporting sustainable farming practices by responding to community concerns of responsible stewardship and consumer expectations for clean and safe products. In addition, the adoption of these ideas may help to lower costs associated with environmental remediation resulting from poor resource management as well as provide the grains industry and growers with an effective and international standard for environmental issues.

A similar endeavor is underway by the Department of Natural Resources and Environment of Agriculture, Victoria, and the Institute for Integrated Agricultural Development of Agriculture, Victoria, to work with two groups of local farmers to develop a voluntary "on farm" environmental management scheme. The project hopes to determine whether a voluntary farm assessment scheme coupled with "best practice" methodology and group learning is an appropriate tool to deliver an effective environmental management system for grain production.

Through the use of "best practice," the intent is that management practices will undergo a change from those in which yield of grain crops are maximized to those in which yields are optimized with regard for both profit and the environmental implications of grain production. The "best practice" approach may be thought of as a "bottom-up" self learning and empowerment approach rather than a traditional, more formal "top-down" approach which might stem from increased regulatory pressure (Ridley, 1999).

2. Key issues and policy implications

These projects serve as pilot investigations, which will continue for the next couple of years. The approaches are intended to evaluate the likelihood of the success of such voluntary environmental management schemes on a larger scale. This research is, in effect, the first step towards identifying the ability of farmers to implement "best practice" on farm and understanding their motivation to address environmental issues associated with grain production.

Project proponents realize that economic and social factors play a role in the success of such programs. As a result, further research is needed to highlight problems surrounding the lack of incentive payments, tax breaks, or subsidies to assist farmers with the costs of carrying out voluntary environmental management schemes in Australia. There is an example of partial tax rebates in one area. However, these may only be claimed after a farmer puts up the full sum of money first—an unrealistic expectation for many Australian farmers. Punitive measures have also been mentioned to help encourage EMS adoption. These include the restriction of farmer access to vital elements involved in running a farm such as water or chemicals. (e-mail, Carruthers, 2000).

C. Cotton industry in Australia

1. Description of program

The Australian cotton industry is believed to be the most progressive and advanced sector in developing environmental management systems for agriculture. The Best Management Practices (BMP) program, as it is known, was developed, initially, to address the negative environmental image of cotton farming. It has been designed to meet community demands for environmental management by assisting industry with self-regulation through proactive implementation of a regulatory framework rather than reliance on conventional, and thus slower, reaction to increased legislation (Ridley et al., 1999b). A number of groups are responsible for the development and implementation of this program, including the Australian Cotton Cooperative Research Centre (CCRC), Cotton Australia, and the Australian Cotton Industry Council (Cotton Australia, 2000). In addition, cotton growers themselves significantly contribute to the program through compulsory and voluntary research levies on the order of $1.75/bale (matched by the federal government), which funds CCRC and $2/bale for Cotton Australia (e-mail, Williams, 2000).

Through the use of self-assessment worksheets, the BMP program aims to empower farmers to develop an EMS that meets the ISO 14001 standard by the year 2001. However, one observer noted that "ISO 14000 may be too big a jump at this stage." Currently, on farm action plans address high risk areas and strive for minimal environmental impact by focusing on people, soil, water, air, and waste. An audit process, consisting of three levels ranging from a self-audit to a third-party audit, evaluates the plan's effectiveness. The BMP committee hopes to develop

credibility with outside industries and the general public through the use of the audit and a BMP Manual. The Manual consists of four modules: farm design and management, pesticide application, integrated pest management, and pesticide storage and handling. In an effort to seek continual improvement and encompass a more holistic approach, a few other modules (occupational health and safety, water management, and dryland cotton production) are under development (Carruthers, 1999b).

A pilot program with 34 growers is underway in an effort to evaluate this BMP approach. To date, at least one cotton farm in Australia, Southernstar Cotton, has secured ISO 14001 certification. The Australian Cotton Industry Council will officially launch this program later this year. They hope to achieve a 60% BMP audit rate of Australian cotton farms within 3 years and eventually, total participation by the remaining farms.

2. Key issues and policy implications

Australia's BMP program encourages growers to take individual responsibility for environmental protection through continuous improvement. The implementation of BMPs may be thought of as a model for the commodity sector, for it combines sound science and practical farm management to help facilitate the adoption of environmentally responsible sustainable farming systems. While the self-regulation element of Australia's BMP may be appealing to Midwest farmers, the lack of incentive payments and, especially, the farmer contributions to research are unrealistic. It is questionable whether the program will continue beyond the pilot stage in Australia. It is even more doubtful that such a program, without economic incentives, could succeed in the United States. However, feasibility studies are underway to investigate appropriate incentives and drivers in introducing ISO 14000 broadly across the cotton industry in Australia. A range of incentives is expected to be proposed, particularly related to technology access (email, Williams, 2000).

D. Eco-Management and Audit Scheme (EU)

1. Description of program

In 1995, the European Union adopted the Eco-Management and Audit Scheme (EMAS) to facilitate environmental policies with considerations for sustainable development of industry and free trade. EMAS has most often been applied to heavy industries in the EU. However, anticipated provisions will transition this plan to the agricultural sector. EMAS focuses on the improvement of environmental performance with a site-based approach, unlike ISO 14000, which is a system-improvement approach. EMAS includes measures toward environmentally sound management, including development and implementation of a formal environmental management system (EMS), auditing and verification of system and environmental performance, documentation and publication of a "Register of Environmental Impacts," and an annual environmental performance evaluation (Carruthers & Tinning, 1999). Additionally, it specifies the use of economically viable application of best available technology (EVABAT) which calls for technological solutions to problems even if they do not prove to be the best option for the situation (Bell, 1995).

The EMAS is in fact more prescriptive than ISO 14000 and commands more extensive levels of public disclosure on environmental performance. This is the result of pressure from government

and non-governmental organizations to adopt EMS. Through a series of eight major steps, EMAS hopes to achieve continuous improvement in environmental performance by establishing policies, programs, and management systems (Carruthers, 1999b).

2. Key issues and policy implications

The EU government initiated EMAS in order to fuel competition and recognition in the EU market, facilitate industry's participation in government procurement plans, and capitalize on benefits from deregulation. The adoption of EMAS by United States farmers would potentially increase their penetration in the EU market. However, the value of EMAS for domestic sales alone would not justify its implementation. By contrast to conditions in the EU, United States consumers are not willing to pay significant price premiums for sustainably grown agriculture, and the United States government has not made EMS a prerequisite for its procurement plans. This latter distinction highlights an opportunity for the United States government to encourage EMS. Perhaps in the future, agricultural procurement plans will specify the need for an EMS similar to the EU's EMAS. Ideally, the United States program will replace the technology-based standards of EMAS with performance- based standards.

E. LEAF (UK)

1. Description of program

The Linking Environment and Farming Program (LEAF), begun in 1991, is a project of the United Kingdom and part of the European Initiative for Integrated Farming, an alliance of international NGOs and stakeholders focusing on integrated crop management activities. However, in response to public pressure placed on the environmental performance of agriculture, LEAF has since been expanded beyond Integrated Crop Management (ICM) to cover all aspects of farming, including organization and planning on-farm as well as livestock and biodiversity management (Carruthers, 1999b). LEAF is built upon a self-audit process designed to manage environmental issues on-farm. This voluntary whole-farm approach to environmental management affords farmers the freedom to choose the level of participation that is most appropriate for them as well as the security in knowing that the information they provide to LEAF is kept confidential (Ridley et al., 1999b).

The LEAF program aims to develop and promote a few keys areas: integrated crop management (ICM), demonstration farms used for community's educational purposes, tools/guidelines for farmers, and training and technical information. However, the main component of the program is an audit developed to assist farmers with assessing their environmental performance. The audit includes a self-assessment questionnaire based on seven major areas: organization and planning, soil, crop protection, pollution control and waste management, energy, landscape and wildlife, as well as animal husbandry. Recommendations for areas of improvement and action plans are generated based on the results of the audit. The farmers then use this information to compare environmental performance on farm from year to year in addition to assessing and optimizing inputs in an effort to achieve maximum profits (Ridley et al., 1999b).

The UK agricultural sector views this EMS approach as a useful tool to prepare growers for future environmental responsibility and has responded favorably to it. Some UK food companies are even going so far as to require the completion of a LEAF audit and compliance with integrated crop management in order to enter many fresh produce products into processor or supermarket sales. In fact, companies such as Birdseye, Sainsbury's, Tesco, and Safeway stores in the UK have released policies which "strongly suggest" completion of audits and protocols in order to gain market entry (Carruthers & Tinning, 1999). As a result, the LEAF brand has been

registered and labeling is slated for the future. As of September 1999, the LEAF audit has assessed 10% of the agricultural land in the UK (Ridley et al., 1999a).

2. Key issues and policy implications

The success of this program has been attributed to the farmer-to-farmer support as well as the integrated management approach achieved through the inclusion of all sectors. LEAF suggests the viability of a policy that is cheaper and less formal than ISO 14000. It is a system initiated by NGOs and driven by consumer demand, as evidenced in the requests by food processors and grocery stores. United States agriculture can learn from the farmer-to-farmer support and cost-effectiveness of LEAF, as well as the role of NGOs in its implementation. However, implementation of a LEAF-like program is less likely in the United States (than in the UK) to be consumer driven. Our research, including conversations with United States food processors, indicates that it is unlikely for EMS demand to come from higher levels of the supply chain. Presumably, the processors are unwilling or unmotivated to require EMS, since they are not hearing this demand from their customers (the consumers).

F. The New Zealand Experience: NOSLaM

1. Description of program

In 1996, the North Ontago Sustainable Land Management Group (NOSLaM) from New Zealand developed "ENVIRO-AG" through a grant from the Ministry for the Environment. ENVIRO-AG is an environmental management scheme based on ISO 14001. It consists of a process for assessment and monitoring of farm activities relating to environmental, animal welfare, and product safety issues. Each farmer develops an "Environmental Farm Plan" based on continual improvement according to his or her individual farm needs. Farmers then audit themselves once a year to ensure compliance with the objectives they have previously outlined. In addition, farmers are also subject to audits by NOSLaM every three years and random audits by a third party called SGS New Zealand Ltd. ENVIRO-AG, supported by research funding from AGMARDT and the Ontago Community Trust, is not an accreditation scheme in itself, but it satisfies the requirements of ISO 14000 accreditation (Overview of NOSLaM, 2000). This has been proven to be cost-effective since system requirements for ISO 14000 are dealt with at a group level (Ridley et al., 1999b). Over 80 properties in New Zealand are now using ENVIRO-AG plans, with a few of the first farms having already advanced beyond the audit to become officially ISO 14000 certified. To date, six farms have achieved ISO status with many more applications pending. Talk of developing labels that state, "This product comes from an environmentally friendly farm" is also spreading (Overview of NOSLaM, 2000).

2. Key issues and policy implications

The NOSLaM program is farmer driven and goal-oriented. Its success may be attributed to strong partnerships between the farmer and community as well as the processors, producer boards, and other industry groups. Perhaps the key to NOSLaM's success is the government grant and NGO assistance that got the program up and running. NOSLaM has also found the group accreditation scheme to be particularly effective based on the cost-effective nature of group coordination for certification of both ENVIRO-AG and ISO 14000 (Overview of NOSLaM, 2000). The lessons of NOSLaM are especially valuable for application to the United States agricultural sector. We believe that government and NGO assistance with start-up costs, as

well as cost-savings from group coordination, are key to the success of EMS in Midwest agriculture.

G. Farm*A*Syst Program (USA)

1. Description of program

The U.S. Farm*A*Syst (FAS) Program, begun in 1987 and operating in 46 American states today, is a partnership among government, universities, private businesses, and farmers (Ridley et al, 1999a). This program, developed in response to consumer and community concerns related to pesticide and groundwater contamination, helps farmers determine their risk. This program has since been expanded to whole farm management and provides guidance to farmers in an effort to achieve greater environmental performance and improvement without the fear of punishment from regulatory agencies. By providing direction without specific goals, U.S. Farm*A*Syst remains flexible and can be adapted in different forms by individual states.

This program's platform, designed around a series of legislated performance standards and best management approaches, was used as the basis for the Ontario EFP and resembles LEAF (Carruthers, 1999a). It consists of fact sheets, questionnaires, worksheets, and action plans. Based on the responses, confidential scores are calculated and recommendations for improvement are formed. To date, 8500 farmers have participated, which is less than 1% of the farmers in America. However, 70% of the 8500 have changed their management practices and 80% have recommended the Farm*A*Syst program to others (Ridley et al., 1999a).

2. Key issues and policy implications

The U.S. Farm*A*Syst program is informal and low cost, centered primarily on the dissemination of information. The major benefits of FAS include improved management skills, reduced risk of regulation, health protection, better credit ratings with lenders, elevated public confidence, and expanded access to financial assistance. FAS is a sign of hope for environmental management of Midwest agriculture. It implies that there is United States demand for environmental management (PPMs), apart from end-product standards. However, the low rate implementation of Farm*A*Syst hints at the small size of this demand. Without consumer demand or subsidies, the incentives for FAS boil down to reduced liabilities and, potentially, insurance and loan discounts. Although these motivations are not currently enough for widespread implementation of Farm*A*Syst, we believe that the program is a scalable model that can be expanded into other regions with the addition of subsidies, expansion of insurance and loan discounts, and greater publicity.

H. Gårdcertifiering ™: Farm Certification in Swedish Agriculture

1. Description of program

Gårdcertifiering™ is a voluntary program that integrates quality assurance and environmental management, allowing farmers to gain simultaneously ISO 9002 and ISO 14001 certification. Elements of the program include a mapping of the farmer's regulatory and contractual requirements, an understanding of the farm's environmental impacts, guidelines for future actions, internal quality and environmental audits, and a commitment to continual improvement.

> The underlying principle is management by objectives, which means that the manager himself defines the goals he wants to achieve. There is no prescribed level of compliance defined by the system itself, but existing laws and regulations are of course necessary to follow in order to be certified.
>
> (Bergström et al., 2000, p. 3)

Through Swedish Farm Assured (SFA), a program started in 1997, 39 Swedish farms implemented farm certification. These farms included milk, hog, and vegetable production, and ranged in size from zero to more than five external employees. Farmers who participated in this project received financial support, which covered the costs of certification procedures. Several interesting findings arose from a case study of these farmers, as described in "Farm Certification: Implementing and using quality and environmental management systems in Swedish agriculture" (Bergström et. al., 2000). The most interesting observations for the purposes of this paper involve the motives of farmers. The smaller farmers, those with 5 or fewer external employees, "perceived the financial support as a prerequisite for them to work toward a certification at all…To many farmers two months labour [equivalent to the estimated cost of certification] is much more valuable than a farm certificate. Especially when the market signals still are weak" (Bergström et al., 2000, pp.4, 7). By contrast, the larger farmers perceived certification as a valuable tool to improve their management practices. Other motives for certification included product differentiation, price premiums, and expected future consumer demand. Some stakeholders, for instance local authorities, banks, and insurance companies, have responded positively to farms being certified (Bergström et al., 2000, pp.5).

2. Key issues and policy implications

Farm certification in Swedish agriculture is relatively complex and expensive compared to the EMS programs discussed above. For the purposes of their study, Swedish Farm Assured fully compensated farmers for implementation costs. Subsequent surveys of the farmers indicate that this compensation is essential to the program's propagation. Most importantly, this case study demonstrates that most small farmers will not adopt an EMS as burdensome as ISO 14000 requires, without significant financial support.

V. Conclusions and Recommendations

If the analysis of current conditions in domestic agriculture provides grounds for pessimism, then the case studies provide some basis for optimism, which is perhaps the best way to conclude our report.

The preceding case studies make it clear that there are different styles and unlimited options for developing and implementing voluntary environmental management systems. It is also evident that an environmental management system need not be burdensome, time- consuming, expensive, and painful. Nonetheless, the case studies confirm our assessment of the domestic agricultural market – namely, that EMSs are expensive *enough* that some kind of carrot/stick intervention by government or NGOs is required, in the form of subsidies or cost internalizations such as regulation or taxes. Such inducements may be less necessary when and if consumer demand in the United States becomes strong enough to sustain more completely private forms of coordination. Moreover, such demand could allow EMSs to be gradually ratcheted up as

consumer awareness grows. The value of an incremental approach is seen most clearly by Ontario Agriculture's experience in moving towards ISO 14000.

Put more formally, the case studies prompt us to hypothesize that at least one of the following system conditions must exist to provide sufficient economic benefits for EMSs:

- Subsidies or other forms of financial assistance to farmers who implement EMSs
- Tough environmental regulations/cost internalization of environmental impacts
- Substantial consumer demand for sustainably grown food products (crops grown under environmental Production Processes and Methods).

In most of the case studies, we observed a combination of the above system conditions. In the case of the Ontario Environmental Farm Plan, farmers are motivated both by tough regulations and an incentive payment. In the LEAF program, there is a stronger consumer demand component. Some caution should be exercised when applying these models to Midwest agriculture, since conditions in the United States vary from conditions abroad. Specifically, the United States is notable 1), for having fewer environmental regulations, and an overall lower threat of future regulation and 2), for there being less consumer demand for food that has been grown in an environmentally friendly fashion. While these drivers appear likely to grow over time, current conditions call for intervention by the government or some other third party that can provide financial assistance for EMS implementation.

In most cases, successful EMSs have been highly flexible and have allowed the farmers to determine, or at least participate in, the promulgation of standards. This latter feature, if expanded to allow farmers free rein in developing the EMSs that they will follow, is one way to circumvent the systems conditions. Presumably, the farmers will choose to implement only those environmental management practices that realize net cost savings. Thus, some level of environmental protection may be achieved without intervention; however, other environmental practices that reduce yields (including some that produce large environmental gains) must be compensated.

One overarching lesson from the case studies is that all of these attempts at implementing EMSs follow an iterative and evolving process. The demonstrated successes of these studies have been the result of an ongoing learning process. None of them has achieved success overnight and all of them show an understanding of the complexity involved in reaching a generic EMS or more importantly, one with ISO 14000 stature. As the Farm certification for Swedish agriculture demonstrates, ISO 14000 is too complex and expensive, at least as a first step for environmental stewardship.

We would like to note here the following conclusions:

- The potential economic incentives for implementing an EMS include price premiums, increased access to foreign markets, and cost savings. The latter two incentives are highly likely; while the former is less certain.

- Without intervention, the market will probably not bring about the desired level of environmental management. Financial assistance, for example, in the form of subsidies to farmers, is necessary to overcome the lower level of regulatory pressure in the United States. However, a domestic market for eco-friendly crops could materialize ex post, diminishing the importance of subsidies going forward.

- There is particularly important lesson to learn from the NOSLaM experience. Specifically, it is possible for environmental management systems to be cost-effective for small farmers with appropriate assistance and coordination. EMS is a realistic target for Midwest corn and soybean growers provided that they work cooperatively through a coordinating body.

The last point above alludes to the role that IATP or another NGO or trade organization may play in bringing EMSs to Midwest agriculture. Each of these organizations may serve as a coordinating body and a hub for information sharing, training workshops on environmentally superior farming techniques, cost-sharing and economies of scale (shared consultants, etc.), cooperative lobbying for government (financial) assistance, and cooperative negotiations for discounts from banks and insurance agencies.

The agriculture sector can forge ahead of government regulation to meet consumer and community environmental and sustainability expectations. Voluntary environmental management systems for agriculture have proven to be worthwhile in several places around the world. Similar programs are both realistic and worthwhile for Midwest corn and soybean growers, especially in light of predicted United States trends: increases in regulatory pressure and market demand for environmental management. Proactive, voluntary environmental stewardship may even ensure that small farmers are not squeezed out of the market when EMSs become mandatory.

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Editors note

Full citations are currently not available for:
National Corn Growers Association, 2000 and American Soybean Association, 2000.

ISO 14000 & AGRICULTURE: incomplete bibliography

Editors note: this bibliography is an incomplete listing of resources that will aid in searching for information regarding agriculture and ISO 14000 - worldwide. Special thanks to Magnus Ljung for contributing information on ISO in Sweden and to Genevieve Carruthers for contributing a list of papers she has authored.

Australian Competition and Consumers Commission (2000) **-** http://www.accc.gov.au Search for "ISO and Agriculture" at this web site and you will access articles specific to happenings in Australia.

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http://www.rirdc.gov.au:80/reports/ras/99_94.pdf or http://www.agric.nsw.gov.au

A national workshop on Environmental Management Systems (EMS) in Agriculture was held on 26-28 May 1999, in Ballina, NSW, Australia. The principal objective of the workshop was to bring together delegates and facilitate communication regarding EMS. The long-term goal of this process is the development of a national strategy for the adoption and implementation of environmental management systems in Australian agriculture.

The proceedings provide information on the use and development of EMS in agriculture, and indicate the need for the development of policy, regulations and strategies for the practical implementation and support of EMS. Prepared by Genevieve Carruthers and Gavin Tinning, both with NSW Agriculture, for the Rural Industries Research and Development Corporation.

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globeNet - a comprehensive EMS source (2000) http://www.iso14000.net/
globeNet has an agriculture database that features recent articles and case studies that are ISO 14000 and EMS related. For example, case studies and articles include, “Wisconsin Project Strives for Environmentally Friendly Potato’s with ISO 14000", "Australian Cotton Farm Strives to Produce Green Cotton EMS", and "Fresh Del Monte Produce Announces its Third ISO 14001 Certification.”

You must subscribe to globeNet to access the articles and case studies. To subscribe to globeNet, call 301-284-3015.

Institute of Environmental Management & Assessment (2000) Eco Management & Audit Scheme (EMAS) Competent Body. United Kingdom. http://www.emas.org.uk/

This web site contains the latest information about the scheme and details on how to participate. You can download copies of the EMAS registers, including the register of local authorities who are participating in LA-EMAS. These are updated when new sites are added. You can also download the full text of the EMAS Regulation and copies of the European Commission's proposal to change the scheme, which will incorporate ISO 14001 as the environmental management system requirement and open the scheme to all types of organization.

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ISO 14000 & Ontario Agriculture: Is the Time Right? (2000) Conference held March 26, 1998. Arboretum Centre, University of Guelph.
http://www.oac.uoguelph.ca/www/FSR/iso14000.htm

Topics include why farmers should be interested in Environmental Management Systems, such as ISO 14000, the benefits of ISO 14000 to farmers and the agricultural sector, the costs of implementing ISO 14000 and lessons learned from other certification initiatives. To order a copy of this book, visit the website or phone Ellen Wall: (519) 824-4120 ext 8480 Fax: (519) 763-8933 Email: EWALL@envsci.uoguelph.ca

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The Pacific Institute, an independent and non-profit center, that does research and policy analysis in the areas of environment, sustainable development, and international security. Their analysis covers the creation of the ISO standards and their implications for global commerce and environmental protection. Also addressed is the ISO 14001 EMS standard. Three case studies are provided, none of which are agriculturally related and finally, they offer conclusions and recommendations on how the ISO 14000 series standards might be integrated into existing commercial practices, regulatory structures, and trade regimes in a socially equitable and environmentally beneficial manner.

The Pacific Institute, 654 13th Street, Preservation Park, Oakland, CA 94612 www.pacinst.org 510-251-1600

North Ontago Sustainable Land Management Group (2000) "Overview of NOSLaM". http://noslam.co.nz/welcome.html

The North Otago Sustainable Land Management Group (NOSLaM) aims to have North Otago, New Zealand recognized in the market place, both nationally and internationally, as a community operating sustainable farming systems.

NOSLaM's major project is the development of the "ENVIRO-AG" Farm Environmental Certification scheme, modeled on ISO 14001 environmental certification. The "ENVIRO-AG" process helps farmers objectively assess the environmental impact of their farm practices, develop suitable management practices and monitoring methods, then prove their compliance. The farmer controls this process and tailors the plan to suit his or her own needs.

Ruddell, S & Stevens, J.A. (March 1998) *The adoption of ISO 9000, ISO 14001, and the demand for certified wood products in the business and institutional furniture industry*. Forest Products Journal.

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ISO and AGRICULTURE IN SWEDEN
SWEDISH FARM ASSURED (web site)
http://www.swedishfarmassured.com

Note: The paper we wrote was based on empirical data from farmers involved in this scheme. The product certification used in this market-oriented project, is based on the international standards for quality assurance (ISO 9002) and for environmental performance (ISO 14001). Since the aim of the present scheme is to create a simple and transparent system, these two existing standards have been brought together into an integrated plan for agricultural companies. One of the goals of the farm assurance scheme is to replace the numerous controls undertaken at present with a single, annual audit in order to eliminate unnecessary duplication

of work at farm level. The result is a computerised quality assurance and environmental performance plan that can be implemented by all agricultural companies. The system is a template that can be modified according to conditions at the individual farm. This integrated quality assurance program allows complete "one corridor" traceability of all the products that carry its stamp – from their place of origin to the point of sale. By entering the food product code at the homepage, you can follow the product all the way back to the farmer.

SWEDISH SEAL (web site)
http://www.svenskt-sigill.com/eng/index.html

Note: Swedish Seal of Quality is a spearhead operation in Swedish agriculture that targets the food sector's processing industry, wholesalers and retailers, as well as large-scale kitchens and consumers. It is about precision agriculture, with a combination of quality, food safety and environmental sustainability, and a price that enables the concept to cover large volumes. The concept aims to create added value for producers, the processing industry, trade and consumers, while also fulfilling the market's high demands on a controlled, traceable quality raw product which has been produced with particular consideration to food safety and the natural environment. Swedish Seal will be developed in collaboration with producers, customers and consumer/environmental organisations, and marketed to become a well-established brand. Approximately 550 contract farmers produce 125,000 tonnes for Swedish Seal. The Swedish Seal system contains demands of documentation and checklists for control and audit purposes. Each year an independent accounting company, SEMKO Certifying AB (Ltd.), audits the accounts of at least 7% of the farms selected at random. In addition, our own Swedish Farmers' Supply and Crop Marketing Assoc. internal auditors also audit more about 33% of the farms. Audit reports act as a basis for SEMKO's certification of the entire Swedish Seal group of farms. SEMKO AB is generally regarded as Scandinavia's leading test and certification company.

SKÅNE DAIRY (web site - in Swedish)
http://www.skanemejerier.se/miljo/

Note: Skåne Dairy has app. 1400 milk producing suppliers. In Sweden they have been no. one in many environmental areas. They was the first dairy industry to be certified according to ISO 14001, registered according to EMAS, implementing an environmental bonus system for their farmers (which will be obligatory), and had the first and have most certified milk producers according to ISO 9002 and ISO 14001. Today Skåne Dairy works with three different categories of milk; a) certified according to ISO 9002 and 14001, b) according to the environmental bonus scheme, and c) organic milk.

THE FEDERATION OF SWEDISH FARMERS (web site - mainly in Swedish)
http://www.lrf.se/pavag/gardcert/gardcert.htm

Note: The Federation of Swedish Farmers (LRF) has initiated and supported the implementation and use of quality and environmental management systems. On their homepage they tell us that an implementation is motivated from both a market perspective, as well as a management perspective. When it comes to details about their work they link to the homepage below.

MILJÖLEDARNA CICCONIA AB (web site - mainly in Swedish)
http://www.ciconia.se/

Note: Miljöledarna Ciconia AB is a consulting company helping other companies and organisations to minimize the environmental effects of their activities. The carrying idea of the

work is that there is a connection between financial and environmental issues. We help our customers by developing tailor-made systems where the organisation's impact on the environment is translated into facts and figures. It is a subsidary to LRF (see above). They have developed the concept Farm Certification, which is a certifiable system according to ISO 9002 and ISO 14001, especially applied for farms.

ISO-FAKTA NORDEN (web site - in English):
http://www.isofakta.com/

Note: On this homepage you can find information about companies certified according to ISO 9001/2 and ISO 14001 in all Nordic countries. If you search country by country or all countries at the same time, by using the SNI-code (for agriculture it is 01), you will get all certified companies listed with some additional information. When I did that today I got 67 farming/agricultural companies in Sweden, 60 in Denmark, 6 or 7 in Finland, and none in Norway and Iceland. Note that these are listed twice if they both are certified according to ISO 9002 and ISO 14001.

Swedish Farmers and ISO
All of the following web sites are in Swedish, but its fully possible to contact the farmers below through their homepages and ask questions in English.

STAFVA GÅRD AB (Farmer: Patrik von Corswant)
http://www.gotlandica.se/stafva/

WAPNÖ AB (Farmer: Lennart Bengtsson)
http://www.wapno.se/nyheter.htm or http://www.wapno.se/

HÖGESTA GÅRD AB
http://www.skanemejerier.se/webit/Websidor/visaSida.asp?idnr=-411

Hillary, Ruth (1999) *"Small and Medium-sized Enterprises and the Environment: Business Imperatives."* The Network for Environmental Management and Auditing, UK. ISBN: 1-874719-22-5. 416pp, hardback. 234x156mm.

This book tackles a largely neglected topic: Small and medium-sized enterprises (SMEs) and their environmental impact. Over 90% of all firms are SMEs. Their importance to the health of national and international economies is recognized. But what of their environmental impact? Individually, this may be small, but collectively, they pose a huge and largely unregulated threat to national and indeed the global environment. In 'SMEs and the Environment' Dr Ruth Hillary brings together an international collection of experts from government, international and national support agencies, academics and the business community to present arguments about the key environmental business imperatives facing the small firm sector.

The book is divided into five sections: In these sections, the book examines the threats such as trade, supply chain issues and legislative compliance but is also solution-oriented, with considerable discussion of the management tools smaller forms can use to improve their environmental performance. It aims to provide practical strategies for smaller firms and to that end includes a range of informative case studies from around the world.

To order this book, contact: Samantha Self, Greenleaf Publishing Aizlewood Business Centre, Aizlewood's Mill, Sheffield S3 8GG UK Tel: +44 (0)114 282 3475, Fax: +44 (0)114 282 3476 e-mail: greenleaf@worldscope.co.uk, http://www.greenleaf-publishing.com

Richard Riddiford (2000). *The Living Wine Group - A Group Approach to ISO 14001.* Living Wine Group, New Zealand. http://martinborough-vineyard.co.nz/iso/

In February 1998, the Living Wine group from New Zealand became the 1st vineyard to become ISO 14001 certified. Living Wine is a cooperative group of four wineries. See Riddiford's paper in the section titled "ISO 14001 and Agriculture: contributed papers" (Appendix II-E).

Wall, Ellen (1997) *International Standards for Environmental Management Systems: Their Implications for North American Agriculture.* University of Guelph. Ontario. http://www.iatp.org/labels/library/ad…/International_Standards_for_Environmental_Mana.html

Paper presented at the Annual Meetings for the Rural Sociological Society, Toronto, Ontario, Canada, Aug. 12-16, 1997 and the North American Farming Systems Research and Extension Association Conference "Food and Natural Resource Systems: Integrating Diversity, Action and People", Nov. 2-5, 1997. Paper provides general overview, concerns and the basics of ISO 14000 and 14001. The conclusion addresses some possible consequences for agricultural sector from adoption of ISO 14000.

Wall, Ellen, Alfons Weersink, and Clarence Swanton (1998) *Ontario Agriculture and ISO 14000.* Farming Systems Research Project and University of Guelph. Summary report for the Ontario Farm Environmental Coalition and Ontario Federation of Agriculture.

The report is divided into four parts. The first is devoted to general background issues including the idea of standards and the role ISO has played in developing them. Part II of the report goes into more specific details concerning ISO 14001 such as requirements for certification. The report then reviews potential costs and benefits from ISO 14001 for the agriculture industry in Part III. Part IV serves as conclusion to the report and includes a number of implications concerning ISO 14000 and Ontario agriculture.

Welford, Richard (1998) *Corporate Environmental Management 1: Systems and Strategies. Second Edition.* Earthscan Publications Ltd., London.

This second edition focuses upon EMAS and ISO 14001, while the auditing approach within the ISO 14000 series is also examined. The examination of strategy now places more emphasis on cost reduction and differentiation as a means to achieving a competitive advantage through environmental management, while many areas such as that on life cycle assessment, have been updated.

"Who Will Pay for On-Farm Environmental Improvements in the 21st Century?" (2000) is available at http://www.nal.usda.gov/wqic/ResourceGuide.html

This guide was produced in support of a symposium that was recently held at the National Agricultural Library (NAL).

The guide has two sections: The first contains literature citations selected from AGRICOLA--NAL's database of agricultural literature. Citations cover United States agriculture during the past five years. To find additional citations, search AGRICOLA at

http://www.nal.usda.gov/ag98/. The second section contains annotated links to selected World Wide Web sites relevant to the topic.

Information sources in this guide focus on policies and programs related to agriculture and the environment. You'll also find items that examine how these broad policies interface with production factors and issues of environmental stewardship to influence farm-level decisions.