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Managing for Sustainable Agriculture

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PREVIOUS ARTICLE | ISSUE CONTENTS | NEXT ARTICLE

Managing for Sustainable Agriculture

Abstract
The article presents the Agriculture Environmental Management System (AEMS) as a model for the integration of voluntary agriculture environmental management systems into agriculture production operations. The model can serve as guidance for Extension personnel as they assist operators in focusing on continual improvement of their enterprises' interactions with air, water and land resources; pollution prevention; effective compliance management; and owner/operator involvement, using ISO 14001 standard as a baseline.

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Introduction

Extension can provide owner/operators of animal feeding operations (AFO) with a systematic approach to meeting both their business and environmental goals. Farmers and ranchers are recognized as the leaders and primary stewards of the nation's natural resources. These producers are also aware that there is growing public concern for environmental protection and sustainable development. Like professionals in many other businesses and industries, agriculturists are being challenged to demonstrate a commitment to environmental improvement. Implementation of an Agriculture Environmental Management System (AEMS) can assist in this effort in variety of ways.

The focus of effective environmental management is the using of a systematic approach to planning, controlling, measuring, and improving an operation's environmental effort (Stapleton, Cooney, & Hix, 1996). Deming (1986) has demonstrated that, for most industries, 85% of an operator's effectiveness is determined by the production system, only 15% by the operator's own skill. The production system is where managers have their greatest leverage for change and improvement. The potential for significant improvements and cost savings can be achieved by improving the operations management processes. The crucial point is that not all environmental problems need to be solved by installing expensive pollution control equipment.

Modern agriculture in the United States is characterized by a complex integration of bio-chemical, mechanical, and agronomic systems (Just, Schmitz, & Zilberman, 1979). These systems have enabled modern agriculture to become one of the most sophisticated industries in the world (Burke & Wakeman, 1990). Specifically, these systems have continually improved agriculture in a manner that has made agriculture essential to U.S. economic stability, rural community viability and a healthful and high-quality food supply (USDA-ERS, 1998).

An important consideration in this continual improvement cycle is a movement toward sustainable development (Hawken, 1993; WCED, 1987). Ritchie and Hayes (1998) defined sustainable development as seeking a balance between economic growth and environmental protection. This balance will require modern agricultural systems to be integrated with economic, biologic, and human social systems to create a sustainable system of business.

Extension has developed the theories, methods, and tools to assist agricultural producers to meet the challenges of sustainable development. Extension has assisted many farms and ranches in adopting management system frameworks such as the Dairy Herd Improvement Program, irrigation water management, feed management, and Integrated Pest Management. These existing frameworks have similar elements that are also needed in an AEMS. Thus, much of what is

required to implement an AEMS may already be in place. Integrating environmental management with these existing elements can improve an operations economy and performance.

Need for a New Model

Due to increased pressure for environmental sensitivity, the United States Department of Agriculture-United States Environmental Protection Agency (USDA-EPA) adopted the Unified National Strategy for Animal Feeding Operations (USEPA, 1999). This strategy has serious implications for producers. Producers view this strategy as being founded on the environmentalist notion that agriculture producers must be pushed into preserving the environment using the command and control model of management (Ritchie & Hayes, 1998). Ritchie and Hayes (1998) noted that local, state, and federal agencies are struggling with competing political agendas that seek to recreate environmental programs and their administration, with the result that accomplishing goals becomes increasingly difficult. Finally, Ritchie and Hayes (1998) suggest that producers view environmental programs with prescriptive regulations and standards as incompatible with viable production agriculture.

Managers of modern agriculture production businesses must balance the demand on limited resources among many complicated and interdependent systems. Examples of these systems include:

- Cropping systems,
- Livestock management systems,
- Irrigation and drainage systems,
- Pest control systems,
- Resource conservation systems,
- Equipment maintenance and replacement systems,
- Produce storage,
- Transport,
- Marketing systems, and
- Financial management systems (USDA, 1992).

Ritchie and Hayes (1998) state that "increasingly complex environmental regulations only add to managers already overwhelming schedules." They continue by additionally stating that due to uncertainty about the scope of regulations and costs of compliance, many managers believe that environmental management only drains resources and reduces productivity. These managers are struggling for survival and do not give top priority to sustainability.

There is evidence that improving environmental performance can lead to profitability. Repetto (1995) found that operations with good environmental performance were just as profitable as operations with poor environmental performance. He found that getting added value for environmental management was the way to profitability. He suggests government can lessen the burden of environmental management programs by:

a. Provide producers with flexibility in setting and meeting environmental goals;

b. Promote permits with entitlements for the use of resources (e.g. emissions trading);

c. Reward proactive environmental management practices throughout the entire economy; and

d. Build into the price structure of markets the costs of environmental degradation and/or preservation.

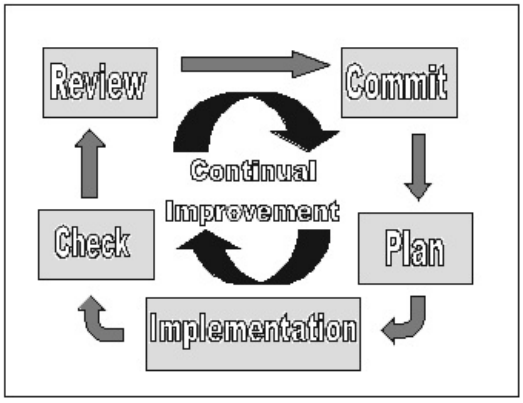
Ritchie and Hayes (1998) found that managers tend to deal well with the aspects of environmental issues that they understand, but react in crisis mode to those aspects they do not understand. Extension can influence the mind-set of producers by demonstrating that proactive environmental management can result in more effective operations and improved profitability. A new producer view toward an effective and efficient environmental management program will evolve. This new view will be based on long-term planning, not on short-term expediency.

The Basic Model

A favorable model that could be used to develop an AEMS is the Environmental Management Systems Model (Figure 1). This model is based on the International Standards Organization (ISO) 14000 series of environmental management standards (Ritchie & Hayes, 1998). Previous efforts and existing programs that agriculture producers have in place can reduce the complexity of setting up an AEMS. According to Stapleton et al. (1996), an effective Environmental Management System (EMS) will improve the economic performance of an operation by assessing the causes of problems and then providing a means for eliminating them (the prevention versus detection method). An AEMS can serve as an investment in the long-term viability of a farm or ranch. Stapleton et al. (1996) noted that this viability will be achieved not only by assisting the operation in meeting environmental goals but also by reducing liability, improving regulatory compliance, reducing costs, and improving public perceptions.

Figure 1.

The Environmental Management Systems Model



The AEMS should be a site-specific system tailored to the producer and the operation. The strength of AEMS is that it establishes a process for achieving environmental quality and can be applied to any size operation. It does not establish performance standards that must be met. There are no specifications for how an operation should satisfy requirements, and it does not specify levels to be achieved. Figure 1 shows the major components of the basic model and the continual improvement cycle required for its adoption.

Phase I: Commitment and Initial Assessment

Producer commitment is essential to implementing a successful AEMS. The producer must clearly and enthusiastically communicate their commitment to the program and support the AEMS. This commitment should include making available the needed resources and being accountable for the successful implementation of the program. During this phase, Extension could assist the producer in establishing and communicating a vision and policy statement for the AEMS. This vision is the future to which the operation aspires and is the long-term view that provides the platform upon which the operation is built. The policy statement should be specific, but not detailed or overly long. The statement will allow the operation to develop meaningful, activity specific operating policies for such as discharge response.

An initial assessment is part of the overall process and provides a benchmark for evaluating current efforts. Ongoing assessment demonstrates the operator's commitment and provides for evaluating future progress made toward improvement. It is critical that producers be actively engaged in operational assessment. The assessment should consider items such as:

- The regulatory requirements that apply to the operation,
- The operations internal support (including personnel,
- Funding,
- Management practices and procedures,
- The producer's commitment),
- The sources of contaminants and impacts resulting from all aspects of the operation,
- Environmental controls and their effectiveness,
- Evaluation of current performance compared with existing regulations and policies,
- Current gaps and needed program areas,
- Equipment,
- Personnel, training, and documentation, and
- Estimated costs and benefits.

The producer should perform the assessment and develop a report that thoroughly reviews all of the operation's management options. The report could also identify specific requirements needed or areas for upgrade. This assessment will be used to maximize resources and position the operation for success toward reducing any negative impacts to the environment.

Phase II: Planning

Phase II entails process analysis, planning, and documentation. This is essential for good planning and is an integral part of the continual improvement program. Process analyses are those activities of the operation that will be broken down into discrete steps, each of which is examined to identify opportunities to eliminate or minimize environmental impacts.

A variety of production agriculture systems that could be included are:

- Manure management systems;
- Cropping systems;
- Livestock management systems;
- Irrigation and drainage systems,
- Pest control systems;
- Resource conservation systems;
- Equipment maintenance and replacement systems;
- Produce storage, transport, and marketing systems; and
- Financial management systems.

Most operators tend to think of each of these systems in terms of a task carried out in relative isolation from other work on the operation. The first step in quality improvement is for operators to look at each of their systems in terms of being part of a continuous process. A process is simply a sequence of tasks that together produce a product or service. The best way to understand a process is to draw a flow chart showing all the steps. When you do this it is possible to visualize work in terms of being a step in a process. A whole set of new insights opens up.

Once the processes are charted, other components of the AEMS can be developed. Planning specifications will require the operation to identify any activity, product, or service that can affect the environment (either beneficial or adverse); evaluate these impacts; and use the information gathered to set objectives and targets. There may be additional legal and regulatory requirements addressed during this phase and prior to implementation of the program. Documentation is necessary to demonstrate adherence with the AEMS. Charting the processes could reveal what documentation is needed by the operation. Supportive documentation should be carefully planned so as not to overwhelm the AEMS process.

Although there are no specific documents required, there are some conventionally accepted methods of keeping records. Record keeping could take the form of a policy manual that includes the AEMS policy, provides information about the operation, and shows how the operation adheres to the AEMS. Additionally, procedures for carrying out the AEMS policy should be documented.

The procedures should identify the who, what, when, and where of operations. These operating procedures are needed for equipment calibration, emergency response, maintenance, manure handling, and any other element of the operations processes that can affect the environment. The final set of documents to be included should be work instructions. These instructions should detail how individual tasks, such as box-spreader calibration, should be done. Equipment manufacturers provide operation and maintenance manuals, and these can be easily included as part of the work instruction documents.

Phase III: Implementation

The third phase of the model is implementation of the AEMS. This is actually an ongoing process that begins with the commitment to develop a system. However, a fully implemented system is more than having written policies, procedures, and work instructions. A fully implemented system is operating as documented and is doing what the producer says the system will do. Good documentation is one way of demonstrating that the AEMS is implemented. Records to be kept include incident reports, assessment results, and copies of regulations. During the process analysis phase, record maintenance, by whom, and for how long will be determined. The producer should develop records that are easy to use, easy to manage, and easily accessible to provide verification of the AEMS process.

Phase IV: Checking

This fourth phase entails measurement and evaluation of the AEMS, which will determine whether the operation actually does what the producer says it will do. The producer should develop a formal review process. This checking process should include audits to evaluate the AEMS on a periodic and ongoing basis. Extension could perform unbiased and non-regulatory external audits for producers. These external audits should be documented and included in the records of the operation.

Phase V: Reviewing

The final phase is periodic review and revision of the AEMS. Continual improvement means that the producer will review available data and determine whether the AEMS is meeting established objectives and targets, and, if not, make necessary changes. The results of this management review should be a return to the continuous improvement cycle. This should include re-commitment to the process, planning the next improvements, implementing those improvements, and then checking and reviewing the improvements. Continuous effort with all aspects of the AEMS will be needed to achieve excellence.

Concluding Remarks

It is important to recognize that operators who adopt the AEMS may not necessarily be sustainable, but they are moving in a direction that is believed to be essential to global sustainability (Ritchie & Hayes, 1998). To many, these steps may appear to be out of touch with the day-to-day pressure facing production agriculture. Ritchie and Hayes (1998) state that there has been a concerted international effort in the direction of sustainable and restorative commerce. They continue by saying that one result of these efforts has been the development of the ISO 14000 series of environmental management standards.

Based upon the ISO 14000 series, an AEMS could serve as a method for producers to measure their operations potential impacts in terms of the ecology, economy, and social equity of existing products and services. Extension can have a role in guiding production agriculture toward sustainable and restorative commerce through assisting producers in developing and implementing an AEMS.

References

Burke, S.R., & Wakeman, T. J. (1990). *Modern agriculture mechanics* (2nd ed.). Danville, IL: Interstate Publishers, Inc.

Deming, W.E. (1986). *Out of the crisis*. Cambridge, MA: Massachusetts Institute of Technology.

Hawken, P. (1993). *The ecology of commerce*. New York, NY: Harper Business.

Just, R.E., Schmitz, A., & Zilberman, D. (1976). Technology change in agriculture. *Science*, 266, 1277-1280.

Repetto, R. (1995). *Jobs, competitiveness, and environmental regulation: What are the real issues?* Washington, D.C.: World Resources Institute.

Ritchie, I., & Hayes, W. (1998). *A guide to the implementation of the ISO 14000 Series on environmental management*. Upper Saddle River, NJ: Prentice Hall PTR, Prentice-Hall, Inc.

Stapleton, P.J., Cooney, A.M., & Hix, W.M. (1996). *Environmental management systems: An implementation guide for small and medium-sized organizations*. Ann Arbor, Michigan: National Sanitation Foundation.

United States Department of Agriculture, Economic Research Service [USDA-ERS]. (1998). *Nonfarm input prices, price margins, and consumer food prices* (ERSTB1867). Washington, D. C.: Author.

United States Department of Agriculture, Natural Resource Conservation Service. (1992). *Agriculture waste management field handbook* (Part 651). Washington, D.C.: Author.

United States Environmental Protection Agency. (1999). *Unified national strategy for animal feeding operations*. Washington, D. C.: Author.

World Commission on Environment and Development. (1987). *Our common future*, 1,8. Oxford, Great Britain: Oxford University Press.