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Abstract
Levels of fertilizer and pesticide usage in Iowa may change in response to at least two forces. One is growing public concern about the environment, which has resulted in increased regulation of the manufacture, distribution, and application of chemical pesticide products. Use of some products has been severely restricted, while others are under evaluation.

Keywords
Economics, Biocontrol and Integrated Pest Management, Economic and environmental impacts

Disciplines
Agricultural and Resource Economics | Agricultural Economics | Economics

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Alternatives for implementation of integrated crop management (ICM) programs in local agricultural input firms

Background

Levels of fertilizer and pesticide usage in Iowa may change in response to at least two forces. One is growing public concern about the environment, which has resulted in increased regulation of the manufacture, distribution, and application of chemical pesticide products. Use of some products has been severely restricted, while others are under evaluation.

The second force has to do with declining government price support payments, which are causing farmers to evaluate more carefully the costs of producing agronomic crops. Farmers will be seeking effective, lower-cost methods of providing nutrients and protecting crops in order to maintain profitable production. In some cases, this may lead to reduced amounts of purchased inputs such as chemical fertilizers and pesticides.

Such changes could potentially impact local fertilizer and ag chemical dealers. In fact, a significant number of local input supply and grain marketing firms in Iowa have been experiencing financial stress since 1988. By 1991, up to half were generating inadequate cash flow to replace fixed assets or to grow. At the same time, the remaining half showed upward trends in cash flow and profits. If these trends continue, the industry’s structure may undergo significant changes, resulting in fewer firms, fewer alternatives for farmers, and adverse impacts on rural communities.

One strategy for maintaining gross margin and service income while reducing chemical sales is the provision of Integrated Crop Management (ICM) services. Such services may include scheduled farm visits for scouting purposes, selection of crop rotations, soil testing by soil type, field-specific yield goal setting, fertilizer recommendations, pesticide recommendations, tillage and machinery recommendations, hybrid or variety selection, enterprise records analysis, conservation compliance advice, post-season evaluation, and others. These differ from traditional consulting services in that they place more emphasis on long-term, preventive, whole-farm management. Preliminary indications from a 1991 survey of Iowa cooperatives showed that there may be significant interest in the ICM approach among fertilizer and ag chemical retailers.

If ICM practices are to be widely and promptly adopted, it is most likely to occur through the existing input/supply business structure. ICM programs that attempt to substitute "as needed" use for "insurance" applications of chemical pesticides and fertilizers fall into the category of new services. However, information on profitability, the ability of such services to provide a competitive edge, and on the techniques used to implement a successful program is critical in facilitating timely adoption of ICM.

Although ICM has potential for eliminating unneeded chemical and fertilizer applications, reducing farm production costs, and benefiting the environment, the potential will remain untapped unless these services can be provided at prices farmers are willing to pay. Accomplishing these goals requires information about costs, lost revenues from declining product sales, income from such services, and workable implementation processes. The objectives of this project were thus to

(1) determine the current and historical importance of fertilizer and ag chemical sales
as a source of gross margins and net margins in diversified local dealerships;

(2) evaluate the feasibility of alternative programs for delivering ICM services in different size firms and the associated revenues and costs of these programs;

(3) identify the requirements for implementing various types of ICM programs, documenting items such as capitalization, personnel, budgeting, training, recruiting, recordkeeping, data processing, marketing, and start-up costs; and

(4) identify key performance areas and key performance indicators useful in managing, controlling, and evaluating the performance of ICM programs.

**Approach and Methods**

Determining the role of fertilizer and ag chemical sales as a source of gross and net margins in diversified dealerships is necessary before dealers enter the market with ICM services (see Fig. 1 for two models of ICM service delivery; see Fig. 2 for budgeted cost and revenue estimates for each model). The role of product sales was considered on a historical basis using data from financial statements of 71 cooperatives and corporate agribusiness firms for the fiscal years 1988, 1990, and 1992. Industry associations assisted in compiling these data.

A case study approach was used for objective three because only a few ICM programs were already in operation. The costs and returns data from these programs were used to determine costs and revenues. Where available, cost accounting data were used; where not, approximations were developed with the help of internal managers and accounting personnel. Because ICM services were viewed by many as a potential competitive advantage, their value in this respect was documented as completely as possible among ICM programs in different sizes and types of firms, so that a range of alternative programs could be evaluated.

The case study approach was also used to pursue objectives three and four. Qualitative management approaches and techniques were described and documented, as were the pitfalls. Because of a lack of input supply firm programs with broad ICM scope, data sources were too limited to be surveyed; instead, crop consultants' experience was used in develop-

**Fig. 1. Two alternative models for delivering complete ICM services.**
ing budgets and labor estimates. Areas critical to the success of various ICM programs were identified along with qualitative performance standards for various types of ICM programs. Investigators anticipated that delivery of ICM services required much different approaches to control and evaluation than did product sales activities.

Findings

Objective one (importance of chemical sales as a source of gross margins): A sample of elevator supply firm financial statements was analyzed to determine the contribution of fertilizer and pesticides to gross margins and revenues. The average percent of total sales from fertilizer and pesticides was calculated and compared to the average percent of total gross margins contributed by these products for firms in the sample. On average, investigators found that fertilizer and crop protection chemicals were generating a much larger fraction of the firm’s gross dollar margins than the fraction of actual dollar sales they generated.

Beyond that, the relative importance of these categories appears to have grown since 1988 (see Fig. 3). This implies that a reduction in sales for these products would have an exaggerated effect on the gross revenue available to pay expenses and provide profits. The more specialized firms in the sample (those with a higher fraction of sales generated by fertilizer and crop protection chemicals) tended to be more profitable in each of the three years analyzed. However, this higher level of dependence on fertilizer and chemicals also made them more vulnerable to reductions in the use of these products.

Objective two (cost feasibility of ICM programs): Results indicated that the replacement of product sales revenue with service revenue from provision of ICM services will be feasible in only a limited number of cases. Analysis of financial statements showed that profits were lower when a simulated product sales reduction of 30% (with the associated reduction in variable expenses) was imposed. The addition of a single-consultant ICM program with associated revenue and expenses only partially offset the profit reduction. When reductions in product sales were less than 10%, profit replacement appeared to be more likely. When product sales were reduced by 20%, full profit replacement appeared very unlikely. Nevertheless, addition of ICM services to partially replace lost revenue appears to be a sound strategy. The provision of these services may attract customers away from

Fig. 2. Budgeted costs and revenues (gross and adjusted overhead expense and profit) for the two alternative models.
firms not offering such services. Furthermore, in some of the larger firms it may be possible to add more than one ICM consultant.

In terms of the two models for provision of ICM services, the scouting model (Fig. 1), in which scouts report to a coordinator, offers the advantages of high skill level, regular contact of scouts with producers, and rapid attention to problems. The professional-technician model offers a broader set of skills, more carefully timed visits, more direct contact with clients, and expertise focused directly on delivery of service rather than on training of scouts.

Objectives three and four (identification of ICM implementation requirements and key performance indicators): Many agribusiness firms have trained agronomists on staff who consult with and provide advice to farmers. However, few if any have been able to successfully charge for such services. At the same time, similarly trained, independent crop consultants who provide consulting services have successfully charged for their services. The few agribusinesses who have been able to charge generally have well-defined programs that are distinct from "free" services provided to support product purchases.

Theoretical modeling indicated that a major cause for this discrepancy may lie in the scope of services and the way services are delivered. Dealer programs usually do not limit access to the agronomists (or agronomists' caseloads) to levels where a complete and effective ICM service can be delivered. Since farmers are uncertain about the quantity and quality of service they may get in a program where access in not well defined, such programs are unlikely to be successful.

Likewise, dealer programs that concentrate on a narrow and incomplete set of services or programs that permit the customer to select from a complete set of services on a "cafeteria" basis are also less likely to succeed. Since the farmer may not select the individual component services most likely to add to farm profits in a given year, the improved results expected by the farmer may not materialize.

Fig. 3. Average fertilizer and chemical share of firm sales, gross margin, service revenue, gross profit, and net profit.
Successful programs are thus likely to require that (1) dealers offer a full range of services, (2) dealers distinguish the ICM program clearly from "free" services provided with sales efforts, and (3) caseloads be reduced in situations where one agronomist is providing ICM services to 20-30 clients.

**Other findings:** Among the options for rate structures when firms charge for ICM service are the flat rate per acre, the variable rate per acre, and cost recovery from the individual client. Advantages include, respectively, simplicity, flexibility, and the appearance of precision.

Personnel selection and training are probably the most critical factors in establishing a successful ICM program. Both technical skills and people skills are needed. Obtaining the broad-based technical background required for ICM can be difficult. The establishment of an internal training program by the dealer may be necessary in some cases. One alternative involves forming alliances with existing independent crop consultants. Although this offers the advantage of technical expertise, the program will not be controlled as directly by the firm. But fee-based ICM programs simply cannot succeed with a sub standard knowledge and skill base.

Management of an ICM program by ag input supply/marketing firms should not present a major barrier. Most such firms have well-developed accounting and information systems, organizational structure, control systems, and billing/collection systems. Many firms have experience in new program start-up and implementation.

The relationship between client and consultant is one of the firm's most important management challenges when ICM services are integrated. Marketing of the ICM program is also an important factor in its success. The profile of the potential ICM customer may include large efficient producers seeking to improve, producers with limited time, those seeking decision-making assistance, those in a "must perform" situation, and those seeking monitoring service and technical assistance.

Finally, the barriers faced by dealers attempting to establish ICM programs include customer expectations for free service, high cost of intensive ICM service, potential conflicts of interest, limited scope of services currently offered, customer misconceptions about ICM, difficulty in getting adequate acreage subscription, and the need for producers to shift toward a multi-year perspective. Strategic alliances must be established among dealers, consultants, and producers that are based on trust, willingness to share information, compatible objectives, and good faith.

**Implications**

In summary, the factors critical to the success of a true ICM program are client base selection, type and scope of program offered, charge rate and basis for charging, personnel recruitment and training, program management, program marketing, and phased start-up and development.

Unlike many services offered by agricultural input supply and marketing firms, ICM services cannot be provided economically for all customers. Consultant caseloads must be limited, and the service cannot be offered in situations where the cost of providing it exceeds the amount the client pays for it.

Rapid changes now occurring at both the production level and the input farm supply and marketing firm level in the Midwest are forcing adjustments. Declining price supports are making it necessary for producers to not only increase the output per acre but reduce the costs at the same time yields are increased. This requires more careful evaluation of the inputs used, the practices and equipment used, and the timing of operations. As producers face increasing financial pressures, they need more reliable methods of cost-effective crop production. ICM services represent strong potential not only to provide such methods, but to ensure the viability of local agricultural supply dealers, both privately and coopera-
tively owned, which in turn will help to ensure the long-term viability of rural communities.

Findings from this project have been disseminated extensively via presentations at various association, crop consultant, and cooperative meetings.

The ISU Economics Department and the Iowa Fertilizer and Chemical Association (now the Agribusiness Association of Iowa) cooperated in this project by providing in-kind funding, assisting in data collection, and identifying cooperating firms for gathering the case study information. An advisory committee consisting of members of these entities as well as from the Iowa Feed and Grain Association and the Iowa Institute for Cooperatives also provided information about existing ICM programs and helped maintain focus on the key aspects of ICM implementation during the conduct of the project.

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