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*Social Sciences  
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## *Technical Report*

# *Barriers and Strategies Influencing the Adoption of Nutrient Management Practices*

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**Gail Brant**  
**Sociologist**  
**Social Sciences Institute**

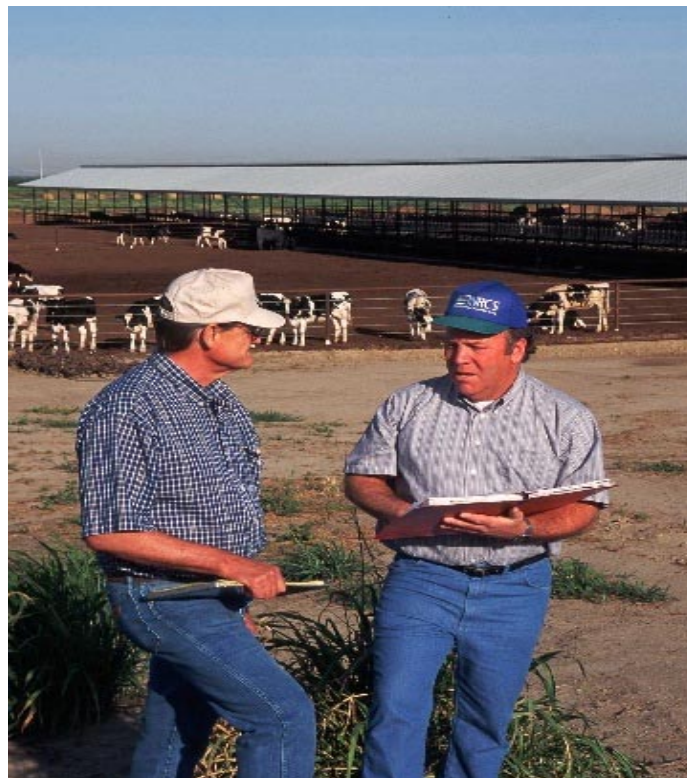
# Barriers and Strategies Influencing the Adoption of Nutrient Management Practices

## 1. Introduction

Field staff, working with the conservation partnership (Natural Resources Conservation Service [NRCS], conservation districts, and state conservation agencies) encounter numerous and varied barriers relative to the planning and implementation of nutrient management (NM) practices. Nutrient management refers to “managing the amount, source, placement, form, and timing of the application of nutrients and soil amendments to ensure adequate soil fertility for plant production and to minimize the potential for environmental degradation, particularly water quality impairment.” (USDA 1999)

Common structural NM practices include waste storage structures, diversions, and fencing for livestock exclusion. Other nutrient management practices are nonstructural. Examples of these practices are planned grazing systems and spreading waste on agricultural fields.

Many of the planning barriers that field staff encounter involve physical resource issues. Others are embedded in social barriers, such as social interaction, traditions, perceptions, attitudes, costs, and communications. This report focuses on these social barriers and how they impact physical resource management. Along with identifying general barriers that influence the adoption of nutrient management practices, this analysis suggests strategies useful in overcoming these identified barriers. Following the introduction is the “Key Points” section that summarizes observations drawn from the identified barriers and strategies.



NRCS Field Staff Providing Service to a Producer on Existing Nutrient Management Plan

## 2. Key Points

- Producers sometimes perceive that government plays a “Big Brother” role when using “good science” as the primary basis for planning and implementation of nutrient management practices. Producers want their ideas and farming experiences viewed as valid inputs for consideration when developing nutrient management regulations, evaluation tools, etc.
- Information about crop uptake of N and P, the nutritive and economic value of manure, and the potential leaching and transporting of N and P requires detailed site-specific information. Work cooperatively with available information sources (universities, private consultants, and agency representatives) to ensure that producers receive consistent site-specific information.
- Use a committee composed of multiple agencies, producers, and local organizations to develop standardized wording to reduce confusion about information and education assistance. Use a combination of information and education distribution methods. Base the information and education strategies on personal and farm characteristics.
- The revisions of laws and regulations along with “which agency is to do what” relative to NM planning and implementation can be confusing to producers. State educational committees can provide, as part of their mission, updates on revisions in laws and regulations. Through committee members, agencies can identify roles and responsibilities.
- The economic issues surrounding the planning and installation of NM and Comprehensive Nutrient Management Plan (CNMP) practices are many and varied. They can include the costs of practices, associated benefits, economic viability, concerns related to herd size, land availability, equipment costs, and the use of discretionary funds. If producers are to make sound decisions about which set of NM and CNMP practices best fit their operation at any given point in time, they will need a detailed economic analysis. To address this, NRCS economists offer a number of economic tools that can assist the producer in his or her decision-making. To benefit from these tools, ask the state economist to help you determine what economic tools will best aid decision making.

- Technology is constantly changing, requiring producers to upgrade and refine their skills. Using “hands on” demonstrations, such as how to calibrate equipment, can be an effective means to assist producers in the refining and upgrading of their skills.
- A soil test or multiple soils tests can be expensive, especially for Limited Resource Farmers (LRF). Soil lab reports can result in different interpretations, leading to mixed messages for the producer about what nutrients are appropriate. Explore the feasibility of EQIP cost sharing rates of 90 percent when working with LRF and beginning farmers and ranchers. Work cooperatively with members of the conservation partnership to form a state educational committee. One objective of this committee will be to ensure that producers receive standard messages about nutrient application.
- One important operation and management issue related to NM and CNMP is time. There are time constraints associated with using the Phosphorous Index (PI), especially if “hot spots” exist. Certifying NM plans is time consuming. If possible, offer alternates to NRCS field staff assistance by reminding producers that certified technical service providers can provide assistance.
- There is an ongoing need for training. Remember that field staffs, producers, and all members of the conservation partnership will benefit from continual training. New or revised decision-making tools, practice standards and specifications, and/or local, state, and Federal mandates are topics requiring training updates. Training can be informal and part of regularly scheduled “all employee meetings.” Members of the conservation partnership can offer formal training sessions.
- NM and CNMP require an organized and detailed recordkeeping system. Producers can resent the time involved in recordkeeping. Suggest to producers that “off the shelf” recordkeeping packages are available. A systematic approach to recordkeeping can result in timesavings.

### 3. Barriers and Strategies

For purposes of clarity and organization, the barriers are designated by italics and the strategy associated follows. The issues are grouped into seven main categories.

- A. Producer Attitudes
- B. Information Issues
- C. Technology
- D. Economic Issues
- E. Operation and Management Issues
- F. Training Issues
- G. Farmer/Rancher Record Keeping

Several sources of information were used to generate the list of barriers and strategies, including field experience, research articles, and interviews with staff members from the conservation partnership in the Northern Plains, Northeast, Southeast, and South regions. This technical report can serve as a guide for the conservation partnership, especially those who work at the field level. While many barriers and strategies are presented, the list is not exhaustive. Unusual geographical locations, unique cultures and sub-cultures (e.g. Pacific Basin, Amish, Latino growers, African American producers, etc.), specific site conditions, and particular characteristics of different producer groups are among the factors that warrant more customized analyses and actions.



Testing Soils on Banana Plantation

#### A. Producer Attitudes

- *Perception by some producers that NM practices are unnecessary.*

Develop or use an existing farmstead assessment or evaluation tool (e.g., FARM \*A\* SYST)<sup>1</sup> to describe and document current conditions. This evaluation tool can confirm or counter the producer's perception that no action is necessary. Farm\*A\*Syst, as a tool, addresses pollution on farms, ranches, and homes using a voluntary, confidential environmental assessment. Farm\*A\*Syst uses step-by-step factsheets and worksheets to identify the behaviors and practices that can create risks from livestock waste disposal and pesticide management. Some of the issues that Farm\*A\*Syst can help address are livestock waste storage and nutrient management.

- *Perception by some producers that the government is "Big Brother" and is devising regulatory, top-down mandates, in contrast to voluntary initiatives. Regulatory programs minimize their roles and responsibilities as stewards of their land.*

Reinforce to producers that the management of their soil, water, and land resources reflects good stewardship and their actions result in the protection and enhancement of natural resources while simultaneously providing food, fiber, open space, wildlife habitat, and positive view-scapes. Using speeches, media, newsletters, farm days, etc. the conservation partnership can underscore the vital roles that producers have in natural resources management. Using a locally led process can ensure that producers have input at the local level. This will help validate the key roles that producers have as stewards of the land. In addition, producers have a voice in developing or modifying current

1. Farm\*A\*Syst reflects a partnership between government agencies (cooperatively supported by the USDA Cooperative State Research, Education and Extension Service (CSREES), USDA Natural Resources Conservation Service (NRCS), and U.S. Environmental Protection Agency (EPA) and private businesses. For more information, visit: <http://www.uwex.edu/farmasyst/text.html> or contact Farm\*A\*Syst, 303 Hiram Smith Hall, 1545 Observatory Drive, Madison, WI 53706-1289 Phone: 608-262-0024, e-mail: [farmasys@uwex.edu](mailto:farmasys@uwex.edu).

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standards, assessment tools, etc. through the locally led planning process. For more information on the locally led process, visit the SSI web site: <http://www.ssi.nrcs.usda.gov/ssi>, select Training, TR001 Developing your Skills to Involve Communities in Implementing Locally Led Conservation.

- *Some producers have negative attitudes toward the implementation of practice standards or regulations that require the use of the Phosphorous Index (PI) or additional soils tests. They view these extra steps as costly in terms of time and money.*

Acknowledge a producer's negative attitudes that using the PI can be burdensome. Under-score that the PI is a dynamic tool and that recommendations resulting from using the PI can change as new scientific findings are available.

- *Some producers question the validity and use of scientific findings as the primary basis for determining the most efficient and effective development of nutrient management plans, policies, and/or regulations.*

Acknowledge that scientific findings sometimes prove to be inaccurate, but the findings are currently the best available. Research findings will change over time and may warrant changes in a producer's nutrient management practices.

- *Some producers are reluctant to participate in government cost share programs due to the oversight requirement associated with the cost share agreement.*

Acknowledge that producers are reluctant to have field checks after installing voluntary NM practices, but that periodic reviews are associated with the cost share agreement and are not a reflection of the producer's NM management skills. You can also point out as a "positive" that producers may be installing an asset (e.g., a waste management facility) for much less than the real cost.

## B. Information Issues

- *Some producers feel there is a lack of clear and concise information on the cost and benefits of alternative NM and Comprehensive Nutrient Management Practices (CNMP) and how these practices can minimize a resource problem or address a concern, especially applicable to some limited resource farmers and minority producers.<sup>2</sup>*

Promote the primary benefits of NM and CNMP practices by outlining benefits including, but not limited to, cost savings, water quality protection, herd health resulting from using alternative water sources and planned grazing systems, potential yield enhancements, and potential improvements in soil quality. Visit the web site [www.nrcs.usda.gov/technical/efotg](http://www.nrcs.usda.gov/technical/efotg) and click on your state to obtain additional information on the economic costs and effects associated with NM practices/systems. Section I has the cost tab where states input their cost data. Section V contains conservation effects and the section may have relevant case studies. Assist producers in decision-making about which alternative best meets their needs. Request assistance of state economist and local specialist to provide a detailed economic analysis outlining cost and benefits of NM and CNMP practices/systems.

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<sup>2</sup> Molnar, J., A. Bitto, and G. Brant. 2001. *Core Conservation Practices: Adoption Barriers Perceived by Small and Limited Resource Farmers*. Bulletin 646. Alabama Agricultural Experiment Station, Auburn University, Page 15, visit web site <http://www.ag.auburn.edu/aaes/information/bulletins/bull646conser.pdf>. For additional details on NRCS actions, visit the Social Sciences Institute web site <http://www.ssi.nrcs.usda.gov/ssi/>. Click on Technical Reports and Notes, scroll down to T019, then click on Executive summary (HTML version), Word version; link to full version (scroll down to Bulletin 646, May 2001).



- *Using generic methods for information and education assistance might not thoroughly explain how to implement alternative CNMP's<sup>3</sup> and the derived benefits of these practices.*

Use a combination of information and education methods that are based on personal and farm characteristics, such as income, off farm employment status, ownership, etc. Methods of contact can include farm visits, electronic contacts, direct mail, public meetings, demonstrations, farm tours, radio spots, videos, etc. Information on NM and CNMP will need to be presented using a format commiserate to the level of formal education. (Note: When working with LRF and minority producers, to help ensure that information mediums are appropriate, ask leaders within that community to evaluate the materials.)<sup>4</sup>

- *Some producers are confused regarding the roles and responsibilities of the different agency representatives that producers come in contact with during the NM and CNMP plan development.*

To clarify the myriad roles and responsibilities of agency, university, and technical service providers who provide assistance on NM planning and implementation, develop an organizational chart that outlines positions, responsibilities, and contact information. Groups on this list could include the State Department of Agriculture, State Department of Environmental Protection, Conservation Districts, NRCS, Regional Office of Department of Environmental Protection, etc.

- *Confusion results from the mixed messages coming from various local, state, federal, and university representatives, as well as private consultants relative to the amount, source, placement, timing, and application of nitrogen and phosphorous on various fields.*

This is an easy barrier to identify but it will take a great deal of coordination to overcome. You might want to establish a committee with assorted local members who represent agencies, universities, producers, and suppliers. One purpose of this group would be to agree on assessment procedures and recommendations related to N and P. A goal of this committee would be that producers receive similar messages from all information sources regarding what is needed and/or recommended for each crop/field relative to the amount, source, placement, timing, and application of nitrogen and phosphorous.

- *Lack clear information and understanding about the nutritive and economic value of manure.*

Work with NRCS' state agronomist and economist to determine the nutritive and economic value of manure in your area. For producers, use a combination of site visits, work sheets, and economic tools such as ManureHG.xls to show an analysis that is particular to their operation. This economic tool is posted at <http://waterhome.tamu.edu/NRCSdata/models/>. Scroll down to NRCS Economic Tools, scroll down and click on ManureHG.xls.

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3. CNMP is a conservation plan that is unique to animal feeding operations. It is a grouping of conservation practices and management activities which, when implemented as part of a conservation system, will help to ensure that both production and natural resource protection goals are achieved. A CNMP incorporates practices to utilize animal manure and organic by-products as a beneficial resource. A CNMP addresses natural resource concerns dealing with soil erosion, manure, and organic by-products and their potential impacts on water quality, which can derive from an AFO. A CNMP is developed to assist an AFO owner/operator in meeting all applicable local, tribal, State, and Federal water quality goals or regulations.

4. Natural Resources Conservation Service. National Planning Procedures Handbook Subpart B, Part 600.51, Draft Comprehensive Nutrient Management Planning Technical Guidance, 600.51 Definition of a Comprehensive Nutrient Management Plan (CNMP).

- *Some producers are confused about the variations in the Best Management Practice (BMP) standards and specifications of local, state, and federal agencies.*

Promote the use of NRCS' Field Office Technical Guide (FOTG) as the primary resource for practice standards when working in cooperation with the state technical committee and the conservation partnership. Visit the web site <http://www.nrcs.usda.gov/technical/efotg>. Click on your State; Section IV contains conservation standards.



Dairy Farmer Discusses Manure Management

### C. Technology

- *Based on soil sample lab reports, recommendations by agency representatives and/or technical service providers to producers may have different interpretations that affect the timing and amount of the application of nutrients.*

Ensure that recommendations from lab reports are interpreted and applied consistently by the producer, agency representatives, and technical service providers by increasing producers' awareness of NRCS' NM policy requiring that producers follow their state land grant university's recommendations on soil sampling, soil testing, and fertility recommendations outlined in the resulting lab reports. Inconsistent interpretations of lab reports can result if producers use labs other than the state land grant university labs.

- *The hauling and disposal of manure for some producers is too expensive.*

Work with Resource Conservation and Development Councils (RC&D), the industry/producers generating the manure, and/or state agricultural agencies to assess opportunities for cost efficient hauling. Maryland Department of Agriculture has a manure transport project. Visit <http://www.mda.state.md.us>. Select Resource Conservation under Department Offices, select Nutrient Management in Maryland, then click on Manure Transport Project.

- *Lack clear understanding of how to calibrate equipment (spreader) to achieve accurate application.*

For decades, producers have cited demonstration farms and field days as trusted outreach methods. Reputable organizations (USDA agencies, universities, farming groups, industry, etc.) that sponsor demonstration farms can show how equipment can be calibrated to work properly. This method can have customized information available to local producers on a regular basis. Field days, in contrast, only have certain days that demonstrate the 'how-to' in calibrating equipment. But, field days can generate local interest and be extremely effective. As an example, in a southern state, NRCS, in cooperation with Extension, visually demonstrated the calibration of equipment by bringing in a truckload of chicken litter to the operation. Plastic rectangles were laid down to serve as collection tools. Litter was collected and weighed; the weight was then converted to tons per acre. The outcome of this demonstration was that producers were able to see and determine the value of litter. Subsequently, producers were better able to understand the value of the litter as it was applied within their varied fields.<sup>5</sup>

- *The use of demonstrations for the calibration of equipment is viewed by some producers as time consuming and not worthwhile.*

Acknowledge that the initial demonstration for calibrating equipment is time consuming. Market the potential benefits: the ability to visualize what is being applied and potential dollar and timesavings on fertilizer application.

- *Lack of understanding on the part of some producers, including some LRF about how to take soil samples. Consequently, many producers do not regularly test their soils.<sup>2</sup>*

In cooperation with the local Extension Service, develop information on the need for soil testing. Some methods to distribute this information could be through the use of field days or workshops to demonstrate appropriate soil-sampling techniques. When working with LRF and/or minority producers, use “one on one” technical assistance to demonstrate where to take the soil samples within the operation, and how to interpret and apply test results. It may be appropriate to use some existing cost share programs (e.g., EQIP) to help defray the cost of a soil test, given limited resources.<sup>2</sup>



Understanding Benefits of Composting Chicken Manure

## D. Economic Issues

- *The cost of constructing chicken composting facilities, manure storage facilities, and lagoons may create financial obstacles for implementing CNMP.<sup>2</sup>*

Producers can receive cost share payments through the EQIP program. Maximum payments can be as high as 75 percent of the allowable EQIP payments. The state conservationist establishes these cost share levels. Sixty percent of EQIP funds are designated to go to livestock producers. The Secretary of Agriculture has authority to provide up to 90 percent cost share funds to LRF and beginning farmers for implementing some practices. Visit the web site [www.nrcs.usda.gov/technical/efotg](http://www.nrcs.usda.gov/technical/efotg) and click on your state to obtain additional information on the economic costs and effects associated with NM practices/systems. Section I has the cost tab where states input their cost data. Section V contains conservation effects and the section may have relevant case studies.

- *The cost of soil testing can be time consuming and expensive. Producers may have to test for both manure and phosphorus on different fields when using the PI or if there is a change in the animals' diet.*

Work with state and local agency representatives to explore the feasibility of making cost share funds available if an excessive number of soil tests are needed for a particular operation.

5. Nipper, Steve. 2001 (December) Personal communication. NRCS Water Quality Specialist, Monroe, LA.

- *Land can be a limiting resource from an economic viability and nutrient utilization perspective. If the phosphorous content of the manure requires more comprehensive spreading, a producer will likely have to reduce animal units or export manure. Producers need the benefits gained from the animals. Any reduction in animal numbers compared to the facility, capital and debt levels impacts the financial viability of the total operation.*

Request assistance from state economist to provide economic and management cost and benefit data on the short and long-term benefits of changing land use, reducing livestock numbers and/or identify local projects for hauling manure. The Resource Conservation and Development Council (RC&D), the State Department of Agriculture, and/or other private vendors can administer these projects.

## **E. Operation and Management Issues**

- *NM requirements can result in higher operation and management costs: calibration of equipment, storage, time costs associated with manure application under unusual weather conditions, which would require different nutrient applications, etc.*

Consider scheduling additional field visits to service existing plans or to “troubleshoot” problems associated with special conditions such as unusual weather.

- *Perception that existing nutrient management standards or regulations limit a producer’s ability to adapt current management practices when there are changes in weather conditions, production costs, and commodity prices.*

Reassure producers verbally, through fact sheets, mail outs, or on the local agency web site that modifications to standards and regulations are feasible if extreme changes occur in weather, production costs, or prices.

- *Perception by some renters that installing NM practices does not pay, especially if the rental agreements are short-term: absentee landowners might not be aware of NM requirements and/or benefits.*

Work simultaneously with landowner and renters illustrating the short and long-term benefits of NM practices: apprise both parties of current regulations.

- *If producers have to add commercial fertilizers to manure that has been previously spread on fields to meet fertilizer needs, this will require at least a second trip around the field and added management costs to the manure application.*

Request assistance from NRCS’ state agronomist to assess the efficiency and effectiveness of practices that include applying manure and N fertilizer at the same time, changing a crop rotation by adding a legume to the rotation to increase soil N, adjusting crop yields to benefit water quality, and applying manure in liquid state.

- *Field contact cannot be scheduled as often as some producers request, limiting the availability and accessibility of agency field staff to the producer.*

Acknowledge to the producer that there are limitations in the fieldwork load. Technical service providers may be able to provide accelerated services within a shorter period, sometimes with a higher dollar cost than is the case with NRCS field assistance. Cost share programs may cover that cost.

- *Producers may be required to layout fields differently and change management practices due to “hot spots” in areas where the PI is the primary assessment tool, mandated for use by state and local regulations. Recalculating the Revised Universal Soil Loss Equation (RUSLE) is necessary if “hot spots” exist. Additional soils tests will be required, adding time costs to both the producer and field staff.*

Work cooperatively with producer to set an agreed upon timetable for scheduling technical assistance for field realignments and recalculating RUSLE.

- *Time constraints, especially where law and regulation deadlines take precedence, can result in greater time lapses between field visits.*

Acknowledge that there can be a lapse of time in providing technical assistance relative to certifying nutrient management plans; the use of technical service providers to provide TA can be warranted.

## F. Training Issues

- *The specifics about CNMP including the how to's can differ between and among producers, agency representatives, and technical service providers.*

NRCS through its National Employee Development Center (NEDC) offers an online training course that addresses nutrient management and CNMP in conservation practices. Visit the web site <http://www.nedc.nrcs.usda.gov/>. Click on NEDC Courses, click on Course Listing, and scroll down to Nutrient and Pest Management Considerations in Conservation Planning (000116).<sup>6</sup> In addition, the National Pork Producers Council offers a one-day CNMP training course for producers and industry

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and agency representatives. The primary objective of the course is to increase understanding of the eight elements in a CNMP. Additional information and materials on CNMP training through the National Pork Producers Council, including a curriculum guide and video, can be obtained from <http://www.porkboard.org/PorkStore/envnutrmgmt.asp> or visit their home page <http://www.porkboard.org/Home/default.asp>.



Monitoring for Non-Point Source Pollution

- *The training of hired labor on how to keep records relative to CNMP is limited.*

Offer half-day training on record keeping to producers and hired-labor.

- *Field and state staffs have minimal experience relative to CNMP, the new 590 Standard, and changing local and state regulations.*

‘Piggy-back’ training on NRCS’ 590 Standard with other planned field training. If needed, allot additional training time for instruction on changing local and state regulations and laws that apply in the local area.

6. Ashford, Obie. 2001 (December) Personal communication. Environmental Consultant, Columbia, MD.

## **G. Farmer/Rancher Record Keeping**

- *The type and format of recordkeeping varies by producers. Some producers keep formal records, e.g., EXCEL spreadsheets, while others will keep informal records, e.g., back of envelope. Record keeping is a cost, as it requires producers to expend time on this activity.*

Suggest to producers that NRCS' agronomist, economist, and/or other technical experts can provide technical assistance and technical materials for the development of a standardized formal recordkeeping system. Extension is a good source for pre-existing and standard systems. Check with the state extension system for a Web site to obtain information about the availability of software that can be downloaded for record keeping. To quickly access Extension sites visit <http://waterhome.brc.tamus.edu/care/budgets/>. Check with crop management organizations and certified crop advisors to determine if formal record keeping systems are available. Obtain a subset of the commercial programs at <http://www.agric.gov.ab.ca/agdex/agsoft/>.

- *Supervising hired labor to record keep routinely is a management cost. The amount of paper work required to administer CNMP at the local, state, and federal levels can "tax" the time of producers, field staff, and laborers resulting in frustration with the increased workload.*

Acknowledge that supervision of hired labor is time consuming. Streamline record keeping by using an "off the shelf" product, which can result in a reduction of time spent on this activity.

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