Sustainable Farming Systems That Work
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Introduction

If you're a farmer, you probably know what sustainable agriculture is. It is now discussed frequently in popular farm publications. But if you're not a farmer, the term may be new to you.

Sustainable agriculture is just that. Sustainable. It lasts indefinitely. It uses farming practices and management techniques that will not only protect and improve the environment but will also allow the family and the farm business to prosper. Agriculture depends on both a healthy environment and on healthy farm families, and our society depends upon agriculture to provide adequate, affordable supplies of food and fiber.

Without protection, natural resources, like clean water and productive soil, can be polluted or used up. We have not yet developed the technology to grow food on other planets, and, until we do, we must remember that the earth and its finite resources are all we have. We must conserve and protect the environment for our own sake and for the sake of our children.

And if family farms are not profitable, they will fail, perhaps destroying the family in the process. Sustainable agriculture works to prevent these tragedies.
Recognizing how critical it is for farmers to practice sustainable agriculture, a number of agricultural leaders developed an educational program called Agri-21 Farming Systems. It is a cooperative program that the seven land-grant universities in the Tennessee Valley region have undertaken with the Tennessee Valley Authority and other organizations.

It is a “whole-farm” program, intended to turn selected family farms throughout the Tennessee Valley into teaching laboratories for sustainable agriculture. The families on the farms that have been selected become cooperators in Agri-21. Each family enrolls for a five-year period, during which they are provided a certain amount of cost-share assistance to make the changes necessary to help them become more sustainable.

The Agri-21 farms then become teaching sites from which residents in the region can learn about sustainable agriculture. Field days are held periodically on each farm to teach the agricultural technology and techniques at work on the farms. Videos will be produced that highlight the changes, and these tapes will be shown at such gatherings as civic club meetings, 4-H meetings and county Extension meetings.

Already 14 Tennessee farms have been enrolled in Agri-21. They range across the state, from the flat land of West Tennessee to the rolling hills of Middle and East Tennessee. And because most of these farms support more than one immediate family, the total number of individual families enrolled is 25.

TVA is committed to the 42 farm families participating in the Agri-21 program throughout the Valley, including the 14 in Tennessee; but it is re-evaluating its program expansion plans. The UT Agricultural Extension Service, however, hopes to enroll additional Tennessee farms in a similar program over the next few years.
Meanwhile, agricultural and Extension specialists will continue to provide technical and financial support for those families already enrolled. Extension staff will also proceed with plans to teach sustainability to farm families across Tennessee. Farm days are being organized, and publications and audiovisuals are being produced to spread the "good word" about agricultural sustainability in Tennessee.

This report documents the progress that Agri-21 farms in Tennessee have made since the start of the program in 1992. Words and pictures are used to describe the successes (and failures) that have occurred on these farms. We begin by introducing you to the farms, briefly describing each operation, discussing the Agri-21 farm planning process, and presenting resource and financial summaries of the farms.

The next section of this report discusses some of the practices that Agri-21 farms have employed to improve farm income and protect the environment. This is followed by a discussion of the methods we are using to inform both farmers and the non-farm public about the results of the program. We conclude with a few thoughts about the relative merits of this educational project and its future.

Now, turn the page to meet the families involved in this intensive, cooperative effort.
The Agri-21 farm families

Robert and Edna Teamer of Tipton County raise cotton, soybeans, corn and hogs on their 222-acre farm.

Tommy and Meredith Surber raise cotton, corn, wheat, soybeans, hogs and cattle on 1500 acres in Carroll County.

David and Paula Parker of Cannon County raise soybeans, corn, hogs and beef cattle on their 1500-acre farm. Pictured behind them are their children, Brian, Angela and Krista.

Woods Farm
Surber Farm
Story Farm

G & W Farm

Meadows Farm

Teamer Farm

Hill Farm

Bill and Debbie Davidson of Hawkins County raise beef cattle, tobacco, corn and vegetables on their 270-acre farm. They are shown here with their son Will.

The Hill family raises cotton, soybeans, corn, milo and wheat on almost 2,000 acres in Haywood County. Pictured from left to right are Scarlet, Russell, Bobby and Sue. Jeff and Karen stand at the far right with their two children.

The Story family farms 1400 acres in Henry County, raising corn, soybeans, tobacco and wheat. At left are Greg and Karen with their three children. To the right stand Gary and Tammy with their daughters. Tommy Dan, the father of Greg and Gary, stands in the back.

George and Patsy Meadows raise cotton, wheat, corn and soybeans on their 795-acre Lauderdale County farm. Pictured with them are their three children, Larry, Leslie and Kamala.
Jim and Ann Shipley have a 500-acre farm in Claiborne County on which they milk cows and raise corn silage and wheat.

Jimmy and Patti Smotherman of Rutherford County have a dairy on their 500-acre farm. They are pictured above with their daughters, Karyl, Kendra and Katie.

Dane and Kim Mercer of Monroe County have a dairy on their 350-acre farm. With them are their children, Jonathan and Jamie. Mary Katherine, their youngest, sits between them.

Donald and Teresa Layman operate a dairy on 500 acres in Loudon County. They are shown here with their son David.

Russ and Debra Woods have a 2000-acre farm in Clay County on which they raise cotton, corn, soybeans, wheat and hogs. They are pictured with their son Jay.

DAVHL Farms is a 630-acre farm in Bedford County, operated by Glover and Martha Davis and their children, Marty Davis, Bob Davis and Loraine Davis Sutton. They milk cows, raise corn and alfalfa and operate a plant nursery.

The G & W Farm in Weakley County is run by Jimmy Gaylord and his two brothers-in-law, David and John Waterfield. They operate a dairy and raise corn, soybeans and wheat on just over 1300 acres. Standing left to right are David, Jimmy and John.
The farm planning process

Agri-21 farm families begin by establishing short- and long-term goals. Using a process developed by TVA, Agri-21 staff conduct a session with the family to help them set their goals. Some families may want to increase their income; others may want to increase their leisure time. All family members are encouraged to participate in this process.

After goals are identified, the farm resources are inventoried. Machinery, land, livestock, buildings and equipment assets are classified and valued. Loan balances and other financial obligations are evaluated, and the net worth of the farm is calculated. Human resources are also inventoried to determine how much family and hired labor is available annually. Then a budget is developed to provide a financial baseline.

An environmental assessment is also conducted on each Agri-21 farm. The 28-page assessment records environmental conditions on each farm when it enters the program. The assessment considers many factors, including livestock waste management practices and facilities, pesticide and fertilizer storage and handling, fuel and lubricants storage, and conservation tillage practices.

At this point, long-run budgets are constructed based on the family's goals, their past management plans, their resources and their levels of debt. Any needed changes identified by the environmental assessment are also considered. The budgets are developed to estimate the impact of a wide range of alternatives, such as adding new livestock waste management facilities, changing crops and rotations or changing farm size.
The farm family selects the best plan to guide future decisions, considering both estimated economic and environmental outcomes. Whole-farm analyses are conducted annually to determine the previous year’s financial results and to track changes in environmental impacts.

FINPACK is a computer software package developed to help farmers plan and manage farm finances. All Agri-21 farm families use FINPACK on their operations.

A number of individuals are involved in planning and analysis. Farmers supply their records; Extension agents and specialists provide technical support; agri-business professionals offer goods and services to achieve results; and government agency staff offer solutions for conservation and government program compliance. It is an intensive, people-oriented process that has also proved to be a valuable professional development exercise for everyone involved.

Resource and financial summary

A brief summary of farmland and livestock inventories is shown in Table 1. The average number of acres managed by Agri-21 farms has not changed drastically over the last two years. Some farms have added small tracts of rented cropland, while one farm terminated a lease on 800 acres of land that was not providing an adequate rate of return. Breeding animal inventories have generally increased for beef, dairy and hog farms in Agri-21. Expanded herd sizes were necessary in several cases to recoup costs of improved feeding and animal waste management facilities.
Table 1. Land and Livestock Summary May, 1995

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Acres</th>
</tr>
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<tbody>
<tr>
<td>Cropland</td>
<td>877</td>
</tr>
<tr>
<td>Pasture</td>
<td>144</td>
</tr>
<tr>
<td>Woodland</td>
<td>64</td>
</tr>
<tr>
<td><strong>Average Total Land</strong></td>
<td><strong>1,085</strong></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Livestock</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Breeding Animals</td>
<td>103</td>
</tr>
<tr>
<td>Market Animals</td>
<td>17</td>
</tr>
<tr>
<td><strong>Average Total Livestock</strong></td>
<td><strong>120</strong></td>
</tr>
</tbody>
</table>

A summary of average balance sheet values for Agri-21 farms is shown below. This chart shows that during 1994, total farm asset values increased by an average of $62,709 per farm. Average farm loan obligations increased by $39,126, resulting in an average increase in farm net worth of $23,583. Net worth represents the portion of the farm that is owned by the operator. Increases in net worth indicate that the farms are growing economically by reinvesting profits and capital gains. To be sustainable, net worth must remain constant or grow larger over time. Reductions in net worth signal a decrease in the operator's stake in the farm business. Declining net worth is not sustainable indefinitely.

Balance Sheet Summary
Average, Based on Market Value

![Balance Sheet Graph]

The next chart illustrates average spending and average income for the 14 Agri-21 farms. It shows that, on average, the farms purchased more...
than $100,000 worth of capital assets during 1994. Net cash farm income averaged $131,695 per farm. After adjusting for non-cash expenses, such as inventory changes and machinery depreciation, net farm income was calculated to be $93,016 per farm. This is the average return to the farm owners’ labor, management and capital, and it is used to provide for family expenses for about two families per farm, on average. It is also re-invested in the farm to pay for capital purchases and improvements. These farms are operating profitably, which is supporting their efforts to be sustainable.

### 1994 Farm Income and Capital Purchases

**Average, Per Farm**

<table>
<thead>
<tr>
<th>Net Farm Income</th>
<th>$93,016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Cash Farm Income</td>
<td>$131,695</td>
</tr>
<tr>
<td>Capital Purchases</td>
<td>$102,721</td>
</tr>
</tbody>
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Definitions of sustainable agriculture typically recognize the importance of the “health” of the farm family. A sustainable operation maintains or improves a family’s quality of life. Although people have different opinions about what improves quality of life, there are a few conditions that most people agree are necessary. First, consider wage rates. Most would agree that higher earnings enable families to improve their quality of life. Net farm income averaged $13.85 per hour of unpaid family labor on six Agri-21 farms for which records were available in 1994, ranging from a low of $4.84 to a high of $37.11 per hour.

Another measurable indicator of quality of life is the family labor hours spent on the farm. Many farm families feel tied to the farm, so they place priority on managing or reducing their family labor requirements. Labor records from six Agri-21 farms show that the families worked about 5,300 hours on their farms in 1994, representing about three full-time equivalent employees working 40 to 50 hours a week. Farm families with less than three family members employed must work longer hours and more days to complete 5,300 hours of family employment, suggesting that family labor hours may need to be monitored more closely in the future on some family farms.
Once the farms are enrolled and budgets and plans have been developed for them, the farm families set out to implement the practices and management techniques that will help them achieve their goals.

Each Agri-21 farm is unique. But all of them share the common objectives of improving both their profit and the environment. This section describes those practices and techniques that Agri-21 farm families have employed to improve their sustainability. Most have been extremely beneficial, while a few have proven to be unsuccessful. Thankfully, something is learned in either case.

**Decision Support**

Farm managers make production, marketing and financial management decisions daily. Unlike non-farm businesses, which often employ managers with very narrowly defined responsibilities, a farm manager must take responsibility for all business management decisions. What crops and livestock should be produced? When and where should products be sold? Should another employee be hired? Should a machine be repaired or replaced? Modern farm managers must answer these questions and hundreds of others.

Good decisions are the result of hard work. Problems must be correctly identified; information about solutions must be obtained and analyzed; and resulting plans must be implemented and evaluated. Agri-21 farm managers are making better informed decisions by improving the ways they manage information and market their products.

**Management information systems**

Agri-21 farms rely on information to make decisions about their farming operations. Farm families keep track of all kinds of information, like crop and livestock production records, accounting records, research results and legal documents. This information is critical for conducting Agri-21 financial and environmental analyses, so considerable effort has been spent establishing and refining management information systems on Agri-21 farms.

Several farms have begun using computerized accounting programs to maintain their financial records. Others have improved their livestock and milk production record-keeping systems. The Shipleys, for example, have added a computerized milk production system to their farm. Agri-21 families now have greater access to agricultural price and outlook information, thanks to the use of satellite-based systems, which transmit cash and futures market prices, weather conditions and forecasts, and market analyses.
Estate planning is a very important aspect of information management on a farm. In working with Agri-21 farm families, Extension professionals have stressed the need for comprehensive estate plans.

Most of the Agri-21 farms involve at least two generations of family members in their operations. Estate plans and ownership arrangements are critical to the long-term success and sustainability of these farms. A recent estate planning exercise on one Agri-21 farm involved three immediate families; the exercise helped them develop a plan to transfer the land and machinery assets to the younger generation and maintain a viable farm business.

Marketing

Producing a crop or raising livestock does not guarantee that a farm makes a profit. Crops and animals must be sold at prices that more than cover production costs to generate profit. So effective marketing decisions are necessary for farms to be profitable and sustainable. Marketing is considered to be an integral part of the Agri-21 farm plans, and significant changes in marketing have taken place on many of the farms.

Many farmers feel they have as little control over the prices they get for their products as they do over the weather. But this isn’t entirely true. Marketing strategies exist that can help them get the most for their products. Farmers can improve their understanding of price trends and variability. They can develop a better feel for the best time to make a sale. They can develop an instinct for choosing profitable alternative crops and rotations. And they can learn ways to establish price floors that serve debt and family living needs, avoiding extremely low prices by giving up opportunities for extremely high prices.
Marketing decisions require up-to-date information. Computers and satellite receivers enable farmers to receive current price and outlook information within minutes of its release by USDA, futures trading floors and private marketing services. The G&W Farm relies heavily on its Farm Bureau Acres system to support marketing decisions on 1,000 acres of row crops. Forward pricing a portion of its crops each of the last two years has provided the G&W Farm higher average returns than if the farm sold everything at harvest.

The Acres system provides marketing and weather information. It helps farmers decide when to sell in the cash market; it can also inform them of forward-pricing opportunities.

The use of a price contract enabled the Story family to increase its acreage of white corn, which has turned out to be a more profitable crop than the popcorn they produced in the past. The recent construction of a new grain storage bin and automatic batch drying system has given them more marketing options for their grain.

The new grain bin and the automatic batch drying system that the Story family has purchased enable them to dry and store grain, allowing them to market their production at favorable prices.

New marketing techniques have also been adopted by Agri-21 livestock producers. The Davidson Farm has both purchased and sold cattle through video sales since joining Agri-21. Bulls used in the farm's 85-cow commercial beef herd are purchased from performance-tested bull video sales. Backgrounded calves are sold through the Columbia, Tennessee Video Board sale.
Several group educational sessions have been presented to Agri-21 farm families. One-on-one meetings with individual farm families have also been used to develop farm marketing plans. The Agri-21 program will continue to place emphasis on this important management area for the duration of the project.

Resource Management

How farmers manage their resources can affect the environment as well as their financial success. They must often use resources that are both expensive and potentially harmful to the environment.

This not only means that farmers must bear the stress of making a living and taking precautions for their own personal safety, but it also means their business is subject to constantly changing regulations. Farmers must continually educate themselves to stay up-to-date on regulatory changes. At the same time, they must evaluate the impacts of resource management on their profitability.
Tillage Practices

One of the biggest causes of water pollution in Tennessee is erosion. Farmers, however, are reducing the amount of soil that is eroding by using no-till or conservation tillage. Tilling the soil makes it easy for rainwater or water from melting snow to wash bits of soil into nearby water sources. By not tilling or only tilling the soil lightly, most, if not all, of the residue from the previous crop remains on the soil surface. This residue protects the soil by absorbing the impact of falling raindrops. This prevents it from being washed away. That is why more and more farmers are now using no-till or minimal tillage.

The top photo shows how destructive erosion can be. Runoff has carved a gully in this field, washing away the good, productive topsoil. On the bottom is a photo of a crop of no-till soybeans on the Hill farm. Using no-till or minimum tillage practices helps prevent erosion.

There are also economic benefits in switching to no-till crop production. It can reduce the amount of time farmers (and farm machinery) spend in the field. This reduces labor and machinery costs, as shown in the chart on the next page. Reduced labor can mean more time and energy for other things, like planting a few more acres of crops, raising a few more head of livestock or maybe just spending more time with the family. And to the surprise of many farmers, crop yields from conservation tillage and no-till are usually as high or higher than yields from conventional tillage.
Since they enrolled in the program, almost all of the Agri-21 farm families have either converted to no-till 100 percent or have greatly increased the number of acres they no-till. In fact, several of the Agri-21 farms had never even tried no-till until they enrolled in the program. Agri-21 encourages farmers to consider switching to no-till, not only because it reduces soil erosion, but also because it can decrease production costs and labor requirements.

A possible downside of adopting no-till is that it usually requires increased use of chemicals to control weeds and other pests. As a result, many farmers and other agricultural professionals are paying more attention to proper storage, handling and application of pesticides. Interest in a management strategy called integrated pest management has also increased.

**No-Till Corn Production**
Production Cost: $167.30/acre

- Chem/Fert: $86.16
- Other Costs: $26.11
- Labor: $8.33
- Machinery: $46.70
- Fuel: $4.90
- Interest: $9.04
- Repairs: $11.43
- Depreciation: $21.33

**Conventional Tillage Corn Production**
Production Cost: $166.27/acre

- Chem/Fert: $73.73
- Other Costs: $25.77
- Labor: $11.22
- Machinery: $55.56
- Fuel: $6.45
- Interest: $11.02
- Repairs: $13.78
- Depreciation: $24.31

Integrated Pest Management

Agricultural chemicals have enabled farmers to produce abundant, low-cost food. But these same chemicals may become contaminants if they make their way into ground and surface water.

Today, both scientists and farmers are striving to keep agricultural chemicals out of water. Scientists are developing pesticides that are more effective in smaller quantities and that degrade quickly after they are applied to the land. And farmers are using a variety of management techniques to prevent chemical pollution of water. Some of these techniques are part of a strategy called integrated pest management (IPM).

IPM is a relatively new approach to fighting pests. In the past, many farmers thought of pesticides as a kind of insurance policy for crops. They would spray fields to prevent all kinds of problems whether they actually saw evidence of them or not. But the IPM strategy is to target specific problems that the farmer already knows are present. To farmers who use IPM, pesticides are not a kind of insurance policy, they are a medicine. These farmers use them in the same way we use prescription drugs only if needed and when needed. And just as we take no more medicine than necessary, these farmers use no more chemicals than necessary. This can often translate into the use of less chemicals.

With IPM, pesticides are only one of the tools with which farmers can control pests. There are many others. By studying a pest, by finding out how it lives, under what conditions it thrives and what its weaknesses are, agricultural researchers have developed chemical as well as non-chemical methods to fight pests. That's what IPM is all about: integrating several methods to come up with the best solution to a pest problem, both from an environmental standpoint as well as from an economic standpoint.
Farmers determine whether it is necessary to fight a pest by scouting their fields. Farmers may do their own scouting, or they may hire someone else to do it. Scouting involves going into fields on a regular basis and randomly checking for pests by using insect nets and traps. Scouting helps farmers determine if they actually should fight a pest, when they should fight it and how. Farmers who scout their fields do not use pest control unless they decide it is necessary.

Agri-21 encourages farmers to use integrated pest management because it is a sustainable management strategy both profitable and protective of the environment. Several Agri-21 farm families use IPM practices on their operations.

Storage and handling of chemicals

Not only must farmers apply chemicals properly, they must also store and handle them correctly as well. Accidents happen. Chemicals can be spilled. Tanks can be overfilled. That is why some Agri-21 farms have built concrete mixing pads over which chemicals can be safely mixed. A proper mixing pad has a catch basin to capture any spills or leaks. Agri-21 also stresses the importance of storing chemicals safely. Storage structures should be locked and located away from any wells, sink holes or bodies of surface water. Careful storage and handling are not only important to prevent water pollution, but other accidents as well.
Fertilizer application levels

High crop yields are important to farmers. Fertilizers are one of the most important tools farmers can use to help them achieve high yields. But using the right amount of fertilizer is important. Using too much can be harmful. A plant can only use a certain amount of the nutrients fertilizer provides. What’s left over is wasted. Rain may wash the nutrients into surface water or cause them to leach into the groundwater. Nutrients are a good thing when they are taken up as plant food, but in water, they can be contaminants.

Some farmers overestimate how much fertilizer they should apply to their fields. When they apply too much, not only are they threatening water quality, they are also spending more money than necessary.

The University of Tennessee has determined rates at which fertilizer should be applied to various crops. By testing soils regularly and following UT-recommended application rates, farmers can be sure they are applying enough fertilizer to help their crops thrive, but not enough to threaten water quality.

Marty Davis and Associate Extension Agent John Teague take a soil sample from a field on the DAVHill farm.

But changing rates of fertilizer application can be a frightening decision to make. The Story family has consistently had high crop yields, so family members were understandably skeptical when Extension staff suggested they could maintain the same high yields and use less fertilizer. The Storys were applying fertilizer at a somewhat higher rate than UT research indicated to be optimal.

Reluctant to reduce fertilizer rates on all their acreage but willing to test the theory, the Storys have divided a field into sections, one of which they are fertilizing at their usual rate and one of which they fertilize according to UT recommendations. They will conduct this test over
several growing seasons in an effort to determine if, in the long run, the reduced rate produces returns that are as high as those they achieve with the higher application rates.

Variety selection

Another key to help farmers manage more efficiently is careful selection of seed varieties. Each plant species has many genetic varieties to choose among, and each variety has different traits. Some are resistant to certain types of disease. Some fare particularly well in certain weather and soil conditions. Others are notable for bountiful production. By familiarizing themselves with the varieties of seed available and by considering the climate and soil conditions on their farms, farmers can select the seed varieties that will perform best for them.

Some farm families, including a number of the Agri-21 families, conduct variety trials on their farms in which they plant a small amount of several different varieties of the same crop species in an effort to determine which varieties work best on their land. Through published results and farm tours, neighboring farmers can learn which varieties produced the best results. Farmers can then choose which varieties to plant based on their farms’ climate and soil conditions.
Animal Waste Management

One of the greatest concerns in agriculture today is how to manage livestock waste. Whether they own dairy cattle, beef cattle, hogs or chickens, farmers have to manage waste and probably lots of it. Even on relatively small farms, waste can accumulate quickly. If not properly managed, it can be a serious threat to water quality. If manure escapes a storage area or is over-applied to land, it may enter surface water. Groundwater can also be contaminated when polluted runoff enters wells and sinkholes, or when contaminants leach into the ground from unsealed or improperly sealed waste storage areas.

Animal waste contains pollutants that can be harmful to drink. It can also degrade aquatic habitat for fish and wildlife. Agri-21 stresses the importance of managing animal waste properly. Several of the farms enrolled in Agri-21 have recently constructed facilities in which waste can be stored safely, with little risk that seepage or runoff could enter surface water or groundwater.
Some Agri-21 farm families have also updated and improved their methods of applying manure to land. Organic waste is a natural fertilizer. By using it, farmers can reduce their use of commercial fertilizers. The money they save on the cost of commercial fertilizers helps offset, to some extent, the costs of proper waste management.

Applying waste properly involves analyzing both the soil to which the waste is to be applied and the waste itself. This ensures that farmers do not apply more fertilizer than crops can use. Applying too much fertilizer, whether natural or synthetic, can cause water pollution because some nutrients the plants do not use can run off into groundwater or surface water.

Managing animal waste properly may be expensive, but it is becoming increasingly necessary. Agri-21 encourages farmers to adopt technology and practices that protect the quality of our water.

**Intensified grazing**

Intensified or rotational grazing is another management technique farmers with cattle can use to improve production and efficiency on their farms, while also reducing environmental impacts. The idea is to subdivide a pasture into small paddocks in which cows are allowed to graze daily from spring through late fall. Because the paddocks are small, the animals must be moved frequently from one paddock to another. When the cattle are rotated from one area to another, the forage in the paddock that has just been grazed has a chance to grow back.

Intensified grazing improves efficiency because the cows are compelled to stay inside a particular paddock to graze forage they might otherwise left untouched if they had been able to move to tastier forage. In other words, they cannot just eat what they like—they have to clean their plates before they get more food. Intensified grazing allows farmers to graze more cattle per acre. It allows cows to continually graze young, nutritious forages without damaging the pasture.
Despite some additional costs for fencing and labor, intensive grazing has proven to be a profitable practice for livestock producers.

The Mercer farm is using this method to improve dairy production. Dane and Kim Mercer’s rotational pasture is sown with a variety of alfalfa specially developed for grazing. They have been very pleased with the performance of their cattle on the pasture.

Environmental protection measures

Most farmers are far from indifferent to the well-being of the land and the quality of the water; they care deeply about them. They hunt in the fields and woods on their property, and their children play in the creeks that flow across their land. Many of them have taken measures to protect the environment that may have nothing to do with increasing profit. Fencing livestock out of environmentally sensitive areas is one such measure.

Protecting sensitive areas

Keeping large herds of closely confined livestock out of streams and fragile areas may be important to prevent water pollution. If livestock can enter streams, they may defecate in them, contaminating them with harmful microorganisms. But that’s not the only reason to fence livestock out of streams.

Streams are popular places for livestock, particularly in the hot summers. The traffic of the animals in and out of streams eventually destroys the vegetation on the streambanks. Plant life is important along streams because it provides food and shelter for fish and wildlife. It shades streams, maintaining lower water temperatures which some species of aquatic life require. But, even more importantly, plant life protects the soil, helping prevent it from eroding.
When the Smotherman family first enrolled in Agri-21, their dairy cows had complete access to a stream across their pasture. As you can see in the top photo, the stream banks had no vegetation. Rain washed soil directly into the water. On the bottom is a photo of the same streambank after the Smothermans erected a fence to keep the cattle off the banks. Vegetation has already returned.

Some farmers have even chosen to restrict the access of their cattle to ponds on their property. From a water quality perspective, it is less important to fence cattle out of ponds than it is to fence them out of streams, since pond water generally does not enter the groundwater or flow into lakes or rivers from which towns and cities draw their drinking water. But some farmers want their ponds to provide a healthy habitat for many species of aquatic wildlife. To protect the habitat and provide a better water supply for their livestock, they have fenced their cattle out of the ponds.

The Davidsons, who have chosen to fence their cattle out of their pond, have also installed an offsite watering system to bring water from the pond to a watering trough for their cattle. Since the water comes from the pond, the Davidsons do not have to pay for their cattle's drinking water. And since the cattle cannot go into the pond, the pond provides cleaner drinking water for them.
Above and to the left is Bill Davidson with his father Bill Sr. Behind them is the newly constructed pond, around which they have erected a fence. To the right is the off-site watering system that the Davidsens installed to provide clean drinking water for the beef herd.

Farmers are also concerned about the effects of their operations on non-aquatic wildlife. Agri-21 farm families are working with forestry and wildlife specialists to create forestry and wildlife habitat management plans. For example, the Storys have fenced their cattle out of their woodlands to protect a number of wild species.

Above is a picture of the forestry and wildlife habitat management plan created for the Story farm.

Agri-21 applauds those farmers who have taken the initiative to protect the environment even when there is no apparent financial incentive. As one Agri-21 farmer put it, as he looked up into a tall stand of white ash he vowed he'd never cut, "There are some things that money just can't buy."
Helping the farm families enrolled in the program become more sustainable is important, but is only half the battle. The ultimate goal is to encourage the rest of Tennessee’s farmers to operate sustainably as well.

But the farm audience is not the only audience we seek. We want to reach out to the non-farm public as well. This may surprise you, but the reason is simple. Perhaps more than many other industries, agriculture, as we know it today, depends on public policy. And, of course, public policy is influenced by public perception and opinion.

This is why we want the public to understand sustainable agriculture. We want people to know what agriculture requires to be safe and affordable. And we also want them to understand the farm family to realize that farmers share their concerns about the environment. In a sustainable world, individuals as well as interest groups must understand each other and communicate openly.

We use many methods to introduce people to Agri-21 and the sustainable practices and techniques it teaches. The farm tour continues to be one of our most powerful tools for communicating with people. It provides an opportunity to invite area farmers and rural residents to visit Agri-21 farms. Agri-21 families, Extension educators and staff from cooperating agencies conduct the farm tours, spotlighting the changes made on the farms since enrollment in Agri-21.

Agri-21 farms are teaching models. The strategy works like this: by attending a tour on an Agri-21 farm in or near their community, farmers will see the success of the farm, and they will adopt many of the practices and management techniques used on it.

During the five-year period that each farm family is enrolled in the program, the Agri-21 family will host at least one and perhaps two farm tours. Extension agents are the primary coordinators of each tour.
To address farm audiences, we also use exhibits and printed materials at agricultural-related events. Exhibits are displayed on Agri-21 farms during farm tours, and they are used at meetings attended by farmers and/or the public.

Exhibits have been used on a number of occasions already. They have been used at the Milan No-till Field Day for the past two years. They have been displayed at the Agri-21 Orientation, the UT Bicentennial celebration, the Beaver Creek Clean Water Tour and the Dollars and Sense Conference.

The factsheet can also be a useful educational tool to use at farm-related events. We have distributed farm family factsheets at farm tours
and other events. Each farm family factsheet contains a description of the family’s operation and identifies the changes that have been made or are planned on the farm since the family’s enrollment in Agri-21.

News articles are effective tools for reaching both farm audiences and the general public. We have written a number of articles about the program already, and we will be writing more in the coming months. So far, the articles, including features and news releases, have appeared in more than 30 newspapers across the state.

Farm tours, news articles, exhibits and factsheets are all effective tools in spreading the message about sustainable agriculture, but we plan to go further. Video can be one of the most powerful ways to speak to an audience. We hope to produce a video about sustainable agriculture that spotlights several Agri-21 farms. These farms and the families who operate them will become case studies for making family farms more sustainable. We will show this video at civic club and Extension meetings. We will also investigate the possibility of airing the production on public television.

An Agri-21 farm has already attracted some television coverage by a news program from a local station. We will seek more television coverage in the future for Agri-21-related tours.

We also plan to create a video for children about sustainable agriculture. Again, live footage demonstrating sustainable practices and techniques would come from Agri-21 farms. It will be used in elementary school science classes. To complement the video, we plan to develop lesson plans for science teachers to use.
Conclusion

We are proud of the progress the farm families have made in two years. We have seen many changes on all of the farms enrolled in the program. Trying new things can be frightening, especially when the changes may affect the amount of money people make. Sometimes the farmers were not altogether certain that a change would be for the better, but they were willing to try. We appreciate the cooperation of the Agri-21 farm families and the commitment with which they have pursued sustainability, and we look forward to the opportunity to work with future Agri-21 farm families.

Is the Agri-21 program successful? We believe it is. Cooperating farms have demonstrated techniques that make them more sustainable. Profits have improved, and adverse environmental impacts have been reduced. We have shared these results with both farm and non-farm audiences. Participants in the program, particularly farmers and Extension staff, have enjoyed opportunities for personal growth and professional development.

It is the goal of Agri-21 to help farm families across Tennessee become both more profitable and more protective of the environment. To achieve this goal, both farmers and non-farmers must work to understand the other's perspective. Farmers must adopt some of the practices and techniques that protect and improve the environment, and non-farmers must understand the practical needs of the agriculture we all depend on for our sustenance.
Teaching improved management techniques has always been an integral part of The University of Tennessee Agricultural Extension Service’s complete educational program. To help farm families realize their financial potential and meet tomorrow’s farm and family changes, the Extension Service has management programs available in all Tennessee counties.

MANAGE provides the assistance necessary for Tennessee farm families to:

- accurately assess their current financial status
- identify and evaluate alternatives available to the family
- develop appropriate strategies to improve their financial future
- determine farm and family goals and opportunities for achieving them

To become involved or to obtain additional information, contact your county Agricultural Extension Service office or call the toll free MANAGEment Information Line at 1-800-345-0561. All financial and personnel information will remain confidential.