

MINNESOTA *Science*

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When is Women's Work Done?



Farm women provide a significant, but often unrecognized labor resource to rural communities. Their multiple roles include farm worker, off-farm employee, wife, mother, housekeeper and volunteer.

The saying "women's work is never done" seems especially true of farm women. Most of 531 Minnesota farm women recently surveyed juggle roles as farm worker, wife, mother, housekeeper, community volunteer, and increasingly as off-farm employee.

"Work and volunteer activities of these farm women provides a significant but often unrecognized contribution to the rural household, community and economy," notes family social scientist Sharon Danes. "This shows how important farm women are to the economics of their own farms and to the community."

Danes and colleague Daniel Detzner examined the kind and extent of work

farm women did. Their study was unique in looking at the multiple roles farm women play. "Nobody has had a feel for the role overload these women feel, because other studies haven't looked at all the roles together," says Danes. Their research is done for the experiment station and the College of Human Ecology.

The women studied were asked about participation and leadership activities in farm tasks, family and household activities and volunteer work. Responses were divided into older (over age 55) and younger groups, and between those who were and were not employed off the farm.

All farm women, whether or not

employed off the farm, participated in numerous farming tasks in addition to their family and volunteer activities. A clear majority helped with the harvest, cared for farm animals, ran errands and did unmechanized fieldwork. Younger women who didn't work off the farm had the highest participation rate in farm work.

Off-farm employment caused changes, but the older group changed less when they added that role, says Danes. These older women were especially apt to add obligations, rather than to drop one role when they took on others. Women younger than 55 were more likely to drop some activities when they worked off the farm.

Though older women volunteered nearly as much as those younger women, they were less apt to be leaders. "Leadership training might benefit them in the long run because, as leaders, they might be able to change attitudes about what women 'should' do," says Danes.

"Older farm women are a resource to the rural community, rather than a problem to be solved as they are sometimes characterized in gerontological and policy research," adds Detzner. "They have many skills learned on the farm to offer volunteer organizations in the rural community."

—Anne Gillespie Lewis

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Contribute to Family
Stability**

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Close Urban, Rural Connections Shown

Urban and rural residents have many connections, and exchange resources of many types, according to a study of rural residents in two Minnesota counties. It's an interdependence which surprises many who think of urban and rural residents as distinct groups with little in common, says University of Minnesota family social science researchers Paul Rosenblatt, Jean Bauer and Terri Karis.

"It challenges the idea of the community," says Rosenblatt. "We lose track sometimes of how much the community is connected to the rest of the world."

The many connections between rural and urban residents may have public policy and political implications. Rosenblatt says, "Politicians who appeal to urban people as being interested only in urban affairs, and vice versa, are making a big mistake." Bauer says the study shows that "connectedness is social, psychological and economic."

The study was done in Norman and Rock counties in western Minnesota. Its part of a larger eight state study of rural residents, sponsored in part by the Minnesota Agricultural Experiment Station.

More than 80 percent of rural residents polled had family members or friends living in urban areas, with the Twin Cities mentioned most often. About three-fourths of those polled received or visited them at least once a year. Urban residents are, in fact, often those who migrated from the rural area, **Connections** continues on back page.

Social Programs Contribute to Family Stability



Minnesota's social program spending contributes to stable families. Educational enrichment for youths at risk, health screening and child protection services are examples of important public social programs.

States that spend more for public social programs have lower divorce and teenage birth rates than less generous states. That's the conclusion of a study by family social scientist Shirley Zimmerman in the College of Human Ecology. She conducts research for the Minnesota Agricultural Experiment Station.

Zimmerman says her findings refute the charge that social programs foster family instability. "The connection that critics have drawn between the welfare state and family breakup is a mythical one at best," she says.

Using 1985 data, she has shown that there is an inverse correlation between state spending and family welfare. States that spent more for social programs had lower divorce and teen birth rates than states with leaner social welfare budgets. Poverty and suicide rates were also lower in more generous states.

She plans to extend her study into 1990 when the most recent census figures are released. Zimmerman says she suspects they will show a continued strong relationship between state social spending and indicators of family stability.

Zimmerman says she hopes her results will encourage people and governments to see social programs more positively. "Government social programs have been under attack," she says. "There seems to be a pervasive feeling that nothing has gone right. Some people feel that unless the entire society is restructured, any efforts we make are just not going to matter. I don't feel that way."

The impetus for Zimmerman's study came in 1985, when the Minnesota Legislature debated cuts to the Aid to Families with Dependent Children program. That was four years after federal eligibility rules for social programs were greatly restricted.

She used statistics for all 50 states for 1960, 1970, 1980 and 1985. Data on each state's population density and changes, ratios of men to women, per capita income, median age and race were included in the study.

Her findings challenge many public attitudes about the benefits of spending for social programs. Zimmerman says she hopes her findings help people realize it may be necessary to pay more taxes to ensure individual as well as general well-being.

Zimmerman, a former social worker, says that individual state political cultures strongly influence each state's level of support for social programs. She has written about political cultures in *Family Policy and Family Well-Being: The Role of Political Culture*, a book to be published in 1992.

—Anne Gillespie Lewis

on tasks typically handled by men.
Uncertainty about whether an

Human Ecology: Research for



When Alzheimer strikes, roles of family members often change. Stress results from boundary ambiguity as relationships evolve to account for a member rendered physically present but psychologically absent from traditional family patterns of activity.

Recognizing When Things Aren't the Same: Alzheimer

When Alzheimer strikes, once-clear family roles become uncertain. With the patient present in body but not mind, stress of deciding how he or she fits within the family can be daunting. The stress can depress the primary care provider and challenge other family members, says University of Minnesota family social scientist Pauline Boss.

Families that come to terms with how the disease makes familiar family boundaries uncertain can deal with the situation better, she says. And when caregivers and family members feel less stress about the patients and their own roles in the family, the patients themselves tend to be less agitated.

Fitting a person with Alzheimer into a family may lead to switching traditional roles, Boss explains. Men learn to cook, for instance, and women take

Alzheimer patient is even still a part of the family, what Boss calls "boundary ambiguity," is a relatively new concept in family social science research. "I think if you want to study family health, the psychological health is as important as physical health," she says.

Boss says boundary ambiguity can occur in many situations. And the reverse of an Alzheimer situation is also possible. In times of war, for instance, family members serving in the military may be physically absent but psychologically present.

How families deal with Alzheimer imposed change was studied for five years by Boss and research assistants Wayne Caron and Ann Garwick. Funded by the experiment station and the National Institute on Aging, they worked with Alzheimer patients at the Veterans Administration Medical Center in Minneapolis, and their families. Several coping recommendations were developed by the research team.

Boss says a family must recognize that uncertainty over whether the patient is part of the family is a major cause of stress. Families need to talk over their situation, she says. "It's not therapy, the family isn't sick, it's stressed." Family members also need to become informed about the issues involved in Alzheimer disease, including the range of services available to help them.

And, families need to be able to choose the kind of support they will receive. Some families will want direct aid from health care professionals. Others will want information only.

Family members should also try to find meaning in their situation. Some could view it as an opportunity to give something back to the patient. Others might choose to participate in a research study, such as that of Boss and her colleagues, to help other families cope with Alzheimer in their future.

—Anne Gillespie Lewis

Families and Communities

"Home economics or human ecology research focuses on improving the quality of life and the environments in which people live." That's the framework Mary E. Heltsley brings to her dual roles as an associate director of the Minnesota Agricultural Experiment Station and dean of the College of Human Ecology.

"The early emphasis in home economics research focused on rural families," she says, but "many of the concepts and findings from the farm families were equally applicable to urban families. Many social problems, like crime, delinquency and drugs, either began in cities and spread outward or occurred at the same time in cities and rural areas."

Heltsley came to Minnesota in 1987, after four years with the USDA

Cooperative State Research Service, an agency which administers the federal share of the experiment station funds in universities. Before that post she had been a professor and assistant dean for research in home economics at Iowa State University, also serving as an assistant director of the Iowa Agricultural Experiment Station.

Experiment station research explores the causes and cures of ills within society, whether urban or rural. The studies of divorce and teenage birth rates, and on Alzheimer disease reported in this *Minnesota Science* are examples of the human ecology component of experiment station supported research.

"One of the key arguments given by farmers," Heltsley says, "is that even though food and fiber could be mass pro-

duced with less cost and subsidy, the rural way of life would be lost if family farms no longer exist. However, life down on the farm has not always been as idyllic as we may like to portray. Danes' research, featured in this issue, indicates that farm women are often ignored for the monetary contribution which they contribute to the farm operation. Off farm employment, for both men and women, is more often necessary than desired as a mode of living in rural areas today."

Research by experiment station faculty in the College of Human Ecology is also behind the meat counter and inside the package at the grocery store. "Changes in consumers' life styles, specifically food choices, have greatly influenced agricultural production and processing," Heltsley says. "Demand for leaner beef and pork, more fiber in the diet, and reduced cholesterol products, has influenced both quantity and type of product produced. Food product development has undergone tremendous change to meet the demand of the public for food that is safe, nutritious and tasty, yet easy and quick to prepare."

Financing important and essential research is a continuing major problem, Heltsley explains. "One of the major issues facing experiment stations in the future will be the maintenance of its support base when the control of state legislatures and Congress shifts from rural representatives and senators to those from urban settings. This shift from rural to urban control will occur in most states and Congress within the next five to ten years. This change calls for new coalitions, different emphases in research direction, and persuasion of local and state interest groups that change is inevitable and can be beneficial."

—Dave Hansen



Mary E. Heltsley

IN PRINT

The annual *Varietal Trials of Selected Farm Crops* has long been a valued resource to Minnesota's farmers. The 1992 edition, now available, covers all the forage, grain, oilseed and pulse crops for which the Minnesota Agricultural Experiment Station is currently conducting variety evaluations at some or all of its locations across the state. The new edition's format is similar to the major redesign introduced in last year's edition.

Crops covered in this year's *Varietal Trials* include alfalfa, amaranth, barley, birdsfoot trefoil, canola, crambe, field-pea, lupin, oat, oilseed rape, orchard-grass, reed canarygrass, soybean, timothy, wheat (duram, hard red spring and winter), and wild rice. Crambe is a new addition to the experiment station's trials program.

Directions to information resources for many of the crops no longer being evaluated in branch station trials are also included in this publication.

Varietal Trials of Selected Farm Crops is available for \$2 (plus tax) through county extension offices, or from the Distribution Center, 3 Coffey Hall, 1420 Eckles Avenue, St. Paul, MN, 55108-6064. Ask for publication number AD-MR-5615-E



New Wasp Weapons Await Gypsy Moth Invasion

Imagine about one quarter of Minnesota's 15 million acres of forest stripped bare. That's how much forest gypsy moth caterpillars defoliated in the United States in 1991. And that was a good year! The pest defoliates up to 13 million acres some years.

Beyond lost growth and killed trees, the cost of the moth included government and private expenditures of more than \$27 million in 1991 trying to control the gypsy moth.

Despite control efforts, the gypsy moth continues to eat its way westward. It's already well established in Wisconsin, and was recently found in Iowa, but so far Minnesota has been lucky. The Minnesota Department of Agriculture has managed to eradicate the minor gypsy moth infestations that have occurred here since 1982 by spraying insecticides and the bacterium *Bacillus thuringiensis*.

But it's only a matter of time, says University of Minnesota entomologist Herb Kulman. "Though the Department of Agriculture has done a great job, sooner or later the moth will be here to stay. When that time comes, if we have parasites already established, they can help our native parasitic wasps and flies to lessen its impact." The moth's greatest impact is expected to be in the oak forests of southeastern Minnesota and in urban areas, he says.

For three years, Kulman's research associate, Bill Schaupp, conducted research funded by the Legislative Commission on Minnesota Resources, seeking parasites that could contribute to gypsy moth control. In 1990, at several sites Schaupp recovered descendants of a stingless, parasitic wasp, *Coccygomimus disparis*, he had released the year before.

and the white-marked tussock moth. This is all to the good; the forest tent caterpillar is the primary pest of Minnesota's valuable aspen resource. The other species feed on trees and shrubs and are a costly nuisance for homeowners. Schaupp says, "Even if we escape large invasions of gypsy moths, the wasps will do us a favor by ganging up on these other pests."

Schaupp and his colleagues have released some 3,600 adult wasps in the Minneapolis-St. Paul area, where the gypsy moth is expected to first show up in large numbers. In 1989, they released descendants of wasps from South Korea, provided by the USDA Agricultural Research Service's Beneficial Insects Introduction Research Laboratory in Newark, Del.

In the summer of 1990, the lab sent Schaupp 28 *C. disparis* adults collected in mainland China. He reared 2,000

wasps from those adults, and released them at three sites that fall. When he found wasps last spring, he knew that some of his releases had mated and laid eggs in the pupae of local host species, and that their eggs had survived the winter and hatched.

Scientists cooperating with the Newark ARS lab have released more than 80,000 adult wasps in 16 eastern states since the 1970s. Those were descended from adults brought from India, Japan, and South Korea. The wasps Schaupp released in 1990 were the first to come from China.

Schaupp has left Minnesota, but Kulman and others in the Department of Entomology are evaluating other insects that prey on the gypsy moth, such as the nonbiting fly *Compsilura concinnata*, and another stingless wasp, *Brachymeria intermedia*.

—Sam Brungardt





Crambe, grown for the production of high-erucic acid industrial oil, is the newest crop undergoing varietal trials by the experiment station.

It was proof that the species had established itself in Minnesota.

Most parasitic wasps are gnat size or smaller, but *C. disparis* is about an inch long. It almost always deposits its eggs in the pupae of cocoon forming moths (such as the gypsy moth), so it poses no danger to butterflies, which do not encase their pupae in cocoons. When the eggs hatch, the wasp larvae devour the moth pupae.

The new wasp attacks several harmful moths, including the forest and eastern tent caterpillars, the fall webworm



A beneficial predator, the stingless Coccygomimus disparis wasp parasitizes the pupae of cocoon formers such as the gypsy moth. The adult wasp lays eggs inside the pupal case, one of which eventually devours the pest from the inside and emerges as a new adult. This beneficial wasp appears to have established itself in Minnesota.

Urban Leaves May Benefit Farms

University of Minnesota soil scientists raced the Halloween mega-snowstorm to begin a two year study of the effects of tilling leaves into farm land. Experiment station researcher Carl Rosen rushed to apply and till leaves into the soil before the advent of winter, which the heavy snowfall threatened to bring to Minnesota very early this year.

Garbage trucks hauled metro area leaves to experiment station research fields at Becker, Minn. With plots already marked, the research crew weighed each tractor bucket of leaves before spreading it over the field. Several application rates are being tried, ranging up to 16 dry tons per acre.

Rosen and project leader Tom Halbach are trying to determine best application rates for crops. They are also watching for possible pollution from excess nitrogen leeching into the groundwater. Crops grown on the leaf amended sandy soil will be irrigated, and the soil water analyzed for the next two years. Recommendations will then be developed for farmers who wish to use their fields for leaf recycling.

The project is a direct response to requests from metropolitan suburban



As the first inches of Halloween's snow fell, experiment station workers rushed to weigh and spread leaves across marked field plots at Becker, where a project has begun to determine recommendations for tilling leaves into farm fields.

communities for help with leaf disposal. Leaf management problems have been created by Minnesota's legal ban of yard wastes from landfills and incinerators. That ban has become effective statewide as of January 1992.

—Dave Hansen

Researcher Warns Against Using Plastic for Installment Purchases

Consumers who believe its okay to use credit cards as "instant" installment loans could be buying their way into financial trouble, especially during shaky economic times. So warns Sharon Danes, a family social scientist studying resource management for the Minnesota Agricultural Experiment Station. Even people fully aware of high interest costs should reexamine that practice, she says. She also says a recent congressionally proposed interest rate ceiling does not alter her warning at all.

Danes has studied the relationship between knowledge, beliefs and practices in the use of credit cards. She says knowing the facts about interest and consumer rights doesn't always make consumers cautious about overusing cards. A study of 198 household money managers in a midwestern town showed that those who knew the most about credit cards were more likely to use the cards for installment purchases. They paid the high monthly interest rates. They didn't use them only for convenience, paying their balances off each month.

Alternatives to credit card "instant" loans include paying cash, postponing purchases, buying lower cost items, or seeking bank or credit union loans with lower interest rates.

People with high incomes, good educations or large families had more credit cards and said they believed they should be used for installment purchases. Older and poorer individuals said cards should be used for convenience.

These results may seem surprising, but to Danes they are logical. "When people have more resources, they aren't as careful. They think they're more secure and they are betting on their future income. But that can be a false sense of security because, if the economy goes sour and they lose their jobs, they won't have the money to pay off their credit card debts. Those with fewer resources are much more careful about using credit.

"More and more people are becoming installment users of credit. That's because resources have been plentiful in the past. But in today's economy, incomes don't stretch to cover all wants and needs anymore and one way many people believe they can extend their income or money available is by using credit cards."

Family conferences, Danes says, are good ways for parents to teach financial responsibility by discussing the connections between needs and wants, resources available and the consequences of various choices. "The process of making decisions is the same no matter how young the children are," she says. All family members—even very young children—should take part in financial decision making, at levels appropriate to their ages.

—Anne Gillespie Lewis

Wood Building Materials: Environmentally Friendly

Many who frown on timber harvesting may not realize that there are few options. Manufactured substitutes are much more energy intensive and environmentally harmful than wood building materials, says forest products specialist Jim Bowyer.

"Gathering and processing industrial raw materials tends to be energy intensive," says Bowyer, who conducts research for the Minnesota Agricultural Experiment Station. "Energy consumption has major environmental impacts, ranging from global warming to oil spills. And when you look at industrial materials in an energy context, wood looks very environmentally acceptable in comparison to other materials."

It takes six to eight times more energy to make a wall of brick or concrete block than to make an all-wood wall. Bowyer says the National Academy of Sciences compared total energy costs (harvesting or mining, transportation, processing and construction) of manufacturing different kinds of walls used in buildings.

A 100 square foot wood wall—



In terms of the environmental cost of producing a finished wall, wood as a construction material uses much less energy than other commonly used materials such as brick or concrete block. It is also a domestically produced and renewable raw material.

medium density fiberboard siding over plywood sheathing, with 2-by-4 framing—required only 2.54 million Btu oil equivalents. Energy cost for a concrete block wall was 17.09 million Btu oil equivalents. Brick walls cost even more: 17.89 Btu.

Substituting steel for wood studs on the fiberboard and plywood wall almost doubles the energy used, to 4.79 million Btu. Thus, while using steel would result in fewer trees being harvested, the overall environmental impact would be very negative, Bowyer says.

Bowyer notes that potential substitutes for wood are also largely imported.

The U.S. is a net importer of many raw materials. Sometimes the materials aren't found in this country, sometimes domestic production isn't economical, and sometimes it is considered environmentally disruptive to produce them here when they can be obtained from countries with less stringent regulations.

Bowyer says "The U.S. is a net importer of almost all important industrial raw materials: metals petrochemicals (the basis for most plastics), and wood, and generally by a substantial margin."

We in effect export our pollution problems to other countries. "In 100 years, given rapidly growing popula-

tions, will these countries be willing to export these raw materials to us and, even if they are, is it morally acceptable for us to do that as a national environmental strategy?" Bowyer asks.

"The materials issue cannot be ignored as we seek to create a quality, sustainable environment. What we need to do is to produce raw materials to the extent we can in an environmentally acceptable way. If we choose not to consider realistically the need for materials, then our efforts to create a pristine U.S. environment will be at the expense of the global environment." This approach, he says, is irresponsible.

In an energy context, wood looks very environmentally acceptable.

The construction materials question is part of a larger problem of coping with population growth while maintaining healthy ecological systems. "Global thinking means looking at the total system, yet we often talk about the environment without considering population trends, which shows there is a certain amount of wishful thinking," he says.

The U.N. says world population could possibly double in the next century, to more than 12 billion. "Let's plan for that realistically," Bowyer says. "We need to take the requirement for materials and the need to protect the environment and come up with real solutions. When we view the world in this way, sustainable production of wood to near the biological potential of our forests looks to be a desirable envi-

Seeking a Truly Biodegradable Plastic Bag

Plastic bags are everywhere. Two million tons of plastic films are produced each year. But growing environmental awareness is creating in many of us an uneasy feeling that we may have created and are toting home a monster.

Some say a solution is to make low density polyethylene—what most plastic bags are made of—biodegradable. But do

rounded by the polyethylene film, and as long as this encapsulation is intact the bacteria and fungi can't get at it. So until there is further physical degradation to produce cracks or tears to expose more starch, there is no further degradation," Halbach says. At most, 40 percent of the added starch actually was accessible to microbial degradation.

a biologically active environment—compost bags, for example—or materials that may end up in sewage treatment plants. Some types of plastics could be recycled. Some could be burned to recover their energy content."

"We'll end up with a more diversified set of plastics in the future," he says. "Products that will be in biologically

grade? And are our only choices to bury plastic or be buried by it?

Are our only choices to bury plastic or be buried by it?

Seeking answers, experiment station natural resources researchers Tom Halbach, Phillip Barak, Yves Coquet, Jean-Alex Molina and C. Edward Clapp have been studying the use, disposal and reuses of plastic. They've developed an objective standard for testing biodegradability, and delivered some hard data on whether the plastic bag you use will actually biodegrade. The answers aren't simple, Halbach says.

Nobody had an objective definition of biodegradability for plastic bags, Halbach says. Instead, the industry used standard tests for mechanical features of plastic, such as loss of tensile strength and puncture resistance, and called that degradability. But biodegradation refers to the action of fungi and bacteria.

Even stable polyethylene will eventually biodegrade. However, "estimates are around one percent degraded in 100 years, and in general the rate slows down after the first hundred years," Halbach says.

To make a product that degrades more quickly, some producers devised polyethylene film infused with corn starch. Halbach and his colleagues studied these currently available products, and also a natural organic polymer called PHBV. They looked at biodegradability of samples in both lab tests and field conditions, on top of the soil and in hot active compost piles.

In all the tests, they found that most of the starch on the surface of the polyethylene film does degrade within 14 days. "But most of the starch is sur-

posed of, we'll engineer them so they degrade more quickly. Those we are going to put in modern, well managed landfills we'll make stable and durable, so they will not contaminate ground water, air, or the landfill.

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Two million tons of plastic films end up in U.S. landfills annually, and many makers of consumer plastic bags claim their products are biodegradable. University of Minnesota research unfortunately shows that most so-called biodegradable plastics actually won't!

—Anne Guespie Lewis

IN PRINT



Annual canarygrass

One of 240 slides in the new Lesser Known and Grown Field Crops slide collection.

A color slide collection, *Lesser Known and Grown Field Crops*, is available for use by teachers, agronomists, and food producers and processors. It is the most complete set available, according to agronomist Lee Hardman, one of its developers.

The 240 slide set organizes 70 crops into grain, pulse, oilseed, forage and miscellaneous categories based on their major use. Slides show vegetative and reproductive growth stages as well as many closeups of seeds. Each slide has the common name of the crop superimposed. Separate title slides for each crop list common and scientific names and major uses.

The collection is a valuable resource for presentations about alternative crops, and the photos are useful for crop identification. The collection, shipped in plastic storage sheets, is available for \$162.50 (plus tax for orders to Minnesota addresses) from the Distribution Center, 3 Coffey Hall, 1420 Eckles Avenue, St. Paul, MN, 55108-6064. Ask for item AD-SS-5669.

Connections continued from page 2. Rosenblatt explains. "Migration typically does not end the migrants relations with the people left behind."

Exchange of resources between urban and rural residents is about even, he says. About 47 percent of the rural respondents reported receiving gifts, with monetary values ranging from \$3 to \$25,000, from their urban connections. And 52 percent of rural respondents gave gifts of similar value to urban relatives and friends.

Rosenblatt says the exchange of money and gifts supplements moral support, advice giving, child care, car repair and other important, if less quantifiable, "gifts" and interactions.

The study shows that rural residents have resources available beyond their immediate community. It also suggests, Rosenblatt says, that they may be able to get their perspectives and concerns across to their urban connections, who may keep them in mind on election days.

—Anne Gillespie Lewis

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Sustainable Agriculture: the Who and Why



Who practices sustainable agriculture? Why do they? Can they and their communities survive today's economy? These questions are behind a survey of 1,000 Minnesota farmers carried out by researchers in rural sociology and agronomy in cooperation with the Land Stewardship Project.

Sustainable agriculture "is a new challenge to society, a process of change," says Dario Menanteau, an experiment station rural sociologist and director of the university's Center for Rural Social Development.

The survey examined farm size, rental or ownership, membership in farm organizations, off-farm employment, attitudes toward sustainability, and future ownership. Sociologist Virginia Juffer says farmers who scored higher on a sustainable practice scale were more likely to expect a future generation of their family to continue farming.

Farmers who scored high "had more diverse operations. They had less land in corn and soybeans, more in oats, alfalfa, pasture, and were more likely to have livestock or poultry on their farms," says university agronomist Bruce Maxwell.

Farmers high on the scale were also

more likely to base production decisions on several environmental factors and animal welfare. Farmers using fewer sustainable practices were more influenced by federal commodity programs.

Gross incomes varied drastically between groups. "The less sustainable took in a lot more money," says Juffer. "However, net farm and non-farm income comparisons showed less difference between the groups."

Farm owners appeared to be more sustainably oriented than did renters.

Sustainability is a complex issue, Maxwell says. "It's not just producing a crop year after year and maintaining the land. It is maintaining farms, farm families and rural communities. Policy makers need to know if sustainable agriculture serves its community better," he says.

Juffer notes that the farm population is half of what it was in 1960.

The project, funded by the Northwest Area Foundation, is beginning in-depth interviews with 50 farm families.

Foundation vice president for programs Karl Stauber, says it's a joint effort "to find ways to increase the economic vitality of farming and ranching, without damaging the environment or people."

Ron Kroese, executive director of the Land Stewardship Project, hopes the study will better define "what agriculture is best for small and medium size farms, the family farm." He says he wants to know whether sustainable agriculture is really "a viable alternative for rural Minnesota and the region?"

Menanteau says changing to sustainable practices "depends on the individual, the support they get from others, the information available, and support from public policy."

—David Hansen

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