Changes

There are several noticeable changes in this issue of Utah Science.

Why change? The most compelling reason was to make it easier for readers to review information, to help them quickly assess research underway at the Experiment Station.

Some may think our new format is less attractive. It certainly is less colorful. And, yes, it is less expensive to publish.

But we believe it is appropriate to the task at hand—to inform, succinctly and accurately. We think the new format meets these objectives.

We have not completely abandoned the “old” form of the magazine. The format of our new annual report will resemble that of previous issues. Subscribers to Utah Science will automatically receive a copy.

Please review the “new” Utah Science and tell us what you think. Your comments and suggestions are always welcome.

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Researchers Tackle Costly

MINK DISEASE

Aleutian Disease is ravaging Utah’s $100 million mink industry.

Mortality in infected herds approaches 25 percent. Some producers have liquidated herds. Others are on the verge of going out of business.

“Aleutian Disease is probably the most serious livestock disease in the state at the moment. If this disease afflicted any other species of farm animal, it would receive a lot more attention,” says LeGrande Ellis, a USU physiologist who has studied reproduction and pelt production in mink for 20 years.

The virus responsible for Aleutian Disease triggers excessive production of antibodies, and blood becomes noticeably thicker. Eventually, so much antigen and antibody are deposited in the kidneys and liver that these organs are attacked by the animal’s immune system.

The Problem Reappears

The disease first appeared in mink more than 50 years ago. It hasn’t been much of a problem since tests allowed ranchers to identify infected animals. It resurfaced with a vengeance about four years ago.

Ironically, the tests that let ranchers detect infected mink may be partially responsible for the severity of recent outbreaks, Ellis says. Some of the infected mink that were culled may have had some natural resistance to disease.

“When the disease hits now, it wipes out herds because none of the remaining mink have been exposed to the virus,” Ellis says.

Researchers with the Utah Agricultural Experiment Station are attacking the problem on several fronts. The research team consists of Ellis, and virologists John Morrey, Dale Barnard, and Keven Jackson. The State of Utah funds some of the research.
The latest outbreaks don't appear to be due to a new, more virulent strain of the virus.

There's very little evidence that a more virulent strain of the disease has appeared, but that's one possibility the researchers will examine.

Enhancing Immunity

The virologists are studying an agent that may enhance the immune system's ability to ward off the virus; the compound also may have antiviral properties.

“In preliminary experiments, this compound seemed to reduce the severity of the disease. We are conducting clinical trials to determine the optimum dose, timing, and formulation of the compound,” Barnard says. The compound is similar to the immune modulation agents used in human medicine.

“This compound will not necessarily cure the disease, but it might let ranchers raise mink that are old enough to be pelted. It could be a cure for the disease if its viricidal properties are great enough to prevent shedding of the virus,” he adds.

The researchers are also studying the effectiveness of Imexon, a compound that limits the destructive immune response by suppressing the proliferation of B-cells, thereby also curbing the production of antibodies.

Vaccine and Genetic Resistance

Jackson, who is also a veterinary pathologist, is developing a vaccine against the disease. Early vaccines were based on killed viruses, which often increased the severity of the disease; he is using a live virus that is not virulent.

The USU researchers will also identify the genes responsible for resistance to the disease and will transfer them to mink. Such transgenic animals may provide a long-term solution to the problem.

Ellis is also determining whether it's possible to select and breed mink with natural resistance to Aleutian Disease.

Researchers are cooperating with Gary Durrant at the Utah Fur Breeders Agricultural Cooperative, Sandy, Utah, to determine how the virus is transmitted. Many ranchers believe skunks and raccoons harbor the virus and there are several accounts of outbreaks following exposure to raccoons. Producers in Holland blame seagulls and other birds. Ranchers in Franklin, Idaho, think starlings are implicated. However, there's no proof that any of these animals spread the disease.

Feral mink are certainly prime candidates for spreading the virus, however. “I certainly wouldn’t start shooting wildlife indiscriminately because it could generate a lot of unfavorable publicity for mink ranchers. I would recommend eliminating feral mink from other ranches. Ranchers may underestimate the number of feral mink and the ability of feral mink to transmit the disease,” Barnard says.

If researchers find wildlife carry the virus, guard fences may help limit spread of the disease. These fences are used successfully in other mink-producing regions, but are not present on all Utah farms.

In Utah, mink production is concentrated in a few areas and ranches are often close to each other, which aids the spread of the disease.

Strains and Resistance

Some strains (color phases) of mink are resistant to the virus. “Unfortunately, mink
with the desirable colors of pelts are susceptible," Ellis says. These include Aleutian, dark, and pastel color phases.

Inbreeding for coat color increased susceptibility to the virus, even though the traits may not be linked. Ellis notes that the genes controlling coat color, reproduction, and immunity are located on the same chromosome. “Once a 'bad' gene is found on the chromosome, it's very difficult to eliminate,” Ellis says.

Aleutian pelts command nearly twice the price of standard pelts. Ranchers who switch to resistant strains of mink with less desirable coat colors probably couldn't afford to stay in business.

Utah often leads the nation in pelt production.

Barnard says Aleutian Disease is a classic immune complex disease, similar to feline infectious peritonitis, among other ailments. Acute infections are normally associated with kits (young mink) and are characterized by lung damage and pneumonia. Most die, or are stunted.

The progressive form of the disease is usually fatal. Those few adults that do survive usually are much less fertile and produce poor-quality pelts.

Aleutian Disease plagues mink ranchers around the globe, including Russia, the People's Republic of China, Holland, Scandinavia, Canada, and Iceland, as well as areas throughout the United States. In some areas of China, nearly 85 percent of the animals in a herd are infected.

Recent unfavorable publicity concerning the production of fur-bearing animals may have diminished support for research to combat the disease, Barnard says.

KG Dale Barnard 797-2696
LeGrande Ellis 797-2563
Kevan Jackson 797-1887
John Morrey 797-2662

Field Days and Other Events

Dryland Crops Field Day
Blue Creek Dryland Farm
July 13
Contact: Ralph Whitesides — (801) 797-2259
Marlon Winger — (801) 797-0406

Irrigated Crops Field Day
Greenville Farm, North Logan
July 20
Contact: Ralph Whitesides — (801) 797-2259
Marlon Winger — (801) 797-0406

Utah Botanical Garden
Farmington
Open House
September 3
9:00 A.M. to 3:00 P.M.

Saturday Morning Gardening Series—9:00 - 10:30 A.M.
June 18 — Composting

Other Classes
Plant Diagnostic Clinics—Tuesdays (1:00 - 4:00 P.M.)
through August 30

Guided Tours
Wednesdays (10:00 A.M.) through September 28
Contact: William Varga, Director
(801) 797-2252 or (801) 451-3204

Tree Fruit and Vegetable Field Day
Kaysville Horticulture Research Station
Early September
Contact: Dan Drost — (801) 797-2258
Schuyler Seeley — (801) 797-2248

Note: Land Grant Days is held every other year. The next program will be offered in 1995.
Pastures in the state haven't exactly been ignored. It's just that they probably haven't gotten the attention they deserve.

Pastures may be the sleeping giant of Utah agriculture...and they're about to be roused.

Of approximately 11.6 million acres of private farmland in Utah, about 1 million acres are planted to crops such as hay, small grains, corn, beans, potatoes, and fruit.

Most of the rest—about 10 million acres—is probably pasture of one form or another—improved pastures, native meadows, and unimproved forested and non-forested range.

Interest in irrigated pastures waned during the 1960s, in large part because dairy farmers began raising cattle in drylots. Pastures were still utilized, but often not to their full potential.

Research involving irrigated pastures decreased, although research in native range pastures and dryland grasses increased.

Irrigated pastures are looking greener now, however. In part, this reflects the fear that livestock producers will lose grazing rights on public land, and that private pastures could provide the necessary replacement forage. (USU animal scientists are already studying several promising alternative systems of production.) There's also increased awareness of the role of pastures in conservation and as a component of sustainable agriculture, says USU agronomist Jim Thomas.

A Cooperative Effort

The Utah Private Grazing Lands Development Project is a cooperative effort to increase the productivity of pastures in the state. It involves the Utah Agricultural Experiment Station, the Utah Cooperative Extension Service, federal agencies, the Utah Department of Agriculture, and cooperating farmers and ranchers.

The project includes three major aspects:

- Determine the acreage and types (irrigated, non-irrigated, native, improved, etc.) of private grazing based on remotely sensed images from aircraft. These images are already available for much of the state, and will be combined with maps of climate and dominant soil types to get a better idea of carrying capacity. Findings will also help determine the rate at which prime farmland is being converted to urban uses.

- Determine the most profitable uses of pasture and develop a comprehensive pasture planning and
The program emphasizes grassroots participation and stresses the importance of small, family farms.

improvement guide. This guide will be distributed through Cooperative Extension offices.

- Evaluate plant germplasm and grazing management, including improved cultivars and species developed by the USDA-Agricultural Research Service Forage and Range Research Laboratory. Research plots will be established in the Uintah Basin and at other locations to evaluate grasses and legumes, and the effects of grazing systems, fertilizers, and irrigation regimes. Researchers will also consider the nutritional value of forages.

Similar research is underway on sustainable rangeland ecosystems in the Intermountain region.

Updating Research Findings

A lot has happened in the 40 years since pastures were the center of research at USU. "Some of the previous research findings may still be valid, but there are many new varieties and management techniques to evaluate," Thomas says.

Some results, such as determining pasture resources, may be completed within a year or so while results of many field studies may not be available for several years, Thomas says.

The researchers welcome suggestions. They also are looking for farmers and ranchers willing to establish research plots.

KG Jim Thomas 797-0404

Recent Grants & Contracts

Donald Snyder, Economics Department, is studying agricultural enhancement and marketing with support from the Utah Department of Agriculture.

Donald Jensen, Utah Climate Center, Plants, Soils & Biometeorology Department, is developing precipitation maps for the Utah Division of Water Resources.

Gary Straquadine, Agricultural Systems Technology & Education Department, helps education districts implement the National Ag Ed Network, an electronic mail service for agricultural instructors, with support from the Utah State Office of Education.

The Four-Corners Navajo Nation Sustainable Agriculture Demonstration Project (USDA) supports the efforts of Lyle McNeal, Animal, Dairy & Veterinary Science Department, to develop and demonstrate sustainable agropastoral systems on the Navajo Reservation.

Richard Krannich, Sociology, Social Work & Anthropology Department, studies the socioeconomic impacts of waste facility siting and management with support from the Cooperative State Research Service (USDA).

Diane Alston, Biology Department, is determining how insecticides used for grasshopper control on rangelands affect the pollinators of native plants. Her research is supported by the Animal and Plant Health Inspection Service (USDA).

The Bureau of Land Management funds a pilot project concerning the green strips on rangelands. The research is conducted by Robert Newhall, Plants, Soils & Biometeorology Department.
Compound Promises to Curb SOIL EROSION

Adding small amounts of polyacrylamide, an organic compound, to irrigation water dramatically reduces erosion on gypsum-rich soils in Southern Utah. Many of these soils are very susceptible to concentrated flow erosion, such as tunneling, piping, and gulleying, says USU soil scientist Janis Boettinger.

Development in the region has exacerbated erosion-related problems. Fields subside, sinkholes appear, and pavement and foundations crack as soil collapses.

“When gypsum (calcium sulfate) in these soils dissolves, the remaining particles are like a house of cards, ready to collapse—which they often do,” Boettinger says. Erosion is especially severe in silty soils that contain a finely dispersed, easily dissolved form of gypsum.

Sandy soils that contain larger amounts of gypsum are less susceptible to erosion because the gypsum exists in a form that dissolves more slowly.

Problems can often be prevented by avoiding overirrigation and by diverting drainage water from roofs and pavements to drains.

Linking Soil Particles

Boettinger and Darrell Norton, with the National Soil Erosion Research Laboratory at Purdue University (Indiana), found that adding small amounts of polyacrylamide—about 10 parts per million (ppm)—to irrigation water reduced soil erosion to one-tenth previous levels. No erosion was detected when the soil was allowed to dry before the next irrigation.

Polyacrylamide is a large organic molecule with a molecular weight exceeding 40,000. (In comparison, the molecular weight of glucose is 180.) The compound works by creating linkages between soil particles. When the gypsum and salt in these soils dissolve, the negatively charged polyacrylamide ions attach to negatively charged clay particles via the positively charged calcium and sodium ions, thereby stabilizing the soil structure.
Including the molecule in irrigation water also adds more organic matter to the soil.

Norton says that research at the USDA-ARS laboratory in Kimberly, Idaho, indicates that it costs about 5 cents per acre to apply 10 ppm of polyacrylamide via surge irrigation. At Kimberly, six applications per year reduced water and wind erosion.

The research is supported by the Utah Agricultural Experiment Station, state Mineral Lease Funds, and the National Soil Erosion Laboratory.

Better Estimates of CROP WATER USE

We now have a much better idea of how much water crops actually use.

USU irrigation engineer Robert Hill recently revised the estimates used to determine the water use of crops. The results will be published by the Utah Agricultural Experiment Station as Research Report 145, Consumptive Use of Irrigated Crops in Utah.

The updated estimates reflect the use of better weather data, improved estimates of the periods of crop growth, and more complex equations. The study involved the analysis of weather data (1961-1990) from more than 100 locations around the state.

In most cases, the revisions increased the estimated water use of crops, due to the incorporation of factors such as wind speed, relative humidity, and solar radiation in addition to temperature.

The estimates are widely used in water resource planning, irrigation system design, and irrigation scheduling. They may be used to determine the allocation of water rights.

The research was supported by the Utah Agricultural Experiment Station and the Utah Department of Natural Resources, Division of Water Resources and Division of Water Rights.

Robert Hill 797-2791
Higher Grazing Fees Would Worsen Economic Plight of SMALL UTAH RANCHES

Increased grazing fees may not make much of a dent in the federal deficit, but they could certainly make matters worse on many small ranches in Utah, according to a range economist with the Utah Agricultural Experiment Station.

The proposed increase in grazing fees would wipe out net income and substantially reduce the borrowing power of these ranches.

"Grazing fees currently represent a relatively small portion of total variable costs on these ranches. However, the proposed increase in fees is somewhat larger than the average total net income of about $2,000," says USU economist John Workman.

Loss of Collateral

A more important consequence of higher grazing fees is the loss of the capital value of federal permits, which would reduce borrowing power on the typical ranch by about $46,000, Workman says. "Most ranchers are already borrowing extensively. The loss of the capital value could mean ranchers lack collateral to support existing loans."

Most ranchers acquired grazing permits by purchasing them from another rancher. (More than 85 percent of BLM and Forest Service permits had been sold by the mid 1960s.) Ranchers purchased permits on the assumption that they were buying the right to annually lease forage worth $3.00 to $5.00 per animal unit month (AUM) at the federal fee of about $2.00 per AUM.

Permits Become Worthless

“When the price of the federal grazing fee increases..."
The typical ranch had 196 brood cows. “These aren’t cattle barons. A lot of publicity has focused on the proposed impact of higher grazing fees but there hasn’t been much attention to how they would affect smaller operations.”

It’s already tough on these ranches, Workman says, as he and graduate student Scott Evans found when they analyzed costs and returns on small Utah ranches in 1990.

**Bleak Prospects**

They characterized the situation as “especially bleak” due to low cattle prices, increased operating costs, and declining land values, which resulted in a negative net return for family living of more than $28,000.

Matters certainly haven’t improved much since that time, Workman says.

Why do ranchers stay in business? Optimism helps. Many ranchers tough it out because they think the situation will improve.

Some “live on depreciation” by postponing the replacement of machinery and improvements, Workman says. The “perks” associated with ranch ownership, such as home-grown food and housing, also help, as did increasing real estate values between 1964 and 1982, which let ranchers borrow against equity to raise needed cash.

Some also rely on off-ranch income.

Nonetheless, this can’t continue indefinitely. Ranchers place a high value on the ranching lifestyle and may stick with an asset that generates a net loss, but they can’t do so forever, the economist says.

Workman published his findings in recent issues of the journal Rangelands.

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**ERRATA**

The yield data for forages reported in the Fall 1993 issue (“Cattle Displaced from Rangeland May Find Home on Irrigated Pastures,” p. 104), indicated that Newhy R/S grass outyielded the other grasses tested. However, these data were from the first harvest. The yields for the entire growing season were as follows:

<table>
<thead>
<tr>
<th>Forage Type</th>
<th>Tons of Dry Matter per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orchardgrass</td>
<td>4.39</td>
</tr>
<tr>
<td>Newhy R/S grass</td>
<td>4.28</td>
</tr>
<tr>
<td>Crested wheatgrass</td>
<td>4.23</td>
</tr>
<tr>
<td>Tall fescue</td>
<td>4.17</td>
</tr>
<tr>
<td>Smooth bromegrass</td>
<td>2.70</td>
</tr>
<tr>
<td>Bluebunch wheatgrass</td>
<td>1.24</td>
</tr>
</tbody>
</table>
FORAGE KOCHIA
Holds Ground Against Cheatgrass, Erosion

Researchers with the Utah Agricultural Experiment Station are studying whether forage kochia (Kochia prostrata) can control erosion on rangelands.

Forage Kochia Field Day

Forage kochia’s ability to thrive on inhospitable rangeland sites will be demonstrated June 28 during a field day at White Rocks, Utah, where about 60 acres have been planted to the versatile forage. The program begins at 10:00 a.m.

White Rocks is located approximately 6 miles north of the entrance to the Dugway Proving Grounds. Take the Dugway Exit from I-80.

The field day is sponsored by the Bureau of Land Management, the Utah Department of Wildlife Resources, the Soil and Water Conservation Society-Utah Chapter, the USDA Shrub Sciences Laboratory, the Utah Cooperative Extension Service, and the Utah Agricultural Experiment Station.

Advance registration is required. For more information, contact Dick Page (801 539-4061) or Robert Newhall at (801 797-2183).
“It’s a way of introducing diversity into these wheatgrass monocultures,” says Richard Stevens, project leader and wildlife biologist for the Utah Division of Wildlife Resources, Great Basin Experimental Area, in Ephraim, Utah, who has studied forage kochia since 1969.

Livestock like it. So do deer and elk. Its foliage provides protein-rich forage for year-round grazing. In Idaho, it’s widely used in greenstrips to suppress costly cheatgrass-fueled fires and to revegetate scarred landscapes. And it’s a remarkably docile inhabitant of western rangelands. It seldom ventures where it’s not wanted, nor does it displace desirable species.

**Improves Winter Pasture**

“If I were a livestock operator with semi-arid land, I would seriously consider using kochia as an improved winter pasture,” says Stephen Monsen, a botanist with the Forest Service Shrub Science Laboratory in Provo.

In grazing studies in southern Idaho, Monsen says cattle readily used

the shrub from mid-summer (when grass started to dry) through winter. Cattle usually consumed more than 50 percent of the plant, which provided a substantial portion of their diets.

Forage kochia has received a cool reception in some quarters, partly because of a preference for native species—and an aversion to introduced species. No one wants the large monocultures that accompanied the introduction of crested wheatgrass, nor do they want to eliminate native communities. Forage kochia’s ability to compete with cheatgrass has fostered the impression that any plant that can do that must be wickedly aggressive—that it might be as bad as cheatgrass.

Not so, say researchers who have studied forage kochia for almost two decades. Many of these researchers say they once had similar concerns.

**Tough but not Invasive**

“If anyone is critical of introduced species, it’s us,” says Monsen, who notes that the danger of aggressive and uncontrollable spread was “one of our biggest fears, which is why we waited 20 years before releasing it. But it’s not that aggressive against sagebrush and perennial grasses. Moreover, its seeds aren’t widely dispersed by wind, and it doesn’t move outside areas where it has been planted.”

“Forage kochia is very adaptable to low-rainfall sites, especially where few species are able to grow. It’s nutritious and palatable,” says Allen Rasmussen, USU Extension range management specialist. “I don’t see it as a problem in grazed systems, but I am concerned about its ability to spread in ungrazed sites where biodiversity is a concern.”

Ten years after its establishment on trial plots, forage kochia has seldom spread from its prepared seedbeds, and then its spread has been confined to areas where sagebrush had died or to disturbed areas, such as anthills, says Howard Horton, range scientist with the USDA Forage and Range Research Laboratory in Logan.

**Increased Demand for Seed**

Stevens says the supply of seed rather than its price seems to limit its use. Seed currently costs about $4.00-$6.00 per pound, much less than the $60 per pound it cost soon after it was introduced.

‘Immigrant’ was released by the USDA Forest Service Intermountain Research Station, the Utah State Division of Wildlife Resources, the Agricultural Experiment Stations of Arizona, Idaho, and Utah, and the USDA Soil Conservation Service.

Demand for seed is definitely increasing and there’s a market for twice as much seed as is now produced, says Stan Young, secretary-treasurer of the Utah Crop Improvement Association. About 20 acres are grown for seed in Utah. Some is collected on public rangeland. Most of the seed appears to be used in reclamation.

“Native plants are usually preferred, but we are unable to use natives exclusively. There are places that must be stabilized, or we’ll get nothing but cheatgrass,” says Stevens.

**Forage kochia's attributes have impressed some strong critics of introduced species**

Howard Horton 797-3079
Stephen Monsen 375-6968
Robert Newhall 797-2183
Richard Stevens 283-4441

**KG**
High-Tech

RANGE MONITORING

Rangeland monitoring often involves large acreages, small samples, and huge disagreements.

Matters could get worse, considering that a lot of people are riled up about what they think livestock are doing to public rangelands.

It has all the ingredients of a classic 1990s style Western showdown, only this time the politics are thicker than bullets.

Many of the problems stem from the system currently used to assess rangeland condition, which is based on information from a few selected plots.

"It's difficult to get around often enough and fast enough to accurately monitor such factors as plant growth and soil erosion, all of which can change relatively quickly," says USU range scientist Neil West.

There's often disagreement over whether the plots are representative of overall rangeland condition.

Moreover, the limited scope of sampling makes it difficult to determine whether effects are due to livestock or other factors such as the climate and insect infestations.

Aerial views and digitized images are likely to be staples in range monitoring. And they may be used by anyone who can fly over rangelands.

Computers Speed Analysis

Using computers to analyze images (photographs, video images, or satellite images) of rangelands may be a much better method.

"These new techniques promise to provide more information in much less time than we can obtain with current methods," says Extension range management specialist Allen Rasmussen.

Rasmussen and West are using computers to analyze digitized images. The major impediments to this type of analyses—the speed and memory of computers—probably won't be a problem in a few years.

"We think we can use computers to estimate the percentage of cover on a site, a process that now requires hand measurements along a transect, but we don't know whether it will be possible to determine the composition of species by this method," Rasmussen says. It's definitely a possibility, however, since plants differ in their spectral properties. The researchers are also studying factors such as total standing live material and organic matter on the soil surface.

"There's a lot to be learned by examining the patchiness, shape and continuity of pixels of differing spectral
characteristics. Many of the desirable changes in rangelands are associated with a change from uniformity to heterogeneity," West says.

"Opening Up" the Process

Computerized techniques would "open up the process used to determine rangeland condition. Anyone could reconstruct how the decisions were made," he adds.

It also means that anyone could gather information by flying over rangelands. The interest in monitoring ecosystems and wildlands is also driving interest in these systems. In other words, rangelands are likely to be monitored by these systems, whether or not ranchers approve.

Aerial video images, with a resolution of about a square meter, could be used in combination with LANDSAT images, which have a resolution of about 30 by 30 meters.

The new process makes it possible to analyze entire pastures instead of small plots. Although the system might be more expensive initially, "if it works, the potential savings are enormous. We can gather information over a large area and stockpile data," West says.

"The ranchers that are going to stay in business are those who monitor their rangelands, whether private or leased from government. I predict the technique will be in routine use by the first decade of the next century," West says.

USU has been named host institution of the Western Region Sustainable Agriculture Research and Education (SARE) program, which will be coordinated by Philip Rasmussen, head of the USU’s Agricultural Systems Technology and Education Department.

Sustainable systems include a wide range of practices that can reduce farmers’ reliance on purchased...
inputs, such as fertilizers, pesticides, and oil. "The program is a holistic approach to agriculture that includes conservation, economics, and rural sociology," Rasmussen says.

Annual funding for the SARE program in the western region exceeds $2 million. The western region includes 11 contiguous states, Alaska, Hawaii, and several U.S. Pacific territories, including Guam, Micronesia, and American Samoa.

The program, which is funded by the USDA's Cooperative State Research Service, involves research at several universities and nonprofit organizations. It also includes the Agriculture in Concert with the Environment (ACE) program of the U.S. Environmental Protection Agency.

**Grassroots Participation**

Rasmussen says the SARE program reflects an increased awareness by Congress of the need to support small family farms and to encourage grassroots participation. Asking producers for advice and to help evaluate grants is changing the face of agricultural research, he says.

According to Rasmussen, USU has several projects that exemplify the type of research funded under the SARE program. Lyle McNeal heads the the Four Corners Navajo Nation Sustainable Agriculture Demonstration Project, which encourages rural economic development while preserving traditional lifeways.

Bruce Miller studies the composting of agricultural wastes. The compost could be sold to landscapers and home gardeners, thus making profitable use of nutrients that might otherwise leach into streams and groundwater.

Rasmussen says the SARE program will attract many experts to Utah.

As coordinator of the Western SARE program, Rasmussen also serves as assistant director of the Utah Agricultural Experiment Station and of the Utah Cooperative Extension Service.

**Livestock Blamed Unfairly**

Methods to monitor and inventory the conditions and trends of rangelands have become increasingly important. Because agencies lack baseline data on rangeland conditions, livestock may get blamed for changes caused by other factors.

"There's no question that livestock grazing is an important factor in the condition of rangelands, but it's often not nearly as important as climate. However, federal agencies lack the manpower and funds to monitor rangelands and are turning a lot of that responsibility over to ranchers, who require training in monitoring techniques," Malechek says.

Research also concerns plant ecophysiology, including competition between plants in the root zone, and how rangeland vegetation, especially junipers, affects water yields and erosion.

One study concerns how the ability of junipers to colonize new sites is affected by factors such as the spread of...
Social and political constraints play a larger role in range research. So do the amenities provided by rangelands.

Changing Values
Most Utahns live along the Wasatch Front, and are only dimly aware that Utah is predominantly (84 percent) rangeland.

The changing demography of the West means that public lands are valued more for their amenities than for commodity production, Malechek says.

However, those same trends may jeopardize the very landscape that makes the West so attractive.

Malechek says ranching may be easier on the landscape than many alternative uses, such as subdivisions and small "ranchettes."

"We are going to have to decide what kind of rural landscapes we want," he says. "I'd hate to see us give up the scenic beauty, open spaces, and quality of life that are part of our agricultural heritage."

New Faculty

Jeanette J. Arbuthnot is assistant professor in the Human Environments Department. She earned a Ph.D. in clothing, textiles and merchandising from Oklahoma State University. She joined USU in 1988.

Luz S. Colón-Teicher is research assistant professor in the Animal, Dairy & Veterinary Sciences Department. She earned a Ph.D. from the University of Rochester and was a research scientist and lecturer at Columbia University (New York).

Paul R. Grossi is assistant professor in the Plants, Soils & Biometeorology Department. He earned a Ph.D. in environmental soil chemistry from Montana State University and was a postdoctoral fellow at the University of Delaware and Battelle Pacific Northwest Laboratories.

Richard M. Joerger is temporary assistant professor in the Agricultural Systems Technology & Education Department. He earned a Ph.D. in adult education from the University of Minnesota and was a farm management consultant and a secondary education agriculture instructor.

Shashi D. Kalaskar is postdoctoral fellow in the Chemistry & Biochemistry Department. He earned a Ph.D. in analytical chemistry from USU and was a research associate at USU.

Eric D. Miltner is assistant professor in the Plants, Soils & Biometeorology Department. He earned a Ph.D. in crop and soil sciences (turfgrass management) from Michigan State University.

Richard G. Munger is associate professor in the Nutrition & Food Sciences Department. He earned a Ph.D. in biological anthropology and an M.P.H. in epidemiology from the University of Washington. Before joining USU, he was director of the Epidemiology and Biometry Core of the Environmental Health Science Research Center, and associate professor, Department of Preventive Medicine and the Department of Anthropology, University of Iowa.

Irina Polejaeva is postdoctoral fellow in the Animal, Dairy & Veterinary Sciences Department. She earned her Ph.D. in biological science from the Russian Research Institute of Animal Husbandry.