

MINNESOTA *Science*

Agricultural Experiment Station
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When the Farm Falters, Friends May Too



During in-depth interviews, farm couples in economic distress expressed feelings of isolation.

The exodus from farming involves more than legal documents, boarded-up buildings and silent, empty barns. For many families, losing the farm is coupled with feelings of failure, self-doubt and isolation.

That's when legendary country neighborliness and community support can be a big help, says experiment station family social science researcher Paul Rosenblatt. Often, however, that spirit is missing as families face their troubles seemingly alone.

Rosenblatt and Sara Wright, a psychologist at Dakota Mental Health

Center, recently examined some of the reasons that neighbors and friends may seem to pull away from families in danger of losing everything. Their analysis is a spin-off from in-depth interviews with 24 farm couples in five counties who were either leaving farming or cutting back drastically because of economic troubles.

Feelings of isolation and lack of support were common among those interviewed, but Rosenblatt and Wright say that some of that may stem from neighbors, friends, and relatives seeing non-intrusion as the polite and kind way

to treat those whose luck has turned.

"Neighbors who draw away from a farm family in trouble may believe that their distance is respectful and a way of minimizing the discomfort of the distressed family," Rosenblatt said. "There may also be the concern that their own well-being may be a source of pain to a family on the verge of losing everything. At the extreme, friends may even fear that saying or doing the wrong thing could lead to tragedy such as suicide or violence against a banker or other creditor."

Wright added that friendship and neighborliness are based on mutual assistance and good feelings. "When families are going under financially, they aren't in a position to barter services, advice or companionship with their neighbors. Their time, energy and spirit are tapped out by their financial problems. They may not be fun to be with, may not be appropriately gracious and may not even be particularly civil."

In some cases, neighbors may also be among the creditors who stand to lose money if the farm fails. "Survivor's

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Human Health Research Takes Clues from Plant and Animal Research

As agricultural research gets increasingly specialized and complex, it seems to grow further apart from other disciplines and apart from our own life. But the truth is, we have learned and continue to learn a lot about human health from what we learn about soybeans and dairy cows. Agricultural research findings have frequently been the basis, or the inspiration, for progress in human medicine.

Back in the late 1800s a Mayo Clinic physician and veterinarian, Christopher Graham, wrote his opinion that medical schools should include a course in veterinary medicine because, he believed, in no other field except perhaps pediatrics, was it possible to better train the faculty of observation. The sensitivity gained from studying a subject that can't talk back is just one of the skills gained from researching animal health and plant growth. Agricultural research into the nature of viruses, hormones, muscle growth and nutrition has given insights into similar studies in humans.

There are many advantages to research with plants and animals over human research. Plants stay put, for one



Agricultural research has often given clues or developed basic information later used for medical analysis and practice.

thing, says Willard Koukkari, University of Minnesota plant physiologist who studies the biological rhythms of plants. A scientist can more easily control the environmental variables of an experiment with plants or animals. Experiments can

be repeated over and over again with similar organisms, and the research is less expensive.

Of course, the flow of research information can work both ways, from human health research insights back to

animal research. Victor Cox, University of Minnesota veterinary anatomist, found that out in his research on the downer cow syndrome. Cox found clues in the human research literature which gave credence to his hypothesis that the downer problem in cows was not only due to a calcium deficiency but rather to pressure damage also. "We were seeing the same thing that was being described in the human medical literature as pressure damage, except that the syndrome was occurring in six hours in cows rather than in 12 hours as in humans, because the cows are heavier."

Sometimes the information gained from plant and animal research is not directly applicable to human health, Koukkari points out, but provides basic background information that is necessary in understanding human biology. And sometimes animal research is not related to agricultural research, but is a component of human health research. But frequently agricultural research has unexpected payoffs, as light from one research field spills over to illuminate others.

—Jennifer Obst

Links with Human Health:

Animal Research Gives Insights into Human Fertility

Reproduction is a mystery of life frequently considered a delicate subject.

several years has been with in vitro fertilization of cattle embryos. Hunter has

(102.2° F) doesn't. On the other hand, 39° C fertilizes the eggs, 37° C doesn't. The medium has to be one thing at one hour, another at six hours, which makes it much more difficult to precisely control in the lab."

So now Hunter is looking at the process from the beginning: "Now we've backed up all the way to the egg again.

Links with Human Health:

Mycotoxin Research Tracks a Chinese Connection

But there's no room for that attitude in agricultural research. There, understanding animal reproduction is more than a fact of life.

For agriculture, infertility is not only a management difficulty, it can spell economic death. As a result, "agriculture has been doing research on and teaching courses in reproduction light years before the medical school even found it polite to talk about," says experiment station animal scientist Alan Hunter. "And the real strengths in reproductive research still come from agricultural research." The result is a pool of knowledge about the reproductive process that has been tapped for progress in human infertility problems, contraception, artificial insemination, and in vitro fertilization.

Some of this research has a long history. Artificial insemination, now widely used in agriculture, was started as early as the year 1322 with Arab horses, according to E. F. Graham, University of Minnesota reproductive physiologist who has studied artificial insemination and cryopreservation of spermatozoa and eggs himself for over 30 years. Many years of research into hormonal regulation to synchronize estrus in sheep, pigs and cattle helped lead to the human birth control pill, Hunter says.

"Most animal reproduction research has focused on increasing fertility," Hunter says. "But like a coin, reproduction has two faces—one face says fertility, the other contraception. What you learn about one applies to the other in reverse."

The front line of reproductive research now is in vitro fertilization. In vitro fertilization research was first begun with farm animals at Cambridge University. "At the University of Minnesota, the human in vitro fertilization program was built on the expertise that was here in agriculture," says Hunter.

Hunter's own work over the past

developed a method to retrieve immature eggs from a cow's ovary. This method makes it possible to get thousands of eggs at once, rather than one at a time as released by the cow. But because these eggs have been retrieved in an arrested state, they must be matured before they can be fertilized. The problem is how to mature the egg, fertilize it and bring it to the four cell embryo stage. He recently spent a sabbatical leave working on that project at Cambridge University, and while he was there, "the scientist I was working with had the first recorded birth of live offspring with pigs and sheep," he says.

Yet using the same system has not brought results with cattle. Hunter can achieve fertilization of the cow's egg, but the fertilized egg will not continue to divide and develop into an embryo. "Apparently pigs require a different developmental environment than do cattle," Hunter says. "With cattle we could get sperm into the egg, but we still had the problem of the two cell block. There is something in the environment that isn't working. The lesson I learned is that a very specific medium is needed to mature the eggs, an entirely different en-

"The real strengths in reproductive research still come from agricultural research."

vironment is needed to fertilize the eggs, and then once the eggs are fertilized a third, entirely different medium is needed to get those fertilized eggs to cleave and develop.

"For example, just look at the different temperature requirements: 37° C (98.6° F) matures the eggs, 39° C

Evidently the way we have been maturing eggs hasn't been right." Hunter suspects that something in the maturation process of the eggs creates an asynchronous chromosomal development be-



What scientists have learned about fertility in agricultural research has frequently shed light on human fertility.

tween the sperm and the egg and eventually, says Hunter, "the system self-destructs."

Hunter's research illustrates the subtlety of the reproductive process, and serves as a useful reminder. As the methods and information relating to pig in vitro fertilization cannot be translated directly to cow in vitro fertilization, so too, are human fertility issues complex and individual. Yet, this basic agricultural research into fertility continues to help illuminate the way for human fertility research.

—Jennifer Obst

When Chet Mirocha, University of Minnesota plant pathologist, goes on vacation he usually heads north. That's not only because he likes to ski, but because he finds northern climates good hunting grounds for mycotoxins—the toxic compounds sometimes produced by fungi.

Mirocha heads the University's Experiment Station mycotoxin laboratory. The study of mycotoxins, which infect many crops and can cause serious health problems for animals who consume them, is relatively new—many mycotoxins have yet to be identified and analyzed. Mycotoxins such as those of *Fusarium*, a fungus of animal feeds and human foods, are often found in northern climates. Mirocha explains that's because cold climates provide the environmental stress necessary to produce toxic strains.

It was on one of his northern treks that Mirocha traced a connection between a bone disease that affects poultry in Minnesota and a human bone disease in China. Mirocha began to suspect that they may be caused by the same toxic product he was studying in the laboratory—a *Fusarium* byproduct labelled TDPI.

Mirocha, working with veterinary pathologist Mary Walser, had already tracked TDPI as the cause of tibial dyschondroplasia—a bone disease in chickens. He was able to confirm this hypothesis by re-creating the chemical in the lab and reproducing the disease in chickens with crude cultures.

"Then, during my travelling through various parts of the world, I became familiar with a disease which causes bone deformation in humans called Kashen-Beck. The disease, which was named for the two Russians who discovered it, is found in both Russia and China, but it is confined to the

Mycotoxin continued on p. 3

IN PRINT

Minnesota farmers continue to search for alternative crops that offer some chance of greater profits than those they usually grow. The Minnesota Agricultural Experiment Station has several publications, based on station scientists' research, that contain information on crops that are not widely grown in Minnesota.

Production of Naked-Seeded Pumpkin: A Food Crop for the Family Farm (AD-MR-2121) looks at the varieties, nutritional value, and culture of an easily grown, high-protein food crop. While trials at Rosemount showed that naked-seeded pumpkin is not commercially viable as an oilseed crop in the state, some varieties do warrant production for their edible seed.

More controversial but also of interest to people who want to live a "natural" lifestyle is comfrey. Dried comfrey leaves are sold in tablet and other forms in stores in the United States. However, the safety of using comfrey as a major component of human and livestock diets is debatable. *Comfrey—A Controversial Crop* (AD-MR-2210) discusses the types of comfrey, the culture of this perennial crop, its performance in experiment station trials, and the use of comfrey for livestock feed and human food.

There has been increased interest in growing lupines in Minnesota. *Crop Sequence Effects of Pulse Crops and Agronomic Research on Lupine* (AD-MR-2339) gives the results of trials that compared the yields of several pulse crops, including lupine, fababean,

Links with Human Health:

Plant Physiologist Finds Some Fascinating Rhythms



The left half of this photo is a triple-exposure illustrating the circumnutation movement of a bean shoot. Both the rhythmic movement of the bean, and the human REM-nonREM sleep cycle have a similar ultradian period.

Looking at the oscillations of a bean plant, Department of Botany plant physiologist Willard Koukkari sees rhythms that describe the dance of life.

The conclusions that can be drawn from studying those rhythms are more

understanding everything from crop cycles to preventive medicine.

Koukkari, working with rhythms of soybean growth, has shown that the sensitivity of a plant to herbicide is related to when it is applied, and this follows a

tion is not constant, but fluctuates. The plant, like the human, is built as a time structure," he explains.

"Some of the basic principles and characteristics of biological rhythms were worked out first with plants, because plants can be placed in isolation. It is more possible with plants than people to eliminate environmental and social cues," he says. But researchers nevertheless find sorting out real biological rhythms from normal fluctuations and "random noise" a complicated process. True internal rhythms are not driven by environmental cues such as alternation of day and night, or yearly changes in day length, although they can be synchronized by them.

Koukkari first studied daily, or circadian, rhythms. There are many identified circadian rhythms in both the plant and animal worlds. For example, body temperature and blood pressure both rise and fall with a 24 hour rhythm. But while he was studying circadian rhythms, he began to notice shorter oscillations of between approximately 30 to 240 minutes in duration, called ultradian rhythms.

He found this rhythm in a bean plant as it climbs. It moves in a spiral and it goes faster and slower as it grows in a period of 90 to 110 minutes. That, he recognized, is the same rhythm of a human being drifting into and out of rapid eye movement (REM) sleep.

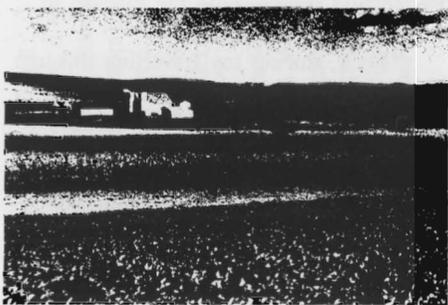
He became curious about how many of these rhythms cross species lines. His search identified ultradian rhythms throughout the biological realms. "Ultradian rhythms, for example, are associated with such variables as the udder temperature of a cow, the division synchrony of yeast cells, and the synthesis of bacterial enzymes. The activity of fish, bacteria, plants, humans, all have ultradian rhythms as organizing patterns," he says. In fact, he concludes

rapea, melonbean, and soybean, at several Minnesota locations and discusses the residual effect that these legumes had on soil nitrate nitrogen and subsequent small grain yields. The publication also discusses lupine varieties and lupine culture.

There's been a lot of discussion lately about how Minnesota is going to compete businesswise in the future. Will it become a "brain power" state? Are Minnesota youth up to playing a major role in the state's future, or are they constrained by traditional attitudes and expectations? *Minnesota Youth Poll: Aspirations, Future Plans, and Expectations of Young People in Minnesota* (AD-MR-2512) discusses the findings of a youth poll undertaken in 1984 that focuses on the differences in the ways young men and young women plan for and dream about their futures. The poll looks at teenagers' plans and preparation for adult life, including their career and family life expectations; their perceptions of sex-role development and stereotypes; their definitions of success and failure in adulthood; and their family, school, and work experience and its impact on their future plans.

To obtain copies of these and other Minnesota Agricultural Experiment Station publications, contact a county office of the Minnesota Extension Service, a branch experiment station, or write the Distribution Center, 3 Coffey Hall, University of Minnesota, 1420 Eckles Av., St. Paul, MN 55108.

—Sam Brungardt



than just fungal. They are being taken seriously by scientists across disciplines, who are finding them an aid in

Mycotoxin *continued from p. 2*

same northern region across the border from each other. The disease is also found in northern Korea. All of these areas are cereal-growing, and cold with long winters," he says.

Researchers in China believe Kashen-Beck's disease is caused by a dietary deficiency of selenium. They were not particularly receptive to Mirocha's suggestion that the culprit may be TDPI. But there are good reasons for rejecting the selenium deficiency hypothesis, he says. "The whole north-eastern section of China almost all the way to Beijing—which is hundreds of thousands of square miles—is a selenium-deficient region. But they have Kashen-Beck's disease only in certain areas—where the climate is harsh, and they have a lot of corn in their diet." Mirocha visited China in 1984 and offered to test the possible correlation with the disease and Fusarium toxic byproducts, but was unable to get Chinese Fusarium samples. "They told me Fusarium is a national resource, and to take it would be like exporting gold out of the country," he says.

Unable to get actual site samples, he looked for correlations in samples from other northern climates. "I went to Alaska because it is the same latitude as the portion of the USSR and China that has a long history of Fusarium diseases," he says. He found isolates from there that do produce TDPI. And, in another northern country—the arctic region of Norway—he found cold-stressed Fusarium isolates that indicated a correlation with yet another disease.

This disease, called Kessam, is another disease Chinese researchers attribute to selenium deficiency. It causes

rhythm. This work can be associated with work in medicine showing the response of a human being to medica-



Plant pathologist Chet Mirocha calibrates a multiple stage mass spectrometer at the University's mycotoxin laboratory.

hemorrhaging of the heart in humans. Of the over 125 isolates Mirocha collected in Norway, about 80 of them were toxic. Testing them on rats in the laboratory, he discovered they caused hemorrhaging in the heart. This hemorrhagic agent he named HI.

In this odyssey, Mirocha has linked toxins collected in the northern reaches of Alaska and Norway to a disease of humans in China and animals in Minnesota. At the same time, his research has shown that science rarely goes in a straight line, but makes many valuable sidetrips that can lead to unexpected and fruitful discoveries.

—Jennifer Obst

patterns, he says. In fact, he concludes, "I am not aware of any major physiological process that doesn't have a rhythmic component."

"The plant, like the human, is built as a time structure."

"People can ignore their internal rhythms until they do something different, or something goes out of synch," he says. "When we get sick, or leave our normal routines, we are reminded of them," he says. Recent research on jet lag and ways to reorient your internal rhythms to a new time period are based on knowledge of biological rhythms. Chronobiologists have found that understanding these rhythms may be very useful in detecting and treating disease, and suggest restructuring some patient care as a result. "Many of the practices in medicine have been created for the convenience of the staff. For example, in cancer therapy a patient goes in for five days, is off for the weekend and then starts the treatment again," Koukkari says. A pattern that fits a patient's internal rhythms might increase the success rate, some recent research suggests.

Whether dealing with health or sickness, the importance of internal rhythms is "they provide an organism with some stability whereby certain metabolic events can proceed in time-structured sequence," Koukkari says. In that sense, internal rhythms are an example of biological common sense. And Koukkari's research is an example of how plant research, while giving insights into the plant kingdom, also frequently gives us insights into ourselves.

—Jennifer Obst

How to Tolerate Lactose If You're Lactose Intolerant

According to an old saying, milk is nature's perfect food. That can't be true for the 70 percent of the world's population that is lactose intolerant, however. For them, it may not be milk that is the perfect food—it may be yogurt.

Experiment station nutritionist Dennis A. Savaiano and his colleagues in the Department of Food Science and Nutrition and at the Minneapolis Veterans Administration Hospital, have been studying how people who cannot digest lactose, the main carbohydrate in milk, can still get milk's important nutrients, including riboflavin, vitamin D and calcium.

Lactose intolerance results from insufficient lactase, an intestinal enzyme that helps digest lactose. Most people are born with plenty of lactase. Some people maintain this enzyme in high amounts, but most lose the enzyme after

"The normal situation is clearly to lose lactase activity."

three to five years of age and become lactase deficient. The severity of lactose intolerance symptoms varies. Some people show symptoms such as gas, cramping and nausea after drinking just two ounces of milk, but most lactase-deficient persons (probably four out of five) can tolerate eight ounces of milk without symptoms.

"It's a genetic phenomenon that we believe is related to the development of dairying in certain cultures," Savaiano explains. "People who began dairying in

other mammals."

Savaiano has been studying nutritional strategies for handling lactose intolerance. One approach concerns the unique digestibility of yogurt. "Research suggested that the lactose in yogurt was easier to digest, but no one had conducted the experiments to prove this hypothesis. Further, the mechanisms by which yogurt was tolerated was unknown," he says. Savaiano's research showed that bacterial lactase in unpasteurized yogurt can substitute for a person's deficient lactase.

Normally, stomach acids denature food-borne enzymes, preventing their activity in the intestine. However, the unique characteristics of microbial lactase in yogurt allows much of the lactase to survive attack by stomach acids or digestive enzymes, Savaiano says. Because yogurt is a better buffer than milk, nearly three times as much stomach acid is required to acidify it.

"The standard belief is that enzymes in foods are degraded by stomach acid," he says. "That's true for enzymes that are simply part of the food. But in yogurt, the enzyme is inside the microbial cell and thus protected by a cell wall. Plus, dairy products are very good buffers of stomach acid. Therefore, yogurt contains a food-borne digestive enzyme that is protected by the nature of the food that it is in."

Savaiano has also evaluated other yogurt products to see if they were as easy to digest for lactose intolerant people as unsweetened yogurt. "We compared unflavored yogurt with strawberry-flavored yogurt because it had been suggested that adding sugar would slow down the rate of stomach emptying. Theoretically you would digest sugared yogurt more slowly than unflavored

milk and ice cream. "Frozen yogurt doesn't provide microbial lactase because either the microorganisms and their lactase are destroyed during the heat processing of frozen yogurt, or a sufficient quantity of the yogurt culture is not added to the product after repasteurization," he says.



More than 70 percent of the world's population is lactose-intolerant. For them, getting the food benefits from milk is a problem.

Savaiano has also looked at other nutritional strategies for lactose intolerant people. A study of a milk-based food supplement showed that, since the

Lactose continued on back page

Farm continued from front page

Letters

I would like to know where I could purchase the Rosy Glow chrysanthemum. It was discussed in an article in the winter issue.

Wayne Simoneau
Fridley, Minnesota

Editor replies: Horticulturist Richard Widmer has given me a list of nurseries that are propagating Rosy Glow. I will send a copy of the list on request.

I'm writing regarding an article in the winter edition—specifically, "Young Farmers Are Being Forced Out." In my judgment, this article reflects great confusion on several fronts. Most importantly, the thrust of the story fails to give recognition to the single most important factor for consideration of young farmers as they establish a business enterprise—in this case, farming.

The most vital item that must be considered by businessmen about to make an investment in a business enterprise is projected return on investment (ROI). I have no fear about the economic competitive capability of U.S. farmers if ROI receives proper consideration in the planning stage. It would, of course, be constructive if all teachers of improved technology more clearly understood this truth.

Clarence D. Palmby
Marcell, Minnesota

I read the Angora goat article and am very interested in raising a small flock of high-grade Angora goats on a

...people who began dairying in northern Europe and in some narrow regions of Africa and the Middle East, adapted to this diet over thousands of years and now maintain the lactase enzyme. The normal situation is clearly to lose the lactase activity, as is true for

...yogurt more slowly than unflavored yogurt. But in fact the response to both products was very similar."

Frozen yogurt, however, was not as good. Experiments with lactose intolerant subjects showed that tolerance to frozen yogurt was similar to that for ice

...guilt may also play a role among farm neighbors who manage to weather the current farm crisis while their friends become victims.

And, indeed, not all the isolation that troubled families may feel is at the hands of others. Embarrassment, shame and anger may cause troubled families to reject offers of support.

“Survivor’s guilt” may also play a role.”

Rosenblatt and Wright believe that organizations and individuals within the community are keys to helping families cope. They add that extension agents, newspaper editors, clergy and elected officials can bolster a sense of community. “Neighbors in farm communities need to have a good sense of how everybody is in the same boat, that helping a farm family to pull through may make it more likely that businesses, schools and other basic services will also survive the crisis,” said Rosenblatt.

They say that informal teaching, whether from the pulpit, the newspaper column or the 4-H or Homemakers’ group, can help troubled families reach out for assistance from financial or legal experts or mental health organizations. Such efforts also make others aware that even small, neighborly acts can make a big difference to families struggling to maintain their farms and their self-respect.

Wherever it is undertaken, such family life education, the researchers say, “can encourage people who may be investing all their time and energy in the battle to save a farm that cannot be saved into focusing on the battle to maintain themselves as healthy, contributing members of the community.”

—Deedee Nagy

farm in southwestern Minnesota. Please suggest a quality Angora goat breeder that I can spend some time with.

Adrian Kooiman
Chandler, Minnesota

Editor replies: Animal scientist Bob Jordan says anyone interested in more information about raising Angora goats in Minnesota may write him at 121 Peters Hall, University of Minnesota, St. Paul, Minnesota, 55108.

Helping Third World Countries Helps U.S. Farmers

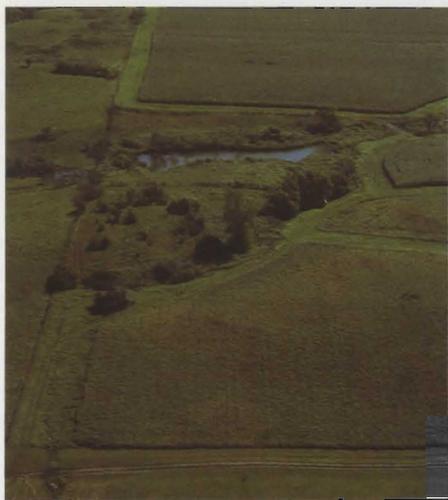
United States agricultural aid to poor countries is usually a good thing for U.S. farmers, according to a University of Minnesota agricultural economist.

“U.S. investments in the agricultural development programs of most low-income countries are not detrimental to U.S. farm exports. They are usually beneficial,” says James P. Houck, a researcher with the Agricultural Experiment Station.

“A strong case can be made for the idea that advances in agricultural productivity are associated with increases in imports of cereals and other agricultural products. The connection comes from higher income due to general economic development,” he says.

The case is “not so clear and probably more controversial for middle-income nations,” Houck says. But there’s no evidence that improvements in farm productivity among middle-income nations is generally or systematically threatening to U.S. farm exports across a broad international spectrum, he adds.

—Jack Sperbeck



Southwest Experiment Station Growing Opportunity Acres

At Lamberton, Minnesota, a fifty-acre pastureland is being called Opportunity Acres. Some day it may be as well-known in southern Minnesota as Central Park is in Manhattan.

“It began,” says Wallace W. Nelson, superintendent of the Southwest Experiment Station at Lamberton, “in 1983 when the University bought part of the Behrends farm adjacent to the station.” Nelson thought fifty-some acres of the new purchase made up of rock-outcrop pastureland should be used “as an opportunity to do something besides grow corn and soybeans.”

“We hope it will become a place

where people can come to see how various species of trees do in Minnesota,” Nelson says. Eventually—and he emphasizes this is a long-term project—he sees skiing and hiking trails and some wildlife islands on Opportunity Acres. Three ponds are already in place. Parts of the plot, stretching a mile and a half in length and running along the north and east sides of the station, extend to the bluffs and bottomlands of the Cottonwood River, a tributary of the Minnesota and ultimately the Mississippi. The wildlife would keep to the river area, Nelson says.

“Since 1965 we have had some forest plantings of ponderosa pine at the station. Some of these are 30 feet tall now and have come from 70 seed sources.”

In the dry, southwestern part of the state, which includes Lamberton, trees are really intruders in the natural prairie of tall grasses. The soil, which is high in organic matter, is relatively “young,” only 10,000 to 12,000 years old. Prairie fires of the past are another reason the land doesn’t support a forest naturally.

Many agencies and local groups will have a part in Opportunity Acres, Nelson foresees, including University forestry and wildlife specialists as well as local, district and state Soil Conservation Services, the Minnesota Department of Natural Resources, and local and state outdoor sports clubs.

“We’ll work at it as we have funds,” Nelson says. “It’s really a long-term, low key project, to show how to cope with this rougher land.”

—Mary Kay O’Hearn

Lactose *continued from p. 4*

supplement contained significant amounts of milk fat and solids, it produced fewer symptoms than a glass of skim milk. Taking the food supplement with other food was even better. "We found a threefold reduction in symptoms if the lactose-containing product was eaten with a meal," he says.

Next Savaiano plans to look at the role of other microbial agents in the digestion of lactose. With a gastroenterologist from the Minneapolis Veterans Administration Hospital and a University of Minnesota animal nutritionist, he wants to investigate the ability of microorganisms in the colon to reduce lactose intolerance symptoms. In particular, he wants to test the theory that these microflora adapt in lactose intolerant people to make up for an insufficiency of intestinal lactase.

Savaiano thinks that what he already has learned about the survival of a food-borne enzyme during digestion due to protection by a microbial cell, may be applied to the digestion of nutrients other than lactose and in treating clinical enzyme deficiency disorders.

Meanwhile, you might want to look at that carton of yogurt in your own refrigerator with more respect. For 70 percent of the world's population, it has a big nutritional advantage.

—Jennifer Obst

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Summercrisp pear is a new station release.

Station Releases New Pear and Raspberry, Both Good for Colder Climates

The Minnesota Agricultural Experiment Station has released two new fruits: Redwing raspberry and Summercrisp pear. Both give gardeners in colder climates a time advantage and both should be available to gardeners in 1987.

Redwing is a "fall-fruiting" (primocane-fruiting) red raspberry that is intended to supplement or replace Heritage, the most widely grown commercial, fall-fruiting raspberry, says fruit breeder Jim Luby.

First- and peak-harvest dates for

Redwing are usually 10 to 14 days earlier than for Heritage, but several days later than for Fall Red. Although yields have been similar to or less than those of Heritage in the southern part of Minnesota due to less development of fruiting laterals, Redwing ripens before killing frosts north of St. Cloud, while Heritage does not. Fruit size and color are similar to Heritage. Firmness and skin strength of Redwing fruit are rated lower than Heritage, but higher than Fall Red. In trials at Grand Rapids, Minnesota, Redwing suffered less winter injury than Heritage.

Summercrisp is an early-season pear that was introduced for cold climates, where most pears survive poorly and often do not fruit. It has been among the hardier pears tested at the University of Minnesota.

Summercrisp fruit are 3 to 4 inches long and 2½ to 3½ inches in diameter. They can be harvested in mid-August, about five weeks before those of Luscious, Patten or Parker.

"Whereas most pears should be ripened to obtain best flavor and texture, this is one pear that should *not* be allowed to ripen on or off the tree," Luby cautions. "Otherwise, grit cells, a browning of the flesh around the seeds, and a strong aroma will become apparent. When eaten without being ripened, Summercrisp has a crisp, juicy texture and a sweet, mild flavor. Fruit picked at the right stage has been stored under refrigeration in good condition for six weeks."

In 20 years of testing, Summercrisp has exhibited no symptoms of fireblight. Scab has been observed on the fruit, but the foliage and fruit have usually been free of disease and insect pests even without the use of pesticides.

—Sam Brungardt

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