MINNESOTA Science
Agricultural Experiment Station
University of Minnesota
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Teens Rate Parental Communication High

Most Minnesota parents would earn a place on the "A" or "B" honor roll if their teenage children graded them on their skill as parents, according to the results of a recent Minnesota Youth Poll. The poll is part of a University of Minnesota Agricultural Experiment Station research project in the University's College of Home Economics.

Diane Hedin, formerly with the Center for Youth Development and Research at the University and now director of community relations for Pillsbury, conducted the poll among 1,250 high school students across the state. The results, she says, are a credit to the good job parents are doing during the sometimes-stormy years with adolescents in the family.

"We hear so much about the endless difficulties of raising teenagers and of all the conflict," Hedin says. "That's dramatic and may make headlines, but the fact is that, on average, kids are getting along quite well with their parents. Three-fourths of the young people in the poll gave their parents high grades."

She adds that less than five percent of the teens gave their parents failing grades. "F" grades were reserved for parents viewed as uncaring and neglectful. "Parents who had really abdicated their responsibilities and given up on the kids were the ones graded the lowest," according to Hedin. "C" and "D" marks went to parents who, according to the kids, were always arguing with them and criticizing. "As long as there was some communication, even open warfare, between the generations, the teens gave their parents passing grades."

The poll asked the teens to offer advice to parents. Nearly half said that teens need more freedom, more responsibility, more opportunities to make decisions, and the chances to make and learn from mistakes.

Many teens also thought parents should be more understanding about what young people go through, and that they need to know more about what pressures today's youths, including drugs, sex and competition for grades.

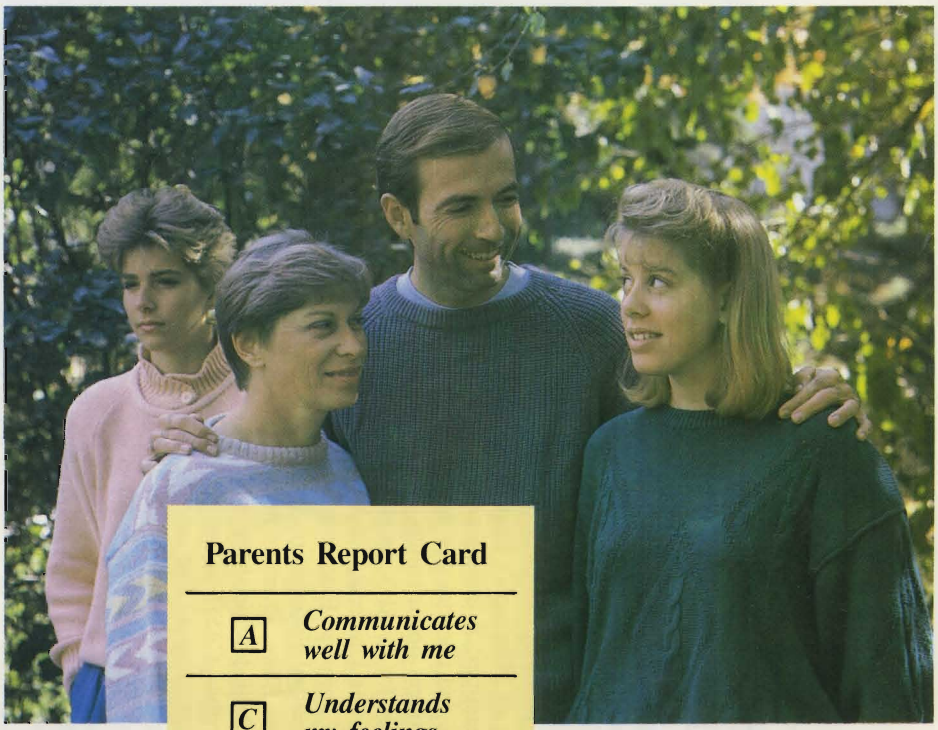
The Youth Poll asked the students to rate whether parents or peers had greater influence on them. Three-fourths credited friends with more influence. "It usually wasn't because of any hostility toward their families," Hedin said. "Rather, it was a gradual drift toward friends caused by a strong pull toward their own generation."

Peers had more influence on dress, social life, leisure activities, fads and music. Parents' influences were strongest in morals, values, spiritual matters, and future plans. And in the reverse, teens said parents asked their advice on fashion, decorating, and family activities.

Young women in the poll said they were most likely to discuss friends, dates, and personal problems with their mothers. For boys, these conversations were usually with friends. Their conversations with parents more often centered on sports, cars, and money.

"Sex" led the list of topics that teens don't want to discuss with parents. Close behind were alcohol and drugs, boyfriends and girlfriends, and intimate concerns about their bodies or health.

—Deedee Nagy



Parents Report Card

A	*Communicates well with me*
C	*Understands my feelings*
B-	*Lets me take responsibility*

If teens could give their parents a report card, they'd consider open communication the most important skill.

MINNESOTA Science

What the Hatch Act Hatched 100 Years Ago

Research methods of the experiment station have become increasingly sophisticated over the past 100 years, but the goal to help improve the quality of life for Minnesotans has remained the same.

Let's face it. The fact that the Hatch Act was passed by Congress 100 years ago this year is not news that is jamming telephone wires across the country. It is not a victory whose anniversary has been celebrated with Homer Hankies, and in its commemoration not a single new car has been given away. Nevertheless, it matters.

Because of the Hatch Act, which established agricultural experiment stations at every land grant university across the country, including the University of Minnesota, a lot of research has been done that otherwise might never have been possible. Of course, the Hatch Act only confirmed the foresight of Minnesotans who had already allocated state funds, two years earlier, to create the Agricultural Experiment Station. They knew back then not only where our bread was buttered in Minnesota, but what industry produced both the bread and the butter. And they also knew that what would help keep our fledgling agricultural industry alive and thriving was knowledge, education, and research.

The Hatch Act entitled each state's experiment station to $15,000 a year from the federal government. The act also granted the states free use of the postal system so that research findings could be widely distributed. In 1987, the University of Minnesota Agricultural Experiment Station received over $3 million from Hatch Act funds.

The experiment station receives a mixture of support from federal funds, state appropriations, and grants and contracts with industry and various state and federal agencies. Hatch funding provides base support to help the experiment station respond rapidly to changing needs of farmers and consumers. It also funds long-term research efforts.

Although Minnesota farmers were the original beneficiaries of experiment station research, the mission of the station has broadened throughout its existence and now all Minnesotans—and others around the nation and the world—share in the benefits of station research, whether they live on farms or in cities, suburbs, or small towns.

Taking a Fresh Look at Who We Are and Where We're Going

in keeping with the mission of "helping people live and make a living."

The station, like more conventional health care facilities, sees health as a

We see now that research impacts may be negative as well and we know that we must assess all potential consequences of any recommendation we

(Editor's note: The Hatch Act Centennial is an opportunity to reflect. Here, Richard J. Sauer, Vice President for Agriculture, Forestry and Home Economics, and Director of the Minnesota Agricultural Experiment Station, offers a new perspective of what the station can and does mean to Minnesotans.)

Minnesotans all belong to one of the state's oldest health maintenance organizations—the University of Minnesota Agricultural Experiment Station. The station might not sound like a vital health care facility, but we've been acting like one for more than a century.

Experiment Station research has, among many other things:

- prevented countless cases of food poisoning
- helped state residents choose better sewage systems
- conquered diseases, such as brucellosis, that killed both animals and humans
- predicted compatibility among engaged couples
- developed techniques to manage "life" stresses of old age, adolescence, economics

Those who think of the station only as breeding better corn and soybean plants or more productive dairy cows might not realize the extent and success of our health research, an effort totally

state of physical and mental well-being, not just as an absence of disease. The Romans had the right idea when they preached the virtue of a sound mind in a sound body. Today, we would add, "in a sound environment." For people and animals will not stay healthy if their environment is harmed, as well-publicized links between environmental pollution and human health problems have shown.

Water quality is of particular concern nationally. Some have linked agricultural research recommendations to excessive pesticide or fertilizer residues in well water, which can be a health threat to humans and animals. It is true that for too long scientists and research administrators everywhere assumed that all research effects would be positive.

make. At our new Center for Agricultural Impacts on Water Quality, we'll be taking a look at agricultural management practices and perhaps making new recommendations for how much fertilizer and pesticide farmers should use to grow a crop successfully without polluting their water.

The water quality issue is a good example of our cooperation with many different agencies on health-related research. Our water quality researchers consult with representatives from public and private institutions such as the Mayo Clinic, the state department of health, soil and water conservation districts, the Gray Freshwater Biological Institute and the U.S. Geological Survey.

We no longer limit our thinking to the task at hand, because we have seen that the path of research has many branches. Work done by station animal scientists, for example, has been of great help to medical researchers dealing with human reproduction problems.

"People and animals will not stay healthy if their environment is harmed."

Some health research results in findings that people can use immediately, such as recommendations that those who can't tolerate milk eat yogurt instead, which is easier to digest and contains the same nutrients.

Other research may yield information that will become a tiny piece in the solution of a health problem. One thing all research has in common is its demand for long-term commitment. Good research takes time as well as money, but it will make us healthier as individuals and as a society in the end.

A Sampling from a Century of Research Highlights

1888. Station issues first quarterly bulletin, with articles on apples, wheat, and potatoes.

1900. Experiment Station Bulletin 67, a pocket-size manual on feeding dairy cows is issued. This was the first attempt to establish scientifically based feeding standards in the United States.

1906. First formal publication of farm management data. Minnesota was first in the country to collect and quantify such information on a daily basis.

1909. Research on wood preservation begins, leading to a national reputation for success in preserving fence posts and railroad ties.

1914. Agricultural engineering researchers begin issuing plans for farm buildings, including the square farmhouses and roomy, hipped-roof barns still seen.

1915. Plant pathologist identifies races of stem rust and their ability to infect particular wheat varieties. This data eventually led to the development of rust-resistant wheat varieties.

1922. The Haralson apple, a tart winter variety, is introduced by station researchers.

1923. Agricultural engineers help the electric industry build the nation's first experimental rural electric line, near Red Wing.

1930. Parental stocks of three double crosses of field corn are released. From these double crosses came the hybrids that increased yields and eased harvesting. In 1933, there were 4,000 acres (0.1 percent of Minnesota corn acreage) planted with the hybrids; by 1957, 99 percent of the corn planted in Minnesota was of the hybrid type.

1937. First calf in the country born of artificial insemination is delivered on the St. Paul campus.

1940s. Veterinary medicine researchers collaborate to develop tests for brucellosis, a bacterial infection of cattle that can spread to humans through both unpasteurized milk and animal wastes.

1954. Nutritionist Jane Leichsenring wins the prestigious Borden Award for her work in fundamental studies in nutrition and in experimental foods.

1960. Plant hardiness lab, now a leading center for cold hardiness studies, is established.

1968. Studies begin on developing the particleboard industry to use underutilized tree species.

1970. Norman Borlaug is awarded the Nobel Peace Prize for leading the "green revolution," by developing high-yielding and adaptable dwarf wheat.

1970. Era wheat, with 25 percent higher yield, is released by the station.

1978. Family social science researchers begin developing the nation's largest data base on stress in families.

1981. The station releases two hardy, half-high blueberry cultivars, Northblue and Northsky.

1984. Animal science researcher reports a 30 percent success rate with in vitro fertilization of dairy cattle.

1987. Plant scientists studying corn and oats discover link between chromosome breakage during tissue culture and so-called "jumping genes."

MINNESOTA Science

Post-Harvest Research Is a Taste of Plenty

To be on Shirley Munson's panels judging french fries and fruits, you've got to keep your lip buttoned. "They can't talk and we tell them not to say "yuk" or "wow" or make any comment that the others could hear," says Munson, a post-harvest horticulturist for the University of Minnesota Agricultural Experiment Station.

Munson has been training volunteer panels to evaluate fruits and vegetables for years. The panel members—usually undergraduate and graduate students—evaluate french fries made from 40 different kinds of potatoes developed by the Agricultural Experiment Station for specific characteristics. There are also panels for apple, strawberry, and blueberry evaluation.

The results of the samplings are tabulated and relayed to potato breeder Florian Lauer and fruit breeder Jim Luby. The breeders keep the panels' judgments in mind when deciding to keep, drop, or cross breeding lines. The potato judging is financed in part by a grant from the Red River Valley Potato Growers' Association.

"We're doing it to make a better french fry," Munson says. Some potato lines are evaluated for several years by panels. Some of the breeding lines Lauer has produced have been judged to make much better french fries than the Russet Burbank that the industry now uses amost exclusively, she adds.

Munson pioneered this kind of sensory evaluation panel in the United States and devised her own questionnaire for judging. Unlike many panels evaluating foods, Munson does not want to know how much the tasters like a food overall. What she's after is judgment of several different characteristics, differences scored."

Tests are run with a tight hand on potential variables. For example, Munson provides several terms to describe french fries, including greasy, limpy, dry, and bitter. All the frying is done with the same kind of oil and timed precisely, to keep the difference in panel reaction due as much as possible to the difference in potatoes.

Munson has one big rule for picking judges: "They have to like the food. If they don't really like it, they aren't good judges." And that's liking it plain, not fancy. For example, the french fries are just lightly sprinkled with salt and no ketchup is allowed until the official tasting is done.

One of Shirley Munson's student volunteers evaluates apples in a testing cubicle.

Panel members are chosen every fall and receive training in the process and vocabulary before they start chomping their way—usually several times per week—through the samples.

"There's a lot of psychology involved in running sensory evaluation panels," Munson notes. "I never run a panel before 10 a.m. because some people are slow starters, or too soon after lunch, because their taste buds may be dull. The samples all have arbitrary three-digit numbers instead of being labeled 1, 2, 3 or A, B, C because some people always pick the first in a series."

Panel members are asked not to have coffee for at least half an hour before the session and they must come into the sampling room through a side door, lest the food preparations bias them in any way. They sit in walled cubicles and always in the same place. Lighting simulates daylight, so they can get a good look at the food they're testing.

Members drink uncarbonated spring water first to clear their palates. Unsalted soda crackers and more water are available if they need to erase the taste of a sample.

The actual tasting regimen is quite precise. When french fries are being tested, for example, panel members first taste a reference sample of commercially available french fries, and assign a score

Taste *continued on back page*

Wild Rice Research: A Race to Stay in the Game

so many different parts of a plant, it's difficult to control.

Percich says. "We now know precisely at what point in the plant's development losses due to infection

including shape, size, color, texture, and flavor. "Mouth feel is terribly important and size and color are what attracts you to certain fruits and vegetables when you shop. When you're dealing with breeding lines, you need to know what they're like, not how well they're liked, so that's why we have the descriptive

Reorganization Not the Best Answer for Local Ag Co-ops

Farm supply and grain co-ops that reorganize through mergers, consolidation, or acquisitions won't necessarily improve their efficiency or profits, according to a study done by Claudia Parliament, an agricultural economist.

Parliament, a researcher for the University of Minnesota Agricultural Experiment Station, studied the financial statements of 35 local co-ops that had reorganized. She found that on the average, profits and efficiency hadn't increased, although there were exceptions. "Some did well and some did poorly," says Parliament, "but we think that any co-op contemplating reorganization should know that it might not improve their financial position."

Parliament collected financial statements for three years before and three years after the co-ops reorganized. She compared the averages with averages from co-ops that hadn't reorganized. "We haven't yet found positive results from reorganization," she said.

Although the number of ag co-ops has fallen in recent years, Minnesota still has more co-ops—566, including 210 farm supply co-ops and 80 grain co-ops—than any other state in the country. Minnesota co-ops did $7.4 billion in business during 1985, according to Parliament.

—Anne Gillespie Lewis

It wasn't so long ago that Minnesota growers were selling all the wild rice they were able to produce at a healthy profit. The same was true for Minnesotans who harvested wild stands of "lake" rice.

Then California growers discovered the crop. With increased production, three years of price stability ended in the 1985-86 marketing year.

In 1985, Minnesota produced 5.1 million pounds of processed wild rice on 25,000 cultivated acres. That same year, California produced 8.3 million pounds on 15,400 acres. Analysis by University of Minnesota agricultural economist Reynold Dahl and graduate assistant Ron Nelson showed that even with higher per-acre production costs and lower prices, California succeeds with a nearly threefold yield advantage.

Dahl and Nelson found that California growers' net returns were nearly $400 an acre higher than Minnesota's growers. Clearly, ways must be found to either increase yields or lower the per-unit cost of production if Minnesota growers are to remain competitive and stay in the game.

"California and the other western states that are getting into production are going to produce a lot of wild rice, and I don't see Minnesota being number one in production during the next decade," says agronomist Ervin Oelke, who has conducted research on wild rice for the University of Minnesota Agricultural Experiment Station longer than any other scientist.

Oelke cites many reasons. "Western states don't have the high humidity that favors the development of brown spot disease. Wild rice worm is also absent in the west, while our shorter growing season gives the wild rice plant less opportunity to fill the grain. Our weather makes growing wild rice a gamble, because of severe periodic storms which shatter the grain from the plant. Plus, about 85 percent of Minnesota's wild rice is grown on peat, and we're only beginning to understand how to manage fertility on these organic soils. It's also now more difficult to get water use permits in Minnesota, so acreage will not expand rapidly."

The best hope is for gradual improvements, and it's a substantial challenge facing scientists who conduct wild rice research for the experiment station. Here's a crop that's a mere infant among domesticated crops; research has been conducted on wild rice for only about 20 years. Scientists had to start from scratch when it came to identifying yield-limiting factors and devising ways to overcome them. Two major problems that must be overcome are brown spot and shattering.

Plant pathologist Jim Percich is leading work on the brown spot problem. Brown spot is one tough customer. It can infect many grasses and can also survive in the soil on decaying organic matter. Because this pathogen can infect so many different hosts and

Station scientists are tackling wild rice research from several different angles.

begin, and we can understand when to both begin and stop fungicide spraying. Studies indicate there will be at least a 34 percent yield loss if the pathogen is not stopped when the flowers are being fertilized, and if the fungus grows unchecked, the loss can reach 67 percent within one month."

"...ways must be found to either increase yields or lower the per-unit cost of production if Minnesota growers are to remain competitive..."

Minnesota growers now have only one fungicide, Dithane, in their arsenal. It protects the wild rice plant from brown spot for 7 to 10 days, and growers may have to spray as many as five times to keep the disease in check. But there may be good news for growers, Percich says. "We've done a lot of work with a fungicide called 'Tilt,' and we hope to get a label to use it on wild rice in 1988. It will mean great savings for the growers because we get as good control wtih one or two applications of Tilt as we do with three or four of Dithane. Our strategy would be to put Dithane on as a protectant, and should disease conditions become manifest, then spray with Tilt."

Percich is also working on the brown spot problem from two other angles. One uses tissue cultures to screen for a source of genetic resistance. With the help of biotechnologists Burle

Rice *continued on p. 4*

CASH Helps Pick Best Investments

A computer can't make your investment decisions, but it can help you assess options. That's the purpose of CASH, a new microcomputer program developed by three members of the University of Minnesota's Department of Forest Resources. It evaluates the economics and uncertainties associated with investment opportunities.

Support for CASH's development came from the University of Minnesota's College of Forestry, Extension Service, and Agricultural Experiment Station.

Charles Blinn, Dietmar Rose and Monique Belli developed the program. They described CASH as "an interactive, menu-driven program that assesses investment performance and the sensitivity of a project to potential cash flow changes."

It's intended for financial decision-makers and can be used by a wide range of individuals, businesses, and industries.

"The user defines the project activity, so CASH can be used to evaluate forestry, agriculture, engineering, home economics, marketing or any other type of investment alternative," Blinn says.

The program uses an IBM PC or compatible. There are instructions for both beginning users and those more experienced with the CASH program. It is available for $30 from the Distribution Center, 3 Coffey Hall, University of Minnesota, 1420 Eckles Ave., St. Paul, MN 55108, as item number AG-CS-3066. Checks should be made payable to the University of Minnesota.

—Mary Kay O'Hearn

Rice *continued from p. 3*

BRIEFS

Recent research aims to improve the health of baby pigs in several ways, through better housing, medicine, and nutrition.

Dose of Coconut Oil May Save More Baby Pigs

Giving underweight baby pigs a dose of coconut oil may help them survive, according to University of Minnesota Agriculutural Experiment Station researchers.

Laboratory work with baby pigs shows they can use fatty acids as a supplemental energy source. University Swine Center director Jim Pettigrew and graduate student Shu-hsing Chiang also trials are planned to see if using coconut oil as a supplemental energy source for low-birth-weight pigs will improve survival rates.

—Jack Sperbeck

New Natural Drugs May Prevent Diarrhea in Pigs, Humans

New drugs made from naturally occurring amino acids may help prevent diarrhea in baby pigs. The idea is ing used in clinical trials with human patients, and seems to have few if any toxic side effects, Brown says.

Diarrhea, or scours, costs U.S. hog producers $50 to $100 million annually from death losses and reduced weight gains. Average losses range from $1 to $2 per pig, and 15 to 20 percent of all pigs are affected.

The natural drug rapidly reverses water loss and lethal dehydration. That occurs over a critical three- to five-hour time frame. A shot given during this time to "rehydrate" the pig may help stop the scouring.

Brown said his research could help children in developing countries, where as many as half of all children born, die from dehydration caused by diarrhea disease. "With undernourished children, diarrhea also impairs intestinal absorption of nutrients already in short supply."

—Jack Sperbeck

Research Seeks to Develop Better Hovers for Baby Pigs

Researchers at the University of Minnesota are designing better hovers for swine farrowing rooms. Hovers help keep baby pigs warm and protect them from being crushed by the sow.

"Hovers prevent drafts and keep baby pigs from being exposed to cold surfaces," says experiment station agricultural engineer Kevin Janni. His research was partially funded by the Minnesota Pork Producers Association through the university's Swine Center.

Gengenbach and Howard Rines, Percich and graduate student David Johnson have grown clusters of wild rice plants cells which they hope to screen for resistance to the toxin produced by the brown spot fungus. Those cells would then be grown into plants and used in breeding resistant varieties.

In another effort, Percich and soil scientist Paul Bloom are applying the element silicon to peat-soil wild rice paddies. This silicon is in the form of calcium silicate found in fly ash from coal combustion or slag from phosphate fertilizer production. Basic research on barley by plant pathologist Richard Zeyen showed the disease resistance benefits of silicon fertilization, and greenhouse experiments with wild rice indicated less susceptibility to brown spot and increased yields. In a replicated field trial last summer, peat-soil plots fertilized with 6 tons of silica slag per acre had less severe brown spot disease and 49 percent higher yields.

"We applied three rates and the response was linear," he says. "So, we might be able to apply more and get an even greater response. It costs about $20 an acre to put on 6 tons of slag, and we think, based on research with white rice, we'll only have to apply the silica once every three years," Percich says. "We're hoping to repeat the experiment next year in large-scale trials."

Oelke says, "Something positive happened when the peat-soil paddies were fertilized with fly ash. Whether it's the silica or something else in the fly ash, we don't know yet." The results may be specific for peat-soils and must be repeated on different soil types before conclusions can be drawn, some researchers say.

Oelke plans to conduct research that might address the brown spot problem in yet another way—by fallowing paddies for a year or growing a nonsusceptible crop in rotation with wild rice.

—Sam Brungardt

found that baby pigs use coconut oil fatty acids best.

The researchers gave newborn pigs doses of two different fats: long-chain fatty acids and medium-chain fatty acids (the kind found in coconut oil). They measured the amount of each fat digested, absorbed, and used for energy by the pigs.

"The pigs used the medium-chain fatty acids well. That's why we think coconut oil would be a good energy source for them," Pettigrew says. Farm

already being used experimentally to treat human diarrhea, according to David Brown, a veterinary phamacologist with the University of Minnesota Agricultural Experiment Station.

Somatostatin, a natural "messenger" substance found in the pig's digestive system, could be modified by organic chemists and injected to prevent dehydration, the main cause of death from diarrhea.

Somatostatin analogue is already be-

The researchers recommend a "box" hover with one open side that can be closed to catch the baby pigs for treatment. Solid flooring is also needed.

Hovers in a crate or pen give the best of two worlds—temperatures as low as 65 degrees for the sow and 80 to 90 degrees around the baby pigs. This saves energy costs for heat. The sow is more comfortable and more apt to eat more, resulting in better reproductive performance after she weans the pigs.

—Jack Sperbeck

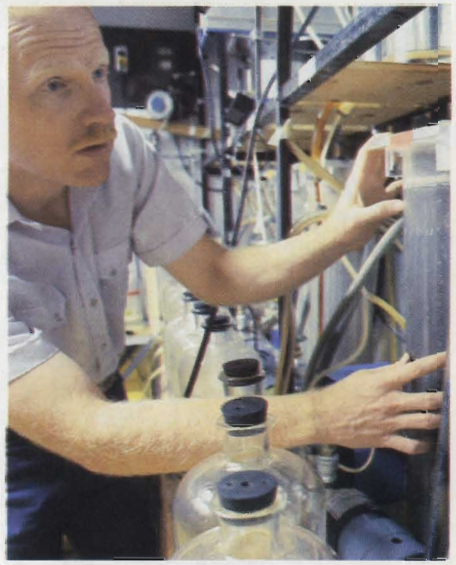
Finding New Uses for Whey

Who doesn't remember that childhood verse about Miss Muffet eating her curds and whey?

But the verse has never made sense to the dairy industry—at least the part about the whey. The industry has always found plenty to tempt the consumer with products made from curd, while whey has gone begging. "Of 100 pounds of milk, 10 pounds wind up as cheese (that's the curds portion) and 90 pounds as whey (the watery part)," explains Howard Morris, Agricultural Experiment Station food scientist.

Some of that whey becomes an ingredient in other foods for humans and animals, or winds up in pharmaceutical products, but a significant amount remains a disposal problem, usually at the wastewater treatment facilities nearest the cheesemaker. An estimated 2.9 million tons of liquid whey is produced in Minnesota annually and approximately half of that is dumped as wastewater.

Disposal costs of all waste, including whey, are rising. Because whey is unusually high in biochemical oxygen demand it is expensive and difficult to treat. Whether a cheese factory can afford to remain in a community becomes partially dependent on what can be done about the whey. And, as costs rise,



Charles Clanton examines digesters which are being used to produce methane from whey.

everyone realizes, ultimately it's the consumer who pays.

So, to approach this problem, Morris is providing whey left over from food science cheese-making classes to Charles Clanton, an experiment station agricultural engineer coordinating the multidisciplinary research into the anaerobic digestion of whey. Clanton's goals is to find a relatively inexpensive method of pretreating the whey to reduce wastewater treatment costs and to manufacture methane from the whey to use as an energy source. If methane production is feasible, this conversion could supply as much as 35 percent of a cheese factory's energy needs, he says.

But producing methane is a delicate, fastidious process. It takes knowledge and control of microbiological processes. Controlling salt and pH levels during the process is essential.

On the top floor of the agricultural engineering building, Clanton and assistant scientist Bruce Backus, with graduate student Gene Fox, have six digesters going, each scaled to six liters of liquid. Different buffer solutions are mixed with whey to discover which will be least toxic in producing the methane. So far a calcium hydroxide buffer seems to show the most promise, Clanton says.

Research on this alternative use of whey is also going on in England, Germany, and Australia, he points out. Anaerobic digesters are said to be in use in England and Nova Scotia. Meanwhile, a Wisconsin brewer recently visited with Clanton to ask if adaptation of the Minnesota research might help brewers.

As waste disposal is becoming more and more expensive, this kind of research may not only produce an alternative to expensive treatment, but convert wastes to usable products as well.

—Mary Kay O'Hearn

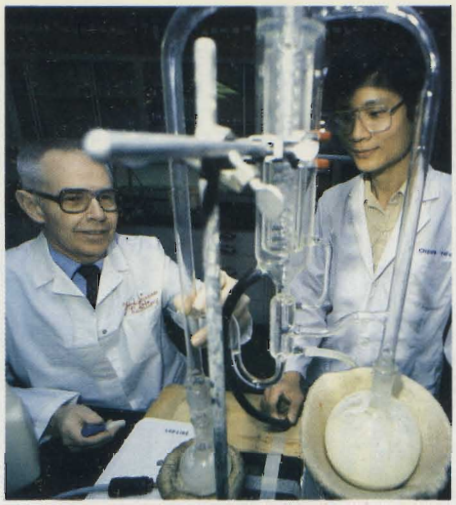
Scientist Studies New Uses for Soybeans

As every economist knows, one way to deal with surplus is to find new markets. There is rarely a surplus for a versatile product. Agricultural Experiment Station food scientist William Breene is looking at ways to make the soybean more versatile. Supported by the Minnesota Soybean Research and Promotion Council, he is studying potential new uses for the bean.

One product Breene has been testing is a soybean powder produced by the St. Peter Creamery in St. Peter, Minnesota. This powder can be reconstituted into many products.

"They have developed a new method to process soybeans into a powder," Breene explains. "The beans are heated as they are ground up, which results in a product with a less 'beany' taste. The hulls are also ground up and added back so no part of the soybean is wasted. Then they add water to it to 19 percent solids, spray dry it, and grind it back into a powder. The result is a full-fat soybean product with all the fiber in it. They make another version which is dehulled and we are looking at both."

Breene is helping to develop product specifications to aid in finding uses for the product. "For example, we are looking at solubility of the product versus pH of the solution. If you were going to use it in a liquid that is acidic, less of it will dissolve than in a neutral pH liquid. We are finding out how much will stay in suspension, and how much will settle out. We are also looking at other potential uses, such as in yogurt-type products and frozen desserts," he says.



William Breene, right, and graduate assistant Tai-Ben Cheng prepare samples for flavor analysis.

The advantage of the dry powder is it can be stored without refrigeration, Breene points out. "For smaller companies this product might be ideal, because not only is the powdered product simpler to store but it doesn't require a lot of equipment to produce it. You can make a soft-serve dessert with it, for example, with a soft-serve machine; you just have to add water and whey solids. Whey is cheap and a lot of cheese processors would welcome another use for it."

—Jennifer Obst

Taste *continued from p. 4*

against which the others are judged.

Next, Munson and assistant Mara Crombie, an undergraduate student in food science and nutrition, get to work, much like fast-food workers braving the noon rush of customers. The cubicles are separated from the kitchen by panels that can be raised to slip the plate of sample before the judge and quickly lowered again.

The samples, 8 to 10 hot fries each, are served on white paper plates. Panel members eat enough to score the sample, then go on to the next plate. Generally they taste five to six samples. Scores for each characteristic range from 1 to 9. "We tell them not to hug the middle," says Munson.

Even before the panels start, Munson often screens many samples to detect those that aren't worth the effort. This year, she wound up eating an endless supply of boiled potatoes, with no salt or butter added, of course. "I could hardly look a boiled potato in the face after that," she laughs.

Munson's closeness to fruits and vegetables is virtually hereditary. Her grandfather, an Italian immigrant, had a fruit and vegetable business and her father was a state fruit and vegetable inspector. "I was the only one in my first food science class in college who had ever eaten an artichoke," she says.

Panels are usually composed of five or six people, less than ideal, Munson admits. Scheduling problems limit the size of the panel, she says. But many panelists stay for several years. "I could never do this without a lot of cooperation, from faculty, staff, and students," she notes.

—Anne Gillespie Lewis

MINNESOTA Science

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