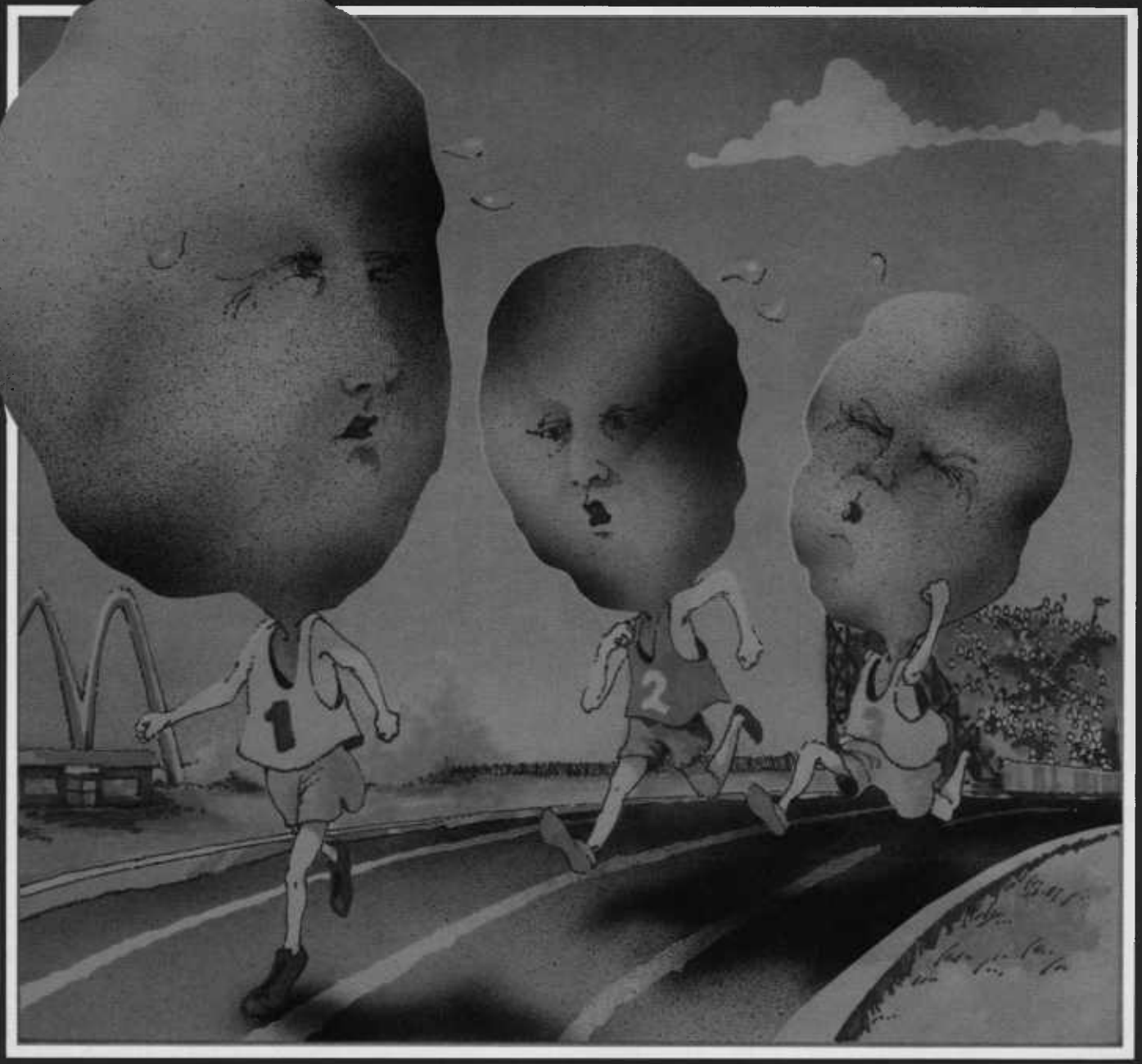
OREGON'S AGRICULTURAL

progress

SPRING/SUMMER 1982

Can We Win the Potato Race?



Agricultural Experiment Station
Oregon State University

comment

John R. Davis
Director, Oregon Agricultural Experiment Station

The chickens have started scratching

The old saying "when the going gets tough, the tough get going" surely applies to the University and the Agricultural Experiment Station. For those many persons from Roseburg to Portland to Burns to Newport who are unemployed, or for those farmers and ranchers who defaulted on loans and had to sell out, the going really got tough, and the future certainly looks bleak. There's no valid comparison to being out of a job, but for the Agricultural Experiment Station, we've had to sell out a few of our programs and have reduced the number of scientists by almost 13 percent from last year.

But the future is far from being bleak for us—we've regrouped, re-evaluated, re-sorted and made plans to support Oregon's agriculture in high priority areas, with a major thrust toward economic development. In Oregon, major issues deal with jobs, with producing a product at a reasonable profit, and in many cases with selling the product in a reliable market—in other words, with economic development. We, therefore, have pointed ourselves in this direction: to provide the basic scientific support and the transfer of technology that will help Oregon's agribusiness get back on its economic feet.

Successful ventures

Over the years, agricultural research has provoked many successful ventures that have produced economic diversity and new jobs in Oregon. Examples of these include:

1. Developing a new virus-free cheese starter, so dairies can start and finish a batch of cheese at a much lower average cost with much less waste.
2. Developing bush beans to replace pole beans, thereby providing a new stimulus for Oregon's food processing industries.
3. Developing a chum salmon run at the coast, which has the potential of adding significantly to Oregon's fishing industry. Similarly, the Oregon moist pellet for fish, and the salmon run in Young's Bay near Astoria, have been a real shot in the arm for our fisheries.
4. Developing disease-resistant, higher-yielding varieties of wheat that contribute substantially to making 76 percent of the tonnage flowing through the Port of Portland agricultural goods.
5. Developing an understanding of the cause of white muscle disease in cattle and, by suggesting the use of selenium additives to feed, reducing losses of cattle from the disease in many areas of Oregon.

Economic development

We could identify many research programs that have created new industries and new jobs and strengthened economic activity in Oregon. But we don't intend to rest on these laurels. Rather, we have dedicated ourselves to mission-oriented research that has direct impacts on economic development.

We've got a lot of work to do with fewer resources, but somehow we'll increase our research on improving crop production and assessing new crop possibilities, on economically and environmentally sound pest management and on agricultural trade and marketing. You can be sure that sound economic development—good jobs, reasonable profits and consumer concerns—will be foremost in our planning. We'll work even more diligently to develop improved crop varieties, to assist food processors in developing new products and reducing costs, to develop sound economic and scientific support for Oregon's industries. We'll be leaner, but we'll be tougher (just like most of you). The future is still there and we intend to make the best of it! As Henry Ford said, "Business is never so healthy as when, like a chicken, it must do a certain amount of scratching for what it gets."

John R. Davis

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Cover: Rising shipping costs and stepped up research are helping the Midwest and East challenge Northwest supremacy in potato production. See Page 8. (Drawing: John Subert)

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A new seasoning for cauliflower

Although cauliflower is white it may turn some Oregonians' pocketbooks green, a researcher at OSU's North Willamette Agricultural Experiment Station at Aurora believes.

Four years of testing suggests winter cauliflower, which is planted in the fall and harvested in the spring, is a promising crop for Willamette Valley vegetable growers and processors, and for home gardeners, says Delbert Hemphill, a horticulturist at the North Willamette station.

"I think it's a good opportunity for growers and processors to generate some cash at a time (April and May) when they usually don't have much going. Growers could put it in rotation with peas, beans or something else and get two crops a year on a piece of ground, and processors could utilize their equipment more efficiently," said Hemphill.

Most cauliflower grown in the Willamette Valley is a fall type planted in June or early July and harvested in September or October, the researcher noted.

Testing at North Willamette and six other sites ranging from Corvallis to Sandy, east of Portland, has shown several types of winter cauliflower grow well in western Oregon.

"Two Dutch varieties, Armado April and Armado May, seem to have the best winter hardiness and quality," Hemphill said, explaining that the months in the variety names indicate when the cauliflower should be ready for harvesting.

The way Hemphill envisions it, Willamette Valley farmers would plant winter cauliflower seedlings from mid-August through September, depending on their schedule for other crops, on land where peas, beans or another crop had just been harvested.

> "I like the taste of winter cauliflower better."

The cauliflower would be ready for harvest in the spring in time for peas, beans or another crop to be planted again, completing the double-crop cycle.

"The idea with winter cauliflower is to get it established in the fall. During an average winter around here it will continue to grow slowly, then the heads will really start developing in late winter or early spring," the researcher said.

Cold or long winters can be damaging, he noted.

"The problem this year was that it didn't turn warm soon enough. The cool spring made the heads develop late and they were

smaller than in 1980-81. That was a warm winter and we got a very good yield—three tons of processed weight per acre in some plots. That would be about 10 tons of cauliflower an acre for fresh market," Hemphill said.

"A few Willamette Valley growers have been trying to overwinter cauliflower for years," he said. "It seems like they get frozen out every few years. But these European varieties we've been looking at are pretty hardy."

Winter cauliflower looks promising for commercial growers and home gardeners, says horticulturist Delbert Hemphill, shown here checking a test plot at the North Willamette experiment station.

In appearance and taste, winter cauliflower is a little different from the fall type most Oregonians are used to buying, the researcher explained. Fall cauliflower heads are round like grapefruit; winter cauliflower heads, although similar in color and size, are shaped more like a half dome with little edible material on the underside. Winter cauliflower heads are less dense.

"I like the taste of winter cauliflower better," Hemphill said. "It's more delicate. I like it raw and it's particularly good as a salad vegetable."

Most fall cauliflower grown in Oregon is frozen. Only about 2,000 acres were planted in 1980. But cauliflower is a high-value crop and the 19,000 tons (unprocessed weight) produced were worth about $4.4 million.

Like fall cauliflower, some winter cauliflower could be sold for fresh market but most would have to be processed, Hemphill speculated.

"There's a limited fresh market in Oregon and when you started paying to ship it out of state you'd have to compete with California and other states," he said.

Winter cauliflower presents home gardeners an opportunity to produce another vegetable—relatively easily—early in the season, Hemphill believes.

"Fall cauliflower is kind of hard for home gardeners—like broccoli," he said. "Insects are really a problem. But with winter cauliflower there's no watering once you get the stand up in the fall, and insects aren't too much of a problem that time of the year."

There is a hitch. Farmers would want to transplant seedlings to shorten the growing season so they could produce two crops. It would be cheaper for home gardeners to grow winter cauliflower from seeds, according to Hemphill.

"But seed is real hard to come by," he said. "I know of one company down in Lorane that sells seed. I'm sure others would if the demand was there."

Cauliflower isn't the only vegetable Hemphill and other OSU researchers are eyeing for overwintering. Among others being evaluated, spinach looks promising, Hemphill said.

"From a processor's standpoint, almost anything would be good," he said. "April and May are a little too early for strawberries and peas. About the only thing a processor might have going then is rhubarb."□

Heyday for Hay

Despite what many people think, high quality alfalfa can grow in many parts of Oregon.

That is a major finding in an OSU study of alfalfa hay quality and its impact on livestock.

"Traditionally, people associate high quality alfalfa with eastern Oregon, particularly the areas around Redmond and Klamath Falls, but this study showed us that management factors are more important than where you grow alfalfa," said OSU agronomist David Hannaway.

"The higher elevation areas in eastern Oregon do produce better hay, on the average, but the quality range between there and other areas is narrow, we found," Hannaway added.

Alfalfa, cut several times a season, must dry in the field before baling.

In Oregon, growing alfalfa is a $100-million-a-year industry, the researcher said. Top alfalfa sells for about $80 to $85 a ton or higher. Lower grade alfalfa sells for $50 to $70 a ton.

Top quality alfalfa is fed chiefly to dairy cattle, dairy goats, sheep and occasionally to horses. Lower quality alfalfa is fed mostly to beef cattle.

Alfalfa is grown in western Oregon counties such as Lane, Marion, Washington and Yamhill but the majority produced in the state is grown in eastern Oregon.

Often, western Oregon alfalfa is of lower quality because it is harvested later in the year when the weather is better, or cut and damaged by rain, Hannaway said, explaining that, after it is cut, alfalfa must dry in the field several days before it is baled.

"When you wait until July for the first cutting, as a lot of people in western Oregon have done, the alfalfa is coarser and less digestible," he said. "We're encouraging farmers and ranchers to harvest in mid- to late May.

"It's a good trick to do it that early west of the mountains because of the rain," he said, adding that a chemical being studied shows promise for use as a spray that would cause alfalfa to dry in one to two days.

"We've found the single most important management decision is when to cut," the researcher said. "If you cut your alfalfa in the late bud stage when the plants have a higher proportion of leaves and a low proportion of indigestible fiber, you'll get a higher quality hay with a higher feed value."

"The single most important management decision is when to cut."

Alfalfa is cut three times a season in western Oregon and three to four times in most parts of eastern Oregon, Hannaway explained. Each cutting, plants are mowed to within an inch or two of the ground. The tops grow back in about six weeks.

One option for persons who want to produce high quality alfalfa in western Oregon is to use the first cutting of the season for silage, rather than hay, because silage doesn't have to dry as much, OSU researchers say.

The study showed the only way to assure you are buying top quality alfalfa is to have it analyzed (to measure properties such as crude protein content and digestibility) at one of the commercial testing laboratories around the state or at the OSU Forage Testing Laboratory on the campus.

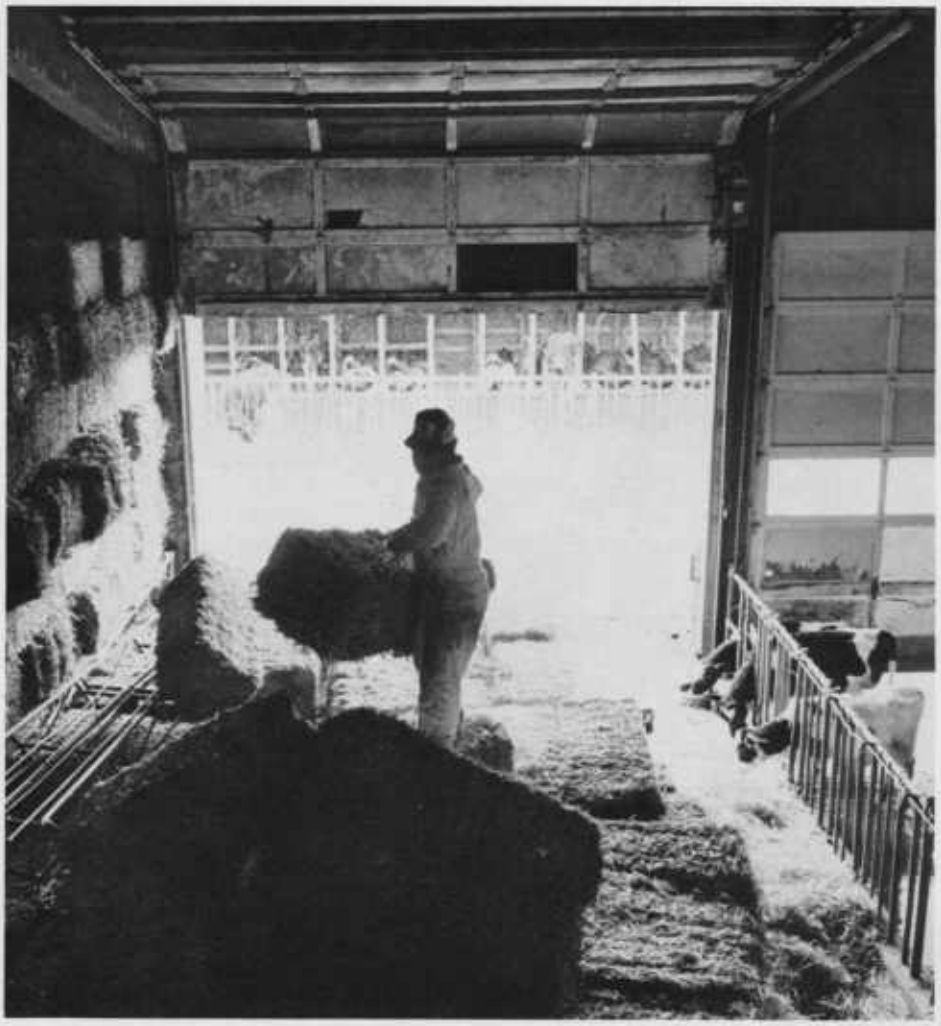
New hay grading standards proposed by the American Forage and Grassland Council and the Federal Grain Inspection Service were examined in the study. Overall, the proposed standards, which relate the chemical composition of hay to performance data such as how much milk dairy cattle produce and how much weight animals gain, would be an improvement over current standards that divide hay into five grades based on appearance, smell and feel, researchers concluded.

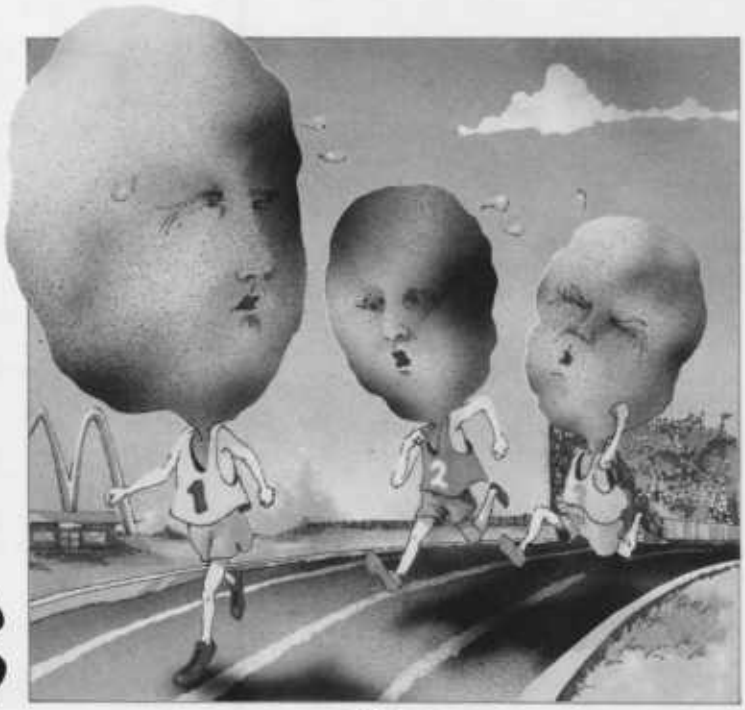
Another part of the research focused on milk production in dairy cattle fed various percentages and grades of alfalfa. Milk production was highest in animals fed a 45 percent ration of Grade 1 alfalfa (the top grade). There did not seem to be a significant difference in milk production in animals fed a 30 percent alfalfa ration when the animals were given Grade 2 or Grade 3 alfalfa.

Taking part in the multidisciplinary study besides Hannaway, who coordinated reporting of the findings in Oregon Agricultural Experiment Station Technical Bulletin 141, were Donald Claypool and H.P. Adams of the OSU animal science department; Mark Buettner and George Carter of the Klamath Agricultural Experiment Station at Klamath Falls; Frank W. Adams of the OSU agricultural chemistry department; Lonnie Allison, formerly of the Klamath Agricultural Experiment Station, and Lester Vough, formerly of the OSU crop science department.

Single copies of Technical Bulletin 141 are available free to Oregonians who write the Bulletin Clerk, OSU printing department, Corvallis 97331. □

The ultimate test for this bale of alfalfa will be how much milk the cows that eat it produce.





The Great Potato Race

Crop scientist Al Mosley

Hearing OSU crop scientist Al Mosley talk about a situation that concerns him these days, you might be tempted to picture it in an athletic framework, maybe as a marathon race where talented newcomers line up year after year to take a shot at the perennial, but aging, champion (representing the Northwest).

But what Mosley sees is an economic contest, one the potato growers (really, all the citizens) of Oregon, Idaho and Washington can't afford to lose.

"We're going to have to start running faster just to keep standing still," the Experiment Station potato specialist said one day not long ago. Then he dropped the sports talk:

"Potatoes are a $200-million-a-year industry in Oregon alone," he said. "The Northwest grows more than half of them sold in this country, including about 75 percent of the baking and processing potatoes. But nine-tenths of the breeding research is going on in the Midwest and East. There must be 13 or 14 breeding programs back there and there are two out here. They're trying to breed us right out of business.

"We can grow the Russet Burbank (by far the most popular potato for baking and processing) better than anyone anywhere else in the country. That's our edge. But with all that research, you can see they're

Left: Al Mosley (left), research assistant Dan Hane of OSU's experiment station at Hermiston (center), and Luther Fitch (right), Umatilla County Extension agent, inspect potatoes grown in variety tests at the Hermiston facility. Below: Agronomist Malcolm Johnson of the Central Oregon branch experiment station checks potatoes from variety tests at Redmond.

going to outgun us sooner or later. Transportation costs are going up fast and when they develop a russet potato for baking and processing that does well back east, a potato McDonald's can use for French fries, the processing plants are going to move closer to where most of the people are. Some already have."

There you have it. Mosely is worried the Northwest potato industry is stumbling. But he doesn't expect to see it fall from its top position. Northwest potato growers, and Mosely and many other researchers, don't plan to let it.

"The potato growers in Oregon, Idaho and Washington see what's happening and they're getting together to pool their clout and see that what has to be done is done," he said.

At the top of the list of "what has to be done," the researcher believes, is intensified research in potato breeding, potato diseases and potato production methods.

In Oregon, several OSU efforts are contributing in those areas. The next step, expected early in 1983, will be an expanded varietal development program to be operated by OSU in cooperation with the U.S. Department of Agriculture's regional potato breeding station at Aberdeen, Idaho. A USDA potato breeding station at Prosser, Washington, also will help with the program.

Oregon has no potato breeding station in the state, although it is fourth on the list of top potato-producing states behind neighbors Idaho and Washington and Maine, which grows mostly potato varieties

used for the fresh market. Breeding, which includes crossing germplasm (genetic material) from two or more potato varieties, can produce potatoes with better disease and weather tolerance, better yields and other desirable qualities.

Under a plan now being worked out in detail, the Aberdeen station will increase its breeding efforts by making new crosses for Oregon. The Aberdeen station will provide Oregon researchers with true potato seeds from these new crosses and Oregon researchers will grow the seeds into seedlings and screen them so the Northwest will have more potato selections to work with.

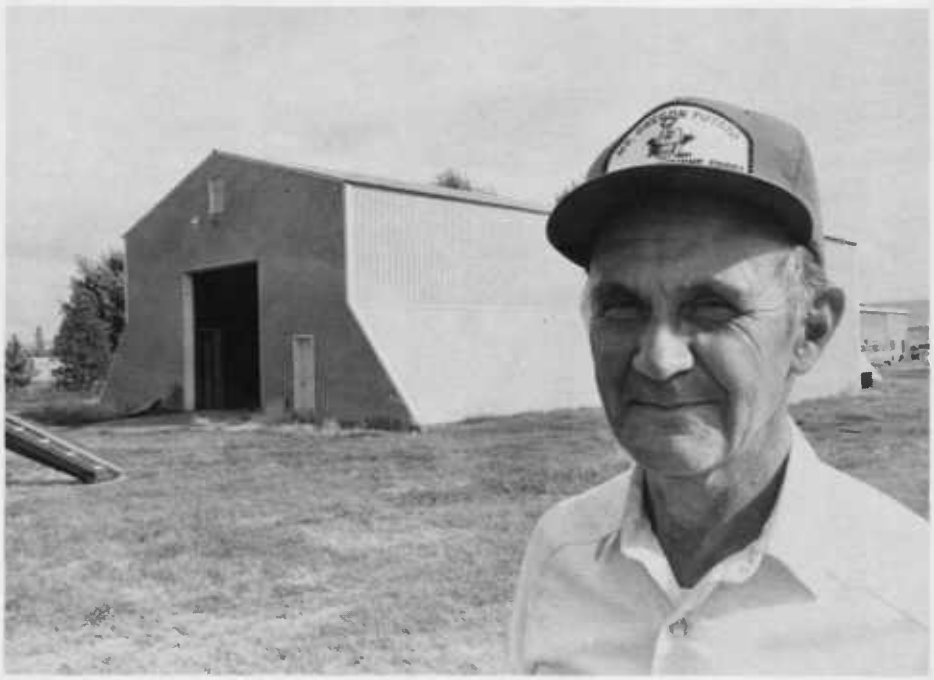
"We're trying to strengthen the Aberdeen program. They'll be making more crosses and testing more germplasm and the USDA administration is enthusiastic about the prospect," said Mosley, noting that Oregon potato growers pushed for the expanded program and will provide much of the initial funding.

"They're trying to breed us right out of business."

The breeding station in Washington will contribute to the Oregon program by developing and screening potato plants that might be used in special crosses for Oregon.

A brief explanation of how potatoes are grown makes it easier to explain the logistical details of the program. Potatoes can grow from true seeds or from tubers like the potatoes people eat. Potatoes are produced commercially by cutting tubers into pieces and planting the pieces, which contain buds commonly called eyes.

In the new program, potato seedlings will be grown from seeds obtained at Aberdeen and planted on the OSU campus in greenhouses or screenhouses. Then small tubers from these seedlings will be planted at a test site at Powell Butte in central



Oregon's expanded potato variety development program is a step in the right direction, says George Carter, shown standing in front of a potato storage facility at the Klamath Falls branch experiment station, where he is superintendent.

Oregon operated by the Redmond branch experiment station. The seedlings will be evaluated in the field and the best will be harvested for further testing at Powell Butte and at the branch experiment stations in important potato growing areas such as Klamath Falls in southern Oregon, Ontario in the Treasure Valley and Hermiston in the Columbia Basin, plus other Northwest sites.

Except that the breeding will focus directly on Oregon and that seedlings will be screened first in Oregon, the process will resemble a potato variety development program started about 10 years ago by two longtime leaders in Oregon potato research, Malcolm Johnson, superintendent of the Redmond branch experiment station, and George Carter, superintendent of the branch experiment station at Klamath Falls.

In that program, Johnson, Carter, Mosley, Charles Stanger of the Malheur branch experiment station at Ontario and others have been going to Aberdeen each fall to select 75 to 150 promising potato crosses and bring them back to Oregon for testing at Redmond, Klamath Falls, Hermiston and other sites.

"I think there will be lots of advantages to this new approach," said Carter. "We'll probably learn and change things as we go, but the concept is a good one. The physical limitation in potato selection work is in how much material you can grow and handle. Joe Pavek (the Aberdeen potato breeder) could make enough crosses in a year or two to last us a lifetime. Growing the seedlings and evaluating the tubers is the hard part. Eventually, we'll grow over 60,000 seedlings a year in Oregon and they'll do the same in Idaho. This could almost double the opportunity to develop a superior new potato variety for Oregon and the Northwest."

Mosley, who will help coordinate the new program from Corvallis, noted it can take 10 to 12 years to produce a potato variety and researchers and growers aren't expecting overnight payoffs, just a chance to compete on a more equal basis with their eastern counterparts.

> "I think there will be lots of advantages to this new approach."

"There have been three or four new russet potatoes released east of the Mississippi River in the last year or two and only one out west here," he said.

The one western potato, a russet called Lemhi released jointly by the Idaho, Washington and Oregon agricultural experiment stations, demonstrates a challenge facing researchers. Its yields are good but probably not good enough to threaten the Russet Burbank, the standard by which all new baking and processing potatoes are judged.

"The Russet Burbank has been around more than 100 years and the story goes that Luther Burbank (the famous horticulturist) produced it by chance when he planted seeds from a potato seed ball a squirrel had carried over a few rows in a test plot," said Mosley. "We've never been able to beat it. Farmers know how to handle it, grow it and store it, and processors are geared up for it. They're reluctant to switch from a good thing."

But that doesn't mean farmers growing the Russet Burbank in Oregon have no problems. Disease is a formidable foe.

Mary Powelson, an OSU plant pathologist, is directing studies of several potato diseases, including early dying disease, caused by a fungus transmitted through the soil. Early dying cuts yields by killing plants prematurely. The more potato crops are grown on a piece of land, the more the fungus builds up in the soil and the worse the early dying problem.

The disease seems to thrive in the irrigated, intensely farmed fields of the Columbia Basin, where Powelson is doing most of her field studies. She and colleagues are working with a chemical called Vapam that can be applied in irrigation water and shows promise for controlling early dying disease.

Powelson also is studying blackleg and stem soft rot, bacterial diseases that reduce potato yields. Recently, she discovered one type of bacteria that causes the diseases can be spread through the soil, as well as spread through seed tubers, as previously known. That information may help in efforts to manage the diseases.

Among many other disease studies is one aimed at reducing virus problems by producing virus-free seed potatoes. Results

Left: So far, researchers have not produced a potato more attractive to Northwest growers and processors than the more-than-100-year-old Russet Burbank, says Al Mosley, shown in an OSU greenhouse with seedlings being tested. Below: OSU scientists are producing virus-free potatoes by growing tiny plantlets like these in bottles from tissue on potato stems found to be disease-free.

from the seven-year-old project, initiated by OSU plant pathologists Tom Allen and Paul Koepsell and seed certification assistant Oscar Gutbrod, are impressive.

A tumble from the top would cause far-reaching economic tremors.

In a procedure they devised, the researchers identify virus-free tissue in potato stems, clone the tissue to produce seedlings, and use the seedlings to grow virus-free seed potatoes. Field production of virus-free seed potatoes is being done at a central Oregon test site which is isolated and relatively disease-free. That generates enough seed tubers for growers who want to develop their own virus-free stock.

Virus-free seed potatoes can produce yields about 30 percent higher than those of infected tubers and about 10 percent of the potatoes produced in Oregon today are from the virus-free OSU seed potato stock, said Allen. Increased yields from virus-free seed potatoes added more than $6 million to growers' profits last year, he calculated.

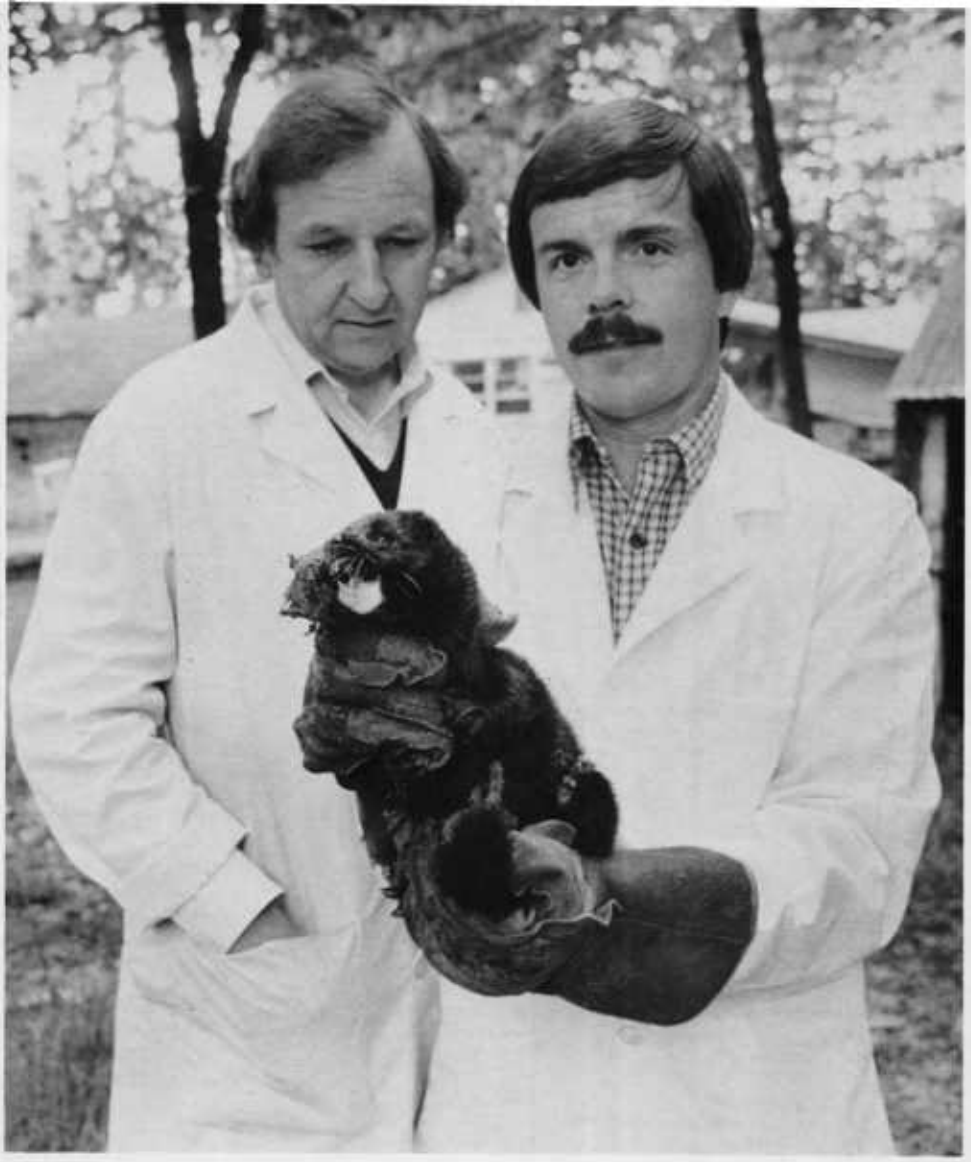
Nearly 90 percent of the potatoes produced in Oregon five years from now will come from virus-free seed stock, the researcher believes.

Other statewide OSU studies of how to plant, till, irrigate, fertilize, store and process potatoes, and campus work in determining and certifying the purity of seed tubers, promise to give a boost to the potato industry in Oregon and throughout the Northwest, Mosley believes. Exporting is going to have a positive impact, too, he thinks.

"There's great potential in exports," he said. "I feel we can help some of these developing countries by selling them high quality seed potatoes, and we are in perfect position to sell processed potatoes to the countries like Japan that have the technology to use them."

There are other obstacles. For example, if electricity rates soar as expected, the cost of irrigating potatoes in drier parts of Oregon will loom as a large stumbling block. But with growers and researchers in Idaho, Washington and Oregon responding to the eastern challenge, the Northwest can stay on top in potato production, Mosley believes. Good thing too, he pointed out, because in Oregon at least a tumble from the top would send out far-reaching economic tremors.

"Potatoes have the biggest payroll of any crop in our state. Three-fourths of the potatoes we produce are processed here," he said. "That's like having most of our wheat used in Oregon bakeries. We need to increase potato varietal development here in Oregon just to play it safe, if for no other reason. We can't afford to take a chance on losing our potato industry."□



Animal scientist Fred Stormshak, left, and graduate student researcher Jack Rose pose with a mink at the OSU Fur Farm.

Hurrying the mink's coat

OSU animal scientists say a hormone speeds fur growth

Normally in Oregon, or anyplace else, it takes about seven months for a mink to grow its plush winter fur coat, the kind used in coats people wear.

Jack Rose, a doctoral student, and Fred Stormshak, his advisor in OSU's animal science department, say a chemical implant they've developed can cut that time by as much as six weeks. They're excited by the prospect, although they believe more research is needed to fine-tune the procedure.

"An average fur farm might have 5,000 mink. To the rancher, eliminating several weeks of cold, late fall feeding and care with one implant could be quite a bonus," said Rose, noting that he and Stormshak are receiving inquiries from mink ranchers interested in testing the implant themselves.

Rose and Stormshak developed the implants, which resemble plastic, time-release cold capsules, for use in experiments at the OSU Fur Farm on campus.

In the experiments, the researchers made a logical jump from tests done elsewhere that showed the hormone melatonin affected hair growth in weasels. Melatonin, secreted by the pineal gland in the brain of animals, is thought to be regulated by the amount of daylight and darkness. Mink, like weasels, develop their dense winter fur rapidly in the fall when there is more darkness each successive day, so the researchers figured there could be a connection between melatonin and mink fur development.

The first experiment, with 30 adult, female mink divided into three groups of 10, showed they were right.

In early June, they shaved spots on all the test animals. They implanted melatonin capsules on the back of the necks of the 10 mink in one group and housed those animals in outside cages. They did not give melatonin to mink in the other two groups and housed one group outside and one inside in a facility that reduced daily exposure to light (reducing a mink's exposure to light is known to speed up winter fur growth, although it requires building a light-tight facility). They fed all the animals the same diet.

By mid-October, mink given melatonin had prime winter coats—the kind the other mink caged outside had six weeks later. The mink given melatonin even had prime fur before the animals housed indoors under controlled lighting.

Left: A melatonin implant. Lower left: John Adair, OSU Fur Farm manager, shows off a light-colored mink. Below: Adair keeps OSU mink in cages such as these so scientists like Stormshak and Rose can use them in their research. When it comes to how to raise mink, Adair is the campus expert.

"It was striking. Here you'd have one animal in the control group with a bald patch and another, hormone-treated animal in a cage nearby you couldn't even tell had been shaved," Rose said.

An experiment the next year that included young (mink kits are born in early spring) and adult mink of both sexes yielded similar fur growth results.

A key test, from the mink rancher's viewpoint, was when pelts of animals given melatonin and pelts of other OSU mink were sent to the Seattle Fur Exchange, where pelts are graded on a one-to-four scale (one being tops). All the pelts were purchased. Graders, who knew nothing of the experiments, gave pelts of the animals implanted with melatonin grades ranging from 1½ to 2. They gave other OSU pelts grades ranging from 1 to 2—a very slight grading difference.

Given all that, John Adair, who as manager of the OSU Fur Farm works closely with mink ranchers, sees possibilities for the implant.

"It would be interesting to check out the subtle differences in fur quality and also to determine the effects, if any, that the implants may have on breeding animals. But mink ranchers would welcome a way of cutting costs like this," he said.

"Because current pelt prices may average about $40, people think it's a lucrative business. It isn't. Actually, mink ranchers are selling pelts for what they did 20 years ago—in the face of sharply increased production costs. Research that could help reduce those costs would be valuable," he added.

By mid-October, mink given melatonin had prime winter coats.

Oregon, with about 40 mink ranches, mostly in the Willamette Valley and on the northern coast, produces about 150,000 pelts a year, making it seventh in the country in pelt production (Wisconsin is the leader), Adair said.

Suppose a large number of mink ranchers decide they want to try the implants. How will they get them? That has Rose and Stormshak a bit frustrated because they aren't sure.

"One of the first questions a representative from a big drug company I contacted about manufacturing the implants asked me was how many mink are pelted every year," said Stormshak.

The man's enthusiasm faded when the researcher told him he thought the figure was about 3½ million for the United States and around 20 million worldwide, and that OSU officials have learned that the implant is not patentable because melatonin is a naturally occurring substance.

"When one of these companies thinks of FDA (Food and Drug Administration) clearances they'd have to get and the development process necessary, it's easy for them to just say forget it," Stormshak said. "Those 3½ million mink pelted in this country are in contrast to the millions and millions of cattle that create a market for other types of implants.

"But really, we haven't exhausted the commercial possibilities," he added. "Some small company looking for something to manufacture may come along and decide this looks lucrative. The production cost would be relatively small and if you could just sell a million implants a year at a dollar a shot that wouldn't be too bad. Unless there's a problem we're unaware of, the mink rancher would be way, way ahead." □

research notes

They ignore acid rain

Acid rain may be wreaking havoc with fish and granite statues but it won't do much harm to U.S. crops, judging by an OSU study of its effect on wheat, corn, alfalfa, tomatoes, lettuce and more than a dozen other plants.

"Plants seem to ignore acid rain is the best way to put it," said Dale Moss, project director and head of OSU's crop science department.

"I wouldn't feel one bit spooky about saying our results suggest it doesn't have much impact on crops. We see some stimulation, some inhibition, but no big effect. Generally, by our results, it's just not a problem," added the project field research supervisor, Shelton Perrigan.

The work of Experiment Station researchers on the three-year-old project (featured in an article in the Spring 1980 issue of *Oregon's Agricultural Progress*) is being funded by the U.S. Environmental Protection Agency.

Some studies elsewhere in the country seem to back up the OSU finding. Others don't.

Acid rain, said to be falling with increasing frequency in some parts of the country, is formed when pollutants such as sulfur dioxide and nitrogen oxide combine with moisture in the atmosphere.

It has been fingered as the culprit in lakes where fish and all other life died, in polluted drinking water and in the speeded up erosion of granite and marble structures in the Midwest and East.

The OSU study, which started as a broad look at how acid rain affects about 20 key crops, is narrowing in focus this spring and summer to four experiments with field corn, the type fed to livestock. □

New barley developed

A new, six-row winter feed barley developed by OSU agronomists has been named Scio.

High yielding with stiff straw, Scio is being released by the agricultural experiment stations of Oregon, Idaho and Washington.

Fairly tall and early, the new variety is the result of a cross between Luther/Hudson barley and a barley line from Illinois. It averaged 102 percent of Boyer and 107 percent of Mal in two years of regional testing. Both are commercial varieties.

In more than five years of testing in the Willamette Valley, Scio averaged 107 percent of Boyer and 103 percent of Mal.

"Scio's major strength is in resistance to lodging (falling over before harvest)," said Mary Verhoeven, who developed the new variety. "It appears to be particularly well adapted to the high rainfall areas of Oregon and Washington and to irrigated areas of production where straw strength is a major consideration."

The new barley averaged 76 percent winter survial, indicating a moderate amount of winter hardiness, in a two-year test at 49 locations.

Some seed is available at Hyslop Agronomy Farm near Corvallis. Approximately 60 acres of registered seed now is growing, Verhoeven said. □

Virus-free lilies

Consistency can hide dirty work, OSU researchers who developed the world's first virus-free Easter lily have learned.

They used to think lily symptomless virus was harmless, as the name suggests.

"We didn't know it caused any problems until we started growing virus-free Easter lilies and they turned out be to about 30 percent larger than ordinary stock," said Tom Allen, OSU plant pathologist.

The virus probably has been stunting the growth of lilies around the world for centuries, said Allen, adding that that's not particularly damaging commercially because most lilies are tall enough.

Having virus-free Easter lily stock helps growers get rid of two very damaging viruses, though, Allen said.

One, called cucumber mosaic virus, discolors Easter lily leaves in a green and yellow pattern. The other, tulip breaking virus, causes dark streaks to appear on lily leaves.

The virus-free Easter lily was developed at the A.N. Roberts Easter Lily Research Center near Brookings on the southern Oregon coast. The center is operated by OSU and the Pacific Bulb Growers Association.

In 1980 and 1981, virus-free Easter lilies were grown in the field at the research center. This year, virus-free stock has been distributed to two growers in the Brookings area for commercial testing.

Viruses that infect Easter lilies are transmitted by aphids, said Allen, who has been studying the process with fellow OSU researchers A.N. Roberts and J.P. McMorran, Lee Riddle of the Brookings research center and W.C. Anderson of the Northwestern Washington Research and Extension Unit at Mt. Vernon, Washington.

Tom Allen with a virus-free lily.

Spraying insecticides and applying a light oil to the tops and bottoms of virus-free Easter lilies growing in the field while aphids are active can keep the plants from being infected with viruses, Allen said.

Growing Easter lilies is a $5-million-a-year industry in southern Oregon and northern California. □

Wildlife ecologist Bruce Coblentz shot this wild goat during a visit to Santiago Island in the Galapagos chain.

Pigs are ruining Darwin's 'world'

Survival of the fittest has taken an ironic turn in the Galapagos Islands where 19th Century naturalist Charles Darwin did much of the field work for his famed theory of how life evolves through natural selection, according to Experiment Station wildlife ecologist Bruce Coblentz.

Marauding pigs and goats that are descendants of animals released by man are ravaging the very island Darwin once described as "a little world within itself" because of its abundant and unique native forms of life.

"Pigs have been observed eating eggs from beneath female green sea turtles as the eggs were laid," said Coblentz, who plans to help stop the destruction.

Last year, Coblentz and Bill Baber, a doctoral student in OSU's fisheries and wildlife department, went to the Galapagos Islands (about 600 miles west of Ecuador, which owns them) at the request of the Office of Biological Conservation of the Smithsonian Institution in Washington, D.C.

Smithsonian officials wanted Coblentz, who has directed studies of domestic animals gone wild on islands elsewhere in the world, to evaluate the pig and goat problem.

Coblentz and Baber found that the animals, unchecked by predators, had turned parts of 350-square-mile Santiago Island, where Darwin spent most of his time in the Galapagos chain, into barren, rocky areas.

The goats can help eliminate the pigs, they decided.

Wild pigs are shy and stick close to heavy cover if they can, said Coblentz, explaining that hordes of wild goats on Santiago Island have made pigs vulnerable by eating most of the brush the pigs would hide in.

The rifle is the most practical tool for eliminating the pigs, he said. Ecuadorian wildlife specialists believe they will be able to eliminate the goats on Santiago Island once the pigs are gone.

The Charles Darwin Research Station in the Galapagos Islands, supported by the Smithsonian, the World Wildlife Fund and the Frank Zoological Society, has given top priority to Coblentz's proposal for a study of Santiago Island's pigs and a pig eradication program, the OSU researcher said. The project will begin in mid-summer, he said. □

Cabbage release

Four new cabbage breeding lines resistant to club root, a fungus, have been developed and released by Experiment Station vegetable breeder Jim Baggett.

"These new lines are of good quality but have no advantages over commercial varieties if club root is not present," said Baggett, explaining that the disease, although found in several areas of western Oregon, is most prevalent in moist, acidic soils near the coast.

Once established in the soil, club root may remain for many years, the researcher said. It causes tumorlike growths on the roots of cabbages, broccoli and similar vegetables, stunting their growth.

The breeding lines have been named Oregon 100, 123, 140 and 142.

Baggett has small quantities of seed and will give them to farmers and gardeners whose soil contains the club root fungus, he said. The researcher can be contacted through the OSU horticulture department. □

Drink your antibodies

Beef cattle ranchers may feel like whooping "Hey Baby, Drink Your Milk," the Oregon dairy industry advertising slogan, if Bill Hohenboken is successful.

The OSU animal scientist and two of his graduate students, Lindsay Norman and Noelle Muggli, are using selective breeding to try and produce beef calves that absorb disease-fighting antibodies more effectively from colostrum, the first milk a cow produces after giving birth.

Antibodies can help prevent disease during the first six weeks of a calf's life, but calves lose the ability to absorb them into their systems about 26 hours after birth, Hohenboken said.

"The average death loss of calves in the United Sates is about five percent," he said. "If, through selective breeding for optimum levels of antibody absorption, we could save 10 of every 100 calves lost we would be doing researchers a big favor."

Some crossbred calves absorb more antibodies than others, indicating the ability to extract antibodies from colostrum depends, at least partially, on a cow's genetic makeup, the researchers have found in their studies. Also, they have found that younger cows produce fewer antibodies.

One big question still needs answering.

"It is tempting to believe the best level of antibodies for a calf is a maximum level. However, maximum is not necessarily optimum," Hohenboken said, adding that nature often works toward medium levels rather than highs or lows in such things.

He hopes his next study will show what level of antibodies is best for calves, he said. □

1981 PUBLICATIONS INDEX

Oregon Agricultural Experiment Station scientists conduct a lot more research than *Oregon's Agricultural Progress* has the space to report. Most readers know that. But some of you may not know of other Experiment Station publications available to Oregonians. The scientists write reports—called Circulars of Information, Station Bulletins, Technical Bulletins and Special Reports—about their research findings. Also, the scientists have reprints—called Technical Papers—of articles they write for scientific journals and papers they present at scientific meetings. Usually, Oregonians can obtain single copies of the circulars, bulletins, reports and reprints free.

Following is an index of publications that were printed in 1981. They are categorized by the departments of the OSU School of Agriculture and by branch experiment stations. Copies of Circulars of Information, Technical Bulletins and Station Bulletins may be obtained by writing the OSU Bulletin Mailing Service, Industrial Building, OSU, Corvallis 97331. Copies of Special Reports and reprints may be obtained by contacting the scientists who wrote them through the scientists' campus departments or branch experiment stations. When requesting a publication, refer to the number preceding the title.

Circulars of Information

Agricultural and Resource Economics Department
- CI 688, Production and Marketing Strategies for Oregon High Desert Rangeland Cattle Producers 1968-1978.
- CI 689, Supply and Disposition of Cool Season Grass Seed in U.S. and Overseas Markets.
- CI 690, The Japanese White Wheat Marketing System.
- CI 692, Economics of Producing Ethyl Alcohol From Agricultural Products in Oregon.
- CI 698, White Wheat Marketing Margins Between the Pacific Northwest and Japan.

Station Bulletins

Agricultural Chemistry Department
- SB 648, Meadowfoam (Limnanthes alba): Its Research and Development as a Potential New Oilseed Crop for the Willamette Valley of Oregon.

Agricultural and Resource Economics Department
- SB 647, Ocean Transportation Serving Pacific Northwest Agriculture.
- SB 652, Demand and Supply in the Oregon Grass Seed Industry: An Economic Analysis.
- SB 655, Portfolio Analysis of Contracting Strategies for Farmer Marketing Cooperatives.

Crop Science Department
- SB 648, Meadowfoam (Limnanthes alba): Its Research and Development as a Potential New Oilseed Crop for the Willamette Valley of Oregon.
- SB 649, The Influence of Seeding Rates on Yield and Stand of Alfalfa in Oregon's Willamette Valley.
- SB 651, The Influence of Seeding Rates on Quality of Alfalfa in Oregon's Willamette Valley.

Entomology Department
- SB 650, The Oregon State Insect (Oregon Swallowtail Butterfly).

Technical Bulletins

Crop Science Department
- TB 141, Alfalfa Hay Quality in Oregon.

Special Reports

Anthropology Department
- SR 641, Labor Relations and Decline of the Oregon Strawberry Economy: Effects on Farm Size.

Agricultural and Resource Economics Department
- SR 610, Outdoor Recreation and the Public Interest: Proceedings of the 1979 Meeting of W-133.
- SR 617, New Shops on Main Street: A Growth Industry?
- SR 631, Estimated Expenditures by Salmon and Steelhead Sport Anglers for Specified Fisheries in the Pacific Northwest.
- SR 636, Economics of Integrated Pest Management An Interpretive Review of the Literature.

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- SR 613, Summary of Reports...1981 Sheep and Wool Days.
- SR 643, Reports of the 23rd Annual Swine Day.

Botany Department
- SR 633, Irrigated Crop Research in Oregon's Columbia Basin 1981 Research Report

Central Oregon Experiment Station—Redmond
- SR 632, Oregon Potato Variety Trials 1980.

Columbia Basin Agricultural Research Center—Hermiston
- SR 632, Oregon Potato Variety Trials 1980.
- SR 633, Irrigated Crop Research in Oregon's Columbia Basin 1981 Research Report.

Columbia Basin Agricultural Research Center—Pendleton.
- SR 606, Best Management Practices and Water Quality Demonstration and Evaluation Project Five-County North Central Area, October 1979 to April 1980.
- SR 623, 1981 Research Report Columbia Basin Agricultural Research.

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- SR 608, Results of the Seventh International Winter X Spring Wheat Screening Nursery (1979-1980).
- SR 618, Local Climatological Data for Oregon State University 1980 with Normals, Means, and Extremes.
- SR 619, Effects of Simulated Sulfuric Acid Rain on Crop Plants.
- SR 621, Alfalfa Hay Quality Survey.
- SR 632, Oregon Potato Variety Trials 1980.
- SR 633, Irrigated Crop Research in Oregon's Columbia Basin 1981 Research Report.

Eastern Oregon Agricultural Research Centers—Burns and Union
- SR 609, 1981 Progress Report . . . Research in Beef Cattle Nutrition and Management.
- SR 620, 1981 Research in Rangeland Management.

Klamath Experiment Station—Klamath Falls
- SR 632, Oregon Potato Variety Trials 1980.
- SR 635, Hay and Pasture Research in the Klamath Basin, Oregon 1980 A Research Progress Report.

Malheur Experiment Station—Ontario
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North Willamette Experiment Station—Aurora
- SR 611, Vegetable Research at the North Willamette Agricultural Experiment Station 1979-1980.

Poultry Science Department
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Rangeland Resources Department
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profile

Can you spell what he does?

Think, for a moment, of what an econometrician does for a living.

If you drew a blank, don't be frustrated. Bill Brown has trouble with that one, too, and he's the senior econometrician in OSU's agricultural and resource economics department.

Brown has used his considerable knowledge and talents in many Agricultural Experiment Station projects, like helping farmers estimate the value of using various rates of nitrogen fertilizer on crops, working with poultry researchers trying to develop cost-efficient feed rations for broilers and helping government officials determine how much money sport fishermen spend every year in Oregon. But all that hardly seems to set him off from others in his field.

How is an econometrician different from a plain old economist? If you ask Bill Brown, be ready for a raised eyebrow, a half grin —signs of nervousness.

Recently, he grabbed a pencil and a sheet of paper and started furiously drawing graphs when a visitor to his dark, book-strewn little campus office asked that question.

His reaction told quite a bit.

Econometricians, Brown said when persuaded to give up on the chart-and-graph explanation attempt, are the mathematicians of the economics world. In a field of generalists and theorists, they boil economic relationships down into equations, called econometric models, other economists (and they themselves) can insert figures into to make estimates and forecasts. Many economists construct models for predicting this or that, but constructing mathematical models is the econometrician's specialty.

The 57-year-old Brown, who grew up on a small farm in west-central Kansas and studied agricultural economics as an undergraduate at Kansas State University, recalls getting interested in statistics, the econometrician's meat and potatoes, while a graduate student at Iowa State University in the early 1950s.

"I guess you might call it the infectious enthusiasm of Earl Heady, a professor of mine who's become famous in agricultural economics, that drew me in," he said.

Brown came to OSU in 1955 when he received his doctorate and since has plugged away behind the scenes, mostly, teaching and contributing to agricultural production research. Efforts like his are the sort seldom before the public eye but linked clearly to the pocketbooks of farmers and consumers.

Bill Brown

Work has been a bit more high profile lately, though.

Brown is serving as a member of the Governor's Council of Economic Advisors, a group that consults with State Economist Chang M. Sohn on Oregon's model for forecasting revenues. Because of the recession and state budget problems, most Oregonians are painfully aware of the importance of the revenue forecasts.

The luxury of being able to practice his profession in relative obscurity for more than 25 years has given Brown great sympathy for the goldfish-bowl situation of Sohn (like Brown, an econometrician). Perhaps as much as anyone in the state, Brown knows the pitfalls of estimating something as important as how much money the government will have to spend by using figures that are themselves riddled with projections and, sometimes, downright guesses.

"The state's revenue forecasting reminds me of that old joke that it's no fun to be getting older but it's better than the alternative," he said.

One minor benefit of the revenue forecasting publicity is that it may familiarize Oregonians with econometrics, Brown noted. But even that won't completely solve his identity problem.

"My relatives back in Kansas will still wonder what it is I do," he said. "But I guess they'll keep figuring as long as I'm not fired or trying to hit them up for a loan it must not be too bad." □

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