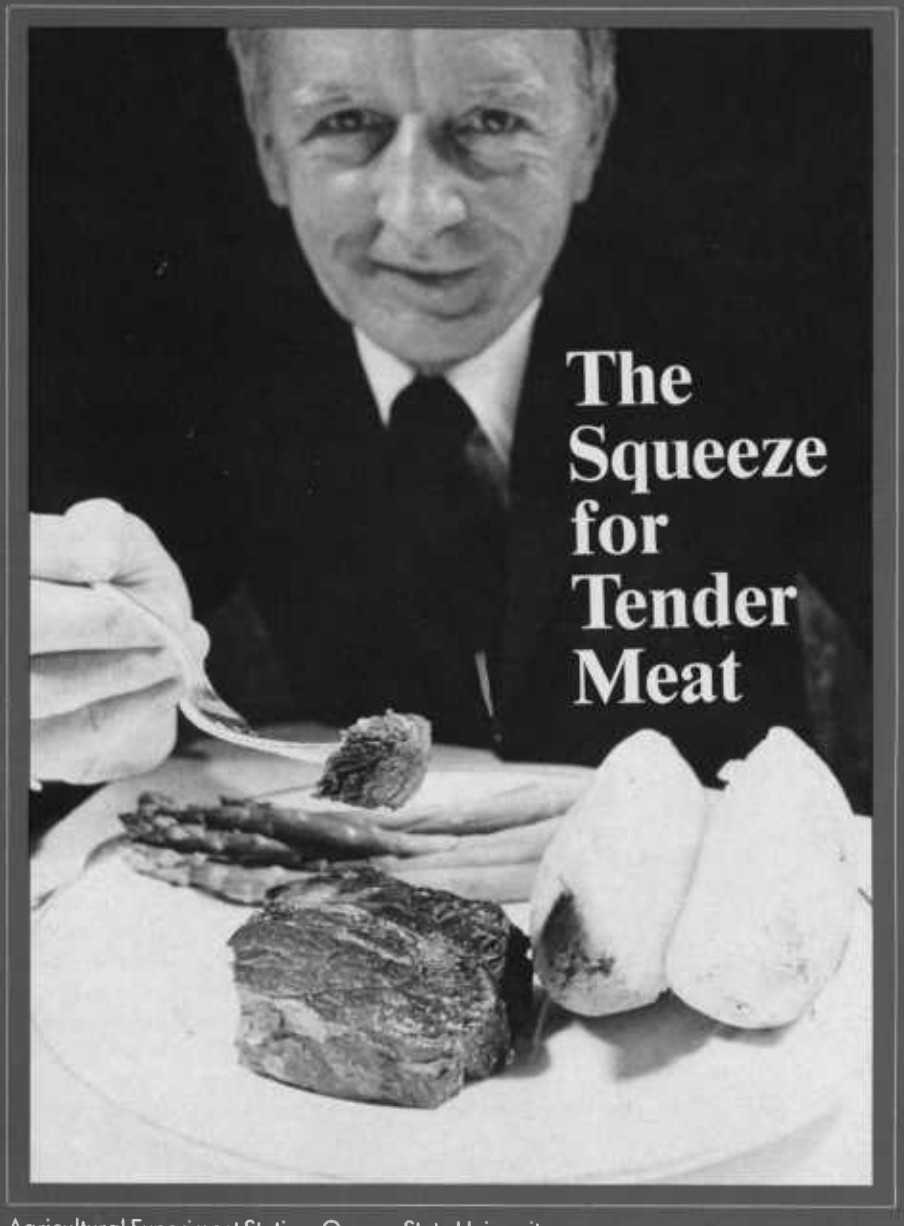
OREGON'S AGRICULTURAL

progress

SPRING 1981

ANNUAL INDEX ISSUE



Agricultural Experiment Station, Oregon State University

comment

John R. Davis
Director, Oregon Agricultural Experiment Station

Ag Conference Days: another great idea

These are times when finding that someone did something new or better is a pleasant surprise, because new ideas seem to be at a premium. The School of Agriculture did something great in March when it planned and sponsored the 1981 Agricultural Conference Days in concert with Oregon's Agri-Business Council and Oregon Women for Agriculture. This not only was an outstanding program, it was the first program held in OSU's Cultural and Conference Center (even before the official dedication of this fine facility).

The Ag Conference Days were significant for several reasons: they honored Oregon's distinguished agriculturalists, outstanding faculty and students; they provided an opportunity for about 20 agricultural organizations in Oregon to meet and to attend the program; and they offered a program of interest and quality dealing with health, food and agricultural chemicals. More significant than anything else, however, was the developing sense that agriculture is indeed the foundation for Oregon's economic strength and that Oregon State University is a major force in sustaining and improving all of agriculture.

Mutual Interest

Agriculture is known for its innovation and independence, for spawning many of our nation's leaders and finest citizens and for its ability to survive somehow through many hard times. We also learned from the conference that agriculture and agriculturalists no longer are independent but are major users and producers of economic goods and are contributors to jobs and social well-being in Oregon. Not only that, but the conference symbolized the mutual interests of agriculture and the togetherness of people involved in agriculture. The conference drew closer together those at OSU, Oregon's State Department of Agriculture, the Agri-Business Council, Women for Agriculture and all the other organizations attending.

A lot happened that week in March: An attempt was made on President Reagan's life; plans were being completed for launching of the space shuttle; people were still talking about the outstanding OSU basketball season; a crisis was building in Poland. But through it all one could sense something special for Oregon agriculture—a new awakening. People were moving to the same beat. The impact of Ag Conference Days, perhaps subtle and unspectacular, is still with us. A new enthusiasm is growing.

Sleeping giant

State Department of Agriculture Director Leonard Kunzman started the momentum with his Agriculture Unity program several years ago. It was a great idea. OSU School of Agriculture Dean Ernest Briskey pumped in adrenaline with Agricultural Conference Days. Another great idea. And thanks to OSU President Robert MacVicar's vision of building the university's new Cultural and Conference Center, there was a fitting place to awaken the sleeping giant, agriculture.

Something good has started, and there is no other way to go now but up—for Oregon and for agriculture.

See you at next year's Conference Days!

OREGON'S AGRICULTURAL
progress

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Cover: Researcher Walt Kennick has begun the second generation of experiments designed to make tough meat tender with water pressure. See Page 8. (Photo: Dave King)

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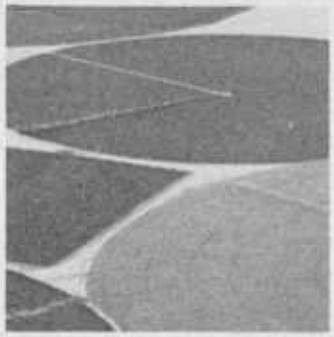

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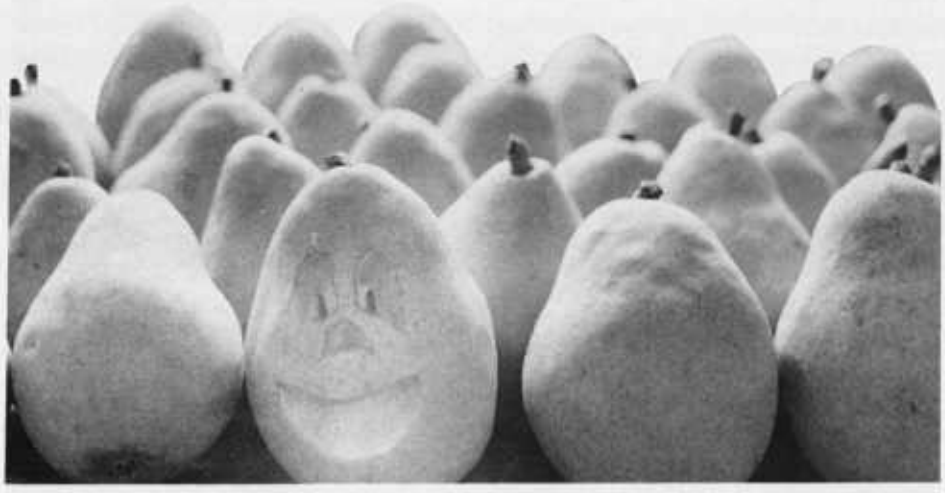
SPRING, 1981

GOOD NEWS about PEARS!



Good news, fruit lovers: An experimental storage technique promises to keep certain types of pears in top condition months longer than the most widely used commercial technique.

"It's important because it means better fruit in the off season and more marketing options for fruit companies," said Walt Mellenthin, superintendent of OSU's Mid-Columbia Agricultural Experiment Station at Hood River.

Mellenthin is evaluating the commercial potential of the technique with fellow horticulturists Paul Chen and Scott Kelly, who also work at the Hood River research station.

The key to the method, called low oxygen storage, is reducing the oxygen level of artificially controlled atmospheres inside special fruit storage rooms from the normal 21 percent in the air we breathe down to about 1 percent, and removing carbon dioxide gas from the rooms instead of adding it, as is commonly done, the scientists explained.

"We've been studying this about four years and it looks like it's going to do the industry some good. We think we can get about nine months' storage with low oxygen (about two months longer than with the carbon dioxide method) and cut down some problems, too," said Mellenthin.

The purpose of storing some pears and apples in rooms kept at low temperatures and filled with various mixtures of gases is to slow down the fruits' metabolism and retard aging and spoilage.

Commonly, controlled atmosphere pear storage rooms contain about 0.8 to 1 percent carbon dioxide and 2 to 2.5 percent oxygen and the remaining gas is primarily nitrogen, the researchers explained.

But with carbon dioxide, some fruit suffers a physiological problem called "brown core," said Paul Chen. Also, he said, fruit stored that way must be coated with a substance called ethoxyquin to prevent surface blemishing called scalding, which generates labor and other costs.

"It means better fruit in the off season."

Researchers are not sure why "brown core" and scalding sometimes appear. But the low oxygen technique seems to prevent both problems, the scientists said. It includes filling storage rooms with about 1 percent oxygen, almost 99 percent nitrogen and an "ambient" or natural level of carbon dioxide (usually about .03 percent).

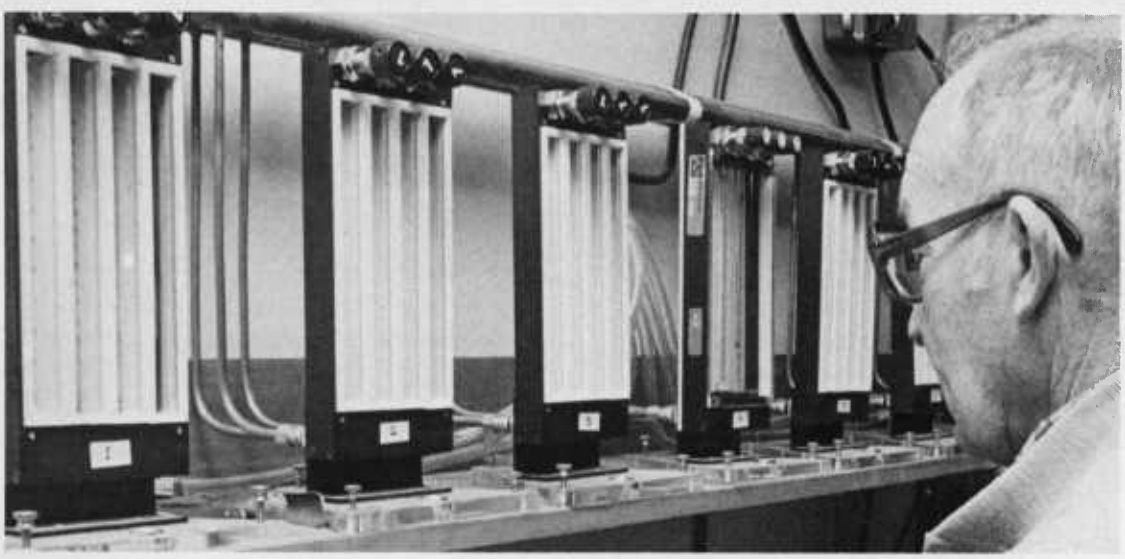
The researchers are experimenting with raising the storage room temperature slightly. If it could be raised above the normal 30 degrees Fahrenheit, fruit companies would be able to cut energy costs, and that might help hold down the cost of fruit stored in such rooms.

Mellenthin said the low oxygen technique has worked best with "d'Anjou" and "Bosc" pears, used primarily as dessert fruits. Exploratory studies show promise for preserving "Red Delicious" apples, popular in grocery store fruit departments, the same way and more apple tests are planned, he added.

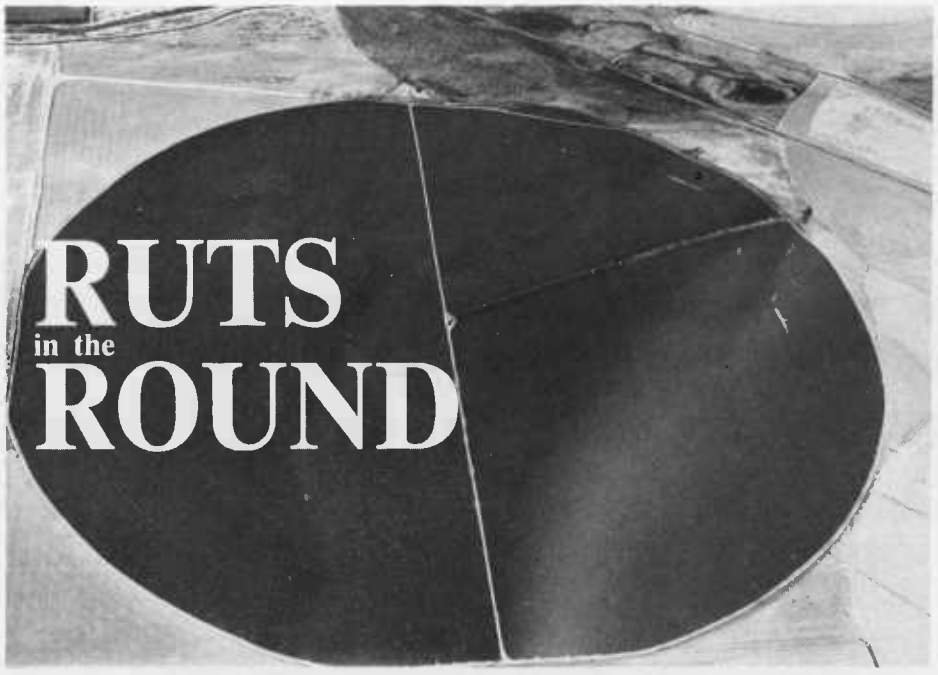
Roughly 30 percent of the pears produced in Oregon are stored in controlled atmosphere rooms, and a few fruit companies in the Hood River area are experimenting with the low oxygen storage technique, the scientist said, explaining that the biggest obstacle to putting the method into use is improving the air-tight qualities of storage rooms.

Mellenthin said he hopes the technique will be ready for wide-scale commercial use in two or three years.

"Our ultimate goal, of course, is to give consumers fresh pears and apples 12 months a year," he said.



Walt Mellenthin (both photos) believes pears can be stored nine months with the new low oxygen technique he and other researchers are testing at OSU's Mid-Columbia Agricultural Experiment Station at Hood River.



RUTS in the ROUND

Circle irrigation, which creates those lush, round agricultural fields Oregonians see when they drive through the Columbia Basin, was introduced little more than a decade ago to send water from the Columbia River through huge pipes on wheels. The pipes turn on a pivot like the sweep on a radar scope, bathing more than 250,000 acres where wheat, potatoes, alfalfa and other crops grow on a rotating basis in what used to be desert.

It sounds great, and it is: a classic example of high-technology, high-yield-per-acre agriculture. But a technology-related problem is developing. OSU and U.S. Department of Agriculture researchers say the arsenal of sophisticated equipment that tills, plants and harvests on the intensively farmed "circles" is packing down the sandy soil, making it more difficult for crops to grow.

"That is worrying us because the equipment is getting bigger," said Vance Pumphrey, an agronomist at OSU's Columbia Basin Agricultural Research Center at Pendleton. "The compaction is going down 15 to 20 inches."

"It's not having much impact on production yet," Pumphrey said. "But the potential is there for reduced yields."

Pumphrey and fellow researchers — Dan Hane, an OSU research assistant at the Pendleton facility, and plant physiologist Betty Klepper and soil scientist Ron Rickman, USDA scientists stationed there also — realized the machinery was causing problems while checking wheat growth. They noticed the healthiest wheat in some circles was in areas where potato diggers, used for harvesting, had loosened the soil.

"Essentially, what we found was that the compaction was restricting root growth and the wheat's overall growth in some areas," Klepper said. "Plants growing over wheel tracks had about one-third the dry weight and one-third the tillers of plants in the loosened areas."

"Plants growing over wheel tracks had about one-third the dry weight."

Generally speaking, Pumphrey explained, soil compaction takes away a "buffer" farmers normally have.

For example, he said, when a wheat plant's roots spread over a wide area and penetrate deeply into the soil they give the plant greater access to moisture and nutrients that can help it overcome errors in tilling, planting, irrigation and fertiliza-

tion a farmer might make, or overcome adverse weather conditions.

Also, he said, farmers need uniform rooting in their fields so plants will respond uniformly to their farming procedures, and compacted soil can reduce the water infiltration rate and the rate at which air, needed for plant growth, is absorbed into the soil.

The compaction in the Columbia Basin circles is underground, Pumphrey noted, and does not help combat erosion, a major problem in the area.

What can farmers do?

Various types of tilling equipment loosen the soil somewhat but usually penetrate no more than 10 to 15 inches, Pumphrey said, explaining that the compaction in the circles is going down much deeper. Crops such as wheat should send roots down 48 inches or more, he said.

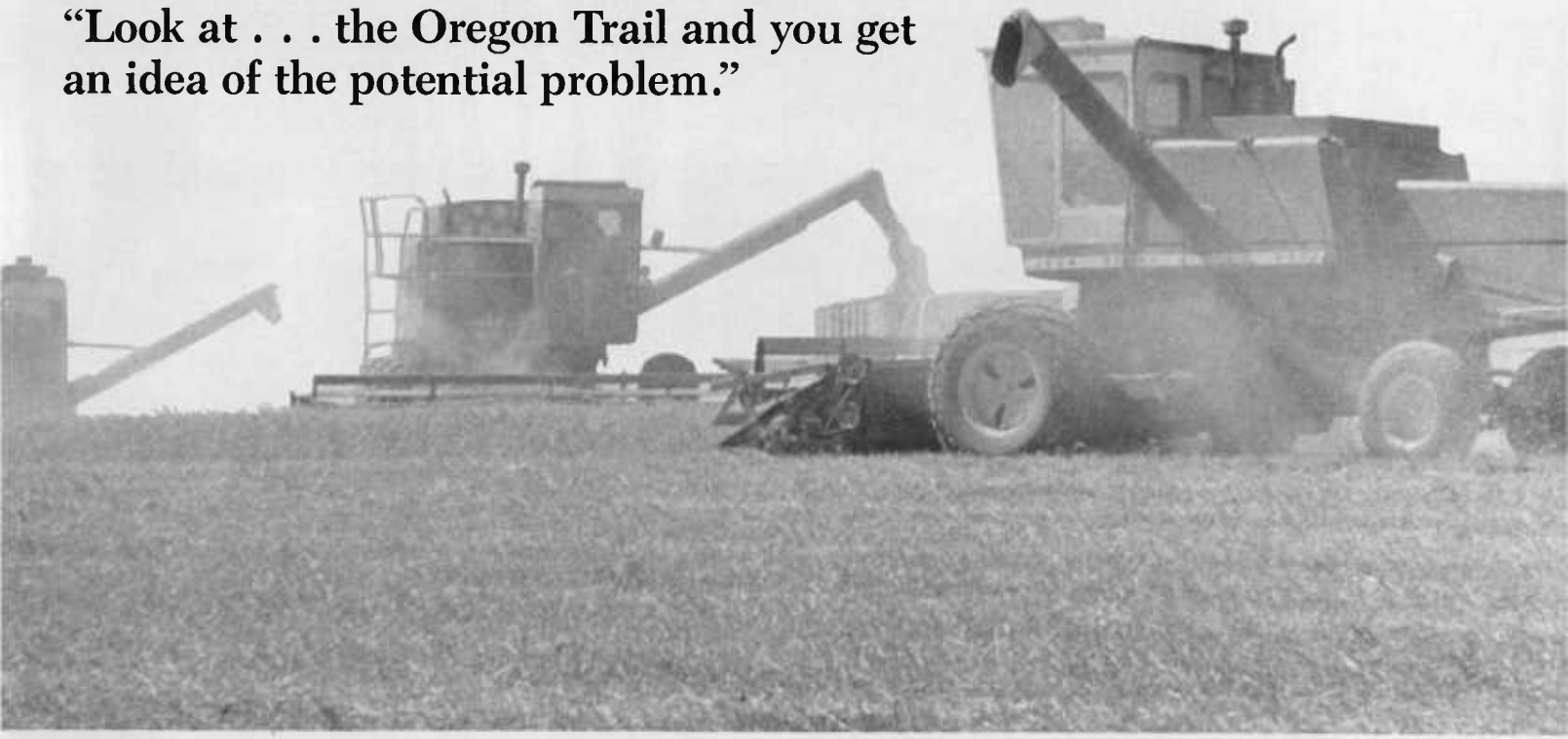
The researcher said subsoiling — loosening soil with a heavy shank that goes deeper than other tilling equipment—is one of the most effective ways of easing the problem. But he said the cost can be prohibitive because it takes more horsepower and heavier equipment to till deeper.

There are other strategies that minimize compaction, he said, although he added that most do not fit into modern agricultural operational patterns. They include: Working the soil when it is as dry as possible; increasing the number and size of vehicle tires and reducing tire pressure; reducing equipment weight; increasing equipment operational speed; reducing field traffic by combining several operations into one; directing wheel traffic to the same path for all operations.

Similar problems have been observed in unirrigated wheat fields in the Columbia Basin. But Pumphrey said the moist, sandy soils of the circles seem most susceptible to being compacted by the tractors, plowing equipment and various harvesters and trucks—some hauling more than 250 tons of potatoes or other crops—that crisscross them season after season.

"Look at the path the wagons followed on the Oregon Trail and you get an idea of the potential problem—how long it takes nature to repair compaction," he said. "The ruts are still there."

"Look at . . . the Oregon Trail and you get an idea of the potential problem."



Combines harvest wheat in the Columbia Basin.

Walt Kennick's idea may help ensure that those who like tender meat get

Walt Kennick

no 'Bum Steers'

There may be people who work under pressure better than Walt Kennick but few accomplish as much *with* it.

The Agricultural Experiment Station researcher has begun the second generation of tests that apply 15,000 pounds of pressure per square inch (the sort automakers use to shape car bodies) to objects such as sirloin steaks. His goal is to make the meat of even the scrawniest range cow as tender as that of well-fed cattle.

So far, so good—and Kennick, head of OSU's Meat Science Laboratory, knows very well how important that capability could be in a period when petroleum prices are driving the cost of producing grains and other feeds sky-high and segments of the public are grumbling over feeding grains to animals while food shortages plague humans in some parts of the world.

The researcher's innovation, a pressure device that uses water to squeeze the toughness out of meat, would help ranchers sell animals raised on forages —abundant in Oregon and other states— humans can't eat.

Kennick stumbled onto the idea on sabbatical leave in Ireland about seven years ago. He read in an academic journal that Australia's national meat research facility had tested meat under intense hydrostatic (water) pressure and it came out more tender. The Australians had passed off the results as a laboratory novelty. Not Kennick.

When he returned to Oregon he teamed with Peter Meyer of the OSU physics

Research assistant Mike Schuman cuts meat for testing in the tenderizing device built by Walt Kennick (looking on), head of OSU's Meat Science Laboratory.

"We've demonstrated that you can get a comparable yield of meat."

department and developed a cylindrical steel cannister that could hold a small cut of meat and water at 15,000 pounds of pressure per square inch.

"Some of the engineers were a little skeptical about the idea at first," said Kennick. But it worked; the pressure tenderized meat.

After a round of publicity, and planning, he and Meyer set out to build a larger device. The result is a cannister that holds about 80 pounds of boneless meat cuts. It works, too, and is being tested with various types of meat in a campus laboratory set-up that resembles a pilot plant operation.

"There are a few problems but it all seems feasible," Kennick said. "We've demonstrated that you get a comparable yield of meat with this thing, although it gives the meat a different shape—thicker, mostly.

"Now we need to answer questions like how consumers will deal with it. Do they need special cooking instructions? It appears they do. We need to test how it works with the meat of young bulls (they produce meat very efficiently), with the meat of old dairy cows that are no longer productive. That sort of thing."

Above all, Kennick needs to know if industry wants the pressurizer. He's had some inquiries, and he has a vision of how the technique might be used commercially. Tough meat could be piled in one end of a long cylinder (50 feet? 100 feet? Who knows?) similar to a cannon barrel. After pressurization, tender meat would tumble out the other end.

The basic laboratory procedures would transfer to such a commercial operation, he believes. In the process, meat is vacuum-wrapped in plastic to keep out air and water and placed in the cannister. The cannister is corked with an aluminum top and placed under a protective harness. Water is pumped in until the pressure reaches 15,000 pounds per square inch and kept there for two minutes.

That's it. When the lid comes off, the meat is contracted to about half its carcass length and noticeably hardened. Most importantly, it is tender.

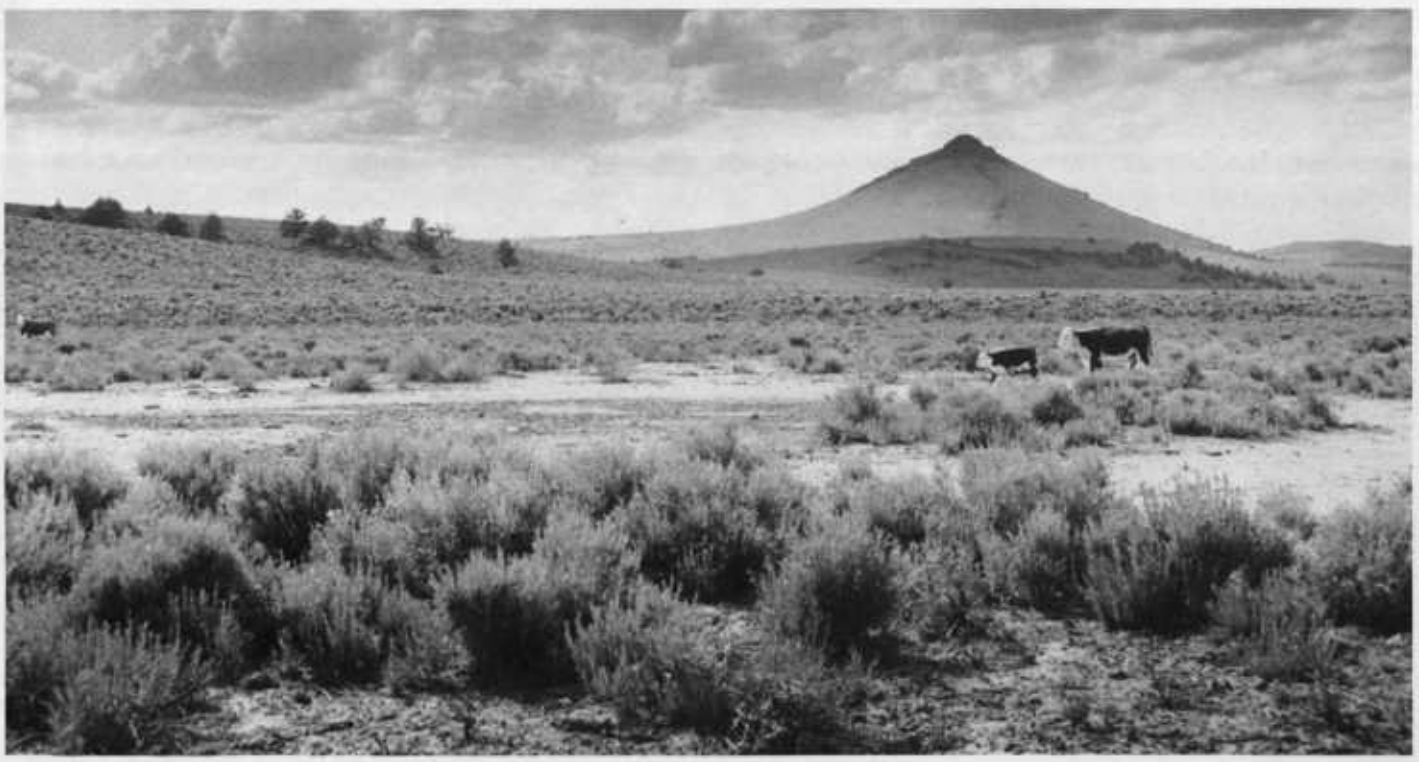
"The energy aspect is very appealing," said Kennick, whose work on the larger prototype was funded partially by the U.S. Department of Energy. "The ability to tenderize meat immediately after slaughter allows us to save substantial amounts of energy along the entire production path from producer right to consumer."

That's a path Kennick has traced many times.

The first energy savings, he pointed out, would occur when cattle in areas such as central and eastern Oregon ate nothing but range forage instead of being fed some grains before slaughter to add weight and increase meat tenderness. Cattle raised in the Midwest might continue to utilize feed grains because of the large-scale corn production there. Cattle in areas such as the Southwest might best be fed primarily alfalfa, which grows very well there.

The next savings would be at the packing plant.

Immediately after slaughter, Kennick



explained, carcasses are hung and chilled to 35 degress Fahrenheit. But only 60 percent of a chilled carcass is edible, he said, and bones and other inedible parts later have to be reheated for rendering. Boning and tenderizing would occur before chilling, in Kennick's system, reducing the material to be chilled by about 40 percent.

There's a potential energy savings in the storage room, too.

"You can store 20 times more meat in boxes after pressurizing than you can by hanging carcasses," said Kennick. "Also, the pressure process seems to eliminate some of the need for aging in the cooler. So, not only are we reducing the space needed for a cooler, but we seem to be reducing the time the meat needs to stay there."

Kennick has analyzed all those steps but, oddly, he still hasn't figured out exactly how the pressure treatment tenderizes. He has two theories.

Pressurized meat is just as flavorful, and perhaps easier to digest.

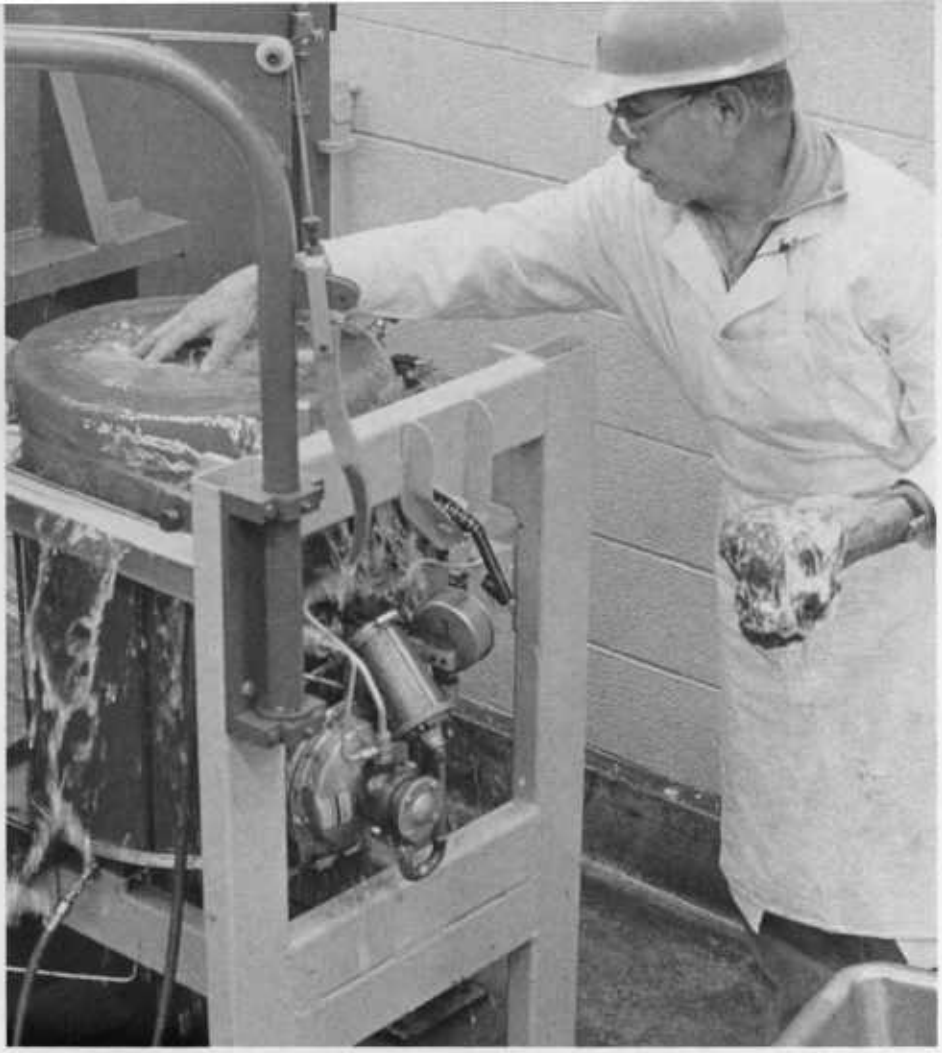
One is that very fine non-elastic connecting material in meat ruptures when the meat contracts in length, causing the meat to expand laterally and become more tender. The other is that a fibrous protein in the meat is altered during pressurization, tenderizing the meat.

Whatever happens, tests performed in OSU's foods and nutrition department suggest the pressurized meat is just as flavorful, and perhaps slightly easier to digest, than nonpressurized meat.

Kennick and graduate student helpers such as Mike Schuman are testing the pressurizer's effects on various types of meat.

Their outlook is guarded, but optimistic.

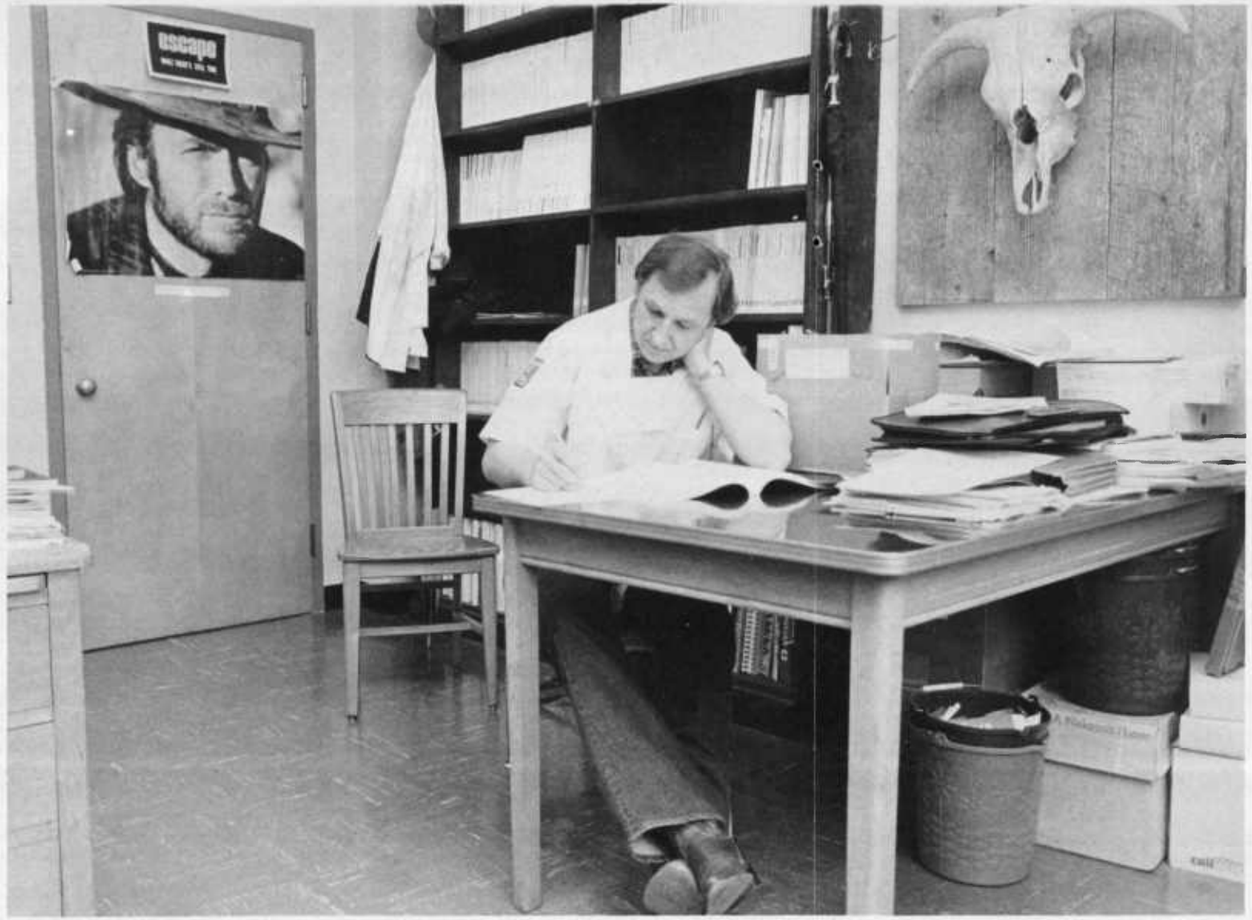
"I've been at this sort of work long enough to know not to make too many promises before all the research is done," said Kennick. But he adds, "Americans are plumb fussy about liking their meat tender, and this may just help them stay that way."



Walt Kennick places meat cuts in the tenderizer he designed (top), then removes a tender roast a few moments later after raising the pressure in the water-filled device to 15,000 pounds per square inch, about the pressure automakers use to stamp out new car bodies.

Test tube cowboy

Fred Stormshak wrangles with problems rooted in livestock molecules.



Fred Stormshak

Fred Stormshak wears cowboy boots and blue jeans to work. But he spends more time looking into the lens of a high-powered microscope than down the shaft of a red-hot branding iron.

What he sees could pay off for Oregon's livestock industry . . . someday.

On the OSU campus, fairly seething with scientists doing practical, applied work, Stormshak stands as a basic researcher preoccupied with the actions of molecules inside the cells of cows, sheep, pigs and other animals.

"The long-term objective, very simply, is to understand the causes of early embryonic mortality," he said. "It's like spontaneous abortion in humans, and about a third of all domestic animal embryos are wasted that way.

"The research has tremendous economic importance—if a cow loses her calf or a ewe her lamb in the embryo stage, that costs the rancher and the consumer," he added. "But it's really tough to talk about practical application. It could take us another 20 years or more to figure it all out and apply the findings to animal science."

Stormshak hopes the lag will be shorter.

Six years ago, he decided to tackle the embryo survival problem with his training as an endocrinologist, a specialist in studying the endocrine glands that produce hormones.

The research has branched into two parts, the scientist explained. Both center on reproductive organs such as the ovaries, where eggs are produced and so-called "steroid" hormones are secreted, and the uterus, where embryos develop. The hormones, such as estrogen and progesterone, help regulate the reproductive system in domestic animals (humans, too).

One of the research goals is to learn how the hormones affect cells in the lining of the uterus of animals.

The other goal is to learn precisely how those same hormones regulate the flow of blood delivering lifegiving nutrients and oxygen to embryos in the uterus.

If this article were going to offer a peek deeper into the research, you'd have to get ready for a discussion about how "receptors" inside the cells of the uterine lining latch onto the reproductive hormones and "translocate" them to the nucleus of the cells where "transcriptional" events make the cells do what the hormones want. You'd have to prepare for complicated descriptions of how estrogen goes about loosening the smooth muscle around the arteries that feed blood to embryos, increasing the blood flow, and about how progesterone tightens the muscles, causing the opposite effect.

Don't worry. This is as deep as it goes. Let's just say Stormshak is starting at "square one," mapping how the hormones function so he and other researchers will be able to recognize malfunctions that might kill embryos.

And even though he, researchers in OSU's pharmacology department and others who have helped him have been working for six years, the embryo research is at an early stage; it is painstakingly slow work, some might say. Is it worth the effort?

"Don't misunderstand. I'm not saying all embryo mortality is related to these hormones," he said. "Many other things may kill them. For example, an animal's genes may dictate the number of offspring that will die. But how can we hope to tilt the balance until we understand how the embryos operate at the basic, cellular level?"

He hopes to help tilt the balance . . . someday.

A House Needs a Foundation

"Really, there aren't too many people you can converse with about endocrinology in domestic animals," says Fred Stormshak, as if suddenly realizing what might seem obvious.

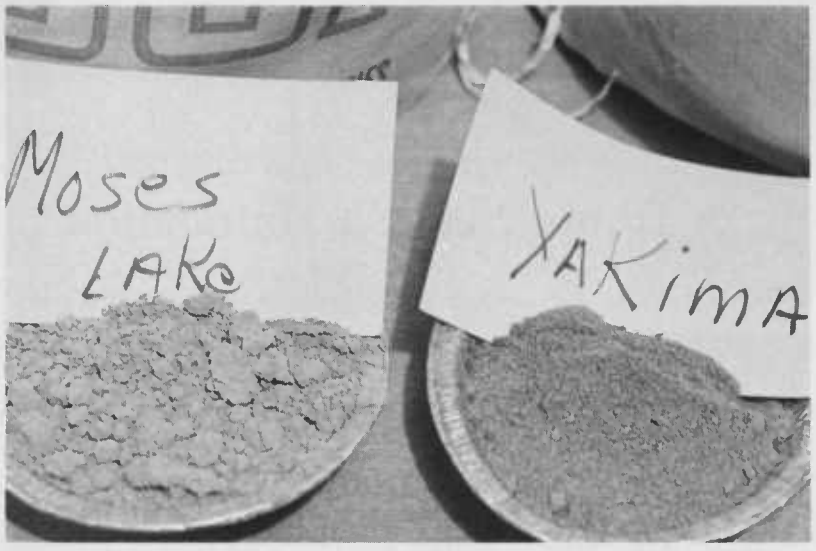
But the OSU researcher, an expert in the study of animals' glands (endocrinology), is well aware of the communications gap that can isolate a scientist doing highly specialized work.

"I've had trouble at times relating my work to people out in the state," he says. "Sometimes they just stare at me when I tell them what I do. But I think most realize the need."

He elaborates: "These compounds and remedies we use in agriculture don't drop out of the sky. They are an outgrowth of important basic research, often where the scientists didn't know exactly where the work was taking them. It has to be that way. You can't build a house without a foundation."

"These compounds and remedies . . . don't drop out of the sky."

research notes



Ash from Mount St. Helens

Landslide study

Chester Youngberg has set out to measure the impact of landslides on timber production in the Cascade Mountains.

The study involves measuring tree growth on landslide areas in the Blue River drainage basin in the Willamette National Forest where more than 250 landslides have been recorded since 1950, said the Agricultural Experiment Station soil scientist. He explained that volcanic soils such as those in the Cascades are unstable and more prone to landslides than some other types of mountain soils.

Data collected in the study will provide a base for estimating the impact of landslides on comparable areas through the Cascades, Youngberg said.

The work is a follow-up to a study conducted three years ago by Youngberg and two other scientists. In that study, volcanic, or pyroclastic, soils were found to be highly susceptible to avalanches and debris flows.

"Erosion is a potential problem anywhere there is steep mountainous terrain," Youngberg said, pointing out that factors besides natural soil instability, such as floods, road construction and damage from logging, contribute to landslides. He noted that many landslides in the Blue River area were the result of a flood in December 1964.

As well as examining the growth of timber-producing Douglas-fir trees, Youngberg and his assistant Donald Miles plan to study the effect of red alder on increasing nitrogen and organic matter in the landslide areas.

The soil scientist hopes the research will result in recommendations for how to hasten revegetation on disturbed timber-producing sites.

Ash and cattle

Since Washington's Mount St. Helens roared to life last year, some have wondered if ash the volcano deposited on range forage could damage the stomach microorganisms that help a cow digest its dinner.

The answer appears to be no.

"Our feeding studies indicate Mount St. Helens ash has no influence on a cow's digestion. Like the scientists have been saying all along, it's chemically inert—just like eating sand," said Martin Vavra, superintendent of the OSU agricultural experiment station at La Grande.

Vavra said the only negative impact forage covered with ash might have on cattle's digestion would be to fill them up more quickly than normal, cutting their intake of beneficial foods.

He added, however, that animals subjected to vast amounts of ash might suffer other physical problems, such as emphysema.

In the study, fluid from the rumens (part of the stomach) of two steers fed about 2 pounds of ash a day was removed and studied in laboratory experiments with nine combinations of forages and grains.

The research was part of a larger study being coordinated by Forrest Sneva, a range scientist with USDA's Science and Education Administration stationed at OSU's Eastern Oregon Agricultural Research Center at Burns. Purpose of the project is to assess the impact of volcanic ash on rangeland and livestock.

For the study, Sneva hauled ash Mount St. Helens deposited at Yakima, Wash., and at Moses Lake, Wash., near the Idaho border, to eastern Oregon. He has covered plots of range forage with ash and observed no significant ill effects, he said.

In another part of the work, OSU range scientist John Buckhouse is using a rainfall simulator device at OSU's Squaw Butte research station nears Burns to find out how various types of ash affect water infiltration on rangeland.

Sneva said parts of the forage and infiltration studies will continue for years.

Drinking water tests flawed

That cool, sparkling water cascading out of public drinking fountains this summer may not be as good as it looks.

OSU researchers who tested the two standard methods used across the United States to monitor the safety of public water supplies say they are seriously flawed.

That means people in some parts of the country probably are drinking public water which is thought to conform to the requirements of the federal Safe Drinking Water Act but does not, the scientists claim.

"These are long-standing, very basic methods of monitoring water quality taught in microbiology courses throughout the world, and we tested them in Oregon and they failed to perform," said Ray Seidler, an Agricultural Experiment Station microbiologist who directed the study.

"Most communities have good water treatment systems and no problems but there are marginal systems in Oregon and other states where the potential for a health hazard exists. Our study suggests operators may not even know if consumers are getting unsafe water," continued Seidler, adding that the two methods detected all the hazard "indicator organisms" in only a fifth of contaminated water samples collected at various sites in western Oregon.

Seidler, along with OSU microbiologist Tom Evans and graduate researchers Mark LeChevallier and Chris Waarvick, reported the findings to the U.S. Environmental Protection Agency, the agency charged with enforcing the country's six-year-old Safe Drinking Water Act.

The two techniques used to monitor disease hazards in public water are the membrane filter and fermentation tube methods.

Both are considered effective by the EPA, which requires that the level of bacterial organisms called coliforms in public water not exceed one coliform per 100 milliliters of water as a monthly average, Seidler said.

Here's how the methods are supposed to work:

With the membrane filter technique, water is passed through a filter to trap coliforms. The organisms then are placed in a dish containing a culture medium or nutritive growing environment, and incubated for 24 hours to allow them to grow into colonies so they can be identified.

With the fermentation tube technique, water is placed in a test tube containing nutrients and incubated for one or two days. The contents then are tested for gases produced by various coliforms.

The chief problem with both methods is that the culture mediums used do not allow some coliforms to grow properly, Evans said.

The OSU researchers say they have developed a "stop-gap" solution by identifying ingredients for culture mediums that help coliforms grow better. They plan to use new knowledge of coliforms to try and devise a more effective way of monitoring the organisms in drinking water, treated sewage water and other public waters.

Seidler noted that coliforms, which are present in the intestines of all warm-blooded animals—including humans—and are transported into surface water in animal feces, normally are not harmful.

Microbiologists have learned, however, that if coliforms are in water, organisms that cause typhoid, diarrhea, hepatitis and other illnesses may be able to survive there too.

New beans, carrots

New beans and carrots are traveling through the researcher-to-farmer-to-consumer pipeline.

Experiment Station horticulturist Jim Baggett, horticulture professor emeritus William Frazier and food scientist George Varseveld have released three green bean varieties and five carrot breeding lines.

The new green bean varieties, of the Blue Lake type, are similar in quality to Oregon 1604, a high-yielding, early maturing variety which has been grown in Oregon since it was released by OSU researchers in 1972.

The new varieties—Oregon 17, 83 and 91—are thought to be better than Oregon 1604 in growth habit, pod smoothness and straightness, and they approach the yielding abilities of Oregon 1604 and seem to taste as good, or better, when canned or frozen, said the researchers.

The new carrot breeding lines—Oregon 4, 5, 6, 14 and 26—are being released as breeding material for other carrot breeders and for development into commercial varieties by seed companies.

"Release of these lines marks the termination of an OSU carrot-breeding program started in 1960," said Baggett. "The objectives of the project were to develop processing carrots with deeper and more uniform color, resistance to cracking and other problems associated with the wet fall season of western Oregon, and some resistance to motley dwarf virus."

research notes

Germplasm storehouse

In the future, plant breeders the world over who want to develop new small fruits, nuts and other crops will visit the Agricultural Experiment Station's Lewis-Brown Farm near Corvallis.

That's because the 40,000 square-foot Northwest Plant Germplasm Repository there, dedicated in April, houses the national germplasm collection for small fruits (strawberries, blackberries, gooseberries and so on) and germplasm collections for pears, filberts, hops and mint.

The $1.8 million repository was constructed by the U.S. Department of Agriculture's Science and Education Administration and is the first of 12 to be built across the country to collect, preserve and distribute the germplasm (genetic material) of major crop plants researchers and farmers produce from other plants using clonal techniques such as grafting, culturing tissue and planting rooted cuttings.

Fruit and nut trees and some other crop plants are cloned rather than grown from seeds to make sure each has the same combination of genes. The repository will house plant species from around the world in greenhouses, screenhouses, and outdoors to make sure germplasm is not lost forever when plant species die off.

Plant breeders and other researchers on the OSU campus will be only about 10 minutes from the collection, said Otto Jahn, a USDA horticulturist who is repository curator.

OSU scientists will provide expertise in how to maintain various crops, according to Wilson Foote, associate director of the Oregon Agricultural Experiment Station and president of the National Plant Germplasm Committee guiding development of the national clonal repository system.

The Agricultural Experiment Station leased the 3.79-acre repository site to USDA for 25 years, with a 25-year renewal option, for $1.

Getting a bang out of manure

When Sacit Bilgili and Mary Pierson blow up a pile of chicken manure, they figure the explosion is going to produce more than a bang.

The OSU poultry researchers say they have refined a technique developed in Canada a few years ago which uses such an explosion as part of a process for assessing the energy value of poultry feeds. The researchers call the process the "true metabolizable energy," or TME, system.

Most poultry growers use a technique called the "apparent metabolizable energy" system to measure the usable energy in feed rations. But the process takes two or three weeks and uses up a relatively large quantity of feed, Bilgili explained.

The TME method takes only 96 hours and is more accurate—important for high-volume, cost-conscious poultry producers, he said.

The process can be done with as few as 10 roosters. It involves not feeding the birds until all food is out of their bodies (usually 24 hours), then giving half a precise quantity of feed and not feeding the other birds.

Droppings from both sets of birds are collected and exploded in a device the researchers light-heartedly call "The Bomb" which allows them to measure the droppings' energy content.

The energy content of the feed being tested is measured using "The Bomb," too, and the researchers use all that data to find out how much feed energy the roosters were able to use.

Bilgili and Pierson said growers need to know the energy value of feed to calculate poultry rations so there is no waste.

The researchers plan to publish an article about the work in an academic journal. Interested persons can get more information by contacting them through OSU's poultry science department.

1980 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 copies of the circulars, bulletins, reports and reprints free.

Following is an index of publications printed in 1980. They are categorized by the departments of the Oregon State University School of Agriculture and the branch experiment stations. Copies of Circulars of Information, Technical Bulletins and Station Bulletins may be obtained by contacting 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 their campus departments or experiment stations. When requesting a publication, refer to the number in the following index.

Circulars of Information

Agricultural and Resource Economics Department
- CI 682, Strawberries in the Northwest: Present Situation and Future Prospects.
- CI 686 Economics of Spraying Big Sagebrush Communities of Eastern Oregon.

Central Oregon Experiment Station—Redmond
- CI 685, Irrigated Spring Wheat: A Production Guide for Central Oregon.
- Columbia Basin Agricultural Research Center—Pendleton
- CI 687, Sandy Soil and Soil Compaction

Crop Science Department
- CI 683, Selectivity and Efficacy of Diuron for Weed Control in Peppermint.

Mid-Columbia Experiment Station—Hood River
- CI 684, Rain Beetle Grub Control in Orchards of the Mid-Columbia, Oregon Area: Summary of 1974-75 Field Fumigation Tests.

Southern Oregon Experiment Station—Medford
- CI 681, Evaporative Cooling As An Oregon Alternative in Frost Protection System of Pears.

Station Bulletins

Crop Science Department
- SB 646, Effect of a Solid Windbreak in a Cattle-Feeding Area.

Eastern Oregon Agriculture Research Center—Burns, Squaw Butte Station
- SB 641, Chromic Oxide in Range Nutrition Studies.

Entomology Department
- SB 643, Filbert Insect and Mite Pests (Sale only).

North Willamette Experiment Station—Aurora
- SB 645, Strawberry Mechanization (Sale only).

Rangeland Resources Program
- SB 642, Taxonomy and Ecology of Sagebrush in Oregon.
- SB 644, Medusahead (*Taeniatherum asperum* Nevski): A Review and Annotated Bibliography.

Special Reports

Agricultural Chemistry Department
- SR 587, Mineral Content of Forages Native to Certain Locations in Oregon: A Summary of Chemical Analyses by the Department of Agricultural Chemistry 1950 through 1979.

Agricultural and Resource Economics Department
- SR 567, Economic Incentives Facing Mexican Migrant Workers at Hood River, Oregon.
- SR 572, Wheat Acreage Response to Changes in Prices and Government Programs in Oregon and Washington.
- SR 576, Alternative Risk Formulations in an Econometric Acreage Response Model for Northwest Wheat.
- SR 580, Costs of Providing Public Campgrounds in Oregon and Idaho.
- SR 589, Basis Data for Forward Pricing Live Beef Cattle in Oregon-Washington.
- SR 590, Basis Data for Forward Pricing Feeder Cattle: Oregon-Washington; Shasta, California; Billings, Montana.

Animal Science Department
- SR 578, Summary of Reports...1980 Sheep and Wool Days.
- SR 583, 1980 Progress Report...Beef Cattle and Range Resources.
- SR 603, Reports of the 22nd Annual Swine Day.

Columbia Basin Agricultural Research Center-Pendleton
- SR 571, 1980 Research Report Columbia Basin Agricultural Research Center.
- SR 595, Monitoring Terrace Control of Water Pollution from Soil Erosion and Sediment in the Columbia Basin Counties of Oregon: October 1978 to April 1979.

Crop Science Department
- SR 577, Results of the Sixth International Winter X Spring Wheat Screening Nursery (1978-1979).
- SR 585, Local Climatological Data for Oregon State University, 1979 With Normals, Means, and Extremes.
- SR 591, Climatological Data for Oregon Agricultural Regions.
- SR 604, Oregon Potato Variety Trials 1979.

Eastern Oregon Agricultural Research Center-Burns, Squaw Butte Station
- SR 574, 1980 Progress Report...Research in Beef Cattle Nutrition and Management.
- SR 586, 1980 Progress Report...Research in Rangeland Management.
- SR 593, Yield and Crude Protein Concentration in Forage Species and Cultivars Adapted to Oregon Improved Meadowlands.
- SR 599, The Squaw Butte Experiment Station: Its Development, Program and Accomplishments 1935-1969.

Eastern Oregon Agricultural Research Center-Union
- SR 582, The Effect of Pre-Calving Energy Level on Cow Performance.
- SR 584, The Effect of Winter Feed Levels on Steer Production.

Horticulture Department
- SR 598, Oregon Tree Fruit and Nut Research Abstracts 1978-1979.

Malheur Experiment Station—Ontario
• SR 592, Crop Research in Oregon's Treasure Valley 1980.

Mid-Columbia Experiment Station—Hood River
• SR 568, Mucor Rot of Apples and Pears.

North Willamette Experiment Station—Aurora
• SR 594, Cancberries: A Summary of Research Progress, 1980.

Soil Science Department
• SR 602, Erosion, Sediment, and Water Quality in the High Winter Rainfall Zone of the Northwestern United States.

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profile

Some might say Jim Oldfield entered his career field in the wrong era but the 59 year-old Agricultural Experiment Station researcher, head of OSU's animal science department, doesn't think so.

"Animals have a long and productive history of service to mankind," he says, predicting they will figure just as importantly in the future.

"I see so many alternatives, so much that can be done to benefit humanity, I do not feel that the animal industries are in jeopardy in this country or in the world and I think the vast majority of people agree with this," he continues, mulling over a question about whether the livestock industry might be out of step in times of shrinking human food resources and expanding debate over what is a healthy diet.

That's not to say Oldfield, who grew up on a small farm on Vancouver Island off the coast of British Columbia and has been at OSU since he came as a doctoral student in animal science in 1949, is unfamiliar with such questions.

First, he says, there are those who ask, " If there's a world food crunch, should we be feeding cereal grains to livestock or shipping the grains to Asia to curb famine?" Second, some wonder if consuming animal products contributes to human health problems.

Oldfield contends both topics are much more complex than they may seem.

Jim Oldfield

"There's no question there are tremendous, and growing, food needs," he says, "and there's no reason why grain supplies could not be diverted for human use at any time. But there must be the where-with-all to pay for it. This is a socio-economic and food distribution problem more than a production issue. Some people don't seem to understand that."

Besides, Oldfield adds, the cost of conventional livestock feeds is rising.

"We're studying all kinds of new protein sources for feed—fish byproducts, feather meal and hair meal, pulp mill wastes and that sort of thing. Beyond these supplementary feeds there is a tremendous amount of untapped forage in many areas like western Oregon," he said, noting that in Oregon most cattle are not fed large amounts of grain and sheep are raised almost entirely on forage.

As for health concerns, he finds it "almost impossible" to deal fairly with the issues in the concise format of news media. But, as a generalization, he believes the concerns are premature and do not weigh properly the benefits of animal products.

"There have been studies that suggest links between animal products, especially fats, and cancer and heart disease," he says. "But there is a great body of evidence supporting the inclusion of animal products in the human diet."

Such studies need to be planned and interpreted with great care to insure they consider other factors which may influence cancer and heart disease, such as exercise (or lack of it), smoking, drinking, work habits and other variables, he says.

Those are some of Oldfield's thoughts about how animals affect humans. As a researcher, however, his chief interest through the years has been how nutrition affects animals. Along with now-retired OSU veterinary researcher Herb Muth, he earned international recognition in the late 1950s by discovering that a deficiency of selenium, a trace element scarce in central Oregon soils, was the cause of white muscle disease, a sort of animal muscular dystrophy that was killing huge numbers of calves and lambs. A diet supplement solved the problem.

It is that sort of research that helps grazing animals such as sheep and cattle convert something humans can't eat (forage) into something they can—and gives rise to Jim Oldfield's optimism about the future of animal science.

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