



OREGON'S AGRICULTURAL PROGRESS

Fall 1986/Winter 1987

**The Rim of Hope:
Markets or Mirage?**

Agricultural Experiment Station • Oregon State University

THE EDITOR'S NOTE

Several thoughts:

First, there's something unusual about this issue. For the first time, the cover is in full color, thanks to the Agricultural Research Foundation, a private, nonprofit corporation.

"We think highly of the magazine and we'd like to do what we can to see that agricultural research gets the attention it deserves," said Wilson Foote, the foundation's executive director, in explaining the reason for the grant that pays for the extra color.

Those of us who work on *Oregon's Agricultural Progress* hope the magazine reports on the work of OSU agricultural scientists in a simple, but interesting, way. We think this opportunity to add color will encourage readership, largely because television has made people accustomed to seeing images in color.

I'd like to tell you a little more about the Agricultural Research Foundation. Its activities probably reach into every home and farm in Oregon. But not everyone knows about it.

The foundation was set up in 1934, while the nation struggled with the Great Depression. The idea was to solicit gifts from private and public sources and use the money to support research activities that would be of direct benefit to Oregon's struggling farmers and ranchers.

For more than 50 years now, the foundation has done that. It works in partnership with the Agricultural Experiment Station by using donated funds in activities such as purchasing modern equipment for researchers and helping young scientists launch projects.

The foundation's 11 current volunteer directors—farmers, ranchers, food processors, bankers and others who give generously of their time—come from almost every part of the state. The organization is headquartered on the OSU campus, in Snell Hall.

...
The Agricultural Experiment Station has a new acting director, Steve Davis. Davis, the head of OSU's animal science department, replaces Bob Witters, who's taken an assignment as head-of-party for an agricultural development project in Egypt. Davis will direct the Experiment Station until the search for a permanent Station director is completed. That's expected to be before the end of the year. Dairy researcher Lloyd Swanson will be acting head of the animal science department until Davis returns.

...
Last, I want to bring to your attention another oddity about this issue. It's the first in about 16 years published away from the watchful eye of one Richard Floyd.

Dick has retired, ending a distinguished career, first as a newspaper reporter, then as Experiment Station editor and associate director of OSU's agricultural communications office. But he won't go away.

Through the years, he put his imprint—a deep regard for clarity, accuracy and honesty in telling Oregon taxpayers about the activities of the Experiment Station—on a lot of scientists and several of us who worked with, and for, him.

I have to confess, he's caught me misspelling words and misplacing commas so often I'm permanently scarred. He'll always be back there, looking over my shoulder. The thought is kind of comforting.

Andy Dunman



Wilson Foote, left, and Lyle Hammack, Agricultural Research Foundation president



Steve Davis



Richard Floyd

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Cover: This gentleman was photographed at the railway station in Hohehut, Inner Mongolia, in the People's Republic of China. See story on Pacific Rim trade, page 10 (photo by Andy Duncan).

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OLDER CONSUMERS

"Most of the time, a chamber of commerce only focuses on factory smokestacks and wage-paying jobs" when trying to bolster the economy, says Bruce Weber. "They should reconsider some of their assumptions."

The OSU agricultural economist is talking about a study he directed that suggests that a rapid rise in the number of older citizens in the Northwest is giving new meaning to the idea that "a penny saved is a penny earned."

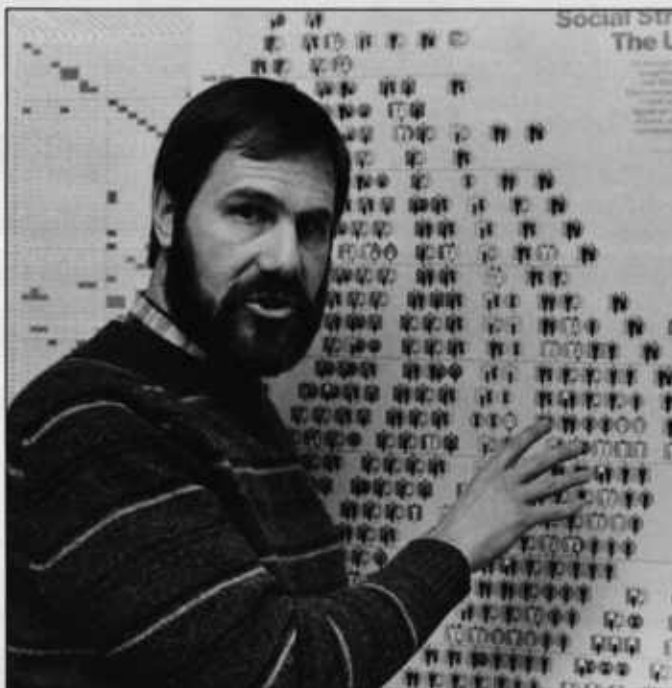
Between 1962 and 1984, with adjustments for inflation, real earned income in the Pacific Northwest went up 95 percent. But during the same period, investment income rose 224 percent, and "transfer income," primarily the retirement programs of adults over 65, increased 313 percent, according to the study. Retirement and investment income now account for one out of every three dollars of personal income in Oregon and Washington, it shows.

"Much attention has been focused on our society moving from a manufacturing base to a service economy," says Bruce Weber. "But I don't think there's near as much awareness of the shift in where income is coming from. Per capita, older adults now have more discretionary, spendable income than any other age group."

The shift suggests that any business product of possible interest to senior citizens will have a measurable advantage, the researcher says. Beyond that, the changing

demographics have implications for taxes, public services and management of public resources.

"Older adults have different demands and interests than a younger population," says Weber. "They now control a great deal of the society's available income, and a city trying to pass a new park budget might be well advised to consider the recreational services desired by this group, perhaps including a dance hall or community theater, as well as children's playgrounds."



Bruce Weber

Although in general older citizens may be more reluctant to approve new taxes "for many things that they never were offered when they were younger," says Weber, they are often strong supporters of public transportation, policy protection and health-related services.

The study documents what areas of Oregon and Washington are receiving the

largest influx of older residents, and where senior citizens form the highest proportion of the population.

"In Oregon, we found by far the greatest growth of older adult population has been in the southwest coast area, particularly Curry County," Weber says. "There's something of a retirement culture in that area, and a reasonably strong level of in-migration from California. Deschutes County was also a strong growth area, as was Washington County near Portland."

In Washington, the fastest growth in older population was on the Olympia Peninsula, the islands of Puget Sound and parts of the Columbia Basin.

Weber did the research through the Western Rural Development Center at OSU in cooperation with researchers Gary Smith and David Willis of Washington State University.

STEER STUDY

Timeliness has its place, including inside a steer.

An OSU researcher's experiment with feeding a chemical compound called Lasalocid to cattle three times a week, instead of daily, didn't produce the anticipated weight gain.

Lasalocid, produced and marketed by a New Jersey firm, is widely used by growers to help cattle gain weight more efficiently, particularly in feed lots.

"What it does is modify the environment of the rumen, selectively killing bacteria and changing the ecology of the digestive system," says Tim DelCurto, the OSU animal science graduate student who conducted the study. "Lasalocid is a low-grade antibiotic that works slowly and effectively, producing as much as a 10 percent increase in average daily gains."

The compound, considered to be inexpensive, also is thought to help speed high quality protein to a cow's true stomach and small intestines, help decrease the occurrence of feedlot bloat, and help cut methane production in the rumen, making the animal more energy efficient.

DelCurto wanted to find out if Lasalocid, fed three times a week, would have the same effect as it does when fed daily. He used 72 crossbred yearling steers in his test.

There were two control groups. One group received ground corn every day and the other group got corn three times weekly. The Lasalocid given the animals was regulated so that the amount consumed on a

weekly basis was the same for the animals in both groups.

The cattle fed Lasalocid three times a week gained no more weight than cattle not given the drug at all.

A white powder mixed in feed grains, Lasalocid has been approved for pasture and feed lot rations. Food and Drug Administration approval for other uses is being sought.

POWERFUL HORMONE

In recent years, agricultural researchers working with valuable crops have been intensely interested in learning more about plant hormones that regulate growth, including groups of hormones called cytokinins.

Now a research team in OSU's horticulture department, led by plant geneticist Machteld Mok, is searching for beneficial ways of using a humanmade compound produced by a West German company as a cotton defoliant. The compound is "10 to 100" times more powerful in promoting plant growth than most natural cytokinins, the OSU scientists have found.

The group is studying thidiazuron. The research centers on the compound's potential for speeding plant tissue culturing. That is the process scientists, and now some agriculturalists, use to produce whole plants that are genetically identical. They do it by placing tiny pieces of plant tissue, often made up of cells known to be disease-free, in laboratory beakers containing nutrients and other growth-promoting substances.



Tissue culture potatoes

DAVE KING

Mok and OSU colleagues first identified thidiazuron's growth regulation properties in the late 1970s. Since then, researchers in several parts of the United States have been studying the compound. Japanese scientists earlier had identified a different humanmade compound that was a powerful growth promoter, Mok notes.

Thidiazuron's chemical structure is quite different from natural plant growth promoters, says Mok. The OSU research team, which includes horticulture professor David Mok and graduate students, hopes to figure out how it promotes plant growth.

FOREST PEST

An infestation of a costly pest, the mountain pine beetle, seems to have just about run its course in the forests of northeastern Oregon and Idaho. But the epidemic is going strong in central Oregon.

"Modern forest management that permits dense tree growth through fire prevention is part of the problem," says Tim Schowalter, an Agricultural Experiment Station entomologist who has looked into the situation, as have several other OSU forest scientists.

"Natural, regular fire cycles help keep down brush, reduce competition and provide nutrients, and can prevent a major infestation," Schowalter says. "But many of our forests are now weak and predisposed to insect and disease damage."

Forests in optimal condition can minimize problems with the beetle through natural defense mechanisms, he adds. Possible solutions to the problem include thinning weak trees, increasing fertilization and using controlled fire, Schowalter says. In the South, controlled burning of pine forests has been a common timber management tool since the 1940s.

The mountain pine beetle is native to the western United States and periodically causes infestations of 5 to ten years' duration. Although large-scale attacks by

several thousand beetles could possibly kill a tree by girdling it, damage normally is done by a fungus the beetles carry. The fungus infects trees and can kill them, also reducing the value of their wood.

According to a recently completed study done by James Funck, a professor of forest products, and research assistant Robert Avery, the pest killed some 93 million board feet of timber in 1977. But in recent years the amount has dropped to less than 1 percent of that amount. Deschutes County near Bend has seen timber losses rise in recent years from four to almost 160 million board feet a year.

The infestation is still rampant in Deschutes, Klamath and Lake counties, the study showed, and will continue at a high level for the next several years.

"Although much of the timber killed by the mountain pine beetle can be salvaged, there is substantial reduction in its value," says Funck. "The products often have a lower grade that reduces their value by one third to one half. The impact in central Oregon may also be greater than it was in the northeast part of the state, because in the northeast a portion of the damaged timber was inaccessible and not really being logged anyway."



The mountain pine beetle

DAVE KING

PERFECTING THE

BY ANDY DUNCAN

This is the fast food era. But don't let the Madison Avenue advertising confuse you about one thing, pickles.

They weren't dreamed up so they could be sliced and inserted into Big Macs and Whoppers. The "art" of making pickles predates recorded history. I can state that concretely because I've been reading about it in "All About Pickling," a brief but fascinating book I checked out of the library (it's by some firm named Ortho Books).

The pickle's roots probably go deep into Chinese culture, "All About Pickling" says, asserting that laborers building the Great Wall had pickle-like food for lunch. It says Cleopatra introduced Julius Caesar to the pickle's charms, and Americus Vesputius, the Spaniard the "new world" was named for, was a pickle dealer. Naturally, it can't ignore Thomas Jefferson's legendary observation that, "On a hot summer day in Virginia, I know of nothing more comforting than a fine spiced pickle brought up troutlike from the depths of that aromatic jar below the stairs in Aunt Sally's cellar."

On and on the book trails the pickle, through the pioneer west and the Civil War to modern times.

I like it because it illustrates a point I want to make in this article—that the pickle appeared in simpler times and has come a long way. Today, researchers at universities and private companies around the world are busy using all the power of modern science to try and improve the high-volume processing techniques of a big bucks pickle industry.

An OSU food scientist named Mike Hudson is involved in that. He may be, as they say, onto something.

"There are basically two types of cucumber pickles," Hudson explains, "fresh pack and fermented pickles. And there are two main reasons for that. One, essentially, is that it's impractical to use all the harvested cucumbers as fresh-pack pickles. It

would be hard to process them all before they spoiled, and then their shelf life is only six to eight months. Even if you could process them, you'd have tremendous production, a big inventory, and then a period of up to six months with no acceptable pickles available to consumers. The second reason there are two types of pickles is that a significant part of the public prefers fermented pickles."

Hudson's work could have economic impact on the processing of the

fermented type of pickle in several ways. A look at Oregon's pickle industry will help you understand them.

In the Willamette Valley, pickling cucumbers are a significant, if not major, crop. They had a \$3.5 million



PICKLE

It's been a favorite through the ages. But Mike Hudson thinks processors can make it for less, and make it better

**"On a hot summer day
in Virginia, I know of
nothing more
comforting."**

farinate value in 1986 and, based on a standard formula, their value after processing was probably about \$10 million (one of the country's major pickle processors is based in Portland).

Like the freshmarket cucumber, the banana-shaped pickling cucumber grows on a vine, hugging the ground until harvest in late June, July and early August. Right after harvest, pickle companies process the ones that are going to be fresh-pack pickles. It involves putting them in a jar with vinegar, salt and, in many case, spices like dill or garlic. The contents are pasteurized to kill germs.

They haul the cucumbers they're going to ferment to "tank farms."

There, they put the cucumbers in

huge, open vats filled with a fermentation brine, which is a mild salt and water solution. Over two to four weeks, microorganisms convert sugars in the cucumbers into a substance called lactic acid that has a distinctive flavor. That is fermentation. It preserves the cucumbers, because lactic acid and spoilage bacteria don't get along. Then the processors put huge amounts of salt in the brine. That keeps the fermented pickles from freezing or softening in the open tanks. They can store them that way for a year, even two, if they want.

But when they do decide to get the pickles ready for the jar, they have to pay for the convenient storage in a couple of ways. One is dumping the brine in the tanks, which by then is extremely salty. They have to dispose of the brine through special waste water treatment systems. Also, the pickles are too salty to eat, and foreign materials can get into the open tanks via birds or other means. So the pickles must be put through a freshwater leaching process called desalting. Besides excess salt, it removes desirable vitamins, acids and color pigment. Some of those items have to be put back in later, in another costly processing step. After that, the pickles are put in jars with vinegar, salt and other things like spices and are ready for the grocery store shelf.

Hudson hopes to help processors streamline the process.



Sh. Letterson

“Desalting is the major waste producer in the pickle industry, both in terms of having to dump the brine in the vats, and in leaching,” he says. “My interest has been in devising a process where you can ferment and store fresh cucumbers in a low-salt brine, and then use that same brine in the finished product.”

Adding calcium is a key to that. He’s shown that you can keep cucumbers in a brine low enough in salt to be acceptable for use in packing, and they won’t soften, if you add calcium to the brine.

Freezing and contamination with foreign materials, the other two obstacles to using the same brine in fermentation and packing, could be overcome by using completely enclosed tanks. North Carolina State University



DAVE KING

Above: OSU food science graduate student Visith Chavasit analyzes enzymes that affect pickle quality. Below: Farzaneh Turk, also a food science graduate student, prepares cucumbers for experimental pickling.



DAVE KING

“Why can’t we use specific microorganisms to produce a bread and butter pickle?”

is developing closed tanks, and a number of large pickle companies are experimenting with the technique.

A recyclable low-salt brine containing calcium can be used in open tanks, too, in areas where freezing isn’t a problem, says Hudson. A few companies are experimenting with that. He notes, however, that pickle makers are having a hard time mentally moving away from their traditional methods.

Hudson has moved his main research focus to other areas.

One is trying to develop an effective way of filtering, or clarifying, brines. “Even with a closed tank system, you’re going to have components in the brine you don’t want,” he says. “An example is dead bacterial cells. Enough grow during fermentation to create a very dense cloud. Most people don’t want a cloudy brine in a pickle product.”

Another part of the research involves living bacteria.

“Now, with the possibility of using low-salt preservation and storage, we can pay more attention to what is actually being produced during fermenta-

tion,” he says. “We need to pay attention to the microorganisms causing the fermentation.”

In simpler times, he explains, most people fermented their own pickles and were accustomed, maybe even addicted, to the taste of lactic acid. Now, most of us eat commercially prepared pickles. Modern fresh-pack pickles come in vinegar. So do modern fermented pickles, because the lactic acid produced during fermentation is removed during leaching.

That’s where the right bacteria can help.

“Some microorganisms produce small quantities of acetic acid (vinegar), and it may be possible to manipulate those organisms so they’ll produce higher levels of that and lower levels of lactic acid,” says Hudson.

He has other ideas for putting fermentation bacteria to work.

“The first step is to utilize existing strains of bacteria that haven’t been used in cucumber fermentation,” he says. “Traditionally, the only concern of the pickle industry has been that enough acid was produced to effectively preserve the pickles. No thought was given to the flavors produced by the bacteria.

“The question we would like to answer is, can the pickle industry make similar use of various bacteria as does the dairy industry? For example, why

can’t we use specific microorganisms to produce a bread and butter pickle that has a buttery flavor? Or, why can’t we produce a pickle that has a good cheezy flavor? And if we can, will the consumer like the product enough to open up new markets?”

North Carolina State University is looking at the possibility of genetically altering fermentation bacteria to produce desirable strains. That is a long-range possibility, says Hudson. But using genetically altered bacteria in a food product might require special government clearance, he adds.

A sideline in the OSU effort involves simply trying to analyze what lactic acid tastes like.

“Cheese has lactic acid. But fermented pickles don’t taste like cheese,” says Hudson. “Earthy? No, mushrooms taste earthy, and pickles don’t taste like mushrooms. I’d have to say I don’t know what lactic acid tastes like.”

I understand his situation. I feel frustrated that this article, with all its details about pickle making, hasn’t answered the question of who fermented the first cucumber, and why (back in the days before massive harvests and year-round marketing created the need). Historians and food scientists like Hudson assume, quite reasonably, that it was someone interested in preserving food, and they leave it at that.

But reading the juicy historical tidbits in “All About Pickling,” the book I mentioned earlier, started me stewing. I believe someone has to try and tackle—concretely—this question of who invented the pickle. Here’s my guess:

Long, long ago, tens of thousands of years before they started building the Great Wall of China, a humanlike cave dweller, I imagine it was an industrious Neanderthal, was gathering wild cucumbers near the beach and dropped one in salt water, in a well-enclosed tidepool, without noticing it. Instead of decaying disgustingly, the cucumber began to ferment. A couple of weeks later, the Neanderthal happened by again, discovered and sampled the first pickle, then rushed off to try and invent the delicatessen.

Who’s going to prove me wrong?



OSU food scientist Mike Hudson examines freshly packed cucumbers.

THE RIM OF HOPE: MARKETS OR MIRAGE?

Farmers. People who sell fertilizer. Equipment suppliers. Other merchants. Teachers. City officials. Carpenters. Gas station employees. Just about everybody who lives in the areas of the state with economies driven mainly by agriculture. Those are the Oregonians who have been hurt most the last few years by sluggish domestic and foreign agricultural sales and generally low crop prices, although, certainly, the state as a whole has suffered economically because of it. And those are the folks with the most reason to want to view international agricultural trade, particularly on the much-talked about Pacific Rim, as a beacon lighting a path that will take Oregon agriculture back to the best of times.

Is it?

"The Pacific Rim is not a bottomless pit for our agricultural products, and there are a lot of dangers like protectionist legislation out there right now," says Mike Martin, an OSU agricultural economist who is studying the market potential of that and other overseas areas.

But, he goes on to say, the Pacific Rim is a land of ever-shifting opportunity for Oregon agriculture.

To take advantage of them, he says, there will need to be many changes in Oregon's agricultural production and marketing systems, including paying closer attention to differing cultures to earn countries' respect and anticipate their needs. Also it will take a "team mentality" in short- and long-range planning by farmers, government agricultural workers, university research and extension personnel, and the shippers, bankers, salespeople and many others with a direct interest in export sales.

Those ideas are nothing new, and Martin knows it. He notes that farmers

and others, such as representatives of commodity marketing organizations and the Oregon Department of Agriculture's Division of Agricultural Development, have put lots of effort into figuring out where the opportunities are on the Pacific Rim and how to take advantage of them. They've had their successes, too.

But there is a new administration in state government in Salem. And Martin believes there is a new enthusiasm statewide for finding creative ways to sell Oregon's agricultural goods overseas.

The words Pacific Rim conjure up images of Asia.

"The wheat industry people," he says, mentioning an industry ravaged by low prices, surpluses and a dropoff from the booming export sales of the 1970s, "are ready for change, ready to do whatever it takes to get things rolling again."

Before looking at what it will take, let's make sure one thing is clear: what Pacific Rim refers to. It's one of those terms you find in newspapers, but not on maps.

The populated areas in—or on the rim of—the Pacific Ocean include Australia, New Zealand and the many countries on the west coast of North, Central and South America. But to a lot of Oregonians involved with agriculture, the words Pacific Rim conjure up images of Asia. It's understandable. The majority of Oregon agricultural exports on the Pacific Rim in recent years have gone to Japan, Korea, Taiwan, China and other Asian countries. In fact, nonAsian countries like Australia, Canada and

Argentina are major competitors of Oregon's in Pacific Rim agricultural trading.

Overseas sales and marketing opportunities certainly aren't limited to Pacific Rim countries. Areas such as the Mid-East, subSaharan Africa and Europe are very important. A big lure of the Pacific Rim is the expense of doing business there. It costs less to ship agricultural goods from Oregon to Pacific Rim countries than from states or countries not on the Pacific Ocean. That helps Oregon farmers, marketers and shippers compete for sales.

Many Oregonians have come to regard Pacific Rim countries as Oregon's "home turf" for trade. Martin isn't the only one who cautions that that sort of thinking is dangerous, just like the notion that Pacific Rim trade will solve all Oregon agriculture's economic problems.

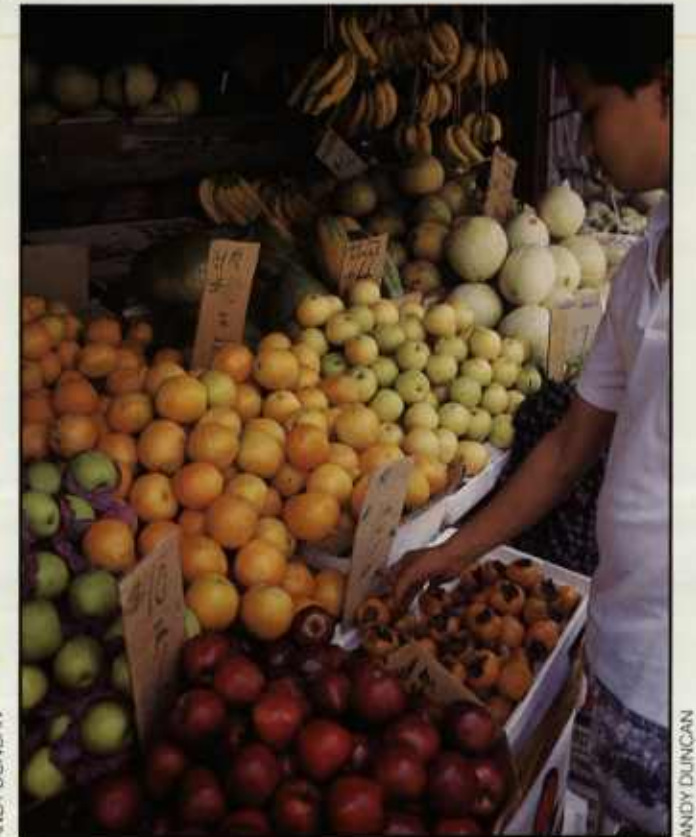
"We never are doing enough on any front. I think the Pacific Rim countries may have more marketing potential," says Bob Buchanan, a former farmer who is the new director of the Oregon Department of Agriculture. "But we shouldn't look upon it as a great big gold mine. I fear some of us may be looking at it like we did at China when it first opened up."

"I think the perception of the Pacific Rim as the great market basket for Oregon products—we are the supplier and therefore you come to us and we will provide—is misleading," says Bruce Andrews, former deputy vice president of the Oregon Wheat Growers League, who works with Buchanan as deputy director of the agriculture department. "Yes, there is promise there. But only for products those countries' markets demand."

A Chinese boy poses with bread from a Beijing bakery.

DAVE KING





Basically, it's wrong to look at the Pacific Rim as a market, says Andrews.

"You have to look at it as many," he says. "It is a full ecological market zone, with countries ranging from industrialized to just emerging. If Oregon is going to continue to be successful, we're going to have to approach each one differently."

Martin, Buchanan, Andrews and others who have studied the situation say the Oregon Department of Agriculture has established a solid base for trade development in the Pacific Rim area, particularly Asia, with fact-finding trips, trade shows that tout Oregon crops, and other efforts.

Now those efforts need to be

integrated with other activities not only in Oregon but throughout the Northwest, Martin believes, to eliminate wasted effort in Oregon, Washington, Idaho and Montana.

"I think the growers and everyone else see now that we need a team effort where the whole becomes bigger than the sum of the parts," he says. "I know a number of us here at OSU are anxious to see how we can adjust the research agenda."

The result will be a lot more collaboration on campus and off, he predicts.

"There are researchers all over this campus in agricultural economics and crop science and food science and

business and engineering and liberal arts and so on—a number of departments and schools and colleges—with valuable expertise," he says. "It's not going to be a one- or two- or three-person show. And there are people like that at Portland State University and the University of Oregon, too. We need to work with each other in setting the research agenda. And we have to integrate that carefully with the activities Department of Agriculture and the commodity groups and marketing organizations."

Bob Buchanan also talks about a team approach.

"We're looking at university pro-

grams that can be brought up to speed to interrelate cultural studies and marketing," he says. "The very first step is identifying and coordinating the business people in Oregon who have like orientations. Agriculture needs to develop linkages with other businesses that already have made inroads in countries we're interested in."

"The Japanese did not capture 25 percent of our auto market by building cars blindly."

Those people will have made the personal contacts necessary to know who makes important purchasing decisions and how they do it, and they can pass that information to Oregonians interested in agricultural trade, Buchanan says.

"But that's going to take a lot of subtle communication," he adds. "It's going to take a lot of trust among people from private industry with propriety interests."

Ultimately, he says, the state as a whole will be able to deliver a broader range of goods, adding flexibility in trading with a country. That will expand the trade opportunities for all.

The historic Great Wall that slices across northern China, left, is a stark contrast to the high-finance highrises of Hong Kong, top. Above, a Hong Kong vendor looks over his produce.

Martin puts it another way. "There's a lot to be learned from the Japanese style," he says. "Some Japanese exporters sell everything from bicycle parts to corn syrup. Maybe we can't sell computer chips and apples on the same boat, at least not at first." But it would be a good thing to do, he argues.

"You've got to be able to generate some economies of scale in shipping,"

he says. "You've got to be able to command enough containers going into Hong Kong to give you a discount. But let's say you haven't got enough apples. So what do you do? You look around for complimentary products. They don't necessarily need to be agricultural products."

"We think our grass seed industry here is huge, and it is in a few counties. But nationwide the grass seed industry is tiny. If the grass seed shippers could somehow find a way to cooperate in transportation and marketing with apple growers, prune growers and the wine industry, for instance, they could probably accomplish more than any one of them alone. The United States is not good at that. We've developed a system that says everybody has to compete. If we start to say to ourselves, how could we, as a group or unit, compete internationally, then you get coordination. We have to accept that."

Market intelligence is a popular phrase these days. Apparently, the Japanese know something about that, too.

"It is not industrial espionage," says the state agriculture department's Andrews. "It is simply looking from an educated view and seeing what other people like—knowing your customer and what he wants. The Japanese did not capture 25 percent of our auto market by building cars blindly and sending them over."

"I think Ken Meier (of the agriculture department's trade development division) has been able to show that if you can develop a product to a country's specifications, you can sell it," adds Andrews. He mentions sales of high-quality cherries and similar products in Oriental markets as examples.

OSU and other universities can help in the gathering of market intelligence in several ways, Buchanan believes. They include professors doing campus-based studies of consumption and other trends in specific countries, and faculty members sharing a broad range of information collected in the varied overseas projects they work on.

For example, he says, once they "get the flavor of a culture," they could return to their universities to fine-tune what they learned, then share their insights with farmers and other Oregon



Understanding among future generations could be a key to increased trade.

business people, perhaps in short training courses.

Some complain that U.S. universities' participation in agricultural development projects overseas spawned by humanitarian or national defense concerns have had negative impact at home, helping foreign countries learn to compete with U.S. farmers.

"I don't have a real hard, pat answer on that," says Buchanan. "In some cases, we may have given away too much too quick. It does have its paybacks, though." Those include helping underdeveloped countries reach a point where they can afford to consume U.S. goods, and in bringing back to Oregon material helpful to Oregon farmers. Wheat varieties OSU crop scientist Warren Kronstad developed with germplasm obtained in an international breeding program are "classic examples of that," says Buchanan.

Martin's thoughts:

"Beggars make bad customers," he says. "You can put forth some criticisms based on the short term. But, ignoring for a moment the humanitarian aspects of all this, I believe assistance to agriculture and other sectors of developing economies is absolutely essential for the long-term interests of Oregon's economy. If we don't continue to see real economic growth in the developing world, we aren't going to sell to those people."

"The up-and-coming potential markets are in Indonesia, The Philippines, Malaysia, Burma, Thailand, Cambodia, in the Middle East, Afghanistan, Pakistan and subSaharan Africa," he continues. "Those countries can only achieve economic development by first developing their agriculture."

But what about the risk of erasing potential markets for U.S. farmers?

"Clearly, the United States has provided some important technology to developing countries," says Martin. "But, in truth, this technology was available from a wide variety of sources other than the United States." Those sources include competitor countries anxious to befriend potential customers, he contends.

"Protectionism in the short run has great appeal," he says. "Let's export our unemployment, if times get tough, with protectionist legislation. Let's not give away our strengths. But that's short-sighted. Look at history. The British tried to hang onto the textiles industry, and they had a much better grasp on it than we do on agricultural technology. Still, it leaked."



A vendor transports his wares, Chinese style.

"It doesn't take much to look back and find some very good anecdotes on how development has paid off for farmers in Oregon and elsewhere. South Korea is a prime example. During the 1950s and 1960s, South Korea received more U.S. development assistance than any other country. We gave them tons of free grain and all sorts of technology. Korea now is the second most important customer for Oregon farmers in the world, after Japan, another country we've provided tremendous development assistance to since World War II.

"Korea has been able to elevate its per-capita income from about \$600 a year to about \$2,400 a year. They may buy less white wheat in the future as their own rice and wheat production rises. But they'll buy more feed grains because they'll eat more red meat. And they'll buy more spuds because they'll eat more French fries."

Martin's current research is shaping his thoughts on what's going to limit or open up overseas markets for Oregon. It includes a study of how programs that promote specific crops affect the total agricultural sales volume. For example, if a promotion increases Oregon wheat sales in Japan, how will that affect the state's overall share of the agricultural sales market there?

"We have to realize there's another world out there."

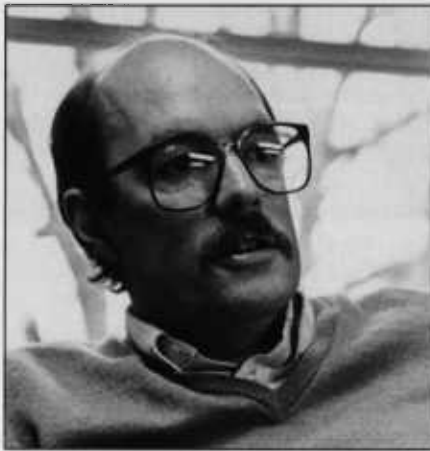
For several years, he's been studying how the import system in the developing world matches the export system in states like Oregon. "I believe 85 percent of the Third World ports can't handle the ships that come from Portland," he says.

A possible remedy that's been mentioned in brainstorming sessions is building "staging systems" overseas. That is, arranging for large-volume shipments leaving the Northwest to funnel into central distribution points overseas where shipments could be tailored to small-volume receiving facilities in developing countries.

In another study, Martin is analyzing the potential for selling hard red wheat grown in the Northwest to countries in Asia and elsewhere. Most wheat grown here is the soft white type, good for making pastry and noodles. Hard red wheat is used to

make bread, an item that seems to be consumed more in Third World countries as the standard of living goes up. A research team led by OSU wheat breeder Warren Kronstad is developing hard red wheat varieties that will grow well in Oregon.

Hard red wheat has potential on the Pacific Rim, Martin acknowledges, because of Oregon's strategic position. And in the future demand for hard red wheat probably will be more stable than demand for soft white, he says. But there are many competitors for hard red wheat markets, he notes.



"Holistic" marketing will help Oregon, contends OSU's Mike Martin.

In Oregon's immediate future—the next year or so—there will be a few bright trading spots on the Pacific Rim and in other overseas areas, Martin predicts, like expected increases in the sale of canned and frozen vegetables in Asia. But the overall outlook for agricultural export sales in 1987 is bleak.

For example, the state exports about 70 percent of its wheat. An upward swing in rice production in Asia and elsewhere is expected to keep wheat prices down, although, oddly, the total sales volume of wheat sales may rise slightly because of the bargain prices. Also keeping wheat prices down will be a year's supply of wheat growers have in storage, not yet sold.

The long term, say the next five years: What are the prospects for Oregon agriculture in trade on the Pacific Rim and in other overseas areas?

"The developed countries in Asia have probably peaked for white wheat," says Martin. "But they're going to be eating more meat, so anything that ties into that is im-

portant—producing feed grains for export, for example. I think we'll see more potential for selling high-value crops. The French fry market is just taking off. Processed vegetables. Oil seeds.

"We have to recognize there's another world out there besides what is traditionally thought of as the Pacific Rim—areas just beginning to develop like Indonesia, The Phillipines and some of the Latin American countries. And there's the Mid-East and Africa. The Northwest has to have more say in national policy decisions. We have to press hard for greater use of PL 480 (a special subsidy status for shipping goods to needy countries) to get rid of our grain carryover stocks. We have to make a serious effort at trade liberalization. I understand people in other parts of the country are hurting, but our being protectionists on textiles and cars, and subsidizing the export sale of commodities like cotton, sugar and rice, can only hurt Pacific Rim agricultural trade."

Through several very hard years, Oregon's agricultural industry has shown once again that it is an immovable part of the state's economic bedrock. But, certainly, some cracks have appeared. Martin's frank appraisal of how much export trade on the Pacific Rim, and agricultural export trade in general, can be expected to do to return Oregon agriculture to solid ground?

First he notes that export sales make up only about 20 percent of Oregon's total agricultural sales, and that the United States is still the world's biggest market. To him, that means that, while important, export sales alone cannot "pull the ship out of a tailspin." Second, he says that, in his opinion, the booming agricultural export days of the 1970s were an exceptional period, not the norm many seem to judge the present against.

Then the researcher looks at the bright side.

The new "holistic" approach to farming and marketing is going to help Oregon agriculture compete flexibly and successfully wherever there is opportunity, he says. "We are becoming full-fledged citizens of the world," he says, "and that can only help."

—Andy Duncan

A WAR AGAINST WOBBLING

BY DAVID STAUTH

The horse's legs began to buckle as the anesthesia took effect. Four adults struggled to push the large, bleary-eyed mare against an operating table, which then swiveled from a vertical into a horizontal position.

The process didn't look easy.

In fact, some horses tend to get a little antsy and violent during this procedure, so the humans within kicking distance keep a watchful eye. After this particular horse was anesthetized, the operation was fairly quick and routine. It involved a moderate incision above and behind the knee of one front leg. That revealed an irritating bone spur, or protruding lump of cartilage. Like a custom-carpenter working on fine cabinetry, the surgeon chipped the spur off with a small hammer and chisel. And that was that.

Ray Downs, 43, of Tillamook, frowned thoughtfully as he watched the procedure in the operating room through a little window.

On the table was his \$2,000, eight-year-old Morgan horse, Starbright Love, which Downs hoped to breed to a good stallion and raise more show horses. It wasn't the first animal operation he'd ever seen, but this was a family favorite on the table.

"I've got two kids, ages 13 and 16, and they just love this horse. They like to go camping and packing with her," said Downs, a health, P.E. and global studies teacher at Neahkahn High School, who grew up surrounded by horses on a Midwest dairy farm.

"They're very attached to her. When she came up lame, we had to do what was needed. In that sense, we don't really look at it as an economic situation, even though she's not worth much as long as we have this problem."

A Morgan, Downs explained, is a type of purebred horse known for versatility, including riding, driving and working. They even compete in horse shows that way, using English saddles, Western saddles and pulling a "stone boat" for distance to show their strength.

Like most well-bred horses, they're sleek, fast-growing and heavily muscled—powerful animals with a high-priced pedigree, a noble bearing and an ancestry that can be traced further than most humans'. Some run fast. All cut a fine figure in show competition. They're just plain handsome.

But these horses have an Achilles' heel, a disease problem that may be linked to the same characteristics that make them big, fast and handsome. It can cripple horses, endanger trainers and, in the worst cases, necessitate the animal's destruction. It's called osteochondrosis, and its incidence is apparently increasing.

One report from Ohio State University, which has not been verified in other research, indicated a 2,000

percent increase of the disease in the past decade.

The disease is most prevalent in thoroughbreds, affecting up to 2 percent of the world's most valuable horses. There are many types of osteochondrosis. Some affect the joints, causing lameness. Others affect the spinal column, causing a disease called "wobbling," which refers to uncoordinated muscle control caused by a malformed vertebrae in the horse's neck. This makes the animal unstable and, in severe cases, prone to falling.

It involves fusing a vertebrae in a horse's neck to relieve pressure.

At OSU, a group of veterinary researchers is tackling this chronic problem from several angles. They've pioneered the first successful surgery to relieve the symptoms, and now are moving from symptomatic relief to a comprehensive understanding of the disease.

"This work is very exciting, because we're moving towards at least a way to prevent this disease," said Pamela Wagner, an associate professor of veterinary medicine. "We have some good theories, and if they can be substantiated, it will be very significant. Osteochondrosis is a serious problem for thoroughbred horses, and I feel its incidence is rising."



Veterinary researcher Nan Rice points out a bone spur on an x-ray of Starbright Love's knee.

DAVE STAUTH

Interest in osteochondrosis at OSU began with an interest in "wobblers." In past research, Wagner helped develop an operation that can relieve wobbling symptoms. It involves fusing a vertebrae in a horse's neck to relieve pressure on the spinal cord. But that surgery did not address the root causes of the disease, which Wagner believes can be traced to developmental bone problems. These bone deformities, or OCD lesions, occur during the growth process, as cartilage changes to improperly shaped bone. If this happens in a leg or ankle joint, Wagner said, it can cause arthritis. In the spinal column, it can cause wobbling.

For the owners of \$500,000 animals, it can cause nightmares.

Ray Downs' horse, Starbright Love, had an osteochondroma near the knee—another type of osteochondrosis. Wagner believes the Pacific Northwest may have a higher-than-normal incidence of this problem. In that case, fortunately, it wasn't a \$500,000 problem, but it was still serious for a family that loves its animals.

"The whole concept of thoroughbred horses is a species that grows large and fast," Wagner said. "These horses also often eat a very rich diet. We're reasonably sure that some of these same characteristics are linked to the development of OCD lesions."

That means nutrition may be the key preventing the disease, if not curing it.

"It appears," Wagner said, "that a deficiency of one enzyme naturally produced by the body, lysyl oxidase, may be relevant. This enzyme helps to make collagen, critical to the proper formation of bones, ligaments and tendons. Lysyl oxidase, in turn, cannot be properly formed without adequate copper in the diet. So we may be seeing a problem that is partly related to a genetic predisposition, partly an unbalanced diet, partly a deficiency of enzymes."

Other principal OSU veterinary investigators in the study include assistant professor Brad Smith, associate professor Morrie Craig and associate professor John Maas. They agree with Wagner that the cause of the problem may be multilayered.

"Solving this disease problem will be an ongoing process, and it will take more time and a lot of work," Craig said. "But just being able to focus on

"We may find diet is not the only variable involved."

specific aspect of a long-term problem is a big step forward. As we focus on that part, we may find diet is not the only variable involved. Mother Nature can throw some curves."

According to Craig, diet and enzyme deficiencies may be a large part of the problem, but not the only part. If the disease is definitively linked to an enzyme deficiency, such as inadequate lysyl oxidase, it may be possible to increase the body's natural production of that enzyme with drugs or dietary changes. A simple supplementation with the enzyme would probably be broken down by the digestive processes in the stomach and rendered ineffective, he said.



Researchers anesthetize Starbright Love before surgery.

In other recent work, Craig and colleagues are studying if a deficiency of vitamin E or selenium, a trace element, is related to nervous system degeneration in horses, which is one cause of wobbling. Doctors successfully treated a very similar disease in human children with large doses of vitamin E.

Maas, who is working on new dietary approaches to preventing OCD lesions, agrees that wobbling will resist any simple solution.

"If these lesions were caused by a simple dietary deficiency, they might not be such a problem to understand or prevent," he said. "But they may well be related to a combination of dietary factors, or an inability to utilize certain nutrients."

One reason OSU is moving along rapidly with its research is a special "breeding colony" of horses predisposed to OCD problems. Researchers breed wobbling mares to a wobbling stallion. So far, there are no wobbler offspring, but about 50 percent of the offspring have OCD lesions, compared to a normal incidence of less than 2 percent. With a group of animals like this to work with, theories can be readily tested and verified or disproven.

For the time being, Maas said, feed animals a balanced diet is the best advice researchers can offer horse owners concerned about possible OCD problems. Blood tests could identify possible dietary deficiencies so mineral supplements can be given. Until the disease is more fully understood, he added, he would not recommend giving dietary supplements that exceed an animal's normal dietary requirements. Copper supplementation in high doses must be done very carefully, he cautioned, so as not to interfere with the absorption of other vitamins and minerals. Craig adds that a moderate overall food intake and plenty of exercise are good precautions against the disease.

And what's happened to Starbright Love, the horse on the operating table? Thanks to the surgery to remove her osteochondroma, she grazes happily these days on a pain-free knee at a new 12-acre spread the Downs family bought near Tillamook.

David Stauth is a science writer in OSU's Department of Information.

DAVE STAUTH

OSU researchers in Astoria hope surimi technology turns unused Oregon fish into seafood of the future

CRAAB FROM THE

BY JOE CONE

Just think of it: You have large quantities of certain kinds of fish, and you can catch them pretty easily. But nobody particularly likes them, so you don't. Then someone develops a technique that turns these fish into products that can be made to look and taste like crab, lobster, salmon or virtually anything else you want ...wholesome hotdogs, say, or even nutritious "milkshakes."

Imagine the consequences. Fishermen are happy—they have a market for the fish. Processors are happy—they buy the raw materials low, sell the manufactured products higher. Consumers are happy—they have new products that taste good, are good for them, and are reasonably priced.

Sound like a pretty nice trick if you could pull it off?

At the OSU Seafood Laboratory in Astoria researchers are busy at work learning the secrets of this fish alchemy with two abundant varieties of unused Oregon fish.

On a stainless steel-topped table, work is beginning this particular morning. Five lab workers have pulled on rubber aprons over their white lab coats and have settled into the rhythm of cutting up fish. Over the mingled sounds of fillets slipping into plastic tubs and of water flowing onto the table to keep it clean, lab director Dave Crawford explains that this particular fish, Columbia River shad, has for a long time been an overlooked opportunity.

On the East Coast, he says, the fish are a traditional seafood. Shad roe, the fish's eggs, are considered a delicacy. "But shad are a bony, fatty fish with what many people consider a "'fishy' flavor," he adds, "and they've never caught on on the West Coast." Crawford holds out a freshly cut fillet. A latticework of little bones is plainly visible.

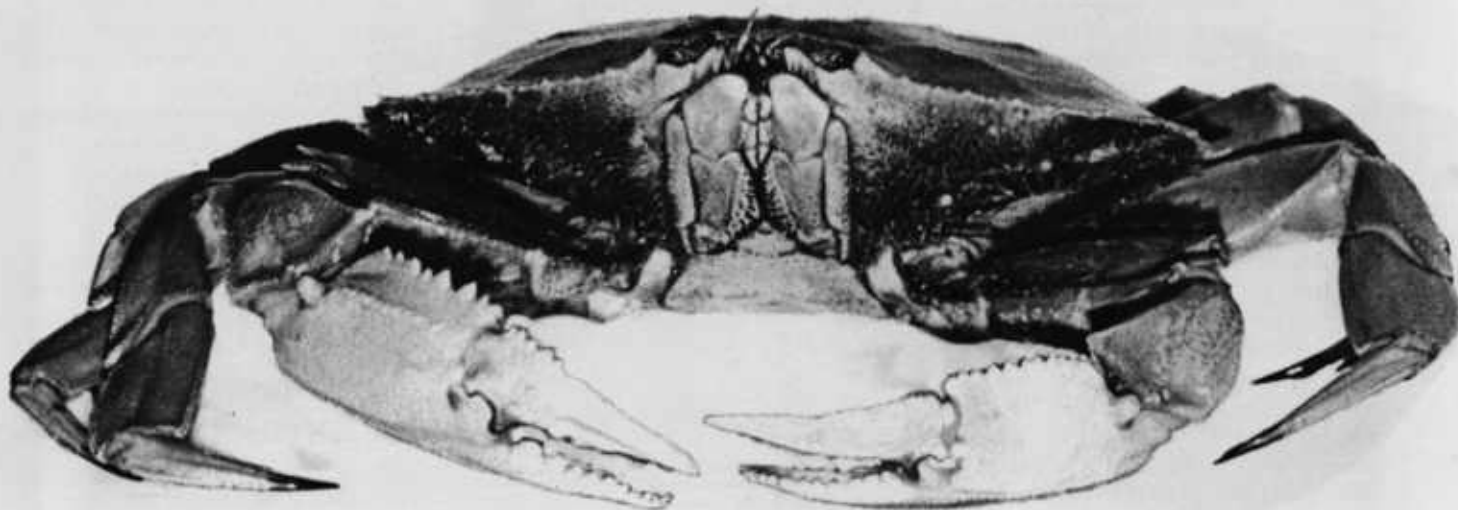
"Our approach to making shad marketable is to remove these objections," says Crawford. "We're working at developing products, made from

shad, in which the bones are removed and the flavor and texture are changed."

It may sound like black magic might be needed, but all that's actually involved are the latest techniques of seafood processing. Crawford and his coworkers are adapting techniques used in making surimi.

Surimi is an adaptable seafood protein substance that can be made from many different kinds of fish, then turned into a variety of final product forms. The products best known by Americans are the imitation crab strips and flakes now common at fish markets and restaurant salad bars. The Japanese developed them. American consumption of such imitation crab has increased more than 10-fold in recent years, from six million pounds in 1981 to 88 million pounds in 1985.

The market value of products made from surimi in 1985 was in excess of \$300 million; some projections for 1990 see the retail market at 1 billion



LAB

pounds and \$3 billion value. Oregon could share in this growth, many believe.

American consumption of such imitation crab has increased.

Shad is one of the fish the lab is concentrating its surimi development efforts on; the other is Pacific whiting, also known as hake. Pacific whiting is an abundant, but largely unused, deep-ocean fish. OSU's Sea Grant program is supporting the shad work; the OSU Agricultural Experiment Station and the West Coast Fisheries Development Foundation, a private organization, have supported the whiting research.

On this particular morning, the transformation of shad continues as the headed and gutted fish are walked across the room to a machine that separates skin and bones from flesh. There, Crawford slides the pound to pound-and-a-half fillets into a tube, and out the other side come minced



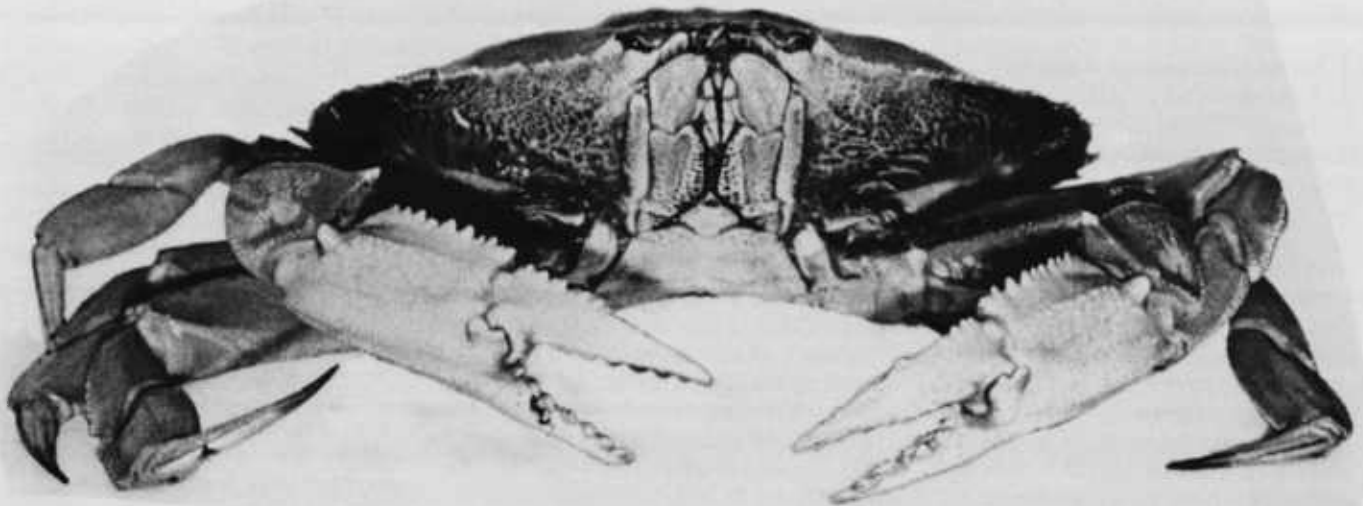
The Japanese developed the surimi technology used to make this imitation shrimp.

fish flesh in one place and skin and bones in another.

The minced flesh is then washed in plain water. The washing removes both undesirable flavors and organic substances that would cause the surimi to be less adaptable and have a poorer frozen shelf life. The washed flesh is transferred to another small machine, an extractor, or press.

Again the fish goes through a change of state. This one removes most of its remaining connection to the river: Nearly all the water is pressed out. What's left, mainly, are a mass of fish protein and a few tiny bones and pieces of skin.

The goal is protein without such traces of fish, so one last time Crawford carries the once-was-shad to a different machine. Into the refiner's hopper goes the protein, a switch is flicked, and *voila!*, out the nozzles comes a substance that looks more than anything else like thin spaghetti. It has a rather crumbly texture, a light color, and smells only ever so faintly—one might rather say "has the bouquet"—of fish.



This is what surimi is made of, Crawford explains. The refined flesh is mixed with phosphates and sugars to prepare an intermediate product that can be frozen and temporarily stored, awaiting further production. It is this intermediate that the Japanese, who invented it, call surimi.

"Technically, the Japanese name applies only to this intermediate form," Crawford notes. "The end-products, though Americans call them surimi, really should have other names."

"They're very low in fat, and of course they have good-quality protein."

With the dewatered fish protein in hand, Crawford starts the process of preparing surimi. The flesh is chopped together with small quantities of condensed phosphate and sugars, placed in plastic-lined boxes, and frozen. The materials added to the flesh allow it to be changed later into end products.

Later, Crawford explains, the thawed surimi will be mixed with salt so as to make the protein soluble. Flavorings, potato starch, egg white and other ingredients may be added to the mix at this stage, depending on the desired end product. Finally the mix will be "heat set" to form a gel, and depending on how the heat is applied and for how long, a variety of product forms can be obtained, fish cakes and "crab" legs being only the most obvious.

But for this morning at least, the odd machines of fish manipulation are turned off, and everyone breaks for lunch. Back in his office across the building, a mere couple of hundred feet from the Columbia River, Crawford talks about the potential of Columbia shad and surimi.

"We've begun experimenting with a product prepared from shad surimi that I think could be quite nice," he says. "It will have the characteristics of cold smoked salmon."

"It will have good flavor, and will also have the advantages of a cooked product," he continues. He waxes

momentarily enthusiastic: "It would be easy for retailers and consumers to handle and to slice, and it would have good shelf life."

Products made from surimi have more than convenience and relatively low cost going for them, Crawford says. They can also be made to be healthy foods.

Many people have become conscious of the desirability of lowering fat and cholesterol in their diets, the food scientist observes, and a number of recent studies have pointed out how eating fish can actually lower an individual's cholesterol levels and lessen the risk of heart disease. Surimi products can be a very good fish choice, Crawford suggests. "They're very low in fat, and of course they have good-quality protein."

But he notes that most surimi products on the market have two common characteristics he believes could be improved. They are "fairly salty and rather sweet."

Typically, 2½ to 3 percent salt is added to the surimi to make the protein soluble so a gel can be formed. While other ingredients are added later, reducing the percentage weight of salt in the finished product, "this is still adding a lot of sodium to the diet," he observes.

Sugars are added to surimi to help stabilize the washed, minced flesh while it's in frozen storage. The Astoria lab is looking for alternatives to the 8-10 percent level of sucrose and sorbitol traditionally added.

Reduction of sugar content of surimi products is not only desirable for health reasons, Crawford suggests. The sweet flavor is not appropriate to many end-products. "Once you get past the crab legs and those sorts of shellfish meats, which are inherently a little sweet, the sweet flavor is not all that acceptable to consumers," he observes.

The work on whiting, also known as hake, has been going on in parallel with the shad research at the lab. Interest in whiting has become intense during the last couple of years. "Many in the Northwest fishing industry see surimi products made from whiting as a very big factor in the industry's future," says Crawford. "They could help revitalize the industry."



Pacific whiting like these, also called hake, are

There are plenty of stories about how hard-hit Oregon's fishing industry has been in recent years, and many fishermen are still underemployed, barely making it. Processors are virtually non-existent. For those with visions that reach beyond subsistence, whiting sometimes looks like the Great White Hope. There are three reasons: supply, market opportunities and product forms.

Whiting is abundant off the coasts of Washington, Oregon and California. As an adult, the fish reaches about 3 feet and 8 pounds and can be caught by the thousands in a single scoop of a net by today's large trawlboats. The catch of whiting allowed by the Pacific Fishery Management Council in recent years has been approximately 350 million pounds.



However, just about half that amount per year was harvested between 1978 and 1985. In recent years, most of that catch has been by American trawl boats operating in joint ventures with Polish, Bulgarian and Russian processing boats, but previously the catching and processing was carried out almost entirely by foreign vessels. The fish are sold in Soviet-bloc markets. Today, the Pacific Fishery Management Council says it wants to "encourage development of the domestic sector, particularly in short-based processing," according to a recent policy statement.

An article ... asked rhetorically whether the federal fisheries service was "pandering to pollock"?

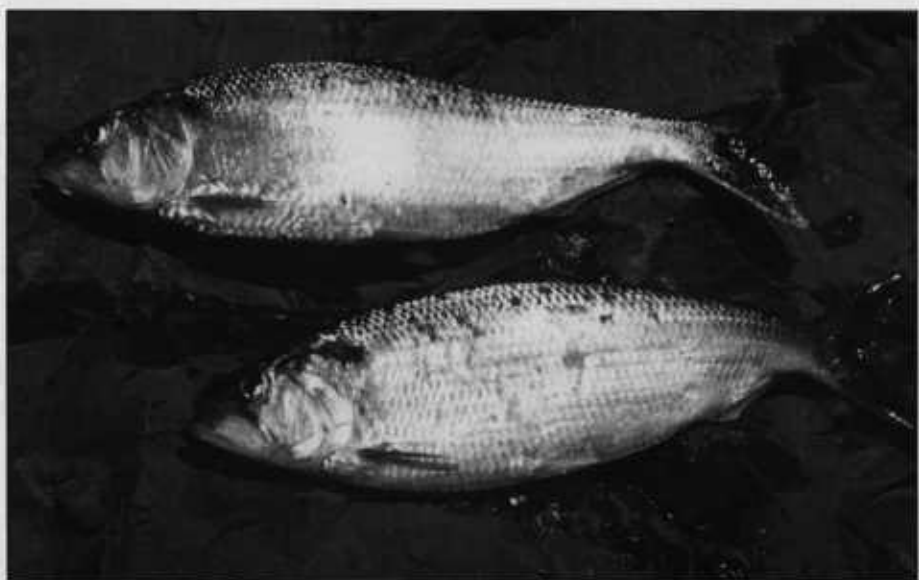
The fishing industry has been eagerly attempting to spur development. Pete Granger, executive director of the West Coast Fisheries Development Foundation, based in Portland, told an industry meeting in May, 1985, that "Pacific whiting is probably the number one target, the number one priority for all of us involved in fisheries development on the coast."

Granger noted at the time that whiting has been traditionally sold in a simple headed-and-gutted form, but that there was market potential for whiting in fresh fillets and frozen block, as well as surimi. "Certainly, the world market is available for whiting," Granger said. "Whiting is a world commodity."

Surimi-based products made from whiting have been seen to be a particularly attractive way of exploiting perceived market opportunities, OSU's Crawford says. Whiting has remained largely unused over the years, he says, because of complications that arise in post-catch handling.

Like most animals, whiting are susceptible to parasites. The myxosporidian parasite, which lives in a "substantial number of the whiting population," Crawford explains, releases a chemical substance that causes the fish's flesh to be "mushy" when cooked. The presence of the parasite

abundant in the waters off the Oregon coast, but underutilized.



More than 3 million shad run up the Columbia River each year. Researchers are studying how to catch and market them.

JIM LARSON

Photo courtesy Oregon Department of Fish and Wildlife

poses no particular health risk to consumers, he says. In addition, whiting are a soft fish with a very thin skin, which makes them subject to damage during mechanical handling aboard boat and on shore.

Crawford and principal colleague Lucina Lampila started addressing such problems involving whiting surimi in 1985.

The strategy is to develop a new system of net traps.

The vast majority of surimi on the market today is made with Japanese techniques, which use a lot of water and result in a great deal of fish protein being washed down the drain, Lampila notes. The Astoria lab has found that by washing the minced fish flesh in a slightly acid solution, less water needs to be used to eliminate undesirable components of the flesh. At the same time, more protein can be retained.

The whiting research had been proceeding so well that it's "very unfortunate," says Crawford, that hoped-for continuing support from the West Coast Fisheries Development Foundation failed to develop. But the foundation's grants are largely supported by federal funds through legislation called the Saltonstall-Kennedy Act, and the foundation suffered a sharp reduction in those monies for the current fiscal year, October 1986 through September 1987. Of eight projects that the foundation submitted to the National Marine Fisheries Service, only one was funded. Of those rejected, one concerned whiting market development, another the OSU lab's whiting surimi research.

Some groundfish projects for 1986-87 were funded by the Northwest region of the fisheries service, but they were for development of Alaskan pollock. Virtually all surimi consumed in the United States is made from Alaskan pollock (90 percent of it is made by the Japanese and Koreans). Many in the fishing industry, outside Alaska, questioned the appropriateness of the pollock funding. For example, the newsletter of the Pacific Coast Federation of Fishermen's Associations ran

an article in August titled "West Coast Fisheries Development Foundation Gets Shaft," which asked rhetorically whether the federal fisheries service was "pandering to pollock?"

"With half a million (dollars) given to the Alaska Fishing Trawlers Association alone for pollock-related projects there is some credence to this explanation," said the article.

Whiting research at OSU is continuing, however, with funding from the Agricultural Experiment Station, and Crawford has solicited other research grants. Meanwhile, shad activities have come to an "interesting stage," he says.

Crawford has sampled some of his shad surimi products. Asked whether the smoked surimi achieves his salmon objectives, the food scientist will say only that it is "tasty." He is trying other product forms as well, including combining shad surimi with surimi obtained from leaner fish like pollock or whiting.

But he raises a concern. Before there could be any substantial business to come out of processing shad, more of the 3 million shad that go up the Columbia would have to be caught.

Crawford's OSU colleague Jim Bergeron, a Sea Grant marine agent with the Clatsop-Columbia County Extension Service Office in Astoria, is trying to ensure that the opportunity to catch shad exists.

"The problem with a shad fishery on the Columbia is that the shad return from the ocean at the same time as summer chinook, which is not only the

most desirable salmon but is also an endangered run," Bergeron notes. To protect the salmon, fishery managers have placed season limitations and gear restrictions on the gill-netters who have worked the shad fishery. For shad, the result appears to be a cycle of disuse.

"Almost no one fishes shad; so there are no markets; so there is no incentive to fish shad; so there is no change in fishery management," says the agent, a long-time fisherman himself.



Seafoods Lab director Dave Crawford

Bergeron hopes to create a supply of shad while working within the management restrictions. The strategy is to develop a new system of net traps that would catch shad but allow salmon to go through.

Smoked shad and cream cheese are not on your breakfast bagels yet. Nor are breaded crab steaks made from whiting surimi ready to be taken out of your freezer and popped in the microwave. But Dave Crawford has a couple thousand pounds of shad and whiting in his freezer at the OSU Seafoods Laboratory, and he has ambitions for them.

"Frankly," he says, "most species of fish that are underutilized by American fishermen and processors are underutilized because they have characteristics that make them unacceptable to American consumers.

"I believe surimi technology offers a means of altering these characteristics, and potentially opening new markets." The seafood lab, the director says, has a role to play in this development of our unused fish resources.

Joe Cone is a science writer for OSU's Sea Grant College Program.



Most surimi products consumed in this country are made from Alaskan pollock.

DAVE KING

PROFILE

THE WORK IS KIND OF WILD

While most Oregonians shiver through late winter, Bruce Coblentz is sweating as he fights his way through tropical brush and over coral so sharp it can slice a pair of heavy hiking boots to ribbons.

Where?

A tiny speck of land called Aldabra in the Indian Ocean.

Why?

Partially, it's what he does for a living, and partially, it's what he wants to do for posterity.

The OSU wildlife ecologist is one of the few people apt to get a call from a government agency or conservation group when uninvited creatures start tearing up a pristine island.

"There just aren't a whole lot of people experienced in the control methodology of feral animals," explains Coblentz.

Feral animals are domestic animals—like pigs, goats or even housecats—that have gone wild. Sometimes they, or their offspring, interbreed with wild animal species. They are environmental invaders and usually unwelcome, especially in isolated spots like islands that may have developed with no natural defenses against them.

Coblentz's expertise puts him in a category somewhere between a bounty hunter and the esoteric scientist you sometimes see depicted in movies, the kind who walks around wearing a pith helmet and waving a butterfly net.

"The folks who call on me," he says, "usually want just enough science done to show that the feral animals should go."

Then they want him to tell them how it should be done. The answer, usually, is killing the feral animals, either shooting them or using other methods such as putting out poison bait only the animal will eat.

"It may be distasteful to think of," says Coblentz, "but it's kind of like when you step on a cockroach walking across your living

Coblentz and the OSU graduate students he teaches have done lots of wildlife studies in Oregon.

But they've had their share of exotic projects.

In one, paid for by the Smithsonian Institution, they battled marauding pigs rooting up an island in the Galapagos chain off South America.

Others have included

miles wide, surrounding a 21-mile-long lagoon.

Aldabra has been described as a living history museum. It's an important breeding base for multitudes of sea birds and the last wild home of the giant Indian land tortoise. It's also the home of the Aldabran brush warbler, arguably the world's rarest wild bird. Only 25 are thought to exist.

Feral goats released there in the 1800s are threatening the birds' nesting habitat. Also, the island is extremely hot, and the goats are destroying shade the tortoises need to survive.

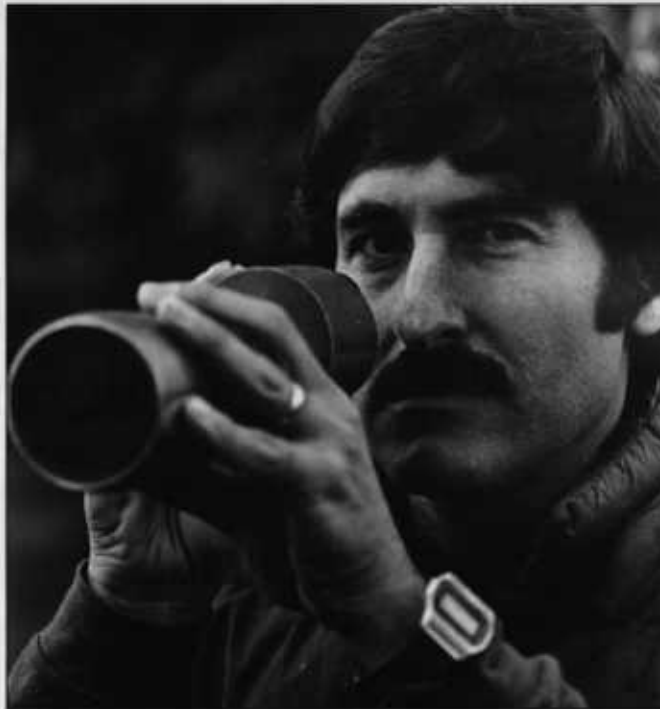
Dirk Van Vuren, one of Coblentz' former OSU graduate students, is with him. They plan to stay until mid-March, dealing with the 300 or so feral goats.

Just getting there in the first place was a challenge. An early arrangement involved catching a cement tanker on the coast of Kenya in East Africa. When that fell through, they boarded a vessel that sailed from the Seychelle Islands, about 600 miles to the northeast of Aldabra.

Why not stick with research closer to home?

"Aldabra is one of the unique places on the planet," says Coblentz. "I think being able to study it certainly gives us a better understanding of the whole ecosystem. And, I guess at one point in time I just sort of fell in love with islands. You go to one of these islands and help preserve it and you've, by God, done something meaningful, let's say compared to studying the fat content of a deer's femur...."

— A.D.



Bruce Coblentz

room floor. There's a time and a place for everything, and a highly specialized and fragile oceanic island ecosystem is not the place for these destructive generalists (feral animals)."

Why not capture the feral animals and haul them off the islands?

"For one thing," says Coblentz, "no one wants them. They'd tear some other place up." And, especially with rugged islands, the logistics and costs of such an undertaking would make it almost impossible, he says.

studying feral sheep and pigs damaging Santa Cruz and Santa Catalina Islands off the California coast, and trying to outwit mongooses after the creatures were introduced to the Virgin Islands.

His current work in the Indian Ocean started when Britain's Royal Society, probably the world's best-known conservation group, contacted him a few months ago. The society has a small field research station on Aldabra. The remote atoll is a 70-mile rim of land, relatively new coral one to three

Perfecting the Pickle

(see page 6)



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