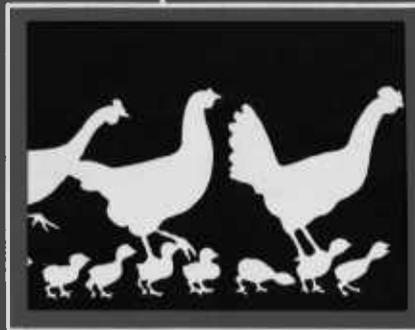


Oregon's Agricultural
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Agricultural Experiment Station
Oregon State University



Director John R. Davis

The laws of (Human) Nature

Now that Congress and the Oregon Legislature are back in session, one wonders what new laws will come next—whether the man-made ones will be any better than the natural laws with which we are familiar. Or will Murphy's Law prevail again—if anything can go wrong, it will.

There are many laws that pertain to agriculture—or to everyday life, for that matter. Some of these have been collected and published by Paul Dickson, whose book "The Official Rules" has been published by Delacorte Press. For example, Parkinson's Second Law, which states that expenditures rise to meet income; or Gumperson's Law: that after a raise in salary you will have less money at the end of each month than you had before.

These sound like one of the great stretches of truth of all time—"Hello, I'm from the government and I'm here to help you!", or the motto ascribed to Josh Bellings—"Live within your income, even if you have to borrow to do it."

Speaking of financial problems, there is Dunn's Discovery—the shortest measurable interval of time is the time between the moment you put a little extra aside for a sudden emergency and the arrival of the emergency. This is also about equal to the time between the expiration of the warranty and the equipment breakdown.

Goldwyn's Law of Contrasts states, "A verbal contract is not worth the paper it is written on." Getty's Reminder is a simple explanation—"The meek shall inherit the earth, but not the mineral rights!"

What rights do farmers have, in addition to all of these laws? Weather laws don't help too much, as stated in the Harney County Precipitation Passages: "When it rains, it pours except when it doesn't rain at all"; also "April showers bring May flowers. May flowers bring pulmonary emphysema."

Hartman's Automotive Laws are applicable also to sheep producers: (1) Nothing minor ever happens to sheep on the weekend. (2) Nothing minor ever happens to sheep at night. (3) Nothing minor ever happens to sheep.

Regarding taxes—Gross' Law is that when two people meet to decide how to spend a third person's money, fraud will result. The modern version of the Golden Rule is whoever has the gold makes the rules. The Checkbook Balancer's Law holds that in matters of dispute, the bank's balance is always smaller than yours.

Administrators usually enjoy poking fun at themselves—through the Peter Principle, for example, which proclaims that in every organization each employee tends to rise to his level of incompetence. Even better is Imhoff's Law—he was the inventor of the septic tank—"The scum always rises to the top."

From this view on the top, some of the above laws seem to be more truth than fiction. At least we can laugh at most of them and know that somehow the laws of common sense will prevail. There are really only ten laws—very simple, very short. It's the regulations and interpretations that are the problem.

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Gary Cooper, graduate research assistant, chases a winter fly species in the H. J. Andrews Experimental Forest east of Eugene.

Opposite: Winter moth photograph by E. J. Dornfeld, professor emeritus of zoology.
Below: John D. Lattin, collection curator, displays an insect tray from the laboratory.

Bugs keep laboratory hopping

Population:
2.2 million

Some foreign visitors should never set foot on U.S. soil, even in an era of improving diplomatic relations.

An isolationist viewpoint? Definitely. But to John D. Lattin, curator of Oregon State University's Systematic Entomology Laboratory, insect isolationism may be the best policy.

"Most of the non-native insects we have in the U.S. are from Europe," said Lattin. "But increased trade with Japan and China broadens the possibilities for introductions. While some accidental introductions become pests, many beneficial insects are introduced deliberately as biological control agents."

Occupying several small rooms on the fourth floor of OSU's Cordley Hall, the Systematic Entomology Laboratory (formerly the OSU Entomology Museum) houses more than 2.2 million specimens. Started prior to 1890, it is the largest collection of insects in the Northwest and 18th largest of the 584 in North America.

Lattin, serving his second stint as the collection's curator, quickly points out that the collection is a working laboratory, not just a museum full of interesting but dead creatures.

"A collection like this one can be an active, participating unit or it can just sit," he said. "Our collection is active and working, and involved in many projects both at OSU and elsewhere."

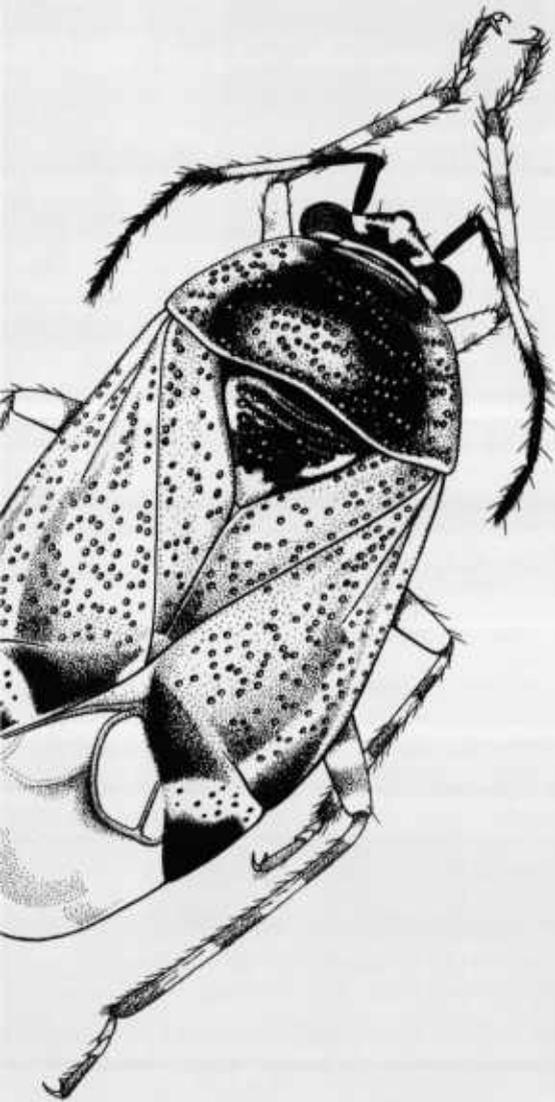
The laboratory is a center for the collection of insects and related arthropods (invertebrates with segmented bodies), particularly those from the Pacific Northwest. Insects in the collection are used for research and educational purposes that include everything from scientific and medical use to identifying a garden pest or helping children learn about insects.



Of particular interest are insects of economic importance. One recent discovery involved the winter moth, a potential pest of fruit and hardwood trees and ornamentals. A USDA entomologist participating in a cooperative exchange with the OSU laboratory, correctly identified the winter moth from specimens in the collection. Additional insect specimens obtained from the Oregon State Department of Agriculture confirmed the presence of the winter moth in the Portland area. Surveys now underway by the state agriculture department will determine the extent of the infestation.

"This report of the winter moth—the first record of its occurrence in the U.S.—is a good example of benefits from the cooperative nature of the collection," said Lattin. "This particular insect bears a strong resemblance to several native moths in the area, but because USDA entomologist Douglas Ferguson is a highly competent systematist and had observed winter moths before, he was able to identify it correctly. Positive and accurate identification is the basis for any control program."





It almost looks real. Bonnie Hall, scientific illustrator, brings insects to life with detailed drawings. Crawling onto the page is *Deraeocoris brevis*, a predatory insect that attacks pear psylla.

Cooperation between government and a wide variety of individuals has been the cornerstone of the Systematic Entomology Laboratory. Professional and amateur entomologists have given the laboratory many collections containing thousands of specimens. The largest single addition—about 800,000 specimens—arrived in 1977 when the entomological collection of the Thomas Burke Memorial Washington State Museum was moved permanently from the University of Washington to OSU.

"No one person puts a collection like this one together," Lattin said.

Support for the laboratory also has been cooperative. Although most of the funding comes from Science Technical Advisory Service through the OSU College of Science, some assistance has been received from the Agricultural Experiment Station and from private contributions made through the OSU Foundation. Research grants provide some additional assistance.

"We have a strong interest in applying taxonomic principles and techniques (the science of classification) to problems of Oregon's forests and croplands," said Lattin. "For instance, in looking at two potential Oregon crops—meadowfoam and *Kochia* (Russian sagebrush)—we may examine the insect fauna of native plants that are related and review the scientific literature to try and identify insects that might cause problems later."



Other missions of the laboratory include:

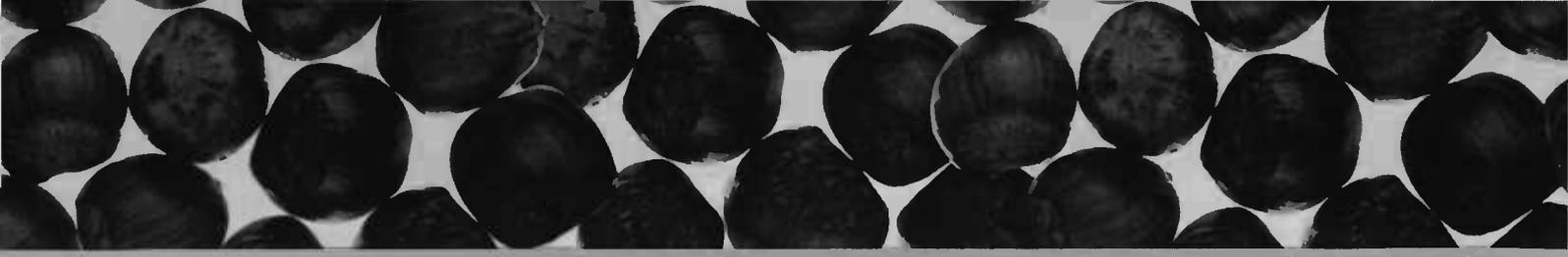
- Identifying insects that are predators of insect pests. One insect recently studied in the Systematic Entomology Laboratory attacks pear psylla, a serious pest of the state's pear crop.
- Basic research. Work in sites like the H. J. Andrews Experimental Forest east of Eugene is providing a basic understanding of the role of insects in the forest ecosystem. The Andrews Forest, declared an Experimental Ecological Reserve in 1976, is representative of the Western coniferous region.
- Training and education. Students from throughout the world have studied in the OSU Entomology Department and worked in the Laboratory. A Sudanese student currently studying horseflies will use his knowledge of entomology to establish a systematic laboratory for medical entomology in his country. Another student from Madagascar will use training in basic taxonomy to set up an agricultural unit for insect pest identification.
- Cooperation in insect identification. Through a library-like lending program, specimens from the collection are sent throughout the nation and the world to aid in insect identification and study. At any given time, some 10,000 specimens are out on loan.

"We also have been working with the USDA to study the taxonomic resources of Central and South America," said Lattin. "There are so few taxonomists in those areas, that even obtaining basic identification is a problem."

The OSU Systematic Entomology Laboratory is involved in areas of the insect world that reach far beyond the borders of the state and the nation as scientists reach out in friendship and service in a mutually beneficial exchange of knowledge.



Upper left: Paul Oman, entomology professor emeritus, examines laboratory insects. Above: Michael Schwartz and Gary Stonedahl, assistant museum curators, take a close look at a parasitic wasp. Left: Gary Cooper and John Lattin compare stoneflies found near a river in the Andrews forest.



Filbert propagation

A 50-year search goes on

It takes patience—lots of patience—to conduct filbert research.

Just ask Harry Lagerstedt.

Lagerstedt is a USDA Science and Education Administration horticulturist who conducts filbert research at Oregon State University.

“We’ve been searching for 50 years to find a variety better than Barcelona, the industry standard of today,” he said.

Now, two new varieties—Ennis and Butler—have been introduced to help increase filbert production. But growers have not yet been able to obtain the new varieties for planting and that’s where Lagerstedt comes in.

“We’ve been trying to develop new methods of rooting and grafting trees so that their numbers can be increased rapidly,” he said. “Now, filberts are propagated by simple layerage, the most antiquated propagation method and the most labor intensive.”

Working with Lagerstedt on the problems are graduate students Robin Scoles and Marsha Romines. Scoles is conducting greenhouse and nursery studies of a grafting procedure called chip budding and Romines is trying to find the optimum temperature for filbert callusing.

“Budding is the most efficient way to propagate fruit and nut trees. You just slip a bud of the desired variety into the rootstock tree during the growing season, then when the bud grows sufficiently, you can cut off the top of the rootstock and allow the budded variety to take over,” Lagerstedt said.



"But filberts are slow to callus, not like an apple or pear which will callus rapidly. We've tried many ways of getting the buds to develop, but usually the buds do not survive over winter. Our latest experiments, involving fall chip budding using the current season's wood, look very promising."

If these experimental methods are successful, Lagerstedt said growers could obtain new varieties such as Ennis and Butler more quickly.

"There is a big demand for Ennis right now, but it takes the nurseries five to eight years to tool up for the new variety. Ennis eventually will replace Barcelona as the main crop variety so growers' demand for Barcelona trees will gradually drop off. During this period of change, the nurseries are caught in the middle—they have lots of Barcelona stock on hand while supplies of Ennis are increasing slowly. With simple layerage as the nurseries' only choice for propagation, they can't just flip in and out of varieties overnight," Lagerstedt said.

Butler will replace Daviana as the pollinator tree. The new varieties first were observed by growers who reported them to researchers. Years of evaluation proved the new varieties were superior to Barcelona and Daviana.

"The U.S. filbert industry has developed around Barcelona, so the strengths and weaknesses of this cultivar are the strengths and weaknesses of the industry," the USDA federal researcher said.

Ennis filberts produce nuts which average about 30 percent larger than Barcelona nuts. The shells are about the same thickness, and the kernels are smooth and clean. The yield potential of the new variety is good, scientists have found.

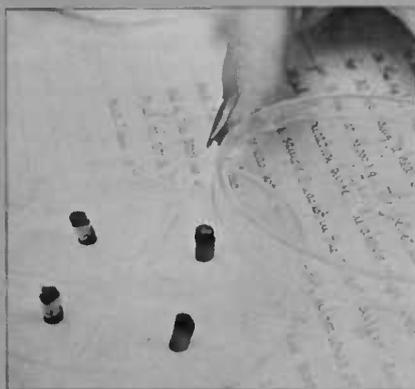
Filberts, also known as hazelnuts, are an important crop in Oregon and Washington. Production in 1978 totaled nearly 12,000 tons, approximately the same amount as last year.

"Growers were surprised and pleased by this year's crop because ordinarily, filberts bear a heavy crop only every other year," Lagerstedt said.

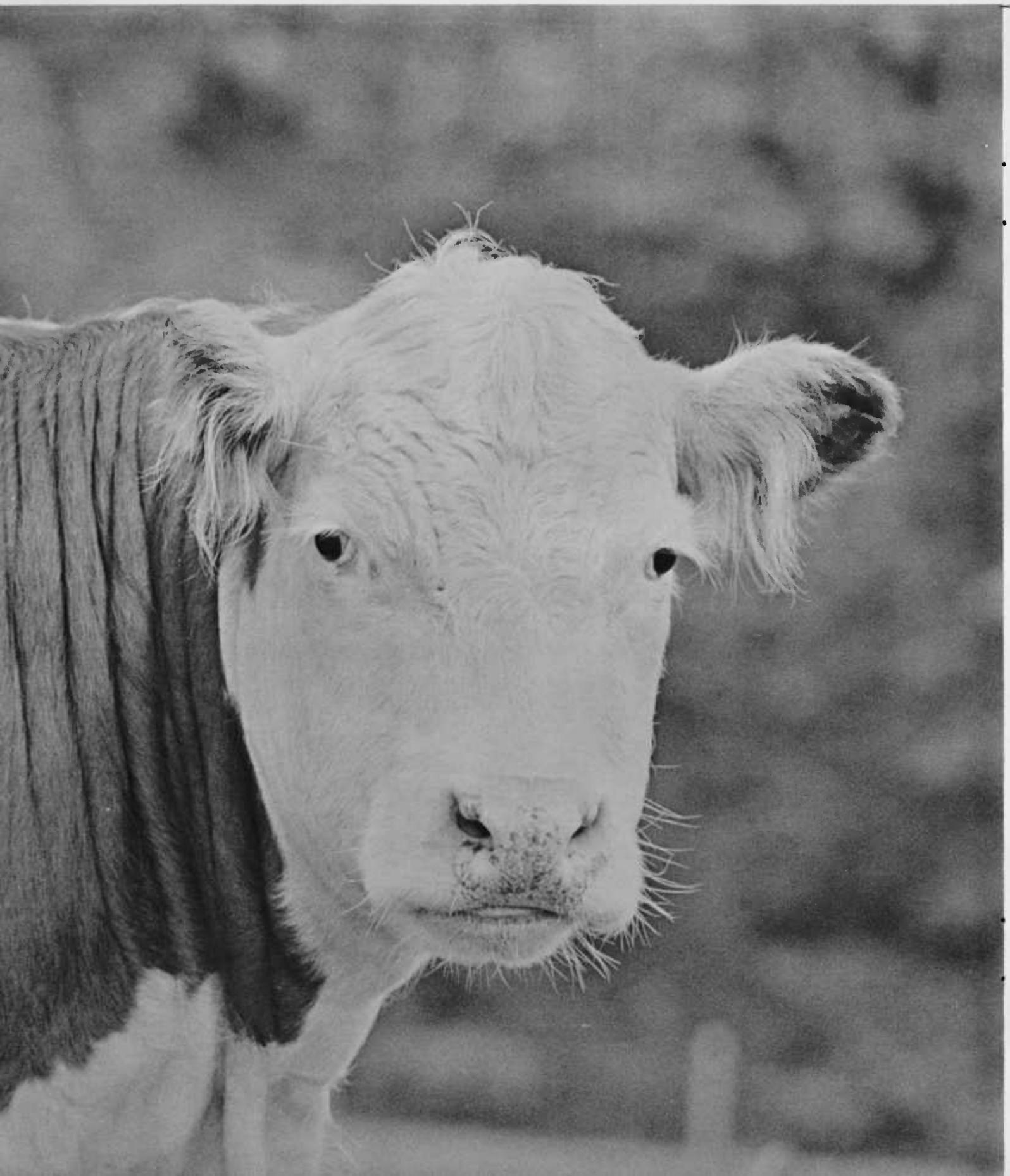
Filberts also are grown in Turkey, Spain and Italy. But the largest filberts in the world are grown in the Pacific Northwest and many are shipped to Europe. Consequently, the U.S. actually imports 45 percent of the filberts it consumes each year.

"There is a ready market for this home-grown product and there has never been a complete crop failure with filberts, so the potential is good," Lagerstedt said. "A key to tapping this potential is an improved propagating technique for rapid increase of tree numbers, for rapid introduction of new varieties and for utilizing the advantages of improved rootstocks."

But facing the problems and prospects of the industry takes time—and patience.



Robin Scoles, horticulture graduate student, seals chip buds onto a filbert rootstock. Small filbert plugs in glass dish reveal the optimum temperature for callusing.





A small farm: a word game

What is a "small farm?"

The answer: It depends on who is talking.

Robert Mason, a study director of the OSU Survey Research Center, asked a random sample of 813 Oregon adults to define a "small farm" and to say if they were willing for the public to spend money to support research on small farms. Results are in Experiment Station Circular of Information 669.

People used a variety of terms to describe a small Oregon farm—the type of agriculture raised, intensity of family labor, acreage size and non-economic aspects of the quality of life such as peace and quiet and

independence. However, none of their descriptions related to the magnitude of annual farm sales or investment in land, buildings or machinery.

The most frequently selected definition from a card of five definitions was the exclusive use of all family labor, a definition endorsed by more than two of every five respondents. An acreage limitation of 40 acres or less, and total investment in land, buildings and machinery, were selected by 17 percent and 15 percent.

If the "all family labor" definition is adopted, then 75 percent of Oregon's 26,753 farms are considered to be "small farms," according to the most recent agricultural census. If total investment in land and buildings of less than \$100,000 is used as a definition, 61 percent of Oregon's farms are included.

The survey also showed that young people more than older persons endorse funding for "small farm" research. Those in agricultural and

other occupations supported the idea less than those in other occupations, as did rural residents.

"Public support for 'small farm' research seems to depend on the way people define it," said Mason. "Support tends to be strong—averaging close to 60 percent or more—for definitions which imply all family labor, 40 acres or less, total investment of less than \$100,000 and total farm sales of less than \$20,000 annually."

He pointed out that aspects of rural living did not surface strongly in the Experiment Station study and may relate more to issues of rural development than to "small farms" and farming.

"The definition of a 'small farm' developed in the study is an effort to construct a concept in which public preferences are considered," said Mason. "A consideration of these preferences clearly suggests that terms employed in the past are not well recognized by the public at this time."

Hunters wing fair share of travelers

As summer draws to a close with the final days of August, the mass migration of mourning doves begins.

Keith Miles, a wildlife graduate student at Oregon State University, recently analyzed collected data to determine the time of initial movement of mourning doves in the fall. This was in response to complaints by hunters in the northern states that all the birds had left their area before hunting season opened on September 1. The initial data had been collected over a three-year period by state fish and game departments in the western U.S.

Under the Migratory Bird Treaty Act, September 1 is the earliest a season can be opened for any migratory bird, and it is the opening day for mourning doves. The act is



based on an international agreement between Mexico, the United States and Canada to manage and set hunting regulations on all migratory birds moving through this range.

Miles concluded the doves began to move at the end of August, with those at higher elevations migrating sooner. However, it was a mass movement over the western part of the continent, widespread and consistent in the southern as well as the northern states.

The migration pattern of mourning doves was found to correspond with the September 1 opening day. During the early part of September, the birds are equally dispersed over the western states in their movement, and provide an equal opportunity to all for hunting.

Long life predicted for cottage cheese

Even when you cool it, cottage cheese can spoil fast.

But researchers at Oregon State University have been working on new ways to make creamed cottage cheese last longer.

Floyd Bodyfelt and Lois McGill, OSU food scientists, tested creamed cottage cheese with added potassium sorbate and sorbic acid to see if either of the retardants could keep it from spoiling without damaging the delicate flavor.

They found both additives could retard spoilage for up to one month but that sorbic acid did so without significantly affecting flavor.

Why is longer-lived cottage cheese needed?

Bodyfelt said cottage cheese is very perishable—even more perishable than milk.

"Milk is processed in such a way that it never sees the light of day until it gets into your home," he said. "Cottage cheese, however, is made in an open vat where it is more susceptible to air-borne contaminants."

Bodyfelt also said "some dairies precondition' their cottage cheese to spoil early because of inadequate temperature control and insufficient housekeeping which encourages dust and other potential air contaminants."

The result is cottage cheese which usually lasts two weeks or less.

Adding to the problem are shipping and storage temperatures that frequently are too high.

"The ideal storage temperature for creamed cottage cheese is 35 to 40 degrees, but most cottage cheese is not treated that well. Transporting and storage in overloaded dairy cases may expose the cottage cheese to higher temperatures. Furthermore, the majority of home refrigerators operate in the 40-45 degree F. range," Bodyfelt said.

During the study, all the creamed cottage cheese was tested at 45 degrees—"an abuse condition," Bodyfelt said.

Bodyfelt studied the sensory, microbial and chemical changes in cottage cheese samples that were left untreated and those that were treated with the retardants. McGill, who heads OSU's Flavorium, conducted taste tests with both expert and general panels to determine how much of the food additives could be used before flavor was affected.

Together, the researchers found that approximately seventy-five hundredths of one percent of each additive could be used to prevent spoilage but that sorbic acid did a better job of retaining flavor. Both potassium sorbate and sorbic acid are approved food additives.

"They work in an innocent way," Bodyfelt said. "The bacteria and yeasts that cause spoilage consume the retardants and those chemicals interfere with the metabolism of the cell and eventually prevent microorganism growth."

Bodyfelt, an Extension dairy specialist, said changes in the dairy industry are making the use of retardants inevitable.

"The move is toward fewer but larger plants and longer shipping," he said. "Many dairies don't make their own cottage cheese anymore and those that do face demands from labor unions because employees insist upon consecutive weekend days off from work. So to cope with increasing pressure, the manufacturers are turning to more centralization and increased shipping."

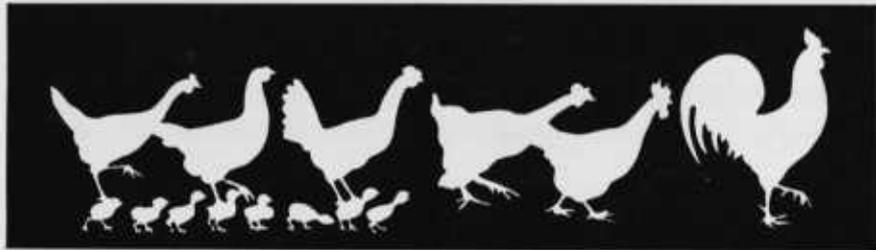
Results of the study, conducted by the OSU Agricultural Experiment Station, will be forwarded to Monsanto Company in St. Louis, the project's sponsor. The company, which manufactures food additives and many other products, will test market the creamed cottage cheese with spoilage retardants in cooperation with a regional food processor and, if the product is acceptable, it may be appearing in most supermarkets soon.

Chickens kept in the dark

Catnaps for chickens?

Researchers at Oregon State University think that small siestas could cut fuel bills and increase efficiency in the broiler industry.

"Commercial broiler ranchers keep the light on in their buildings 24 hours a day. That can be expensive, especially during an energy crunch," said Harry Nakaue, associate professor of poultry science at OSU.



Several years ago, researchers started looking at intermittent lighting as a way to cut the fuel bills for confinement buildings where the broilers live from the time they are hatched until they are ready for market. At first, results showed that the birds did not gain weight as fast or utilize feed efficiently when lights were recycled off for 12 hours and on for another 12. But research by Nakaue and R. W. Dorminey, a former member of the poultry science department who now is deceased, showed that if the lights were more intermittent, the birds would utilize feed more efficiently.

"We found that when the light was intermittent enough—like 15 minutes

on, followed by 45 minutes off throughout the production period—almost 100 percent of the treated birds had a comparable growth rate and a better feed-to-meat conversion rate than birds exposed to 24 hours of light," said Nakaue, an Agricultural Experiment Station researcher.

So far, the reason for this efficient feed utilization has not been identified. Scientists suspect digestibility may be increased or feed passage through the birds is slower. Tests now underway at OSU will provide an answer within the next year.

So what happens when the lights are turned off?

"Some birds eat in the dark, but most stop what they are doing and squat down," said Nakaue.

When the lights are turned back on, the birds flock to feeders and begin eating again. The crush of birds has presented a problem and feeder space may need to be increased to accommodate the hungry birds, Nakaue said.

Savings for growers who start using intermittent lighting may range from one-half cent to two cents per bird. Although that might not sound like a tremendous saving, it can add up in large poultry barns where as many as 56,000 broilers can be housed four times per year, Nakaue said.

Fiberglass, yes; but which one

If you're planning to build a fiberglass greenhouse, choose the kind of fiberglass carefully.

Martin Hellickson, OSU agricultural engineer, said energy savings may vary significantly between corrugated and flat fiberglass.

"Corrugated fiberglass will lose more heat because there is more exposed surface area," he said. "We found that the additional heat loss from corrugated fiberglass is directly proportional to the area."

Corrugations can add from nine to 26 percent more surface area, depending on shape and depth of the corrugations. That means that from nine to 26 percent more heat would escape through a corrugated surface than through a flat surface with the same projected dimensions.

But flat fiberglass has disadvantages, too, Hellickson cautioned.

"Corrugated materials are more rigid than flat, so if the greenhouse needs added strength for wider bay lengths, perhaps the extra heat loss cannot be avoided," he said.



Monkeys help test selenium

Twelve baby Rhesus monkeys and their possessive mothers have teamed up with three Oregon State University scientists.

The team goal: to determine selenium requirements for people.

"The current intake of selenium is about 160 micrograms a day but some authorities feel this should be increased to prevent deficiency problems and possible cardiac troubles," said Phil Whanger, nutritional biochemist in the OSU department of agricultural chemistry.

Other team members are John A. Schmitz, OSU School of Veterinary Medicine pathologist, and Nephi Patton, director of the OSU Laboratory Animal Resources Center and a veterinary pathologist.

The Northwest was identified as being deficient in selenium several years ago but the deficiency apparently presents few health problems because Oregonians eat many foods grown outside the state and have a normal selenium intake.

Naturally occurring in the soil, selenium was noted in the late 1800s when a cavalry group reported their horses got sick after foraging in South Dakota. In 1932, the cause was determined to be selenium poisoning.

This toxicity was thought to be selenium's only significance until 1957 when a National Institutes of Health investigator discovered that lack of selenium also could cause problems. A year later, an OSU team identified selenium deficiency as the cause of white muscle disease of calves and lambs, a crippling disorder.

Whanger, who has worked on the selenium problem since 1966, now is interested in finding selenium requirements of lambs which appear to be higher than anticipated. He has fed animals hay from Hermiston and Madras with identical selenium content. The Madras hay promoted white muscle disease; the Hermiston hay did not.

"Selenium requirements seem to differ with diet, with alfalfa and clover requirements higher than a grass diet," said Whanger. "We are looking at why this is so."

No one is quite sure what selenium deficiency does to humans although there are suspicions, based on



Mother and baby Rhesus monkeys are giving their blood to help researchers learn what happens to humans with selenium-deficient diets.

studies of rats, that it could cause liver problems.

Which is why the Rhesus monkeys and their babies have become important. The monkeys, then pregnant, were obtained from the Primate Center near Beaverton. Each month, both adults and babies give blood for testing. Their diets—milk protein, soybean meal, torula yeast, sugar, vitamins, minerals and fat—contain about 25 to 35 percent of the required amount of selenium.

Results of the blood chemistry tests, to show presumed enzyme activities, will be recorded for two years under the \$90,000 NIH grant. Blood samples taken during pregnancy are expected to be especially helpful in establishing a requirements base.

Whanger worked with Paul Weswig, retired agricultural chemist, and O. H. Muth, retired OSU veterinarian, and J. E. Oldfield, head of the OSU department of animal science, when they did a similar study in 1970-71 with squirrel monkeys. The study produced a selenium deficiency with diets in nine months and showed changes in livers of the squirrel monkeys and minor muscle changes.

"Although selenium requirements have been published for livestock, there are certain diets which increase these requirements and OSU now is working on this with sheep," said Whanger. "Because the Rhesus monkey is the closest animal to human we have worked on, we hope to determine how much selenium humans need to stay healthy."



A man of science —and fiction

If you haven't had your spine tingled or your funny bone tickled lately, read something written by Jesse Bone.

The OSU professor of veterinary medicine has written five novels and more than 40 short stories for science fiction lovers and promises more after he retires in July.

His love of science fiction started when he was growing up in Tacoma, Wash. "I used to buy science fiction books and sneak them home under my coat and read them under the covers in bed at night with a flashlight," he said.

But it took a dare from his German-born wife, Faye, to turn the avid reader into a writer. "I was reading one of the new science fiction magazines early in the 1950s but the writing was so bad, I threw it across the room and said anyone could write better. Faye said, 'Why don't you try?,' so I sent a story to *Galaxy* magazine and, much to my surprise, I got back a check. I've been writing ever since."

Bone joined the OSU veterinary medicine faculty in 1950. He has

taught and conducted research, including Experiment Station projects on bovine infertility, diseases of swine, vitamin A and trace mineral metabolism. He has published scientific and professional material and is finishing a textbook, *Animal Anatomy and Physiology* (or Bone's bones?). He hopes it will fill the gap between high school and college texts with factual, easy-to-read and occasionally amusing information on what makes animals tick.

"I have this odd feeling," he said. "I believe education should be fun. I just honestly hate to approach education in the same way a German philosopher approaches the meaning of life."

As for research, Bone confessed his main research interest now is a 52-foot sail boat under construction in Sacramento.

Next fall, the Bones will assemble a crew and begin a round-the-world voyage.

"Perhaps we will live on the Mediterranean coast until I get too old to sail then we'll come back to Corvallis," he said.

Certainly, his life will never be dull.



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