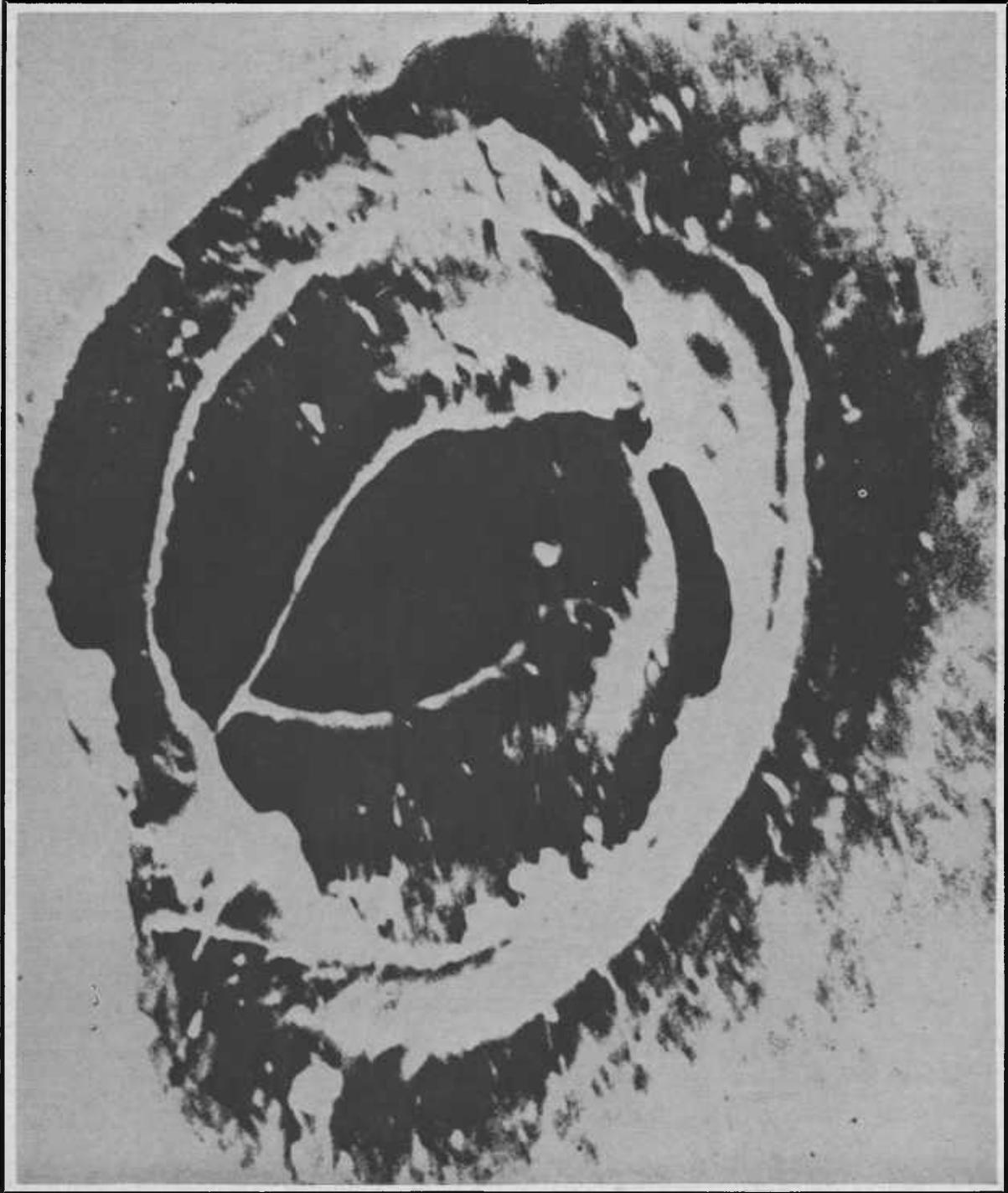


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COVER: A scanning electronmicrograph of a normal cherry breathing pore (stomata) magnified more than 2,000 times. (Story on page 5.) **RIGHT:** Variety plots at the Pendleton Experiment Station are an integral part of cereal breeders' efforts to develop a satisfactory feed grain for Oregon. (Story on page 3.)



The need is feed

WANTED: Oregon-grown feed grain.

Must be high yielding, full of energy and bulging with protein for livestock. Palatability important and good economic return vital. Consistent volume required.

The answer, agree OSU cereal plant and animal scientists, may not be too far ahead for Oregon where more than a million acres now grow wheat, barley and oats, adding about \$50 million yearly to the economy and generating other income from related industries.

Bountiful feed grain harvests in the state could open several doors, giving cereal growers more diversity, livestock growers some alternatives and could set up new markets, both in the U.S. and abroad, for the grains or the red meat they produce. A plus for all Northwest agriculture would be a home market for products, one that did not rely on conditions abroad or hinge profits on the transportation industry.

"Four approaches—one a surprise—appear quite promising in developing a high energy feed grain," said Warren E. Kronstad, OSU cereal plant breeder. He listed:

- 1—A high-yielding wheat with purple seed.
- 2—A high-yielding barley with a better nutritional balance.
- 3—Triticale, the man-made species, a wheat-rye cross.
- 4—The surprise—sorghum.

Last year, the Legislature provided funds to expand the OSU cereal breeding program to include developing a high energy cereal grain designed specifically for feed.

Part of the emphasis for feed grains has come from changes in the market place, resulting in a greater demand

for high protein, hard, red wheats. Flour from these wheats is favored for bread.

Earlier programs encouraged the Pacific Northwest wheat industry to concentrate on quantity and pastry quality in developing high-yielding soft white varieties. Northwest wheat exports filled a need for excellent quality, soft, white wheat for pastry.

Oregon will continue to produce excellent quality white wheat, however, in the future wheat buyers will demand—and get—shipments of wheat that meet more rigid quality specifications. Japan, the Philippines and other countries want wheats with specific quality characteristics. Nations like Australia, which offers 11 market classes of top quality wheat, are providing stiff competition.

In addition, countries once dependent on wheat imports from the Pacific Northwest are becoming self-sufficient in wheat, using new semi-dwarf varieties similar to those which boosted Pacific Northwest yields to all-time highs. The result: A big increase in world wheat output—and a big drop in the need for soft white wheats exported from this area.

The export market may require less of this market class in the future, therefore, the need is to provide growers with greater flexibility—such as other market classes and, perhaps even more important to all segments of agricultural economy, a feed grain. It has been estimated that if a consistent source of feed grain were available and livestock producers could meet just the needs of Oregon, it would add an additional \$100 million annually to the state's economy.

Said animal scientist James E. Oldfield:

"Grains have always been developed for something beside feed—wheat for flouring and barley for malting—and if the market or crop were unsatisfactory, the grain became feed so there has been no consistent flow of feed. Livestock producers need a steady guarantee that the feed is there."

Oil meals shipped in

Fairly low in protein, grains have to be supplemented with oil meals and because there is no local source for the meals, livestock producers must rely on shipments of soybeans or cottonseed meal and absorb extra cost.

Since grain may make up to 80 percent of rations, just a small increase in protein content of grain could make a great difference in returns, said Oldfield.

"Our livestock producers could cut down on oil meals and save ration supplement costs," he said.

One of the most promising approaches to a feed grain, Kronstad pointed out, is a high-yielding wheat which carries a purple seed color so it can be distinguished from wheat grown for food.

"Without restrictions based on baking and milling characteristics—not needed for livestock feed—it may be possible to develop varieties much higher in yielding ability and provide a good energy source," he said.

The purple color would mean instant identification, simplifying storage and marketing of livestock grain. It would also mean a decision on the part of the grower as to whether he wanted to raise wheat feed or wheat for human food.

Poultry nutritionist George H. Arscott said that studies over a number of years show the difference between wheat and corn in poultry feed remains

(Continued on page 16)

Radio waves are replacing snowcats at remote snow measuring stations in Oregon's Cascade Mountains.

Last year four automatic snow measuring stations operated in the Cascades. This year there are five, and plans call for 10 next winter. Within the next 10 years there will be some 50

to determine power generation capacity, irrigation district and reservoir managers use them to calculate release rates, and farmers use them to determine summer irrigation water supplies.

Because of the importance of water supply forecasts to Oregon Agriculture, a prime consideration in estab-

automatic measuring sites replace monthly treks by snowcat to obtain measurements.

SCS water volume forecasts are averaging within 15 to 20 percent of actual volumes. George predicts that the margin of error can be reduced to less than 10 percent when there are enough automatic sensing stations to provide daily readings from important locations throughout the state.

The automatic measuring stations consist of one or more sheet metal "pillows" filled with antifreeze. Weight of snow falling on the pillows creates pressure, moving the antifreeze through a hose into a pressure transducer that transforms the change in pressure into an electric impulse that can be coded and transmitted to SCS monitoring headquarters. The stations are powered by nickel cadmium batteries recharged by solar energy.

The radio network was established in 1966, but it took three years to perfect the system. Elk became an unexpected problem by taking an antagonistic view of the 4 x 5 foot metal pillows and causing trampling damage at some sites. They even refused to be fooled by a camouflage of pine needles. Construction of fences around the sites finally eliminated the problem.

Ice buildup heavy enough to snap transmitting antennas is still a problem at some sites.

A new radioactive isotopic snow gauge developed by the Atomic Energy Commission is being field tested on Mt. Hood and could prove to be better than the pillows. It is designed to measure snowpack depth, something the pillows can't do, and can provide snowpack density readings at one-half inch intervals for any depth.

This additional information will tell where ice layers are located in the snowpack and how much rainfall the pack can absorb. This will provide accurate flood control information on river peaks two or three days before they occur.

Snow job

stations dotting mountains throughout Oregon, said Soil Conservation Service (SCS) employe T. A. George who is responsible for Oregon's snow measurement operations.

Although the automatic stations will not be used at all snow measurement locations, their presence at key sites will greatly increase water forecasting accuracy.

Such forecasts are important to many Oregonians. They are used to predict stream rise and potential flooding conditions. Power companies utilize them

lishing cropping patterns, Oregon Agricultural Experiment Station funds have been helping support improved snow measurement methods.

The automatic measuring stations, linked to the Portland SCS office by a radio network, provide daily readings of snow water content. Other information affecting the snowpack such as air temperature, wind, solar radiation, precipitation, soil temperature and moisture under the pack is also recorded.

The daily readings provided by the



T. A. George approaches a snow survey site in the Cascades.

Stripping has revealed some bare facts about Royal Ann, Oregon's number one cherry.

USDA production statistics for 1970 show that Oregon has the nation's leading cherry brining industry. The cherries are used primarily as maraschino cherries for cocktails. Some also are used for sundae topping, ice cream and fruit cocktail.

A major problem in the industry has been the development of defects during the brining process known as solution pockets. The pockets are formed by internal tissue ruptures in the cherry, causing it to become soft and flabby. The result is a lower quality cherry.

An uneven water or solution intake during the brining process that exerts internal stress and ruptures cell walls is the suspected cause of solution pockets.

OSU Food Science and Technology researchers Robert Cain and Darrell Beavers feel they can eventually solve the solution pocket problem by understanding the physiology of the cherry.

Added knowledge

One of the most recent additions to their knowledge of the cherry has been work completed under their direction by Lester A. Wilson, a National Defense and Education Act fellow now doing doctorate work at the University of California in Davis.

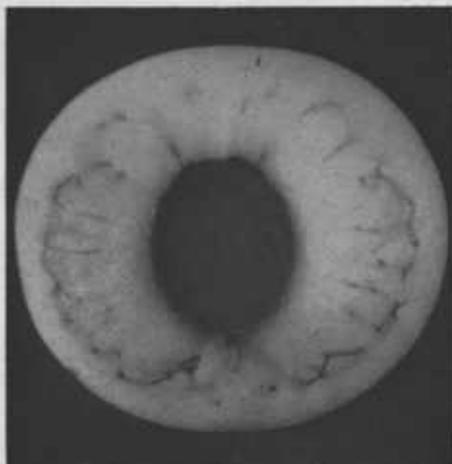
"The work confirmed many things we suspected but didn't know for sure about the cherry and changed our thinking on some other things," said Cain.

Most of Wilson's research concentrated on characteristics of the cherry cuticle—a thin wax-like layer covering the skin of the cherry.

The cuticle is important because brining chemicals must pass through it before they can enter the cherry to kill, firm and preserve the tissue.

Primary objective of the study was to investigate the cuticle's effect on water and chemical intake, with the expectation that a better understanding of this process would lead to some clue about the formation of solution pockets.

Royal Ann gives up a secret -- of anatomy



Top: Cross-section of a normal brined Royal Ann cherry. Bottom: Cross-section of a brined Royal Ann cherry with a solution pocket.

One theory the study disproved was the belief that the brining solution entered the cherry through small pores in the stomata—small cellular structures in the cuticle that permit the transfer of gasses through the cuticle.

Wilson confirmed that surface tension of water (as had previously been found to be the case in leaves) prevented passage of liquid through the extremely small stomatal openings. Instead of entering through the stomatal pores, he found that liquids entered through microscopic pathways called ectodesmata, which act like a wick drawing the solution into the cherry. Ectodesmata are concentrated in the stomatal guard cells surrounding the stomatal pore, but they can also be found in other areas of the cuticle.

Wilson found a greater number of ectodesmata on the side opposite the cherry suture (the small cleft that characterizes one side of many fruits).

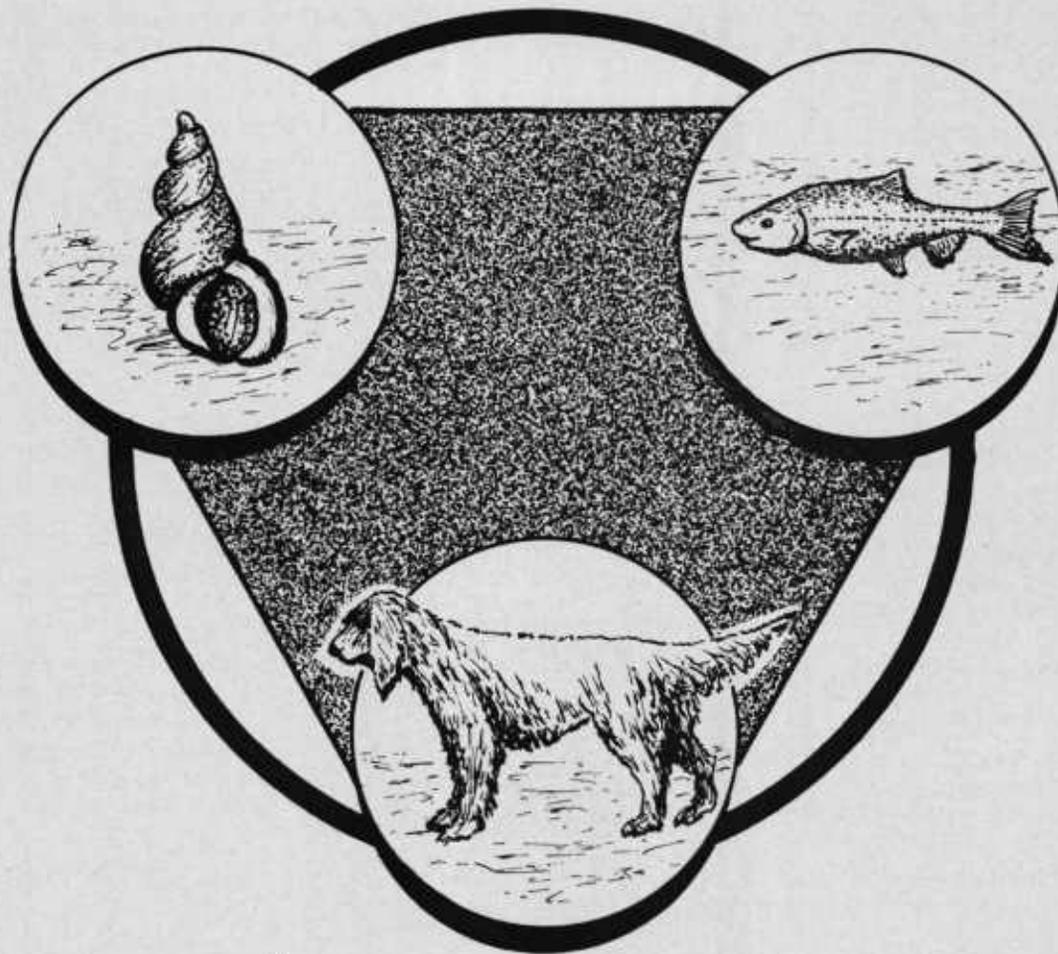
Cuticle removed from cherry

He was able to successfully strip the cuticle from the rest of the cherry by using enzymes to digest the cherry flesh. He found the cuticle was relatively smooth compared to other fruits and leaves and that it consisted mostly of wax, pectin and cellulose.

By gluing the cuticle to ends of glass tubes, the transfer of solutions through the cuticle could be studied by simulating the brining operation.

This led to the discovery that the cuticle was a selective one-way screen. Brining chemicals could pass from the outside to the inside of the cuticle but were blocked from going the opposite direction. The chemicals also penetrated the cuticle most rapidly from the side opposite the suture, allowing one side of the cherry to be exposed to the brining solution faster than the other.

"Main value of the study is the detailed information it provides about the transfer of brining chemicals through the cuticle and their effect on physiological processes of the cherry," said Cain.



Raw salmon and trout "poison" more than 1,700 dogs a year in Western Oregon, a survey of state veterinarians shows.

If untreated, the disease is fatal.

It is caused by a virus-like organism hitch-hiking in a worm that infects many fish found in western streams and virtually all salmon and trout. Without the worm, the organism, present in all stages of the worm's life cycle, could not exist. Likewise, fish, fish-eating mammals and birds and a specific fresh water snail are necessary for the worm to survive.

The disease, commonly called "salmon poisoning" disease (a misnomer because salmon are not poisoned nor do they cause the poisoning), is limited to Western Oregon and western areas of Northern California and Southern Washington because these are the only areas where the fresh water snail essential to the disease-harboring worm's life cycle is found. In Oregon, the snail is found only west of the Cascades.

A misnomer

Salmon 'poisoning' disease

After eating salmon or trout, dogs are victims of a strange hitchhiker

Salmon poisoning disease (SPD) was first reported in the early 1800s. Basic research was done by the OSU Department of Veterinary Medicine in the 1930s. Recently, SPD has been the object of a six-year research program by the OSU Departments of Fisheries and Wildlife and Veterinary Medicine.

The adult worm lives harmlessly in the intestines of many species of fish-eating birds and mammals. The SPD organism hitch-hiking in the worm is fatal only to canines. Reasons for selectivity of the disease are still unknown, said Raymond E. Millemann, professor of Fisheries and Wildlife participating in the study.

If eggs from the adult worm, released in feces of the host animals, find their way into fresh water, they hatch into microscopic forms that invade the water snails. They reproduce in the snail and are released in a different form that infects fish. The life cycle is completed when a bird or mammal feeds on the fish.

Several discoveries related to SPD were made during the most recent research effort. The list of animals that harbor the worm has been expanded to include fish-eating birds such as the heron and merganser and animals such as the river otter, shorttail weasel and spotted skunk. Fish other than salmon and trout were found to harbor the parasite.

Salt-water fish dangerous too

The raccoon, although previously known to carry the worm, was found to be the principal host for the parasite. The bobcat, mink and Norway rat are other common hosts for the worm.

The research showed the SPD-causing organism was present in eggs of the worm, the only part of the parasite's life cycle where the virus-like organism had not previously been found.

It was also found that salt water does not kill the worm in infected fish as was believed by early researchers.

"This means dogs can be poisoned by eating either ocean-caught or freshwater fish," said Millemann.

Retention of the parasite by sea-going fish leaving coastal streams makes it an excellent biological tag that could be used to identify the origin of fish caught on the high seas, said Millemann.

"This could be important in helping determine Oregon's contribution to the high seas fishery," he added.

Can harm fish

The research also concentrated on the effect of the worm on fish. Heavy worm infections killed salmon under experimental conditions. It was found that native species such as the coastal cutthroat trout, rainbow trout and coho salmon are more resistant to the parasitic worm than non-native species such as the Atlantic salmon and Montana black spotted cutthroat trout.

"We can speculate that effect of the parasite on these non-native species

Signs of salmon 'poisoning' disease in dogs . . . are similar to and often mistaken for distemper.



This fresh water snail carries a parasite that hosts an organism which causes salmon "poisoning" disease. Large numbers of the snail live in most Oregon creeks and streams west of the Cascades.

might be one of the reasons why they have not been successfully established in Western Oregon streams," said Millemann.

Two Fisheries and Wildlife Department student research projects are finding the worm has other effects on

fish including retarding their growth and swimming ability.

Man can be infected with the worm, but is resistant to the SPD organism. Cooking or hot-smoking fish destroys both the worm and its hitch-hiker.

Unlike man, dogs and other canines infected with the worm usually die unless treated. Although no immunization has been developed for the disease, it can be cured by drugs. Once recovered, dogs are almost always immune to the disease, even though they may become reinfected with the worm.

SPD signs similar to distemper

Signs of SPD in dogs, usually occurring five to seven days after eating infected fish, are similar to and often mistaken for distemper.

Signs include fever, appetite loss, weight loss, and sometimes vomiting, diarrhea and discharges from nose and eyes. Main method for diagnosing SPD is by looking for eggs of the worm in the stool of a dog suspected of having the disease.

Death in untreated animals usually occurs 10 to 14 days after signs appear, said Millemann. Natural recovery occasionally happens either because of genetic resistance to the disease or because the animal may have eaten only a small amount of infected fish.

Aside from development of a vaccine, there is little hope for preventing SPD. The worm host most vulnerable to attack by man is the snail. However, the snails are present in flowing streams in such large numbers that there is no effective way to eliminate them.

The parasitic worm and its hitch-hiking SPD-causing organism are a biological curiosity. Similar relationships where one parasite is the host to a second parasite are known to exist in only two other instances—swine influenza and blackhead disease in turkeys.

When logging goes . . . ?

How do you pave the way for change in an area where logging is king?

This problem is facing Douglas County, the nation's leading timber-producing county, where nearly all segments of the economy depend on timber harvesting, hauling and processing.

Although rate of cutting in the county is still high, production on private timber holdings is expected to decline and the allowable cut has decreased on federal timber lands, creating potential for a substantial overall decrease in timber and timber-related income in the area.

The decrease is expected to gain momentum as the cut from private forests is reduced and as public forestland management reflects concern for conservation and maintenance of stable production from public forests.

The economic structure of Douglas County, the effect of economic change on sectors of the economy, and possible alternatives to offset decreases in any sector are being studied by the OSU Department of Agricultural Economics.

"One alternative we're taking a serious look at is recreation," said Russell C. Youmans, agricultural economist directing the study.

"Recreation activities are increasing nationally and we would like to know how much recreation it would take to offset a certain percentage decrease in timber income.

"We also want to identify economic sectors that will suffer from the timber decline and those that will benefit from new industries," explained Youmans.

Youmans stressed that relationships among the economic sectors should be fairly reliable under a wide range of economic growth alternatives.

"These relationships, showing where the impact of change will be, are the most important part of the study," said Youmans.

U.S. Forest Service economists, the Douglas County commissioners, Extension agents and the Roseburg Chamber of Commerce have all cooperated to make the study possible.

Five hundred businesses in the county were surveyed in preparing the economic model. These included all the lumber businesses and samples from 18 other groupings such as retail, finance and transportation.

The study has several potential uses.

It should help public forestland managers understand the effect of policy alternatives. It also will help county planners decide what types and how many new businesses they should try to attract to offset changes in a given sector of the economy.

Use of the study holds the prospect for a continuing program of economic evaluation connected with comprehensive planning.

Prevalent 'pink' problem plagues

Farmers are learning to live with pink root rot, a fungus disease prevalent in the onion-growing areas of Eastern Oregon, but they would rather live without it.

"Pink root disease is one of the most serious diseases affecting onions," said OSU plant pathologist Edward K. Vaughan, who has been working on the problem the last nine years.

The fungus attacks onion roots, slowing or stopping all plant growth. It is characterized by a pink color.

Fumigation helps

It has been only within the last five years that economic loss could be prevented by using fumigants to reduce the fungus in the soil early in the growing season.

"By the end of the season there is just as much fungus as before fumigation, but the head start the onions get early in the season allows a crop to be harvested," said Vaughan.

Vaughan believes the root fungus is present in all soils. It has been found in roots of almost all grasses, cereals and vegetables.

"It occurs throughout the world, but only causes economic losses in onions and tomatoes," he added.

Soil temperature critical

Soil temperature seems to be the factor governing severity of root rot. Little damage occurs until temperature

in the root zone reaches 70 degrees. Greatest damage is experienced during long periods of over 90-degree weather, explaining why the problem plagues Eastern Oregon more than the rest of the state.

Vaughan doesn't recommend fumigation as an annual practice because the fumigants aren't selective and might sterilize the soil.

"A good farmer will rotate onions with other crops to keep the fungus down," said Vaughan.

Vaughan's research, supported by the Malheur and Southwestern Idaho Onion Growers Associations, is directed toward several aspects of the fungus problem.

Some onion varieties have more resistance to the fungus than others. However, the resistant varieties are small and not acceptable for commercial production. Vaughan is trying to pinpoint the reason for the resistance to help breeders come up with an accept-

able commercial variety with the resistant characteristics.

Work continues on screening new fungicides and fumigants for effectiveness, and a soil bio-assay technique is being developed to determine which fields have a heavy infestation of the fungus.

An investigation of a suspected relationship between the amount and type of nitrogen fertilizer used and the prevalence of pink root rot is also beginning.



Uncontrolled pink root rot means economic disaster for the onion grower. Effect of the disease can be seen on the onion on the left, compared to a healthy onion.



Milk bars, using an ewe milk replacement, are becoming substitute mothers for young lambs.

Hormones trim lambing cycle

Pregnancies are replacing expense-paid "vacations" in Eastern Oregon.

Researchers at the Eastern Oregon Experiment Station in Union produced a crop of lambs every 8½ months for three years from ewes experimentally treated with hormones to induce estrus (heat) outside their normal breeding season.

The goal is to reduce the lambing cycle even further to get two crops of lambs from the same ewes each year. By keeping the ewes pregnant, production efficiency can be increased. Sheep normally bear only one crop of lambs a year and enjoy several months of leisure at their owner's expense after weaning their lambs and before their natural breeding period (in Eastern Oregon, late August through February).

Crossbred ewes from Columbia and Targhee mothers and sired by Hampshire rams were used in the experiment conducted by station superintendent J. A. B. McArthur. Each breeding period lasted approximately 35 days with the first one beginning August 1—slightly ahead of the normal breeding period. Subsequent breeding periods began April 15 the following year and January 1 and September 18 the third year.

Treated ewes breed earlier

The first breeding period, using yearling ewes, was divided into two- and three-week segments. During the first two weeks most of the treated ewes were bred while only one of the nontreated ewes conceived, showing the hormone treatments were effective in inducing early fertility. Most of the nontreated ewes were bred during the next three weeks because this period coincided with beginning of normal estrus.

Lambing percentage was highest among the treated ewes. Since ram exposure to ewes in both groups was five weeks, increased lambing among the treated ewes was attributed to the hormones that made the treated ewes the only ones in estrus during the early part of ram exposure.



More lambs in less time is one of the research objectives of the Eastern Oregon Experiment Station.

The second breeding period, which occurred when ewes are normally not sexually receptive, produced lambing percentages of 84 percent and 106 percent for two groups of treated ewes and only 26 percent for nontreated ewes.

The remaining two breeding periods fell when ewes normally ovulate and no significant differences were noted among variables measured between the treated and nontreated groups.

Hormones increase lamb crop

Overall, for the three-year period, the treated ewes gave birth to more lambs and weaned more lambs than nontreated ewes. Improved performance of the treated ewes was largely attributed to ability of the hormone treatment to cause estrus during the April breeding period when sheep usually are not receptive.

Nontreated farm flock ewes at the Eastern Oregon Experiment Station, with a six-week breeding season beginning August 15, usually have a 160

to 170 percent lamb crop. Both treated and nontreated groups met or exceeded this average from all breedings except the ones occurring during the anestrus periods August 1 to 15 and April 15 to May 22.

The Station also is working on other management problems that must be overcome before stepped up production from ewes receiving hormone treatment becomes practical. One such problem is the care of lambs as weaning dates are moved up to accommodate shortened breeding cycles.

Lambs from the hormone experiment were weaned at 60 days of age. The Station is experimenting with even younger weaning ages ranging from 2 days to 45 days of age. Researchers are also developing feeds and feeding practices for lambs weaned at such tender ages.

Result of the work could mean doubled lamb production from flock sheep in the Northwest.



To determine the effect of water stress on suckling calves, the watering tank (left) is raised so only the cow can reach water. Con-



trol group calves have access to all the water they want.

Water lack turns off beef profit

Watering livestock on western ranges should be a moving experience.

Noncontrolled permanent waterholes, inadequately distributed on semi-arid rangelands, are as much a hindrance to efficient rangeland use as a scarcity of water, contends USDA range scientist Forrest A. Sneva. They create overgrazing in nearby areas while good grazing land distant from water is underutilized.

Sneva, working at the Squaw Butte Experiment Station, is investigating the influence of water distribution on range utilization and beef production.

"We need a water procurement method that lets us relocate the waterhole and decide where cattle should graze," said Sneva, who is in the fourth year of a proposed 10-year water management study.

Bureau of Land Management

figures show that 64 percent—approximately 8½ million acres—of Oregon rangeland managed by BLM is not adequately watered for optimum forage utilization.

Water placement important

There are several ways to bring water to these arid lands, including hauling or establishing networks of wells and man-made waterholes, but little research has been done on where the water should be placed for best livestock performance.

Sneva's work shows that suckling calves trailing with their mothers one mile to water gain less than those having water readily available, and that all animals required to trail at least a mile to water show a strong reduction in water, salt and bone-meal intake. Yearling cattle watered every other day gained less than yearlings with ready access to water. Every other day watering reduced water intake to approximately 35

percent of the intake by cattle watered daily.

Suckling calves three to five months old and not having access to water also did poorly, showing reduced average daily gains four-tenths of a pound less than calves the same age that have access to water. During the last two weeks of the two-month study, the restricted calves were gaunt and generally looked poor.

Sneva's research gives some insight to problems that have to be considered when planning waterhole density on the range. If the trailing distance to water is too long, encouraging the calf to remain behind while its mother goes for water, there may be a gain loss because of water

stress. However, if the calf does trail to water, the effect of walking long distances might have the same effect.

"If the calf is seldom seen trailing with its dam to water, distances between water and forage supply are probably too great and top calf gains won't be realized," said Sneva.

Trailing distances greater than one mile are suspected of inducing significant economic loss through reduced gain, he added.

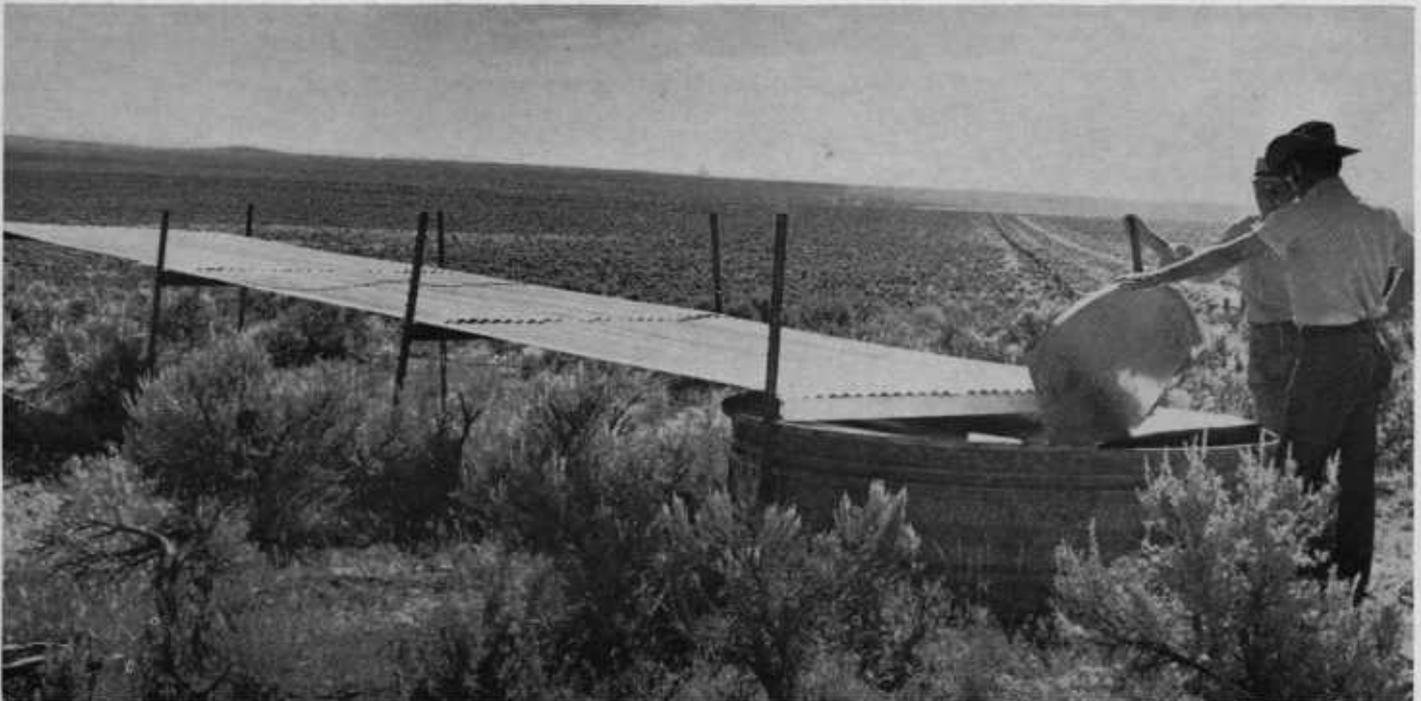
Portable systems needed

Since efficient water catching and storage systems are a key to opening unused grazing areas limited by lack of water and taking grazing pressure off areas around waterholes,

Sneva is researching portable systems for catching and holding rainwater.

Water catchment systems aren't new, but most are too large to be compatible with the concept of increasing the number of locations to provide uniformity in grazing and better animal gains. Installation is also limited in some remote areas where labor-saving devices such as backhoes and other power equipment can't be used to build catchments.

Sneva wants a system that can be easily and economically assembled and small enough to haul in the back of a jeep, making it available for use in all but the most remote areas and easy to move for regulating grazing patterns.



Portable water catchment systems easy to set up and small enough to be hauled into remote loca-

tions are being designed to open up new range grazing areas.

Special lilies will provide holiday color

The traditional Easter lily may soon have some colorful counterparts representing Valentine's Day, Mother's Day, Memorial Day and other special days.

It's all part of an effort to extend lily marketing to a year-around basis and take advantage of attractive colored lily varieties.

Colored lilies are already successful in the garden, but coaxing them into a pot and making them desirable to the consumer is still a problem, said OSU horticulturalist L. H. Fuchigami.

"Colored lilies are too tall to make a durable and attractive potted plant," he said.

The lilies have a tendency to grow from three to nine feet tall. The desired height is under two feet. By experimenting with chemicals and growing methods, Fuchigami is trying to solve the height problem.

He is also trying to develop techniques for forcing colored lilies—the process of programming a bulb to produce a plant with certain characteristics and a planned flowering date.

Easter lily forcing has been refined to the point where the plant is certain to flower on Easter weekend, regardless of the date. However, the same forcing procedure won't work for colored lily varieties and each variety has different forcing requirements.

Fuchigami, with Gloeckner Foundation support and bulbs contributed by Oregon and California growers, has selected three promising varieties, set up forcing experiments and is working with a new growth retarding chemical to control plant height.

If all goes well, lilies comparable to

Horticulturalist L. H. Fuchigami is using chemical growth regulators to control the height of colored lilies.

research briefs

orchids in beauty should soon be available for special occasions throughout the year in supermarkets and other mass outlets, said Fuchigami.

OSU horticulturist Al Roberts, who has worked with lilies since they were first produced in the United States during World War II after imports

from Japan were cut off, is assisting Fuchigami with the colored lily research.

Lily growers concentrated in the coastal areas of Southern Oregon and Northern California produce more than one million dollars worth of lily bulbs annually.



Foam may anchor tree pesticides

Foam may be the solution to pesticide drift in nut orchards.

USDA horticulturalist Harry Lagerstedt is testing commercial foaming agents and application procedures to determine those most effective for eliminating drift and improving foliage absorption of herbicides such as 2,4-D. Coverage can be controlled by regulating concentration of the foaming agent and application methods such as pressure, nozzle design and ground speed.

Foam is successfully used in aircraft application of pesticides where it is necessary to minimize drift and keep the chemicals from harming neighboring crops. However, the tree canopy eliminates possibility of aerial application to the orchard floor.

Two methods of ground application are being tested. One utilizes a foam generator which incorporates air with the foaming agent and then pumps the resulting foam through a hose and nozzle. The other method uses a regular solution pump and a specially designed aspirating nozzle that forms the foam.

Mint silage passes taste, protein tests

Mint flavored steaks?

Not likely. But silage from mint wastes does make good livestock feed.

OSU animal nutritionist D. C. Church, conducting mint digestibility trials with yearling wethers, found that the total digestible nutrients in mint silage compared favorably with alfalfa.

Crude protein content of the silage is approximately the same as medium quality alfalfa. However, digestibility of protein is low—about one-third that of alfalfa—making it necessary to use a protein supplement in the diet of animals being fed mint silage.



Foam generator and foaming agents are field tested.

Low digestibility of protein probably results from the heat mint is subjected to during the oil distillation process, said Church.

Mint residue from the distilling process is usually dried and burned. Ensiling offers an alternative use, possibly reducing the cost of livestock feeding.

The mint should be well packed and watered until water runs out of the stack to make good silage. The silage, although stemmy, has good odor and was well eaten by the test sheep.

Slippery villains are run to ground

Greenish tuff and breccia soils found in the western Cascades are earning a bad reputation among OSU soil scientists.

Department of Soil Science studies have confirmed the long-standing sus-

picion that these olive-colored soils, formed from volcanic ash, are structurally weak and subject to mass movement in wet weather. Tuff and breccia soils reddish in color are more stable.

A study, supported by the U.S. Forest Service, analyzed the mineralogy of these soils and found that they contain smectite, a clay mineral with a seemingly indefinite capacity to absorb water. Retention of large quantities of water structurally weakens the soil, making it unstable. Montmorillonite, a well-known smectite, produces the greenish color. Smectite, usually confined to clay-sized particles, was also present in large silt-sized particles.

Now that the troublesome characteristics of these olive-colored soils have been traced to their clay mineral composition, their color provides an accurate and easy way to identify them. This is particularly useful in developing soil maps. Whenever possible, these soils should be avoided in road building, as they are prone to slides and washouts.

(Continued from page 3)
closely related to the difference in metabolizable energy content.

Pigment added for color

"In studies with dwarf layers, it was found that the hens consumed considerably more feed and produced eggs slightly smaller when fed wheat compared to a similar group fed corn," he said.

"Yolk color also was lighter with wheat. When two percent safflower oil was added to wheat-based rations in place of animal fat (prime tallow), eggs from the wheat-fed dwarfs equaled in size those of the corn-fed dwarfs. It was concluded that the increase in egg

with either corn or wheat. Broilers fed barley grow poorly and convert inefficiently unless rations are pelleted, contain three to four percent added fat, contain an enzyme supplement or contain at least 10 percent corn.

High in protein

A third agent, Kronstad pointed out, is triticale which offers tremendous potential as a feed grain. Lines of triticale, combining the desirable attributes of wheat and rye, have been identified with exceptional nutritional qualities. Some compare favorably to egg yolk in protein quality.

"Unfortunately, in addition to the desirable characteristics, several unde-

"... the world's third leading grain crop, sorghum has a protein content and yield similar to corn ..."

size was due to the linoleic acid supplied by safflower oil."

For broilers fed wheat, it is necessary to add fat for improved efficiency and xanthophyll, a pigment, to give yellow color to market broilers which the housewife likes. The pigment occurs naturally in corn and alfalfa.

OSU poultry scientists are testing the use of wheat as feed on broilers, layers and turkeys.

A second approach to the feed grain problem is developing a high-yielding barley variety with a genetic factor to provide a better balance of essential amino acids, lysine in particular. Such a source of feed could be important in poultry and swine rations.

Cattle can digest the barley hull which is a major problem with swine and poultry because to them it is indigestible.

"We have concentrated on ways to make barley more competitive with other feed grains," said Oldfield. "We have investigated pelleting to improve its use, studied the addition of beef tallow to increase the ration energy contents and researched the use of hull-less barley (naturally or mechanically dehulled)."

Under present economic conditions, Arcscott said, barley cannot compete

sirable factors also are present," said Kronstad.

"Hopefully, through breeding, it will be possible to remove the deleterious factors and develop varieties of triticale adapted to growing conditions in Oregon."

The fourth and surprising approach is sorghum.

The world's third leading grain crop, sorghum has a protein content and yield similar to corn. Now a major human food crop of Asia and Africa and an important feed grain in North and South America, sorghum could have a future in Oregon.

Elmer Johnson, a former OSU scientist working in Mexico, has developed new lines of sorghum which mature quickly, are day-length insensitive and which seem adaptable to cooler conditions.

If the new variety takes to Oregon, where it will be tested this year, it could mean double cropping on irrigated lands at Boardman, Umatilla, Madras and the Klamath Basin, said Kronstad.

With four approaches, the OSU cereal breeding program could change several things in Oregon, one of them spelling.

The new version of success: f-e-e-d.

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