Oregon's Agricultural PROGRESS

Berry Creek---
Stream for Research

Steers Fed on Sliding Scale Gain Faster

New Crops for Columbia Basin?

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COVER STORY: Student scientist checks equipment in Berry Creek, experimental stream north of Corvallis. Bottle is designed to capture insects and other water life used in research described on page 8.

Photo: Bill Reasons

LIVESTOCK MARKET prospects for 1960, and the outlook for farming generally, took an unexpected turn for the better just before the new year arrived.

The brighter side began to show in late December when the U. S. Crop and Livestock Reporting Service released the pig crop report just as it has in many previous Decembers. This time its contents surprised a good many students of farm trends much more than usual.

Pork prospects change outlook

As a matter of fact—the pig crop report contained not one, but two, surprises.

First, it revealed that the number of hogs on farms in the nation's leading hog-producing states was almost exactly the same as a year earlier. Previously, most analysts had expected more to show up—enough to keep marketings in the first quarter, and perhaps the first half, of 1960 above a year earlier. We were wrong, if the pig survey report is right. Really, there is little reason to believe that the report is very far off—at least, it seldom has missed the hog inventory mark very much in the past.

The second surprise, with even greater significance, was the evidence that the nation's hog raisers were planning to farrow 12% fewer sows than in the spring of 1959. With average luck at farrowing time, this would mean 11% fewer pigs than were saved last spring, or about the same number as saved in the spring of 1958. Prior to the December report, leading Midwest and USDA analysts had expected a spring pig crop considerably larger than in 1958, probably little smaller than last spring's large crop. Here in Oregon we had been inclined to go along with this considered conclusion, although we were aware that there is a new unmeasured force influencing hog and corn raisers' plans.

We had recognized that profits from hog raising, as indicated by hog-feed price ratios, had declined sharply during the past 12 months; but these ratios had not gone as low, nor had they been down as long, as in other years like 1955 and 1951, which immediately preceded sharp downturns in the nation's hog production.

What, then, tripped the experts? What is the new force? It is the new

Farm income prospects improve . . . spring pig crop probably will be smaller than in '59 . . . cattle prices may be higher than expected . . .

Farm Outlook

By Agricultural Economist M. D. Thomas

corn program. For the first time in history, practically all corn growers and other feed grain growers who can provide or find suitable storage, may obtain a government loan on their crop or sell it at prices equal to, or better than, loan values. This assures a definite known return for the grain. Apparently this, to many farmers, is considerably more attractive than the uncertain returns from feeding more hogs at this time.

Other reasons for change

There may be other reasons. Undoubtedly, hog producers recognize the almost certain reduction in prices that would have resulted from a further expansion in pork supplies at this time. Likewise, the chance for better prices resulting from reduced supplies may have been a consideration in the minds of some.

Lowest hog prices past

Regardless of the reasons for the generally unexpected turn of events, it now appears that the worst of the hog prices in the present cycle are past. This turning point has come 5 to 10 months earlier than thought likely earlier. The price rise now underway seems likely to extend, with moderate daily and weekly variations, through the summer of 1960.

In the fall, hog prices will turn downward temporarily during the season of heaviest marketings from the spring crop, but prices probably will stay well above the past December's lows—perhaps by as much as a nickel a pound—unless hog raisers veer from their reported farrowing intentions far more than they usually do, or unless the pace of the nation's economy in 1960, for some obscure reason, turns out to be much slower than generally anticipated at this time.

Other livestock affected

The changed hog picture carries significance and implications to farmers in Oregon and throughout the nation whether they raise hogs or not. In fact, the change could wipe out the drop in net farm income which had been expected earlier.

Here in Oregon, it carries special significance to our cattle industry which currently accounts for nearly 20% of the state's farm income and 80% of the income from meat animals.

The change in pork supply prospects means that cattle prices will be higher than they would have otherwise been. Some consumer dollars that would have been attracted to pork will now go for beef. Prices of fed cattle and beef at retail now seem likely to stay close to late 1959 levels instead of working lower as had been expected earlier. They are not expected to go up much, though, because an increase in beef supplies is expected to about offset the anticipated increase in demand.

Even so, feeder calf and yearling prices will also be bolstered by the improved prospects for end-product prices. But feeder prices in 1960 are not likely to return to the higher levels prevailing in the first half of 1959. Instead, they may fluctuate seasonally around the levels prevailing in the last quarter of 1959. Of course, this assumes there will be no general drought to force herd reduction.

The improved market prospects for pork and beef will, in turn, tend to

(Continued, page 16)

NUMBER of hogs on farms in the nation's leading hog-producing states is almost exactly the same as last year. Hog raisers are planning to farrow 12% fewer sows than in the spring of 1959. Rise in pork prices is now underway and seems likely that it will extend through the summer of 1960.

Meadow Mouse Problems Ahead?

Intensive study of life cycles and living habits of meadow mice will help scientists pin-point years mice are expected to do most damage. Predictions will save money for Oregon growers.

MEADOW MICE are aggressive little animals and will fight almost anything. Mice usually nest underground, but will build a surface nest under wet or flooded conditions. They're also good swimmers.

WILL OREGON FARMERS and ranchers be plagued by another field mouse infestation within the next few years?

Meadow mouse populations go up and down, reports OSC Biologist Edward L. Hansen, and these cycles can make the difference between a good and bad crop year for many Oregon growers.

Predicting the ups and downs of meadow mouse populations will save money for Oregon agriculture, so Hansen is in the middle of a research project to learn as much as possible about the habits of this pesky animal.

By taking a close look at meadow mice, their living conditions, life cycles, and the ways they react to certain situations, Hansen hopes to find a reliable and practical method for predicting population increases which cause extensive crop damages.

Scientists already know several interesting facts about meadow mice . . .

- They need cover for hiding.
- They're aggressive little animals and will fight almost anything.
- They're good swimmers.
- Baby mice open their eyes at 7 days, and are weaned at 14 days after birth.
- Meadow mice normally nest underground, but will build a surface nest under wet or flooded conditions.
- During their peak population cycles, the mice can damage a great percentage of a crop, and may also damage sage and bitterbrush in range country.

Recent research findings have opened up several leads which, with additional study, may help solve the meadow mouse problem.

Spring best for control

¶ Spring seems to be the best time to start a control program—particularly in years when an increase is expected in the mouse population—because of breeding habits.

A meadow mouse may be one of the most prolific mammals studied by scientists. Females mature at 3 to 4 weeks, males mature at 4 to 6 weeks and litters—usually of about a half dozen mice—are produced 4 to 6 times a year.

Hansen points out that in one extreme case a female meadow mouse is recorded to have had 17 litters in a year. So when survival conditions are ideal, the mouse population increases rapidly.

Klamath County mice usually breed between April and October—and the most intense breeding occurs in April and June. Another heavy breeding period begins in September and lasts through October, but this period is less concentrated than the one in spring.

Ordinarily, many young are killed off by disease and other factors, but when conditions are good, mouse population builds up to a peak—and agriculture suffers.

Reduce cover to reduce mice

¶ Reducing cover probably will reduce field mice, Hansen noted. During periods of low population, mice live mainly in waste areas along canals, fence rows and field edges where grass cover is abundant.

When conditions are favorable for an increase in the mouse population, mice tend to leave these covered areas and spread out into surrounding territory. Hansen suggests that controlling mice in these covered areas might give effective protection in years when a heavy infestation is expected.

¶ If conditions for survival are ideal, some measures—such as flooding or ineffective poisoning—may stimulate breeding and even prolong moderate or high populations. In other words, when populations are low, breeding rate may be high, and vice versa.

¶ Mice seem to travel greater distances when cover is heavy and populations low. Researchers are not yet completely sure of the distances field mice move. Normally, mice move an average of from 50 to slightly over 100 feet but in one situation studied by Hansen they moved nearly 1,000 feet to populate a previously flooded and plowed field. Also, extensive movements may occur between fields and higher brushlands when fields are flooded during fall and winter months.

DURING PERIODS of low population, mice live mainly in waste areas along canals, fence rows, and field edges where grass cover is abundant. Controlling mice in covered areas might be effective protection.

¶ Hawks and other predatory birds reduce mouse populations. Hansen's work on the Geary Ranch near Klamath Falls shows one of the highest raptor populations—birds belonging to the hawk family—ever recorded in the United States.

An average of 37 hawks per square mile was counted on the ranch

(*Continued, page 6*)

TRAP designed to measure the distances mice travel. Researchers believe normal distance is from 50 to slightly over 100 feet, but in one instance mice moved as far as 1,000 feet to nest in new area.

MOUSE POPULATIONS in 1959 were quite low and probably below normal. Dry weather may have helped this. Less food was available in some areas.

MICE burrow underground and during peak population cycles may damage big percentage of a crop. May also damage sage and bitterbrush on ranges.

(Continued from page 5)

during the winter of 1958-59. Each hawk may eat as many as 4 to 5 mice per day, so, in a month, each hawk has accounted for at least 150 mice. In spite of this heavy concentration of hawks, meadow mice on the ranch maintain a fairly high annual population.

¶ Numbers of mice in fields in June may be a good indication of the size of an infestation the following fall. Hansen's inspection of various fields in one study area in June and October showed that in almost every instance fields with high mouse populations in June had the highest populations in October. Fields with few mice in June showed little increase by fall.

Oregon had serious trouble with meadow mice in 1957 when nearly 110,000 acres of crop land in Klamath, Lake, Jefferson, Crook, and Deschutes Counties were infested. The County Agent's office in Klamath Falls estimated nearly $2,000,000 was lost to Klamath County agriculture as a result of the invasion.

Mouse activity dropped off drastically after 1957—with the exception of a few areas. Hansen points out that eastern Oregon range lands were heavily infested during spring of 1958. This range land infestation may be fairly typical, according to Hansen, in that it started in fall 1957, reached a peak by about June 1958, and then declined.

Hansen suggests that this pattern of irrigated land infestation followed by dryland population build-up probably should be anticipated during future outbreaks.

Several factors probably accounted for the abrupt drop-off, or crash, in mouse population following the 1957 plague.

One of the most important factors is probably the stress suffered by mice during the peak population cycle. Problems of over-population—crowded living conditions, scarcity of food, and so forth—bring about a glandular reaction which causes a general physical breakdown.

This physical weakness makes the animals more susceptible to disease and lessens their reproductive abilities. Mice suffering from this extreme stress also resort to cannibalism—possibly brought on by a craving for salt which is a result of the glandular disorder—

MEADOW MICE are prolific mammals. Females mature at 3 to 4 weeks, males slightly later.

so the population is further reduced and the crash hastened.

Disease attacks the mice during this period, and in 1957 tularemia—a strain somewhat different from that which afflicts rabbits—eliminated a large portion of the mouse population. Mice examined by Hansen since 1957 have not had tularemia, and the reservoir of the disease is a scientific mystery.

Mouse populations in 1959 were quite low and probably below normal. Hansen believes the extreme dry weather contributed to this. In some areas less food was available and many mice failed to survive.

In the year ahead, Hansen plans to construct mouse-proof enclosures which he will use to determine effects of population levels on breeding activity and movement.

Conditions would have to be excellent for reproduction, survival and dispersion of young mice in order for another outbreak—as severe as the one which devastated fields in 1957—to take place.

If some simple method of evaluating intensity of these conditions can be developed, scientists will have other important clues to the possibility of a damaging plague.

In the years ahead, work for prediction of population increases will be intensified, and a simple method of forecasting, useable on a state-wide basis, will be sought to protect Oregon agriculturists from future severe meadow mouse infestations.

Potatoes may look alike, but differ in chemical makeup. Here's a new way to . . .

Cook Potatoes Scientifically

POTATOES with a high solids content will be especially fluffy and mealy when baked or mashed. OSC Home Economists give cooking hints below.

EVER WONDER why some potatoes boil better than others? Or why some "boiling" potatoes are soft and crumbly on the outside but still hard in the center?

It's all due to chemistry according to OSC Home Economists Andrea Mackey and Sue Joiner.

Some potatoes are just naturally mealy—and should be baked, mashed, or French fried. But others are waxy in texture and are best boiled or used in casseroles.

Since all potatoes look much the same from the outside, Mrs. Mackey suggests a simple method to discover whether potatoes are mealy and have a high "solids" content—a fairly high proportion of starch—or whether they are waxy, and have a low "solids" content.

Potatoes with a high solids content will sink in a salty water solution, but potatoes with low solids content will float. Mix 1 cup table salt with 11 cups water and immerse a potato. "Floaters" have a low solids content and are good for boiling for use in casseroles and salads. "Sinkers" will be especially fluffy and mealy when baked or mashed.

Some potato packing plants are now experimenting with this method and, in years to come, potatoes may be labeled so the homemaker will know whether she is buying potatoes with low or high solids contents.

For low solids potatoes—"floaters" —try "Saucy Scalloped Potatoes."

SAUCY SCALLOPED POTATOES

Recipe

Use low-solids potatoes
4 cups raw, pared, thinly sliced potatoes
¼ cup minced onion
¼ cup chopped green pepper
1 teaspoon salt
½ teaspoon paprika
1 can condensed cream of mushroom *or* cream of celery soup
1 cup milk

OREGON NETTED GEMS—Russet Burbanks—are usually, not always, high solids potatoes.

Directions

In large casserole, place alternate layers of potatoes, green pepper and onion. Sprinkle each layer with seasonings. Mix soup with milk and pour over all. Bake 1 hour, covered, in moderate (350°F.) oven. Serves eight.

For high solids potatoes—"sinkers" —try "Sour Cream Fluff."

SOUR CREAM FLUFF

Recipe

6 medium sized, high-solids potatoes
½ cup commercial sour cream
Butter, salt and pepper
Paprika

Directions

Peel potatoes thinly. Cut in pieces and drop in small quantity of salted, boiling water. Cover and cook until potatoes are tender, about 20 minutes. Remove cover. If only a small amount of water remains, do not drain potatoes. Mash and add sour cream. Season with butter, salt and pepper and whip until light and fluffy.

Spoon onto serving plate in fluffy mounds and sprinkle lightly with paprika, or chopped chives or parsley. Serves six to eight.

Designed for Research . . .

Berry Creek

Controlled creek is a new tool to help scientists study life found in natural streams.

TWIGS, LEAVES, and other debris which falls from the air into a stream have an effect on the food and environment of stream life. Suspended screen is used to catch and measure amount of leaves which falls into a given area of stream in a certain period of time. The research creek also contains self-cleaning fish screens.

A CONTROLLED STREAM—a scientist's dream—has become a reality for OSC researchers.

Berry Creek, located north of Corvallis on the Adair tract, has 1,500 feet of its bed set aside for research in stream ecology—a study of the relationship of animal life to its environment.

Fish, crayfish, snails, and all other forms of animal and plant life living within a stream are influenced by their environment according to C. E. Warren, fishery biologist and member of the research team working on the project.

A complete knowledge of *why* various forms of water life react in different ways to particular conditions of a stream is essential for the scientist working to improve or better understand the habits and production of game and commercial fish.

Development of the Berry Creek project will help scientists answer many questions which can't be answered by studying a natural stream or river.

Researchers point out that an entirely natural stream has too many complicating factors for controlled experimentation, and it is difficult to determine the causes of the events which are observed.

Berry Creek, however, is a laboratory stream which permits a considerable amount of control and yet retains the essential characteristics of a natural stream. The influence of light and nutrients on the complex "food chains" existing in streams is the primary problem under study at Berry Creek according to Joseph H. Wales, fishery biologist, who supervises research at the stream laboratory.

All life in a stream depends on some resource for its energy—and the nature of this resource depends on the environment of the stream and the outside influences which affect it.

The amount of natural food present in a stream, amount of sunshine which falls on the water, and effect of this sun on the plants and animals in the stream, and the various problems created by man—logging operations, agricultural practices, and dumping of industrial wastes into streams—all affect growth conditions and food supply.

Another factor being studied is the effect of "enrichment" on fish and other water life in a stream. "Enrichment" is a term for things added to streams by man—some is organic, such as disposal from canneries and packing plants. Other types of enrichment are mineral—such as nitrates and phosphates found in residues deposited in streams and rivers from sewage disposal plants.

By adding various types and amounts of enrichment to Berry Creek, researchers can observe the effect on animal and vegetable life in the stream.

Sunlight affects food

Sunlight which falls on a stream bed affects production of food in the stream itself. Streams flowing in heavy forest and in deep shadow have certain characteristics, and streams which get plenty of bright sunshine have others.

What happens to a forested stream when trees around it are cut and the sunlight is let in? Does food for life in the stream increase or decrease? Or does it change in character? Do new forms of animal life establish themselves in the creek? And what effect do they have on the other animals already located in the stream?

To help answer some of these questions, trees shading parts of Berry Creek are being removed so researchers can observe effects of the changing forest canopy.

Twigs, leaves, and other debris which fall from the air into a stream have an effect on the food and environment of stream life. Scientists are measuring the amounts of leaves which fall into the creek to learn more of these effects. Leaves and twigs are caught in screens to tell just how much debris actually falls into a given area of stream in a certain period of time. From their observations, the researchers will be able to tell whether an addition or reduction of this debris fall will be harmful or helpful to life in the stream.

Screens separate animals

Berry Creek also contains self-cleaning fish screens to separate animals being used in experiments. Crayfish, cutthroat trout, and other species may be separated from each other if necessary for an experiment.

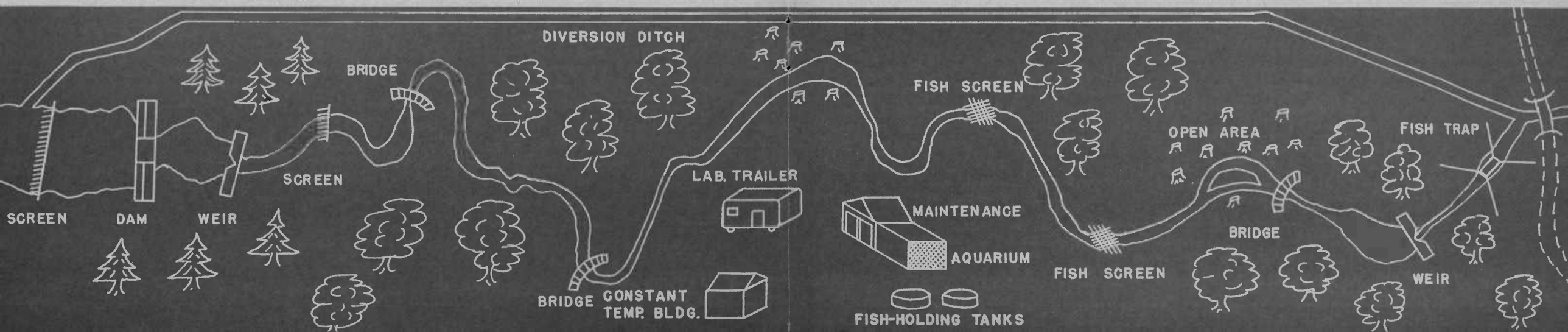
Most experimental work at Berry Creek is done right on the site of the stream. Aquaria, fish holding tanks, and other laboratory facilities are all located nearby. OSC departments cooperating include Fish and Game Management, Botany, Entomology, and Civil Engineering. Scientists from the United States Public Health Service are also participating in the study.

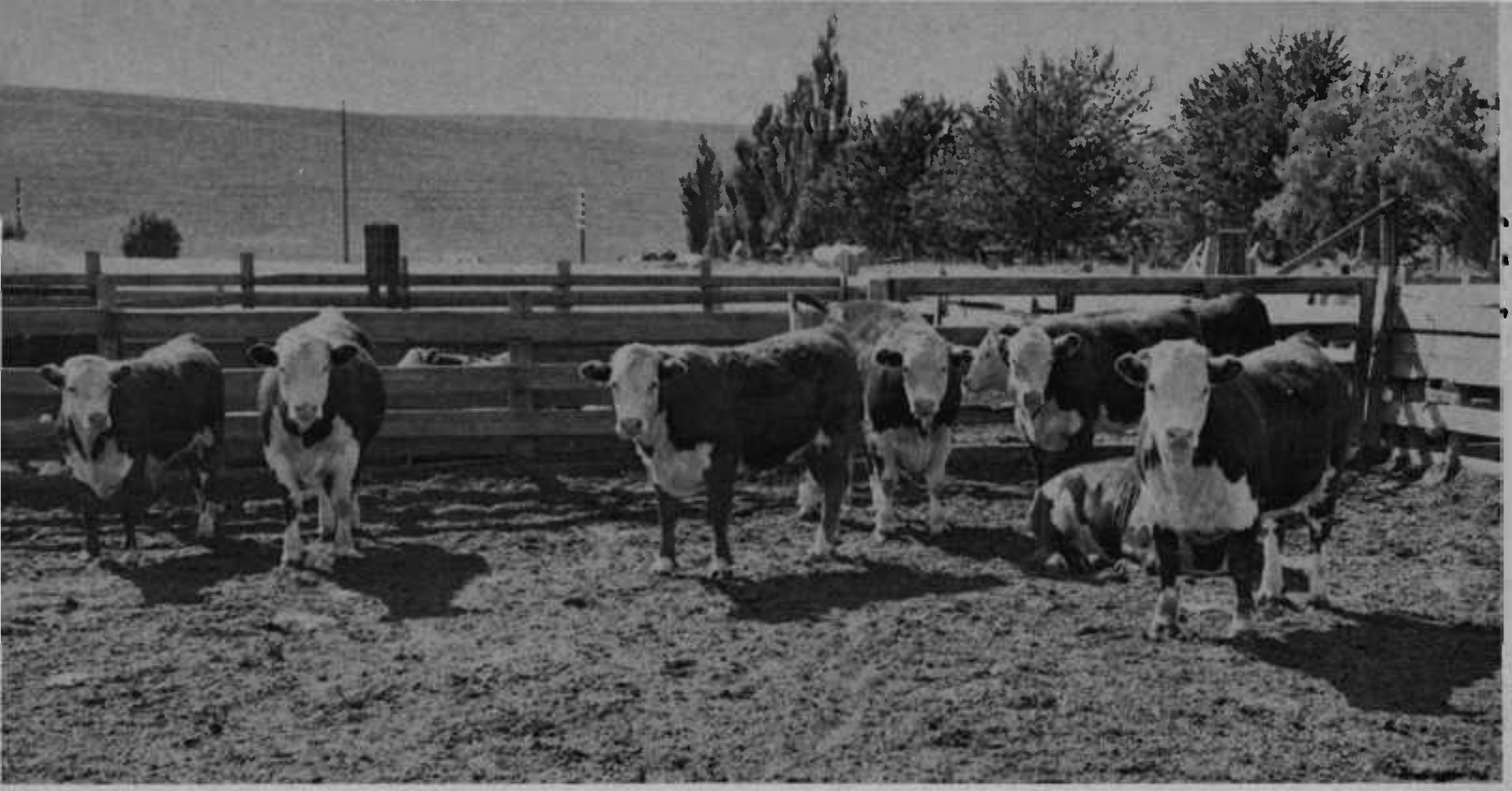
Total purpose of Berry Creek is to help answer questions and solve problems of stream management. Fish production, both of game and commercial fish, will be studied under varying conditions. Effects of these different conditions on food sources will be related to fish production in the stream.

Berry Creek is a long-range research project—while it may not be possible to arrive at definite or startling conclusions within a few months or years, knowledge gained by scientists may some day be applied to fish management problems throughout the Northwest and perhaps throughout the world.

BERRY CREEK, located north of Corvallis on the Adair tract, has 1,500 feet of its bed set aside for research in stream ecology—a study of the relationship of animal life to its environment. Most experimental work is done on the site of the stream. Map below shows location of equipment.

AQUARIA, fish holding tanks, and other laboratory facilities are all located nearby. Dam at head of stream controls flow of water through experimental section of the creek. Berry Creek retains the essential characteristics of a natural stream but permits scientific control by OSC scientists and students.





"SLIDING SCALE" method of allotting daily grain rations produces about 40 pounds more gain per steer during a 250-day feeding period than the same amount of grain fed in a constant proportion to body weight. Results of three years beef research at Milton-Freewater help solve feeding problems.

Better Gains With "Sliding Scale"

Three years beef feeding research at Milton-Freewater indicates a sliding scale method results in extra pounds of gain per steer. Roughage consumption was similar for all animals, so cost of gain was less for steers fed on the sliding scale principle.

It isn't merely a question of "how much," but "how much *when*" in deciding on grain feeding levels for growing and finishing weaner steer calves that go directly into feedlots at weaning.

A "sliding scale" method of allotting daily grain rations produces about 40 pounds more gain per steer during a 250 day feeding period than the same amount of grain fed in a constant proportion to body weight. This is the report from Animal Husbandman D. C. England and County Agent N. O. Taylor after three years of beef feeding research at Milton-Freewater.

Roughage consumption was similar for animals fed by both systems. So cost of gain was less for steers fed according to the sliding scale principle.

This method consists of increasing the ratio of daily grain intake to body weight as the feeding period progresses and the body weight increases.

Table 1 shows a comparison of the sliding scale method to the constant ratio methods of feeding. Animals on the sliding scale received grain at ½% of body weight daily for approximately 90 days, 1% for the next 90 days and 1½% for the remaining days —approximately 90.

England points out that throughout this experiment net return per head was affected by current grain prices and current selling prices. If grain prices were higher than those used in this experiment, profitability of the higher grain ration would be less.

Results show that faster growth and greater economy of feed usage resulted from the sliding scale method than from the constant ration method. Feeding grain at a constant high level (1½% of body weight as daily grain ration) and consequent greater total energy intake resulted in faster growth, more expensive gains and greater net returns than either lower level constant ratio feeding or sliding scale feeding with lower total grain intake.

After this experiment England and Taylor went on to try to combine the lower feed cost per pound of gain resulting from the use of sliding scale with the greater net returns obtained with high level grain feeding (Table 2).

Table 1. Effect of Amount and Distribution of Grain on Feed Lot Performance of Weaner Steers.

No. animals	Method of grain feeding	Av. daily feed		Av. daily gain	Cost/lb. gain		Carcass grade	Net return per head
		Grain	Peavine silage		Feed only	Feed and yardage		
		Pounds	*Pounds*	*Pounds*			*C G S*	
17	1% constant	6.1	27.4	1.62	$0.142	$0.186	0-14-3	$30.90
17	1½% constant	9.6	23.1	2.12	0.138	0.171	9- 8-0	55.43
16	½-1-1½%	6.3	27.5	1.76	0.125	0.165	2-12-2	47.19
18	1-1½%	8.1	23.3	1.83	0.136	0.173	1-17-0	42.38

Table 2. Effect of Amount and Sequence of Daily Grain Intake on Rate and Cost of Gains.

Ration	No. animals	Av. daily feed		Av. daily gain	Cost/lb. gain		Carcass grade	Net return per head
		Grain	Peavine silage		Feed only	Feed and yardage		
		Pounds	*Pounds*	*Pounds*			*C G S*	
(1) ½-1-1½	36	7.5	29.0	1.91	$0.142	$0.179	4-28-3	$16.33
(2) ½-1-1½-2	18	9.1	23.5	2.07	0.146	0.180	6-12-0	24.08
(3) 1-1½-2	18	11.0	19.6	2.09	0.164	0.198	5-13-0	19.83
(4) 1½ constant	18	10.2	24.0	2.08	0.158	0.192	6-12-0	20.84
(5) 1½-2	18	11.8	21.5	2.82	0.191	0.215	10- 7-1	28.13

As in the earlier experiments, animals fed initially at ½% body weight daily and an increasing ratio of daily grain ration to body weight as the feeding period progressed, gained weight faster and more economically than did animals consuming an equal or slightly greater amount of grain fed at a constant ratio of grain to body weight throughout the feeding period. The former also returned a higher net income per animal. This is shown best in Ration 2 vs. Ration 4.

Results were less clear with animals fed on a sliding scale with a higher initial and final level. Animals fed at the rate 1%, 1½%, 2% consumed an average of 11 pounds of grain daily, gained 2.09 pounds daily and returned $19.83 per head as compared to 10.2 pounds, 2.08 pounds, and $20.84 respectively for animals fed a constant ratio of 1½%. Conversely, animals fed at the 1½% level for 150 days and then at a 2% level thereafter consumed an average of 11.2 pounds of grain daily, gained at the rate of 2.87 pounds per head per day, and returned a net profit of $28.13 per head.

England and Taylor determined net profit by using the average price paid for each ration component during the experiment. Hence net profit for the various levels of grain feeding will vary as price changes occur in the ration ingredients.

The way animals responded to the different levels of grain feeding and the manner in which the total grain is distributed throughout the feeding period is independent of price changes for the various forms of feed.

As a result, when grain prices are higher—relative to roughage—than in these studies, a comparatively more favorable net return will result from the sliding scale method than is shown in these experiments according to England and Taylor.

In any price ratio of grain to roughage, a given amount of grain fed at a low level initially and at a progressively higher level in proportion to body weight—as body weight increases—will result in a faster and more efficient gain than will feeding grain at a constant ratio to body weight.

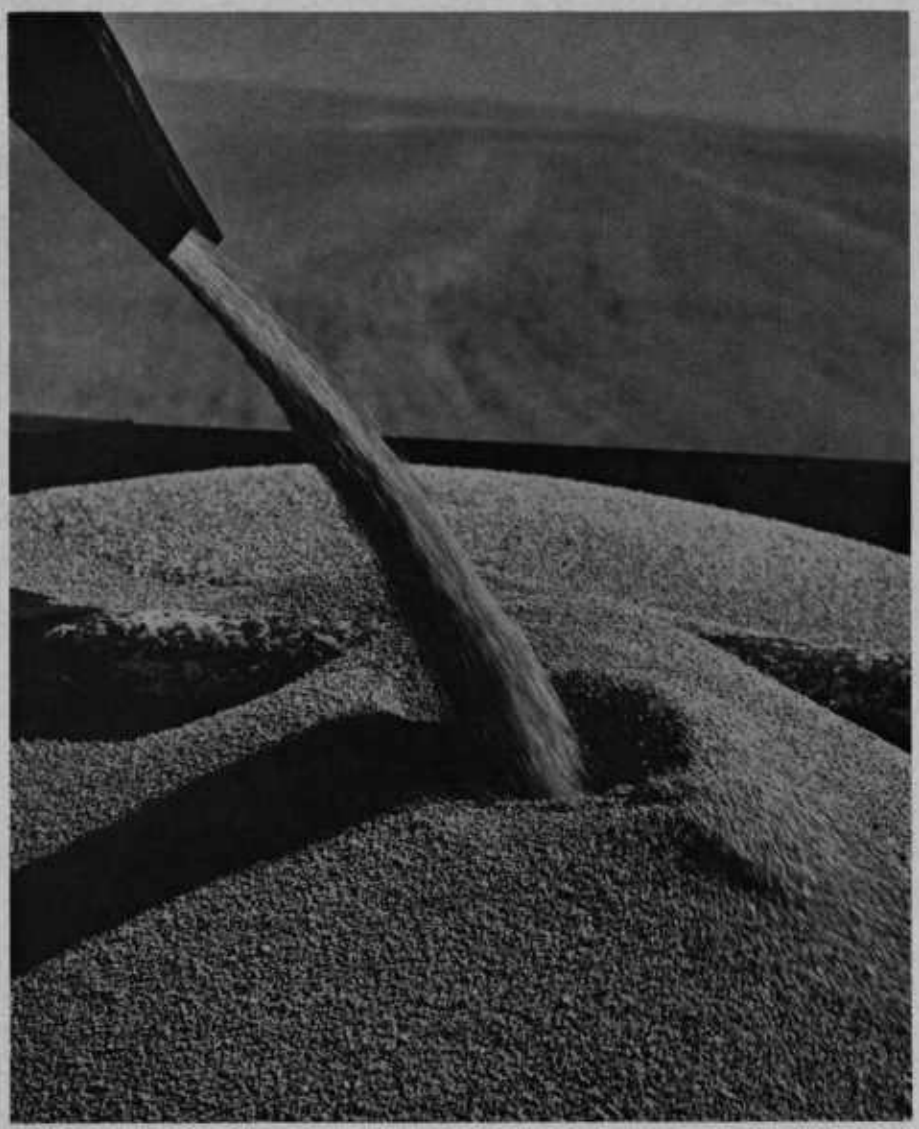
Eating evaluation of rib roasts showed meat quality to be similar from all animals fed. So the producer can choose the most profitable ration without concern for carcass quality effects.

FASTER GROWTH and greater economy of feed usage resulted from the sliding scale method than from the constant ration method. Eating evaluation showed meat quality from all animals was similar.

New Crops for Columbia Basin?

Carrots, safflower, flax, grain sorghum, and canary grass have all been tested experimentally as potential crops for the high, dryland farming areas of eastern Oregon.

Wheat and peas have for years been the dominant crops in certain areas of eastern Oregon. Now scientists are working to develop new crops which are adapted to growing in a high, dry climate.



WILL CARROTS, safflower, and flax ever replace wheat and peas as major crops in the dryland farming areas of eastern Oregon?

While it is doubtful that these crops will ever be produced extensively in the Columbia Basin, researchers at the OSC Pendleton Branch Station are experimenting to find crops particularly adapted to eastern Oregon growing conditions.

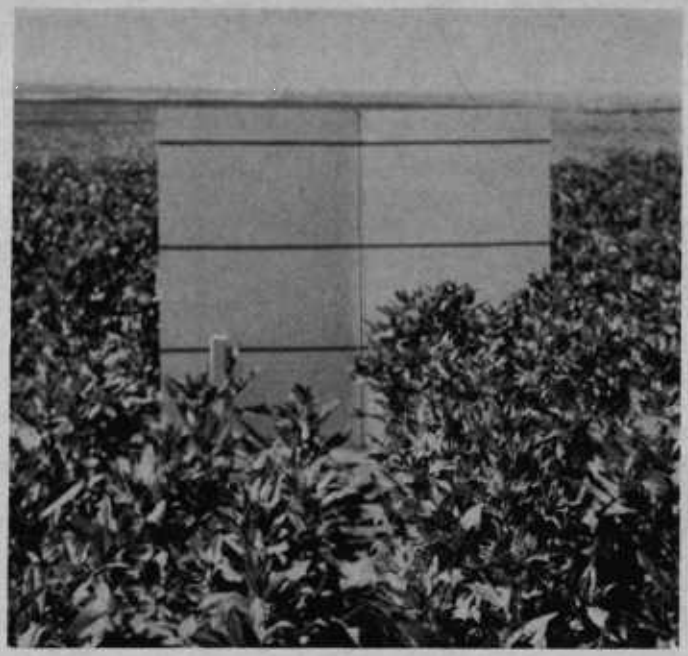
First step in introducing a new crop is to determine if it is adapted to growing in a particular area according to Agronomist J. Ritchie Cowan. Hence, a large number of crops are tested, and if they prove out, are then studied for management and production problems. A potential crop is also studied to find out if it is economically feasible for a particular area.

Carrots have been grown on high, dry acreage with some success during the past four years according to Junior Agronomist Laurn Beutler. The vegetables seem to survive the dry hot months amazingly well and then resume growth when fall rains begin.

If rainfall is at least 14 to 15 inches, a lucky carrot grower may get a yield as high as 20 tons to the acre. In 1958 yields were lower than usual because fall rains held off till November—11 tons of carrots per acre were marketed from the Station experimental farm.

Dryland carrots have been tested for sweetness and have higher sugar content than carrots grown on irrigated farms according to Beutler. Most carrots grown in the Pendleton region are

EARLY RESULTS with fall seeded canary grass were encouraging, but the grass does not appear winter hardy—eastern Oregon potential is limited.



SAFFLOWER, used in cooking oils and soap, grows well under eastern Oregon climatic conditions but it must compete with barley and other spring crops.

sold for freezing and canning.

Safflower, a seed crop used in some cooking oils and in soap, varnishes, and paint, has also been grown successfully as a dryland crop. Cultivated in Egypt 3,500 years ago, safflower is grown extensively in India and also in Egypt, China, Japan, Turkestan, and parts of Europe.

While safflower grows well under eastern Oregon climatic conditions, it must compete with barley and other spring grown crops. It is widely and profitably cultivated in California, western Nebraska, Montana, and parts of South Dakota. Cowan points out that the work underway at the Pendleton Station may lead to the breeding of a new safflower strain with high production capacity.

Yields for a few of the safflower varieties tested at the Pendleton Station are:

Safflower Variety	Yield, Pounds per acre
Pacific No. 1	1,122
N-10	1,350
A-5731	1,233

Dryland seed flax was grown experimentally in eastern Oregon for the first time in 1958. Used for linseed oil, flax may have fair promise for a dryland crop according to Beutler.

Flax is planted in spring, and harvested early in August. Average price throughout the United States for last five years was $2.91 per bushel. Flax has rough price competition from wheat.

Weed control is a problem with flax —weeds start growing in spring with the flax, and if not carefully controlled, may take the crop. Research on weed control in flax is scheduled at the Pendleton Station in the year ahead.

Flax and safflower are crops which can be harvested with a combine, just as is wheat, according to Beutler. Wheat farmers who decided to grow one of these crops could utilize present equipment.

Average yield of several flax varieties tested in 1958 in a 15-inch rainfall area are given below.

Flax Variety	Average yield, Bushels per acre
Dakota	28.3
Bolley	23.2
Marine	23.1

Agronomist Cowan emphasizes that oil crops, such as flax and safflower, may be particularly useful in Oregon. Our area is deficient in protein production, and oil crops might have possibilities of providing protein supplement sources as a result of meal by-products, according to Cowan.

Canary grass, which produces a seed used to feed canaries and parakeets, has also been tested for dryland farming. Widely grown in countries near the Mediterranean Sea and also in Australia, *Phlaris canariensis* has been selling for about $70 per ton. Much bird seed marketed in the United States is grown in Europe and Argentina.

Early results with fall seeded canary grass were encouraging—experimental plots yielded as much as 1,500 pounds per acre. But the grass does not appear to be winter hardy—so potential for growth in the dryland wheat area is greatly limited.

Grain sorghum was also tested in 1958. Most of the 15 varieties tested suffered from the summer drought, and many of the bottom leaves were burned and curled. Researchers believe sorghum needs more summer moisture than may be available in the dry land farming areas of eastern Oregon.

Research will continue to find crops adapted to growing in this climatic area. Spring planted crops must be able to withstand summer drought and heat, and must be able to survive and reach maturity with an average annual rainfall of about 15 inches or less. Fall planted crops must have a high degree of winter hardiness.

Research Briefs

New Seed Separator Developed • Slug Controls Being Tested • Dried Green Beans Handy for Campers

Beef Heartbeat Aids Research

A CALF's heartbeat may be involved in developing high grade beef animals and breeding stock, according to OSC animal physiologists Hugo Krueger and William Van Arsdel.

Each contraction of the heart muscle produces an electrical pattern and by charting and studying the rate and spacing of these patterns—taking electrocardiograms — scientists hope to learn some factors behind quality in beef animals.

A system of taking electrocardiograms of beef cattle has been developed by the OSC research team, and scientists all over the world now have a relatively simple method for studying hidden details in functions of a beef heart.

In the past, the records obtained were vague and difficult to read, and researchers had difficulty in observing day to day operations of heart muscle.

Krueger points out that OSC is one of the first institutions to consider function of the beef heart as a special problem worthy of intensive and systematic research into its operation.

Specific results coming out of this research may include selection of breeding animals from calves with strong, regular, and healthy hearts.

Since a strong relationship exists between healthy heart function and over-all body efficiency, animals with a good electrocardiogram record probably will have a high rate of gain per pound of food.

May pinpoint white muscle

A better understanding of white muscle disease could develop as a result of these experiments.

An electrocardiogram may ultimately be used to pinpoint white muscle in calves and also to help scientists observe the course of the disease.

Until this technique was available, researchers used autopsies to detect and identify white muscle—and they had no easy method of following the day-to-day development of the disease.

This research also may be helpful, in the long run, in human medicine, according to Krueger. Most experimental physiological data comes from animals smaller and lighter than man —such as mice, rats, or rabbits—so data from research on animals heavier than man will be useful to comparative physiologists.

Study of heart and voluntary muscle in cattle should yield information of value in treating muscular dystrophy in humans. Muscular dystrophies represent muscle errors, and there should be no better place to study muscle than in animals especially selected for muscle—or meat—production.

BEEF CALF prepared for electrocardiogram. This research may help scientists develop stronger, healthier breeding animals, and may also aid with research in the study of human physiology.

Dried Green Beans For Campers

CAMPERS' cooking problems may be partly solved by dehydrated green beans according to Food Technologist Earl M. Litwiller.

Packable, light weight, and easy to reconstitute, green beans dried by a method developed recently at OSC for the Army Quartermaster Corps have good flavor and food content when cooked. These dehydrated beans take up only one-fourth as much space as fresh beans and weigh one-tenth as much.

Litwiller points out that the processing method is simple. Beans are cut into half-inch lengths, blanched three minutes in steam, and soaked five minutes in a sulfite solution which readies them for freezing.

Beans are then frozen solid and placed in a tunnel dehydrator with a dry bulb temperature of 195°F. Temperature is gradually reduced to 145°, the final finishing temperature. After six to seven hours, beans are dried to a moisture level of from 2½% to 3½%, and are ready for storage in sealed containers away from contact with moisture or insects.

EXPERIMENTAL VIBRATOR developed at OSC separates seeds which differ slightly in shape, surface, texture, and weight. Table surface of vibrator is covered with fine or coarse sand paper.

Vibration Separates Seeds

ANOTHER seed separating problem has been solved by Jesse E. Harmond, USDA Engineer, and his staff stationed at OSC.

A machine operating on a vibration principle makes it possible to separate seeds which differ slightly in shape, surface texture, or weight.

The seeds are jogged out of a feed hopper onto an 8 by 10 inch inclined vibrating table. Moved by the motion of the table, they divide into streams according to their physical differences and drop into small containers.

The table surface is covered with sandpaper—fine or coarse grained, depending on the seeds being separated. The incline of the table plus the speed of the vibration separates one type of seed from another.

Harmond points out that this small model is only experimental, and volume could be increased by increasing number of tables and power. Several tables could be energized by a single power source, and the operation would have greatly increased capacity.

Seed cleaning and separating is big business in Oregon's Willamette Valley. In 1957, Oregon produced 184 million pounds of grass and legume seeds, more than one-fifth of the total production in the United States according to OSC Agricultural Economist C. H. Greene.

Of 400 seed cleaning plants in Oregon, at least 350 are located in the Valley, Greene reports, so Harmond's development could have a direct effect on operations of local seed cleaners.

The new seed vibrator will be most useful for making these separations: crimson clover from curly dock; alfalfa from pigweed; beans from peas; timothy from hedge mustard and dog fennel; rye grass from sweet vernal grass; and bent grass from ripple seed plantain.

VIBRATOR separates crimson clover from curly dock, alfalfa from pigweed, beans from peas, timothy from hedge mustard and dog fennel, and bent grass from ripple seed plantain. Volume can be regulated.

Work on Slug Control Shows Promise

TOO MANY slugs in your garden these days?

OSC insect toxicologist Leon Terriere reports the laboratory war against slugs is in full swing and several promising new pesticides are in final stages of testing.

Slugs, mysterious animals which may be out of sight all summer and then reappear in large numbers with the fall rains, are particularly dangerous to Willamette Valley growers. They have ruined bean crops, robbed pastures, vetch and clover fields, and endangered strawberry patches.

OSC entomologists are working to learn to rear slugs in captivity so an intensive research program can be launched. Having to depend on slugs collected in the field puts a researcher at the mercy of weather and peculiar biological habits of the slug. With laboratory reared test animals, researchers can make a year-round attack on slugs.

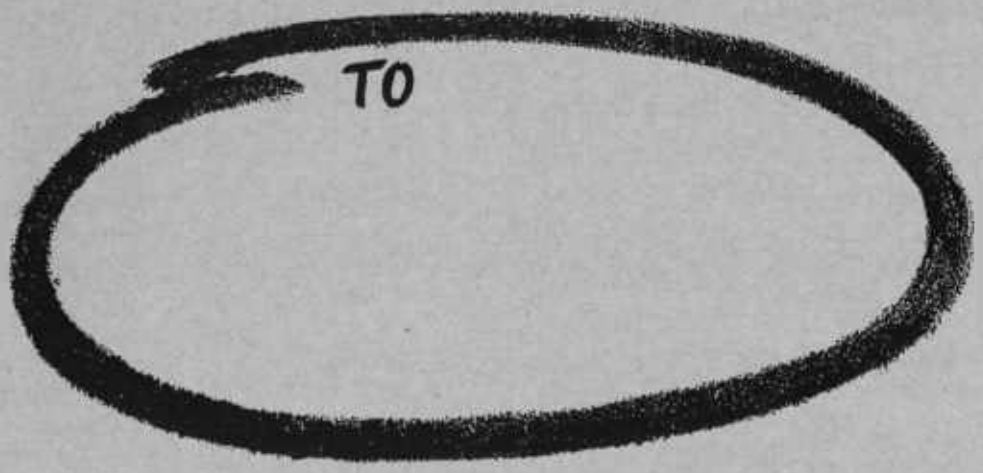
Slugs have enemies

Laboratory-reared slugs have enemies—protozoa, nematodes, bacteria, and fungus—and can survive only a month or two. So far, OSC scientists have learned to control all of these enemies but the protozoa. Slugs collected from the field still survive only a short time in a lab.

Over 70 new poisons have been tested on these field-collected slugs, and a half dozen show promise for use on annual crops. Main drawback of these poisons is that they are toxic to plants. Researchers now face the problem of learning to use these materials when slugs are active but when a crop cannot be damaged.

One new pesticide recently discovered by a chemical manufacturer is an antifeeding compound which keeps slugs and other insects from feeding on a plant sprayed with the material. Field tests for this compound are planned for next summer.

Other lab tests currently underway are aimed at developing poisons which will kill slug eggs. Of some 40 chemicals tested, a few show definite promise.



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Farm Outlook . . .

(Continued from page 3)

strengthen demand for lamb, eggs, broilers, turkeys, and meat substitutes.

At the same time, any reduction in hog production will aggravate the nation's rapidly developing feed grain surplus problem. It means that the record-large carryover of feed grains already anticipated for next fall will be even larger than expected earlier.

Much of the corn that would have been fed to hogs will go into government storage instead. This tends to postpone the "day of reckoning" for feed grains as well as livestock producers. This situation also has political as well as economic implications for the 1960 election year.

Less poultry, plenty of milk seen

Market prospects for eggs, broilers, and turkeys have taken on a somewhat rosier hue in their own right, at least for the first half of the year ahead. The brighter outlook stems from prospects for a more favorable supply situation than the one existing throughout much of 1959. Downward pressure on prices could return in the second half of the year if production is stepped up much.

It will pay to give close watch and careful study to chick and poult placement figures, storage stocks, and other bits of economic information when making poultry production and marketing decisions in 1960. It could be a year of especially rapid changes for an industry already accustomed to pains and gains growing out of rapid change.

For dairymen in Oregon, the 1960 outlook may not be quite as encouraging as it is to dairymen in some other parts of the country who have been churned by the butter and milk-powder markets, or who are enjoying somewhat better hay supplies and lower hay prices than those prevailing in Oregon. The butter and powder market looks brighter at least temporarily due to the clearance of government stocks. Cheese is still available under disposal programs.

Oregon's surplus of Grade A milk, along with surpluses to the north and east, keeps the state's fluid milk prices under pressure. The plentiful supply leaves slim chances for producers to recover higher costs through higher fluid milk prices. Instead, the supply favors price-shading and other concessions to volume outlets.

More wheat and corn to come

Oregon's 1960 wheat crop was not quite up to a year earlier when it started into the winter, but national prospects pointed toward another harvest about like 1959. There is fair chance that we will use and export close to that amount before the new harvest rolls around. Even so, this still leaves a record carryover, plus planting restrictions and an uncertain future to worry about.

Oregon farmers produced and harvested their biggest corn crop in 1959. So did Washington and Idaho. But the crop is still short of meeting usual Northwest requirements. There is room for more in 1960; but make sure of a market or a place to store for loan in case a large acreage or high yields force prices below support levels. Supports probably will be around a nickel a bushel under 1959. USDA will announce definite figures before planting time.

Best potato, wool prices may be early

There is a good chance many potatoes now in storage will be held beyond the best time to sell this winter. Treating to retard sprouting is increasing. Larger supplies of treated and cold storage potatoes may eliminate sharp late season price advances seen in the past two years.

Watch stocks reports, rates of disappearance, and other data closely in deciding when to sell. Especially critical is the month of February. Remember, many growers have lost more than they have made by trying to get the top dollar on all their spuds. This might be a good year to sell a few along and hit a high average rather than a low close.

Like potatoes, the best prices for wool may come early in the year. It's too soon to be sure, but it appears that the peak rate of mill consumption in the current cycle came last June. Consumption rates have fallen off moderately more than usual in the fall of 1959.

Peaks and lows in U. S. woolen and worsted mill activity since the war have come from 18 to 24 months apart. If the current cycle is like other recent ones, the peak was due in 1959, and mill consumption will be lagging throughout 1960. This would not be unusual for an election year, either.