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COVER STORY: Spiles, semicircular tubes that siphon water from ditch to furrow, are one way to manage water better. With a water shortage looming, use of spiles along with other water-saving tips is reported on page 6. (Photo: Bureau of Reclamation)

MOISTURE MAY JOIN markets and margins as matters of major concern to Oregon farmers and ranchers this year. April showers won't be enough to make up for the past winter's light snow and rain east of the Cascade peaks.

Ranges in the high country of central and southeastern Oregon came through the winter in much poorer condition than a year ago. Ranchers reporting to the Crop Reporting Service in March figured their range prospects averaged at least 13 per cent under a year earlier and were 10 per cent less promising than usual for that time of year.

Snow surveys show the poorest spring runoff prospects in years (see page 4). This could be serious for mountain meadows that usually supply most of the hay in the cattle country and about one-fifth of all the hay harvested in the state. Even some areas served by stored water may be short.

Of course, we have pulled through seasons like this before. May and June rains have sometimes saved the day. They may do it again. Yet, it pays to be prepared for the worst while hoping for the best.

Water can be stretched some by changing cropping practices and irrigation methods. Some ideas on "how to do it" are reported in the article on page 6.

It certainly looks like a good time to give special attention to forage—hay, silage, pasture. With record numbers of cattle in the state and almost as many sheep as in recent years, forage could be short. Keeping alfalfa and clover fields an extra year before plowing for other crops may be good business. Silage or hay can be cut from fields with volunteer vetch, clover, or grass. Even grain that might not fill makes good feed if cut while green.

Cattle

After 7 years of continuous buildup in cattle numbers, another look at the feed balance seems in order. Altogether, 180,000 head of beef cows have been added to Oregon herds since 1948. Some places may be overstocked. The sooner numbers are brought in line with the normal carrying capacity of the range, the better. You might start by selling cows that are not calving this spring.

A sales contract that permits de-

By Agricultural Economist M. D. Thomas

Farm Outlook

livery of feeder calves and yearlings earlier than usual could be a good hedge against short feed, too. Feed would be saved for the basic cow herd.

Cattle numbers have exceeded expectations. This means slaughter will continue heavy but a slightly stronger demand is holding prices up. Apparently we can now slaughter about 40 million head of cattle and calves a year and still maintain numbers.

Wheat

Northwest wheat exports during the next 3 months probably won't make up the 10-million-bushel lag that developed last fall. Northwest stocks, when the new season starts, are likely to be about half again as large as a year earlier.

Emergency storage probably will "save the day" for most Oregon growers again this year, if the grain can be moved to this space in time. That's the big job ahead for grain handlers and transportation people this spring.

At best, some localities may be short of space. Better make sure on storage. Much shortage would hurt grain prices at harvest time. That could lead to some good buys for alert livestock and poultry feeders.

The step-down in wheat price supports permitted under the present law will price some wheat into the feed grain market in time. In 2 or 3 years, wheat on Oregon farms should be cheaper than corn shipped in from the Midwest.

Corn

This spring, more Oregon farmers than usual are eyeing corn as a crop possibility.

Unless a calamity hits corn in the Midwest, prices are almost certain to be lower in the year ahead. Even so, corn should make good returns on many farms in western Oregon and in parts of Malheur and Umatilla Counties.

Check with your county agent on hybrids best adapted locally, and consider grazing or hogging off part of the crop. A little extra fencing can reduce waste and save the cost of harvesting and drying.

Oregon corn raisers' price advantage over Midwest producers would shrink considerably if California continues to step up corn and milo production. Over 6 million bushels of corn were harvested for grain in that state last year. That is more than four times as much as a year earlier. Another increase is expected this year. California feeds much barley but has shipped in corn, too.

Barley & oats

In contrast with a possible forage shortage, supplies of feed grains seem likely to stay plentiful.

Much of last year's barley and oats will still be on hand when the new harvest starts. On top of this, another big crop seems fairly certain. Barley is the number one substitute on much of the land being held out of wheat and cotton under crop controls. This is still true even though supports are being lowered around $8.75 a ton. Oat supports in all Oregon counties are 13 cents a bushel under last year.

The buildup in feed grain stocks has been much faster in Oregon and the Northwest than in the rest of the country. Barley has piled up the fastest. Next summer's carryover here probably will be fully six times as large as last summer.

Barley has been the best feed grain buy this winter and is likely to con-

(Continued, page 16)

SALES contract for early feeder delivery could be a good hedge against short feed supply.

SNOW SURVEYORS Aubrey Perry (left) and W. T. Frost check a Deschutes County snow course. Photos: Soil Conservation Service

Water Shortage, *How Bad?*

For 20 years, snow surveyors have measured Oregon's snows to predict our summer water supply.

TWO SKIERS slid to a stop one crisp morning last February beside a bright red and orange stake that stood in the shadow of the Three Sisters. One unbuckled a hollow aluminum tube about 30 inches long and 1½ inches wide from his pack. A cutting bit was on one end.

The two pushed the tube into the snow, coupling more sections as it continued sinking in the snow. When the tube hit the ground it was removed.

The tube, with its core of snow inside, was weighed on a special spring scale, and the weight recorded. This was repeated 10 to 12 times at 100-foot spacings. Then the skiers repacked their tubing and moved down the slope.

Once or twice a month from February through May, this scene was repeated on each of Oregon's 126 snow courses located along the backbone of the Cascades and higher elevations of eastern Oregon.

Summer water predicted

The 175 snow surveyors aren't collecting and weighing snow samples for the fun of it. Information they gather is compiled for the very serious business of predicting how much water this snow will feed into the creeks, streams, rivers, and dam reservoirs of eastern Oregon next summer. And that information is important to those whose livelihood depends on irrigation.

Predicting streamflow for farmers, power companies, cities, and government has been the job since 1935 of the Oregon Cooperative Snow Survey Unit, a team made up of Soil Conservation Service and agricultural experi-

R. A. WORK (left) and A. E. Kenworthy sink a 1½-inch aluminum tube through the snow for sample. Pipe at right is snow course marker. Some 175 snow surveyors visit 126 courses to obtain samples.

AMOUNT OF WATER in snow sample is weighed and about 10 samples each visit to snow course—once or

ment station workers. Started in 1926 by the State Engineer, the task was turned over to this unit in 1935. Headquarters are in Portland.

In 1954, snow surveyors traveled some 4,100 miles on skis and snowshoes, 1,150 miles in "snow cat" machines, and 100 miles by aircraft to measure Oregon's winter watershed.

Special tubing shown in the pictures measures only snow depth, but the weight measured by portable spring scales tells how much water is in the snow. Thus, data reported to the Portland office give the *amount of actual water* from each sample. The average of the 10 to 12 samples taken each time gives this organization it's basic snow information.

This information, coupled with figures on soil moisture, existing streamflow, and fall and spring precipitation, is combined to produce the forecast.

Forecasts accurate

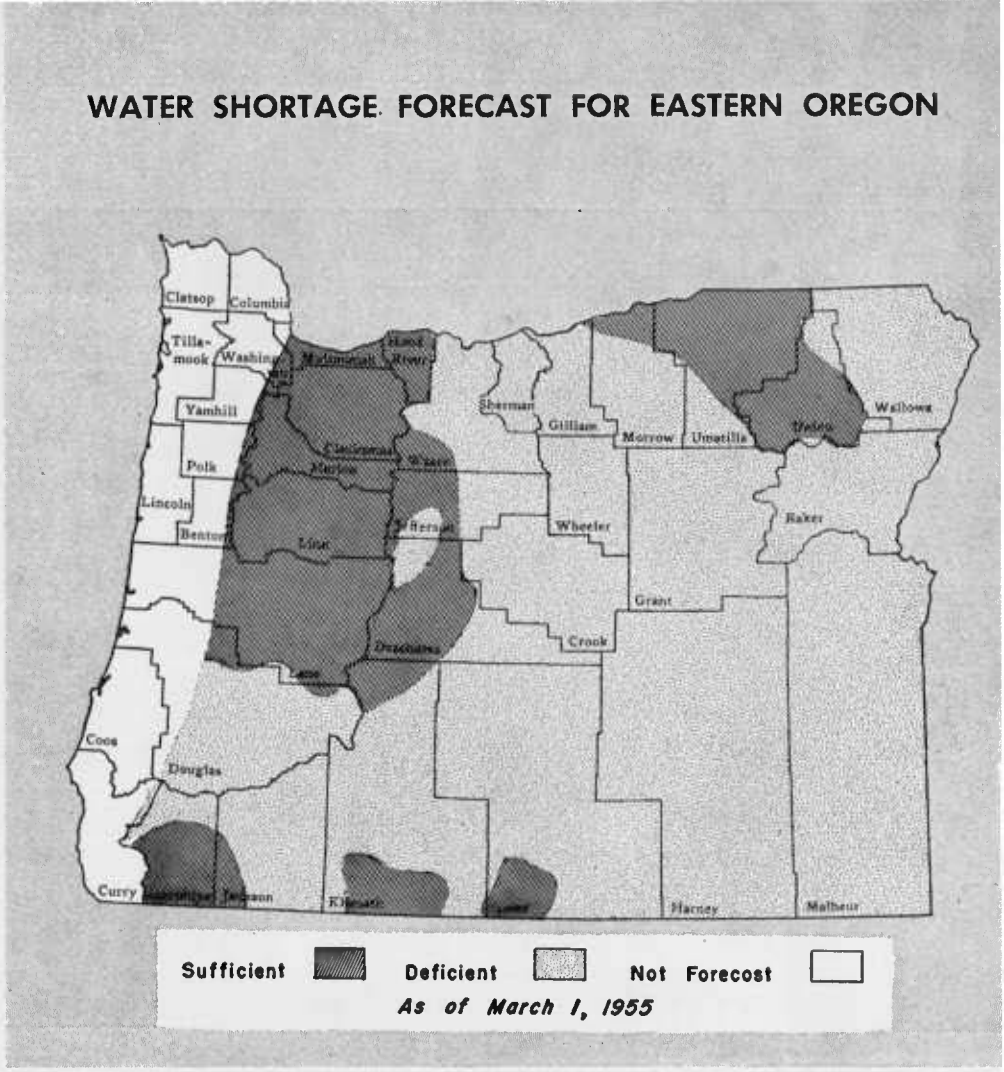
And these forecasts are fairly accurate. Comparisons of past forecasts with actual stream flow show that the April 1 prediction often will hit actual flow within 10 per cent or less.

The 1955 April forecast will be worth watching, too. For a severe water shortage is shaping up in some areas, primarily eastern and central Oregon. Based on March 1 figures, here's what's in store:

Snow Cover: Only 67 per cent of the winter's normal snow cover has fallen. Usually 87 per cent occurs by this time. This means mountain snowfall in March must be three to four times greater than usual to assure a normal snow cover. This isn't likely.

recorded soon after sample is taken. Surveyors complete twice a month, February to May. Samples give basic data.

WATER SHORTAGE FORECAST FOR EASTERN OREGON



Soil Moisture: Mountain soils are dry, and much early snowmelt will be absorbed before streamflow begins.

Reservoir Water: Water shortages in many areas will be lessened by release of stored water. But six reservoirs have less than one-half their average March 1 storage. These are the Owyhee, Warmsprings, Unity, McKay, Emigrant Gap, and Cottonwood reservoirs.

Precipitation: Fall precipitation was half normal.

Streamflow: Short water supplies are foreseen for ranchers and other water users in the Owyhee, Malheur, Burnt, Powder, Pine, Imnaha, Wallowa, John Day, Crooked, Tumalo, Squaw, White, Mile Creeks, Rogue (except Applegate and Illinois), Klamath, Chewaucan, Silver Lake, and Malheur-Harney Lakes river basins. Release of stored water will help in some of these areas. Elsewhere, streamflow may be enough, but below normal, except for normal flow in the Umatilla basin.

Just how short predicted summer streamflow is on some of Oregon's 19 major drainage basins is reported below. The percentage figure is the 1955 forecast expressed as *per cent of the 10 year average* (1943-52). One hundred per cent is considered normal:

Owyhee, 29%; Malheur, 45%; Burnt, 41%; Powder, 53%; Imnaha, 41%; Grande Ronde, 70%; Umatilla, 106%; Walla Walla, 82%; John Day, 64%; Crooked River, 37%; Deschutes, 83%; Hood River, 79%; Willamette River, 86%; Umpqua, 75%; Rogue River, 81%; Klamath, 70%; Goose Lake, 98%; Warner Lake, 86%; Chewaucan, 50%; and Malheur and Harney Lakes, 23%.

Local storms may improve this situation in some areas.

But if cutbacks in irrigation are planned, a switch in water management and perhaps a change in cropping plans are in order. For a report on how to use irrigation water more efficiently, read the story on page 6.

OWYHEE DAM: It may be half full this year.

Possible water shortages looming in Eastern Oregon may not be as bad as predicted. Researchers found that of the total turned down furrows . . .

Crops Get Only Half the Water!

Photos: Bureau of Reclamation

IF 1955 SEES a water shortage, farmers irrigating in central and southeastern Oregon must sharpen their pencils and figure their water needs more closely.

And research can help. Research conducted at the Owyhee project from 1945 to 1953 shows that farmers are wasting a lot of water. Many can get the same crop yield with half to three-fourths the water they're now using.

Research was cooperative among the experiment station, the Bureau of Reclamation, and the U. S. Department of Agriculture. Soil scientists and irrigation engineers included F. M. Tileston, A. W. Marsh, L. R. Swarner, E. N. Hoffman, and C. A. Bower.

Although the figures apply to 102,000 irrigable acres in southeastern Oregon-southwestern Idaho, many of the ideas can be applied in central Oregon and other furrow-irrigated areas.

Water only half used

The researchers figure that only a little over half (54 per cent) of the water delivered to fields was crop-used. The rest was lost. This efficiency was figured from 16 better-than-average farms. Thus, the average water loss probably was higher.

How was this water lost? Answer: runoff and deep percolation (drainage down through the soil). Of the two, runoff was the more serious.

About one-third of the water turned down the furrows ran off, never reaching plant roots. About one-sixth percolated below crop roots, draining to the water table below the soil.

Losses can be reduced

These water losses can be reduced tremendously, think the scientists. How? By shortening irrigation time, by reducing amount of water in each furrow, and by increasing the soil's water intake rate.

NOTCHING hole in ditch bank encourages water loss. Water controlled better with spiles, semicircular plastic or aluminum tubes (see cover).

SAVE WATER by pushing it across a field in one-fourth the irrigation time. This means increasing the flow at first, then reducing when it reaches end.

Of the 16 farm fields measured, the workers report operators of 13 could have shortened irrigation time from an average of 52 hours to the 41 that was required.

Cheeking the root zone with a soil auger is one way to determine if enough water has been applied.

Farmers also put on too heavy a flow per furrow. The researchers figured enough water should be put on so it will reach the far end of the furrow in one-fourth the irrigation time. This means increasing the flow at first, then reducing when water reaches the end of the furrow.

There are several ways of doing this—all better than the water-wasting practice of notching a hole in the ditch bank, then trying to regulate the flow by plugging the ditch, the stilling basin, or the furrow with chunks of sod. These chunks often erode out, and water flow is not controlled as it should be. You can control water flow by using spiles, semicircular plastic or aluminum tubes that siphon water from the ditch to the furrow. By varying the number per furrow or using different-sized spiles, you can accurately control the amount of water entering in each furrow.

No soil survey

How much water soils in the area will hold varies with different types, and the answer often determines how much water to apply. The workers report there is no soil survey for the area, thus area-wide moisture storage figures aren't available. The OSC soil testing laboratory can figure these moisture capacities from a soil sample.

But water storage figures for two major soils are shown below. By digging or augering down you also can find your crop's rooting depth and soil dryness.

Thus, when it seems time to irrigate, you can figure how much to add by using moisture capacity figures with your observed root depth.

Increasing the soil's water intake rate also saves water. Two quick ways include reducing the width between furrows and reducing the furrow slope. For example, non-row crops usually are planted with rills 24 to 36 inches apart. Shortening this width to 18 to 20 inches will still permit necessary cultivation, yet increases the water intake rate. High intake rates decrease irrigation time, save water.

For a short-term water shortage, like the one looming now, those are researchers' suggestions.

Average Inches of Water Two Malheur County Soils Can Store

Soils	1st foot	2nd foot	3rd foot	4th foot
Very fine sandy loam. Hardpan and extreme nodulation 18"-24" below surface. Hardpan 8"-16" thick. Found in Mitchell Butte division	2.3	2.2	2.8	2.6
A silt loam surface that is over a heavy clay subsoil 10"-18" below surface. Found in Dead Ox Flat division	2.3	1.7	2.6	2.7

Change cropping practices

For a drought—or longtime water shortage—increasing your soil's intake rate becomes even more important. Most soils on the Owyhee project are abnormally low in this respect.

HAY AND FORAGE crops reduce surface runoff, compared to row crops. More roots and surface trash from forages also increase water intake rates and reduce erosion hazards on higher benches.

Changing to close-growing crops, such as hay and forage, increases intake rates while row crops, such as sugar beets and corn, have the reverse effect. Close-growing crops not only cover and protect the soil from erosion, but more roots and surface trash open up the soil, channeling more water into it.

Changing cropping practices is suggested by E. R. Jackman, extension agronomist. For better water conservation, he advises:

¶ Seed legumes and grass without a grain nurse crop. You'll lose more in the long run from a poorly established perennial than gaining from the income of a one-season cash crop. Besides, young alfalfa without a nurse crop doesn't need much water.

¶ Turn thin alfalfa fields to seed production. Cultivate early to kill cheatgrass, then cut for seed.

¶ If hay is needed, seed rye or other grains in thin alfalfa fields.

¶ Summer fallow for weed control. This frees some water for other crops.

¶ Bluegrass pasture is a water thief. Being shallow rooted, it must have water often. If water is short, get rid of these pastures.

¶ Cutting instead of pasturing the crop saves water, since pasture requires more water per pound of dry feed. Closely grazed, irrigated pastures also need more water. Best to give them a rest period to allow some top growth.

Other suggestions are reported in the FARM OUTLOOK, page 2.

In Western Oregon . . .

Liming Pays!

Enough high quality lime applied to acid soils will increase your crop yields for several years.

LIMING WESTERN OREGON soils means spending money to make money. Those who don't lime are probably neglecting their biggest soil fertility problem and missing a chance to increase profits, according to soil scientist Tom Jackson.

But why do western Oregon soils need lime? How much lime is needed? What does lime do when it is added to the soil? And how long will finely ground lime stay active in the soil?

Research results combined with established liming principles can answer these questions.

Lime is calcium carbonate

Winter rains percolating through the soil for thousands of years have carried away calcium and magnesium, leaving the soils acid. Lime is primarily calcium carbonate, but may contain magnesium carbonate. These carbonates react chemically with soil acids forming water and carbon dioxide. Soil acidity is reduced and soluble calcium or magnesium replace the acids.

Thus, liming does two things.

1. Adds calcium.

2. Partly neutralizes soil acids, and the pH (a measure of soil acidity) is increased.

The combined result of adding calcium and neutralizing a portion of the soil acids has many effects on the soil:

¶ Increases the number and activity of important soil microorganisms, especially soil bacteria.

¶ Increases the breakdown of soil organic matter, and releases nitrogen, phosphorus, sulfur, and other nutrients for plant use.

¶ Increases nitrogen fixed by certain types of bacteria that grow on legume roots. You should be able to get 200 to 300 pounds of available nitrogen per acre from well-limed, irrigated clover pastures that are adequate in phosphorus and potash.

¶ Decreases amount of soluble iron, aluminum, and manganese. These elements often are present in harmful amounts in highly acid soils.

¶ Increases the availability of inorganic phosphorus.

¶ Permits growing of a wider range of crops, especially legumes.

Lime alone, however, will not make your soil more productive if it does not have a good supply of other plant nutrients, such as nitrogen and phosphorus. You can't expect lime to benefit a crop when other essential nutrients aren't available.

Soil test shows lime needs

Your soil's lime needs can be figured from a soil test available through your County Extension Agent. The Oregon State College soil testing laboratory will measure the soil acidity and the amount of lime required to neutralize enough of these acids.

Results of 3,300 soil samples from the Willamette Valley the past 2 years show some lime is needed on most western Oregon soils. For example, about 80 per cent of these soils needed lime for best legume growth, and high soil acidity would have made it impractical to establish stands of legumes on 40 per cent of these soils. Coast county farmers were worse off. Out of 500 samples, about 90 per cent needed lime for good legume growth, and 60 per cent were too acid for growth of the most acid-tolerant legumes.

Lime—even finely ground, high quality material—stays in the usable root zone a long time. Coarse ground lime takes years to react with soil acids and become effective.

Lime remains in soil

But how much lime stays where it can be used? Research begun in 1918 at the Astor branch station and in 1941 at the Red Hills experimental area near Oregon City shows much of it was still present in the top 20 inches of soil when tested last year. (See graphs.)

At Astoria, 2 tons of lime were applied to test plots every 4 years since 1918. A second test began in 1938 with the same rate of lime applied. In 1954, then, 20 tons of lime per acre had been applied to the 1918 plot, 8 tons to the 1938 plot. Every winter about 6½ feet—77 inches—of rain falls and much of it leaches through the ground.

All but 5 tons was still there in the 1918 plots; only 200 pounds were missing from the 1938 plots. Missing lime leached out or was crop-used.

Plots located near Oregon City show similar results. Here lime was applied in 1941, 1947, 1950, and 1953, totaling 1, 2, 4, and 8 tons per acre. Thus, researchers could measure the leaching effect on each rate, plus finding the effects of this application on crop yield.

Again, little had leached. Most of that not in the soil was used by the crop.

Lime affects yields

Another chart shows the effect of lime on yields. No other fertilizers were added—but phosphorus and sulfur probably would have upped yields. Corn and oat yields following clover were more where the soil had been limed, compared to grain yields that followed clover that had not been limed. Lime increased the legume's ability to fix nitrogen and left a larger supply for the grain. Also, availability of other nutrients increased.

The experiment shows another important fact, says Jackson: light lime applications every 3 or 4 years do little good. Enough lime must be added to neutralize enough soil acids to cause a real change in soil acidity.

Thus, farmers face two jobs in a liming program. First, put on enough lime to do some good; second, add enough lime regularly to hold down accumulating soil acids. A soil test will tell how much lime you need for the first application. Further tests every 5 years or so will show how much is being used.

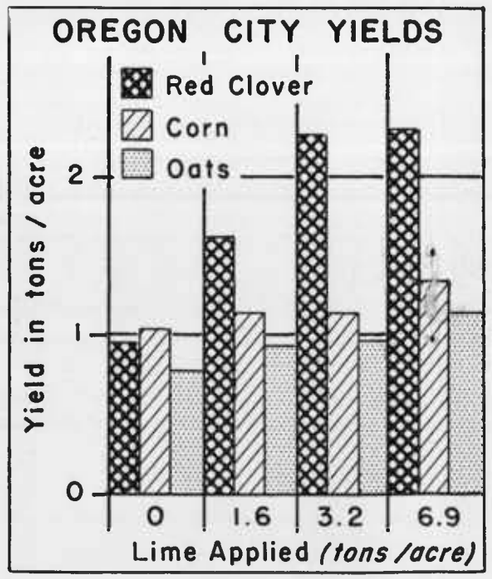
The soil scientist cites two other reasons besides leaching that will affect maintenance application rates. One is crop removal. The other, acids left by some commercial fertilizers.

In general, legumes will remove more lime than will grain or grasses. For example, 1½ tons of barley per acre will remove about 40 pounds of lime, while 5 tons of alfalfa hay per acre will remove about 500 pounds.

Any fertilizer supplying the ammonia form of nitrogen will leave residual acidity. But this is not a serious problem if you lime to neutralize these acids.

When you buy lime, remember there are two items that determine lime quality, according to Jackson. One, know the calcium carbonate content or the per cent of actual lime. Second, know the fineness of grinding. Finely ground lime comes in contact with more soil particles. Thus, it reacts more quickly with soil acids—going to work for you faster. Particles the size of a wheat kernel, for example, will take decades to react.

Lime Increases Clover, Grain Yields, Leaches Slowly, Research Results Show



LIME APPLIED over 14-year period. Applications made each time red clover planted. Corn, oats, followed in rotation.

OREGON CITY TRIALS

Soil Depth (Inches)		Lime Applied (tons/acre) 0	1.6	3.2	6.9
pH (0-5")		5.5	5.65	6.0	6.6
Calcium Recovered (as tons / acre of lime)	0 - 5"	1.43	.69	1.76	4.38
	5 - 10"	1.43	.08	.69	1.52
	10-20"	2.78	0	0	.33
	20-30"	2.72	0	0	0
Total Recovered			.77	2.47	6.23

ASTORIA TRIALS

Soil Depth (Inches)		Lime Applied (tons/acre) 0	8	20
pH (0-5")		5.0	5.9	6.4
Calcium Recovered (as tons / acre of lime)	0 - 7"	.75	4.80	7.75
	7 - 18"	.64	3.10	7.35
Total Recovered			7.90	15.10

LITTLE LIME leached in trials at Astoria and Oregon City. Figures in black area show the increase in calcium recovered in the soil, compared to unlimed plots, plus downward movement of calcium. Each ton of lime contains 800 pounds of calcium. Note that pH, calcium, increase with lime applications.

A calf takes less feed to put on beef than do older animals. Using this principle, a Union branch experiment station animal husbandman says . . .

Spring-Sold Calves Can Bring More Profit

WEANER CALVES full fed, then spring-sold, returned $21 more profit than did fall-marketed yearlings.

WHO SAYS it never pays to fatten weaner calves for a spring market?

If you can get a cheap concentrate, like cull peas, you may profit more that way than by holding and marketing them as yearlings, says Cecil Pierce, OSC animal husbandman at the eastern Oregon branch station at Union.

Results of a 1953-54 feeding trial show that wintering calves on full feed (2/3 hay, 1/3 concentrate) and selling as baby beef in the spring returned $21 per head more than cattle fed a maintenance ration in winter, summer grazed and grained, then sold in the fall. That's $21 above all animal and feed costs, too.

Reasons for profit

The researcher cites three reasons for this:

1. Calves needed less feed to put on a pound of beef than did older animals. This advantage paid off most when they were fed a full ration. Much of this advantage was wasted when calves were fed only a maintenance ration.

2. No summer pasture or feed was needed as it was for fall-marketed yearlings.

3. There was, and usually is, a better market, thus a better price for medium grade (commercial and good) slaughter animals in the spring than in the fall.

Pierce divided 45 calves—24 steers, 21 heifers—into lots receiving three different rations. In the low fattening group, he fed each animal 6.5 pounds of long alfalfa-grass hay and 2.9 pounds cencentrate (2/3 barley, 1/3 cull peas) per day. Each animal in the medium-fattening group was fed 9.2 pounds of hay, 4.4 pounds of concentrate per day. Those in the high fattening group received 11.6 pounds of hay, 5.5 pounds of concentrate daily. These figures are averages for the feeding period. Actually, Pierce fed less than these amounts at the beginning, more at the end of the feeding period.

Fed 150 days

Calves went on feed December 7, 1953, and were taken off May 6, 1954—150 days. Those fed the high fattening ration were sold. The other two groups grazed on summer irrigated pasture from May 6 to September 27

Calves Full Fed Returned Most Above Total Costs

Fattening group	Average total gain	Average daily gain	Average total cost animal and feed	Selling price	Selling price	Return above total cost
	Pounds	*Pounds*	*Per head*	*Per head*	*Per cwt*	*Per head*
LOW	359.2	1.22	$133.08	$153.68	$19.00	$20.60
MEDIUM	428.8	1.46	138.86	161.58	19.00	22.72
HIGH	290.8	1.94	123.82	165.70	21.50	41.88

Winter Feeding Summary (December 7 - May 6)

Fattening group	Total gain	Daily gain	Feed per 100 pounds gain		Total feed per head (150 days)		Total feed costs per head	Slaughter grade
			Hay	Grain	Hay	Grain		
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*		
LOW	74.6	.50	1305.0	599.4	973.5	447.2	$18.20	——
MEDIUM	219.3	1.46	630.0	298.3	1,385.9	654.2	28.01	——
HIGH	290.9	1.94	598.8	272.2	1,741.9	791.8	34.63	1 choice 10 good 1 commercial

Winter Feeding, Summer Grazing Summary (December 1 - September 27)

Fattening group	Total gain	Daily gain	Feed per 100 pounds gain		Total feed per head (294 days)		Total feed costs per head	Slaughter grade
			Hay	Grain	Hay	Grain		
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*		
LOW	359.2	1.22	1305.0	210.2	973.5	755.0	$45.51	4 good 7 commercial
MEDIUM	428.8	1.46	630.0	230.2	1,385.9	987.3	55.32	1 choice 16 good 5 commercial

—144 days. They were fed grain from July 1 to September 27—89 days—then sold. The barley-cull pea amounts fed while cattle were on pasture: 3.8 pounds per day for both groups.

Average starting weights for each animal were: low-fed group, 520.6 pounds; medium group, 496.4 pounds; and high group, 530.3 pounds. At the close of the winter feeding period (May 6), the average weight was: low, 591 pounds; medium, 717 pounds; high, 821 pounds. For the two groups fed until fall, the average finish weight was: low, 879.8 pounds; medium, 925.1 pounds.

Average initial cost per head for each group was: low, $87.58; medium, $83.54; high, $89.19. Selling price, per head: low, $153.68; medium, $161.58; high, $165.70. Steers were valued at 18 cents a pound, heifers, 17 cents. Test animals were from a high-gaining herd, capable of efficiently converting feed to beef.

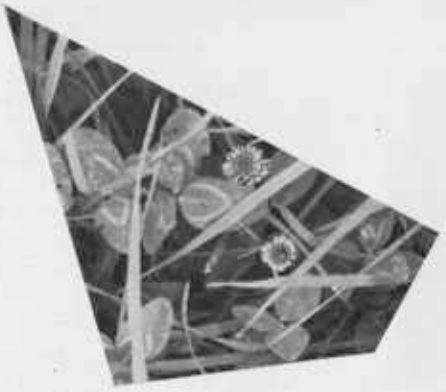
Hay was figured at $18 a ton, peas and barley, $48 a ton, and pasture, $4 per head per month.

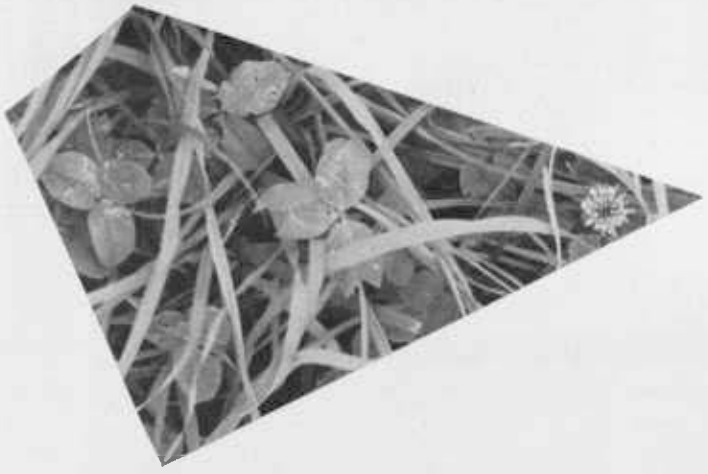
More complete figures are presented in the tables.

Besides returning more profit in the spring, Pierce says marketing fall-weaned calves as baby beef in the spring offers another advantage: summer pasture can be grazed entirely by the cow herd. Thus, it's possible to increase cattle numbers on the same amount of land. In northeastern Oregon, where summer grazing pasture is short and cull peas, a "cheap" concentrate, are plentiful, these results give feeders something to think about.

BESIDES RETURNING more profit, spring-marketed calves free summer pasture for the cow herd, making it possible to increase numbers on same land.

Nitrogen - - -





Buy It, or Grow It?

Keeping a legume in an irrigated pasture mixture offers several advantages over using commercial nitrogen fertilizers.

LADINO CLOVER in an irrigated pasture mixture will replace lots of commercial nitrogen. In fact, agronomist H. L. Schudel thinks some folks might be "oversold" on commercial nitrogen for irrigated pastures.

Irrigated pasture research at OSC the past 2 years provides one answer to the question, "Which pays more—grass-legume or grass plus fertilizer?" Results in pounds of beef per acre in 1954 show Ladino-grass, 642 pounds; grass and heavy nitrogen fertilizer, 518 pounds.

And steers on a Ladino-grass mixture returned $47.47 more per acre than did steers grazing grass fertilized with nitrogen. Here are the per acre figures.

	Grass-Ladino	Grass only
Gross return (lbs beef @ 18¢ per lb.)	$115.56	$93.24
Fertilizer costs	17.31	42.46
Return, less fertilizer costs	98.25	50.78

Grass-only pastures were fertilized with 240 pounds of actual nitrogen, applied in seven different applications from March to September. Grass-Ladino pastures received 72 pounds of actual nitrogen in two applications —40 pounds ammonium nitrate in March, and 32 pounds 16-20-0 in June. Silage was cut on one-third the pasture area in May. Nitrogen was used on the legume pasture to increase silage yields and to insure a rapid recovery following clipping.

In July, these pastures averaged 80 per cent grass, 20 per cent legume. Twenty inches of water was added in 6 irrigation "sets," beginning May 11 and ending August 23.

Fifty grade Hereford yearling steers grazed the pastures in rotation (6 Ladino-grass, 6 grass-only) 5 days on, 25 days off. Grazing began April 17, ended October 17.

Clover adds nitrogen free

Thus, Schudel figures adding Ladino clover to a grass pasture mixture means adding 175 to 200 pounds of actual nitrogen free—plus reaping the benefits of higher protein in a legume feed.

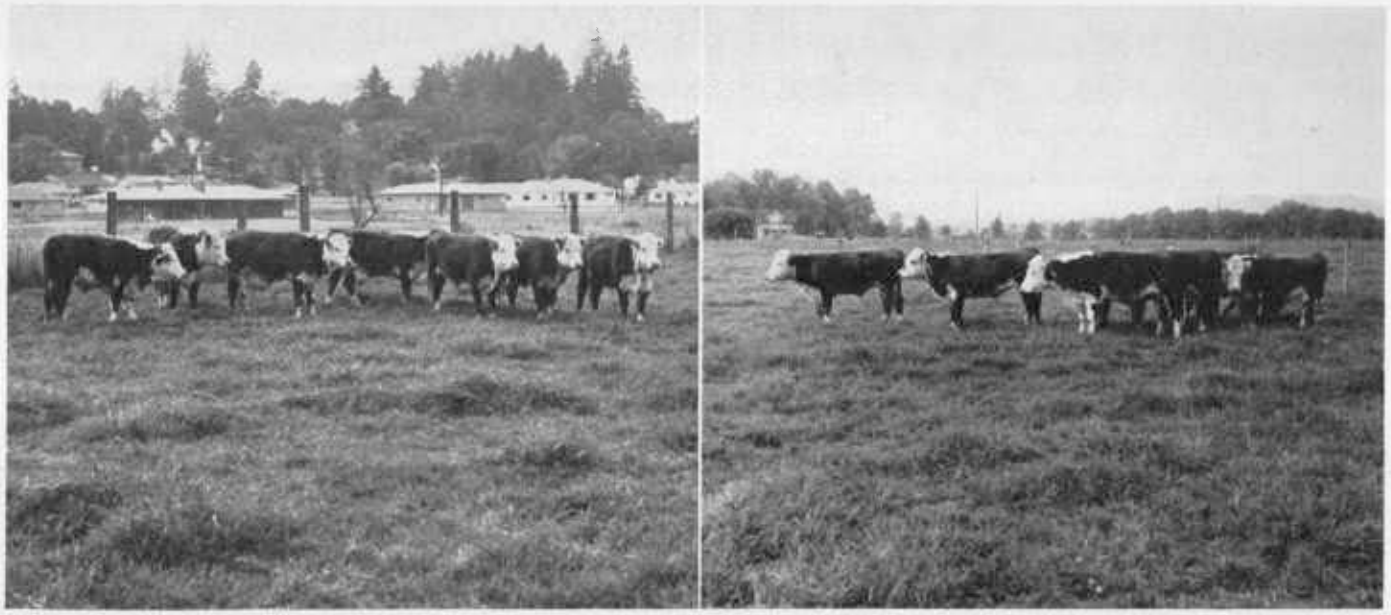
These pastures were seeded in May 1952. The basic grass mixture contained 4 pounds per acre each of Alta fescue, orchard grass, meadow foxtail, and Tualatin oatgrass. Ladino clover at 3 pounds per acre was added to this basic mixture for the clover-grass seeding.

Results of the 1953 grazing trials were reported in the Spring, 1954, issue of *Oregon's Agricultural Progress*. Briefly, they showed that 810 pounds of beef per acre were produced on clover-grass pasture, compared to 479 pounds on grass-only. Both pastures received 185 pounds of nitrogen.

Nitrogen drives out legume

Besides finding that a legume in an irrigated pasture increased beef yields, Schudel reports later experiments showed that nitrogen drives out the legume and fails to increase yields to a paying basis.

Results from more than 150 small plots clipped in 1953 to simulate grazing showed that nitrogen quickly reduced the legume in the mixture. Three weeks following first spreading of one-fourth the total nitrogen applied, legume percentage was cut more than half at the 300 pound per acre



STEERS on grass fertilized with nitrogen (left) returned $47.47 less per acre than did steers grazing a Ladino-clover grass pasture (right).

rate. By September, only one-fifth as much legume was present on the same plot, compared with no nitrogen. A year later, only one-twentieth as much legume was left. The rest was grass.

Losing this legume meant that added nitrogen resulted in expensive feed. The table shows that increased hay yields due to nitrogen cost about $53 a ton.

Summing up, the agronomist says heavy nitrogen applications on an irrigated grass pasture on a heavy Willamette Valley soil did not put on as much beef as did a Ladino-grass pasture with little nitrogen. Also, nitrogen added to a legume pasture drives out the legume, and small forage increases due to nitrogen are expensive.

However, Schudel thinks commercial nitrogen does have a place in an irrigated grass-legume pasture program. Too much legume can become a bloat hazard, and nitrogen can reduce such legumes to a safer level (about 40 per cent legume). Nitrogen can increase winter growth some, since the legume doesn't grow much in winter. Small nitrogen applications also insure a quick grass recovery in the spring, getting your pastures off to a good start, and providing a big silage crop from lush spring growth.

Nitrogen Drives Out Legume, Increases Forage Yields Little

Nitrogen rate* (actual N)	Yield increase due to nitrogen	Cost per ton of additional yield increase	Amount of legume 1953 April 18	1953 Sept. 27	1954 Sept. 8
Pounds	*Pounds*	*Dollars*	*Per cent*	*Per cent*	*Per cent*
0	.....	.....	22	53	70
60	403	$53.69	18	42	46
120	730	59.18	13	25	35
180	1,234	52.38	10	20	17
240	1,833	47.14	10	11	10
300	2,040	52.84	9	10	4

* Nitrogen was split in fourths and applied four times in both years. Forage data is 1953-54 average. Fertilizer and application costs totaled 18 cents a pound. Data is from clipped plots. In actual grazing, animal droppings add additional nitrogen.

NITROGEN applications slowly drive out legume. Left, no nitrogen, 53% legume; center, 60 pounds N, 40% legume; right, 240 pounds N, 10% legume.

Research Briefs

Weed Invading Southern Oregon Range • Eggshell Strength Measured • Muffin Recipes Developed

Two New Muffin Recipes Developed Using Soft Wheat Flour

MUFFINS will be extra good if made with the right flour—soft wheat flour—according to OSC home economists Andrea Mackey and Mary Stockman.

A fine, uniform texture, a "knobby" crust and tenderness are easy to get when you use soft wheat flour. This flour is sold as a cake or pastry flour. It has a low protein content which is the reason for muffin tenderness.

Two recipes—using only soft wheat flour—have been developed by the researchers.

PLAIN MUFFINS

Recipe

- 2¼ cups pastry or cake flour
- 2 tablespoons sugar
- ¾ teaspoon salt
- 4 teaspoons baking powder (double action)
- ¼ cup vegetable shortening
- ¾ cup plus 2 tablespoons milk
- 1 egg

Directions

Sift flour before measuring. (Pile lightly into measuring cup, remove excess with knife edge. All ingredients should be at room temperature.) Then sift flour, sugar, salt, and baking powder together. Blend vegetable shortening with flour mixture, using fingers or pastry blender. Beat egg and milk together, then add to dry ingredients. Stir until dry ingredients are dampened. Fifteen mixing strokes should be enough. Batter will appear wet and lumpy. Spoon batter into muffin tins, filling each ⅔ full. Bake in hot oven (425° F.) for 15 to 20 minutes. Remove from tins and serve while hot. Makes about 12.

SWEET MUFFINS

Recipe

- 2¼ cups pastry or cake flour
- ¼ cup sugar
- ¾ teaspoon salt
- 4 teaspoons baking powder (double action)
- ⅓ cup vegetable shortening
- ¾ cup milk
- 1 egg

Directions

Same as plain muffins.

Variations

The home economists have worked out two variations *for sweet muffins.*

Applesauce muffins: Substitute ¾ cup sweetened applesauce for milk in recipe. Sprinkle mixture of sugar, cinnamon, and nutmeg on top, then bake.

Peach muffins: Use sliced canned peaches. Use ⅓ cup peach juice plus ⅓ cup milk to replace milk in recipe. Arrange two or three peach slices on top, then bake.

Mediterranean Sage Becoming Southern Oregon Range Problem

A PLANT Arabs and Turks cultivated centuries ago for its alleged cure of aches and pains is fast becoming a headache to Lake County farmers.

The plant: Mediterranean sage, a biennial.

The problem: It has taken over an estimated 200,000 acres of annual-grass range land in Lake County, according to extension agent Elgin Cornett. A patch has started in Union County, and unconfirmed reports say it's growing near Walla Walla, Washington. It's been a range problem in California, too. The plant is not poisonous. It just takes over low producing range land, using the space on which desirable perennial grasses should grow. Cattle won't eat it.

The control: 2,4-D spraying or grubbing, combined with good range management. The weed kills easily, but it takes over again unless good range management follows.

And Mediterranean sage probably is capable of spreading to rundown ranges in other counties. Almost all of Oregon's southeastern range is poor enough so the weed would take over quickly once it got a start.

Grows well on 8 soils

In greenhouse tests, for example, Mediterranean sage seed germinated and grew well in samples from 8 typical range soils, says OSC range management researcher C. E. Poulton.

The soils: saline from Klamath County; pumice from Deschutes County; fine dune sand from Columbia River; sandy loam from Squaw Butte branch station near Burns; deep tillable soil from along highway 206 west of Condon; shallow, stony soil from scabland sagebrush areas near Condon; deep, black soil from Morrow County; and a Winchester medium sand from Umatilla County.

Also, Mediterranean sage teams up with another "range robber," Medusa rye. Together, the two can easily crowd out usable range grasses, especially annuals or young perennials.

But Mediterranean sage can be controlled. Workers at the Squaw-Butte-Harney branch station found in 1948 that only 1 pound per acre of butyl ester 2,4-D sprayed at the early flower-stock forming stage (about June 25) will kill *all* plants.

Poulton emphasizes that spraying alone won't keep the plant in check. After spraying, perennial grasses must be seeded and managed well so they can take over. Once these grasses get established—and are permitted to remain healthy — Mediterranean sage will have to go elsewhere for a home.

Phosphorus, Nitrogen Up Corn, Bean Yields

WHEN, WHERE, and how much phosphorus you put on your pole beans or sweet corn will affect yields, says OSC horticulturist S. B. Apple. With nitrogen, only "how much" is important for increasing yields.

After 5 years' research, here are his suggestions:

For phosphorus, apply only at planting time, side dressing the fertilizer in bands 2 to 3 inches to the side and 2 inches deeper than the seed. The 120 pound rate of actual P_2O_5 per acre (about 3 sacks of treble superphosphate) gave the most economical yield increase.

Nitrogen timing unimportant

For nitrogen, 50 to 100 pounds of actual nitrogen per acre was the best paying yield-booster. Timing was not too important—just so the nutrient was there for plant use. Banding and broadcasting gave about equal yields, but the researcher cautions not to apply more than 40 pounds of nitrogen at one time, if banding. Amounts over this may burn plants.

For sweet corn, Apple says it's important to irrigate after applying nitrogen. Yield increases from nitrogen depend on plenty of water. If you irrigate only once or twice, you'll get less from your nitrogen than if you irrigate more.

Just how much water is needed is difficult to say. Tests in 1954—a wet summer—showed that two to four irrigations per season were enough to get economical yield increases from 100 pounds of actual nitrogen applied per acre.

No potash response

Neither vegetable responded to potash applications. Also, potash didn't affect bean or corn quality. According to food technologist A. P. Sidwell, potash applied to snap beans growing on soils already high in potash failed to affect processing or canning quality.

Minor elements — boron, copper, zinc, and magnesium—also failed to increase yields, and boron tended to decrease bean yields slightly.

All experiments were conducted on a Chehalis loam soil, medium to high in phosphorus.

Specific Gravity Measures Shell Strength

POULTRY BREEDERS now can measure eggshell strength without breaking the egg, reports OSC poultryman Paul Bernier.

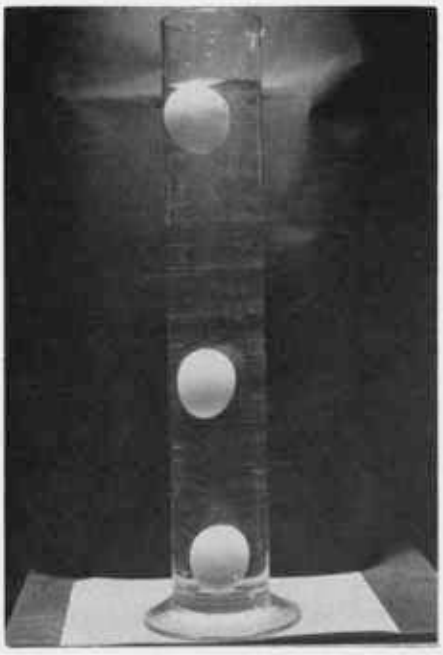
He uses specific gravity. In principle it works like this: if water in a container weighs the same as an egg that is dropped into it, that egg doesn't sink or rise, but remains half way between the water surface and the bottom of the container.

Bernier added different amounts of salt to separate containers of water. Thus, he could adjust any volume of water to any specific gravity he chose. Eggs with a shell thickness greater than an "average" would sink in the same solution in which an "average" egg would not sink. By setting up a battery of 16 crocks—each with salt solutions of different specific gravity—he could determine the thickness or thinness of an eggshell, compared to an "average."

Shell thickness measures strength

Poultry researchers found many years ago that the contents of an egg always had the same specific gravity. Only different shell thicknesses changed the specific gravity. And eggshell thickness is a good measure of shell strength.

This method has another advantage.



DIFFERENT eggshell strength shows up among eggs dropped in experimental salt solution.

Researchers usually have recommended that breeders measure shell strength late in the year, since shell strength decreases in late summer. Bernier found that the specific gravity method accurately measured hereditary shell strength regardless of season. Three to five eggs per bird are enough.

Here's how it works for a poultry breeder:

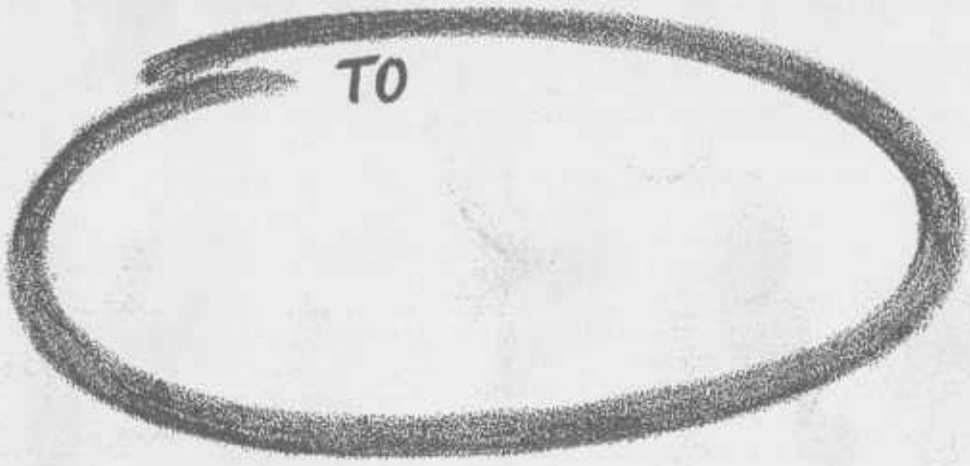
Eggs are trapnested and tested 3 to 5 successive days. Early in each afternoon, after most of them have been laid for the day, they are sorted according to layers and placed on egg trays. Eggs from trays are immersed at random in a 2½-gallon crock solution—one estimated to measure the "average" shell thickness. Thin shelled eggs—those that rise to the top—are transferred to the next solution with a lower specific gravity. Those that sink in the "average" solution are transferred to that with the next higher specific gravity and so on in both directions until all the eggs are in the last solution in which they sink. Solution and hen numbers are recorded. After rinsing, eggs tested are suitable for marketing or for incubation.

The actual operation involves several exacting conditions such as constant water temperature and salt accurately measured to one-tenth of an ounce per quart.

Thus, when many eggs from each hen and strain have been tested, hereditary differences in eggshell thickness can be observed, providing the birds were fed and managed similarly. Detailed instructions are available from Bernier.

Shell strength important

Selecting laying strains that have the genetic ability to produce strong-shelled eggs offers more advantages than you might think. According to Bernier, at least one-tenth of all eggs produced are broken or cracked between the nest and the consumer. Such eggs mean at least a 50 per cent loss in the price per dozen producers receive. For Oregon, this is about $1½ million a year. Although some of this breakage is due to poor feeding, a hen still must have the inherent ability to produce strong-shelled eggs when fed the proper diet.



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Farm Outlook . . .

(Continued from page 3)

tinue so for some time. It is replacing some corn and other grains in feed rations.

Poultry

Surpluses often lead to shortages. This year looks like no exception for eggs.

The number of chicks raised for flock replacements will be cut 18 per cent this year unless the nation's farms change their February intentions. A cut of this size would mean favorable prices next fall after stored eggs have moved. A cut half this size should bring at least average returns, so take good care of those pullets.

Broilers will have their ups and downs. Competition will be keen. Some will make money—others won't. Don't try broilers unless you really want to test your production and marketing efficiency.

The nation's turkey raisers plan about as many heavy birds this year as last, but fewer light ones. These plans suggest prices next fall about the same as last fall unless demand picks up more than expected. Margins could be better though, if lower feed prices come as expected.

Some Oregon turkey growers, tired of losing money or barely breaking even on heavy toms, are considering all-hen flocks this year. Tom poults would be shipped out of state and hen flocks would be culled for breeders next fall. Carried far enough, Oregon would drop out of the turkey surplus class and gain a little freight advantage on local markets.

Hogs

Thanks to the buildup in grain supplies, we are in a better position to produce more of the pork eaten in the West than we have been for a long time. We have the barley and it now costs less than corn on many Midwest farms. We shall have a hog-price advantage over Midwest competitors until we produce more pork than we use. That will take some time.

Meanwhile, hog profits will stay below average this spring. There is little chance for much price rise before July. And that rise is likely to be temporary. It probably will be erased by fall marketing from the 5 per cent bigger pig crop expected this spring. Before long, declining hog prices will cause Midwest farmers to turn more of their corn toward government price-supporting loans and less toward hogs. Weaner and feeder pig prices are likely to work lower this spring.

This is the time for Oregon farmers to learn to raise hogs efficiently and get set to take advantage of the better times that are almost certain to come in a couple of years.

Lambs & wool

It isn't easy to tell where this year's wool market will settle, but holding the clip awhile, or putting it in a sales pool, may pay unless you can come close to last year's prices. Other than the possibility of all-out war, there seems to be little chance for higher prices in the coming season.

Last year's prices attracted fewer imports, but government stocks increased a little. This year's domestic wool clip will fall short of our mill's needs if use picks up.

Remember, the higher the price you get for your wool, the bigger the bonus. The incentive payment will be figured as a per cent of your sales.

Lamb prices are expected to be close duplicates of last year. Best prices on the spring crop should come in May and June. Demand for feeders probably will be keener next summer. Lamb feeders had good margins this winter.

Lamb looks like one farm product that promotion could help. The new wool program provides a means of financing lamb promotion. Many people have forgotten how good lamb can be—or never knew.

Potatoes & onions

Some Oregon farmers may save both money and moisture by holding the line on potatoes. Early potatoes are almost certain to bring less money than last year. Plantings are being increased 23 per cent in California.

Late potatoes may fare better than early potatoes and attract prices about like this season, if growers stay with plans to cut acreage a little.

Growers plan to plant a few more late onions this year, despite the poor showing made in the markets during the past winter. Those likely to be short on water or getting below-average onion yields might be ahead to turn to some other crop.