Oregon's Agricultural PROGRESS

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for

SHEEP are the best grass scavengers for much of western Oregon's cut over hill land. And over the years, sheep have been one of the best money makers for those who farm the rolling slopes between the high timber line and the valley floor.

With present prices, returns from fat lambs are about 4 to 1, compared to wool. For the sheepman on western Oregon's hill lands, marketing early fat lambs off grass is a good way to harvest the lush spring grasses.

But nature and need often are not together for producing early fat lambs. Lush spring annuals on higher slopes do not last long enough to market fat lambs.

Pasture improvement important

Research at OSC shows that by fertilizing, cutting silage, reseeding overgrazed areas, and seeding better pasture sites with grass-legume combinations, you can encourage nature to conform more to sheep production needs.

And by breeding with bucks that will give consistently heavier, better

nage pastures

Earlier fat lambs

Sheep have been one of our best money makers.

Pasture management and siring with a breed that will produce heavier fat lambs early are 2 ways of profiting from recent OSC agricultural experiment station findings.

finished lambs, you can best use the better grasses from pasture improvement.

Combining the research findings so that they fit your situation might bring more returns from fat lambs, say animal husbandman Ralph Bogart and range management researcher, D. W. Hedrick.

So far, their research has shown the following will pay off in heavier fat lambs:

▶ Combine improved and unimproved hill pastures in a rotation scheme. Use each type when it is most productive. Grazing native areas heavily in early spring, but do not continue grazing into summer. Such continuous grazing cuts back perennials, limits grass production in the fall and next spring. By improved pastures, Hedrick means those which are worked up and seeded.

▶ Use more green feed by making silage from extra spring forage. Fertilizing and good grazing management also will insure enough grass for silage making.

▶ Add nitrogen fertilizer to lambing pastures in the fall. Hedrick also has tripled early spring grass growth on lambing pastures by not grazing sheep on these pastures in the fall.

▶ Put lambs and ewes on your improved pasture (one containing a legume) at least a month before marketing.

Put ewes after weaning on eaten-down pasture to help halt the milk flow. But do not put them on dried annual pastures. Ewes will eat only green perennials, thus encouraging an invasion of weeds.

▶ Use a lush pasture during August breeding. Ewes should be in good condition. Alta fescue makes more growth in the summer than most other grasses.

▶ Larger rams, such as Hampshire and Suffolks, will produce more pounds of marketable fat lambs off grass than long wool breeds. Cheviots are better for rougher hill land. Long wool breeds, such as Romney, produce a heavy wool clip and can stand rainy weather, but their lambs lack the finish needed for marketing directly off grass. Western or cross bred ewes shear a good fleece and are good mothers.

▶ Keep winter feeding costs down. Pasture will usually last until mid December, when bad weather usually starts. Then you'll need to feed grain —about ½ pound per head per day. If snow completely covers the grass,

Here's what happens to spring pasture that has been grazed the previous fall. Picture at left shows little spring growth of fall grazed pasture. Picture at right shows spring growth of ungrazed pasture.

Compare the Lambs From Different Breed Sires

Hampshire-sired lambs: weaning weight, 78 pounds; marketable, 56 per cent; income per ewe, $19.66.

Cheviot-sired lambs: weaning weight, 75 pounds; marketable, 56 per cent; income per ewe, $18.36.

Border Leicester lambs: weaning weight, 76 pounds; marketable, 45 per cent; income per ewe, $18.76.

Romney-sired lambs: weaning weight, 75 pounds; marketable, 23 per cent; income per ewe, $15.67.

increase grain intake to $\frac{3}{4}$ pound and add some legume hay or silage.

► Rotate pasture grazing to control parasites. This means taking all sheep off the pasture. A few head may not harm pastures, but will keep the parasite cycle going.

Now for their specific findings:

Taking advantage of early June markets means August breeding with ewes in good condition. Hedrick reports preliminary experiments with alta fescue indicate that this grass makes a good summer regrowth for a breeding pasture if managed properly in the spring. Applying 30 pounds of actual nitrogen in the spring will just about double summer regrowth.

Also, alta fescue pastures grazed or cut in the spring when plants were about 3 to 5 inches tall produced the greatest amount of August regrowth. This means cutting for an early silage crop from areas used later for August breeding. If this is not practical, graze the area heavily up to the time annuals die.

Breed combination results

Which breed combinations result in the heaviest number of early fat lambs? After four years of weighing and selling lambs from grade Romney, Border Leicester, Cheviot and Hampshire rams, and Western ewes (Lincoln X Rambouillet), Bogart reports the heaviest and highest number of marketable fat lambs off grass came from rams in the following order: Hampshire, Border Leicester, Cheviot, and Romney.

Lambs from Western ewes crossed with Hampshires averaged 78 pounds at weaning time, and returned $19.66; Border Leicester lambs averaged 76 pounds and returned $18.65; Cheviot sired lambs weighed 73 pounds, returned $18.36; and Romney sired lambs weighed 73 pounds, returned $15.67.

Fifty-six per cent of the Hampshire sired lambs were marketable as early grass fat lambs, with 45 per cent for Border Leicester; 56 per cent for Cheviot, and 23 per cent for Romney.

In addition, Bogart tested Suffolk and Southdown sired lambs, crossing these rams with Hampshire, Border Leicester, Cheviot, and Romney ewes. The percentage of marketable fat lambs follows: For Suffolk-sired lambs, Hampshire ewes, 80 per cent; Border Leicester ewes, 56 per cent; Cheviot ewes, 65 per cent; and Romney ewes, 20 per cent.

For Southdown-sired lambs, Hampshire ewes, 80 per cent; Border Leicester ewes, 54 per cent; Cheviot ewes, 65 per cent; and Romney ewes, 75 per cent.

Market weights listed

Market weights of lambs went like this: For Suffolk-sired lambs, Hampshire ewes, 69 pounds; Border Leicester ewes, 64 pounds; Cheviot ewes, 62 pounds; and Romney ewes, 58 pounds. For Southdown sired lambs, Hampshire ewes, 57 pounds; Border Leicester ewes, 57 pounds; Cheviot ewes, 56 pounds; and Romney ewes, 58 pounds.

Combining these research results, Bogart recommends considering the Western ewe for fat lamb production. She shears a good fleece and is a good mother. Also, heavy rams, such as Hampshire and Suffolk, look like good sires for fat lamb production, with Cheviots adapted more for rougher hill land.

Cut winter feeding costs

Winter feeding is a good place to cut costs, says Hedrick. Generally you can pasture up to mid-December on areas revived by fall rains. If snow is no problem, graining $\frac{1}{2}$ pound per head per day is enough until lambing time. Small grains—whole oats, barley, or wheat—are good feed. If snow covers the hills, you'll need to boost grain intake to $\frac{3}{4}$ pound and feed some legume hay or grass silage. One pound of hay per head per day and up to 3 pounds silage is the usual allowance. A sack of nitrogen, added to lambing pastures in the fall, doubled forage yields in the spring, Hedrick reports. Pasture plots receiving no nitrogen yielded only 400 pounds of dry forage an acre in December, and 1,000 pounds in April. Applying a sack of ammonium nitrate (33 pounds actual nitrogen) in September boosted forage to 1,000 pounds in December, 2,000 pounds in April.

Perhaps more important than fertilizing was the effect of grazing a lambing pasture in the fall. Hedrick found that you can triple forage yields by not fall grazing. Fall grazed pastures produced about 400 pounds of forage in the following spring, while ungrazed pastures yielded 1,500 pounds in the spring. This year, the researcher is testing the combined benefit of fertilizing and non-fall grazing.

Taking sheep off lambing pastures in the fall worked only on well-drained soils. Heavy grazing at lambing time did not limit forage production. Grass just needs a chance to recover in late spring and summer. Light grazing between May and December did not seriously limit production.

An improved pasture for finishing lambs in late April, May, and June is a must to put the best finish on your lambs. The researcher has found that a good legume in the mixture is essential. He says orchard grass, burnett, sub clover, birdsfoot trefoil, meadow foxtail, and alta fescue are possible grasses and legumes to include in a mixture.

After weaning, high producing ewes were put on a previously used pasture for drying up. A pasture that had had a silage crop removed was used.

These are some of the lamb breeding and pasture management findings that might help you increase your profits from fat lambs if farming conditions are similar to those described here.

For 1 Year: 8 Management Steps, 4 Pastures

(200 Ewes)

PASTURE 1

1 Use before lambing. January-February. If improved, cut for silage in May.

5 Summer grazing. June-August. Dry up ewes. Use pastures 1 and 2 in alternate years.

8 Winter feeding. December. Use in years not summer grazed.

Improved, 20 acres; unimproved, 80 acres.

PASTURE 2

2 Lambing pasture. February-April. Use after lambing.

5 Summer grazing. June-August. Use second year for summer grazing.

8 Winter feeding. December. Use in years not summer grazed.

Improved, 20 acres; unimproved, 80 acres.

PASTURE 3

3 Spring pasture. April-May. Make good use of spring annuals.

7 Fall grazing. September-December.

All unimproved, 100 acres

PASTURE 4

4 Finish lambs. May-early June. Use lush improved pasture, one containing a legume. Creep-feed twins.

6 Breeding pasture. August. Use earlier-grazed portions.

All improved, 60 acres.

Which Preservative for Grass Silage?

Numerous grass silage preservatives are on the market—cane molasses, dried molasses, beet pulp, sulfur dioxide, and sodium bisulfite. After 3 years of comparing these preservatives, OSC dairy nutritionists have found that all 4 will preserve grass silage, but dried beet pulp offers additional advantages worth considering. Here are their findings.

GRASS AND LEGUME silage is just as good or better than corn silage, if made properly.

And adding the right preservative is an important step, say dairy researchers I. R. Jones, J. H. Byers, J. V. Bateman and John Schubert. A silage preservative is added to encourage rapid build up of acid-forming bacteria in the silage. If these acid-producing bacteria grow too slowly, silage acidity is also slowed. This means other bacteria—which produce protein-destroying compounds—build up. The result is foul smelling, low-quality silage.

Grass and legumes are high in protein, low in sugar, so you should add some kind of sugar to encourage lactic acid bacteria growth and thus better silage preservation.

Several are available. One is cane molasses. Another is dried molasses beet pulp. Others include sulfur dioxide gas and sodium bisulfide. The last two do not add any feeding value, but form acid directly, thus halting the growth of silage-spoiling bacteria.

In 1950, OSC dairy nutritionists compared the preserving qualities of cane molasses and dried beet pulp in two 75-ton upright silos. They added 70 pounds of cane molasses to grass legume forage in one silo, and 60 pounds of dried beet pulp to the same kind of forage in the other.

The nutritionists found that both preservatives made good quality silage, but that every pound of dried beet pulp absorbed about 2 pounds of forage juices. In dollars and cents, the juice saved by the beet pulp would be worth about $35—enough to pay half the beet pulp cost.

The researchers point out that the beet pulp addition was not enough to absorb all the forage juices, but beet pulp silage was higher in feeding value.

Beet pulp vs. sulfur dioxide

In 1951, they compared beet pulp with sulfur dioxide. The preservatives were added to oats and vetch forage, with 160 pounds of beet pulp per ton in one silo, and 6 pounds of sulfur dioxide gas per ton in the other.

Again the beet pulp absorbed most of the forage juice—only 120 gallons or about one-half ton was lost. In the sulfur dioxide treated forage, almost 15 tons of juice was lost. This meant that beet pulp as a preservative saved about 800 pounds of dry matter, worth about $150 per ton of ensiled forage. Each cow received her normal ration. Cows fed beet pulp silage as the only roughage produced 1.5 more pounds of 4 per cent fat corrected milk than those fed the sulfur dioxide preserved silage.

Sulfur dioxide was difficult to handle. It was applied with a tube and hoses connected to gas cylinders. The tube was inserted into the forage in several places as the silo was filled. A careless operator can permit the gas to escape, making it uncomfortable for himself and others helping.

Beet pulp vs. sodium bisulfite

In 1952, the researchers compared beet pulp and sodium bisulfite as a silage preservative. They used 200 pounds of dried beet pulp in one silo filled with pasture grasses and ladino clover. About 8 pounds of sodium bisulfite per ton was added to the grasses and legume in the other.

Sodium bisulfite is a dry powder and can be applied with a blower. Escaping gases thus are not a problem.

Ten Holstein and eight Jersey cows were paired into two groups, with one group receiving beet pulp silage, the other sodium bisulfite silage. Each cow received her regular grain ration according to her production and about ten per cent of her daily roughage requirement in good quality alfalfa hay. Silage made up the rest of the roughage. Cows were fed 63 days.

Beet pulp-preserved silage increased 4 per cent fat corrected milk production by 2.13 pounds daily. These results are about the same as the feeding trials comparing beet pulp with sulfur dioxide in 1951.

Sodium bisulfite silage costs less to preserve, about 80 cents per ton. Beet pulp silage—figuring 200 pounds of pulp at $60 per ton—cost $6 per ton of silage. But the researchers point out that 200 pounds of beet pulp absorbed about $2 worth of forage juice. Then they add the feed value of beet pulp. This would be about three-fourths of the original cost, or $4.50 per ton. This brings the cost of adding beet pulp to a 50 cent per-ton gain!

But is the cost of beet pulp paid in additional milk checks? The answer is one which individual dairymen must decide. You'll have to consider carefully the value received from $450 for beet pulp in a 75 ton silo, compared to $56 for sodium bisulfite. According to the dairy nutritionists, cane molasses, dried beet pulp, sodium dioxide, and sodium bisulfite will preserve forage. Dried beet pulp, however, has advantages worth considering. Additional silage studies are in progress.

Suggested Amounts of Beet Pulp for Your Forage

Condition of forage	dry matter	beet pulp per ton of silage
	Per cent	*Pound*
Immature, no wilting	20	300
Early bloom, no wilting	25	200
In bloom, no wilting	30	100
Wilted 2 to 3 hours in sun, chopped fine	30 to 35	None

Tips for Making *Good* Grass Silage

▶ ***Cut forage early.*** Cut legumes when clover and alfalfa are in the early bloom or 1/10 bloom. Cut cereals when in the early milk stage. Cut grasses when heads begin to show—before blossom.

▶ ***Cut forage fine for tight packing.*** For grass and legume crops, set the chopper to cut $\frac{1}{2}$ inch lengths. For pasture clippings, use a $\frac{3}{4}$ inch setting. A $\frac{1}{4}$ inch cut is recommended when ensiling mature grasses or legumes, when using a temporary silo, or when not adding a preservative.

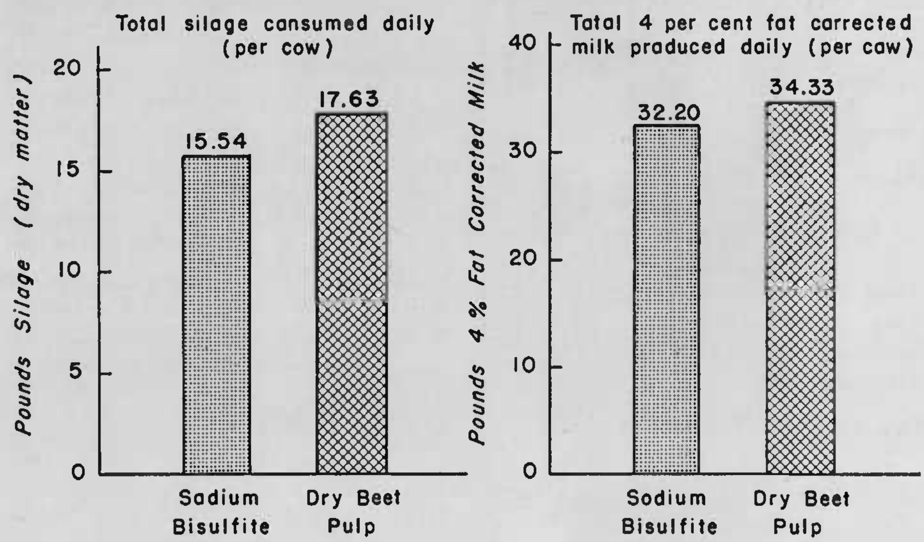
▶ ***Control forage moisture.*** About 65 to 70 per cent is best—better too wet than too dry. Here's a simple way to check: squeeze a handful of forage as it falls in the silo. If it remains a ball and leaves some moisture on your palm, it's about right. If it fluffs out again, it's too dry. Add water to dry forage by spraying it into the silo or into the blower fan case.

▶ ***Preserve properly.*** Wilting and adding grain are two silage-preserving methods not mentioned in this article. Forage wilted to the right moisture—65 to 70 per cent—makes excellent silage. With grain, add 150 to 250 pounds of ground oats, barley or wheat to each ton of forage.

▶ ***Tramp forage.*** Pack and tramp material unless it has been harvested at an immature stage or cut in short lengths.

▶ ***Seal silo to avoid spoilage.*** One method: wet top 6 inches thoroughly and tramp well. Repeat for 3 or 4 days. Plastic covers can be successfully used.

Cows Ate More, Produced More, When Fed Dried Beet Pulp



With an instrument that measures electrical current and some wire, OSC Soil Scientist A. W. Marsh says . . .

Gypsum Blocks Tell *when* to Irrigate

GYPSUM blocks and an instrument that measures electrical current —once tools of research workers for measuring soil moisture—will work for the typical irrigation farmer who wants to know exactly when and how much water to apply.

Soil scientist A. W. Marsh reports that equipment costs ($100 to $200) may be repaid through increased irrigation efficiency. In most cases, costs will be repaid quickly for farmers with a large investment in irrigation equipment.

When and how much to irrigate is a big problem facing western Oregon irrigators. It's important in eastern Oregon, too, but not as much as it is west of the Cascades.

Gypsum blocks can be purchased for about $2 apiece, or they can be homemade, but purchased blocks probably will be more accurate. They are about 2½ inches long, 1¼ inches wide, and ½ inch thick.

You can make them by first stripping 2 inches of insulation from the ends of bell wire or lamp cord. Put the bared wires parallel and about an inch apart in a gypsum block mold. Then pour a mix of gypsum and water. After they have dried and hardened, blocks are ready for your irrigation field.

Two methods of installing blocks

The expected root zone of an irrigated crop determines how many blocks you use. Gypsum blocks are generally set at 6-inch intervals, beginning 6 inches below the surface.

Marsh reports that two methods of installing blocks are used. First, let's assume you have 5 blocks to install. By one method, drill a 30-inch hole with a 3- or 4-inch wide post hole auger. Then lay a block flat on the bottom. Backfill 6 inches, tamp with a stick, and lay another block. Repeat until the final block is 6 inches below the soil surface. Collect and identify wire leads with colored tags or clips.

For the second method, you'll need a steel bar, sledge, and a hand cranked hoist with tripod. First, drive a hole with the bar and sledge. Remove the bar with the hoist. Then insert the blocks lengthwise. Backfill hole between blocks, using the rod for tamping. Bentonite has been used to form an inch thick seal in the backfill midway between blocks. Tie and identify wire leads.

Marsh reports it takes about one minute to take a reading. The instrument sends out a small electrical current through the block, after the leads have been connected, and measures the resistance to electrical flow. Gypsum blocks absorb and lose moisture as the soil moisture changes, and the instrument's dial will indicate how much soil water is in the blocks. Instructions with these instruments will tell how to interpret readings.

When readings are recorded every 3 days on a chart, you can predict several days ahead when you will have to irrigate. First, draw a horizontal line on the chart to represent the minimum moisture level. Then chart block readings. As the charted readings approach the minimum moisture line, you should be able to predict when you'll need to irrigate.

Guessing isn't accurate

Old methods of "guessing" soil moisture usually aren't accurate, says Marsh. Summer rains can be misleading and often do not wet the soil to an effective root zone depth. Just scuffing the soil with your toe isn't enough. Even squeezing soil between your fingers is only an estimate—although experience counts here. The fact remains that few farmers bother to examine various soil depths with an auger or have trained fingers to estimate the soil moisture accurately. Gypsum blocks offer the best foolproof method to date.

But the gypsum blocks have their disadvantages. One, gypsum blocks dissolve and will break up if left in the ground all winter in western Oregon. They'll last 2 or 3 years in eastern Oregon. Researchers are searching for more durable types. Two, gypsum blocks do not give reliable readings in highly saline soils, like some of those around Klamath Falls, Prineville, and in Malheur County. And three, roots may move in around gypsum blocks if soil isn't properly tamped, resulting in unreliable readings. Industry is trying to develop blocks which can be installed without using a backfill.

Fertilize for Higher Yields

Plants need 15 elements for growth. Three come from the air and water. The other 12 come from the soil. Oregon soils contain enough of many of these 12 elements. But many soils are lacking in a few of the essential nutrients. In the next 4 pages, we will attempt to bring you up to date in our fertilizer research findings. Much of the work was completed at branch experiment stations.

OREGON farmers spent more than 10 million dollars last year for fertilizers. With the squeeze for efficient farming, many are asking, "How much should I spend for fertilizers?"

The answer depends on a lot of things—the amount of nutrients in your soil, soil moisture, cropping history, and the crop you plan to grow—according to H. B. Cheney, department head of soils at OSC. This information, combined with a soil test, will give you a pretty good picture of your fertilizer needs, and should aid in your fertilizer-buying decisions.

Soil scientists classify essential plant nutrients into major and minor elements. Elements used in abundance are nitrogen, phosphorus, potassium, sulfur, calcium and magnesium. Minor elements are iron, boron, zinc, copper, manganese, and molybdenum. Plants need all of them for growth.

NITROGEN

But nitrogen—and lots of it—is badly needed on most Oregon soils.

About 99 per cent of the nitrogen in the soil is tied up in organic matter so plants can not use it. Plants use nitrogen when it is in the nitrate or ammonia form. Billions of tiny microorganisms take organic nitrogen and convert it to the form plants use.

MOST PROFITABLE RATES

Research has shown that nitrogen will profitably increase crop yields.

Wheat

In the Columbia Basin, nitrogen must be adjusted carefully to the moisture supply. With deep soils which yearly receive 15 or more inches of rain, 60 pounds of actual nitrogen per acre will usually give you a profitable yield increase when wheat follows wheat. In some cases, even higher rates have been profitable.

On shallower soils low in moisture-holding capacity and soils in areas receiving less than 15 inches of rain a year, from 0 to 30 pounds of actual nitrogen per acre appears to be a more profitable range. If the field is being recropped, higher rates are necessary.

The after-effect of continuous nitrogen applications was found by Merrill Oveson and H. M. Waddoups after a ten-year study at the Pendleton branch station. Federation wheat was grown.

Nitrogen ups wheat yields in the Columbia Basin

Every year from 1944-50, 0, 30, 60, 90, and 120 pounds of actual nitrogen were added. From 1951 to 1953 no fertilizers were applied.

The results: In the first seven years, the 60-pound rate boosted yields 11 bushels over the 14 bushel yields on the plot which received no fertilizers. There was a 16-bushel increase with the 120-pound rate. But in the 3 years no fertilizer was applied, the plot that had received 60 pounds of nitrogen increased yields 9 bushels, while the plots that had received 120 pounds of nitrogen continued to show yield increases of 17 bushels.

Barley

Nitrogen responses in the Willamette Valley will vary according to some of the conditions outlined below, according to Tom Jackson, OSC soil scientist, who conducts fertility trials on farmers' fields, and Wilson Foote, OSC agronomist.

In one trial where barley followed oats and vetch, 30 pounds of actual nitrogen per acre increased yields 700 pounds. The actual figures: no fertilizer, 3,300 pounds per acre; 30 pounds of nitrogen, 4,000 pounds. Higher nitrogen rates caused lodging, thus reduced yields.

In another trial where barley followed alta fescue, 60 pounds of actual nitrogen more than tripled yields. The figures: no fertilizer, 1,000 pounds of grain per acre; 60 pounds nitrogen, 3,700 pounds grain. More than 60 pounds of nitrogen did not cause lodging but it did not increase yields, either.

A third trial—barley following barley—probably comes closer in representing cropping plans in many Willamette Valley barley fields, say Jackson and Foote. In this trial, the farmer had been applying some nitrogen and plowed under all the straw. Applying different nitrogen rates at planting time gave the following results: no nitrogen, 2,400 pounds of barley per acre; 30 pounds of nitrogen, 3,700 pounds; 60 pounds nitrogen, 4,200 pounds of barley. Much lodging occurred at the 60 pound rate, indicating this was too much fertilizer.

(Continued next page)

No one recommendation

Results from these barley experiments show one thing, according to Jackson. No one can recommend one application that will fit all Willamette Valley barley fields.

What, then, can be used?

Jackson says the following guide can be used in the Willamette Valley:

1. The first 30 to 40 pounds of actual nitrogen per acre can be expected to increase barley and oat yields 1,000 pounds.

2. If your estimated yield with 30 to 40 pounds of nitrogen is still less than the top yields you expect on your soil, an added 20 to 30 pounds of nitrogen likely will be profitable.

In all cases, Jackson says this guide

Nitrogen ups barley yields in Benton County.

will work if: (1) there is enough moisture in the soil to balance the fertilizer added, (2) there is enough of the other nutrients, especially phosphorus and sulfur, (3) there is adequate drainage.

Grass seed

In Jackson's trials, nitrogen also profitably increased grass seed yields. In one Linn County trial, for example, 80 pounds of actual nitrogen per acre more than tripled common ryegrass seed yields. The figures: no fertilizer, 350 pounds of seed per acre; 40 pounds nitrogen, 900 pounds seed; 80 pounds nitrogen, 1,140 pounds seed; and 120 pounds nitrogen, 1,470 pounds of seed.

Many grasses do not yield as much as common ryegrass, but Jackson says you can expect the same percentage of increase from nitrogen on other grasses. In general from 75 to 100 pounds of actual nitrogen has given profitable yield increases.

Irrigated crops

Soil scientists, agronomists, and horticulturists at OSC and at branch experiment stations have found that 75 to 100 pounds of actual nitrogen per acre usually will profitably increase yields of potatoes, sugar beets, sweet and field corn, pole beans and hops.

For example, horticulturist S. B. Apple has found that 100 pounds of actual nitrogen per acre increased pole bean yields 1 ton and sweet corn 1½ to 4 tons. The figures: for pole beans, no fertilizer, 8.6 tons; 100 pounds actual nitrogen, 7.6 tons; 100 sweet corn, no fertilizer, 5.3 tons; 50 pound actual nitrogen, 7.6 tons; 100 pounds nitrogen, 9.1 tons.

Soil scientist A. R. Halvorson at the Klamath branch station reports similar rates of nitrogen will profitably boost yields on potatoes. In one trial, 50, 100, and 150 pounds of actual nitrogen were applied with 100 pounds of phosphorus. The results: no fertilizer, 101 hundred-pound sacks per acre; 50 pounds nitrogen, 221 sacks; 100 pounds nitrogen, 247 sacks; and 150 pounds nitrogen, 244 sacks.

Even Klamath Basin muck soils require nitrogen. In another trial where phosphorus and potassium were adequately supplied, nitrogen boosted yields. The figures: 50 pounds nitrogen, 371 sacks per acre; 100 pounds nitrogen, 439 sacks; 150 pounds nitrogen, 463 sacks. However, there's indication that higher nitrogen rates reduced potato quality.

Wild flood meadow in Harney County

Scott Cooper, agronomist at the Squaw Butte-Harney branch station near Burns reports that 60 pounds of actual nitrogen per acre increased hay yields from native flood meadows in the Harney Basin by one ton. The agronomist tested nitrogen at 0, 20, 40, and 60 pounds per acre, but got the best return from the 60-pound rate.

Nitrogen needs vary

Even though most crops will respond to nitrogen fertilizer, Cheney reports extra yields from applying nitrogen will depend on four items:

▶***Total nitrogen.*** The reserve supply in the soil will vary widely.

Total nitrogen tells only part of the story. It's available nitrogen that counts. Temperature, moisture, acidity, aeration, plant residues, and added nitrogen all affect the release of available nitrogen.

Here's A Suggested Fertilizer Guide

Check with your county agent and use soil test results to find your soil's specific fertilizer needs. In table below, a zero (0) means that research has not indicated a response. A question mark (?) means there is some research information which indicates a possible response under certain conditions.

Area and Crop	Actual Nutrient (pounds per acre): Nitrogen (N)	Available Phosphoric Acid (P_2O_5)	Potash (K_2O)	(Sulfur) (S)
Columbia Basin:				
Wheat following wheat in deep soils high in available moisture. 15 inches annual rainfall.	30–90	0	0	?
Wheat following wheat in shallow soils low in available moisture. 15 inches annual rainfall.	20–60	0	0	?
Wheat following summer fallow in soils high in available moisture.	20–40	0	0	0
Wheat following summer fallow in soils low in available moisture.	0–30	0	0	0
Willamette Valley:				
Barley following oats and vetch	20–40	0–40	0	0
Barley following small grain	30–60	0–40	0	0–20
Barley following grass	50–70	0–40	0	0–20
Grass seed crops	50–100	60–120	0	0
Irrigated sweet corn	50–100	60–120	0	0
Irrigated pole beans	75–100	80–120	0	0
Eastern Oregon (irrigated regions):				
Potatoes	50–100	0–100	0–100	0–50
Sugar beets	50–100	0–100	0	0
Field corn	50–150	0	0	0
Small grain	0–75	?	0	?
Legumes	0	0–100	0	0–80

▶***Moisture.*** It may limit crop yields, thus limit the amount of nitrogen that is needed.

▶***Past management.*** Soils that have been heavily manured, heavily fertilized with nitrogen, and legume-cropped, will need less nitrogen fertilizer.

Contrast this with soils not well managed. Erosion, growing continuous grain without legumes or fertilizer, and plowing under of heavy straw or grass, all increase nitrogen needs.

▶***The crop you plan to raise.*** Nearly all non-legume crops respond to nitrogen. And even legumes may respond in some cases.

PHOSPHORUS

Phosphorus needs are fewer on most Oregon soils, compared to nitrogen, says Cheney. But we have some areas which need this element. According to fertilizer experiments, phosphorus-deficient soils are found in western Oregon, Klamath Basin, Harney Basin near Burns, and in the irrigated areas of Deschutes, Crook, Jefferson, and Malheur counties.

Western Oregon hill soils and the "white land" ryegrass soils are generally lower in phosphorus than other well-drained valley soils. But not all hill soils are low in phosphorus, and not all "white land" soils are low in the nutrient.

Also, many hill lands in the Willamette Valley need phosphorus for another reason: these soils "fix" added phosphorus into forms less available to plants.

Past cropping and management seem to have affected phosphorus needs in irrigated areas of eastern Oregon. Most farmers raising potatoes, sugar beets, or onions apparently have applied plenty of phosphorus, and few increases from phosphorus applications have been found.

MOST PROFITABLE RATES

Barley

In one Linn County trial, the benefit of phosphorus was shown when it was combined with nitrogen. The figures: no fertilizer, 1,570 pounds barley per acre; 60 pounds actual nitrogen per acre, 2,670 pounds barley; 60 pounds nitrogen plus 80 pounds phosphorus, (P_2O_5) 3,830 pounds barley.

Oats

Phosphorus sometimes hastens crop maturity. In a Linn County trial where oats followed ryegrass, phosphorus boosted yields and limited green sucker growth. The figures: no fertilizer, 1,060 pounds per acre; 60 pounds nitrogen, 2,050 pounds oats. Sixty pounds of nitrogen plus 80 pounds of phosphorus yielded 2,330 pounds of oats.

Common Ryegrass

Nitrogen plus phosphorus increased seed yields 310 pounds on this same Linn County farm. The figures: no fertilizer, 300 pounds per acre; 80 pounds nitrogen, 830 pounds seed; 80 pounds nitrogen plus 60 pounds phosphorus, 1,140 pounds seed.

Irrigated vegetable crops

These are shallow rooted, fast growing, and usually have a high phosphorus requirement. Vegetable crops may respond to phosphorus applications on soils normally considered well supplied with the nutrient.

In 1951 and 1952, horticulturist S. B. Apple increased irrigated sweet corn yields more than one ton by adding phosphorus with nitrogen. The 1951 figures: no fertilizer, 5.32 tons per acre; 100 pounds actual nitrogen, 9.1 tons; 100 pounds actual nitrogen plus 120 pounds phosphorus, 10.7 tons per acre.

In the same year, he increased pole bean yields the same way. The figures: no fertilizer, 8.6 tons per acre; 100 pounds nitrogen, 9.6 tons; 100 pounds nitrogen plus 120 pounds phosphorus, 12.1 tons per acre.

Phosphorus ups oat yields in Linn County.

Phosphorus levels in most potato-growing soils in the Klamath Basin have been maintained for high yields, according to Halvorson. Few yield increases from adding phosphorus have been found by experimentation. In one trial, Halvorson added 50 and 100 pounds of the nutrient per acre. The results: no phosphorus, 225 hundred pound sacks per acre; 50 pounds phosphorus, 226 sacks; 100 pounds phosphorus, 233 sacks. Nitrogen and potassium levels were also high in this trial.

Wild flood meadow in Harney County

Cooper says phosphorus would profitably increase hay yields from native flood meadows containing white-tip

Sulfur ups barley yields in Benton County.

clover. In his trials, phosphorus increased yields by a third of a ton per acre the year it was applied, and one-fifth of a ton the year after application. Although the agronomist applied 0, 40, 80, and 120 pounds of phosphorus per acre, he reported no important benefit in rates higher than 40 pounds per acre.

Phosphorus stimulated the growth of white-tip clover, an annual native. On areas where the clover is not growing, phosphorus probably won't increase hay yields much. But it is important to check closely for the legume.

POTASSIUM

Soil tests and field experiments show that most Oregon soils have plenty of available potassium or potash for their crop needs, but some areas are deficient.

Muck and peat soils in western Oregon have long been known to need potassium. Also, potatoes growing in some mineral soils in Deschutes, Crook, and Jefferson Counties may respond to potassium applications. However, important yield increases have rarely been obtained experimentally when the nutrient was added to mineral soils fairly high in available potash.

Soil and plant analyses are helping researchers find other possible potassium-deficient soils. Last year, 104 soil and alfalfa hay samples were collected in Jackson and Josephine Counties. They indicated a few soils in this section are as potassium-deficient as any soil in Oregon, but more research is needed before workers can say for sure where potassium applications are needed.

SULFUR

Lack of sulfur is a problem in many Oregon soils. Sulfur responses were first noticed in Oregon in 1912. Legumes are most responsive to sulfur, and farmers in the Klamath area and in western and central Oregon have added it to their legumes for many years.

A sulfur response on small grains showed up last year in field trials in

OSC's 40-inch portable plot combine in action

Klamath and Umatilla counties and in the Willamette Valley.

There isn't a good soil test for sulfur.

Increased yields from sulfur when it was added to nitrogen were found at experimental plots near Corvallis last year. The figures: no fertilizer, 980 pounds barley; 60 pounds actual nitrogen, 3,280 pounds barley; 60 pounds nitrogen plus 3,680 pounds sulfur, 3,700 pounds grain.

MINOR ELEMENTS

Minor element deficiencies have been reported in several areas of the state. But their problem is so complex and different, compared to the major elements, that they will be reported later.

HOW TO USE RESULTS OF FERTILIZER RESEARCH

Every farm has a separate fertility problem. Cheney says you can get help from your county agent. The agent is familiar with the research results in your area, which may apply to your soil. And he can help you with a soil test.

The experiment station operates a soil testing laboratory at OSC.

Soil acidity, lime requirement, available phosphorus, potassium, and calcium are determined on western Ore-

Special fertilizer spreaders insure accuracy.

gon soils. In eastern Oregon, sodium and total salts are also checked.

WHAT IS AHEAD?

Some 168 fertilizer experiments were harvested last year (See map). These experiments were completed on farms and on the College's experiment stations.

In addition, Cheney reports that more than 200 new fertilizer experiments were started in 1954.

For example, 49 were begun last fall in the Columbia Basin. Cooperating with A. S. Hunter, OSC and U. S. Department of Agriculture soil scientist, are workers at the Pendleton and Sherman branch stations, soil specialist Howard Cushman, and county agents in Umatilla, Morrow, Sherman, Gilliam, and Wasco counties.

Cheney says this increase in new experiments was possible primarily because portable field equipment had been designed and constructed by the experiment station. Soil scientists use a special fertilizer applicator which accurately and quickly spreads material on plots. Harvesting is completed with a miniature 40-inch self-propelled portable combine. Built by Hunter last year, it proved so successful that three more are under construction. This equipment is loaded on a trailer and is moved from one experimental site to another.

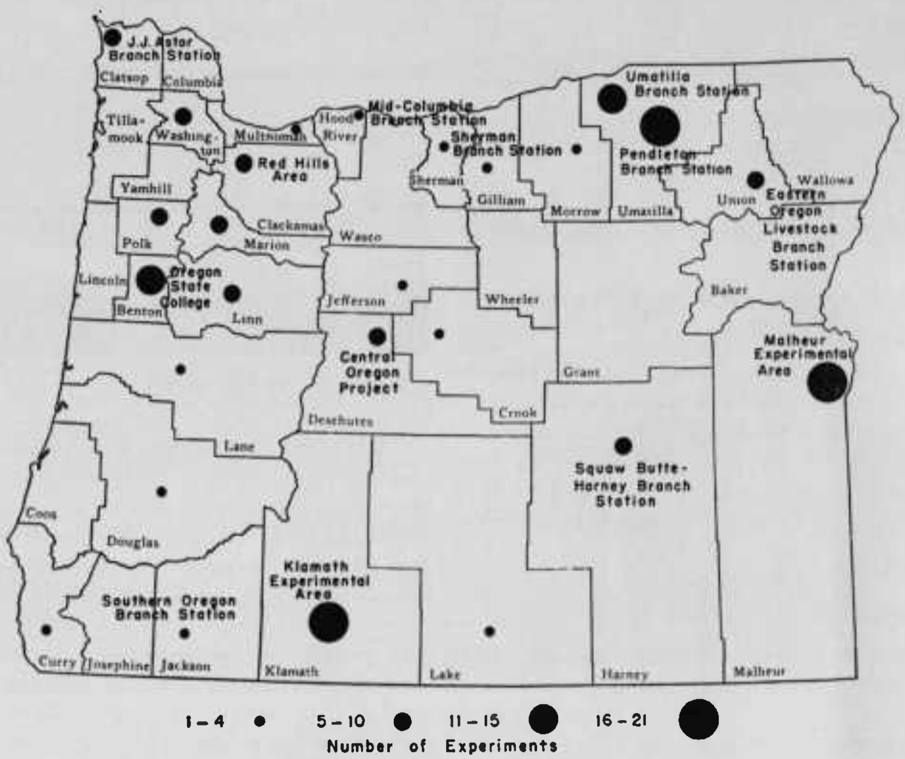
Field experiments are only part of the program.

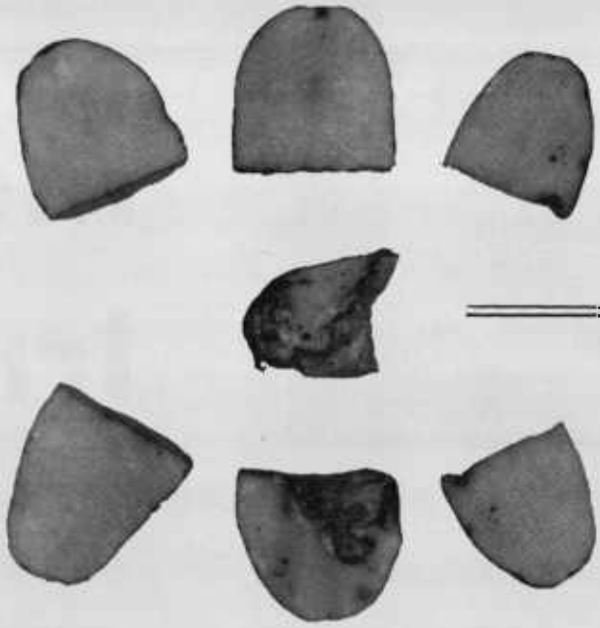
The soil testing laboratory, L. A. Albin in charge, analyzed more than 2,500 soil samples from research plots last year.

Experimental results are used to help calibrate soil tests. When this is done, you can test your soil from your farm, then compare the results with those from soils where experimental results have been obtained, and then apply fertilizer accordingly.

In addition, OSC soil scientists are trying to develop a better nitrogen test and an accurate test for sulfur.

Where 168 Fertilizer Experiments Are Located





Prevent

potato seed rot

Left are potato seed pieces treated with (from left) Phygon, Semesan Bell, and Zerlate. Top 3 were planted immediately, bottom 3 were planted 2 weeks after treatment. Seed piece in center was not treated. Note decayed or dark areas. Two OSC plant pathologists report that proper treating with fungicides will give you almost complete rot control.

POTATO SEED rotting after planting can be reduced to practically zero.

Plant pathologists Roy Young and J. A. Milbrath report that 2 years research has shown that treating potato seed pieces with Semesan Bel or Phygon will give almost complete control.

Seed rotting is common in most of Oregon's potato growing areas—Central Oregon, and in Klamath, Malheur, Multnomah, and upper Willamette Valley counties. Fungi belonging to the Fusarium and Pythium groups commonly reduce stands 15 to 25 per cent in all areas, and in many cases have caused losses so severe that replanting was necessary. Also, fungi-decayed tissues provide an open wound for other potato diseases, such as black leg. These diseases not only cut production, but also result in knobby, low-grade tubers.

Fungi found in soil

The pathologists say that fungi are found both on stored seed potatoes and in the soil. Once the cut, untreated seed is planted, fungi begin their attack, which may result in brown, decayed, shriveled tissues.

Favorable potato growing conditions —such as soil temperatures above 60 degrees—will favor sprouting and growth of potato plants and will sometimes halt the decaying process. Low temperatures favor fungi, retard potato growth.

Seed piece treatment important

Also, heavy potato losses may result if a protective, corky layer does not develop on cut seed pieces. Development of this layer is known as "suberization," and begins within 24 hours when the temperature is above 60 degrees. When growers use a tuber-unit planter, tissues are left unprotected. Then seed piece treatment is more important. However, Young and Milbrath also have tested a new mechanical tuber-unit planter which has an attached cylinder for cutting and dipping potato seed pieces in a fungicide. The fungicide-treating attachment was designed and built by Scott Warren of Klamath Falls.

After testing several fungicides and methods of treating and planting, here's what the researchers recommend:

▶ Soak all seed potatoes 1 to 2 hours in mecuric chloride (4 ounces in 30 gallons water) at least 2 to 4 weeks before cutting or planting. This is a general "clean-up" treatment that kills fungi and bacteria living on tuber surfaces.

▶ Dip all seed pieces in Phygon (1 pound in 10 pounds water) immediately after cutting, if you are using a picker-type planter. Phygon treated seed can be planted immediately or held in storage for later planting. If you dip seed pieces in Semesan Bel (1 pound in 10 gallons of water) be sure to plant immediately. They won't suberize normally after treatment. More than 20 other compounds were tested also, but Young and Milbrath found none of these as effective as Phygon or Semesan Bel.

▶ If using a tuber-unit planter, fill the fungicide tank with Semesan Bel or Phygon using above mixtures. Both chemicals provide excellent protection against decay fungi, and no injury has resulted from Semesan Bel-treated seed pieces that were planted immediately after treating. In one trial, for example, Semesan Bel was more effective in reducing blackleg, Verticillium, and Rhizoctonia than were any of the other materials tested. The researchers recommend using Semesan Bel if there is a chance ring rot bacteria in a seedlot.

Mo
Irri

How much beef will high priced irrigated pastures in the Willamette Valley produce? And how will irrigated pastures fit in the several kinds of beef cattle operations in the valley? Results from an OSC study will help answer these questions.

EIGHT hundred pounds of beef per acre—that's the result of summer grazing yearling Hereford steers on a Ladino clover-grass irrigated pasture near Corvallis, according to animal husbandman Joe Johnson and agronomist H. L. Schudel.

The researchers say the legume in the pasture mixture boosted cattle gains per acre nearly 60 per cent over straight grass. Adjacent pastures, originally seeded to grass and Granger birdsfoot trefoil, produced only 479 pounds of beef per acre, but the legume in the mixture was so sparse the researchers considered the pasture straight grass.

In addition, Johnson reports that steers not grained and kept on these pastures after September 30 steadily lost weight, while those fed grain on pasture and those dry-lot fed continued gaining.

First year's results

This sums up the first year's results of the college's irrigated pasture study. Many Willamette Valley cattlemen are wondering how much beef can be produced on irrigated pastures, and how well these pastures fit in the several kinds of beef operations.

Results from one year's trial may help answer the questions, but the researchers hope to come up with some better answers as they continue the study.

Irrigated pastures can fit two ways in Willamette Valley beef operations:

- ▶ Use irrigated pastures in a small cow-calf or feeder operation. Fit irrigated pastures and cattle in rotation with other crops.
- ▶ Use irrigated pastures as one source of feed in a large cow-calf or feeder operation. This includes taking silage or hay from the pasture.

Study began in 1951

Groundwork for the study started in the summer of 1951 when a 50-acre field that had been in barley was fallowed and worked down. The tract was on Amity silt loam, and was moderately acid. A soil test showed a pH of 5.5.

In May of 1952, it was fertilized with 32 pounds of actual nitrogen and 40 pounds of phosphorus (P_2O_5) per acre. Then the area was seeded to 4 pounds per acre of each of the following grasses, recommended by experiment station agronomists: alta fescue, orchard grass, meadow foxtail, and Tualatin oatgrass. On half the area, strips of Ladino clover were seeded at a rate of 3 pounds per acre. Strips of Granger birdsfoot trefoil were seeded at the same rate on the other half.

According to Schudel, the birdsfoot trefoil failed to grow well, and thus could not be used in a comparison with Ladino clover. A combination of reasons—poor inoculations, lack of lime and phosphorus, and tough grass competition—probably caused the sparse lotus stand.

The pastures were clipped to control weeds the establishment year. In midsummer, the area was fenced into 12 2½-acre test pastures and 4 2½-acre holding pastures. In the fall, two 100-pound sacks of ammonium sulfate and three 100-pound sacks of superphosphate were applied per acre. Last March, four sacks of ammonium sulfate were added.

Eighty-six steers put in pastures

Then in April, 86 Hereford yearling steers—averaging 550 pounds— were turned into 8 of the 12 pastures. Four pastures were held and cut for silage in mid-May.

Schudel allowed silage-clipped pastures a month to recover, then worked them into the three-pasture rotation. It worked this way: Cattle grazed each pasture one week, then were off two. Pastures were irrigated as soon as cattle moved to the next pasture.

Nineteen inches of water were applied from June 19 to September 28. About 3 inches of water went on each application in six sprinklings during the 14-week period. Sprinkling laterals were 60 feet wide, with sprinkling heads located 45 feet apart on the pipe.

The pastures were fertilized three times during the grazing season. Two 100-pound sacks of ammonium sulfate were applied in the middle of June, a 100-pound sack of ammonium nitrate in early August, and 200 pounds of 16-20 ammo-phos in the middle of September.

The 15 acres of Ladino-grass pas-

re Beef From gated Pastures

ture carried 54 head early in the season, then numbers were reduced gradually to 24 head by September 30. Lower amounts of available forage forced the reduction. Grazing on 15 acres of the grass pasture dropped from 32 head to 12 in the same period. Extra animals were kept in holding pastures of the same mixture as in the experimental pastures.

The Ladino-grass pasture yielded slightly more than 1 ton of silage and about 5 tons of pasture forage per acre. Straight grass returned 1.61 tons of silage and 3.21 tons of pasture forage per acre. Total forage from both grazing and silage—adjusted on a cured hay basis—totaled 6.08 tons per acre for the Ladino-grass pasture and 4.82 tons for grass only.

Cattle grazing the legume-grass pasture put on 60 per cent more weight than those grazing only grass. The pounds of beef per acre after grazing from April 22 to September 30: Ladino-grass, 810; grass only, 479. Gains in pounds per head per day; Ladino-grass, 1.55; grass only, 1.34.

Animals received no additional feed, and there was no bloating. But weather last summer was cool, favoring grasses, and thus reducing the bloat hazard. There was some loss in weight from stomach worms in the latter part of the grazing season.

Some cattle fed out after grazing

How did the cattle fare after September 30?

Johnson divided them into 3 lots. Animals in all 3 lots were judged to grade about half commercial, half utility. One lot was kept on the experimental pastures without supplemental feeding until November 3. Another group was moved to nearby dry land alta fescue pastures and fed 8 pounds of chopped barley per head per day until November 25. A third group was dry lot fed the same amount of grain as the second group plus the May harvested grass silage (at 25 pounds per head per day) and slaughtered December 14.

Cattle on pasture were slaughtered earlier because the grass was not providing enough feed.

Those on pasture without grain lost weight after September 30. Johnson reports losses averaged 1.43 pounds per head per day. At slaughter 1 graded choice, 4 graded good, and 13 graded commercial. Johnson believes much of the difference between carcass grade and live animal grade was due to error in grading the live animal.

Cattle on pasture plus grain gained a quarter of a pound per head per day. After slaughter, 5 graded choice, 20 good, and 2 commercial.

Cattle on grain and silage averaged a 1.13 pound per head per day gain, with 4 grading choice, 12 good, and 2 commercial.

The researchers emphasize that these results are only a progress report of one year's trial. In 1954, they plan to lengthen the grazing cycle to 12 rather than 7 days each grazing period.

Nitrogen didn't pay

Also, each pasture in 1953 received 185 pounds of actual nitrogen per acre from March to September. Schudel says that additional nitrogen would have increased grass yields, but the first year's test was designed to compare the two mixtures under the same management. Nitrogen applications next summer will be heavier for grass, lighter for the grass-legume mixture.

Fertilizer results from small plot trials, established near the pastures when the experiment started, are guiding the researchers in next year's pasture management.

For example, Schudel found that when a legume—such as Ladino clover—is included in a pasture mixture, added forage from nitrogen applications resulted in expensive feed. In one year's trial, he found that the increase due to nitrogen cost more than $40 a ton.

The agronomist also found that lime boosted forage yields about 25 per cent the establishing year and increased the amount of Ladino clover in the mixture. The carry-over effect of lime the second year, however, was much less and showed only a slight yield increase. In these experiments, the pH of the soil was 5.5 before liming, and a 3-ton lime application raised the pH to 6.5 in the upper 3-inch soil layer.

Legume important

Findings and observations from this year's trial suggest the following:

▶ A high producing legume in the mixture is essential for economically boosting forage and livestock yields. It's also a cheap source of nitrogen.

▶ To take advantage of lush spring growth, ensile $\frac{1}{3}$ to $\frac{1}{2}$ of your pasture. Turn cattle on clipped pasture 3 to 4 weeks after clipping.

▶ Cattle parasites are a problem with irrigated pastures. Treat animals for stomach worms.

▶ Supplementing with grain or other feed is necessary to get a "good" or higher grade finish in the fall. Irrigated pastures are best in growing out animals—but it seems necessary to add some higher energy feed to reach a desirable finish.

Orchard & Garden

Higher Yields from Close-Planted Apple Trees

CAN HIGH producing apple varieties—grafted to selected or Malling rootstocks—and planted close together produce as much or more than the same varieties grafted to standard rootstocks?

That is the idea horticulturist A. N. Roberts is testing.

He figures that smaller trees planted close together will increase the bearing surface per acre, thus might increase apple production.

Also, there are other advantages to growing smaller, closely-planted trees. One is lower costs for the commercial grower in less picking labor and ease of spraying. Varieties grafted to certain Malling rootstocks bear quicker and the higher first cost of planting more trees might be offset by early production.

The horticulturist used nine Malling stocks as his selected rootstocks in his six-year test. They vary in growth control, with Malling IX resulting in the true dwarf.

Other stocks usually vary in height from about 15 feet to 30 feet—depending on the rootstock used and amount of pruning.

Tested 6 varieties

Roberts tested 6 apple varieties—3 early and 3 late croppers. Early cropping varieties grafted to selected or Malling rootstocks bear in 3 years, compared to 4 or 5 years on standard rootstocks. Late cropping varieties bear in about 4 years when grafted to selected rootstocks, but take about 8 years on standard rootstocks.

Roberts concludes from his test results that the advantages of close planting of controlled rootstocks are enough to justify limited tests by commercial growers.

Here are his 6-year yield figures from Golden Delicious, an early cropper:

Type of rootstock	Planting distance	Yield per acre
	feet	*pounds*
IX	12 x 12	48,018
IV	18 x 18	25,862
VII	18 x 18	36,716
I	18 x 18	39,360
II	18 x 18	43,952
XIII	36 x 36	12,144
V	36 x 36	10,230
XVI	36 x 36	17,457
Standard	36 x 36	6,963

Here are his 6-year yield figures for Starking, a late cropper:

Type of rootstock	Planting distance	Yield per acre
	feet	*pounds*
IX	12 x 12	33,220
IV	18 x 18	3,350
VII	18 x 18	9,514
I	18 x 18	8,308
II	18 x 18	6,700
XIII	36 x 36	858
V	36 x 36	2,277
XVI	36 x 36	693
Standard	36 x 36	1,518

Cucumber Pickers, Not Insects, Main Spreaders of Mosaic Virus

Cucumber pickers—not insects—are the main spreaders of cucumber mosaic virus, according to entomologist Clark Amen.

And the best way to halt this virus spread is to plant MR-17, a virus-resistant variety developed in Ohio, or to stake out infected plants and pick them separately.

Virus sticks to hands

Pickers spread the yield-reducing virus by picking early cucumbers from infected plants. The virus that sticks to their hands is in vine sap that oozes from wounded tissue—usually where the cucumber is detached. As a picker moves from vine to vine, he spreads the virus when infected sap from his hand touches an open wound on uninfected plants.

In 5 to 10 days, leaves of newly-infected plants turn a yellow and green mottling, and the growing tips are stunted. Later, diseased cucumbers are distorted, warty, and white. In about 6 weeks, the plant is unproductive and unprofitable.

A mosaic virus has crippled these cucumber vines. Yields were not enough to pay picking costs. Best protection: plant a resistant variety. Next best protection: isolate and pick infected patches separately, since pickers spread virus.

Amen found that aphids first brought the virus into the fields. They fed on cucumber vines in May and June, while they were migrating from winter to summer feeding areas. However, they fed only for a short time, and usually infected only a few plants per field. Later, in July, when pickers moved into the field, the disease began spreading.

Spraying won't work

Spraying expensive insecticides failed to cut down the first infection, since aphids were killed *after* they had infected the plant.

Yields in many fields have been cut two-thirds from their normal 10-12 ton per acre yield. Damage in some fields has been so great that farmers have plowed up their cucumbers 6 weeks after workers first began picking.

Sawdust Mulch, Nitrogen Increase Red Stele Infection

Applying more than 100 pounds of actual nitrogen per acre or mulching with sawdust can increase red stele infection in Marshall strawberries where the fungus is present, according to plant pathologist E. K. Vaughn and horticulturist A. N. Roberts.

Red stele has seriously crippled strawberry production in the major berry-producing areas of Oregon. This fungus weakens plant roots and results in stunted plants and lower yields.

Nitrogen aids fungus infection

In 4 years of testing, the researchers found that actual nitrogen applied above the 100 pound per acre rate resulted in 28 to 42 per cent infected plants. Highest infections came from 400 pound per acre rates. Untreated plots showed only 7.8 per cent infected plants, while from 11 to 13 per cent infection showed up in the recommended 100 pound per acre application.

Phosphorus and potash did not encourage or discourage red stele development.

Sawdust mulches also caused an increase in fungus infection. Thirty-six per cent of those mulched were infected, compared to 8 per cent in clean cultivated plots. No increase in red stele infection was found in plants grown in soil mixed with the same amount of sawdust.

The workers figure the protective mulches increase the disease by lowering soil temperatures and increasing soil moisture.

Limit nitrogen, don't mulch

In areas hard hit by red stele, limiting nitrogen applications to 100 pounds per acre is suggested. Also, it appears that sawdust mulching is not practical for commercial growers.

College plant breeders say a new red stele-resistant variety won't be ready for Oregon growers until 1956, although virus-free plants of a promising selection will be available to approved growers for plant increase and trial next winter. Those interested in getting plants may obtain application forms from county agents this fall. Growers who best meet rigid growing standards will receive plants for plant increase and further trial.

Crops & Soils

Spray May Control Seed-Destroying Midge

Timing 2,4-D sprays so that the first bloom of Ladino clover is delayed holds promise as a control for a midge that has been destroying up to seven-tenths of the Ladino clover seed crop in southern and Central Oregon.

OSC entomologist Guy Bishop and U. S. Department of Agriculture entomologist H. W. Prescott report the midge—a pinhead size, flying insect—reduces seed yields this way:

Larvae emerge from their silken cocoons in the spring, when the first clover blossoms appear. The female deposits about 100 eggs in clover flowers. Eggs are small—100 stacked end to end would equal an inch.

Life cycle takes one month

In a few days, eggs hatch and young maggots feed on pod and seed juices. This continues for about two weeks, then maggots drop to the ground, spin their cocoon, and emerge as adults. The entire cycle takes about a month, and is repeated 3 or 4 times in a Ladino clover growing season.

Instead of being plump and heavy, seeds are papery and light. Pods shrivel to about half their normal size, one-twelfth their normal weight.

Most Ladino seed growers spray weeds with 2,4-D in the spring to control weeds; some spraying during the first bloom to destroy this midge host. Other blossom-destroying methods include cutting first-blossom clover for feed, or irrigating after the first cutting. Either separately or together, these practices should halt clover blooming during first generation midge emergence.

Insecticides applied in the summer failed to control the midges. Growers in Jefferson County applied DDT and toxaphene both as dusts and sprays with little effect, Prescott reports.

Curly Top-Resistant Pole Bean Released

Columbia, a new stringless blue lake bean, will be released to growers this spring.

The new bean is resistant to curly top, a virus which has kept commercial bean growers in the Snake and Columbia River valleys from raising this high quality, popular, blue lake type.

The bean was developed by B. F. Dana, a U. S. Department of Agriculture plant pathologist, cooperating with the Oregon agricultural experiment station.

Bean a high yielder

Columbia is a high yielder, with test plots at Corvallis and Prosser, Washington, producing from 10 to 12 tons of graded beans per acre under irrigation. This equals or is above commercial bean yields in irrigated areas of the Willamette Valley.

Bean pods are medium green and will blanch to a darker shade. At picking, pods range from five to seven inches long. Plants are vining, and the researcher thinks the new variety will be popular with both commercial growers and home gardeners in the Columbia and Snake River basins.

The variety compares favorably with standard varieties in canning and freezing qualities.

Seed for Columbia is available at several Oregon seed companies. County extension agents can give you a list of local dealers selling seed. Dana says there is plenty for this year's planting.

Farm Outlook

By Agricultural Economist M. D. Thomas

Grains and Hay

Wheat growers can count on more of the same for wheat prices in 1954. Supports, storage, and compliance are the combinations that will pay off again this year. Loan rates will be upped a little if parity stays at the mid-February level until next July. Don't over plant; there are real penalties.

Oat prices moderately lower than at harvest time last year are likely. Barley prices will be down more than oats at harvest time, but should strengthen later as the expected large harvest finds cover. Support prices for both oats and barley are moderately lower than in 1953. Support prices for oats are around $3.00 a ton under 1953; barley props are cut $3.75. California growers in late-March were being offered around $41.00 to $42.00 a ton for new crop barley. That's around $10.00 under their last year's market.

Hay will be plentiful with an average break from the weather. Prices about like 1953 or slightly lower seem to be in the making.

Sheep and wool

Wool returns should equal 90 per cent or more of parity. This seems almost certain for several more years. Some are asking Congress for more than 90 per cent. Lamb prices about like 1953 are a fairly firm prospect, too.

Consider saving a few more good ewes this year. If you don't need them, someone nearby may pay you a premium over the slaughter market. There is room for more farm flocks in western Oregon and in irrigated areas.

Wool returns should equal 90 per cent parity.

But don't expect sheep to live on fresh air and sunshine alone. Sheep specialists say a little money spent for winter feed pays well in better lambs and wool. Creep-feeding lambs —especially twins— is usually good business. They say that three-fourths of the lambs that fail to finish off grass are twins.

Dairy

Lower support prices on dairy products are bitter medicine if you are milking cows. It's hard to take, but it may be better to start the treatment now than to wait until the ailment is worse.

The dairy surplus "molehill" could really grow into a "mountain." The nation's dairy cow numbers increased 3 per cent in 1953. Heifers, including calves, edged up a little, too. Lower supports may check this trend toward dairying. Remember, it is easier to keep a fellow out of business than to drive him out once he is established. Best to cull cows closely and sell early. Heavy culling of dairy and beef later could force cow prices down sharply.

Dairy cow numbers increased 3 per cent in 1953.

Seeds

Take another look at seeds. New life is showing in most lines. Even tall fescue may be out of trouble by the time plantings made this spring come into production. We have probably gone out of tall fescue a little too fast. This grass has really "shown its stuff" in the southern drouth.

Fine fescues, like creeping red and chewings, may be in for trouble after 1954. Much depends on the size of the Canadian fescue crop and Midwest Kentucky bluegrass production.

Grasses and legumes are profitable soil savers.

A favored new-comer is Merion bluegrass, but lower prices are almost certain.

The immediate future for clover depends greatly on changes that may be made in disposing of government stocks. Current commitments are scheduled to end June 30. In any event, both red and alsike have undoubtedly seen the worst prices that are in store for awhile. If you can get good yields of high quality, you probably won't go far wrong by planting some of those two clovers this year.

Also look for more thinking and talking about "soil saving" as a way of dealing with farm surpluses. Soil saving makes sense. It can make dollars, too.

Grasses and legumes are soil savers. Growers of these seeds will stand ready to be rewarded for their help with soil saving during the next few years.

Beef

We can not be sure that we are over our troubles with beef.

The heifers that were kept in 1951 and 1952 have grown into cows. Many are on farms producing calves this year. The annual USDA survey of livestock numbers revealed a national total of 23¾ million beef cows as of the first of this year. That's 6 per cent more than a year earlier—and the most ever.

But this may be the peak of the current cow cycle because the yearling heifer count was down slightly. For the short run, a 10 per cent drop in steers past one year of age is reassuring. Calf numbers showed little change. We shall be lucky if we get by without lower cattle prices, especially for cows. Smaller pay checks for workers—or drouth—could lead to new trouble for beef producers.

Hogs

After some seasonal weakness, hog prices probably will hit new highs in June and July. That will break down more of the caution that slowed the rise in farrowings. And then the increase in pork supply and decline in hog prices will be on its way. Yet hog prices this fall and through most of 1955 may be quite favorable compared to grain prices. After that, look out—unless wheat becomes available at feed grain prices.

Chickens and Turkeys

Big hatches in other states spell trouble ahead for Oregon turkey raisers and egg producers. Chicks have been rolling out of Midwest incubators in record numbers. By this time next year their eggs will be flooding markets from coast to coast.

A near-record turkey crop and lower prices seem to be in the making, too. Lower feed costs will help Oregon poultrymen, but super-management will be needed to pay costs and make a living off turkeys and laying chickens raised in 1954.

Fruits

Boysens may be the kind of berry to plant this spring if you have good berry land located near processors. But act now. Next spring may be too late. Californians are again looking longingly at this crop. They grabbed a good part of the boysenberry market in the late 40's but turned loose when prices came down. Now that prices have come back, California growers and processors may make a second try. By acting now, Oregon growers may beat them to the punch, but we shall have to back our moves with high yields and low costs to stay in business. Ditto for strawberries, and everything else, as a matter of fact.

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Which Farm Program?

By Agricultural Economist G. E. Korzan

Congress is considering a new farm program this session. Some folks believe it is better than the present one for farmers and for the rest of the country. Others believe the present program is better.

It's important that people understand the advantages and limitations of each. No farm program will ever be perfect, but some kind of program is necessary to keep American agriculture in balance—to keep it relatively prosperous and efficient.

Present program

Our present program is called high fixed-price supports. It's named that because the price of six basic crops—wheat, cotton, corn, peanuts, tobacco, and rice—is fixed at 90 per cent of parity. Also, the Secretary of Agriculture may support wool and mohair at 90 per cent and may support dairy products between 75 and 90 per cent of parity. He also may support the following up to 90 per cent of parity: meat animals, poultry and eggs, feed grains, oil seeds, tung nuts, honey, potatoes, fruits, vegetables, and sugar.

What is parity? It's an economic method of measuring the relationship between the price farmers receive for their products and the price of things they must buy. Put another way: If you could buy a tank of gas for a bushel of wheat in 1914, a bushel of wheat would buy a tank of gas today.

The government carries out its fixed support policy by "loans" to farmers, by direct payments, or by marketing agreements. As of October 1953, the government has paid up to 4½ billion dollars in price props, and it's estimated the cost will break the 7 billion dollar mark in 1954. This is an average increase of nearly 7 million dollars a day in 1954.

Proposed program

The new program Congress is considering has four main features:

▶ A flexible rather than a high fixed-price support program.

▶ An up-to-date parity formula which will permit the price support program to reflect improvements in farm practices.

▶ A "freezing" of some present surpluses by creating reserves which can be used only in emergencies. These reserves would be handled outside regular marketing channels.

▶ Increasing federal funds from 6.75 billion dollars to 8.5 billion. This is to help cover price propping for 1954 crops.

Let's examine some of the arguments for each program:

The Case for FIXED versus FLEXIBLE Price Supports

High fixed price supports have helped stabilize income and production.

Farmers can plan better when there is less uncertainty and risk. And since prices are stable, farmers usually push production. More wheat and corn may have helped encourage more livestock numbers, since these numbers can not increase much without more feed.

Some folks think that fixed price supports do not permit production shifts to the things people want

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A flexible price plan encourages shifts in production to meet changes in demand.

Those favoring a flexible price support program say that this is the only way to avoid staggering surpluses. When production increases faster than demand, the price would drop—as low as 75 per cent of parity if necessary—to discourage production of this product. These folks think many farmers will turn to producing something else, thus reduce supply.

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The Case for FIXED versus FLEXIBLE Price Supports

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most. But other people point out that price may not guide farm production too well anyway. For example, if the price for a particular product is too low, farmers do not know of anything better to raise. Also keep in mind that it may be difficult—and sometimes impossible—to shift to other farm enterprises.

High fixed-price supports have helped raise farm income.

There's no question that high price supports have benefitted those who have accepted government loans. But even with these supports, total farm incomes have averaged less than those of city groups. In January of this year, farmers received less than 10 per cent of the national income, but 15 per cent of the people in the United States are farmers. Economists did not figure the value of farm products raised and consumed on the farm. But even if they were included, farmers would receive less than other groups.

High fixed-price supports have increased total farm production.

During the war, food was needed desperately—and may be needed just as desperately in the future. But at the present, we are faced with some bothersome surpluses. Some folks believe these surpluses are a blessing in disguise. For example, our population is increasing by more than 3 million persons a year. These people must be fed. Meat, milk, fruits and vegetables are essential to human health. We can get more meat by growing more feed.

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Besides fewer surpluses, the program would cost less.

Flexible price supports would permit consumers to buy food at prices reflected by available supply.

Under flexible supports, it is reasonable to expect a drop in food prices. Those items in greatest supply would be the cheapest to buy—thus encouraging consumption. We need prices for corn and other feed crops that will result in pork, beef, milk, poultry, and eggs. Stored wheat, corn, and cotton do not help anyone. Lower feed prices will encourage more livestock production, and lower livestock prices should expand consumption. We want to put food into use rather than into storage.

Flexible price supports would help expand international trade.

Export markets are vital to American agriculture, and to keep American agriculture reasonably prosperous, farmers must export at least a tenth of their products. These include from one-third to one-half of their wheat and cotton. At present, farmers have almost priced themselves out of the foreign market with such items as wheat and cotton. We need a substantial foreign market for these and other products, but our prices must be in line with those of our competitors. A flexible price support plan rather than a fixed plan will come closer to bringing our prices in line with those of other countries. Unrealistically high prices will not move our farm products into international trade channels.

Farm Outlook

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Maintain sweet cherry orchards, maybe increase apple and winter pear plantings if you are in a favored growing area. Prices will fluctuate from year to year, but increasing population and leveling-off in production brighten the future.

Potatoes and Onions

Both potatoes and onions should be money-makers for good growers this year. Growers in most other states are planting less. We can move ahead while those in other states stagger from the blows taken in 1953. Prices for this year's crops are almost certain to be higher, especially for onions. Potatoes should be up, but probably not equal to the highs reached in 1951 and 1952.