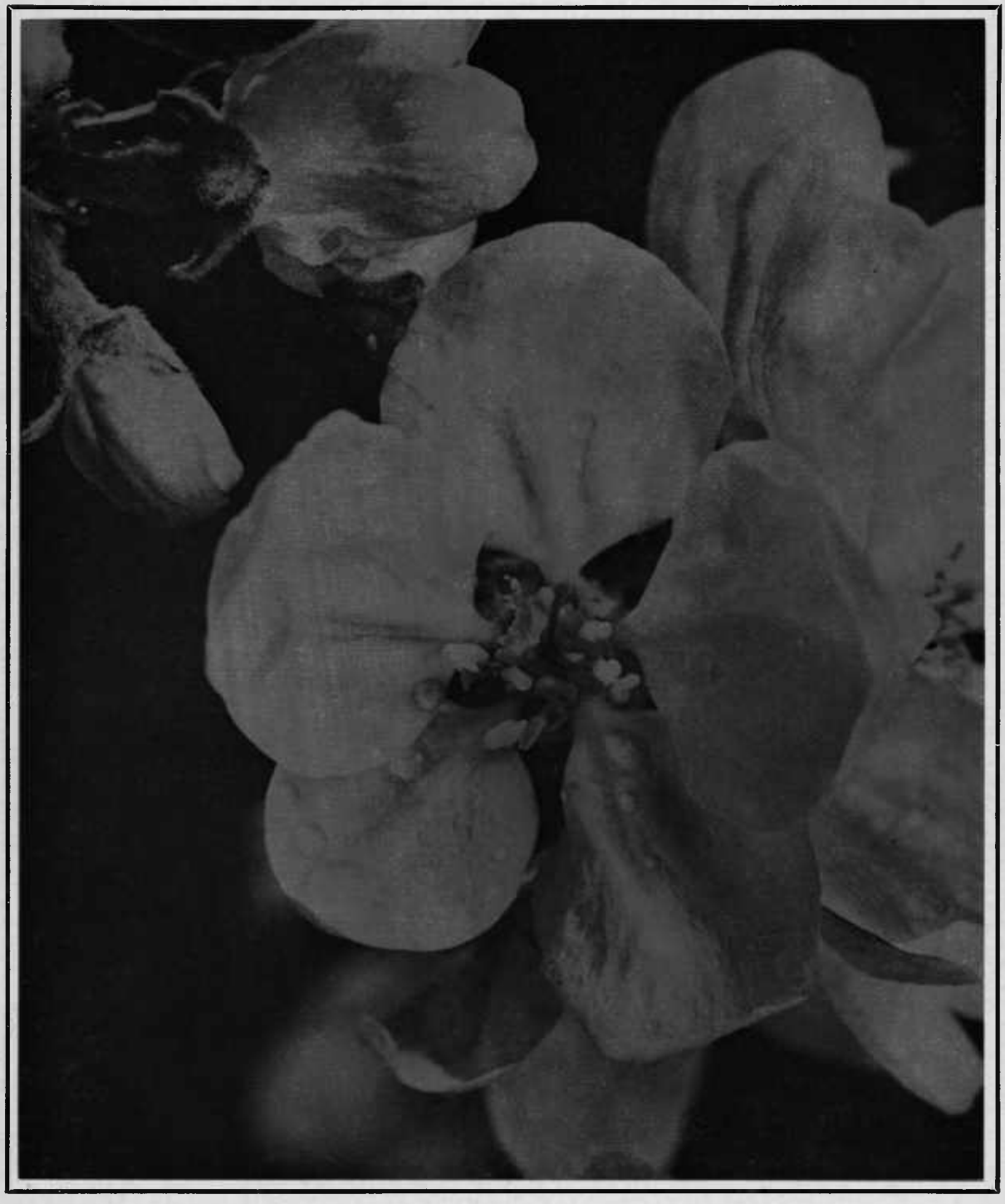
oregon's agricultural PROGRESS



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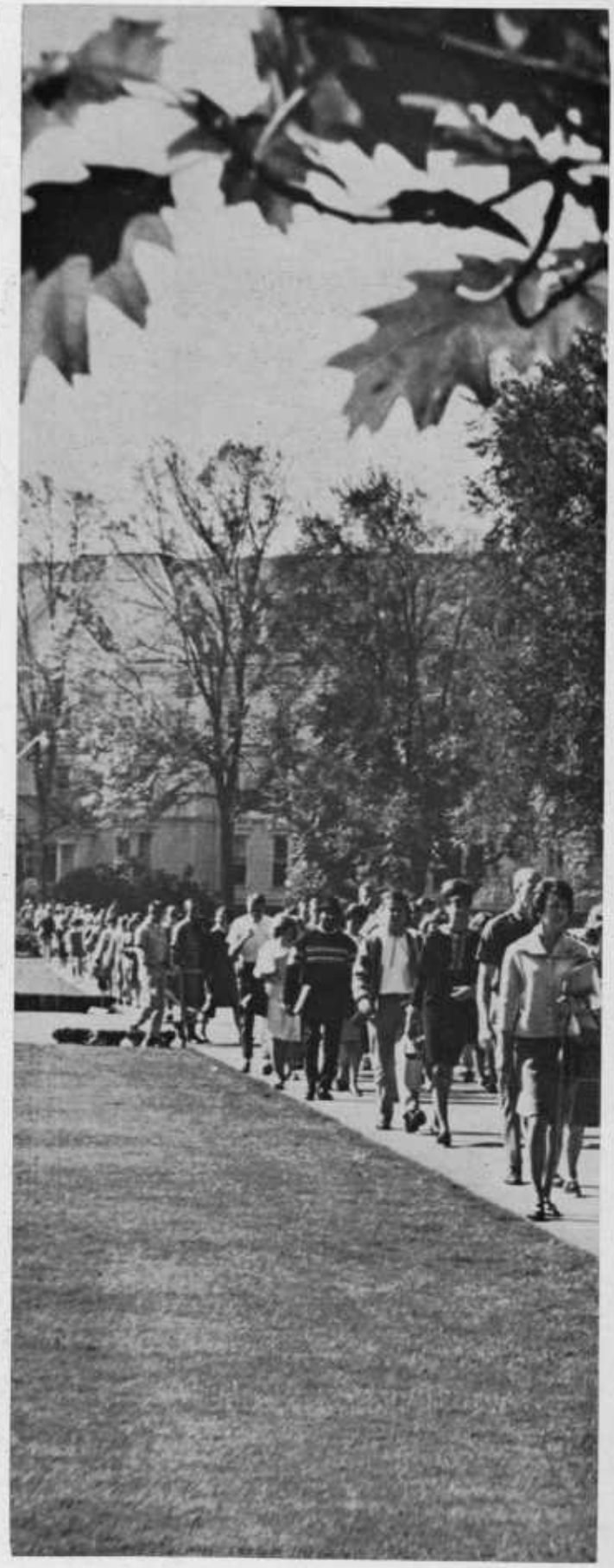
COVER: These apple blossoms are the handsome handiwork of a compound fruit tree, the subject of 20 years of research by OSU horticulturists. For more about the compound tree and its role in the extra-efficient hedgerow orchard of tomorrow, see the article beginning on page 7.



The Need

for

Young People in Agriculture

By Wilbur T. Cooney

Dean of Agriculture

"When tillage begins," Daniel Webster once remarked, "other arts follow. Farmers, therefore, are the founders of human civilization." They may be its most essential stewards as well, for throughout history the level of living enjoyed by any people has been dependent upon the success of its agriculture.

American agriculture has been successful beyond imagination. Today, only about 6% of our population produces all of our food and much of our fiber needs. Perhaps as a result of this remarkable achievement, the nation appears to be losing sight of the need to encourage, rather than discourage, capable young people to pursue a career in agriculture. This alarming trend, it seems to me, is due largely to a lack of understanding—both of the need and the opportunities at hand.

Not an easy way of life

The American people generally feel that farming *per se* is neither an easy nor a financially rewarding way of life. Hence, they are reluctant to see their children become farmers.

For example, a recent study indicates that while most Oregon citizens are aware of agriculture's importance in this state, they tend to depreciate its occupational potential. Out of 10 leading industries, the public ranked agriculture only sixth in occupational promise. College-educated business leaders, in particular, ranked it as one of the least promising occupations.

A high-risk business

Many Oregon citizens think of the farmer as having limited job security, and of agriculture as a high-risk business. Many feel that the farmer's financial return is neither commensurate with his efforts nor equivalent to other industry standards. And many express the view that "it just takes too much money to get started in farming today."

To be sure, the average farm investment has increased more than tenfold since 1940, although average return on the farm investment has decreased by about 40%. National income has risen by 230% in the past 20 years, but farm income has declined by 9%. And while retail food prices have increased by about 40% during the past two decades, prices received by farmers in 1966 were about 2% lower than those received during the 1947-49 period.

Such developments make it less difficult to understand the declining interest in encouraging young people to obtain an education in agriculture. But to understand is not to accept.

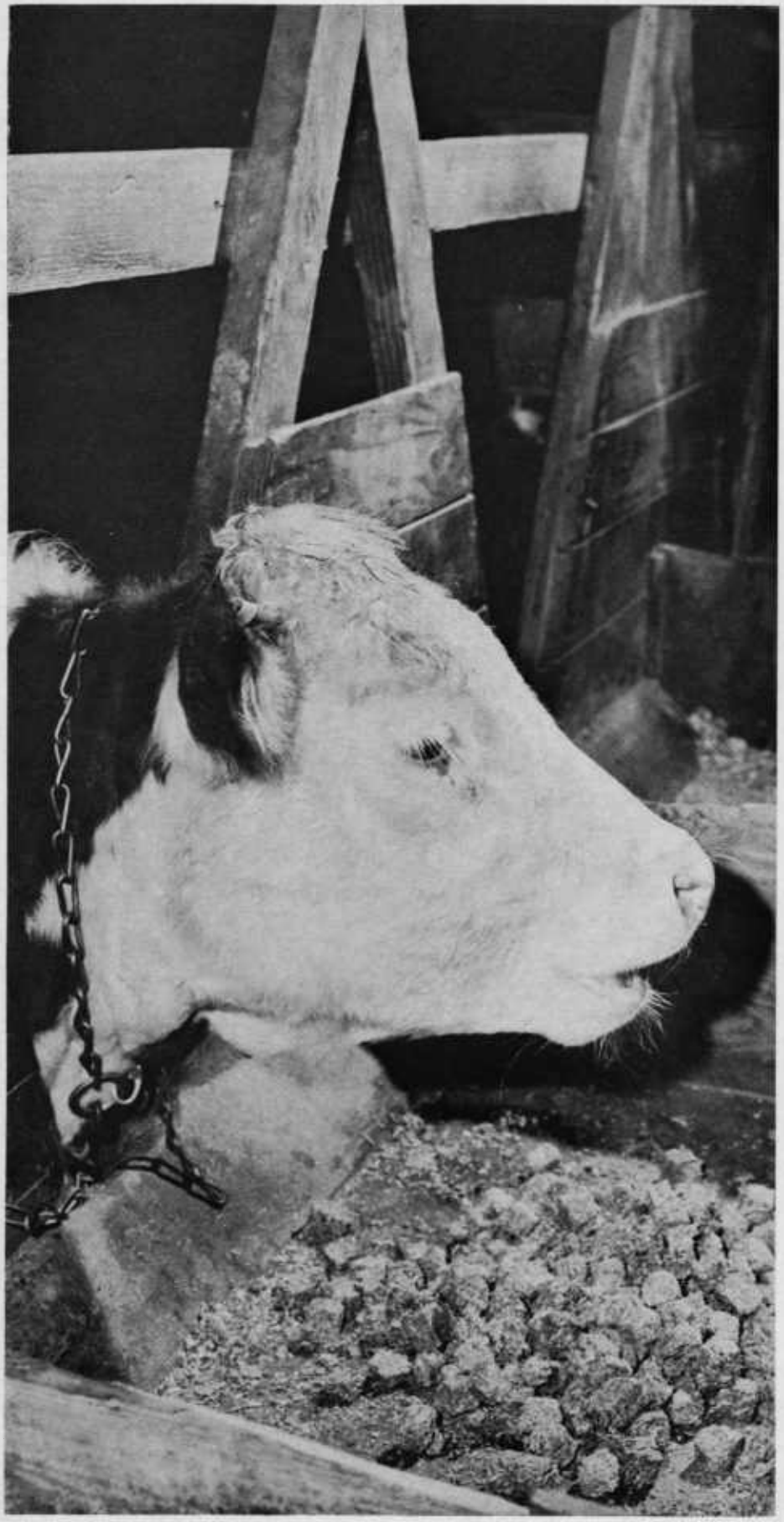
First, we must come to realize some hard facts of life concerning:

¶ The increase in world population. It is a matter of record that births are exceeding deaths by about 60 million annually—enough people to populate each year a new country the size of France.

¶ The extent of world hunger. Nearly two thirds of the world—about 1.5 billion people—goes to bed hungry every night. Approximately 10,000 people die every day because of inadequate diet. The World Health Organization estimates that 3.5 million youngsters die every year from hunger and various diseases associated with malnutrition. Millions more are physically and psychologically crippled.

Food production and demand

¶ The world demand for food production. World food production in 1965 was about the same as in 1964, but there was a net gain of 63 million people during 1965. Between 1961 and 1965, the amount of food available to each person declined by 4% in Asia and by 6% in (continued on page 16)



How heifers and steers compare as feeders . . . How alert buying and selling can help boost returns.

NEW FINDINGS FOR CATTLE FEEDERS

HOW DO HEIFERS compare with steers as feeders?

This is a top-priority question for the Oregon cattle feeder, for unlike feedlot operators in such areas as the Midwest, he generally feeds heifers as well as steers.

To secure the answer, OSU animal husbandmen A. T. Ralston, W. H. Kennick, D. C. Church, and T. P. Davidson set up feeding trials last year at the Umatilla Experiment Station near Hermiston. The work reveals, among other things, that prevailing prices for feeder heifers are relatively high and that prevailing prices for slaughter heifers may be relatively low.

The trials were launched with the selection of 60 steer calves and 60 heifer calves of similar quality. Twelve animals of each sex were placed on each of five prefinishing treatments: 1) corn silage, plus 1% of body weight in both chopped alfalfa hay and concen-

FEEDING CATTLE in Oregon is a risky business. Some doubt, in fact, that it really is profitable over a period of years.

To be sure, the industry is no place for the inexperienced, or for entrepreneurs hoping to realize a substantial return every year. Profits come hard, even for the skilled and experienced feedlot operator.

Cost-price relationships in the cattle feeding industry are, of course, determined primarily in the market place. Still, a recent study by OSU agricultural economist Gerald Korzan shows that alert buying and selling, while no substitute for consistently good management, can and do help Oregon cattle feeders boost returns. Here's how . . .

One of the feedlot operator's chief objectives is always to use the lowest-cost ration consistent with good feeding practices. Take a fairly common ration of 55% barley, 20% alfalfa hay, 15% beet pulp, 5% molasses, and 5% supplement. The average cost for these ingredients was $39.50 per ton in 1964, $40.10 in 1965, $42.50 in 1966, and about $41.50 in 1967. Where storage was available, however, the same ration may have been obtained for less when quantity purchases were made at the right time.

Suppose this ration, or one with an equivalent feeding value, can be purchased for $1.00 per ton less. This may seem a modest reduction, yet Korzan points out that it means an increase of nearly $1.50 in the return on a finished steer. During some feeding periods, that additional $1.50 can turn a loss into a profit.

Good feeder buys

Oregon's most successful feedlot operators by no means take as given the prevailing feeder cattle prices at Ontario, Portland, or other points. There are times, Korzan observes, when an operator makes relatively good buys in feeder cattle in his immediate vicinity. This reduces both transport and shrinkage costs.

Many successful operators also feed on a year-round basis. Even when feeder cattle prices are comparatively high, the OSU economist notes, net returns may be maximized—or losses minimized—because fixed costs are spread out over more cattle.

A cattle feeder's selling ability sometimes enables him to obtain a better-than-average price. Arrangements with a packer for weekly shipments have resulted in higher slaughter cattle prices. And, at times, it is possible to supply cattle of a given weight and grade for certain specialized segments of the market.

Some packers in large coastal cities supply choice and prime beef to restaurants and steamship companies. Skilled and experienced operators may be able to supply the right kind of cattle for this market. However, Korzan points out, an operator who possesses the management ability to finish cattle that grade better than 50% choice will generally receive better prices in any situation. Thus, the additional costs inherent in supplying a specialized market must be measured against the increase in prices to determine whether net returns actually are higher.

The OSU study updated available information on several trends of utmost significance to Oregon cattle feeders. Among the findings: feed-conver-

(continued on page 6, second column)

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trate; 2) long alfalfa hay, plus 1% of body weight in concentrate; 3) a pelleted combination of 80% alfalfa hay and 20% steam-rolled barley; 4) pelleted alfalfa; and 5) hay cubes. (The concentrate consisted of 70% steam-rolled barley, 15% beet pulp, 10% cull peas, and 5% molasses.)

Common finishing ration

Heifers were kept on the prefinishing treatments until they averaged 625 pounds. This required 105 days. Steers were kept on the prefinishing treatments until, after 132 days, they averaged 725 pounds. On reaching these weights, all animals were treated with standard hormone implants and placed on a common finishing ration of 74.5% steam-rolled barley, 10% ground alfalfa, 10% beet pulp, 5% molasses, and 0.5% mineralized salt.

Steers were marketed after 108 days on the finishing ration at an average weight of 1,081 pounds. Heifers were sold at an average of 917 pounds after 101 days on the finishing ration.

The trials confirm that ADG (average daily gain) can be influenced significantly by both sex and ration. And interactions between sex and ration also generate differences in ADG.

During the prefinishing phase of the trials, when energy (concentrate) intake was limited, steers outgained heifers by an average of only 0.09 pounds per day. But during the finishing period, when energy intake was unlimited, steers chalked up an advantage in ADG of 0.39 pounds. Heifers were relatively more efficient gainers in the prefinishing phase, but considerably less efficient in the finishing period.

Exactly why heifers responded differently than steers to the prefinishing treatments is not yet pinned down. At this point, the researchers suspect that the various treatments more closely satisfied heifers' requirements for maximum gains.

The trials show that prefinishing treatment also has independent effects on ADG, regardless of sex. During prefinishing, the five groups of steers ranged from 1.79 to 2.18 pounds in ADG. And the five groups of heifers ranged in ADG from 1.64 to 2.08 pounds.

Carry-over effects

Moreover, prefinishing treatment "carries over" to affect finishing performance. For example, one group of steers registered 3.74 pounds in ADG during the finishing period. Another group fell slightly below 3 pounds. This difference in performance, the animal husbandmen found, was due chiefly to the level of gains during prefinishing. Many of the trial animals

(continued on page 6, first column)

gained well in excess of 1.65 pounds per day on the prefinishing treatments, and such gains have an adverse effect on subsequent performance.

Profit and prefinishing

As shown in the financial summary of the trials (see below), prefinishing with long hay resulted in the greatest overall profit from steers. With heifers, the pelleted combination of 80% alfalfa hay and 20% steam-rolled barley gave the best overall profit.

Differences in the carcass characteristics of the trial animals were minor. The heifers received slightly higher marbling scores and graded slightly higher. The heifers also had somewhat less back fat and a somewhat larger area of ribeye per hundredweight of carcass. Yet slaughter prices for these animals (see summary) were $2.25 to $2.50 per hundredweight below slaughter prices for the steers.

Thus, the researchers suggest, prevailing prices for slaughter heifers would not seem to reflect accurately their relative slaughter value—particularly when the heifer's lighter carcass is taken into consideration. Do steer carcasses presently excel heifer carcasses in dressing percent and cut-out value to the extent indicated by the spread in slaughter prices?

A further question: Does the traditional use of this price spread to establish the relative value of feeder calves accurately reflect the profit potential of heifers?

Under conditions of the OSU trials, if feeder steers were worth $28.50 per hundredweight, feeder heifers were worth only about $21.40 per hundredweight (see suggested feeder values in the summary). Actual price for the feeder heifers, however, was $25.50 per hundredweight. The animal husbandmen point out, therefore, that the prevailing spread in slaughter prices is not an accurate pricing mechanism for feeders. To put it another way, feeder heifers will have to cost less in relation to feeder steers to be equally profitable for the Oregon cattle feeder.

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sion ratios are on the way down; nonfeed costs are continuing to rise.

Five years ago, a feed-conversion ratio of 8.5 was considered average. This means that 8.5 pounds of feed were required for each pound of gain. Today, however, a ratio of 7.5 is fairly common. And some feeders are attaining ratios of 7.0 to 7.25, particularly during the dry months of the year. In noting this trend, Korzan points out that an improvement in feed conversion ratio of only 0.25 currently results in an increase of about $2 per head in net returns.

During the eight years previous to 1964, total nonfeed costs in Oregon feedlots averaged around $17 per head. Nonfeed costs include such items as depreciation, interest, taxes, labor, veterinary expenses, fuel, electricity, water, and repairs. But with rising labor costs and sharp increases in interest rates since 1966, the trend is markedly up. The study reveals that nonfeed costs averaged $17.53 in 1964, $17.95 in 1965, $19.35 in 1966, and nearly $19.90 in 1967.

Experienced operators

Adding up the findings, the OSU economist concludes that while more cattle feeding in Oregon is desirable from the standpoint of generating economic activity, this important job can best be undertaken by experienced operators. The cattle feeder may welcome years like 1965, when net income averaged nearly $26 per head and almost anyone could have made a profit. Nevertheless, such years often attract inexperienced operators who fail when a high level of efficiency is once more the difference between a profit and a loss.

How Heifers Compare With Steers as Feeders: A Financial Summary

Prefinish treatment	Cost/ head	Selling value/cwt	Value/ head	Feed cost/ head	Yardage/ head	Interest/ head	Profit/ head	Suggested feeder value/cwt
				STEERS				
Corn silage	$133.38	$28.00	$304.08	$112.79	$11.70	$ 9.90	$36.31	$28.50
Long alfalfa	133.38	28.06	310.90	113.92	12.20	10.41	41.01	28.50
Alfalfa cubes	133.38	27.75	299.98	112.91	12.40	10.55	30.74	28.50
Alfalfa pellets	133.95	28.11	302.46	117.20	11.70	10.09	29.52	28.50
80:20 pellets	132.24	28.25	298.04	115.01	12.05	10.27	28.47	28.50
				HEIFERS				
Corn silage	109.91	25.67	243.87	96.74	10.30	7.35	19.57	21.62
Long alfalfa	109.65	25.71	232.42	87.50	10.45	7.14	16.68	20.07
Alfalfa cubes	109.91	25.58	223.57	86.65	10.45	7.12	9.44	20.56
Alfalfa pellets	109.91	25.67	232.57	98.47	10.15	7.30	6.74	20.21
80:20 pellets	109.91	25.67	243.61	91.95	10.05	6.99	24.71	24.63

NOTE: Actual feeder steer costs, $28.50/cwt.; actual feeder heifer costs, $25.50/cwt. Steers sold for $27.50 and $28.25/cwt. for good and choice, respectively. Heifers sold for $25.25 and $25.75/cwt. for good and choice, respectively. Yardage was figured at 5 cents per head daily and interest calculated on initial cost, feed cost, and yardage at the rate of 6% per annum.

the compound tree . . .

OSU horticulturist A. N. Roberts surveys the apple crop on a young compound tree composed of Starkcrimson scion variety grafted on Malling VII root.

Heart of the Hedgerow Orchard

REVOLUTIONARY ADVANCES in fruit production are just around the corner. Plenty of work remains to be done. But few doubt that the extra-efficient hedgerow orchard, designed for easy harvests and high yields of quality fruit, is the basic orchard of tomorrow. And until plant genes can be turned on and off at will, many of these orchards will utilize the compound tree—a tree composed of various combinations of scion varieties and growth-controlling rootstocks.

For centuries, men have experimented with grafting in an effort to put together improved genetic systems. Only now, however, are the principles and many potentials of such systems beginning to be understood.

A. N. Roberts, W. M. Mellenthin, and other OSU horticulturists have been studying scion-interstock-rootstock influences and interactions for some time. Their goal: a better understanding of how these influences and interactions affect fruit-tree efficiency. Because of their wide range of effects on scion vigor and early flowering and cropping, the apple rootstocks selected at the East Malling Research Station in England are being used in this work. The scion varieties in use are Red Delicious, Starking Delicious, and Starkcrimson.

Results obtained during the past 20 years in experimental orchards at Hood River and Corvallis show that both scion and rootstock influence tree efficiency. In addition, the studies reveal that some superior combinations already exist and that others can be developed.

Fruit-to-wood ratio

One way to express tree efficiency is in terms of the ratio of total fruit production to total wood production. A tree's total fruit production is, of course, easily measured. And Roberts has found that the cross-sectional area of a tree's trunk provides an accurate index of its total wood production. Thus, a fruit-to-wood ratio can be derived by comparing a tree's cumulative yield to its trunk cross-sectional area. The higher the ratio, the more efficient the tree.

Tree size and efficiency

The OSU studies show that tree size and tree efficiency are not necessarily related. There are inefficient smaller trees, as well as efficient larger trees. Also, the ratio of fruit to wood production changes with tree age. Certain scion-rootstock combinations, however, are consistently more efficient in orchards of all ages.

Table 1 (see page 8) shows the relative tree size (trunk cross-sectional area), cumulative yield, and fruit-to-wood ratio of Red Delicious scions on Malling rootstocks and on seedling root at 6 and 15 years of age. Note that the relationship between both tree sizes and fruit-to-wood ratios was essentially the same at 15 years as at 6 years. As indicated, the cropping per-

Yield harvested from this research hedgerow of Golden Delicious on Malling IX, an efficient scion-rootstock combination, exceeded 45 tons per acre.

Table 1. Some Scion-Rootstock Combinations Are Consistently More Efficient

Rootstock	Trunk cross-sectional area	Cumulative yield	Fruit-to-wood ratio
	Square centimeters	*Lbs./Tree*	
		(Red Delicious at 6 years)	
IX	25	112	4.5
VII	42	71	1.7
IV	46	25	0.5
II	57	50	0.9
I	51	62	1.2
Seedling	76	54	0.7
XVI	81	21	0.3
		(Red Delicious at 15 years)	
IX	103	1,391	13.6
VII	279	2,584	9.3
IV	324	3,002	9.3
II	370	2,964	8.0
I	434	3,382	7.8
Seedling	492	2,812	5.7
XVI	532	3,192	6.0

formance of Red Delicious on seedling root and on the very vigorous Malling XVI was relatively poor. This has been the case repeatedly at both Hood River and Corvallis.

Some believe the spur-type Delicious selections have eliminated the need for growth-controlling stocks in the hedgerow fruit orchard of tomorrow. In both study locations, however, Roberts and Mellenthin have found that spur-type Starkcrimson trees on the various Malling stocks show the same range of vigor and early flowering and cropping as standard and red strains of Delicious. The trees simply average somewhat smaller in size.

Rootstock influences

Table 2 lists information obtained in a block of five-year-old Starking Delicious trees before and immediately after it was destroyed by the historic Columbus Day storm. Most of this orchard was on the best of the older Malling rootstocks and some of the newer Malling-Merton selections. Also in this block were trees on the semi-dwarfing crabapple root, *Malus sikkimensis* (see SIK in Table 2).

For comparison, information is included from an adjoining block of five-year-old Starking trees with Malling XVI roots and dwarfing interstocks of Malling IX (see IX/XVI). Both of these experimental blocks were producing their first commercial crop and exhibiting the influence of rootstock on scion vigor and early flowering and cropping.

A careful reading of Table 2, with particular attention to the fifth-year bloom percentages, reveals this highly significant finding: dwarfing *per se* does not induce earlier flowering and cropping, and, conversely, vigor *per se* does not necessarily delay flowering.

For example, Malling VII and *Malus sikkimensis* produced trees of equal size in five years. But Malling VII roots induced twice as many flowers on the Starking Delicious as the crabapple root. Note also that Malling I induced five times more flowers than

Malling XVI and Malling-Merton 104, although trees on Malling I were about as large as those on the other two notably vigorous rootstocks.

Two six-year studies

In two successive six-year investigations, the OSU horticulturists have found that tree vigor and onset of flowering are influenced by the length and position of dwarfing and invigorating interstocks. Six kinds of trees were developed for this work: Starking Delicious scions with invigorating Malling XVI roots and dwarfing Malling IX interstocks 3, 6, and 12 inches long; and Starking Delicious scions with dwarfing Malling IX roots and invigorating Malling XVI interstocks 3, 6, and 12 inches long.

Initial response to the Malling IX interstocks was earlier and heavier flowering in proportion to interstock length. Reductions in tree size followed later, as a result of heavier cropping. Conversely, the Malling XVI interstocks favored increased tree size, but did not influence flowering. Yields reflected the degree of balance between 1) tree vigor supplied by Malling XVI, which determined fruit-bearing surface; and 2) flowering stimulus supplied by Malling IX, which determined flower numbers and fruit set.

These results, Roberts and Mellenthin point out, further indicate that onset of flowering in young trees does not necessarily follow a reduction in growth. In turn, this suggests that vigor and flowering, while related, are separately determined.

"Programmed" fruit trees

Such findings have many important implications. For example, scion-rootstock influences and interactions will have to be considered with extreme care in selecting compound trees for the hedgerow fruit orchard of tomorrow. And through the use of interstocks, it even seems possible that trees can be "programmed" for optimum efficiency under a given set of conditions or requirements. A revolutionary advance, indeed.

Table 2. Dwarfing per se Does Not Induce Earlier Flowering and Cropping

Rootstock	Trunk cross-sectional area	Bloom	Cumulative yield	Fruit-to-wood ratio
	Square centimeters	*%*	*Lbs./tree*	
		(Starking Delicious at 5 years)		
IX	24	83	91	3.8
SIK	39	40	37	0.9
VII	41	78	101	2.5
IV	53	53	73	1.4
111	57	20	46	0.8
109	60	33	82	1.4
IX/XVI	61	46	80	1.3
II	63	41	75	1.2
XXV	63	26	74	1.2
I	68	50	114	1.7
104	70	10	29	0.4
XVI	74	9	42	0.6

Heavy early flowering in this five-year-old hedgerow orchard was due to favorable scion-rootstock interactions, and not the result of dwarfing per se.

OSU research gains ground in

The Battle Against Douglas-fir Beetle

RESEARCH that solves a problem often receives public attention and acclaim. What often goes unrecognized is that such successes are built on the knowledge of what will *not* work, as well as on the knowledge of what will. A case in point: OSU forest entomologist William Nagel's intensive investigation of the causes of Douglas-fir beetle population changes.

More than half of Oregon's vast timber volume is in old-growth Douglas-fir forests west of the Cascade summit. In these forests, many trees are uprooted every year due to heavy winter rains and high winter winds. Clear-cut logging in large blocks, now the standard procedure, aggravates the situation because it exposes the edges of surrounding stands to the full effect of winter storms. As a result, many additional trees are uprooted.

Numerous insects infest these wind-thrown trees. Among them is the Douglas-fir beetle, the most serious insect threat to Douglas-fir. This beetle, which feeds beneath the bark, always is present in wind-thrown trees. And while it prefers these trees for food, it can cause substantial losses of standing timber when circumstances are right.

Oregon's most recent Douglas-fir beetle epidemic developed as an aftermath of the Columbus Day storm in 1962. This historic storm uprooted Douglas-firs by the thousands. The following summer, beetles attacked and produced large populations in this ample food supply. When these beetles emerged in the spring of 1964, after a mild winter that left behind very few wind-thrown trees, they were "forced" to attack standing trees.

Standing Douglas-fir is somewhat resistant to beetle attack, but a mass assault can overcome this resistance. Many trees were lost in 1964, and the populations produced in these trees were sufficient to exact further losses in 1965. Not until 1966 were beetle attacks once again confined to wind-thrown trees.

To date, no practical method has been developed either to prevent a Douglas-fir beetle epidemic following a population build-up or to control one once standing trees have been attacked. Effective application of insecticides is virtually impossible, primarily because of tree size and inaccessibility. And attempts to achieve control by salvaging infested trees, then destroying bark and beetles at the mill site, seldom succeed. The idea is sound, but rarely is it feasible.

Search for weak links

Thus, OSU scientists are looking for weak links in the beetle's life cycle that might be exploited to achieve control. A key project in this effort is Nagel's investigation of beetle population changes, with particular emphasis on the beetle's natural enemies.

The Douglas-fir beetle is native to western North America, and breeds almost exclusively in Douglas-fir. It produces one generation a year, spending all but a brief period of its life beneath the bark of infested trees. Beetles usually overwinter as adults beneath the bark of brood trees. In the spring and early summer, they emerge and fly to new host material. There, the adult beetles mate and lay eggs in passageways they have constructed beneath the bark. Entomologists call these passageways "galleries." Larval development continues through the summer, and the pupal stage starts in late summer or early fall.

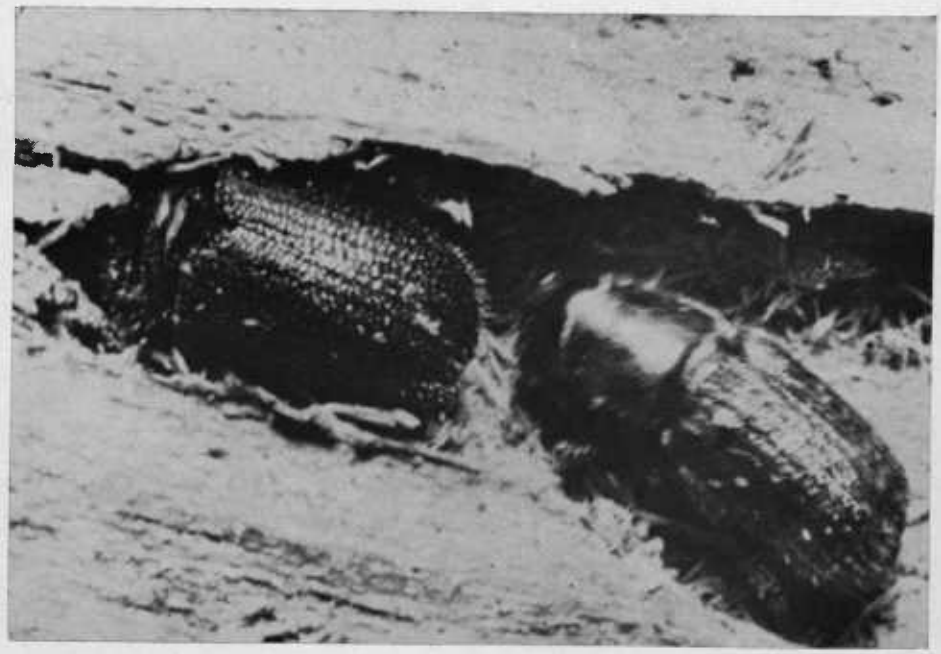
Beetle mortality occurs in several ways, including losses during the flight to new host material; inability to invade a host; competition between the larvae; inadequate food quality; and attacks by predators or parasites on either adult or immature beetles.

Most species of bark beetle have a large number of highly conspicuous natural enemies, often credited with causing substantial mortality. The Douglas-fir beetle, Nagel has found, is no exception. In western Oregon, it is attacked by at least nine species—eight predators and one parasite.

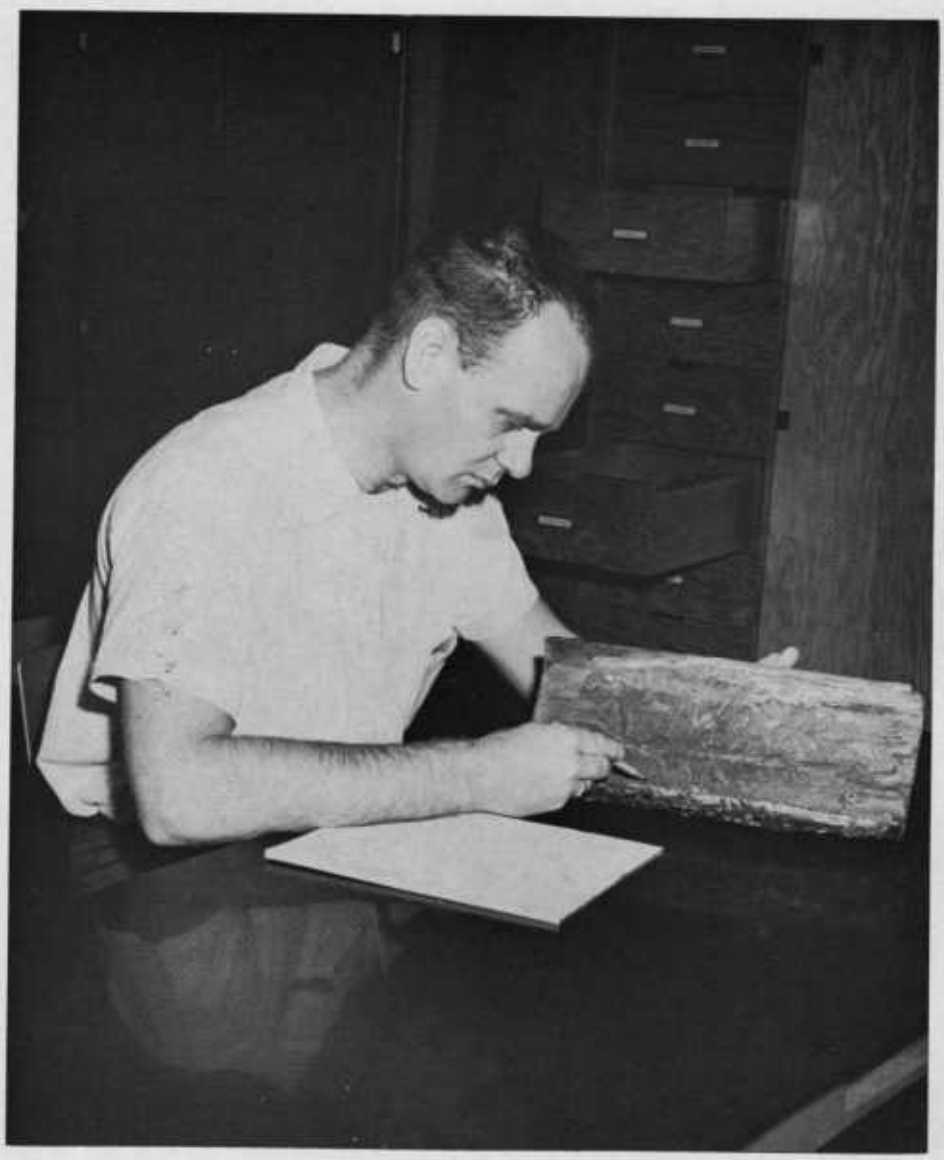
Parasite effective, but . . .

The parasite, a small wasp, is very effective where the bark is thin, for it lays eggs by piercing the bark and placing them directly on beetle larvae. However, bark that is thicker than the length of the wasp's egg-laying organ prevents parasitization. In five years of sampling wind-thrown trees, this parasite has been found in less than 1% of the samples—not nearly enough to qualify it as a truly effective control agent.

The other natural enemies are all predators—seven beetles and one fly.



Beetles shown four times actual size.



Nagel examines sample of damaged bark.

Both adult and larval stages of the beetles are predaceous on Douglas-fir beetle adults and larvae. But field and laboratory work show that none of them can be considered effective. Only one of the beetles was present consistently, and it requires two years to complete development. Moreover, most of its development period consists of various resting stages, so it could not keep up with an increasing Douglas-fir beetle population. Nagel suspects that any mortality caused by this predator merely would replace mortality due to larval competition.

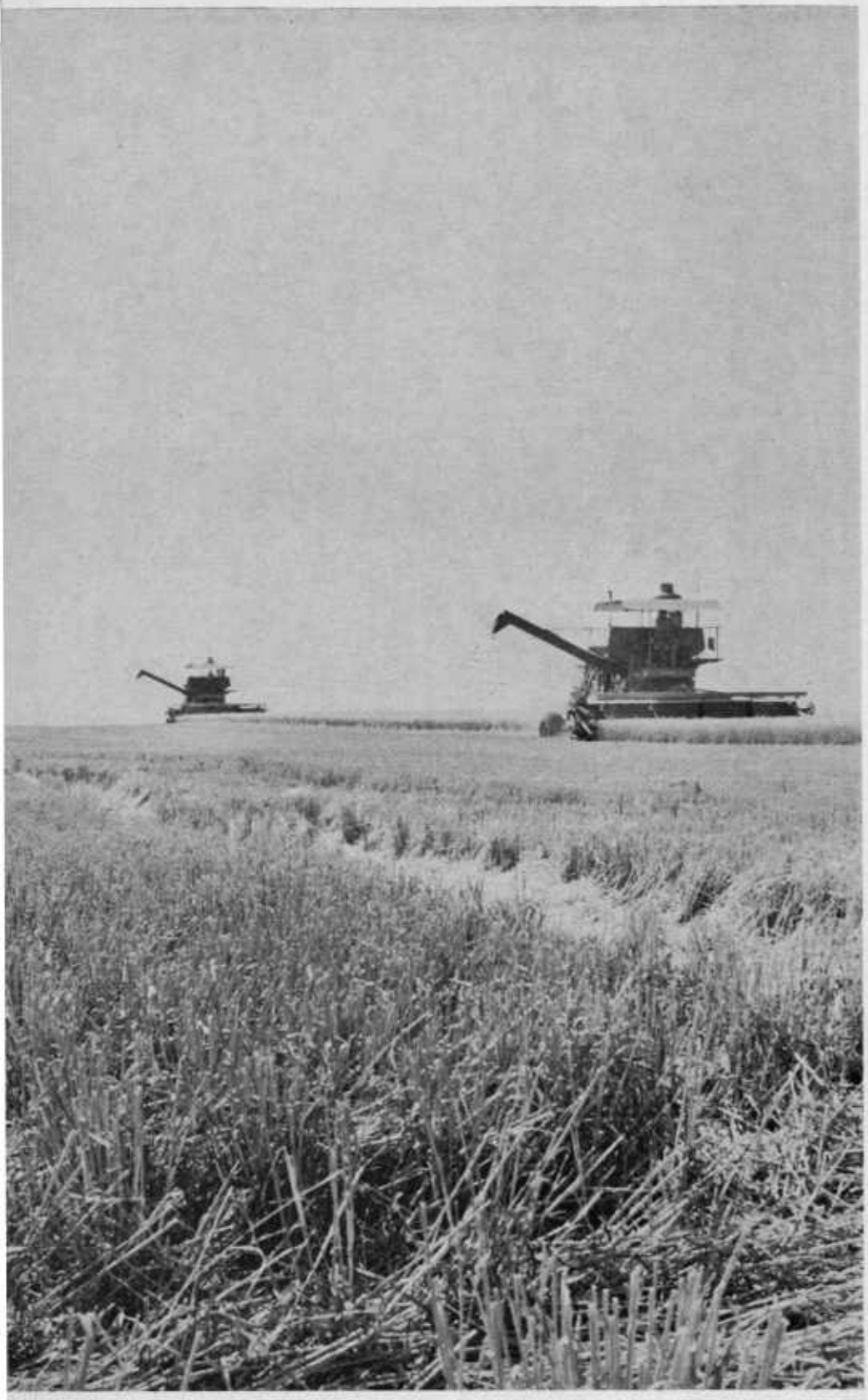
Fly of some promise

Only the fly seems of possible importance as a control agent. The larval stage of this predator feeds on Douglas-fir beetle larvae and appears to possess some favorable habits. For example, there are indications that it responds to increasing densities of beetle larvae by killing them in increasing numbers. As with the predaceous beetle, however, this predator simply may be replacing other mortality and not achieving a net increase.

Thus, Nagel concludes that Oregon's timber industry cannot count on the use of natural enemies to help prevent Douglas-fir beetle population increases. Clearly, what regulates the Douglas-fir beetle population is the amount of suitable breeding material available during each generation.

As yet, there is no way to stop a Columbus Day storm. However, other phases of the OSU effort indicate there may be a way to reduce successful beetle attacks sufficiently that intensified salvage operations become feasible. This vital work now confronts far fewer "unknowns" because of research that showed how the problem could not be solved.

Low Yields From Late-seeded Winter Grain?



QUESTION: Can grain growers in Oregon's Columbia Basin seed winter wheat and winter barley varieties in late winter or early spring and still harvest acceptable yields?

Answer: OSU agronomist Charles Rohde has found that Gaines and Moro winter wheats are likely to produce a satisfactory crop if seeded by the middle of February. Still, he points out, it is best to seed a good spring wheat when large acreages are at stake. As for barley, Rohde has found that yields from late-winter and early-spring seedings of the Hudson winter variety are well below acceptable levels.

Fall seeding normal

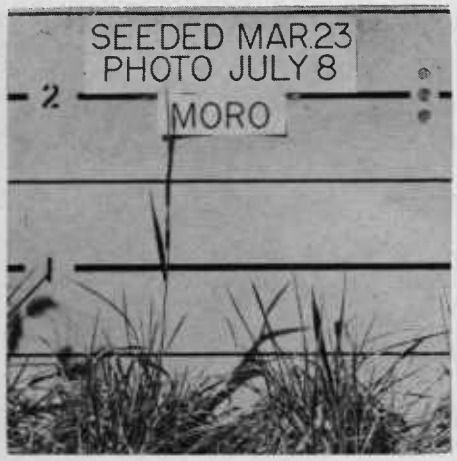
Fall is, of course, the normal time to seed winter wheat and barley. But at times, Columbia Basin grain growers are not able to complete fall seeding because of dry or frozen seedbeds. Moreover, wind or water erosion and winterkilling often destroy parts of fall-seeded grain fields, making reseeding necessary.

An interval of mild weather frequently occurs in this region during February, and the soil may become dry enough for seeding. Many growers will have on hand a supply of winter-variety seed that they would prefer to use, rather than purchase additional seed of a spring variety. The problem is that winter wheat and winter barley must go through a period of "vernalization." That is, they must be exposed to a sufficient period of cold temperatures in order to produce heads and a normal crop of grain. How late can winter grains be seeded in the Columbia Basin and still complete this vernalization process?

Date-of-seeding tests

To find out, Rohde launched date-of-seeding tests at the Pendleton Experiment Station in 1965. Gaines and Moro winter wheats, Idaed 59 spring wheat, Hudson winter barley, and Gem spring barley were used in the tests. Three years' worth of yield results are shown in the accompanying table.

For the first dates of seeding (February 7, 10, and 18), yields of the winter wheats averaged about the same



Seedings of Moro and Gaines winter wheat made on March 23 failed to produce heads and yielded no grain. But seedings of Idaed 59 spring wheat made on the same date produced normal heads and 45 bushels of grain per acre.

as those of the spring variety. Yields varied markedly from year to year, however. For example, in the earliest 1967 seeding, made on February 7, yields of winter wheat were decidedly inferior to yields of Idaed 59. In 1966, on the other hand, Gaines and Moro easily outproduced the spring variety in the first seeding, made on February 18. Note that Gaines apparently is somewhat more suitable for late-winter seeding than Moro.

Winter barley yields low

Throughout the OSU tests, Hudson winter barley yielded considerably less than Gem. The difference in average output ranged from a low of 953 pounds per acre to a high of 1,719 pounds.

Rohde also observed that the maturity of the winter wheat varieties was delayed about 10 days, causing the grain to mature during the hot portion of the summer. Thus, test weights of the grain from winter varieties were 3 to 4 pounds lighter per bushel in comparison to the spring variety. This would result in lower grades and lower prices.

Yields of Late-Seeded Winter Versus Spring Wheat and Barley in the Columbia Basin

Date of seeding	Wheat varieties			Barley varieties	
	Gaines	Moro	Idaed 59	Hudson	Gem
	Bu./A	*Bu./A*	*Bu./A*	*Lbs./A.*	*Lbs./A.*
First date					
Feb. 7, 1967	24.6	27.9	42.8	3,120	4,173
Feb. 10, 1965	58.6	51.6	58.5	3,988	4,809
Feb. 18, 1966	70.1	66.8	50.8	3,401	4,535
Average of first date	51.1	48.8	50.7	3,503	4,505
Second date					
Feb. 21, 1967	18.8	22.0	36.0	2,453	3,629
Feb. 24, 1965	52.2	47.4	55.1	3,879	4,942
Mar. 1, 1966	53.2	52.5	46.9	3,586	4,208
Average of second date	41.4	40.6	46.0	3,306	4,259
Third date					
Mar. 9, 1967	12.8	13.6	30.6	1,753	3,302
Mar. 11, 1965	35.4	29.6	56.1	3,778	4,970
Mar. 12, 1966	26.2	19.3	54.6	3,547	4,576
Average of third date	24.8	20.8	47.1	3,026	4,282
Fourth date					
Mar. 23, 1966	0.0	0.0	45.3	2,273	3,866
Mar. 24, 1967	4.0	0.0	23.2	946	2,440
Mar. 24, 1965	0.0	0.0	53.0	2,184	4,254
Average of fourth date	1.3	0.0	40.5	1,801	3,520

research briefs

Getting Christmas Trees To Market In Top Condition

A COMBINATION of top ice, floor racks, proper loading, and improved packaging will help Oregon Christmas tree growers get this perishable product to market in top condition. That's the report from Melvin Conklin, OSU agricultural economist, following a series of railroad-car shipping trials.

Heat is a Christmas tree's chief in-transit enemy. Cut trees deteriorate rapidly when temperatures rise above 55 or 60 degrees. However, Conklin points out, as trees generate heat through respiration, and as most Oregon-grown trees are shipped to warmer climates, the temperature in a carload of trees can climb to 80 degrees or more.

In the trials, the installation of slatted floor racks prior to loading reduced temperatures by at least 5 degrees through improved air circulation. Subsequent top icing with about 3 tons of crushed ice per car reduced and held temperatures well below 45 degrees, in addition to maintaining tree moisture.

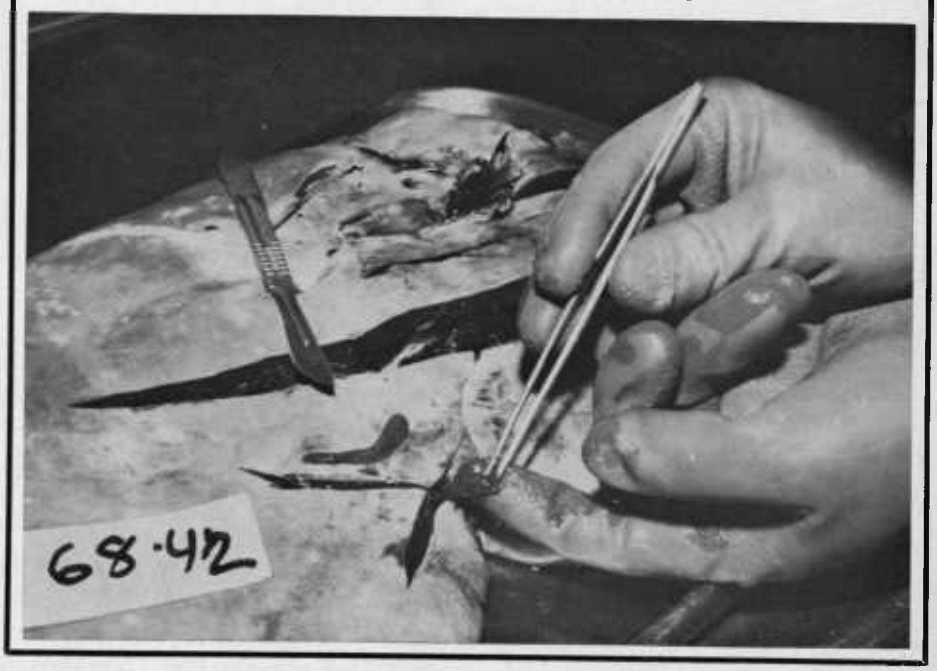
Proper loading technique

The trials showed that to make the most of top icing, Christmas trees should be loaded crosswise to the car, with butts high at the outside and tops low at the center. This forms a "valley" that keeps the melting ice water running to the center of the load where it is needed. (Floor racks aid drainage of warmed, excess water.) Doors should be closed when loading is completed. Otherwise, the load may shift between shipping and icing points, making it difficult to close doors after icing.

The cost of floor racks and icing, Conklin notes, ranged from 5¢ to 7¢

Icing crew applies 3 tons of top ice to a carload of Christmas trees. In tests, top icing reduced and held shipping temperatures below 45 degrees.

A large American liver fluke is extracted from the infested liver of a Rocky Mountain elk, one of the fluke's two principal reservoir hosts.



per tree for plantation trees in loads of 700 to 900 trees per car. Per-tree costs would be lower for bundled natural trees, because more of these can be shipped per car.

During the trials, trees packaged in a plastic mesh-netting (Vexar) were observed to arrive in at least as good condition as string-tied trees, although actual temperature comparisons were not made. And Conklin reports this material avoids damage from tight string tying, which often occurs during unfavorable or lengthy storage.

Large American Liver Fluke Could Become Costly Problem

ATTACKS ON SHEEP and cattle by the common liver fluke rob Oregon livestock producers of an estimated $2 million every year. And at times, the toll may be much higher. Now there are signs that the large American liver fluke, *Fascioloides magna,* could become an equally expensive parasite.

Several years ago, OSU veterinary parasitologist Stuart Knapp observed that this large fluke was more widespread in Oregon than most realized (see *Oregon's Agricultural Progress,* Spring 1965). Since then, he has been conducting a survey to determine its geographic distribution and principal hosts. Among the findings:

Two enzootic areas

Oregon contains at least two enzootic areas—areas where epidemics of liver fluke infection can be caused by the large fluke. These are the lowlands and islands of the lower Columbia River, and the central Oregon Cascades.

The black-tailed deer is the principal reservoir host in the lower Columbia region; the Rocky Mountain elk is the principal reservoir host in the central Cascades.

At least three, and probably four, of the five species of fresh-water snails found in pastures grazed by infected reservoir animals or accidental hosts can serve as intermediate hosts.

The large fluke is not confined to western Oregon. Several infected livers were found in cattle from the north-central part of the state, and all the necessary conditions for infection are present in northeastern Oregon.

Are liver fluke infections due to *F. magna* definitely going to increase? Further research is needed before the answer is certain. However, Knapp points out, many recent developments favor an increase. Examples are the construction of dams which permit increased use of river land for livestock grazing; the increasing use of pasture irrigation; the possible introduction of livestock to enzootic areas previously grazed only by wild animals; and the transfer of deer and elk to new areas.

OSU Scientists Test Ground Beef For Moisture, Fat, Protein

HOW HIGH IN QUALITY is the ground beef offered Oregon consumers at the retail level? Are its moisture, fat, and protein contents acceptable? How widely does the price vary per pound of protein in ground beef?

Research has provided some preliminary evidence of the answers. OSU food scientists Allen Anglemier and William Davidson recently tested 72 individual samples of ground beef purchased over a six-week period from three independent and three chain stores located in a major Willamette Valley city. Here are some of their findings.

Fat content limit is 30%

Although a fat content of 30% is the legal limit for ground beef sold in Oregon, more than 32% of the samples tested exceeded this limit. Half the samples purchased at independent stores had a fat content in excess of 30%, while about 14% of the samples sold by chain stores exceeded the 30% limit.

Moisture content averaged 55% and protein content averaged 17%, with ground beef purchased at chain stores significantly higher in both categories. The ratio of moisture to protein averaged 3.59 to 1, which is considered acceptable. However, approximately 28% of the samples tested had moisture-protein ratios in excess of 3.70 to 1. Anglemier and Davidson note that this may indicate the addition of either water or various organ meats to these samples.

Price per pound of the ground beef averaged 49¢. On the basis of protein content, prices ranged from $2.04 to $4.05 per pound of protein. The average price per pound of protein was $3.16, with no significant difference between the chain and the independent stores.

Anglemier and Davidson suggest that limiting the ratio of moisture or fat to protein might help stabilize the quality of ground beef offered Oregon consumers at the retail level. The food scientists point out that semiautomatic instruments which can determine moisture or fat content could readily be adapted for use by retail stores.

(continued from page 3) Latin America. With the anticipated population growth during the next 30 years, world food production will have to be increased by 80% just to maintain current levels of consumption. Many nations will have to double, and some nations triple, their food output merely to stay even.

Our number-one industry

Second, we must not fail to realize that:

¶ Agriculture continues as America's number-one industry and the cornerstone of our economy. Nearly one third of all the productivity employed people in this country are engaged in some phase of the dynamic agribusiness complex.

¶ Agriculture is fundamentally a wealth-producing industry operating on a base of renewable resources. For every $1 worth of product leaving our farms, another $1 to $2 is generated in the economy as this farm product moves into the channels of consumption.

¶ The reason 94% of our population presently is enabled to pursue something other than the active production of farm products is the acquired "know-how" of the other 6%, combined with the use of expensive machines and materials.

¶ One of history's really vital lessons is that food-deficient countries start their decline by not paying sufficient attention to the protection and development of their basic natural resources. Common pitfalls include insufficient provision for research, inadequate control of insects and diseases, and improper management of the capacity to produce food, clothing, and shelter. It is worth noting that even the United States will have to increase food production by 30% within the next 20 years to maintain its current level of consumption.

Clearly, the need for young people in agriculture has never been greater. Graduates of colleges of agriculture are in very short supply. The national ratio of jobs to holders of a B.S. degree in agriculture is more than two to one. And in certain regions, the ratio is considerably higher.

It is forecast that by 1980, fully half the nation's farmers and ranchers will own agribusinesses with capital requirements of more than $150,000. Most of these will continue in the "family-operations" category. One out of every ten agribusinesses will carry an investment in excess of $325,000. These modern agricultural "factories" will want properly qualified management personnel.

In the minds of all too many, however, agriculture still means farming. The fact is that many of the things we used to do on the farm have moved to town. This is a logical part of our industrialization, and the people who make it work are mostly agriculturists, trained and educated in modern agriculture. Thus, industry offers virtually unlimited opportunity in fields such as chemicals and fertilizers, marketing, processing, finance, engineering, transportation, communications, farm organizations, and farm services, to name but a few.

Other opportunities await

Numerous opportunities also await young people in agricultural education, research, and development, and in state and federal services. The opportunity abroad speaks for itself.

If we ever are to meet the needs of all mankind, including a degree of peace and release from famine, disease, and pestilence, we must have personnel who can lead the way. Hunger, starvation, and the many miseries that accompany them can be brought to a point of acceptable tolerance—but not unless we provide our own people and the world with young men and young women who have the knowledge and the skill to do the job.

"... even the U. S. will have to increase food production by 30% within the next 20 years ..."