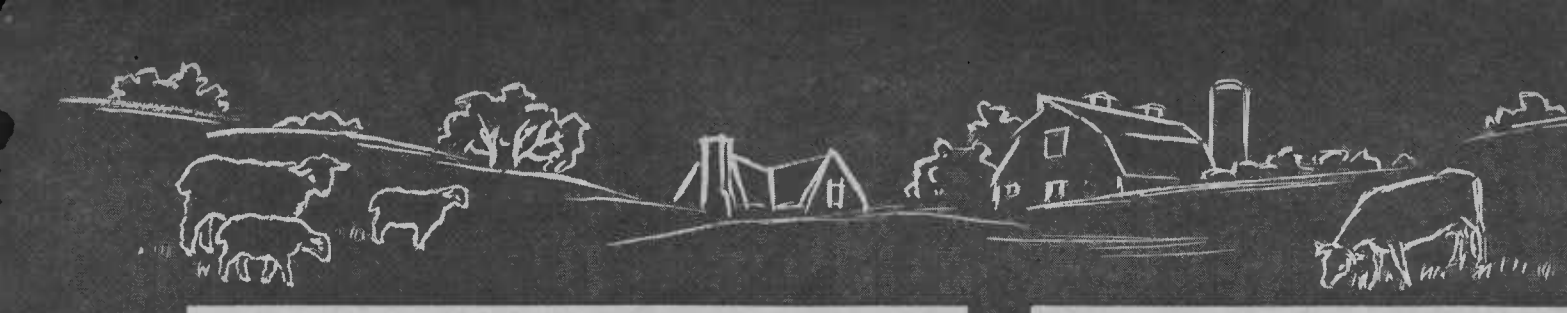
FALL 1964

Oregon's Agricultural PROGRESS

Wheat Can Be Fed in Oregon When the Price Is Right • New Wheat Resists Stripe Rust

OREGON STATE UNIVERSITY CORVALLIS



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OREGON'S AGRICULTURAL PROGRESS will be sent free to Oregon residents upon request. Address requests to Bulletin Clerk, Industrial Building, Oregon State University, Corvallis, Oregon, or see your County Extension Agent.

COVER: The spotlight is on Oregon wheat, which now comes close to being priced competitively with other feed grains grown here as well as with corn and milo from east of the Rocky Mountains. The cover photo is Druchamp, ready for harvest.

Photo: Bill Reasons

IF WHEAT is priced right, it can be fed successfully to livestock and poultry. There is much early experience and recent research in Oregon—reported in other articles in this issue—to support this conclusion.

Now Oregon wheat is coming close to being priced right for feeding—that is, priced competitively with other grains produced here as well as with corn and milo produced east of the Rocky Mountains. In fact, some Oregon grain-feeders and feed-mixers this summer could use wheat economically in their rations for the first time in 20 years.

Generally, since the 1964 harvest started, Oregon wheat has been lower priced than shipped-in corn and milo. In a few places, a ton of some grades

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M. D. THOMAS, *Extension agricultural economist at OSU since 1937, specializes in public affairs education.*

In this article, he is not taking a position for or against market-splitting or any particular course of action.

Instead, his aim is to point out thought-stimulating possibilities and raise questions that otherwise might not be considered.

The author is currently collaborating with veteran OSU agricultural economist, Dr. Harold F. Hollands, in a series of educational leaflets on wheat. These relate to domestic and international practices, programs, and policies affecting this number one northwest crop. These reports are being developed and released with financial assistance from the Wheat Commissions of Oregon and Washington in response to requests of northwest leaders.

Free copies of the leaflets will be available on request from county Extension offices or from room 219 Extension Hall, Oregon State University, Corvallis, Oregon.

Wheat Can Be Fed in Oregon *When the Price is Right*

By M. D. Thomas

of wheat has cost no more than a ton of local barley.

Even more important for the longer run could be sharp reductions in gaps between prices of locally grown grains, especially wheat, and prices of corn and milo in the Great Plains.

Spreads are "killer gaps"

Spreads between these interior grains and northwest grains have ranged from $10 to $30 a ton much of the time in the past 20 years. These spreads are the "killer gaps" that have been wiping out, or ruling out, grain-feeding enterprises in the Northwest for many years. These gaps also have been robbing Oregon grain growers of this important market outlet.

Among enterprises hit first and hardest when the gaps developed after World War II were hogs and turkeys. Since then, the Oregon broiler and egg industries have been dwarfed. More recently cattle and hog-feeding operations have been in jeopardy and wheat planting was sharply restricted.

But this summer the gap between Oregon wheat and interior United States corn and milo prices dwindled. The gap between local feed barley and feed grain prices east of the Rockies is also smaller than it has been for several years. Now northwest grain-feeders are showing renewed interest. They hope that they can stay in business and help provide a broadened market for grain.

Recent price relationships, if continued and given a little help in the form of reductions in east-west freight rates on such items as corn, milo, and soybean meal, could provide an expanding local feed market for barley as well as feed wheat. Present indications are that Pacific coast markets could use a larger supply of northwest broilers, beef, and pork now and in the future. At the same time, eastern and southern producers now helping to supply these coast markets could grow with the expanding markets east of the Rockies.

Changes in the price gaps are at least partly consequences of changes in federally administered grain programs. How long the new relationships will last is anybody's guess.

Federal wheat program

The new federal wheat program, which now relates wheat loan rates to wheat's feeding value, among other things, is authorized only through the 1965 marketing season. Authority for present feed-grain programs also expires with the 1965 crop. What happens then depends heavily on what farmers and farm groups think, say, and do in the next few months. These thoughts and actions will guide Congress and federal administrators who will be reviewing grain programs this winter.

Congress must act before next summer if legislation that permits programming of wheat into feed use is to be extended. It is clear that what happens to this legislation and to "killer gaps" will be decided by men both inside and outside government.

While legislation permits pricing wheat into feed use, it does not require it. This is an important point to remember. The Secretary of Agriculture has wide latitude in this respect. In effect, the law authorizes that wheat be priced into feed outlets to the extent that it is deemed to be in the public interest.

Best chance in 20 years

Under present wheat and feed-grain legislation, the Northwest has the best chance in 20 years to overcome "killer gaps" and develop the "third" market for local grain. The "third" market is feed for livestock and poultry. The other two markets are domestic food and exports.

The market-splitting features of present wheat legislation make it possible to program wheat supplies into (1) domestic food uses, (2) export outlets, and (3) domestic feed uses. The legislation permits this without incurring a loss of producer returns from domestic food and export outlets that would likely occur unless production was very sharply reduced.

(*Continued on page 16*)

Winter Wheat is a Good Crop in Willamette Valley

By W. H. Foote and T. L. Jackson

WINTER WHEAT is a good possibility for Willamette Valley farmers to consider when planning crop rotations and alternate land use.

New, high yielding varieties such as Gaines and Druchamp combined with better fertilizer and weed control practices have done much to increase the yield of wheat on Willamette Valley farms (see Tables 1 and 2).

At one time, the Willamette Valley provided most of the wheat grown in Oregon. But that was about a hundred years ago. When eastern Oregon was settled in the 1870's, opening of railroads into that part of the state led straight to larger wheat fields where wheat could then be grown less expensively.

So farmers in western Oregon turned to fruit, livestock, and forages and almost any other crop that could be grown in the mild climate. Wheat never again has been dominant in western Oregon (Table 3).

Now it is grown largely as a rotation crop in western Oregon and contributes about 15% of the state's 26 million bushel wheat crop. As a rotation crop, winter wheat is an important one. And OSU researchers have learned a lot about good growing practices in trials conducted continuously since 1920 by the agricultural experiment station.

W. H. FOOTE *is Professor of Agronomy at Oregon State University and Assistant Director of the Agricultural Experiment Station. T. L. Jackson is Professor of Soils.*

Three tons per acre

If the fertilizer and management practices outlined in this story are followed, Willamette Valley farmers should realize yields of 100 bushels or 3 tons per acre on many fields with Gaines or Druchamp varieties. Obviously, disease, lodging, and other factors can reduce these yields.

When to plant

Recommended planting dates for winter wheat in the Willamette Valley range from mid-October to mid-November. Plantings before early October often lead to excessive straw growth and lodging. Too-early plantings also may be subject to disease and Hessian fly damage.

Winter wheat varieties, however, often can be planted in the Valley as late as early March and produce a better crop than spring varieties. Late spring plantings of winter varieties should be avoided and spring varieties grown.

Recommended seeding rates are from 60 to 100 pounds per acre. Farmer experiences with higher yielding varieties in recent years have shown that lower seeding rates may be advantageous. Experiments have shown that little is gained from heavy seeding rates, providing the seed is plump and has good germination.

Fertilization of winter wheat in the Willamette Valley requires two separate steps. The first is fall fertilizer applied at planting; the second is a spring application of nitrogen (N).

At fall planting time, a soil test should be used as a basis for applying phosphorus (P) and potassium (K). These two nutrients will not leach from the

Table 1. Yields of Wheat Varieties Grown at Corvallis from 1920 to 1963

Winter varieties	Years grown	Average yield	Percent check*
White Holland	1920-1963	37.6	100
Rink	1920-1953	36.5	103
Jenkin's Club	1921-1957	39.1	107
Redmond (Alba)	1955-1963	54.9	124
Omar	1956-1963	33.2	75
Druchamp	1957-1963	61.6	138
Gaines	1960-1963	62.5	141

* This is a comparison of the yield of each variety with White Holland, considering White Holland to be 100%.

soil with winter rains, and they are both needed for vigorous growth and stooling of wheat during the winter. Total application of these materials should be made in the fall and banded close to, but not in direct contact with, the seed at planting time for most efficient results.

Add fertilizer

OSU fertilizer experiments have shown the following:

NITROGEN. About 20 pounds of N per acre should be applied at planting time, except where winter wheat follows vegetable crops or legumes and there is a big carryover of N. Fall-applied nitrogen is especially important for Gaines wheat because it does not stool as much as Druchamp during winter.

Heavier applications of N should not be made in the fall since wheat plants will not develop an extensive enough root system to take up much N from the soil before winter rains start leaching and denitrifying soil N.

PHOSPHORUS. Fertilizer trials have shown increased yields from application of P whenever the soil test has been below 30 pounds of P per acre. Thirty to forty pounds of phosphate (P_2O_5) per acre are generally suggested whenever soil test values are

Table 2. Average Yield Per Acre*

Year	Bushels
1940	23.0
1945	27.1
1950	28.9
1955	32.2
1960	39.2
1961	32.5
1962	54.9
1963	47.9

* In Willamette Valley counties.

Table 3. Wheat Production*

Year	Acres
1899	396,802
1909	137,278
1919	469,621
1929	175,553
1939	129,300
1949	106,360
1959	93,300

* In western Oregon from 1899 to 1959.

Gaines, being harvested here, is one of two main winter wheat varieties grown in the Willamette Valley. Druchamp is the other variety planted in the Valley.

Field trials show that yields on well-drained hill soils may be as high as on valley floor soils if the hills have reasonable depth for moisture storage.

With proper fertilizer and management practices, Willamette Valley farmers should be able to harvest 100 bushels or 3 tons per acre on many fields.

Loading the truck with the harvested wheat is easy when the arm of the combine automatically swings out.

After "weighing in," the farmer drives his loaded truck into the grain storage warehouse to dump his wheat.

between 30 and 40 pounds of P per acre. The rate of P recommended is increased as the P soil test values go down.

POTASSIUM. Fertilizer trials have shown increases in yield from applications of K whenever the soils tested 200 pounds of K per acre or lower. Forty to sixty pounds of potash (K_2O) per acre are generally suggested whenever soil test values drop below 200 pounds of K per acre. Some soil ($\frac{1}{2}$ to 1 inch) should separate fertilizer from seed when potash is included in the fertilizer banded at planting time.

SULFUR. Ten to fifteen pounds of sulfur should be applied with the fall fertilizer where a light application or no sulfur was applied for the previous crop. Sulfur can be supplied with the fertilizer by using mixed fertilizers, ammonium sulfate, some ammonium phosphates, and super phosphates.

In the spring, the addition of nitrogen will be the big fertilizer application for most Willamette Valley winter wheat growers because it gives the biggest yield increases with winter wheat.

Prior cropping counts

How much to apply depends mainly on previous cropping. Where winter wheat follows a legume, such as crimson clover or summer fallow, rates of 60 pounds N per acre are sufficient. Where winter wheat follows spring barley or any other straw-producing crop, spring application of nitrogen should be boosted to 100 or 120 pounds per acre.

The optimum rate of nitrogen to apply will depend on 1) the soil on which the crop is being grown, 2) the previous crop produced (that is, does the wheat follow barley, red clover, or a vegetable crop), and 3) the yield increase that might logically be expected. It takes $2\frac{1}{2}$ to 3 pounds of added nitrogen to add each additional bushel of wheat above past "average" yields (or 4 to 5 pounds of N for 100 pounds of wheat).

Eighty to one hundred and twenty pounds of actual nitrogen should be added where winter wheat follows a crop like barley or oats on both valley floor soils and well-drained hill soils where winter wheat is grown.

Field experiments during 1964 have shown that the yield potential may be as large on well-drained hill soils (that have reasonable depth for moisture storage) as on valley floor soils. Increase in yield from fertilizer probably will be greater on hill soils than on valley floor soils.

Treated plot (right) had fertilizer, N, and phosphorus banded in the fall, with 120 pounds actual N applied in mid-March. Check plot had no fertilizer.

Serious weeds

Most serious weeds in western Oregon wheat fields are vetch, mustards, French pink, annual ryegrass, and wild oats. For most weed problems, Karmex diuron is used on winter wheat at the recommended rate of 1.6 pounds of active ingredient per acre applied preemergence or early post-emergence. This chemical has given good control of annual ryegrass and a wide range of broadleaf weeds. Generally, its effective use makes 2,4-D applications unnecessary.

Where wild oats are a problem,

The tailgate is removed, the cab of the truck is lifted, and the wheat pours through the gate into storage below.

The farmer drives off to "weigh out" as the last of his wheat crop is swept carefully through the grate.

Barban is recommended at one-third pound per acre, applied when wild oats are in the two-leaf stage. Barban also will provide reasonably good control of ryegrass but will not control broadleaf weeds, so later applications of 2,4-D or 2,4-D-dicamba combinations may be required.

Weed control

For selective broadleaf control, 2,4-D at one-half to one pound per acre will control most weeds. A few 2,4-D resistant weeds, such as dog fennel and knotweed, can be controlled by combining 2,4-D at one-half pound with dicamba at one-eighth pound per acre.

Some control of certain broadleaf perennials like Canada thistle, field bindweed, and wild garlic can be obtained from applications of 2,4-D at one to one and one-half pounds per acre. Applications must be timed so the wheat is not in the sensitive stage.

The most serious disease of wheat in the Valley is foot rot or take-all. Control is difficult as the fungus has a tremendous host range. In general, crop rotation with legumes and other crops not in the grass family will greatly reduce the amount of fungus in the soil. High fertility, particularly in phosphorus and potassium, is helpful in reducing severity of the disease.

Stripe rust has caused severe losses in western Oregon wheat fields where susceptible varieties are grown. In general, winter wheat varieties now grown in the Willamette Valley have resistance to stripe rust, so this disease does not take a severe toll. Planting resistant varieties is the only satisfactory control.

It is only recently that attempts to standardize on a few of the better varieties have been made in the Willamette Valley. A 1930 survey showed 32 named wheat varieties grown in western Oregon counties. Now only two main varieties are grown.

White Holland or Wilhemina was introduced into western Oregon about 1914 where it became the dominant variety until replaced recently by higher yielding and stiff strawed varieties. Varieties grown in the Valley since about 1920 were also introduced from Europe and other wheat-growing regions of Oregon.

The first wheat in western Oregon came to Fort Vancouver over a hundred years ago with French-Canadians who left the Hudson's Bay Company to develop farms in the nearby Willamette Valley. They were soon joined by missionary groups who reported that good wheat crops could be grown in the Valley.

Wheat came in covered wagons of early immigrants struck by "Oregon fever," and it was foremost in their thoughts as they ate wheat and flour on the way; then planted it in the ground after they first arrived.

Flour mills built

When the big immigration wave began in 1842, flour mills were built in nearly every town in western Oregon. The first mill was built near Champoeg in 1834. It was reported in 1837 that settlers near French Prairie grew over 5,000 bushels of wheat for their new mill.

From these beginnings, wheat has reached the place that it now holds in Oregon agriculture.

Straw strength of Gaines (left) is superior to Druehamp when grown after vegetable crops or where an excessive rate of nitrogen was used. Nitrogen should be applied both at fall planting time and again in the spring.

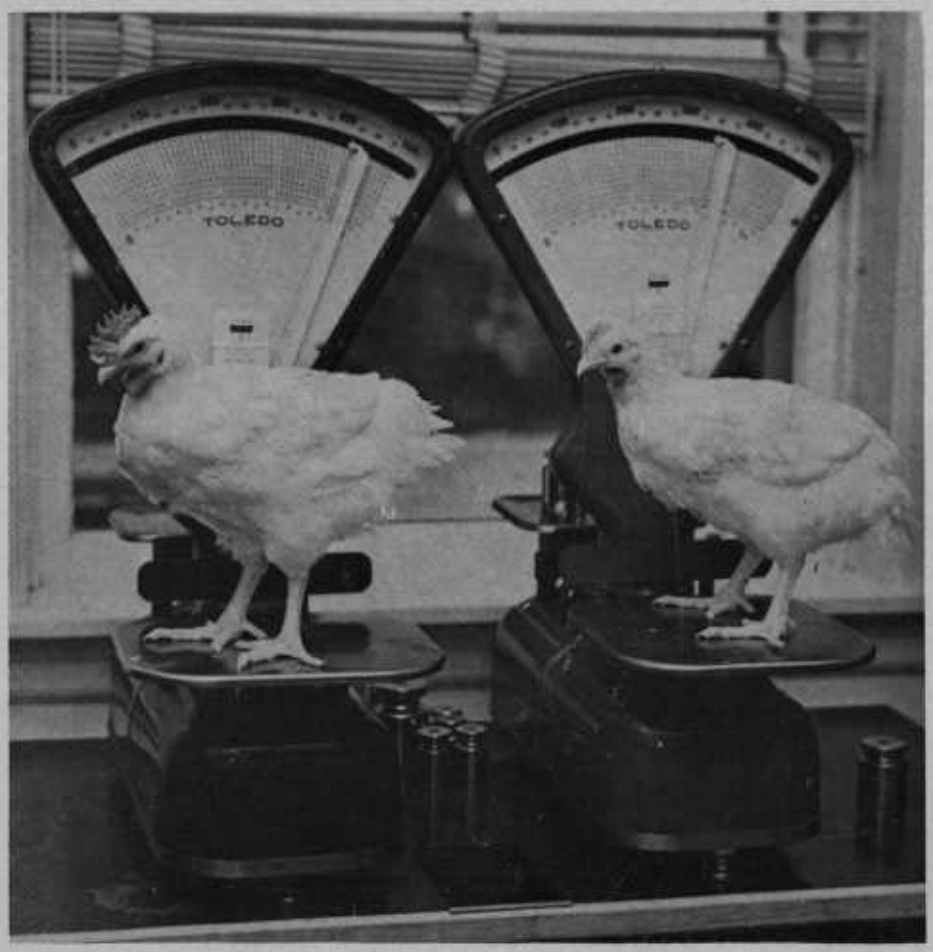
Add Corn to Wheat In Poultry Feed

Wheat is not quite as efficient as corn for poultry; but the two combined equally appear as good as corn alone.

UNTIL about 20 years ago, Oregon poultry producers fed quite a bit of wheat to poultry. But in recent years the importance of wheat in poultry rations has decreased.

Since it now looks as though wheat may again be inexpensive enough to be included in poultry rations, the OSU department of poultry science has undertaken a series of experiments using up-to-date rations to re-evaluate wheat's potential in replacing corn as the major energy source.

Poultry scientist G. H. Arscott says it appears that complete replacement of corn with wheat using present-day broiler and layer rations will result in a decrease in overall performance. Also, carcass pigmentation is decreased with broilers to such an extent as to be a problem.



The heavier broiler (left) was on a corn diet. The lighter one was fed wheat. Both are males—six weeks and five days old when photographed.

On the other hand, yolk color does not seem to be a major problem with layers if enough alfalfa meal is included in the ration.

OSU tests show a certain amount of corn intake is required to remedy the problem of decreased growth in broilers. This can be accomplished in one of two ways:

(1) Blending at least equal amounts of wheat and corn throughout the feeding period, or (2) using high efficiency corn-type finisher rations.

Increases pigmentation

Either of these methods would increase pigmentation. Of the two methods, the use of a corn mash from the sixth or seventh week would permit use of more wheat. Use of a xanthopyll (yellow pigment) concentrate at a level of 1.75 mg/lb could substantially aid carcass pigmentation and thus permit use of even smaller amounts of corn.

Arscott emphasized that if wheat is to be used exclusively in rations for broilers and layers, its price will have to reflect the difference in efficiency when compared to corn. Results of OSU studies showed that the wheat ration for broilers was 91.6% as efficient as the corn ration; for layers, the wheat diet was 94.5% as efficient as the corn diet, but a combination of equal amounts of wheat and corn appeared as efficient as corn alone.

Three experiments were conducted with broilers. Results showed a significant decrease in body weight along with poorer feed conversion and shank pigmentation in broilers fed wheat compared to those fed corn. Small, but consistent, increases in feed and water consumption also were evident. Again, no differences were noted for mortality.

Reduced pigmentation for the wheat-fed birds resulted in processed carcasses that were much whiter than those of corn-fed birds, Arscott noted.

Wheat versus corn

A summary of the wheat versus corn data for the three broiler experiments is shown in Table 1.

Results of the OSU layer study showed no significant difference in egg production between wheat, corn, and a combination of wheat and corn. Hens on wheat consumed slightly more feed. This, coupled with a slight reduction in egg production, resulted in an increase in feed required per dozen eggs.

As the concentration of wheat increased, Arscott noted that both egg size and yolk coloring decreased. However, he said, the appearance of the yolks from wheat-fed layers does not appear objectionable. (Apparently alfalfa meal in the ration supplies sufficient xanthophyll.) No differences in mortality between treatments were evident. The layer study is summarized in Table 2.

The experiment with layers included 6 lots of 40 OSU rotational strain-cross White Leghorn layers housed in floor pens on wood shavings. They were provided with 13 hours of light and with free-choice feed and water. The experimental treatments included wheat, equal parts of wheat and corn, or corn. Results of ten 28-day periods are reported.

Broiler experiments

The three broiler experiments were conducted in floor pens equipped with hanging feeders and waterers, infrared heat lamps, 24-hour lights, and forced draft ventilation. Commercially available broiler crosses were fed the various rations in duplicate for 8 weeks.

Make-up of the experimental rations for both studies is available from the OSU department of poultry science.

Yolk score is determined by comparing yolk color with a color wheel numbered from 1 (off-white) to 24 (dark orange). Shanks are scored similarly.

Table 1. Effect of Wheat Versus Corn in Broiler Rations

Treatment	Average for 8 weeks				
	Body wt.	Feed cons.	Feed conv.*	Water cons.	Shank score**
	lbs.	*lbs.*		*lbs.*	
Wheat mash	3.29	7.80	2.38	12.2	3.0
Corn mash	3.51	7.66	2.18	11.5	7.3

* This is obtained by dividing total feed consumed by total body weight.

** These scores were obtained by comparing shank color with a color wheel numbered from 1 to 12 (1 was the lightest color and 12 the darkest).

Table 2. Effect of Wheat Versus Corn in Layer Rations

Treatment	Average for ten 28-day periods					
	Egg prod.	Egg wt.	Yolk score*	Feed cons.	Feed/doz. eggs	Body wt. gain
	%	*gm.*		*lbs.*	*lbs.*	*lbs.*
Corn	70.88	57.8	14.9	6.72	4.11	0.57
Wheat	70.32	56.7	9.9	7.08	4.35	0.56
½ corn-½ wheat	72.03	56.9	13.2	6.87	4.11	0.53

* These scores were obtained by comparing yolk color with a color wheel numbered from 1 to 24 (1 was the lightest color and 24 the darkest).

OSU Studies Wheat for Cattle

Wheat compared favorably with corn and barley in a study of effect of different diets on finishing performance and carcass character. Another study found four roughages equal when fed with wheat and rye.

Table 1. Wheat-Corn-Barley Performance Summary

		Peavine silage	Alfalfa hay	Molasses (no roughage)
60% wheat $70.50*	Average daily gain..	3.08 lbs.	3.34 lbs.	3.09 lbs.
	Feed efficiency**	698 lbs.	640 lbs.	675 lbs.
	USDA grade***	15.4	15.1	15.9
60% corn $57.00	Average daily gain..	3.02 lbs.	3.09 lbs.	2.90 lbs.
	Feed efficiency	730 lbs.	744 lbs.	731 lbs.
	USDA grade	15.6	15.8	14.9
60% barley $49.50	Average daily gain..	3.00 lbs.	3.17 lbs.	
	Feed efficiency	748 lbs.	740 lbs.	
	USDA grade	16.1	15.8	

* Cost per ton of total concentrate.

** Feed per cwt. gain.

*** 14 = good, 17 = choice.

Table 2. Feedlot Performance on Wheat-Rye Diets

	Average daily gain (lb.)		Feed efficiency (lbs. feed/cwt. gain)		Cost/cwt. gain	
Diluent	Low*	High	Low	High	Low	High
Beet pulp	2.87	3.08	814	805	$20.34	$20.02
Alfalfa	3.09	3.05	834	852	20.37	20.61
Corn silage.....	2.83	2.80	796	798	19.58	18.90
Wheat straw	3.01	2.71	859	1,005	20.29	22.10
Beet pulp**	3.08	2.99	831	840	18.49	18.86
Average	2.98	2.91	827	860	19.81	20.10

* Low = 10% roughage, high = 20% roughage.

** Barley.

Costs per pound—Wheat $.0284, barley .0245, beet pulp .0244, silage .0045, wheat straw .0065, and alfalfa hay .015.

TWO EXPERIMENTS feeding wheat to cattle were recently conducted at the Umatilla station.

In one of the studies on yearling steers, wheat compared favorably with corn and barley, reports animal scientist A. T. Ralston.

The other study tested the effect of different kinds of roughage on feedlot performance and carcass character when fed with a predominately wheat-rye ration. Results here showed satisfactory performances from all four roughages tested.

In the experiment comparing wheat, corn, and barley, 216 steers were used to test the effect of 16 different diets on finishing performance and carcass character.

Main reason for the study was to re-evaluate common feedstuffs for beef cattle, since many values of these feeds were established with higher levels of roughage than are now being used.

Roughage source varied

Steers in the study were divided into 16 pens. Diet of the groups varied as to roughage source (alfalfa or peavine silage) or no roughage, and combinations of concentrates (barley, corn, and wheat). Twenty-five percent beet pulp and five percent molasses were added to all grain combinations. Pens with no roughage received 5% more molasses and 5% more grain than pens with

roughage. Under this all-concentrate diet, wheat resulted in greater gains than corn, suggesting that additional fiber is of greater importance in a corn diet than in one of wheat.

Differences observed in average daily gain and feed efficiency were not large enough to be significant. Such things as conformation, marbling, USDA grade, and back fat were quite similar, regardless of the steers' diets. The wheat, corn, and barley diets are compared in Table 1.

Shelter helped gains

Ralston noted that steers in sheltered lots gained slightly more than those without shelter.

The other experiment was designed to study the effect of various roughages (beet pulp, alfalfa hay, corn silage, and wheat straw) on steer performance and carcass character when used with a wheat diet.

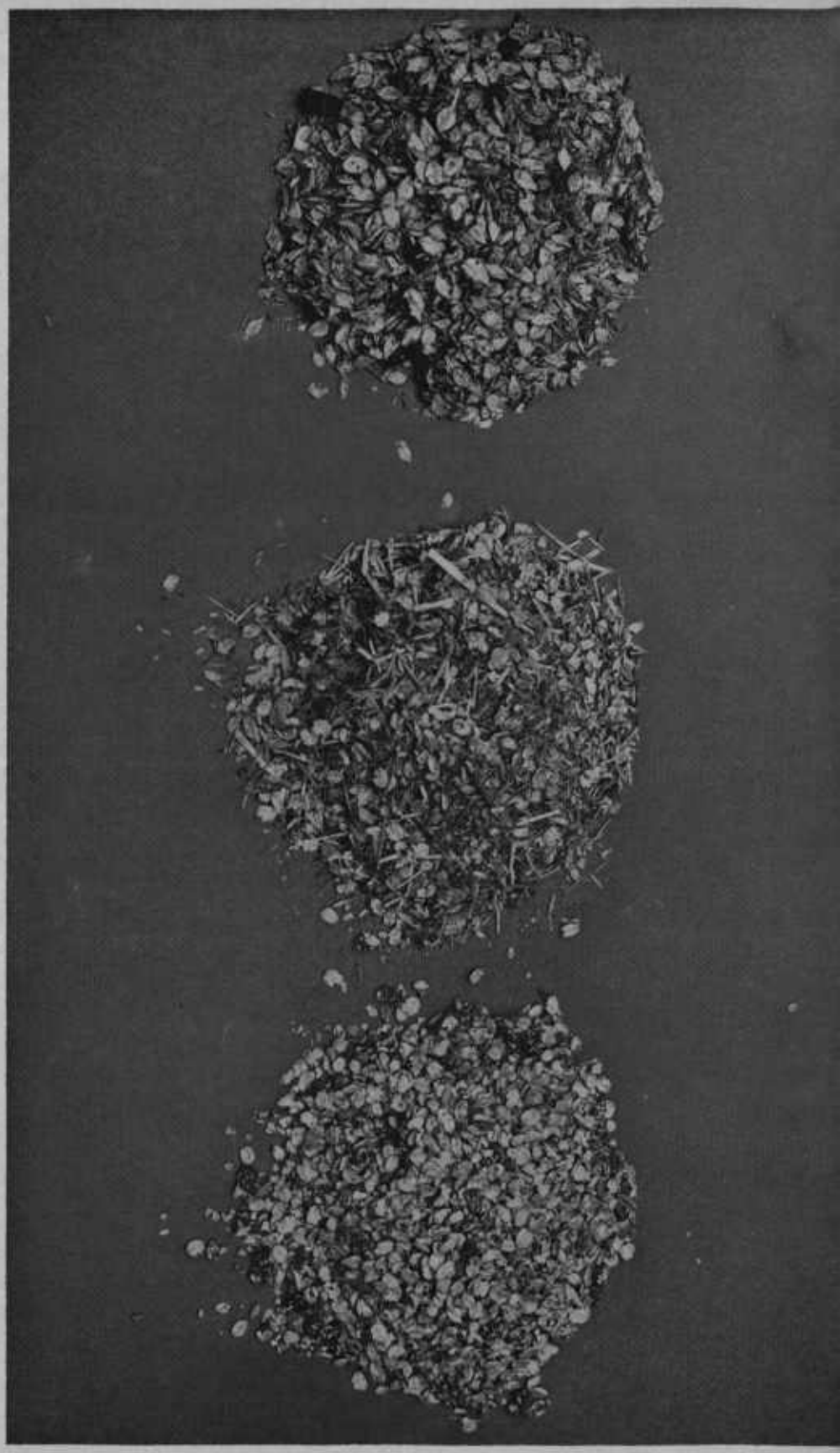
Ralston explained that wheat is low in crude fiber content, and has not been used in "high" concentrate diets. Therefore, researchers wanted to see if the type and amount of roughage might be important in successful use of wheat as a feed for beef steers.

Wheat used successfully

The wheat diets contained about 7% rye. A standard barley-beet pulp ration was fed to another group of steers as a control. Seven percent molasses was added to all concentrate mixtures. Results indicate that wheat can be used successfully with any of the roughages tested. Table 2 shows feedlot performance on the wheat-rye diets.

At the level of crude fiber fed in this experiment, the amount seems to be as important as the digestibility of the fiber in question. An increase from 10 to 20% of beet pulp, alfalfa, or corn silage seemed to have little effect upon gains; but a similar increase in wheat straw reduced gains, feed efficiency, and carcass character. With this in mind, Ralston says it looks as if the amount of fiber from wheat straw may be more critical than the amount of fiber from other sources.

Results of this test showed no significant differences due to treatment. Ralston says it is interesting to note that when the crude fiber content of the ration falls too low, average daily gains apparently drop. When the fiber becomes too high, the total performance of the animal seems to suffer.



Rations, top to bottom: 85% barley, 10% beet pulp pellets; 75% wheat, 20% alfalfa; 95% wheat. Five percent molasses in each; barley and wheat steam rolled.

Wheat Produces Good H

Pellets result in higher gains than either whole

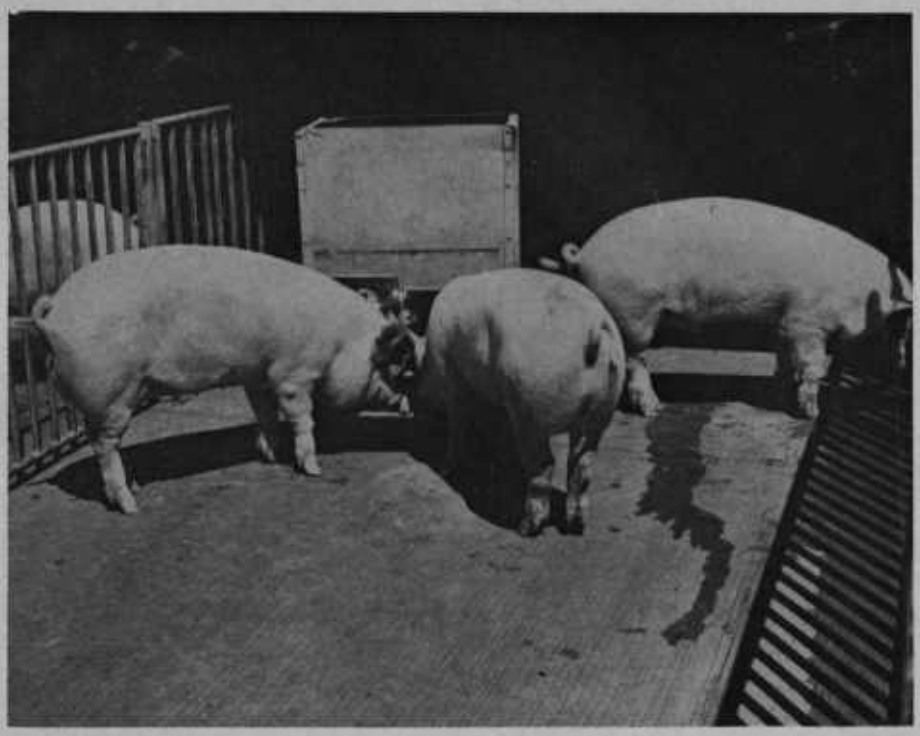
If the price is right, locally grown wheat is as good as barley as a feed for market hogs. Perhaps better, report OSU researchers D. C. England, T. P. Davidson, J. E. Oldfield, and R. W. Cooper.

In two series of tests with producer-owned animals at OSU's Umatilla station, scientists found little difference in gains and carcass quality between hogs fed wheat and those fed barley.

However, when both were pelleted, the researchers noted a fairly consistent trend for more efficient conversion of feed to meat in hogs fed wheat than in the barley-fed group.

Pelleted wheat also produced significantly higher rates of gain than either whole wheat or ground wheat.

Wheat and barley produced in the Pacific coast states are generally similar in composition except for fiber content. Barley contains more than twice the fiber of wheat. However, fiber levels of other feedstuffs in the ration were such that the total fiber content in either the barley or wheat rations was not excessive.



Hog at right drinks from trough while others eat from self-feeder. Both barley and wheat rations were fed in self-feeders during studies reported here.

These two tests involved adding protein supplements in amounts to provide adequate levels in the barley rations. (Crude protein content of the wheat used was 9.9%; of the barley 8.7%.)

The first series of tests was conducted in the fall of 1962 simply to compare the feeding value of wheat and barley in balanced rations supplemented to the same protein level using protein from various commercial sources (see Table 1).

The second series, in the spring of 1963, compared pelleted barley with whole kernel, ground, or pelleted wheat in market swine rations. This comparison is reported in Table 2.

Earlier study reported

In the earlier studies no significant differences were found for the two different kinds of grain as far as average daily gain and carcass measurements were concerned. The consistency with which pigs on the wheat ration required less feed per pound of gain suggests a real difference in the value of wheat and barley—with wheat having a somewhat higher feeding value.

Again in 1963 no significant difference showed up between wheat and barley as far as average daily gain, and carcass traits were concerned. As in the first experiment, wheat showed

ogs

or ground wheat.

some improvement over barley in feed efficiency.

Protein added to rations

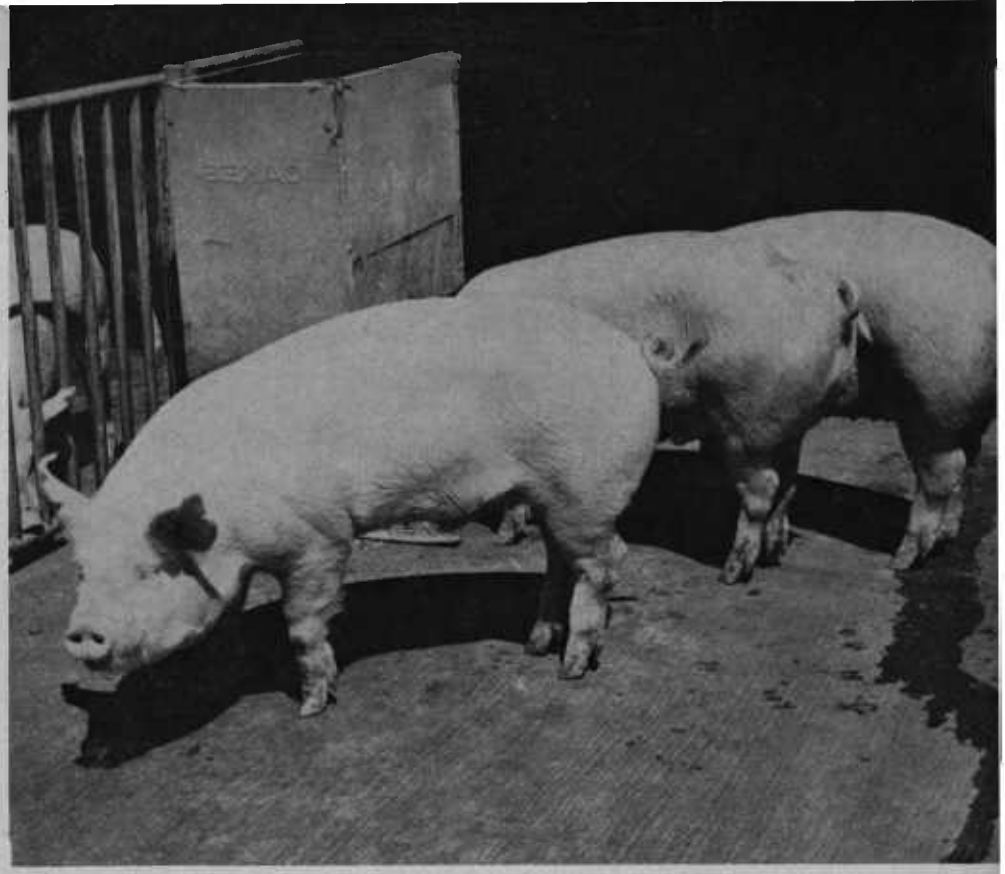
In the 1963 experiments, all rations were supplemented to the same protein levels. The protein supplement formula used was composed of the following ingredients:

Ingredient	Pounds
Herring meal	200
Soybean oil meal	1,000
Alfalfa meal	750
Iodized salt	45
Either, Aurofac 10 or TM-10	5
Total	2,000

This protein supplement was added to the rations in the amount of 500 pounds per ton for pigs between 50 and 100 pounds, 300 pounds per ton for pigs between 100 and 150 pounds, and 150 pounds per ton for pigs between 150 and 200 pounds. Zinc sulphate was added to all rations at a level of 12 ounces per ton, based on previous experiences, as a preventive measure against parakeratosis.

The protein supplement was mixed into the complete ration for both the pelleted and ground preparations. For the whole kernel wheat ration, the protein supplement was pelleted and fed supplementally with the whole wheat. All rations were full-fed.

England said the protein supplement formula used is generally suitable for use with any grains. Amount of supplement to use depends on protein level of the grain being fed.



Hog gains and carcass quality were about the same for the group fed wheat as for those fed barley in two series of experiments at the Umatilla station.

Table 1. Pelleted Wheat Versus Pelleted Barley

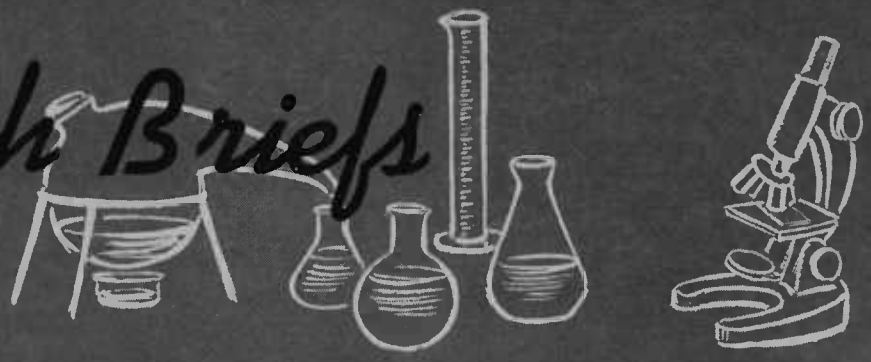
Grain source	Average daily gain	Feed/lb. gain	Carcass length	Backfat thickness	Loin-eye area
	lbs.	*lbs.*	*in.*	*in.*	*sq. in.*
Barley*	1.42	4.34	30.1	1.27	3.83
Wheat	1.40	4.04	29.9	1.23	3.94
Barley	1.42	4.04	29.7	1.32	4.06
Wheat	1.36	4.02	29.8	1.24	4.28
Barley	1.19	5.03	30.2	1.26	3.82
Wheat	1.34	4.08	29.9	1.27	3.86
Barley	1.29	4.42	30.0	1.31	3.81
Wheat	1.46	4.32	30.3	1.31	3.76
Barley	1.16	4.53	30.0	1.19	4.07
Wheat	1.42	4.03	30.5	1.37	4.01
Barley	1.33	4.44	30.2	1.23	4.10
Wheat	1.22	4.33	29.8	1.33	3.79
Average for barley	1.30	4.47	30.1	1.26	3.95
Average for wheat	1.37	4.14	30.1	1.29	3.94

* Each pair represents a different protein source. (No consistent differences existed between the different protein sources.)

Table 2. Comparison of Pelleted Barley With Various Forms of Wheat

Ration	Average daily gain	Feed/lb. gain	Carcass length	Backfat thickness	Loin-eye area
	lbs.	*lbs.*	*in.*	*in.*	*sq. in.*
Pelleted barley	1.52	3.47	30.6	1.37	3.78
Pelleted wheat	1.54	3.31	30.4	1.32	3.80
Ground wheat	1.40	3.56	29.9	1.33	4.00
Whole wheat	1.35	3.63	30.0	1.26	3.73

Research Briefs



New Wheat Resists Stripe Rust

A NEW WHEAT variety which is immune to stripe rust disease and produces a yield of flour approaching that of Omar has been developed by OSU agronomist C. R. Rohde at the Pendleton Experiment Station in cooperation with USDA wheat geneticist R. J. Metzger who is stationed at OSU.

Helps competitive position

Rohde says the new variety should place wheat growers in a more favorable competitive position in both domestic and foreign markets.

The new white club variety has not yet been named, and is not yet ready to be released, but results of early tests look promising.

Besides being immune to stripe rust, the new variety is more resistant to both common and dwarf bunt than previous varieties. Although it possesses a lower grain yield potential than Gaines in the absence of stripe rust, the new variety can provide Pacific Northwest farmers with a stripe rust-resistant variety with better milling quality than Gaines (the predominant variety grown last year).

The growing of resistant varieties appears to be the most practical way to control stripe rust, Rohde said. He noted that this disease has occurred rather extensively in three of the last four years, reducing production by an estimated 20% in some areas. During this period, between 60% and 80% of the wheat produced in the Northwest was from varieties moderately to highly susceptible to stripe rust.

Rohde stressed the need for farmers in the Pacific Northwest to have available wheat varieties that are resistant to the stripe rust disease and that also have the ability to produce high flour yields.

Pastry wheats wanted

He pointed out that the Pacific Northwest is a leading supplier of the pastry type wheats of high milling quality that are in demand for both domestic and foreign markets. Therefore, it is important that wheats with these qualities be available for commercial use.

C. R. Rohde, OSU agronomist, looks over the new wheat variety that he believes should place Oregon wheat growers in a more favorable competitive position.

Economists Study Future Of Oregon Hog Production

IS IT, or is it not, economically feasible to increase hog production in Oregon?

To see how the state stands with competing areas, both now and in the period ahead, two OSU agricultural economists took a long look at the competitive position of Oregon pork producers.

Some favorable factors they found include the fact that Oregon seems to be in an excellent spot for expansion. It would take about twice the present pork production in Oregon just to fill the state's present pork deficit. California is a potential market too.

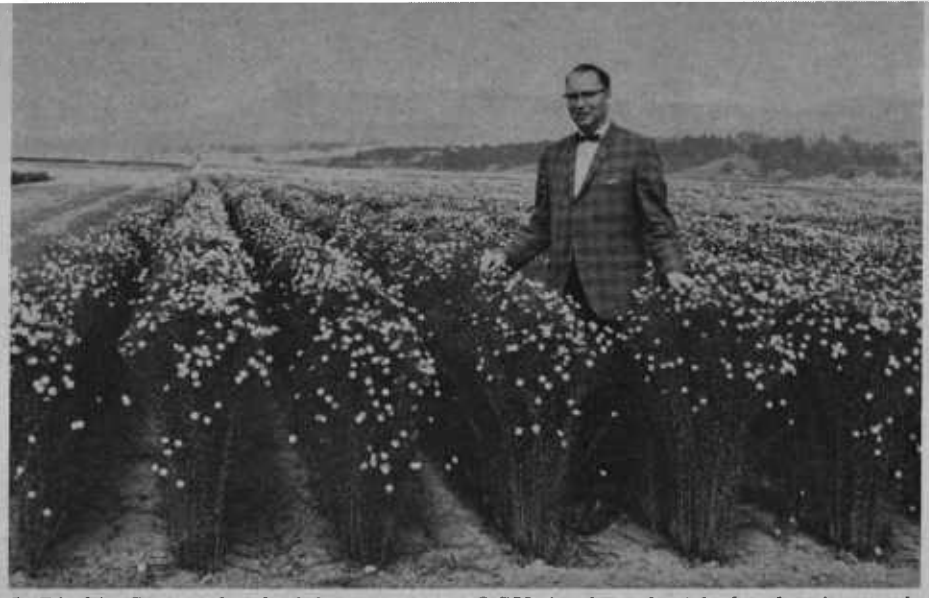
Another favorable factor is that the big midwestern pork-producing states have a freight-rate disadvantage in shipping to the west coast.

The agricultural economists, Virgil Norton and Emery Castle, found that feed, labor, and capital needs for hog production are similar in the two areas.

But they found feed costs higher in Oregon than in the Midwest. So much higher, in fact, that Nebraska farmers could put pork into Portland cheaper than Oregon farmers in 15 of the last 17 years. Right now feed costs are such that total costs are quite similar between the two areas.

Until feed-grain costs come down more in the Northwest relative to the Midwest, Norton and Castle question the wisdom of greatly increasing hog production in Oregon.

More information is available in the OSU agricultural experiment station bulletin *An Analysis of the Competitive Position of Oregon Pork Producers* available from the OSU bulletin clerk.



J. Ritchie Cowan, head of farm crops at OSU, is pleased with the showing made by Linore Winter Flax. Yields have reached 2,000 pounds of seed per acre.

Linore Winter Flax Looks Promising

AN OLD CROP with a new approach is being introduced into the Willamette Valley to provide greater diversity in cropping practices.

Thanks to OSU Agricultural Experiment Station workers, Linore Winter Flax promises to play an important role in western Oregon agriculture.

Researchers working in plant breeding and weed control have cooperated to make this possible, reports J. Ritchie Cowan, head of farm crops at OSU.

Linseed meal, an important by-product of flax, could be produced in the Willamette Valley if the acreage of this crop expands enough to justify a processing plant, Cowan mentioned. He pointed out that Oregon now is a vegetable-protein deficient area.

Flax fits in nicely with the important grass seed industry in western Oregon. As new and special grass seed varieties become more important it is necessary to be able to shift from one variety to another of the same species. Because most chemicals which are selective with flax control grasses quite readily, it is possible to use chemicals to control grass regrowth and at the same time grow a new crop—winter flax.

Yields are high

Flax planted in the spring in western Oregon yields approximately 500 to 800 pounds of seed per acre. Flax planted in the fall has yielded as much as 2,000 pounds of seed per acre, and with good management it appears possible to increase this yield.

In tracing the recent history of flax development in Oregon, Cowan points out that flax has not been considered particularly winter hardy. As a result of breeding work initiated in the late 1940's on fiber flax in an effort to find some material which might have winter hardiness, several lines were isolated after a severe winter in 1948-49. The fiber program was discontinued, but this material was grown each year thereafter and always survived winter in western Oregon.

Weed research helped

One major problem prevented this winter hardy material from becoming an economic possibility: control of winter weeds. In 1957 the OSU weed research program, while screening various new compounds, found some that were selective with flax. This provided an opportunity to take a good look at this crop.

One of the most promising selections of the winter-tolerant material was released in 1962 under the name Linore. Further cultural research during the rather severe winters of 1961-62 and 1962-63 provided information on management practices which will aid in better winter survival.

It is necessary to plant this variety before October 1 to get the plant well established to provide the best winter survival. It is possible that one irrigation for initial establishment will be of real economic significance.

Natural Food Flavors Get Thorough Study at OSU

BECAUSE food flavors are so important to both the food industry and the consumer, OSU scientists are working on ways to assure uniformly good flavor in many popular foods.

Food scientist E. A. Day reports that the origin, composition, and breakdown of natural food flavors is currently under intensive study at OSU.

From new knowledge of the chemical composition of flavor and the reactions involved in its development and destruction, it should be possible to have better control over and improve the flavor of foods, Day said.

Food scientists have discovered the basic chemical compounds responsible for the characteristic flavors of several foods and are working on many others. The flavor chemistry of Cheddar and Bleu cheeses, butter, butter culture, milk, and loganberries are currently under study.

Cheddar cheese, for example, has as many as 130 components of which 40 have been identified. The flavor chemistry of butter culture is simpler, consisting of about 50 volatile components. Only a few of these are necessary to reproduce butter culture flavor.

The scientists are working on the problem of food off-flavor caused by oxidation. Results to date with lipid (fat) oxidation indicate which compounds are formed and suggest the mechanisms through which these compounds develop. Application of this new knowledge is being made to improve the stability of food lipids by retarding the oxidation process.

Dual purpose told

By defining basic food flavors and discovering their origin, researchers hope not only to control natural flavors in many foods but also to replace flavors often lost in processing.

Someday—as the world's population becomes increasingly larger—fish meal, algae, and carbohydrate from hydrolized wood pulp may be needed as new sources of food. To make these future foods palatable to humans and animals, synthetic food flavors will have to be added since much of the acceptance or rejection of a food is based on flavor, Day explained.

Market splitting is like atom splitting: it releases great power, for good or bad.

(*Continued from page 3*)

The legislation also permits programming of wheat into a fourth outlet—government stocks. This is not a real market, but wheat will move into government storage when and if the other three outlets do not return more than price-supporting loans.

Market-splitting is not new, of course, but it is not well understood by many. Long-standing arrangements providing market-splitting often are overlooked. This technique has been used in marketing milk, filberts, and several fruits and vegetables. Market-splitting also is practiced widely in nonagricultural sectors of our economy, especially by large manufacturers of a great variety of consumer goods. Yet, there may be doubts about government assistance with wheat market-splitting.

Economic implications

Market-splitting, like atom-splitting, releases tremendous power. One releases economic power; the other releases physical power but with many economic implications. The power of both can be used for either "good" or "bad."

Market-splitting for wheat requires government participation even more than atom-splitting. This is especially so, if the producer's income object —the "good"—is to be realized and the same time the public is to be p tected from excessive costs—the "ba

In the 1964 Cotton-Wheat A Congress has said, at least implici that the Secretary of Agricult should be permitted to make wh available for livestock feeding at tional price levels comparable to ot grains if wheat producers are wil to produce at this price and if Secretary concludes that this is in public interest.

So here perhaps we have the c of the situation. The public attitud this matter and federal response: it will be very important to the nomic future of Pacific Northwest grain-producers and grain-feeders. What happens also will be important to others wanting bread and meat as well as local employment and investment opportunities.

Freight rate reductions

It may take more than federal programs alone to provide the stable supply of competitively priced grain needed to maintain and develop livestock and poultry enterprises as the "third" market for northwest grains.

It may take some reductions in east-west freight rates on corn, milo, and soybean meal. This is a problem currently receiving organized attention. Any reduction in freight rates would tend to keep "killer gaps" from opening so widely that northwest grain feeders would be driven out of business during periods when available wheat or barley might be priced, or programmed, temporarily away from grain-feeders into domestic or export outlets by unusual or unanticipated food needs or supply shortages.

Now for a closing word of caution. Do not expect miracles even if "killer gap" is kept closed or practically so. Profits will not be easy to get and keep for either grain-feeders or grain-growers. Only opportunities for profits and for expanded economic activity

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