Marketing the Surplus Wheat of the Pacific Northwest Through Livestock

By E. L. Potter
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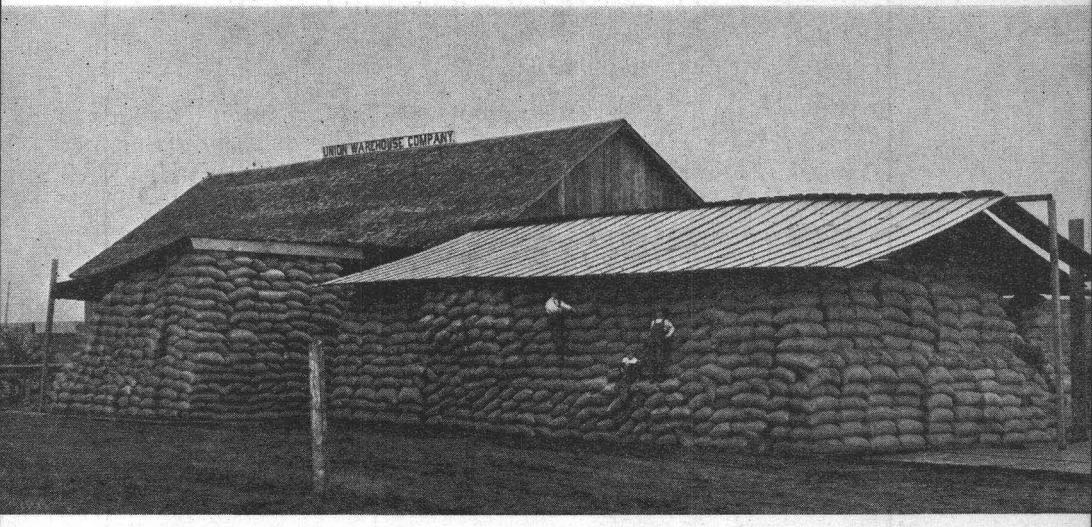

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FOREWORD

Agricultural adjustment is not new to the farmers of Oregon. The College has for years worked with them on the broad problems involved in adjusting production to market demand. Proper landuse must be the basis of further adjustment in agriculture. It is one of the first fundamentals in a marketing program.

The Mid-Columbia wheat counties present a peculiar problem. The principal use of the cultivated land within their boundaries, if it is to continue in cultivated crops, is and will continue to be the production of wheat. The economic and social organization of the communities in that region cannot be continued upon the present basis if the agriculture of the region be changed from this adapted, cultivated crop to grazing practices.

In this publication there are presented suggestions for initiating an attack upon the urgent question of wheat disposal. A new agricultural enterprise is suggested as suitable for this region in view of the present outlook. In it are combined certain phases of marketing, a more advanced livestock industry, and proper landuse. It is not expected that the possibilities suggested in this publication will be widely adopted immediately, but they are presented as a basis for considerations involving changed management practices to meet present and probable future conditions with the expectation that such change will be gradual and therefore sound. In fact, it is believed that with thoughtful planning and gradual execution another phase of agricultural adjustment in reasonable time may be developed.

F. L. BALLARD
Vice-Director, Federal
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Illustration on Cover—

Thus the surplus piles up.

SUMMARY

1. The Pacific Northwest in normal years produces 40 million bushels of wheat in excess of what can be marketed west of the Rocky Mountains. This surplus must be shipped to the eastern states, exported to foreign countries, or fed to livestock.
2. During the period 1926 to 1935 the western states in the Pacific trade area brought in 2,600,000 hogs a year from the Corn Belt. The surplus wheat in the Pacific Northwest is sufficient to produce 2,500,000 hogs annually, or approximately the number now being shipped in.
3. Cost studies show that, on the average, farmers must receive for each 100 pounds of hog, live weight, the price of 616 pounds of grain in order to provide for the cost of the feed, labor, investment, equipment, and all overhead expenses.
4. Prior to the depression, wheat sold for milling purposes brought an average of 36¢ more per 100 pounds than wheat fed to hogs. Since the depression—that is, from 1930 through 1937—wheat sold for milling purposes has brought 4¢ per 100 pounds less than was obtained for wheat fed to hogs.
5. The price of wheat since 1930 has been practically the same per 100 pounds as the price of barley, thereby putting wheat on a feed-grain basis.
6. Prior to 1930, the Oregon wheat producer received 58¢ more per 100 pounds for wheat than the Nebraska producer received for corn. Since 1930, the Oregon wheat producer has received only 21¢ more per 100 pounds for wheat than the Nebraska grower has received for corn.
7. Repeated trials have shown that wheat fed to livestock is as valuable pound for pound as other feed grains and that it is especially suited to the fattening of hogs. The quality of wheat-fed pork equals that of corn-fed pork in every respect.
8. Inasmuch as there has been a large movement of hogs and dressed pork from the Corn Belt to the Pacific Coast the price of hogs on the Pacific Coast has been higher than in the Corn Belt. From 1924 to 1930, Portland hog prices averaged 92¢ per 100 pounds higher than Chicago prices, but since 1930 only 38¢ higher.

SUMMARY—Continued

9. A careful analysis of the situation indicates that if the entire wheat surplus of the Pacific Northwest were fed to hogs, Portland hog prices would be about 35¢ less than Chicago prices, while San Francisco and Los Angeles prices would be about the same as Chicago prices. This would mean that the wheat fed to hogs would return from 10¢ to 13¢ a bushel less than it has from 1930 to 1938. It is believed that with the wheat price on a basis comparable to the price of other feed grains a substantial increase in hog production in the Northwest is in order. This departure from the recognized policy of hog production is believed fully justified by the changed status of wheat prices in relation to the prices of other feed grains. It is not anticipated, however, that all of the surplus wheat in the Northwest will be fed to hogs. Although the foreign export market for wheat has been greatly reduced, there is still more or less outlet in that direction. There is a possibility of an increased export to states east of the Rocky Mountains. It seems probable, therefore, that the surplus Northwest wheat will be absorbed by a combination of these three outlets; namely, foreign shipments, shipments to states east of the Rocky Mountains, and livestock feeding.
10. The Pacific Northwest produces annually 400,000 feeder lambs, which are shipped to the Middle West to be fattened. If these were fattened on wheat and alfalfa in the Northwest, one million bushels of wheat would be so used.
11. Pacific Coast markets will eventually require an additional 100,000 grain-fed cattle. This is due in part to increasing population and in part to increasing demand for better beef. If this many cattle were fattened on wheat, one and one-half million bushels would be so used.
12. With the increasing intensification of Oregon agriculture, manure will become more and more valuable. The extensive growing of such crops as potatoes and sugar beets cannot be long continued without rotation with legumes and application of manure from livestock feeding operations.

Marketing the Surplus Wheat of the Pacific Northwest Through Livestock

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INTRODUCTION

SINCE the foreign market for the surplus wheat grown in the Northwest has been greatly reduced, attention is directed to livestock feeding as one other possible outlet. This bulletin attempts to analyze the probable effects of such a program on the return to the wheat grower and the livestock feeder. The basic data bearing on the subject are presented in the appendix.

The authors are mindful of the shift in production of certain grain crops to hay and pasture under the AAA programs. It is possible that this may result in an increased number of livestock, particularly sheep and cattle. This increase would be expected to occur more particularly in the Midwest and eastern states. On the other hand, the shifting of grain crops to pasture or hay in the eastern area would possibly lower the tonnage of feed grains produced, thereby lessening the competition for northwest producers who choose to fatten livestock on wheat.

In discussing the utilization of the northwest wheat, it should be considered that the Northwest already produces a surplus of feeder steers and lambs that are now fed elsewhere but that might be fed in the Northwest. Furthermore, if there is to be a material increase in the feeding of hogs a corresponding increase in breeding operations would be necessary to supply the necessary feeder hogs.

Volume of the surplus wheat

The Pacific Northwest in normal years produces 40,000,000 bushels of wheat more than can be marketed west of the Rocky Mountains. This surplus must be shipped to the eastern states, exported to foreign countries, or fed to livestock.

According to data supplied by the Commercial Review for the crop years of 1925 to 1934 inclusive, the Pacific Northwest shipped an average of 33,346,000 bushels of wheat per year to foreign countries and 7,364,000 bushels to points in the United States other than California, making an average total surplus above the needs of the western states of 40,710,000 bushels for each of the years in question. (Appendix, Table 1.)

The volume of surplus will naturally vary with the season; dry years will reduce yields and wet years will increase them. The figure given is considered a reasonable yearly average.

The surplus also may be estimated by comparing the total production with estimated home consumption. This method indicates a net surplus of 46,221,000 bushels for the states west of the Rocky Mountains. (Appendix, Tables 2 and 3.) This calculation confirms in a general way the figure of the Commercial Review, but since it involves a considerable amount of estimate, we are probably safer in accepting the figure of the Commercial Review; that is, in round numbers, an exportable surplus of 40,000,000 bushels.

Deficit of hogs in the western states

During the period 1926 to 1935 the western states in the Pacific trade area brought in 2,600,000 hogs a year from the Corn Belt. The surplus wheat in the Pacific Northwest is sufficient to produce 2,500,000 hogs annually, which approximates the number now being shipped in.

During the period 1926 to 1935 inclusive, according to available records, an average of 901,536 live hogs was shipped from midwestern points to Pacific Coast markets. (Appendix, Table 4.) We have no record, however, of hogs shipped from midwestern points to points other than public stockyards. Public-stockyard records are necessarily public information, while the records of independent shippers are confidential. The volume of such shipments is probably small. We also have no record of the volume of dressed pork and pork products shipped in from the Midwest. It is commonly assumed that the volume shipped here dressed exceeds the volume shipped in alive; that is, the equivalent of more than a million head a year. This estimate of one million, however, is little better than a guess.

As with wheat, it is possible to compare estimated production with estimated consumption for the various states involved. This comparison indicates that for the years 1926 to 1935, inclusive, the eleven western states consumed 5,911,900 hogs but produced only 2,890,688 hogs, leaving a net deficit of 3,021,212. (Appendix, Tables 5 and 6.) Included in this deficit, however, are the states of Arizona and New Mexico, which are not in the Pacific trade territory. Elimination of these two states reduces the deficit to 2,707,080. It seems reasonable to assume, however, that the western

states consume a little more beef and mutton and a little less pork than the national average. If this be the case, the deficit is lower than the estimate given. In view of all the data available it would appear that the annual deficit for the states west of the Rocky Mountains, exclusive of Arizona and New Mexico, is between 2,250,000 and 2,750,000, or approximately 2,500,000 head.

Number of hogs that can be produced on the surplus wheat

It is estimated by the Department of Animal Husbandry that it requires an average of 925 pounds of wheat or its equivalent to produce a 200-pound hog. On this basis, 40,000,000 bushels of wheat would produce 2,600,000 head of hogs, a figure that approximates the deficit of hogs, estimated at 2,500,000. In other words, the number of hogs that could be produced on the surplus wheat of the northwestern states is the same as the number of hogs, alive and dressed, now being shipped into this area.

RETURNS FROM FEEDING WHEAT TO HOGS

Cost studies show that, on the average, farmers must receive for each 100 pounds of hog, live weight, the price of 616 pounds of grain in order to provide for the cost of the feed, labor, investment, equipment, and all overhead expenses.

Records of the farm price of Oregon grains have been kept from 1910 to date. Records of the Portland hog prices are available since the establishment of the Union Stockyards in Portland in 1909. The cost of growing hogs in terms of grain has been well worked out. (Circular 56, Oregon Agricultural Experiment Station.) In these cost studies, it has been found that, in the long run, the farmers must receive for 100 pounds of hog, live weight, the price of 616 pounds of grain, in order to stay in the business. It actually requires only an average of 460 pounds of grain to produce 100 pounds of pork, but the farmers must receive approximately 33 per cent more than the price of the grain in order to cover investment, labor, overhead, equipment, risk, and other expenses.

Prior to the depression, wheat sold for milling purposes brought an average of 36¢ MORE *per 100 pounds than wheat fed to hogs. Since the depression, 1930-1937, wheat sold for milling purposes brought 4¢ per 100 pounds* LESS *than was obtained for wheat fed to hogs.*

It is possible, therefore, to compare the price of wheat and other grains each year with an accurate estimate of the price that the growers would have received had these grains been fed to hogs and the hogs sold at current prices. These relationships are shown year by year in detail in Table 7 of the appendix. In studying these relationships, it is found that the situation prior to 1930 was distinctly different from the situation from 1930 to date. During the 20-year period prior to 1930, the farm price of wheat averaged 36¢ more per 100 pounds than the price the growers would have received had they fed this wheat to hogs. On the other hand, the farm price of wheat in Oregon from 1930 to 1937, inclusive, has been 4¢ less per 100 pounds than the growers would have received had they fed this wheat to hogs. Prior to the depression, therefore, the milling price of wheat was entirely too high to permit feeding wheat to hogs, but during the depression the farm price of wheat in Oregon has been approximately what the wheat was worth for feeding purposes, even though only a small part of it was actually fed.

Comparison of price of wheat and barley

The price of wheat since 1930 has been practically the same per 100 pounds as the price of barley, thereby putting wheat on a feed-grain basis.

The farm price of barley in Oregon has at all times been on a feeding basis, since most of the barley is actually fed. A study of Table 7 will show that both before and since 1930 the farm price of barley has been approximately the same as its value for hog feeding. When we compare wheat prices with barley prices on a 100-pound basis, we see that for the period 1910 to 1929 wheat averaged 28¢ more than barley; but from 1930 to date wheat prices have been only 1¢ higher than barley prices, or practically the same. This again shows that the price of wheat during the depression has been on a feeding basis.

Eastern Oregon range cattle furnish desirable feeders.

Comparison of price of Oregon wheat and Nebraska corn

Prior to 1930, the Oregon wheat producer received 58¢ more per 100 pounds for his wheat than the Nebraska producer received for his corn. Since 1930, the Oregon wheat producer has received only 21¢ more per 100 pounds than the Nebraska grower received for his corn.

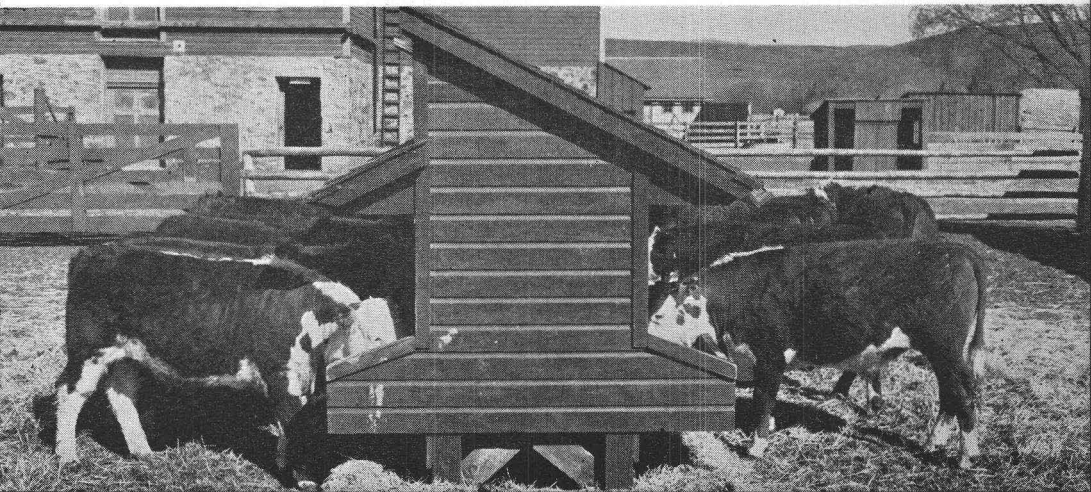
It has not been expected that feed grains in Oregon would be as cheap as those in Nebraska, but records show that the spread is growing narrower. From 1910 to 1929, the price of wheat in Oregon was 58¢ per 100 pounds higher than the price of 100 pounds of corn in Nebraska. From 1930 to date, it was only 21¢ higher. Also, the price of barley in Oregon from 1910 to 1929 inclusive, was 31¢ more than the price of corn in Nebraska. From 1930 to date it was only 21¢ higher.

Probable effect of increased production on hog prices

The comparisons of grain and hog prices made so far have been on the basis of the price of hogs that has actually existed in Portland. In the past, only a small part of the wheat has been fed to hogs. If an attempt is made, however, to convert the surplus of 40 million bushels of wheat into hogs and thereby fully supply all markets west of the Rocky Mountains, this increased production would be expected to affect materially the price of hogs. The problem is to make an estimate as to the extent of that effect.

The markets of the Pacific Coast are small as compared with Corn Belt markets. The prices on the Pacific Coast markets necessarily must be in line with those of Corn Belt markets, considering transportation and direction of movement. Since the movement of hogs and of dressed pork has been from the Corn Belt west, the prices of hogs on the Pacific Coast have been higher than at the Corn Belt markets. Portland gets hogs much of the time from central Nebraska and the Dakotas so that Portland prices should be enough higher than Omaha and Chicago to cover the cost of

A good type of feeder used at Union Branch Experiment Station for feeding wheat to steers.



shipping to these different markets. In recent years, however, the price of hogs on the Pacific Coast has been rather lower than would be expected on this basis. From 1924 to 1930, Portland prices averaged 92¢ higher than Chicago prices. Actual prices by grades, however, are available only beginning with 1924. From 1924 to 1929, inclusive, prices on good to choice

Since there has been a large movement of hogs and dressed pork from the Corn Belt to the Pacific Coast the price of hogs on the Pacific Coast has been higher than in the Corn Belt. From 1924 to 1930, Portland hog prices averaged 92¢ per 100 pounds higher than Chicago, but since 1930 only 38¢ higher.

hogs (B.A.E. grading) averaged 92¢ per 100 pounds higher in Portland than in Chicago. But from 1930 to 1937, inclusive, the difference was only 38¢. San Francisco and Los Angeles prices usually run about 40¢ higher than Portland, but, like Portland, these two California markets have not run as much above Chicago since 1930 as they did previously.

The big deficiency in hogs is in California, while the surplus wheat is in Oregon, Idaho, and Washington. If the Northwest produces any large number of hogs, therefore, shipment of these must be to California, and since the movement will be southward all the way to Los Angeles that city will become the basing point. If Los Angeles can get all the hogs it needs without going east of the Rocky Mountains, there would be no occasion for paying more than Chicago prices. On the other hand, if the Los Angeles market were to be as much as 25¢ to 50¢ below Chicago, it is probable that large numbers of hogs from the Rocky Mountain States and eastern Idaho would move to Chicago. Since the Pacific Coast markets would need these hogs, it is doubtful whether the prices would drop to such a low level, or at most only occasionally. If the prices dropped much be-

A careful analysis of the situation indicates that if the entire wheat surplus of the Pacific Northwest were fed to hogs, Portland hog prices would be about 35¢ less than Chicago prices, while San Francisco and Los Angeles prices would be about the same as Chicago prices. This would mean that northwest wheat fed to hogs would return from 10¢ to 13¢ a bushel less than it has from 1930 to 1938.

low those in Chicago, they would probably have to be made up by a premium later in order to draw some hogs from the Corn Belt.

In view of all these facts and in case the 40 million bushels of wheat were converted into pork, it would seem that the best estimate as to the probable prices of hogs in Los Angeles would range from Chicago prices to possibly 25¢ below Chicago. Since in this case there probably would be a steady movement of hogs from Portland south to California markets, Portland prices would be the same as California prices, less transportation. The freight on hogs from Pendleton, Oregon, to Los Angeles is 48¢ more than to Portland. Shrinkage and incidentals would add another 15¢, making the total cost of shipping to Los Angeles around 63¢ more than to Portland.

Los Angeles prices, as just indicated, would probably be Chicago prices or less, while Portland has averaged about 40¢ above Chicago for the past eight years. It would appear, therefore, that if the Northwest should attempt to market all its wheat through the medium of hog feeding, the prices of hogs in Oregon as compared with prices at Chicago would be from $1.00 to $1.25 per 100 pounds less than during the past eight years. This would mean from 10¢ to 13¢ less a bushel for wheat, which would push the price of wheat in Oregon down very close to the price of corn in Nebraska. The same conclusion is reached by considering the comparative advantages of shipping Nebraska and Oregon hogs to Los Angeles. The cost of shipping hogs from the Wheat Belt of eastern Oregon to Los Angeles would be only very slightly less than the cost of shipping from Nebraska to Los Angeles. This would automatically force the prices of feed in the two states to about the same figure.

SHIFTS TO OTHER GRAINS IN SOME AREAS OF OREGON

Repeated trials have shown that wheat is as valuable, pound for pound, as other feed grains and that it is especially suited to the fattening of hogs since it produces pork of a quality equal to that from the use of corn.

It will prove desirable in some instances to raise some other grains than wheat, such, for example, as corn or barley. Since these various grains are about equal in feeding value pound for pound, the feeder is interested in purchasing the cheapest grain. In view of the fact, however, that much of the wheat is raised on land that seems better adapted to wheat than to any other grain, and since the varieties of wheat produced at present are, for the most part, of the soft, heavy-yielding varieties, it seems unlikely that there would be any major shift from wheat to other grains, even though a large proportion of the wheat should be used for feeding purposes.

CHANGE IN HOG-PRODUCTION POLICY

In the foregoing discussion, the possibility of feeding the entire wheat surplus to hogs has been considered. It is not anticipated that this will happen, but if our export trade in wheat and our shipments to points east of the Rocky Mountains are not sufficient to absorb the surplus, the farmers in the Pacific Northwest will be forced to feed much more than now, not only to hogs, but also to sheep and cattle.

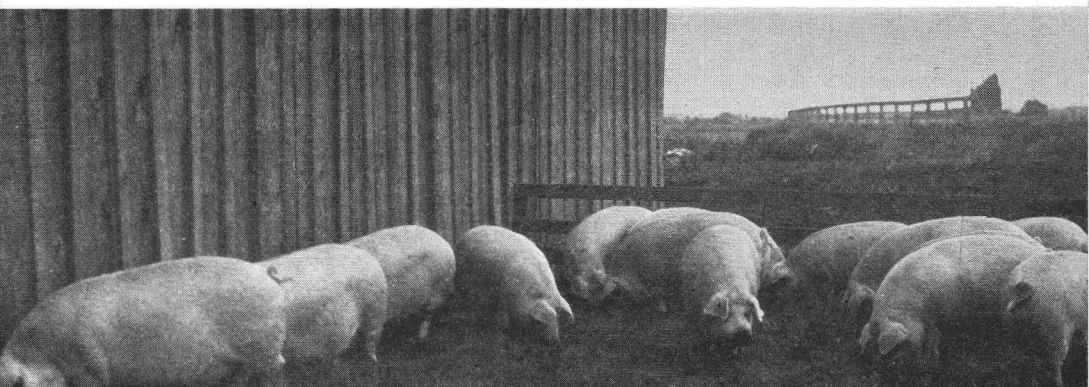
In the past, Oregon's hog-production policy has been to limit production to a basis of farm-waste utilization. This was sound, because wheat values were higher for milling purposes than the hog producer could afford to pay. Further, the supply of feed grains, such as corn and barley, was less than was needed to supply adequately the amount required for the feeding of dairy cows, poultry, and hogs. The situation has now changed. Wheat is more nearly comparable in price with barley or corn. It can be used, therefore, in the feeding ration in competition with such grains. This new situation justifies a change in the hog-production policy and consideration by the farmer of the possibility of increasing swine production gradually, consistent with his adaptability and with conditions on his farm, such as the supply of pasture or supplemental feeds necessary to insure economical production.

INCREASED HOG PRODUCTION WILL BRING NEW PROBLEMS

An appreciable increase in the numbers of hogs in Oregon will be certain to bring with it new problems of disease and nutrition. It is likely that the diseases will be those usually found in any country where there is a concentrated hog population. The operators must expect this to happen, however, and those uninformed must be helped to recognize the diseases and to adopt proper management methods to avoid or correct them. If nutritional deficiencies are encountered, the necessary research must be undertaken to find how they can be corrected.

The probability of these, and perhaps other difficulties being encountered in the program of expansion in the hog industry, offers no reason for not undertaking that expansion if it seems profitable to do so.

The Coast States produce 50 per cent of their pork requirements.



WHEAT FOR LAMBS AND STEERS

Lamb feeding

The Pacific Northwest produces annually 400,000 feeder lambs, which are shipped to the Middle West to be fattened. If these were fattened on wheat and alfalfa in the Northwest, 1,000,000 bushels of wheat would be so used.

A certain amount of the surplus wheat can be fed to lambs. A substantial proportion of the lambs produced in the Northwest rate as feeders and are stopped for feeding in Nebraska, Iowa, or other Corn Belt states, en route to eastern markets. These lambs could be fed in Oregon, Washington, or Idaho just as well as in the Corn Belt. Additional freight on the gains made would have to be paid, however, and the long shipment would pull down the quality somewhat. On the other hand, northwest hay is rather better and cheaper than that of the Corn Belt feeder. In general, it would appear that the northwest feeder should get out of grain used in this way about the same price per pound as the Nebraska or Kansas feeder obtains for his corn. This, for the past ten years, would have been 18¢ a bushel less than the price northwest growers have actually received. (Appendix, Table 9.) At that, however, it might be a better outlet than feeding hogs, except that the volume is quite limited—400,000 lambs a year would seem the absolute upper limit to the number available for feeding in the Northwest. This number of lambs would consume approximately 1,000,000 bushels of wheat, or one-fortieth of the total surplus.

Steer feeding

The price of all kinds of cattle on the Pacific Coast in the past ten years has improved in relation to Chicago prices (Trends of Livestock Prices). As the population of the West grows, the Pacific Coast markets

A lamb-feeding scene in Eastern Oregon.

must reach farther and farther eastward for cattle, and must, therefore, pay higher and higher prices as compared with Chicago prices. The prices of medium steers are sometimes as high as Chicago prices, while for cows they are often considerably higher than Chicago prices. The spread between good cattle and poor cattle seems to be widening a little in recent

The Pacific Coast will eventually require an additional 100,000 grain-fed cattle. This is due in part to increasing population and in part to increasing demand for better beef. If this number of cattle were fattened on wheat, one and one-half million bushels would be so used.

years, but the change so far has been so small that economists cannot demonstrate it statistically. The spread, however, is still much less on the Pacific Coast markets than on the eastern markets (Trends of Livestock Prices) and to the feeder the spread is much more important than the general level.

It is probable that the Pacific Coast market will take more and more grain-fed cattle, possibly 100,000 additional head in the course of a few years. This number would provide an outlet for 1,250,000 bushels of wheat, or one-thirtieth of the total surplus. The returns per bushel from wheat fed to steers cannot be estimated with any accuracy, but they could hardly be expected to exceed the usual feed-grain prices. In any case, it will be noted that steers and lambs together offer an outlet for only a small fraction of the total wheat surplus. If the price of wheat should be reduced to a feed-grain basis, the feeding of lambs and steers would be encouraged but the effect on the wheat situation would be small.

HAY SURPLUS

Certain areas in Oregon produce a hay surplus. These sections include irrigated lands, such as in Central Oregon, and Klamath, Umatilla, Wallowa, and Malheur Counties, with some surplus hay in Baker and Union.

The source of feeder lambs is range bands of sheep in Eastern Oregon.

With the further development of the Owyhee irrigation project and the Jefferson County project, more hay will naturally be produced, which probably will be fed locally in these areas. The Willamette Valley also produces in normal seasons a surplus of hay that is suitable for cattle feeding.

OTHER FEEDS

Beet by-products

The Owyhee project will provide a large tonnage of beet pulp and tops for local use. In addition to the pulp and tops, a supply of molasses will be available, which will find a market in other sections of the state as well as at home.

Pea-vine silage

Umatilla County produces at present 30,000 acres of peas for canning. A by-product of this enterprise is the pea-vine refuse, which is stacked in the field or is put into pit silos. This material offers a source of cheap and efficient feed for fattening lambs and steers when fed in connection with alfalfa and grain.

AMOUNT OF FEED REQUIRED TO FATTEN LIVESTOCK

Hogs

The Oregon Agricultural Experiment Station at Corvallis has shown that from birth to market time it requires 925 pounds of grain, or its equivalent, to fatten a 200-pound hog. Other feeds can be substituted to advantage in reducing the amount of grain required. These feeds are tankage or fish meal, skim milk, or pasture, such as alfalfa, rape, clover, or grain.

Lambs

Results obtained at the Eastern Oregon Branch Livestock Experiment Station at Union, under the direction of Superintendent D. E. Richards, show that a "lanky" feeder lamb can be fed 100 pounds of grain and 200 pounds of alfalfa hay over a period of 100 days and be made into a top

Feeder steers of good quality.

market lamb. Other feeds can be partly substituted for the hay in the above ration. Often carrots, clover screenings, pea-vine silage, and similar feeds are available and can be used to advantage in increasing the gains.

Steers

The Branch Experiment Station at Union has repeatedly shown that it requires about 800 pounds of grain and 2,400 pounds of alfalfa hay to fatten a yearling feeder steer in 100 days. For baby beef, a weanling calf can be fed a total of 1,000 pounds of grain and about one ton of alfalfa and will fatten in 150 days.

GENERAL CONSIDERATIONS

The foregoing results are possible with good-quality feeds and proper feeding management. The figures given will serve as a guide to the prospective feeder as to the cost of finishing the animal for market. The cost of the feeder and the value of the finished product are other factors that cannot be so easily stated, because of conditions beyond the control of the man in the feeding business. The statement can be made, however, that the man who feeds consistently year after year makes a fair profit in the long run, even aside from the value of the manure.

Shipping surplus northwest wheat to eastern markets for milling purposes offers returns approximately the same as would be received by feeding the wheat to hogs, lambs, and steers.

Manure a part of the return

With the increasing intensification of Oregon agriculture, manure will become more and more valuable. The extensive growing of such crops as potatoes and sugar beets cannot be long continued without rotation with legumes and application of manure from livestock-feeding operations.

This bulletin would not be complete without a statement relative to the value of manure produced in the feed lot. Its value, of course, would depend on the intensity of the crop to be grown on the farm. The value of manure is measured by the crop increase it will make, and the money value of such increase. Naturally, if a $20-an-acre crop is grown, the value would be much less than if a crop that would have an acre-return value of $100 or $200 were grown. On the whole, however, many feeders are satisfied if they can break even on feed costs as they consider the manure a necessity in maintaining soil fertility.

Amount of manure produced

According to Morrison's book on feeds and feeding, animals on feed will produce, including bedding, the following amounts of manure per head per year:

Class of Stock	*Amount in Tons*
Cattle	7.8
Sheep	0.75
Swine	1.7

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Appendix

Table 1. Shipments of Wheat and Flour from Pacific Northwest
Data from "Commercial Review" July 1935

(In thousands of bushels)

Year	Total	To California	Total export, domestic and foreign	Total foreign	Domestic other than California
1925-26	41,667	7,980	33,687	30,264	3,423
1926-27	55,215	5,810	49,405	45,640	3,765
1927-28	74,559	7,337	67,222	63,389	3,833
1928-29	56,194	5,599	50,595	45,565	5,030
1929-30	51,834	7,063	44,771	40,870	3,901
1930-31	48,292	10,546	37,746	33,625	4,121
1931-32	54,195	14,633	39,562	35,252	4,310
1932-33	30,601	14,884	15,717	8,619	7,098
1933-34	48,977	10,377	38,600	23,269	15,331
1934-35	39,790	11,882	29,790	6,963	22,827
Average	50,132	9,611	40,710	33,346	7,364

Prepared by D. D. Hill
November 1936

Table 2. Summary of Production, Use and Export of Wheat in the Eleven Western States
1925-1934

(In thousands of bushels)

State	Average production	Acreage	Seed	(Feed) Poultry	Human consumption	Total used in state	Total for feed and export
Montana	43,952	3,168	3,125	1,250	2,153	6,528	37,424
Idaho	25,666	1,085	1,125	1,150	1,792	4,067	21,599
Wyoming	3,135	239	225	475	901	1,601	1,534
Colorado	14,887	1,184	2,000	2,000	4,143	8,143	6,744
New Mexico	2,444	203	175	550	1,678	2,403	41
Arizona	925	37	40	350	1,711	2,101	–1,176
Utah	5,357	224	250	1,000	2,028	3,278	2,079
Nevada	398	16	16	137	366	519	– 121
Washington	43,081	2,189	2,250	3,750	6,259	12,259	30,822
Oregon	20,109	996	1,000	1,600	3,818	6,418	13,691
California	10,475	620	700	8,000	22,448	31,148	–20,673
Total							91,964
Total exclusive of Rocky Mountain states (Montana, Wyoming, New Mexico, and Colorado)							46,221

Data for feed and poultry feed, O.S.C. estimates.
Human consumption estimated 4 bushels per capita (1926-1935 average population).
Prepared by D. D. Hill.

Table 3. WHEAT PRODUCTION IN BUSHELS AND ACREAGE
(000 omitted)

Year	Montana		Idaho		Wyoming		Colorado		New Mexico		Arizona		Utah		Nevada		Washington		Oregon		California	
	Production	Acres	Production	Acres	Production	Acres	Production	Acres	Production	Acres	Production	Acres	Production	Acres	Production	Acres	Production	Acres	Production	Acres	Production	Acres
1926	44,744	3,570	24,633	1,045	3,714	198	18,793	1,481	5,653	245	950	38	5,505	237	408	17	40,901	2,107	18,706	1,026	12,015	653
1927	80,208	3,850	33,734	1,171	4,186	226	20,112	1,419	570	55	1,450	58	5,678	242	460	18	58,436	2,261	26,782	1,065	13,642	812
1928	77,998	4,725	28,792	1,160	3,897	243	18,564	1,339	2,054	186	1,269	47	6,861	257	482	18	48,644	2,271	23,318	1,027	16,380	780
1929	41,290	4,419	28,835	1,294	4,394	341	17,934	1,539	4,435	320	475	19	5,304	265	352	14	42,721	2,295	21,500	1,075	11,014	633
1930	35,313	4,217	30,691	1,245	4,014	343	23,536	1,632	1,904	211	616	22	6,892	276	328	13	38,278	2,305	23,621	1,027	12,136	592
1931	14,684	2,182	19,641	1,059	2,146	243	16,552	1,394	5,112	284	672	24	4,679	257	319	14	40,843	2,357	17,662	945	6,475	456
1932	55,610	4,070	28,360	1,100	3,102	277	7,135	680	2,027	276	798	38	5,332	260	461	18	40,348	2,203	20,060	991	11,126	595
1933	26,480	3,551	17,235	959	2,138	234	5,912	548	1,485	245	1,288	46	4,079	254	378	17	43,044	2,136	17,608	903	12,118	655
1934	28,174	2,572	18,696	906	1,041	130	5,776	650	711	125	1,000	50	3,147	220	336	15	37,346	1,883	12,944	832	8,384	524
1935	35,021	3,250	26,042	926	2,720	155	14,625	1,156	492	80	736	32	6,094	233	456	15	40,251	2,072	18,893	964	11,457	603
1936	13,656	2,239	22,764	1,112	1,511	154	10,691	853	1,023	146	1,104	48	4,639	261	361	17	46,632	2,164	20,340	1,000	16,731	858
1937	21,918	2,624	28,360	1,153	3,060	266	15,857	1,188	3,139	269	1,035	45	5,430	278	409	16	48,725	2,270	20,424	993	16,758	798
Average	39,591	3,439	25,649	1,094	2,994	234	14,624	1,157	2,384	204	949	39	5,303	253	396	16	43,847	2,194	20,155	987	12,353	663

Source of data: B.A.E. Mimeographs, December 17, 1937, and August 10, 1938.

Table 4. LIVE HOGS SHIPPED FROM MIDWEST STATES TO PACIFIC COAST STATES

Year	Oregon*	Washington†	California‡
1926	33,741	104,764	486,000
1927	44,511	76,511	----------
1928	37,085	154,846	539,000
1929	20,671	129,756	618,000
1930	27,690	137,145	738,000
1931	38,433	146,549	827,000
1932	24,425	160,601	1,065,000
1933	35,796	185,021	1,106,000
1934	30,823	189,795	829,000
1935	4,997	23,447	459,880
Ten-year average	29,817	130,844	740,875§
Total of ten-year average			901,536

* From Portland Union Stock Yards Report. Includes Wyoming, Utah, Colorado, Oklahoma, Canada, miscellaneous.

† From brief by George Pierson, President of Portland Union Stock Yards, and the 1935 figures from Bureau of Cooperative Estimates.

‡ From George Scott, State Statistician in California Department of Agriculture.

§ Nine-year average.

Prepared by A. W. Oliver and E. L. Potter, November 1936.

Table 5. HOGS IN ELEVEN WESTERN STATES
Balance Sheet, 1926 to 1935, Inclusive

State	Produced*	Consumed†	Surplus+ Deficit—
Oregon	272,924	477,700	204,776—
Washington	245,024	782,300	537,276—
California	755,284	2,805,900	2,050,616—
Arizona	25,916	213,800	187,884—
New Mexico	83,452	209,700	126,248—
Nevada	27,156	45,700	18,544—
Utah	86,676	253,400	166,724—
Idaho	361,956	224,000	137,956+
Montana	304,172	269,100	35,072+
Colorado	594,332	517,700	76,632+
Wyoming	133,796	112,600	21,196+
Total	2,890,688	5,911,900	3,021,212—

* Numbers on hand January 1, 1926-1935, inclusive, multiplied by 1.24, which is the U. S. ratio of slaughter to numbers January 1, 1926-1934. Slaughter for 1935 is not available.

† Pork consumed is at the rate of 75 lbs. per capita, which is average for U. S. Seventy-five pounds of pork equals one-half of a 200-pound hog.

Prepared by A. W. Oliver and E. L. Potter, December 1936.

Table 6. Estimated Population by States

Year	Washington	Oregon	California	Arizona	New Mexico	Nevada	Utah	Idaho	Montana*	Colorado	Wyoming
1926	1,488,000	891,000	4,854,000	398,000	400,000	86,000	486,000	440,000	542,000	1,001,000	214,000
1927	1,508,000	908,000	5,073,000	408,000	406,000	87,000	492,000	441,000	541,000	1,010,000	217,000
1928	1,528,000	925,000	5,293,000	418,000	413,000	89,000	498,000	443,000	540,000	1,019,000	220,000
1929	1,548,000	941,000	5,513,000	428,000	419,000	90,000	504,000	444,000	538,000	1,029,000	223,000
1930	1,568,000	958,000	5,732,000	438,000	425,000	91,000	509,000	445,000	538,000	1,038,000	226,000
1931	1,579,000	967,000	5,848,000	443,000	428,000	92,000	512,000	446,000	538,000	1,043,000	228,000
1932	1,588,000	974,000	5,947,000	448,000	431,000	93,000	515,000	447,000	538,000	1,047,000	229,000
1933	1,599,000	983,000	6,062,000	453,000	434,000	93,000	518,000	447,000	538,000	1,052,000	231,000
1934	1,608,000	990,000	6,158,000	457,000	437,000	94,000	520,000	448,000	538,000	1,056,000	232,000
1935	1,633,000	1,008,000	5,639,000	386,000	402,000	99,000	515,000	479,000	531,000	1,062,000	232,000
Average	1,564,700	954,500	5,611,900	427,700	419,500	91,400	506,900	448,000	538,200	1,035,700	225,200

* No estimates made between 1930 and 1935.
Figures for 1926 to 1934, inclusive, taken from "Statistical Abstract of the United States," 1935.
Figures for 1935 taken from *New York Times.*
Prepared by D. D. Hill, November 1936.

Table 7. COMPARISON OF GRAIN AND HOG PRICES IN OREGON

Year	Average farm price of 200-lb. hogs*	Returns per 100 lbs. grain fed†	Price of grain on the farm—USDA estimates for Oregon‡		Profit from feeding 100 lbs. of farm-grown barley to hogs	Profit from feeding 100 lbs. of farm-grown wheat to hogs
			Barley per 100 lbs.	Wheat per 100 lbs.		
1910	$ 8.92	$ 1.45	$ 1.40	$ 1.53	$ 0.05	$ —.08
1911	6.74	1.09	1.30	1.31	—.21	—.22
1912	6.94	1.13	1.39	1.31	—.26	—.18
1913	7.63	1.24	1.16	1.28	.08	—.04
1914	7.25	1.18	1.18	1.42	.....	—.24
1915	6.19	1.00	1.33	1.68	—.33	—.68
1916	6.03	.98	1.41	1.72	—.23	—.74
1917	14.06	2.28	2.25	3.05	.03	—.77
1918	16.41	2.66	2.96	3.28	—.30	—.62
1919	17.35	2.82	2.96	3.41	—.14	—.59
1920	14.98	2.43	3.10	3.57	—.67	—1.14
1921	9.81	1.59	1.62	1.79	—.03	—.20
1922	10.14	1.65	1.46	1.67	.19	—.02
1923	7.90	1.28	1.61	1.68	—.33	—.40
1924	7.72	1.42	1.70	1.80	—.28	—.38
1925	12.39	2.01	1.93	2.50	.08	—.49
1926	14.04	2.28	1.31	2.14	.97	.14
1927	10.61	1.72	1.66	1.98	.06	—.26
1928	9.50	1.57	1.74	1.87	—.17	—.20
1929	10.54	1.73	1.70	1.77	.03	—.04
1930	10.04	1.65	1.32	1.34	.33	.31
1931	6.48	1.06	.90	.77	.16	.29
1932	3.71	.61	.87	.74	—.26	—.13
1933	3.93	.60	.82	.86	—.22	—.26
1934	4.53	.74	1.05	1.12	—.31	—.38
1935	8.91	1.45	1.15	1.21	.30	.24
1936	9.74	1.58	1.22	1.32	.36	.26
1937	9.61	1.56	1.54	1.54	.02	.02
1910-29	10.26	1.68	1.76	2.04	—.07	—.36
1930-37	7.12	1.16	1.10	1.11	.05	.04
1910-37	9.36	1.53	1.57	1.77	—.04	—.24

* Average weekly Portland top, less $1.00.

† After paying interest, labor, and miscellaneous expenses. Calculated by dividing the price of 100-lb. hogs, live weight, by 6.16 (See OSC Bulletin No. 56).

‡ Unweighted, arithmetical average of monthly prices for the calendar year.

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Table 8. CARLOAD FREIGHT RATES* ON LIVE HOGS
(November, 1938)

Between and	Portland, Oregon		San Francisco		Chicago		Los Angeles	
	Double deck	Single deck	Double deck	Single deck	Double deck	Single deck	Double deck	Single deck
Chicago	$1.18	$1.36	$1.24	$1.42	$	$	$1.18	$1.36
Omaha	1.09	1.26	1.07	1.23	.42	.48	1.03	1.19
Baker, Oregon	.40	.47	.69	.80	1.09	1.26	.87	1.00
La Grande, Oregon	.37	.43	.67	.77	1.12	1.29	.85	.97
Albany, Oregon	.22	.25	.56	.64	1.18	1.36	.73	.84
Portland, Oregon	.....	.....	.59	.68	1.18	1.36	.76	.88
Corvallis, Oregon	.23	.27	.57	.65	1.18	1.36	.73	.84
Pendleton, Oregon	.33	.37	.64	.73	1.08	1.24	.81	.93
Klamath Falls, Oregon	.39	.45	.44	.51	1.23	1.42	.61	.71
Medford, Oregon	.39	.45	.44	.51	1.29	1.48	.62	.72
Mitchell, South Dakota	.95	1.10	1.12	1.29	.48	.56	1.15	1.32
Grand Island, Nebraska	1.00	1.15	.99	1.14	.49	.57	1.00	1.15
Minneapolis	1.01	1.17	1.18	1.35	.39	.45	1.18	1.36
Denver	.96	1.10	.90	1.03	.65	.75	.83	.96

Minimum loading for single deck cars—16,500 pounds.
Minimum loading for double deck cars—24,000 pounds.
* Rates in foregoing table include 5-per-cent increase authorized by Ex Parte No. 123, 226 ICC 41.

Table 9. AVERAGE PRICE, IN CENTS PER 100 POUNDS, RECEIVED BY PRODUCERS IN OREGON FOR WHEAT* AND BY PRODUCERS IN NEBRASKA FOR CORN.†
1908 to 1938, Inclusive

Year	Wheat in Oregon	Corn in Nebraska
1908	134	.....
1909	167	98
1910	153	86
1911	131	84
1912	131	108
1913	128	99
1914	142	112
1915	168	109
1916	172	118
1917	305	241
1918	328	247
1919	341	258
1920	357	206
1921	178	209
1922	167	79
1923	168	117
1924	180	136
1925	250	158
1926	214	115
1927	198	131
1928	187	139
1929	177	138
1930	134	116
1931	77	69
1932	73	44
1933	86	48
1934	112	101
1935	122	143
1936	132	142
1937	154	58
1938	62	48 (10 months)
1910-29	204	145
1930-37	111	90
1910-37	177	129

* Data for wheat (Oregon), 1908-1925 incl. from Statistical Bulletin No. 17.
* Data for wheat (Oregon), 1926-1936 incl. from Crops and Markets.
† Data for corn (Nebr.) 1909-1928 incl. from Statistical Bulletin No. 28.
† Data for corn (Nebr.) 1929-1936 incl. from Crops and Markets.

Better hay prices in Oregon equivalent to about 12¢ per 100 pounds of grain fed.

NOTE: Data are for calendar years, an arithmetical monthly average. 1908 wheat not included in average.

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