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# W H E A T   S T U D I E S

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### PACIFIC NORTHWEST WHEAT PROBLEMS AND THE EXPORT SUBSIDY

**T**HE Pacific Northwest is a distinct wheat-surplus region, which has long been important in the world market. The wheat is grown mostly in a limited area east of the Cascades, in Washington, Oregon, and northern Idaho, under conditions that vary greatly in different districts. Six types are produced, with white wheats predominating. Many varieties, both winter and spring, are sown, largely on fallowed land. Yields run high, but some three-fourths of the crop is unsuited to produce good bread flours, and the mills bring in hard Montana wheats for strengthening.

Ordinarily two-thirds of the crop or more must be shipped out of the region, in spite of heavy feed use of wheat within it. Part of the surplus moves to California by water, as wheat and flour. In exceptional years, a good deal goes east by rail. Normally, exports afford by far the largest outlet. Only in the past two years have shipments east by water risen to large proportions. Wheat prices in the region move in broad harmony with major movements in the country as a whole, but there is no constant "normal" relationship between prices there and in eastern markets or Liverpool.

Wheat interests of the Pacific Northwest have been hard hit during the latest depression, as export outlets have shrunk and prices have fallen drastically. Three times in the past four years, federal aid in moving the regional surplus has been accorded. The most striking of these is the export subsidy in effect since mid-October 1933. Each has given temporary relief, but has afforded no large or lasting solution of the surplus problem. We present in this issue a discussion of this regional wheat situation as it has developed and exists with its varied problems, and an analysis of the emergency export operations to June 30, 1934.

STANFORD UNIVERSITY, CALIFORNIA

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**WHEAT STUDIES**  
**OF THE**  
**FOOD RESEARCH INSTITUTE**

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# PACIFIC NORTHWEST WHEAT PROBLEMS AND THE EXPORT SUBSIDY

The Pacific Northwest constitutes a fairly distinct wheat-surplus region of the United States. Broadly speaking, it comprises the states of Washington and Oregon, and adjacent sections of northern Idaho, and part of western Montana. By economic barriers resting on geographical factors, it is largely cut off from the great wheat-surplus areas east of the Rocky Mountains, though variable amounts of hard spring wheat from central Montana are drawn into the region, chiefly for milling there; and in economic as well as physical terms, it lies far from the wheat-deficit areas of the East and South. The region is quite separate from California, which in recent

decades has shifted from a surplus to a deficit basis. It is also distinct from the smaller surplus area known as the intermountain region (comprising chiefly southern Idaho and Utah) from which the surplus moves partly east, and partly west and southwest into California markets.

Wheat growing is a major industry of the Pacific Northwest. Of the grain crops produced there, wheat is by far the most important. In some parts of the region, indeed, wheat growing is the dominant farm enterprise; in others it is of moderate importance; in others little or no wheat is raised. Most of the wheat produced in the chief wheat-growing areas is shipped to terminal markets. Wheat shipments constitute a substantial fraction of the railway traffic. The milling industry of the region, dependent almost wholly on wheat, is a relatively important one. For grain dealers and exporters, the wheat crop is of primary business concern. Wheat and flour shipments by water constitute an important part of the outbound traffic of ports on the Columbia River and Puget Sound. The strength of the banking position

and the buying power of the region depend in considerable measure on the financial returns from the wheat crop.

The most natural outlets for its surplus are in California and into export—to the Orient across the Pacific and to Europe via the Panama Canal. In the decade ending with 1928-29 the Pacific Northwest produced, on the average, only about 8.5 per cent of the United States wheat crop. Its exports, however, averaged about 21 per cent of the net exports of the entire country; of the gross exports of the United States, 18 per cent of the wheat and 22 per cent of the flour (exclusive of that milled for export from Canadian wheat) were exported direct from

this region, while small additional quantities moved into export through California. Its relative importance in both crop and exports has increased materially during the past five years. On the international wheat market the region is of no mean importance. The Pacific Northwest produces, on the average, a little more wheat than the three French dependencies in northern Africa, but the net outward shipments average three or four times as large. Its wheat production is hardly as large as that of Hungary; yet the area contributes to the world market, as a rule, more wheat and flour than the four Danube basin countries combined. As in Hungary, flour is an important export as well as wheat grain; and as an exporter of flour the region outstrips Argentina as well as the Danube basin. The region has long been a prominent shipper to Oriental markets, and in Ireland and Scotland its special types of wheat and flour have been highly valued. In recent years Australia has become the most formidable export competitor of the Pacific Northwest, since it ships similar though preferred types of wheat and flour both to Europe and to the Orient.

CONTENTS	
	PAGE
<i>The Region and Its Wheats</i> . . .	354
<i>Historical Development</i> . . . . .	361
<i>Agricultural Aspects</i> . . . . .	369
<i>Marketing Aspects</i> . . . . .	377
<i>Emergence of the Export</i>	
<i>Arrangement</i> . . . . .	391
<i>Operations under the Export</i>	
<i>Agreement</i> . . . . .	398
<i>Concluding Note</i> . . . . .	412
<i>Appendix Tables</i> . . . . .	414

In years of good crops in the Pacific Northwest and liberal export demand for wheat, the region has enjoyed distinct economic advantages. Under such conditions in 1897-98, when the world crop was short, the region reaped a golden harvest. With a bumper crop in 1927 and export demand fairly good, the region prospered. On the other hand, when export outlets are severely limited and export prices are very low, the wheat interests of the Pacific Northwest are in difficulties if not in serious trouble. Inevitably, therefore, developments of recent years have hit the region hard. In 1930-31, the weighted average farm price of wheat in Washington, the largest producer of the three states, was 61 cents a bushel—about half of what it had averaged in the six preceding years. During the worst of the latest depression, in 1932-33, farm prices of wheat in the heart of the wheat-growing territory fell as low as 30 cents a bushel, and in some sections lower still; the average for that crop year was only 36 cents. The average for 1933-34 was hardly up to that for 1930-31.

Among the numerous wheat problems of the area, one is central in times like these:

what to do when export prices are unremunerative, not merely for a brief period but for an indefinite stretch of time. With this problem the region has been and is wrestling. Thrice it has been given relief by emergency governmental action: in 1930-31 by stabilization purchases under the Federal Farm Board; in 1931-32 by a loan to China for a large purchase of wheat and flour for famine relief; and in 1933-34 by open subsidy of exports through the North Pacific Emergency Export Association set up with the support of the Agricultural Adjustment Administration. During the present crop year, the surplus of the region is being drawn upon, to an unprecedented extent, to make up for wheat-crop losses in other important producing areas of the country that have suffered from disastrous drought.

A major purpose of this study is to present a timely analysis of the regional experiment with the export subsidy, which is unique in American history. To provide the setting for this, however, requires consideration of numerous features of the wheat situation of the Pacific Northwest, with due reference to its development as a surplus producer.

## I. THE REGION AND ITS WHEATS

### THE AREA

The Pacific Northwest can be variously delineated. In his *Commercial Survey of the Pacific Northwest* (1932),<sup>1</sup> Edwin Bates bounded it to include Washington, Oregon, all of Idaho except a block of 20 counties in the southeastern part, and practically the whole western half of Montana, extending to an irregular north-south line sometimes east and sometimes west of the 110th meridian. Some such area may represent the territory broadly tributary to ports of the Columbia River and Puget Sound, and the market area served by commercial centers of Washington

and Oregon, such as Spokane, Seattle, Tacoma, and Portland.

From the standpoint of wheat, the region is more restricted. The significant boundaries are those at which the flow of wheat divides. These counterparts of watersheds, however, are not rigidly fixed. They change as new railway lines are built and with major alterations in the freight-rate structure.<sup>2</sup> With variations in wheat prices in different markets, they change more or less from season to season, and even within a season. As a rule, Pacific Northwest mills and Pacific Coast terminals draw all the wheat shipped out of Washington, Oregon, northern Idaho, and the part of Montana lying west of the northward extension of the eastern boundary of southern Idaho. Typically almost all the surplus wheat of southern Idaho moves southwest to California or south to Ogden; while part of the wheat of the middle half of Montana flows

<sup>1</sup> U.S. Department of Commerce, Bureau of Foreign and Domestic Commerce, *Domestic Commerce Series No. 51*.

<sup>2</sup> Thus the opening of the Union Pacific line from Twin Falls, Idaho, to Wells, Nevada, a few years ago diverted to California wheat that otherwise would have had to move northwest or southeast.

west to the Coast and a larger part flows east to Minneapolis and Duluth. However, in central Montana particularly, the economic boundaries of the Pacific Northwest wheat territory are not distinct. Even in a single year some marginal areas of Montana are tributary partly to the Pacific Northwest and partly to markets lying to the east or south. In exceptional years like 1925-26 and the present season, considerable quantities of Pacific Northwest wheat move east by rail.

These facts raise difficulties in the study of the region's wheat problems. For the most part, data on crops, acreage, yield per acre, stocks, and seed and feed use are available only by states. Census data on acreage and production are available by counties also, and the wheat program of the AAA has resulted in assembling, for a limited period of recent years, such data by counties. Existing official publications, however, do not group these data into totals for the Pacific Northwest. Nor is it possible, without much labor and difficulty, to get full statistics of wheat and flour shipments by rail into and out of the region, however one may define it. Such shipments vary greatly in importance from year to year. The consequence is that one cannot, for any period of years, get a "tight" statistical summary of the region's wheat supplies and their disposition. Even grain dealers and mill buyers, who know the local areas and characteristics better than the census officials, make estimates of supplies and disposition that are subject to a considerable margin of error.

A distinct service to the wheat interests of the Pacific Northwest could be rendered by the federal and state crop-reporting service, if it were to define the boundaries of the region so as to include all the area from which the surplus is characteristically shipped to mills and terminals within it, and give data separately for acreage, crops, and stocks, and feed and seed use, for those portions of Idaho and Montana that were included. The most important segregation, that of northern Idaho, could be very simply made.

Lacking such data for the region, one must commonly use summaries of data by states. In such case, the best combination is that of

Washington, Oregon, and Idaho. Montana lies mainly in the interior Northwest, for as a rule most of its surplus wheat moves east, and only a small portion of its crop lies in the region of western Montana from which practically all the surplus flows west. Moreover, its wheat is, broadly speaking, hard red spring (or winter) of high protein content. Westward shipments of Montana wheat, which are practically all inspected at Spokane, can be readily ascertained; hence an understatement of the Pacific Northwest crop by exclusion of all Montana is readily corrected. The inclusion of all of Idaho, however, overstates the Pacific Northwest totals, usually by 60 to 70 per cent of the Idaho crop. For more than a decade,<sup>1</sup> little wheat has moved northwest from counties south of Idaho County.

To throw some light on the differences in three subdivisions of Idaho, we present in the Appendix some tables based on census data. For this purpose we have accepted Bates's line between southeastern and southwestern Idaho and shown data separately for 10 northern counties, 14 southwestern counties, and 20 southeastern counties. For 1929 census data the division is most nearly reliable. For earlier census years, it is less and less so as one goes back. In the three census years 1919-29, the northern counties that clearly lie within the Pacific Northwest produced 38.4 per cent of Idaho's crop. We infer that, on the average, from a third to 40 per cent of Idaho's wheat production belongs in the Pacific Northwest.<sup>2</sup> Since feed use is much heavier in southern Idaho, a larger proportion of Idaho's marketed wheat—often as much as half—flows northwest. Because of

<sup>1</sup> For some years prior to 1922, a good deal of wheat was grown in the Boise Valley from Weiser east, and part of this flowed northwest. In more recent years, as production has been lower there, very little wheat has moved from there to the Pacific Northwest, and shipments from Oregon and Washington to mills in that territory have been more frequent and important.

<sup>2</sup> The author recently made inquiries among competent observers in the Pacific Northwest as to the fraction of Idaho's wheat that should be counted in. The answers varied from one-third, 40 per cent, one-half, to two-thirds.

A better check on this can shortly be obtained from analysis of county crop data for 1928-32, which we were not able to get in time for use in this study.

variations in crops and feed use in the different sections, over a period of years and from year to year, we have not ventured to compute estimates of the Pacific Northwest wheat crop or marketed supply except for the census years given in Table I.

In the case of Montana two zones must be distinguished. West of a line running more or less northwesterly from the eastern boundary of southern Idaho, practically all the surplus wheat moves west, because freight rates from this area to the West Coast are so much lower than to Minnesota terminals. In a broad zone lying east of this, extending across central Montana to Havre in the north and Columbus in the south, freight rates are only slightly lower to the Pacific terminals. The wheat of this zone moves partly east and partly west, and from some points shipments are often made east and west simultaneously. Frequently, wheat will move from certain points in one direction in part of the season and later in the other direction. In most years, more of the wheat in this intermediate zone moves east than moves west; but in very exceptional years wheat may be drawn westward even from territory in eastern Montana that normally ships wholly eastward.

The volume of the movement of central Montana wheat that moves east and west depends upon a number of factors. Of special importance are the size and quality of the crop in Montana and the Dakotas, and the height of protein premiums in Minneapolis. Also important is the size of the crop in western Montana, which is rarely sufficient to supply Pacific Northwest demands for strong wheat. The extent of these demands depends in part on the size and quality of the wheat crops of Washington, Oregon, and northern Idaho, and the extent of outlets for Pacific Northwest flour. Changes in the freight-rate structure are also important. When about 1923 export rates (with milling in transit privileges) were put in force at Montana points for shipments westward, the flow of Montana wheat to the Pacific Northwest was slightly encouraged. The subsequent expansion of the milling industry of the region, with special growth of a few large mills in-

cluding subsidiaries of large milling concerns centering in Minneapolis, has tended also to increase Pacific Northwest use of Montana wheats. When other freight rates on grain became effective August 1, 1931, the export rate was abolished,<sup>1</sup> and the new rates to Pacific Northwest terminals were higher than these, though below the previous standard rates. The effects of these changes in the rate structure, however, have been obscured by other exceptional conditions that have since prevailed.

According to competent observers in the trade, the Pacific Northwest nowadays usually "imports" around 6 million bushels a year of Montana wheat; the peak movement, in 1932-33, was nearly 10 million. Most of this wheat is hard red spring of high protein content (often 15 to 16 per cent, seldom under 13½). Practically none of this wheat is exported as grain, since it commands prices too high for export. At times some of it is shipped to California mills. Most of it, however, is used by Pacific Northwest mills for flour to be consumed in the region, shipped to other domestic markets, or in blended flour for export.

The great bulk of the wheat crop of the Pacific Northwest is produced in a fairly compact though irregular tree-shaped area east of the Cascade Mountains.<sup>2</sup> This includes the southeastern quarter of Washington, and extends east into northern Idaho and southwest into northern Oregon. There are several separate minor wheat-growing sections outside this major one. The oldest, the Willamette Valley of Oregon, has shrunk in importance in wheat growing, and is now ordinarily a wheat-deficit area.

#### WHEAT TYPES

The other wheat-surplus areas of the United States produce, for the most part, one or two

<sup>1</sup> Montana mills had vigorously urged this abolition, charging that the export rates were taken advantage of on wheat milled for domestic use as well as for export.

<sup>2</sup> See dot map based on 1929 census data in *Agriculture Yearbook, 1933*, p. 143. For a discussion of the geographic features of the region, see John H. Garland, "The Columbia Plateau Region of Commercial Grain Farming," *Geographical Review*, July 1934, XXIV, 371-85.

types of wheat for shipment out of the region: in the interior Northwest, hard red spring and durum; in the Southwest, chiefly hard red winter; in the Middle West, chiefly hard and soft red winter. In the Pacific Northwest, however, all of these types except durum are grown in substantial quantities. From two-thirds to three-fourths of the crop, however, usually consists of white wheats. These include three distinct types: white "club" varieties known commercially as Western White, and "common white" varieties marketed as Soft White and Hard White. The last of these is often quoted as Big Bend Bluestem, though nowadays it consists mostly of Baart. The Pacific Northwest is the principal area in the country that produces white wheats, and the only one that now produces them for export in appreciable quantities.<sup>1</sup>

According to estimates made by Department of Agriculture experts with the aid of census data and special inquiries, about two-thirds of the wheat acreage in the Pacific Northwest in 1929 was in white wheats, 21.5 per cent in hard red winters, 8 per cent in soft red winters, and 4 per cent in hard red spring. In the five crop-reporting districts that had nearly 84 per cent of the wheat acreage, white wheats and hard red spring were slightly less important, relatively, and hard and soft red winters slightly more important (see Table V). Data for the three Pacific Northwest states showed a similar distribution, except that hard red winter and hard red spring were more important and soft red winter less so; this reflects the greater relative importance of hard red wheats in southern Idaho (Table VI).

Similar investigations for the census years 1919, 1924, and 1929 are summarized in Table VI in the form of percentages of the total wheat acreage of these states. The estimated

acreage by groups came out as follows, in thousand acres:

Group	1919	1924	1929
Soft white .....	920	517	1,448
Club .....	836	729	644
Hard white .....	1,244	678	923
Hard red winter.....	511	874	1,090
Soft red winter.....	416	304	302
Hard red spring.....	491	226	196
Undistributed .....	297	87	61
Total .....	4,715	3,415	4,664

Data at 5-year intervals covering a decade are not safely to be trusted to show trends, but other evidence supports this to show that soft white and hard red winter have been gaining ground, while club wheats, soft red winter, and hard red spring have been declining.

The approximate geographical distribution of these different types (without distinction between soft and hard white) is shown in the acreage dot maps for census years, which are accessible in Department of Agriculture *Yearbooks*<sup>2</sup> and *Farmers Bulletins*.<sup>3</sup> These maps show magnitudes and distribution varying somewhat from one census year to another, since changes in conditions from year to year do not affect the different types equally; but the broad fact of representation of five or six divergent types has been characteristic of the region for several decades. The negligible importance of durum in the region is clearly shown in Table I.

The trade distinguishes two major groups: (1) *milling* wheats, suitable for good bread flours; and (2) *export wheats*, comprising all others. In the first class are put Dark Northern Spring, of which practically all is shipped in from Montana; Dark Hard Winter, of high protein content, which does not average over a third of the hard red winter wheat produced in the region; and Hard White. All of these usually command more or less substantial premiums over the export wheats, with Dark Hard Winter usually well below Dark Northern Spring, and Hard White varying greatly from low premiums to high. The Hard White wheats (particularly Baart, now the leading variety) have special qualities that make them very valuable for certain limited uses, highly favored in limited quantities blended with

<sup>1</sup> Outside this region, white wheats are common only in California, which was a major exporting region in the latter decades of the nineteenth century; in southern Idaho, Utah, and Colorado, and in southern Michigan and western New York. See dot maps for 1919 in *Agriculture Yearbook, 1921*, p. 126.

<sup>2</sup> See *Agriculture Yearbook, 1929*, pp. 124-26.

<sup>3</sup> See especially Nos. 1303 (club), 1304 (durum), 1305 (soft red winter), 1585 (hard red winter), and 1707 (common white). Only the last of these shows the 1929 distribution.



other wheats, and beyond this good general-purpose bread wheats. Comparatively little of these hard wheats is exported, except as they are used in producing some better grades of flour for export.

The export wheats include the great bulk of the Pacific Northwest crop, and constitute the surplus to be moved out as grain or flour. By no means all of them are used for export. Soft White is valued for producing other than bread flours, as for crackers, biscuits, and pastry. When abundant, the better varieties (such as Federation) are more or less used in making general-purpose "family" flours. Some of the Hard Winter, though lower in protein content than Dark Hard Winter, can be used in bread flours with harder wheats to strengthen them. The same is true, though in less degree, of wheats grading Northern Spring. Western Red, which includes soft red winter and red club wheats, is regarded as the poorest for milling purposes, but is a good feed wheat. Western White comprises largely white club varieties, which are soft but very generally less highly regarded by millers than Soft White. These are largely exported, as wheat or flour, together with the surpluses of the other types.

There are no official estimates of the crop by types, though inspected receipts at terminal markets (including all those at Oregon terminals and most of the rest) are carefully classified by type, grade, etc.<sup>1</sup> A close observer long connected with the grain trade of the Pacific Northwest estimates the percentages

<sup>1</sup> In Oregon inspection is compulsory under state law; in Washington it is not.

<sup>2</sup> These run as follows, in million bushels:

Year	W.W.	S.W.	H.Wh.	H.R.W.	S.R.W.	H.R.S.	Mixed
1923 ...	22.7	12.2	14.0	23.0	13.0	3.5	9.6
1924 ...	13.9	4.6	3.6	10.7	8.3	1.4	3.9
1925 ...	16.7	8.7	20.0	3.3	5.3	5.3	8.5
1926 ...	14.8	12.7	16.7	9.2	7.5	2.6	4.3
1927 ...	14.6	21.6	15.4	26.3	8.8	3.8	5.5
1928 ...	13.5	14.9	10.0	28.7	9.2	1.8	3.5
1929 ...	15.4	20.9	7.4	16.6	8.9	.9	3.7
1930 ...	17.5	19.2	7.8	13.7	8.1	.7	4.9
1931 ...	22.2	11.6	7.9	12.3	8.4	.4	1.6
1932 ...	22.4	14.1	9.8	18.6	7.8	.8	1.7

<sup>3</sup> Prior to July 1, 1922, practically all wheat exported from the Pacific Northwest was shipped on the basis of "Portland, Oregon, Chamber of Commerce type samples." For subsequent years exports are classified according to federally inspected grades and classes.

of the different types in the crops since the war roughly as follows:

Type	Percentage
Western White .....	30
Soft White .....	20
Hard White .....	20
	70
Hard Winter (Turkey Red) .....	15
Western Red .....	10
Northern Spring .....	5
	30

He states that only about 25 per cent of the total can be regarded as "milling" wheats. This includes ordinarily about a third of the Turkey Red, which usually requires strengthening with higher-protein Montana wheats.

Another trade estimate shows an average crop of 74.3 million bushels in the Pacific Northwest in the years 1923-32 inclusive, ranging from 98 million bushels in 1923 and 96 million in 1927 down to 46.4 million in 1924, with estimates by type averaging as follows:

Type	Million bushels	Percentage of total
Western White .....	17.4	23.4
Soft White .....	14.1	19.0
Hard White .....	11.3	15.2
Hard Red Winter.....	16.2	21.8
Hard Red Spring.....	2.1	2.8
Soft Red Winter.....	8.5	11.5
Mixed .....	4.7	6.3

These estimates by years<sup>2</sup> indicate the marked changes in composition of the crop from year to year, the marked variability of the crop of hard red winter, and the declining relative importance of hard red spring.

In the export trade, according to data of the Federal Grain Supervision,<sup>3</sup> Western White usually ranks well ahead of all others, on the average with nearly half of the total and sometimes considerably more. Exports of Soft White and Hard Red Winter are, on the average, of about equal importance, and together hardly as large as those of Western White. Soft Red Winter (Western Red in market terminology) ranks a poor fourth, and the other types are of very minor importance. This is illustrated by the following percentages for the decade ending with 1931-32, when wheat-grain exports averaged 26 million bushels a year (see Table XIV):

Western White . . . . .	45.8	Hard Red Winter . . . . .	18.8
Soft White . . . . .	19.6	Soft Red Winter . . . . .	8.8
Hard White . . . . .	2.2	Hard Red Spring . . . . .	2.6
Total White . . . . .	67.6	Mixed . . . . .	2.2

In that decade Europe took 66 per cent of the total exports, the Orient 32.3 per cent, and Central and South America 1.4 per cent. In the European purchases, Western White constituted about 40 per cent, Soft White about 29 per cent, and Hard Red Winter about 21 per cent, the other 10 per cent being divided among the other groups. In Oriental purchases, Western White constituted nearly 60 per cent, Soft Red Winter about 22 per cent, and Hard Red Winter 14 per cent, with Hard Red Spring making up most of the remaining 4 per cent.

The percentages of each type shipped to these areas of destination were as follows:

Type	Europe	Orient	Americas	Other
Western White . . . . .	57.6	41.7	.4	.3
Soft White . . . . .	97.8	.9	.7	.6
Hard White . . . . .	63.4	6.9	29.5	.2
Soft Red Winter . . . . .	19.9	80.0	.1	..
Hard Red Winter . . . . .	74.2	24.4	1.3	.1
Hard Red Spring . . . . .	44.9	47.3	7.8	..
Mixed . . . . .	97.1	2.9	..	..

Europe took almost all of the Soft White and Mixed wheats, nearly three-fourths of the Hard Red Winter, nearly two-thirds of the Hard White, and nearly 58 per cent of the Western White, but less than half of the Hard Red Spring and only 20 per cent of the Soft Red Winter. The Orient took nearly 80 per cent of the Soft Red Winter, nearly half of the Hard Red Spring, nearly 42 per cent of the Western White, and nearly one-fourth of the Hard Red Winter. Outside these two areas the only exports that were of importance, in absolute or relative terms, were those of nearly 30 per cent of the Hard White to Central and South America.

Ordinarily, therefore, the surplus wheats of the region are predominantly soft. In general, soft wheats are sufficiently abundant in Europe that, outside of preferred markets for Pacific white wheats in Ireland and Scotland, Pacific Northwest exports to Europe meet strong competition from Australian and Argentine wheats. The other natural outlet is

in the Orient, where much of the wheat is used otherwise than in bread, and soft wheats and weak flours are acceptable. Both in Europe and in the Orient, however, the Pacific Northwest feels severely the competition of Australian wheat and flour since the notable expansion of Australia's output in the past decade.

#### WHEAT VARIETIES

A large number of different varieties of wheat are grown in the Pacific Northwest. Divergent conditions of soil and climate, not only between the sections east and west of the Cascades but even within each of these sections, warrant the use of several different varieties. Multiplicity of varieties as well as of types therefore bids fair to remain characteristic of the region. It has come to be generally recognized, however, that the number of varieties grown and marketed is unjustifiably large from every standpoint. Undue multiplicity of varieties has created needless complications and expense in the commercial handling of the region's wheats, and has been disadvantageous to farmers as well.

The agricultural experiment stations, particularly that at Washington, have been doing wheat breeding and testing for many years. Early in the century, new varieties were distributed, and others have been added at intervals since.<sup>1</sup> In recent years, the station forces have been more careful to withhold the distribution of seed of a new variety until it has been thoroughly tested from various standpoints, under varied conditions; and they have stressed the desirability of reducing the varieties grown to a few well-chosen ones. As they once contributed to increase the multiplicity in varieties, latterly they have striven to get wheat growers to concentrate on a smaller number of better quality that have a proved suitability under particular conditions.

These efforts, with which the millers and the grain trade have sympathized but which they have not often actively supported, have yielded results that are partly apparent in detailed estimates by varieties such as these

<sup>1</sup> Professor W. J. Spillman began his work in 1893 and continued it for several years.

from which Table VI is drawn. In each major wheat section not more than two varieties of a type are now much grown, and there is some decrease in the extent of local preferences. Several of the newer wheats are regarded with favor by millers, exporters, and farmers, and have displaced others less satisfactory. Notable examples are Federation (soft white, spring or winter), Baart (hard white), Albit (white club), Ridit (hard red winter), and Triplet (soft red winter).<sup>1</sup>

Of the varieties now most prominent, two are now comparatively old, and both in wide use elsewhere: Turkey and Marquis—hard red winter and hard red spring, respectively. Marquis, though a good wheat in the spring-wheat belt of North America, yields little good milling wheat in the Pacific Northwest, though it is apparently the best of its type yet generally available for that region. Ridit, the other important hard red winter, was first distributed in 1923 after having been developed in 1915 at the Washington station. It is highly smut-resistant, yields well, and is a good milling wheat, but is susceptible to winterkilling. It is grown chiefly in eastern Washington and northern Idaho, where it has rapidly gained favor.

Of the soft red winters, Red Russian and Jones Fife are older wheats, both of poor milling quality. Triplet, which has tended to displace these because of higher yields and better quality, was first distributed by the Washington station in 1918; by 1929 it had become the outstanding soft red wheat of the region, though it was yet little grown in Oregon or Idaho.

Of the hard white wheats, Pacific Bluestem is a very old variety, widely distributed, and was once the leading variety in Australia. It was first introduced in the Pacific Northwest in 1882 (in the Walla Walla valley), and long held first place there among the white milling wheats. In recent years it has largely been

replaced by Baart in the Big Bend section, and by Federation in the Palouse. Baart, now the leading hard white wheat in the region and of excellent milling quality, was introduced into the United States from Australia, by the Department of Agriculture, in 1900. From Arizona it spread to the Pacific Northwest as well as to other sections.

Federation was bred by William Farrer in Australia, where it became the leading variety. The Moro branch station introduced it in Oregon in 1920, and from 1,000 acres in 1922 it quickly became the leading soft white wheat of the Pacific Northwest. Like Pacific Bluestem, Baart, and Jenkin, Federation is a spring wheat, but in mild climates it can be grown from fall sowing. South of the Snake River in Washington, it is more largely fall-sown than spring-sown, and it is generally a favorite choice for reseeding after heavy winterkilling. Fortyfold or Goldcoin was for many years the leading soft white wheat of the region; it is still second only to Federation, and leads it in some sections. It is a winter variety; since it shatters easily, it is suited to districts where high winds are uncommon and where grain is harvested with the binder. It is well suited for biscuits, crackers, and pastry flour, but not for bread making.

The club wheats, mostly white varieties,<sup>2</sup> have been common in this country only in the Pacific Northwest and in California. They are mostly soft winter wheats, suited to areas with mild, rainy winters and hot, dry summers, but not where stem rust is common or rains come at or near harvest. Since the heads are tough and compact, the grain does not shatter easily; hence the type is adapted to windy sections and to the use of the combine harvester. In suitable areas they yield high, but from the miller's standpoint they are mostly quite inferior to the soft white wheats proper.

The older varieties of club wheats came from Chile to California and Oregon between 1850 and 1870, but various crosses have since been made. Hybrid 128, for some years the leading variety, was originated at the Washington station in 1899 by W. J. Spillman, who produced a number of hybrids that have been widely grown but gradually displaced. Hybrid

<sup>1</sup> This subsection is based on evidence from the bulletin cited under Table VI, the *Farmers Bulletins* cited on p. 357, a number of state bulletins dealing with varieties and their distribution, and information from Pacific Northwest millers.

<sup>2</sup> Coppei is the principal red-kerneled variety now grown, and commercially it is classed as a soft red winter, though it may be spring-sown to mature late.

128 is very susceptible to stinking smut (see p. 375). Largely for this reason it has been giving way in recent years to Albit, a new product of the Washington station (first distributed in 1926, but not well started till 1928). This is resistant to the more prevalent forms of smut and is much better liked by millers. Jenkin, another variety still much grown, is a spring wheat, though it is often sown in the fall. It is little better than Hybrid 128 for milling purposes, but is an excellent wheat for hay. It is a late maturing variety,

easily injured by frost, drought, and hot winds, and is best adapted to growing under irrigation and in the subhumid, cooler sections.

There is general agreement that, by and large, the wheats grown today are better wheats than those of even a decade ago. But there appears to be no escape from continued change in the composition of the crop, from year to year and over a period of years, in respect to varieties and qualities within the varieties.

## II. HISTORICAL DEVELOPMENT

The history of wheat and flour in the Pacific Northwest goes back only to 1825.<sup>1</sup> In the 'fifties the flour shipments outside the region became significant in volume, first from the Willamette Valley to California. In the 'seventies the area became a factor in the world wheat trade. In the 'eighties, with completion of two transcontinental railway lines, the interior area east of the Cascades began to outstrip the Willamette Valley in wheat production. In the 'nineties, important milling centers developed in ports on the Puget Sound, and exports of flour as well as wheat rose to high levels in the fifteen years before the war. Production fell off during the war, and exports even more because of extremely high ocean freight rates. In the first post-war decade, however, production and exports rose to new high levels, as the Panama Canal shortened and cheapened the voyage to Europe, as wheat exports in bulk became the rule, and as the Oriental market for flour and wheat was developed. The subsequent years of the great depression, from which the region has not yet emerged, have been marked by grave difficulties and emergency actions of various kinds.

<sup>1</sup> Significant crop and shipments data are given in the Appendix. For other historical information we have relied mainly on extended sketches with some detailed tabulations in the Silver Anniversary Number of the *Commercial Review* (Portland, Oregon), July 1, 1915; and upon John B. Watkins, *Wheat Exporting from the Pacific Northwest* (State College of Washington, Agricultural Experiment Station Bulletin No. 201), May 1926, who evidently drew upon this and other sources which he cites.

### EXPANSION OF WHEAT PRODUCTION

The first bushel of wheat was planted in 1825, at what is now Vancouver, Washington (north of Portland), by Dr. John MacLoughlin, who had recently come out as the Hudson's Bay Company factor in charge of the fort and trading post there. For three years practically all the wheat grown was saved for seed. Apparently the first crude mill, run by "pony power," was built near the fort in 1828, and thereafter the post no longer needed to import flour from England. Wheat growing spread down the Willamette Valley and to interior trading posts, at first primarily to furnish food for the trading personnel and other settlers. In the early 'fifties, when gold-mining camps sprang up in California, flour was shipped there from the Oregon country, partly by water from the Columbia River to San Francisco, partly overland by pack train into northern California.

Prior to 1850, wheat production east of the Cascades was largely limited to small areas in a few valleys near forts or other settlements. The mining developments in British Columbia, Montana, and Idaho led to some expansion of wheat production in the interior, first around Fort Colville north of Spokane and then in the Walla Walla-Pendleton area, and around Lewiston and Nampa, Idaho. For two or three decades wheat growing in this area developed slowly in response to this sort of demand. In 1883, however, the Oregon Railway and Navigation Company and the Northern Pacific completed their lines to the

Coast, and during the following decade they extended their net through the Walla Walla and Palouse areas. Then began the rapid expansion of this important interior area, which has ever since been the principal source of the surplus wheat of the Pacific Northwest. At the outset, the Northern Pacific expected to haul the grain eastward to Duluth, and made lower rates eastward; but Portland interests persuaded the other road to grant lower rates to the Pacific Coast (in 1887, 30 cents per 100 pounds from Walla Walla to Portland), and the Northern Pacific changed its policy to meet the competition.<sup>1</sup>

The expansion of wheat production up to 1879 is broadly indicated by the earliest available census data for the three Pacific Northwest states, as follows in thousand bushels:

Census year	Oregon	Washington	Idaho
1849 .....	212	...	...
1859 .....	827	86	...
1869 .....	2,341	217	76
1879 .....	7,480	1,921	541

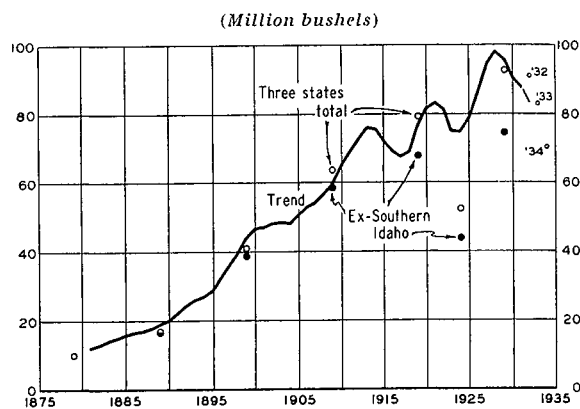
Chart 1 shows the census data for 1879 and later years for the combined total of these three states, together with a line of trend based on the latest revised official estimates of annual production from 1879. These are the best data that are likely soon (if ever) to be available, but up to comparatively recent years they must be regarded as subject to a considerable margin of error. The trend line implies expansion at a fairly constant rate up to the World War, accelerated in the latter 'nineties and retarded in the next few years. It shows the sharp decline during the war, the early post-war recovery, the subsequent reaction and fresh expansion, and the fresh decline during the latest great depression.

Throughout most of the period, only the "panhandle" of Idaho has belonged within the Pacific Northwest. Though annual data excluding southern Idaho are not available, an approximate separation can be made for census years. The lower series of census dots on Chart 1 show the totals for the Pacific

Northwest proper, including Washington, Oregon, and northern Idaho.

A condensed view of the distribution of wheat growing in the Pacific Northwest states is afforded by dot maps showing census data

CHART 1.—TREND OF PRODUCTION OF WHEAT IN PACIFIC NORTHWEST STATES, WITH CENSUS DATA FOR CENSUS YEARS AND ANNUAL ESTIMATES FOR 1932-34\*



\* Based on official estimates given in Table III and census data in Table I. The trend line is a 4-year moving average, further smoothed by averaging each two successive averages.

on wheat acreage and production in each census year.<sup>2</sup> These make clear that in 1869 (as earlier) practically all the wheat was grown in the Willamette Valley of Oregon. By 1879, there had been only a limited expansion outside of this area. By 1889, while the Willamette Valley wheat area had increased in scope and importance, it was already surpassed by the expansion in northeastern Oregon and western Washington, and a small wheat area had appeared in northern Idaho (as well as another in the southeastern corner of Idaho). By 1889, the Willamette Valley area had increased but little further, while other areas had greatly increased in extent and importance. By 1909, the bigger area had expanded much more, while the Willamette Valley had shrunk to smaller proportions than for several decades. Under the stimulus of the war, wheat growing revived in the Willamette Valley, but only temporarily. The greater growth occurred in the major wheat regions of eastern Washington, northern Oregon, and northern Idaho; but marked increases occurred in parts of southwestern Idaho as well as in the

<sup>1</sup> Watkins, *op. cit.*, p. 10. Present rates from Colfax and Pullman are 24 cents per 100 pounds.

<sup>2</sup> See *Agriculture Yearbook, 1933*, pp. 141-43, for production dot maps for 1869, 1889, 1899, 1909, and 1929.

southeastern counties, much of it under irrigation. By 1929, the Willamette Valley output was again lower, and southwestern Idaho hardly held her place, while the other major wheat areas had all increased in absolute and relative importance.

For a broad view, these decennial maps are useful and reasonably reliable. They must not, however, be trusted too far. The censuses are at best incomplete in varying degrees. Also a single year of a decade is not always representative (see Chart 1). Sometimes, as in 1919, special conditions conspire to increase the acreage or production; sometimes, as in 1924 for which census data are also available, natural and economic conditions conspire to reduce acreage and production greatly. Variations in acreage and production are such that year-by-year data alone can give a fair idea of the course and trend. Unfortunately, however, we lack such data by counties for most years, and even the best official estimates by states cannot be regarded as altogether trustworthy. Much more reliable detailed data will shortly be available for the years since 1928, as a result of the wheat program of the Agricultural Adjustment Administration.

Chart 2 (p. 364) shows, on a logarithmic vertical scale, the latest official estimates of wheat production and acreage in each of the three Pacific Northwest states and the total, covering Oregon data from 1873, Washington totals from 1879, and Idaho from 1889. This brings out the order in which wheat developed in these three states, and the comparative rates of expansion in different periods. Oregon developed first. Washington, unimportant until the railroads were built in the 'eighties, passed Oregon in acreage in 1893 and in production in 1895. Idaho developed more slowly. Since 1917, its wheat crop has usually exceeded that of Oregon; but since usually less than 40 per cent of the crop is produced in northern Idaho, Idaho's wheat contribution to the Pacific Northwest proper is considerably less than Oregon's.

During the war, the output of the region was erratic. In 1915 Oregon and Idaho harvested larger acreages than ever before, and Washington not much less than in 1911 and

1912, so that acreage for the Pacific Northwest was clearly at record heights. Yields were above average, though not of record size. Each of the three states harvested a record crop, in the aggregate about 87 million bushels, of which perhaps 10 million bushels were outside the region proper. In 1916 acreage and yield per acre were materially lower in each of the three states, and the crop was only about 64 million bushels. In 1917, in spite of some recovery in acreage (except in Oregon) poor yields brought the aggregate crop down to 56 million bushels, the smallest since 1910. Acreages rose to new record peaks in 1918, but very low yields except in Idaho held down the aggregate crop to 67 million bushels. And in 1919, though acreage (except in Oregon) exceeded that of 1918, yields were sufficiently below average to hold the crop down to 80 million bushels, well below the record of 1915.

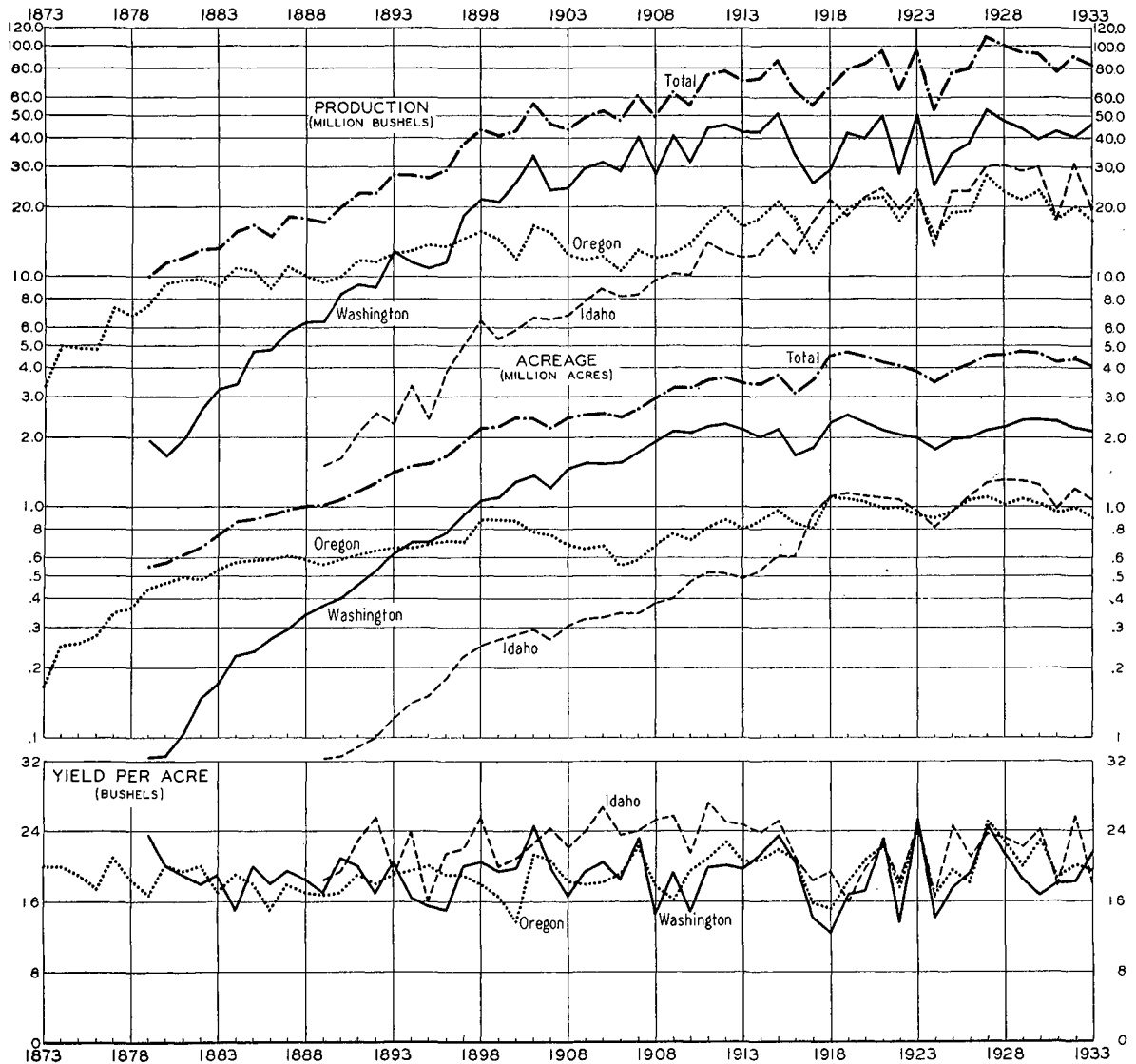
The wheat acreage of each of the three states declined from 1919 to an especially low level in 1924. Yet because of excellent yields, the crops of 1921 and 1923 each surpassed the record of 1915. Following the recovery of wheat prices in 1924, acreage expanded in all three states, but at its maximum in 1929 did not materially exceed that of 1919. Exceptional yields in all three states, however, brought in 1927 an aggregate crop of 110 million bushels, some 14 million bushels above the big crops of 1921 and 1923. During the depression, acreage has declined somewhat, especially in Oregon, and production too has tended downward. As a result of acreage reduction under the official program and disappointing outturns in some important sections, the 1934 crop is expected to be the lowest since the short crop of 1924.

Each of the three states shows average yields well above that for the United States as a whole. Indeed, only the lowest yields in three states are below the usual average for the entire country. For the fifteen years 1919-33, as shown in the tabulation below, the average has been a little above 20 bushels per acre in Oregon and a little under 20 bushels in Washington. The Idaho average is higher chiefly because in some sections of southern Idaho a good deal is raised under irrigation,

with yields well above average (see below, p. 371); the average for the state cannot be taken as representative of northern Idaho. The high average yields of the Pacific North-

Over the whole period of wheat growing in the Pacific Northwest, there appear to have been no marked trends in yield per acre, as the foregoing tabulation and the chart sug-

CHART 2.—PRODUCTION, ACREAGE, AND YIELD PER ACRE IN PACIFIC NORTHWEST STATES, 1873-1933\*



\* Plotted from latest revised official estimates in Table III.

west proper are obtained, nowadays, only with extensive resort to summer fallowing.

State	Period	Average	High	Low
Oregon	1869-1913	18.8	22.8 (1912)	13.7 (1900)
Washington	1879-1913	19.0	24.6 (1901)	14.6 (1908)
Idaho	1879-1913	22.8	27.2 (1911)	16.0 (1895)
Oregon	1919-33	20.5	25.0 (1927)	16.8 (1924)
Washington	1919-33	19.1	25.3 (1923)	13.6 (1922)
Idaho	1919-33	21.2	25.7 (1932)	16.0 (1919)

gest. Variations from year to year in yield per acre, however, are important; this is shown by the lowest section of Chart 2. In 1894-96 Washington had three years of low yield in succession. In 1900 Oregon had her lowest yield, followed in 1901 with the highest up to that date. During the war, following high yields in 1915 and yields above average

in 1916, came two years of low yields and a third below average for both states. In 1921 and 1923 high yields in both states were promptly followed by a year of low yields.

Revised estimates of (a) average production in 1928-32, (b) average seeded acreage (excluding duplication due to reseeding of abandoned winter wheat acreage) in thousand acres, and (c) yield per seeded acre in bushels, are as follows:<sup>1</sup>

State	(a)	(b)	(c)
Washington . . . .	42,882	2,447	17.5
Oregon . . . . .	21,205	1,046	20.3
Idaho . . . . .	27,488	1,236	22.2
Total . . . . .	91,575	4,729	19.4

Assuming that 60 per cent of the average crop of Idaho fell outside the Pacific Northwest proper, the average crop of the region in this recent period was about 75 million bushels.

Since about 1850 the Pacific Northwest has produced a surplus of wheat beyond its ordinary uses for seed, food, and feed. In the five years before the war, when the surplus was probably not as high as in some 5-year periods of the preceding decade, the surplus averaged about 50 million bushels a year.<sup>2</sup> During the war years, in spite of a bumper crop in 1915, the average surplus must have been considerably less. In the post-war decade (1919-28) prior to the recent depression, the surplus varied widely from year to year, but must have averaged close to 50 million bushels exclusive of southern Idaho. In this period the water-borne shipments averaged 52.6 million bushels a year, but inshipments from Montana presumably somewhat exceeded outshipments by rail.

In the past five crop years, the regional surplus has averaged a little less than in the preceding decade or before the war. There were no crops equaling those of 1921, 1923, and 1927, though none as short as those of 1922 and 1924. Probably reduction in per capita food consumption has offset the effect

of increase in population, but normal feed use has increased. For these five years water-borne shipments, as reported, averaged 47 million bushels a year of wheat and flour, and outward shipments by rail probably well under half a million. Inshipments (mostly from Montana) averaged nearly 7 million. The average quantity produced in the region and disposed of outside it may be roughly put at 40 million bushels. Not all of the surplus, however, was shipped out during this period. Under stress of low prices, a good deal was fed to livestock in excess of customary feed use, and part of it remained in the carryover on July 1, 1934. For these five years these two items may be roughly estimated to have averaged at least 5 million bushels. On these assumptions, the true surplus above ordinary requirements may have averaged nearer to 45 than to 50 million bushels a year. By contrast, the regional surplus for 1934-35 bids fair not greatly to exceed 40 million bushels, even if the carryover should be reduced to normal size.

#### OUTWARD SHIPMENTS

We have seen that in the 'fifties and 'sixties Oregon shipped flour to California, overland and by water, but the volume of this movement has not been ascertained. Doubtless the development of that market stimulated the expansion of wheat growing in Oregon during these decades. Until 1868 practically all the wheat shipped from the region went in the form of flour. Though small lots may have been exported earlier from the Pacific Northwest, apparently the first shipload of flour exported from the Pacific Coast was shipped out of the Columbia River to Japan in 1857, by Herman C. Leonard.

For some years, however, most of the flour shipments went to California. Of 1,029,705 barrels shipped from the Columbia River in the six crop years 1868-74, nearly 76 per cent went to San Francisco, 9.5 per cent to British Columbia, 8.9 per cent to Europe, and 4.5 per cent to China, and 1.5 per cent was divided among the Sandwich Islands, Brazil, and Australia.<sup>3</sup> Shipments of flour to California continued even while, from the 1860's until the early 1900's, California was a impor-

<sup>1</sup> *Agricultural Adjustment*, p. 59.

<sup>2</sup> The surplus of the three states was officially estimated at 59.3 million.

<sup>3</sup> Watkins, *op. cit.*, pp. 10-11, citing Lewis and Miller, *Economic Resources of the Pacific Northwest*, p. 363.



tant exporter of wheat and flour—until 1897–98 surpassing the Pacific Northwest in the export trade.<sup>1</sup> Presumably, however, a more or less considerable part of the flour shipped from the Pacific Northwest to California was transshipped for export out of San Francisco.

The Pacific Northwest first became a significant factor in the world grain trade in the 1870's. Prior to 1868 wheat grain exports had not much exceeded 10,000 bushels in any year. In that year the first cargo of wheat grain from the Columbia River was shipped in the "Helen Angier" to the United Kingdom by Joseph Watt. Though flour exports also expanded, wheat exports rose much more rapidly. From 2.2 million bushels in 1873–74, the total exports expanded for twenty years with little interruption, the most notable being exceptionally large exports of 8.7 million bushels in 1881–82 and exceptionally small shipments of 6.7 million bushels in 1889–90.

The broad trend of the export movement is shown in the upper section of Chart 3, against the background of the somewhat erratic movement of individual years. Prior to the war, peak exports were in 1907–08, at slightly over 40 million bushels; but the annual average from 1897–98 to 1913–14 was only 25. Smaller crops and extreme advances in ocean freights caused a marked decline in exports during the war; but, as railway rates remained stationary while wheat prices advanced sharply and ocean freight rates still more strikingly, large quantities were shipped east by rail. This had happened once before, as a result of the short crop of soft red winter wheat in the rest of the country. For these years this movement is unofficially estimated as follows, in thousand bushels:<sup>2</sup>

1904–05 .....	17,958
1915–16 .....	18,432
1916–17 .....	40,431
1917–18 .....	12,868

After the war, with larger crops and easier shipping conditions, exports rose to much

<sup>1</sup> According to official export data compiled by R. L. Baldwin.

<sup>2</sup> Watkins, *op. cit.*, p. 16.

<sup>3</sup> *Ibid.*, p. 9. Apparently a shipment had been made to California as early as 1876.

higher levels. In the decade of the 1920's the annual average was 42 million, and the peak of 63 million in 1927–28 was closely approached in two earlier years.

During the depression, exports have been considerably lower. They were not small in 1930–31 and 1931–32, but in 1932–33 they fell to 8.7 million bushels, for reasons shortly to be discussed. The result was a piling up of a huge surplus carryover, which led to urgent demands for export subsidy in 1933–34.

The middle section of Chart 3 shows the exports of wheat and flour from each of the two groups of ports. Until the late 1880's, practically all of the export shipments, as well as most of those to California, were made from the Columbia River. The first wheat cargo from the Puget Sound to Europe was shipped by Balfour, Guthrie & Co. in 1881.<sup>3</sup> In the following decade, as wheat growing developed in eastern Washington, Puget Sound shipments increased rapidly while those from the Columbia River fell short, until 1894–95, of the earlier peak of 1881–82. During the late 'nineties exports increased through both outlets, but more strikingly from the Puget Sound. From the beginning of the new century until the middle of the war period, exports from the northern ports annually exceeded those from the southern. Since 1917–18, however, the Columbia River has regained its earlier superiority and held it by a substantial margin.

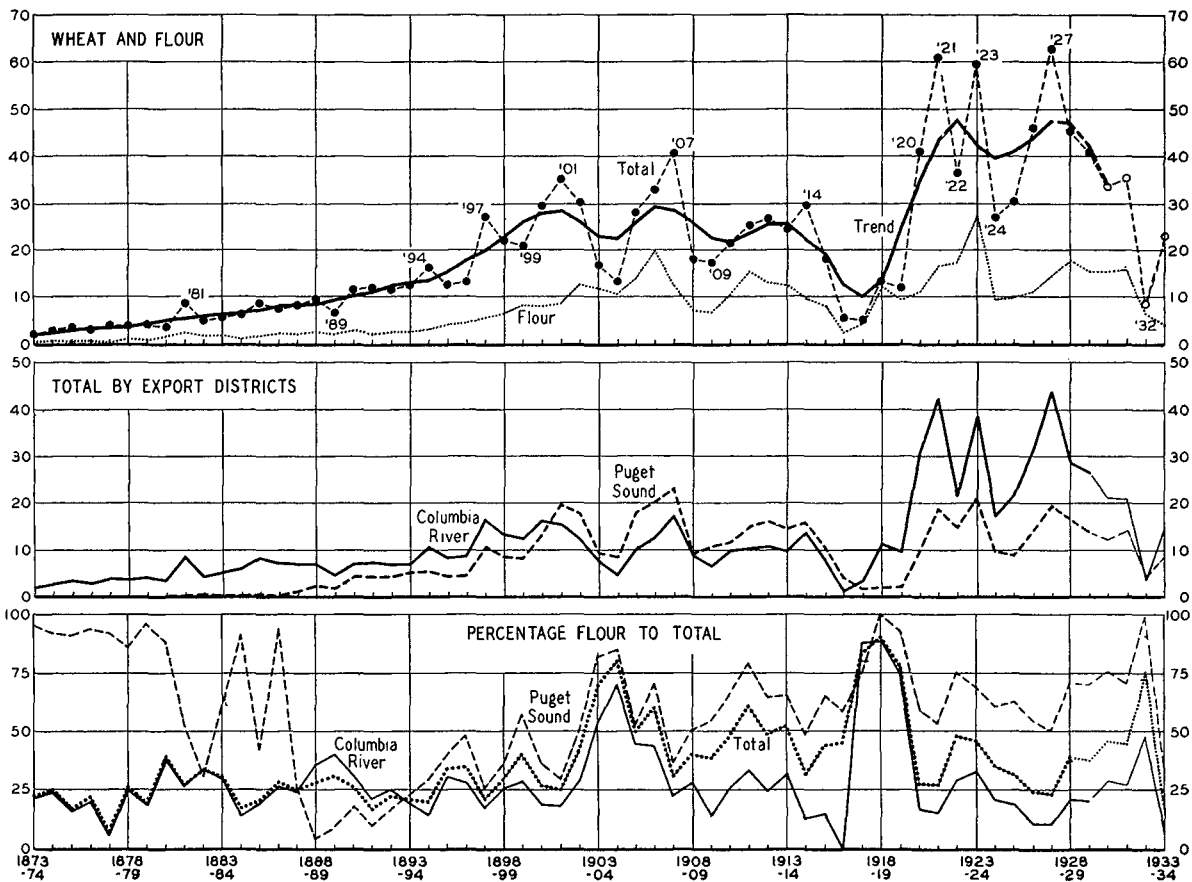
In the first post-war decade, flour exports from the region averaged 37 per cent of the total exports. With the exception of a few years around 1890, and 1917–18, flour has constituted a larger percentage of total exports from the Puget Sound than of those from the Columbia River. Flour exports from the Puget Sound ports rose at a rapid rate in the 'nineties and early 1900's, and have almost invariably since exceeded Columbia River flour exports by a wide margin. From the northern ports, in 1882–83 and again in 1885–86, wheat exports exceeded flour exports, and beginning in 1887–88 wheat exports predominated for more than a decade. Since about the turn of the century, however, Puget Sound flour exports have generally exceeded its exports of wheat grain, though the

flour exports have never equaled the peak exports of wheat—13.9 million bushels in 1901–02 and 14.7 million in 1907–08.

The lowest section of Chart 3 shows the percentage of flour exports to combined exports of wheat and flour, with separate curves

In Chart 4 (p. 368) we present, on a logarithmic scale, statistics of wheat and flour exports from the Pacific Northwest in terms of the 5-year pre-war average, in comparison with similar index numbers of net exports of wheat and flour from the United States. This

CHART 3.—EXPORTS OF WHEAT AND FLOUR FROM THE PACIFIC NORTHWEST, BY CROP YEARS FROM 1873–74\*  
(Million bushels)



\* Based on data in Table X, supplemented by unofficial data since 1928–29 in Table XI. To the extent that flour and/or wheat may be shipped to California and exported from there, these data (particularly the unofficial ones) may understate the true exports. The trend line is a 4-year moving average, further smoothed by averaging each two successive averages.

for the two different groups of ports. From 1870–71 until 1902–03, flour exports from the region as a whole never exceeded 40 per cent of the wheat and flour exports. From then until after the war, flour exports were larger than wheat exports about half of the time, and, when total exports declined heavily, flour exports held up so well that in five different years flour exports were more than double the exports of wheat grain.

brings out the relatively steady rate of rapid growth of exports from the Pacific Northwest in the first half of this period, their lesser decline in the decade before the war and their much greater decline during the war, and the relatively higher level that they have maintained in the past decade.

Until after the turn of the century most of the wheat and flour exports were carried in sailing vessels, and these continued to handle

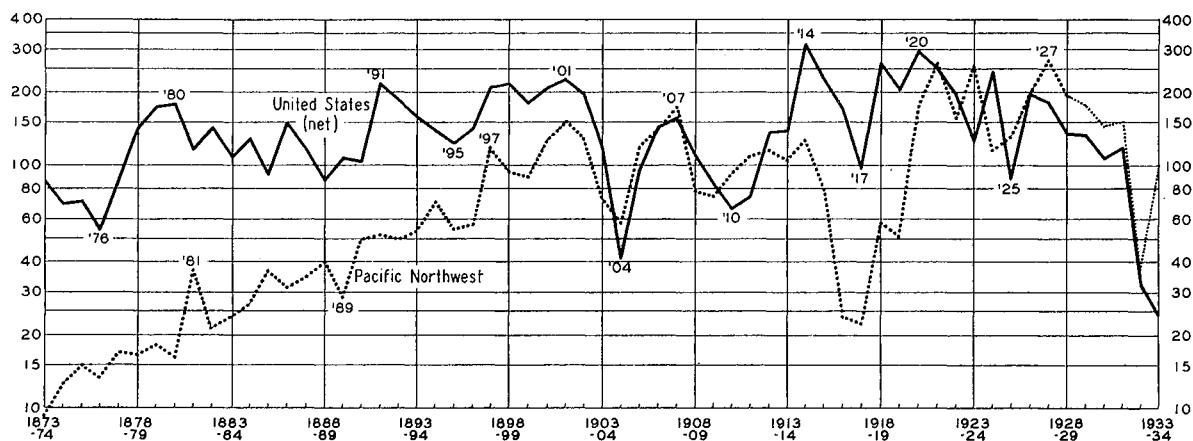
an important fraction of the trade until after the opening of the Panama Canal in 1914. In 1889-90, forty ships with an average tonnage of 1,132 carried the 2.9 million bushels of wheat exported from the Columbia River; and twenty ships, including five carrying wheat also, handled flour exports of 321,931 barrels. In the same year twenty ships, with an average tonnage of 1,582, carried the Tacoma exports of 1.8 million bushels of wheat; one of these had also 16,755 barrels of flour. Because of navigation hazards, the larger ships avoided

from the Columbia River and 140 days from Puget Sound, and it was much the same in 1914-15. In the latter year steamers made the same voyage on the average in 60 days from the Columbia River and 51 days from Puget Sound. With the extensive use of the Panama Canal, and the improvement in size and speed of vessels, the length of voyage to Europe has been greatly reduced since the war.

The development of liner service from Puget Sound ports has immensely facilitated flour exports from there both to Europe and

CHART 4.—INDEX NUMBERS OF EXPORTS OF WHEAT AND FLOUR FROM THE UNITED STATES (NET) AND FROM THE PACIFIC NORTHWEST, 1873-74 TO 1933-34\*

(Base: 1910-14 average = 100; logarithmic vertical scale)



\* Based on United States official data from *Agriculture Yearbooks*, and Pacific Northwest data in Tables X and XI.

Columbia River ports. As the years passed, the sailing ships in the trade increased in number, size, and volume handled. In the decade before the war, steamers became of increasing importance. As late as 1914-15, however, sailers predominated in the trade from the Columbia River: fifty-three sailing vessels, with an average tonnage of 1,789, handled 5 million bushels exported from there to western Europe, while others went to other destinations.<sup>1</sup> Since the war the sailing ships have handled only a negligible fraction of the trade.

The average length of voyage of wheat ships to western Europe in 1889-90 was 130 days

<sup>1</sup> These statements, and those on length of voyages in the next paragraph, and on pre-war and 1914-15 ocean rates in later ones, are based on detailed data given in the *Commercial Review*, July 1, 1915.

to the Orient; and the great bulk of the flour is handled in liners. In spite of improvements in navigation on the Columbia River, its ports are ill supplied with liner services. Wheat grain from the region moves largely in tramp steamers, either in full cargoes or in combination with lumber or other exports. In this trade, Portland and some lesser Columbia River ports have a large share. Other factors accounting for differences between the two groups of ports are mentioned below (p. 378).

Ocean freight rates varied widely in the forty years before the war. In 1899-90 the average rate on wheat exported to western Europe from the Columbia River was 40s. per ton, and from Tacoma 37s. 3d. Then, and for many years later, a differential of 2s. 6d. per ton was in force against Portland in favor of the Puget Sound, because of difficulties

and dangers associated with navigating the Columbia River. With improvements on the river, the differential was reduced and eventually removed. During the 'eighties and 'nineties rates were sometimes more than double these figures, sometimes less than half as high. In the years shortly preceding the war, freights from North Pacific ports commonly varied around 27s. 6d. for sailers and 30s. for steam, though in one year rates went as high as 40s. and 50s. and in another fell as low as 22s. for sailers.

The war, however, promptly caused advances in freight rates. In 1914-15 rates per ton on wheat to western Europe averaged as follows:

Type	Columbia River	Puget Sound
Sailers . . . . .	32s. 8d.	31s. 10d.
Steamers . . . . .	39s. 6½d.	38s. 8d.

Late in the crop year 75s. per ton was considered a low rate, and as high as 82s. 6d. was paid for a steamer to Europe. Much higher rates came to prevail in the later war years, with the result that exports by water were drastically curtailed and most of the region's surplus moved east by rail.

After the earliest post-war years, ocean freights have been materially lower, and they have fallen very low during the last few years. According to data compiled by the International Institute of Agriculture, ocean freight rates from North Pacific ports to the United Kingdom averaged 25.7 cents per bushel (slightly under 40s. per long ton) in the calendar year 1913. Despite much higher levels of prices in general, rates from the same region averaged about 22.1 cents a bushel in the five crop years ending July 1927, about 19.5 cents in the two following crop years, and about 14.6 cents in 1929-30 and 1930-31. Rates fell further each of the next three years, and in 1933-34 (to May 11) averaged 8.1 pre-devaluation gold cents a bushel—or about a third of the average rate in 1913. The marked decline in rates is, of course, the joint effect of the shorter route via the Panama Canal, the plethora of ocean shipping especially pronounced during the depression, and the decline in all sorts of prices. The reduction has been especially large in rates from this region, as compared with rates from other export regions, to Europe.<sup>1</sup>

### III. AGRICULTURAL ASPECTS

#### IN GENERAL

Wheat is one of the most important crops and by far the most important grain crop in the Pacific Northwest. In terms of acreage its pre-eminence is outstanding, as shown by the following average figures for 1931-33 for the three Pacific Northwest states:<sup>2</sup>

Crop	Thousand acres				Percent- age of total
	Washing- ton	Oregon	Idaho	Total	
All field crops . . .	3,447	2,645	2,873	8,965	100.0
Wheat . . . . .	2,229	914	1,083	4,256	47.5
Other grain . . . . .	283	395	335	1,013	11.3
Hay, forage, and hay seed . . . . .	869	1,253	1,216	3,338	37.2
Other field crops . . .	66	53	239	358	4.0

Wheat is by far the most important cash crop except apples. In terms of farm value its importance among the crops, though large, is not nearly so pronounced, as shown by the following average figures (at December 1

farm prices) for the past three years of depression:<sup>1</sup>

Crop	Thousand dollars				Percent- age of total
	Washing- ton	Oregon	Idaho	Total	
Total . . . . .	67,736	42,965	43,724	154,425	100.0
Wheat . . . . .	20,513	8,813	8,835	38,161	24.7
Other grains . . . . .	4,047	4,889	3,369	12,305	8.0
Hay, forage, and hay seed . . . . .	11,468	14,706	15,890	45,064	29.2
Trucks and vegetables . . . . .	5,936	4,440	6,993	17,369	11.2
Other field crops . . . . .	179	22	5,828	6,029	3.9
Fruits and nuts . . . . .	22,593	10,095	2,809	35,497	23.0

The great bulk of the wheat crop is grown in the subhumid and semiarid areas east of

<sup>1</sup> See tables in WHEAT STUDIES issues covering our annual "Review of the Crop Year." While in recent years these averages mainly represent shipments from Vancouver, B.C., we infer that they may be regarded as giving a more or less reliable indication of rates to the United Kingdom from the Pacific Northwest.

<sup>2</sup> *Crops and Markets*, December 1933, X, 453-57.

the Cascades, mainly without irrigation. West of the Cascades, only the Willamette Valley has ever been important as a wheat producer, and there other crops have increased in absolute and relative importance while wheat, except under such a stimulus as war prices gave, has come to occupy much less acreage than formerly. According to the last census, about 84 per cent of the 1929 wheat acreage of the Pacific Northwest was in the five crop-reporting districts in which wheat is the major crop (see Table V).

The pre-eminence of wheat among the cereal crops of the region is due to a simple fact, well tested by experiment and experience. In the subhumid areas that for decades have been of dominant importance in grain production, wheat commonly outyields other grains in pounds per acre, both under irrigation and by dry-farming methods. Consequently, wheat is grown for feed as well as for seed and food use. It is extensively used for poultry feed in the important commercial poultry sections of eastern Washington, and regularly fed to hogs and cattle in several wheat-growing sections. When wheat is very cheap, as in 1923-24 and in 1932-33, expansion of the hog industry may occur as a means of marketing the wheat, and within the region more wheat may be used for feed than for seed and food combined.

According to census data for 1929, there were 135,018 farms in the Pacific Northwest, including northern Idaho only. Winter wheat was grown on 23,985 farms, spring wheat on 16,143; but since some farms grew both winter and spring wheat, the number of farms on which wheat was grown was only about 35,500, or about 26 per cent of the total number of farms (see Table VII). Since some wheat is grown on a large number of small farms, it is probably safe to say that most of the wheat of the region is grown on not over 15,000 farms.

The wheat farms run large in size. Whitman County in southeastern Washington is outstanding in wheat production in the United States, and in 1928-32 its wheat crop averaged one-fourth of that of its state. In that county nearly all of the land area is in farms, and most of the crop land is in wheat or in fallow

for wheat. The average size of farm was 496 acres in 1929, and over 70 per cent of the farm acreage was in farms of 500 acres and over. The distribution by size was as follows:

Group	Number	Acreage	Percent- age of total acreage
Under 100 acres	477	18,593	1.4
100 to 174 acres.	289	43,707	3.4
175 to 259 acres.	255	56,680	4.4
260 to 499 acres.	738	271,495	20.8
500 to 999 acres.	606	416,837	32.0
1,000 to 4,999 acres . . . . .	253	384,015	29.5
5,000 acres and over . . . . .	13	112,421	8.6
Total . . . . .	2,631	1,303,748	100.0

While Whitman County is by no means typical of all the big wheat sections, wheat growing on a large scale is characteristic of the wheat-surplus areas. Corporation farming, however, is uncommon. For the most part, the wheat growers are either owner-operators, or large operators who rent (usually for a share of the crop) part or all of the land they operate. Such tenants, however, are quite different from those to whom this term applies in many sections of the country. Broadly speaking, the wheat growers of the region rank among the ablest and most intelligent farmers to be found anywhere in the United States; and in income and financial standing they rank distinctly high.

Comparative costs of growing wheat are exceedingly difficult to obtain on any reliable basis, and to use with due care when obtained. Yet it seems well established that out-of-pocket costs of wheat growing are lower in the Pacific Northwest than in all or nearly all of the other surplus-producing regions of the United States. Average yields per acre run high for the region, and from year to year their range is much more limited than in corresponding portions of the hard red spring- and hard red winter-wheat regions. With the large-scale machinery and intelligent methods of operation characteristic of the areas of the region that are producing most of its crop, costs per acre are moderate, though perhaps not so low as in parts of the Southwest. It is perhaps significant that during 1933-34, when

costs had probably sunk to the lowest levels since before the war, a considerable proportion of the wheat farmers regarded 60 cents a bushel at country stations a remunerative price; and the wheat sections registered some improvement in financial position with prices averaging no higher than this.

Production of wheat under irrigation is of minor importance in the Pacific Northwest as a whole (see Table VIII). In 1929, according to the census, only 7.2 per cent of the irrigated area of Washington, Oregon, and northern Idaho was cropped for wheat, the irrigated wheat acreage constituted only 2.7 per cent of the total acreage harvested for wheat, and the crop raised under irrigation amounted to only 3.35 million bushels or about 4½ per cent of the region's wheat crop.<sup>1</sup> Irrigated wheat is negligible in northern Idaho, but is substantially more important in the southwestern and southeastern sections.<sup>2</sup> The importance of irrigated wheat in southern Idaho largely explains the relatively high average yield per acre in that state, though in northern Idaho big yields are usually secured without irrigation.

The two principal dry-farming areas comprise the greater part of the Columbia River basin and the Snake River basin. Even within these districts conditions vary greatly. Dry farming is carried on at altitudes ranging from 600 to 3,000 feet in the Columbia basin, and from 2,100 to 6,500 feet in the Snake

basin. The average annual rainfall varies considerably in the different wheat districts, and in each there are important variations from year to year. In practically all of the big wheat sections, moisture is the major factor limiting the area and yield of the crop. These facts go far to explain why several different types and many different varieties of wheat are produced, and the wide variations in yields per acre in different sections and on different farms within a district.

Where crops are grown without irrigation, summer fallowing in alternate years has become general in all localities with an average annual rainfall of under 15 to 18 inches. In the more humid districts, summer fallowing is resorted to once in two, three, or four years. Properly handled, summer fallowing serves three purposes. First and most important, it insures the storage of part of the rainfall in the season in which fallowing is done, chiefly by preventing the use of soil moisture by weeds or volunteer grain, and to some extent also by checking evaporation. Second, nitrogen is formed in the soil and accumulated for use of the future crop. Third, an excellent seed-bed is provided for fall-sown wheat where otherwise winter wheat could not safely be planted.<sup>3</sup>

In most of the Pacific Northwest proper, winter wheat generally outyields spring wheat by several bushels to the acre. The difference is widest in Washington, where winter wheat usually yields more than in Oregon and spring wheat less (see Chart 5). In Oregon, indeed, spring wheat slightly outyielded winter wheat in 1931 and 1932, and yielded as much in 1933. Other things equal, when weather conditions are favorable for fall sowing and during the winter lead to light abandonment, the average yield for the crop in these states tends to be high; under the reverse conditions, the average yields tend to be lower. An unfavorable spring, however, may (as in 1924) result in very low yields in spite of favorable conditions in the fall and winter. In northern Idaho, conditions approximate those in southeastern Washington. In Idaho as a whole, on the other hand, spring wheat characteristically outyields winter wheat, usually by 3 bushels to the acre or more, and sometimes

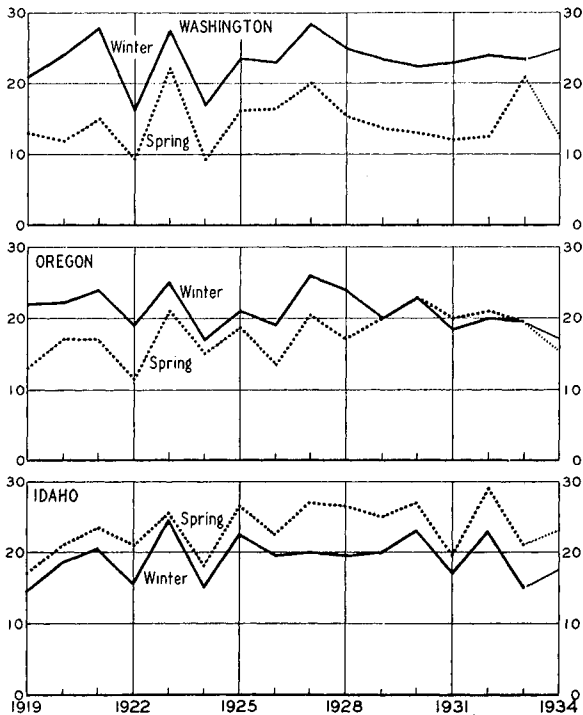
<sup>1</sup> H. P. Singleton, in *The Production of Cereals under Irrigation in Washington* (State College of Washington, Bulletin No. 240), June 1930, on the basis of recent data for six irrigation projects in the Yakima Valley and marketing data for Kittitas County, regarded 3 million bushels as a conservative estimate of the cereals annually grown under irrigation in Washington, and stated that at least 75 per cent of the irrigated cereal tonnage was spring wheat, 7 per cent (or less) winter wheat, 10 per cent barley, and 8 per cent oats. This implies a larger estimate of Washington wheat production under irrigation than was shown by the census of 1929.

<sup>2</sup> Maps showing the irrigated areas of Idaho are shown in Byron Hunter and S. B. Nuckols, *An Economic Study of Irrigated Farming in Twin Falls County, Idaho* (U.S. Department of Agriculture, Bulletin No. 1421), October 1926.

<sup>3</sup> Byron Hunter, *Dry-Farming Methods and Practices in Wheat Growing in the Columbia and Snake River Basins* (U.S. Department of Agriculture, Farmers Bulletin No. 1545), November 1927.

by 6-7 bushels. This is because in southern Idaho most of the irrigated wheat is spring sown, and winter-wheat yields, mostly on un-irrigated land, are low.

CHART 5.—YIELD PER HARVESTED ACRE OF WINTER AND SPRING WHEAT IN PACIFIC NORTHWEST STATES, 1919-34\*  
(Bushels per acre)



\* Data in Table II. For 1934, the figures plotted are preliminary, based on the July official *Crop Report*. Indications are that final figures may be lower.

Though winter wheats, if they survive, generally outyield spring wheats, spring varieties are used as a substitute for winter wheat when the fall is dry, as a replacement for winter wheat when it fails to survive the winter, and in certain areas where conditions are generally unfavorable for winter wheat.<sup>1</sup> Spring-wheat acreage therefore varies greatly from year to year (Table II), tending to be high when winter-wheat acreage is low because of light planting or heavy abandonment.

<sup>1</sup> E. G. Schafer, E. F. Gaines, and O. E. Barbee, *Wheat Production as Influenced by Variety, Time of Seeding, and Source of Seed* (State College of Washington, Bulletin No. 159), March 1921, p. 7.

<sup>2</sup> Apparently four counties of northern Idaho—Latah, Nez Perce, Idaho, and Lewis—rank high enough for inclusion in such a list.

Of the winter-wheat acreage sown, usually not over 7 or 8 per cent is subsequently abandoned, and percentages under 5 are common. As a rule, abandonment runs higher in Washington than in Oregon, and is seldom high in Idaho. Official estimates available since 1901 (Table IV), however, show occasional years of heavy abandonment. In addition to 1905, 1907, and 1920, when abandonment was 15 or 20 per cent in one or two of these states, the percentage abandoned was much higher in the years indicated below, with 1925 and 1933 standing out as the worst on record:

Year	Washington	Oregon	Idaho
1902	39.0	6.0	5.0
1906	26.0	19.0	9.0
1917	33.0	11.0	10.0
1924	25.0	8.0	11.0
1925	70.0	65.0	15.0
1930	28.0	5.0	4.0
1933	60.0	75.0	20.0

Average yields by states obscure wide variations in representative yields by sections. Some idea of this may be seen by the following comparisons of average yields per *seeded acre* in 1928-32 in the Washington and Oregon counties that averaged over 1.4 million bushels a year in this period and produced over 77 per cent of the crop of the two states:<sup>2</sup>

County	State	Production (thousand bushels)	Seeded acreage (thousand acres)	Yield per seeded acre (bu.)
Whitman	Wash.	10,900	448.0	24.3
Umatilla	Ore.	6,226	240.5	25.9
Walla Walla	Wash.	5,763	219.6	26.2
Lincoln	Wash.	5,191	389.9	13.3
Adams	Wash.	3,908	336.4	11.6
Spokane	Wash.	3,057	152.5	20.0
Columbia	Wash.	2,327	93.0	25.0
Sherman	Ore.	2,110	129.0	16.4
Garfield	Wash.	2,083	83.0	25.1
Morrow	Ore.	1,945	131.4	14.8
Gilliam	Ore.	1,718	121.9	14.1
Douglas	Wash.	1,454	140.2	10.4
Franklin	Wash.	1,428	101.4	14.1
Yakima	Wash.	1,420	46.8	30.3

In Yakima County most of the wheat is raised under irrigation. In contrast with its high average yields, those in the dry counties, Adams and Douglas of the Big Bend area, seem strikingly low.

## AGRICULTURAL PRACTICES

In view of the facts just mentioned, the varieties sown and the agricultural practices employed must be adapted to specific local conditions if good results are to be secured. Much progress in these directions has been made by the wheat growers themselves, by the state experiment stations and their branch stations, and by the state extension services. Yet in the Pacific Northwest, as elsewhere, the best practice is far above the average and there are many laggards. Twelve years ago Stephens and Hyslop wrote of eastern Oregon: "There is now less loss from poor stands, dry years, and hot winds, and there is more production of wheat of better quality."<sup>1</sup> The same could be said again today of the main wheat region of the Pacific Northwest, in spite of occasional years of severe losses.

Because of the detail involved, and the considerable literature on the subject which agricultural institutions have issued, there is no purpose in attempting here to deal comprehensively with the farm aspects of wheat growing in the Pacific Northwest. A few facts, however, deserve summary statement.

Among the factors most important for the farmer to reckon with are: (1) choice of the variety to seed; (2) handling of the summer fallow, and preparation of the soil for planting; (3) disinfecting the seed; (4) time of seeding; and (5) use of power.

As we have already indicated, the Pacific Northwest has suffered in the past from undue multiplicity of varieties, but in the past decade much progress has been made in concentrating on a few major varieties that are satisfactory for milling and/or export and also yield well. Because of extreme variations in conditions, different varieties even of the same type will continue to be grown, but the process of replacing the less standard varieties by others is not yet complete. Experi-

mental work and experience are both helpful in determining which variety an individual farmer will do well to plant in his particular fields under specific circumstances.

The choice of variety is not always simple. One variety may clearly be the most suitable under ordinary conditions. Drought resistance, smut resistance, adaptation to the soil and local climate, may make it on the average clearly superior to others in yield. Milling quality, though not unimportant, must frequently be sacrificed to yield. If conditions, however, favor early seeding, another variety may have better promise. If it is a winter wheat, adverse weather conditions may delay sowing beyond the time at which that variety can safely be planted, and render necessary the planting of another variety of winter wheat or waiting till spring to plant a spring variety. Under some circumstances, seed of the preferred variety may be scarce. In the spring of 1933, for example, after the exceptionally heavy winterkilling Federation (which may be sown in the spring or in the fall) was the only one of several varieties of which seed supplies were ample.

Crop rotation is not commonly practiced in the major wheat sections, where summer fallowing, most commonly every other year, has become standard practice. Attempts to substitute some other crops (e.g., corn or peas) in place of summer fallow have been generally found not to pay as well as fallowing, though in recent years peas for seed have come to be extensively grown in portions of southeastern Washington.

Not only the practice of summer fallowing, but the manner of handling the fallow land as well, is important. The best practice generally consists of plowing or disking the fallow acreage in the early spring, before weeds or volunteer grain have got much start, and cultivating it thereafter sufficiently to keep the weeds under control.<sup>2</sup> In different sections the most successful practices vary according to the altitude, which affects the length of the period of good condition for plowing; the character of the soil, since cultivation must be kept to a minimum and tillage operations modified on soil subject to blowing; the condition of the stubble from the preceding crop,

<sup>1</sup> D. E. Stephens and G. R. Hyslop, *Wheat Growing after Fallow in Eastern Oregon* (Oregon Agricultural College, Experiment Station Bulletin 190), May 1922, p. 7.

<sup>2</sup> Highest yields and best quality of wheat are produced on early-spring-plowed summer fallow . . .

"Fall plowing and medium early spring plowing for summer fallow give similar yields."—Stephen and Hyslop, *op. cit.*, p. 3.



since heavy infestation of Russian thistles may render fall plowing or disking desirable; and the size of the farm, which sometimes dictates a combination of methods to secure better utilization of labor and equipment. The principal improvements in recent years have been in "early plowing, clean fallow, and drought-resistant wheats," with some standardization of varieties.<sup>1</sup>

At the Moro station in eastern Oregon (established in 1909) various farm practices have been tested out, and the results have led to the following conclusions among others: Fall disking of stubble reduces yields; spring disking before early spring plowing also does not pay, but spring disking before late spring plowing kills weeds, conserves moisture, and increases yields; harrowing winter wheat in the spring generally lowers yields; early sowing of spring wheat always pays. Researches at other stations are gradually yielding results which in part confirm practical experience under similar conditions and in part give definite answers to questions on which farmer opinions in the district differ.

Thorough cultivation of the summer fallow, while usually resulting in larger yields for the

time being, tends to cause more rapid depletion of organic matter. Soil depletion is an evil to be reckoned with. Investigations by the Oregon Agricultural Experiment Station, published as early as 1912, showed that typical wheat soils of eastern Oregon on which wheat had been grown for seventeen to twenty-five years had about 23 per cent less organic content than similar virgin soils. A similar study of eastern Washington soils, about the same time, showed significant reductions of the same character.<sup>2</sup> In northern Idaho and eastern Washington where the rainfall averages from 20 to 26 inches, and the stubble is short because the grain is cut with the binder, depletion of vegetable matter has been marked, and the soils are much less friable and more inclined to wash. Correction of these tendencies calls for general avoidance of the practice of burning stubble and weeds, for using a straw spreader with the combine or separately if the combine is not used, and for growing leguminous crops and feeding more livestock in the more humid areas with a clay-like subsoil.<sup>3</sup>

Of the various pests that attack the wheat plant, bunt or stinking smut is the only one of major importance in the Pacific Northwest.<sup>4</sup> There it is a constant menace and regularly takes toll of the crop, in spite of all efforts to prevent it. It not only reduces yields, but subjects the marketed wheat to discounts (varying with the percentage of smut) because of the cost of cleaning and the loss in cleaning.<sup>5</sup>

Bunt is a fungous growth, of which the spores appear in smutballs. These are of two main types: *Tilletia tritici*, with rough spores, which is the more prevalent; and *Tilletia levis*, with smooth spores, which has spread mainly within the past ten or fifteen years. Several forms of each type have been distinguished. The two types are similar in their effects, and respond to the same treatment; but some varieties of wheat are nearly immune to some and susceptible to others.<sup>6</sup>

The surest way to insure abundant smut infection is to plant infected seed, for the same conditions that favor germination of the wheat grain promote germination of the smut spores, and the smut immediately attacks

<sup>1</sup> Stephen and Hyslop, *op. cit.*, p. 7.

<sup>2</sup> C. E. Bradley, *The Soils of Oregon* (Oregon Experiment Station, Bulletin No. 112, 1912); R. W. Thatcher, *The Nitrogen and Humus Problem in Dry Farming* (Washington Agricultural Experiment Station, Bulletin No. 105, 1912).

<sup>3</sup> Hunter, *op. cit.* (1927), pp. 20-22.

<sup>4</sup> Bindweed is troublesome, and even serious, in some districts. Foot rot takes some toll in some sections, particularly after a mild winter such as that of 1933-34. It withers the plant at its base, so that winds may break off the stalks close to the ground before harvest. It has never been widespread, or caused heavy loss to the crop as a whole. Rusts are not absent, but are not serious and often go unrecognized.

<sup>5</sup> Smutty wheat must be cleaned before it is milled. Methods of cleaning, with special reference to washing, and their commercial significance, are discussed in E. N. Bates, G. P. Bodnar, and R. L. Baldwin, *Removing Smut from Pacific Northwest Wheat by Washing* (U.S. Department of Agriculture, Circular No. 81), August 1929.

<sup>6</sup> The literature of the subject is reviewed, and some recent results presented, in E. N. Bressman, *Varietal Resistance, Physiologic Specialization, and Inheritance Studies in Bunt of Wheat* (Oregon State Agricultural College, Agricultural Experiment Station, Bulletin No. 281), June 1931.

the young wheat plant below the first joint. If thus started, the parasite grows with the wheat plant, extending upward as the wheat plant grows, living on its juices and filling in most of the air cavities in the stem of the plant, entering the grain before it ripens, and using up the starch of the grain to form the balls and spores. If infection can be prevented at the early stages, it will not occur, for as the outer stalk hardens it prevents invasion by the parasite.

Accordingly, treatment of seed wheat to insure planting smut-free grain has become almost universal in the Pacific Northwest. Very few varieties (notably Marquis) are so nearly immune that they can safely be sown without disinfection. Various methods have been employed. The Jensen or hot-water treatment of the seed, developed about 1888, consisted of immersion in water of 130°–135° F. for ten to fifteen minutes. Difficulties in applying this method successfully arose from the fact that at temperatures under 130° the smut spores were not killed, while at temperatures above 135° the germinating power of the seed was injured. Treatment with solutions of copper sulphate (bluestone) and formaldehyde proved cheap, easily applied, and effective. The wet treatments, however, sometimes killed from one-third to one-half of the seed. Accordingly, they have in recent years been largely superseded by dry treatments, principally with copper carbonate. The result is a thicker and more uniform stand, better control of weeds, and larger yield.

Clean seed, however, does not insure freedom from smut, though it certainly reduces the severity of the pest. Infection occurs also through the soil.

The summer fallow fields of the Inland Empire owe their contamination with smut to wind-blown spores which begin to fall with the first threshing operations. This spore fall or "smut shower" is light at the beginning, increases to a maximum and later gradually subsides with the cessation of threshing operations. The prevailing winds are such that there is a drifting of the smut spores from the regions of early harvest to the regions of later harvest, with the result that summer fallow fields of eastern Washington and adjacent Idaho are very heavily contaminated with smut by the time the smut shower has subsided.<sup>1</sup>

No practical means of controlling this form of infection of the soil have been devised.

For some years, one of the objectives of wheat breeding has been to produce smut-resistant varieties, and persistence or susceptibility to smut is important with any variety developed. Of the new varieties that have quickly risen to importance in recent years, Albit and Ridit are highly resistant to the older forms of smut, and Ridit is apparently resistant to all forms. The prevalence of smut in serious amounts has been considerably reduced in Washington by the displacement of non-resistant varieties of winter wheat, such as Goldcoin (Fortyfold), Jones Fife, Red Russian, and Hybrid 128, by Turkey, Albit, and Ridit.<sup>2</sup>

The amount of smut is also influenced by certain cultural practices. Some of the practices that would be helpful in this direction—such as shallow seeding, broadcasting, and replowing summer fallow before sowing—are rarely practiced for other reasons. In some sections trench seeding could be employed. Greater possibilities lie in choosing the time of seeding in such a way that conditions are least favorable to infection. This line of attack has not yet received the emphasis that it deserves.<sup>3</sup>

The seed planted is commonly that saved from the preceding crop of the farm or district itself. The principal exceptions to this general rule occur when new varieties are introduced, and seed must be secured from the experiment station or one or more growers who have grown a crop for seed; and when, after severe winterkilling, seed of a spring variety must be bought.

The rate of seeding varies widely under different conditions.<sup>4</sup> In some sections less than a

<sup>1</sup> F. D. Heald and E. F. Gaines, *The Control of Bunt or Stinking Smut of Wheat* (State College of Washington, Agricultural Experiment Station, Bulletin No. 241), July 1930, p. 24.

<sup>2</sup> *Ibid.*, p. 16. This matter was ignored in the early work carried on by Dr. W. J. Spillman in 1893–1902, and several of the varieties bred and distributed proved very susceptible to smut.

<sup>3</sup> *Ibid.*, p. 22.

<sup>4</sup> D. E. Stephens, H. M. Wanser, and A. F. Bracken, *Experiments in Wheat Production on the Dry Lands of Oregon, Washington, and Utah* (U.S. Department of Agriculture, Technical Bulletin No. 329), November 1932.

bushel per acre is adequate. In others some advantage at least is gained by sowing  $1\frac{1}{2}$  bushels or more. Experiments at the Moro, Oregon, station since 1914, with rates of seeding varying from 2 to 8 pecks per acre, show that on well-tilled summer-fallow land the rate of seeding winter wheat makes no large difference in net yields (crop ex-seed). For conditions similar to those at Moro, Stephens and Hyslop recommend seeding 4 to 5 pecks of treated seed per acre, somewhat more of large-kerneled varieties such as Baart.<sup>1</sup>

Gain in yields from heavier sowing, when it pays, comes partly from weed control insured by thicker stands. Heavier sowing also conduces to earlier maturity. In high altitudes, at least, lower rates of seeding give best results from early plantings, and somewhat heavier ones from late plantings.<sup>2</sup> For some years the Department of Agriculture has estimated seed requirements in each of the three Pacific Northwest states at the average rate of  $1\frac{1}{2}$  bushels per acre sown, including that sown for hay.<sup>3</sup> Under present practice, we gather that the average runs somewhat lower, particularly since dry-process treatments for smut, which lessens the amount of seed that must be sown, are now common.

The date of seeding winter wheat varies considerably. If the soil is moist enough to insure germination, seeding is done in September. Otherwise, seeding is delayed for a time to await the autumn rains. If these do not come by mid-October, the grain is sown in dry soil in the more favored districts, and in drier areas seeding is delayed until spring.<sup>4</sup> Of the spring varieties, slow-maturing vari-

eties may be preferred if the season is early, while others may be better if sowing has to be delayed. While Nature sets limits to the date of seeding, there is often a range within which the individual may take or lose the opportunity to seed at the optimum time, all factors considered. Part of the gain reaped from the use of tractors lies in ability to perform operations more quickly, and thus to take advantage of timeliness.

There has been a tendency toward larger power units in the area. In the early days of wheat growing in the dry-farming areas, 2- and 3-horse teams were commonly used, with 12-inch and 14-inch walking plows. These were soon replaced by 5- and 6-horse teams with 2-bottom 12- and 14-inch gang plows. These in turn were replaced by 8- or 10-horse teams with 14-inch 3-bottom plows, which have in recent years been commonest; but double units of 16-, 18-, or 20-horse teams have grown in favor, and 12-horse teams drawing 16-inch 3-bottom plows have also come into considerable use.<sup>5</sup>

In the decade preceding the depression, however, tractors came into extensive use on the big wheat farms, particularly for plowing and drawing combines. Census data for farm tractors in the three states are as follows:<sup>6</sup>

Year	Total	Washington	Oregon	Idaho
1920 . . . .	7,292	2,635	3,070	1,587
1925 . . . .	12,185	4,490	5,768	1,927
1930 . . . .	22,917	8,388	9,838	4,691

The big wheat farms in particular are in a position to use tractors with maximum efficiency and economy. During the depression few new tractors have been put into use, and there has been some reversion to horse teams to economize cash expenditures; but if and as financial conditions improve, the number of tractors will presumably expand much further. Diesel tractors are now coming into use in the area.

July and early August is in general the season of wheat harvest. In 1934, harvesting began in the Arlington district and in parts of Umatilla County in the middle of June, but this was exceptionally early.<sup>7</sup> In most of the big wheat sections the grain is now harvested mainly by combines, in spite of the difficulties and loss of maximum efficiency

<sup>1</sup> *Op. cit.*, pp. 4, 22-23.

<sup>2</sup> W. A. Moss, *Rate, Date, and Depth of Seeding Winter Wheat* (University of Idaho, Agricultural Experiment Station, Bulletin No. 145), July 1926.

<sup>3</sup> This figure was based on a special inquiry made in 1919 by the Division of Crop and Livestock Estimates, and later checked against sample data for the crops of 1925-27.

<sup>4</sup> E. G. Schafer, E. F. Gaines, and O. F. Barbee, *Wheat Production as Influenced by Variety, Time of Seeding, and Source of Seed* (State College of Washington, Agricultural Experiment Station, Bulletin No. 159), March 1921.

<sup>5</sup> Hunter, *op. cit.* (1927), p. 20.

<sup>6</sup> *Fifteenth Census of the United States, 1930, Agriculture*, Vol. II, Part 3, p. 55.

<sup>7</sup> *Commercial Review*, June 12, 1934.

in their use in the rolling country characteristic of much of the region. In some districts, including one south of Spokane, the binder is still in common use for special reasons. Most wheat farmers have practically no grain-storage facilities on the farms, though a few have sizable private elevators and more have smaller tanks to facilitate the handling of bulk grain as it comes from the combine.

In most sections, sacked grain can safely be stored in the open for some time without protection, but only at additional cost for handling. Dry summers are responsible for the low moisture content of most of Pacific Northwest wheat, which makes it give high flour yields and renders it suitable for mixing with wheats of high moisture content in European import markets.

IV. MARKETING ASPECTS

FROM FARMS TO TERMINALS

Ordinarily the Pacific Northwest crop is hauled to stations promptly after harvest, and much earlier than in the United States as a whole. Official estimates based on averages for the crops of 1909-21 are summarized below in percentages of annual totals:<sup>1</sup>

Month	United States	Washing-ton	Oregon	Idaho
July	13.5	1.8	5.3	2.2
August	17.4	16.6	31.4	14.2
September	16.3	36.3	33.9	27.9
October	12.7	22.5	13.3	19.6
November	8.9	9.1	3.6	11.9
July-November	68.8	86.3	87.5	75.8

"Farm marketings" are heavy in August and reach their peak in September in all three states, with Oregon leading and Idaho lagging; by the end of November, three-fourths of the crop of Idaho, and about seven-eighths of the crops of Oregon and Washington, have ordinarily been "marketed" in this sense. This does not mean, however, that farmers have sold their wheat when they have moved it from the farms. Since storage capacity on farms is very limited, much of the wheat is held at the railway station, subject to the farmer's decision as to time of sale. Shipments from local stations afford a better indi-

cation of the rate of sale, but variable amounts are shipped "on consignment" subject to later sale.<sup>2</sup>

The region is abundantly supplied with storage capacity, particularly in view of the fact that the wheat is still largely handled in sacks. Most of the "country" storage still consists, not of elevators, but of flat warehouses suitable for sack handling. Official data based on analysis of license reports of May 15, 1918, showed the following storage capacity in the three Pacific Northwest states, in thousand bushels:<sup>3</sup>

State	Country	Terminal	Mill	Total
Washington	29,118	4,089	6,941	40,148
Oregon	25,424	8,843	2,807	37,074
Idaho	22,673	....	3,603	26,276
Total	77,215	12,932	13,351	103,498

Since 1918 there has been much additional construction. Country-station facilities in the Pacific Northwest proper (exclusive of southern Idaho) now have a capacity of around 90 million bushels, or considerably larger than the average crop of the region. Terminal facilities have also been materially increased since the war. At present the port capacity (apart from strictly mill storage) is approximately as follows, in thousand bushels:

Port	Bulk	Sack	Total
Seattle	3,667	4,600	8,267
Tacoma	650	2,682	3,332
Portland	3,715	4,194	7,909
Astoria	1,000	1,000	2,000
Longview	385	15	400
Vancouver	2,000"	....	2,000
Total	11,417	12,491	23,908

<sup>3</sup> Built this year by the Pacific Continental Grain Company.

<sup>1</sup> *Wheat and Rye Statistics* (U.S. Department of Agriculture, Statistical Bulletin No. 12), January 1926, p. 31.

<sup>2</sup> Complaints over the way in which consignment sales worked out were made the basis of part of the appeal of the co-operative movement, and for some years the Farmers National Grain Corporation undertook to buy all the wheat its member clientele chose to sell at the day's price.

<sup>3</sup> *Wheat and Rye Statistics*, p. 50.

Since other grains move to market only in limited quantities, the storage capacity is large in proportion to the size of the wheat crop, even when allowance is made for the fact that the crop is never distributed precisely according to the available capacity. Congestion of storage facilities, such as occurred in the summer and autumn of 1933, is therefore a rare occurrence.

These conditions render it possible for farmers (and also merchants and millers of the region) to hold wheat for a considerable time if they regard prevailing prices as unsatisfactory and if they can afford to defer selling. Such holding is conspicuous in periods of extreme price depression, as in the middle 1890's and again in recent years. It is encouraged by the facts that the farms are characteristically large, the farmers financially responsible, and the banks usually heavily interested in the farmers' returns because of loans on wheat.

The holding policy sometimes, as in 1932-33, pays well; but experienced observers regard it as on the whole a great source of loss to the growers. Occasionally, the holders badly overstay the market, as conspicuously in 1898-99, when farmers who had profited greatly by the price advance of 1897-98 sought (in vain) to resist accepting much lower prices in 1898-99. This has happened since, as in the spring of 1926.<sup>1</sup> The past few depression years have been marked by increasing holding by farmers. This reached an outstanding peak in 1932-33, when it led to an extraordinary carryover equal to over half of the preceding crop, and to congestion of storage and handling facilities at numerous points as the 1933 crop began to move.

The development of what are now the important wheat-growing areas of the region depended upon the extension of the railway net. The great bulk of the grain is naturally shipped by rail, to the seaboard and to in-

terior mills. Latterly, competitors of the railroads have put in an appearance. Some wheat is now shipped by river, from near The Dalles, and boat service is expected soon to be extended to Umatilla;<sup>2</sup> wheat-grower support for projected river navigation developments is readily enlisted. Some shipments are made by truck, but mostly to concentration points for river shipment.

Portland has for several years enjoyed preferential rail freight rates on grain as compared with Puget Sound ports, owing to the lower cost of moving wheat via the Columbia Gorge. Puget Sound interests have repeatedly sought to get this preference eliminated. It accounts in some part for the predominance of Columbia River ports in water-borne shipments of wheat grain, not only for export but also for shipment to California and Atlantic and Gulf ports. Other factors, however, are important. The big surplus of export wheats is in sections more accessible to the Columbia River ports. Bulk-handling facilities for export have been expanded more in that section. Improvements in navigation of the Columbia River have also played a part. "The last authorized federal project completed in the Fall of 1933 now provides a channel from Portland to the sea [96 nautical miles] with a depth of 35 feet and a minimum width of 500 feet."<sup>3</sup>

Puget Sound ports, on the other hand, have advantages for milling. More of the milling wheats, both Hard White and Dark Hard Winters, are grown in parts of Washington naturally tributary to them. For exports of flour, they enjoy the advantage of excellent liner services which Portland lacks. For these reasons, among others, more of the large modern mills are in the Puget Sound area, notably at Tacoma and Seattle.

For the reasons just mentioned, wheat receipts at Columbia River ports are usually considerably heavier; and wheat-grain exports constitute a much larger percentage of receipts than in the case of Puget Sound ports. This is shown by Chart 6 for post-war crop years. In 1927-28, the peak year, receipts at both groups of terminals amounted to 79 million bushels, and exports of wheat grain to 48 million. In 1932-33, by contrast,

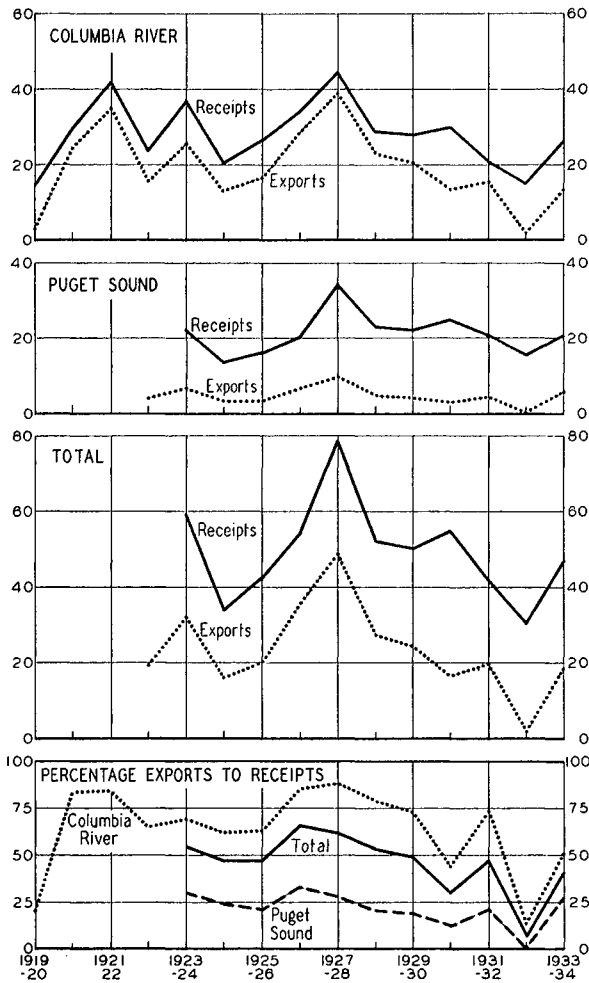
<sup>1</sup> *Commercial Review*, March 9, 23, April 6, 13, 1926.

<sup>2</sup> *Cooperative Comment*, May 1934. At its peak in 1933-34, receipts at Columbia River ports (chiefly Portland) via river boats were 1,105,000 bushels.

<sup>3</sup> *Annual Report of the Commission of Public Docks, Portland, Oregon, Year Ending November 30, 1933*, p. 32.

CHART 6.—RECEIPTS AND EXPORTS OF WHEAT GRAIN, COLUMBIA RIVER AND PUGET SOUND TERMINALS, POST-WAR CROP YEARS\*

(Million bushels, except as noted)



\* Based on data in Tables IX and X.

receipts were only 31 million bushels and wheat-grain exports only 2 million.

SACK AND BULK HANDLING

Until recent years practically all the wheat of the Pacific Northwest moved from farms to terminals in sacks, and until 1922-23 nearly all of the water shipments moved in the sack. "In the early days ship masters refused to carry bulk grain because of the hazard involved should the cargo shift in the rough voyage 'around the Horn.' Spoilage of bulk grain was experienced from extreme temperature changes encountered in the long journey. It was difficult, if not impossible,

to obtain insurance on cargoes of bulk grain. Railroad facilities at that time were limited, and sacked grain could be readily transported on flat cars."<sup>1</sup> The limitations of railway facilities were overcome; improvements in ship construction and operation gradually reduced the hazards of moving grain in bulk; and the opening of the Panama Canal in 1914 greatly reduced the length of voyage and the hazards of shipment to Europe.

It is only since 1924-25, however, that all but a very small fraction of the grain exported has been shipped in bulk. Several factors account for the long delay in making this shift. Extreme advances in ocean freight rates and shortages of tonnage prevented the Panama Canal from exerting prompt influence in this direction. During the war and shortly thereafter, wheat prices and spreads were such that good profits could be made in the grain trade without seeking small economies. The Port of Astoria completed its elevator in 1917, and the Portland municipal elevator, for which a \$3,000,000 bond issue was authorized on June 4, 1917, was completed in June 1919. These stood practically idle for some years. When wheat prices and ocean freight rates fell drastically, the grain exporters built terminal elevators, and within three years after 1921-22 the shift to bulk handling for export was practically complete.<sup>2</sup>

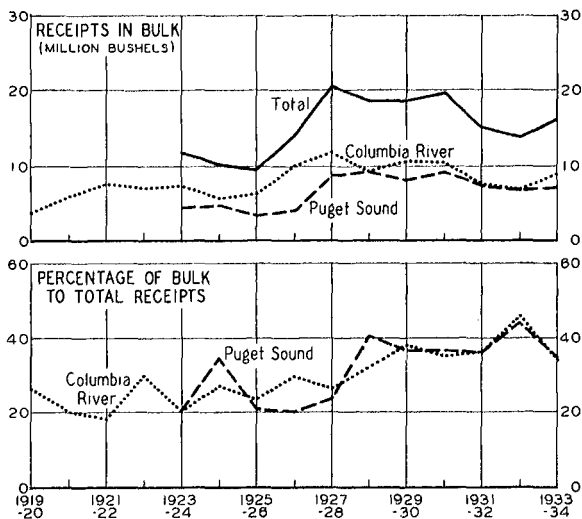
During the war, the high cost of sacks (made largely of imported burlap) led to some development of bulk handling on the farms, largely by makeshift methods in the absence of suitable farm-storage and country-elevator facilities. Under these handicaps, most of the potential economies of bulk handling were not reaped; and after the war, as the price of sacks fell and combine harvesters equipped to sack grain were more widely introduced, bulk handling on the farms diminished for a time.

<sup>1</sup> Neil W. Johnson and others, *Farm Management Problems in Shifting from Sack to Bulk Handling of Grain in the Pacific Northwest* (U.S. Department of Agriculture, Technical Bulletin No. 287), February 1932, p. 1. This is one of several bulletins of the Department of Agriculture and co-operating institutions that deal primarily with the problem as it faces the farmer.

<sup>2</sup> This is clearly shown by data of the Federal Grain Supervision, Portland.

The course of the post-war growth of bulk handling from farms to terminals is roughly indicated in Chart 7—roughly, because the receipts include variable quantities of Montana wheat which is practically all shipped in

CHART 7.—WHEAT RECEIPTS IN BULK AT COLUMBIA RIVER AND PUGET SOUND PORT TERMINALS, POST-WAR CROP YEARS\*



\* Data in Table IX.

bulk. In 1923-24, bulk receipts were only about 20 per cent of the total. Until 1926-27, when the percentage rose to 26, bulk receipts at terminals in the Pacific Northwest had never much exceeded 10 million bushels. In 1927-28, a year of record movement following a bumper crop, they first exceeded 20 million bushels, and again constituted 26 per cent of the total receipts. In the three following years of smaller total receipts, those in bulk held up to between 18.5 and 19.6 million bushels, and constituted over 35 per cent of the total receipts. In 1931-32, with much smaller receipts in bulk as well as in sacks, the percentage in bulk remained about 35 per cent. In 1932-33, with still smaller receipts and with very large inshipments from Montana,<sup>1</sup> the percentage in bulk rose to nearly 45 per cent, since so much of the sacked wheat was held back at country points. In 1933-34, with total receipts again of good size, the volume in bulk rose, but the percentage declined to 34 per cent of the total. In view of

Montana inshipments, this implies that considerably less than two-thirds of the marketed wheat grown in the Pacific Northwest is still handled in the sack.

The depression itself has exerted divergent influences on the transition. On the one hand, low prices for wheat rendered it imperative to cut costs to a minimum. On the other hand, the price of sacks fell to low levels (prior to our departure from the gold standard), diminishing the economies to be gained by bulk handling; and funds for providing or adjusting equipment and facilities for bulk operations have been limited.

Limitations of country-elevator capacity have been one of the factors retarding the shift to bulk handling from the farms. This year, the prospective high cost of sacks (tax-paid), increased availability of funds, and early prospects for a good crop led to the largest expansion in country-elevator capacity of any year. In June it was reported that for the 1934 harvest additional elevators (or increased elevator capacity) were being built at twenty-five country points, with an aggregate capacity of 2,075,000 bushels.<sup>2</sup> Most of these are being built by local co-operatives, usually with the aid of loans from the Bank for Cooperatives at Spokane.<sup>3</sup>

Many considerations are involved in the shift from sack to bulk operation. The obvious facts are that the sack costs money, that the grain must be desacked sooner or later, and that in most of the intermediate

<sup>1</sup> These have usually been, in recent years, around 6 million bushels a year. In 1932-33 they reached nearly 10 million bushels.

<sup>2</sup> *Commercial Review*, June 12, 1934, p. 10.

<sup>3</sup> According to *Cooperative Comment* (the monthly organ of North Pacific Grain Growers, Inc.), May 1934: "Under the plan of financing cooperatives, the Bank for Cooperatives will loan not to exceed 60 per cent of the appraised valuation of any Local facility either under purchase or being constructed, the only requirement being that the Local be on a sound financial footing, have sufficient delivery of grain behind it and guarantee to provide the 40 per cent balance. . . . The total program of new construction will add approximately 2,000,000 bushels capacity at a cost of around \$500,000." This program, however, includes some sack warehouses. New elevators at Mission, Oregon, and Grangeville, Idaho, of 150,000 and 100,000 bushels capacity, respectively, are being built for the Farmers National Warehouse Corporation, a subsidiary of the federated co-operative Farmers National Grain Corporation.

stages it is more economical to handle grain in bulk.<sup>1</sup> But this is by no means the whole story. Warehouse facilities are already available, in liberal volume at most points; additional elevators must be built, at a cost, and they will largely compete with existing facilities. Probably surplus capacity will be more in evidence when carryovers are reduced to more normal dimensions than those of recent years. With wheat crops varying greatly at local points from year to year, new elevators cannot be counted upon as profitable investments. Farmers, equipped for and accustomed to handling grain in the sack, have to make some investment and changes in practice to handle it in bulk. Particularly in the rolling country, bulk handling is expensive because combine tanks and trucks cannot handle full loads. Where lots of wheat vary considerably in quality—because of type, variety, or special factors such as smut or freedom from it—it is easier and cheaper to keep them separate in sacks than in elevators.

For such reasons, bulk handling is never likely to be universal in the Pacific Northwest, and the shift is likely to make moderate and irregular progress. The progress toward standardization of varieties in recent years, however, tends to remove some of the ob-

stacles to the transition, and in turn it is likely to be promoted by the movement toward bulk handling.

#### THE GRAIN TRADE AND MILLING INDUSTRY

The great bulk of the wheat exports of the Pacific Northwest, as well as much of the flour exports, has always been handled by a small number of firms; but few of these have lived through the period, and there have been numerous shifts and changes in the prices and in the proportion of the trade they have handled.<sup>2</sup> They have also handled much of the flour and wheat shipped to California for consumption there or for export from San Francisco. As in Argentina, several of the exporting firms have had more or less extensive interests in flour milling<sup>3</sup> and in the sale of sacks. Most of them own terminal facilities and some have usually operated lines of country warehouses.

The export house that has had the longest continuous period of activity in the region is Balfour, Guthrie & Co. (a British firm with its principal American office in San Francisco), which established branches at Portland in 1877, in Tacoma in 1888, and in Seattle in 1898, and has been an important exporter throughout its history there. Other important grain shippers are Strauss & Co (which entered Portland in 1913-14), Kerr Gifford & Co. (established in 1899), and the Pacific Continental Grain Co. During the past year, as sometimes in earlier years, Dreyfus & Co. and Bunge & Born have opened branches in the territory and secured a share of the export business. Since the organization of the Farmers National Grain Corporation in 1929, the regional division of this company has also had a share, which was especially large during the period of stabilization operations under the Farm Board. Some Japanese houses have branches in the region.

The milling industry includes several outstanding concerns, two of which are parts of companies centering in Minneapolis. There are several large milling units, and a considerable number of small mills. Tacoma, Seattle, and Portland-Astoria have long been and are the outstanding milling centers of the region, and Spokane ranks fourth.<sup>4</sup> At Tacoma

<sup>1</sup> A price differential in favor of sacked grain as compared with bulk largely offsets these costs to the farmer. If this differential (usually 3 cents a bushel) were removed, the transition would be greatly promoted.

<sup>2</sup> For example, the Portland Flouring Mills Co., established in 1880, shipped out most of the flour exports in 1889-90. It has since been absorbed by the Sperry Flour Co. The largest wheat exporter in 1889-90 was C. Caesar & Co., which shipped more than half the total wheat exports from the Columbia River, and about a fourth of those from Tacoma as well as some flour. It was succeeded in July 1892 by J. R. Cameron & Co. In 1889-90 the Portland Shipping Co. was the principal wheat exporter from Tacoma, and a factor also in the Columbia River exports of wheat and flour. In September 1893 its business was taken over by the firm of Sibson & Kerr, which was succeeded on August 1, 1899, by the Portland Grain Co. and Kerr Gifford & Co. The former dropped out in October 1904, but Kerr Gifford has since been an important factor in the trade. See Silver Anniversary Number of the *Commercial Review*, July 1, 1915.

<sup>3</sup> See second paragraph below and following.

<sup>4</sup> For the data next cited we have relied largely upon the *Northwestern Miller*, "List of Flour Mills in the United States and Canada," July 11, 1934.



there are two mills of 5,000 barrels daily capacity. One of these<sup>1</sup> is operated by the Sperry Flour Co. (headquarters San Francisco), now a unit of General Mills; Sperry also operates a 1,900-barrel mill at Spokane and a 500-barrel mill at Portland (formerly the Portland Flouring Mills Co.). The other is that of the Tacoma Grain Co., controlled by the Centennial Flouring Mills Company, which also has a 1,000-barrel mill at Spokane, a 400-barrel mill (Columbia Milling Co.) at Portland, and other small mills at Wenatchee, Ritzville, and Reardan. Fisher Flouring Mills Co. has the principal mill at Seattle, with 6,000 barrels daily capacity—the largest in the region. At Astoria, near Portland, a 3,400-barrel mill is owned and operated by Pillsbury-Astoria Flour Mills Co., a unit of the Pillsbury Flour Mills Co. Crown Mills, at Portland, with a daily capacity of 2,700 barrels, are operated by Balfour, Guthrie & Co. The Terminal Flour Mills Co. has a 1,500-barrel mill at Portland, and a 600-barrel mill at Moscow, Idaho, is controlled by the same interests. Kerr Gifford & Co. operate Albina Mills at Portland, with a daily capacity of 850 barrels. At Spokane, in addition to the Sperry and Centennial plants mentioned, the Spokane Flour Mills have an 800-barrel mill.

Outside the principal centers, where there are several small mills in addition to those mentioned, the territory has a few lesser milling centers. At Pendleton, Oregon, there are the 1,000-barrel plant of the Western Milling Co. (controlled by Preston-Shaffer Milling Co., which has smaller mills at Waitsburg, Athena, and Freewater); the 950-barrel plant of the Collins Flour Mills, whose owner is now the active head of Pacific Continental Grain Co.; and a 500-barrel plant of the Walters Flouring Mills. At The Dalles, Oregon, there are the 1,600-barrel plant of the Wasco Warehouse Milling Co. and the 550-barrel plant of the Diamond Flour Mills, controlled by Kerr Gifford & Co. At Cheney, Washington, the F. M. Martin Grain and Milling Co. has a 1,000-barrel plant. In addition a good many smaller mills remain in the Pacific Northwest, but their number and relative im-

portance have diminished in the past twenty years.

The mills face unusually complex problems because of the great variety of wheats that are available to them, the limited local supplies of good milling wheats, the "surprise packages" that turn up in purchases of sacked wheat, the lack of satisfactory hedging markets, and the divergent character of the markets for which they produce, as well as their heavy dependence on export markets which are subject to disruption. They have learned how the different wheats of the region will mill, and where the different ones can be had year by year. A considerable number of the wheats are separately binned, partly on the basis of protein analyses; and a large number of different mixes are used in addition to export straights. Their problems with respect to technical operation are more complicated than those of British mills, and strikingly more so than are usually those of American mills at Minneapolis, Buffalo, and Kansas City.

The export houses, and the millers of the region as well, vary in degree of strength in particular branches of the trade, though the variation does not amount to intensive specialization. Different ones often predominate in the trade with China (for the mills as between North and South China), Japan, the Philippines, Central and South America, Ireland, Great Britain, and in domestic shipments of wheat and flour to California and to the Atlantic seaboard and Gulf ports.

In the early years, the grain trade of the region was largely in the hands of the exporting firms. Beginning about 1890, however, other grain buyers entered the business. Some of these were absorbed by the export houses, but for many years there have been a considerable number of independent dealers who buy in the interior and sell to millers and exporters. The mills have long bought wheat in the interior, and some of them have lines of country warehouses; but they also buy from exporters and other dealers.

The North Pacific Grain Dealers Association is a large and active organization. At a meeting in June it adopts a schedule of discounts for different grades and of dockages,

<sup>1</sup> One of its Tacoma plants was formerly that of the Puget Sound Flouring Mills Co.

a differential between bulk and sacked wheat, standard charges for interest and for cleaning smutty wheat, and other rules of the trade. This schedule, which is sometimes modified during the year,<sup>1</sup> is customarily adopted by the Merchants Exchanges of Seattle, Tacoma, and Portland.

Co-operation in grain marketing has long had a place in the Pacific Northwest. Until within the last few years, this consisted for the most part of the ownership and operation of local farmers' co-operative warehouses. Sales of grain stored there were long made, as a rule, through the regular grain trade. In recent years, many of these local grain co-operatives have joined the federated body known as North Pacific Grain Growers, Inc., which now has sixty-one local units.

In turn the North Pacific is a member of the Farmers National Grain Corporation, which was founded under the auspices of the Federal Farm Board in 1929. In the National the North Pacific now owns, fully paid, about 20 per cent of the outstanding stock, with a par value of \$220,400. Co-operative grain is extensively marketed through the Pacific Coast Division of the Farmers National, which is therefore a dealer and (to a small extent) an exporter. It has its main offices at Portland, branch offices at Seattle and Spokane, and sales offices in San Francisco and Los Angeles.

In 1930-31, the Farmers National, through a subsidiary, Farmers National Warehouse Corporation, acquired a considerable line of country warehouses and elevators, with the aid of Farm Board loans. At the time, there

<sup>1</sup> This year the discount on bulk wheat as compared with sacked was initially raised to 4 cents from 3 cents, at which it had stood for several years except as reduced to 2 cents in December 1932. In July, however, the 3-cent differential was restored, in view of the removal of the compensating tax on jute sacks. Pacific Northwest interests were active in pressing for the removal of this tax, which had amounted to about 2 cents a sack.

<sup>2</sup> See *Cooperative Comment*, June 1934.

<sup>3</sup> The general manager of the North Pacific reported to its board of directors on April 30: "The officers of North Pacific were working faithfully towards the transfer of these facilities to the locals, but some differences in values and certain contractual requirements in the application for purchase of the facilities had yet to be overcome."—*Cooperative Comment*, May 1934.

was strong feeling among Pacific Northwest co-operatives that such facilities should be owned and operated by the local units. Financial considerations, however, supported the Farmers National leaders in the policy adopted. North Pacific Grain Growers, Inc., however, secured the right to receive ½ cent per bushel on co-operative grain warehoused in facilities of the Farmers National,<sup>2</sup> and this has proved a profitable contract which it is reluctant to surrender. The demands for storage facilities in the past two years have been such that both the Farmers National and the North Pacific have received substantial income from their operation. In the winter of 1934, the Farmers National reversed its policy and offered to sell its facilities to the local co-operatives. Up to May 1, 1934, however, only two of the locals had yet agreed on terms.<sup>3</sup>

Our summary from lists kindly furnished by these organizations yields (with some approximations of our own) the following for country-storage facilities owned and operated in 1933-34 by North Pacific locals and the Farmers National:

	Sack	Bulk	Total
Points represented:			
North Pacific . . . . .	68	24	76
Farmers National . . .	73	29	76
Number of units:			
North Pacific . . . . .	101	27	128
Farmers National . . .	110	31	141
Capacity (thousand bu.):			
North Pacific . . . . .	7,725	2,196	9,921
Farmers National . . .	9,685	2,786	12,471
Both . . . . .	17,410	4,982	22,392

Together, the local co-operatives and the Farmers National appear to operate about one-fourth of the country-storage facilities in the Pacific Northwest. With new construction undertaken this year (see above, p. 380), their proportion of total country-elevator capacity may be considerably larger. The Farmers National also has terminal elevators at Spokane (700,000 bushels) and Longview (313,000 bushels bulk; 62,000 bushels sack), but no facilities in the principal terminal ports.

WHEAT PRICES

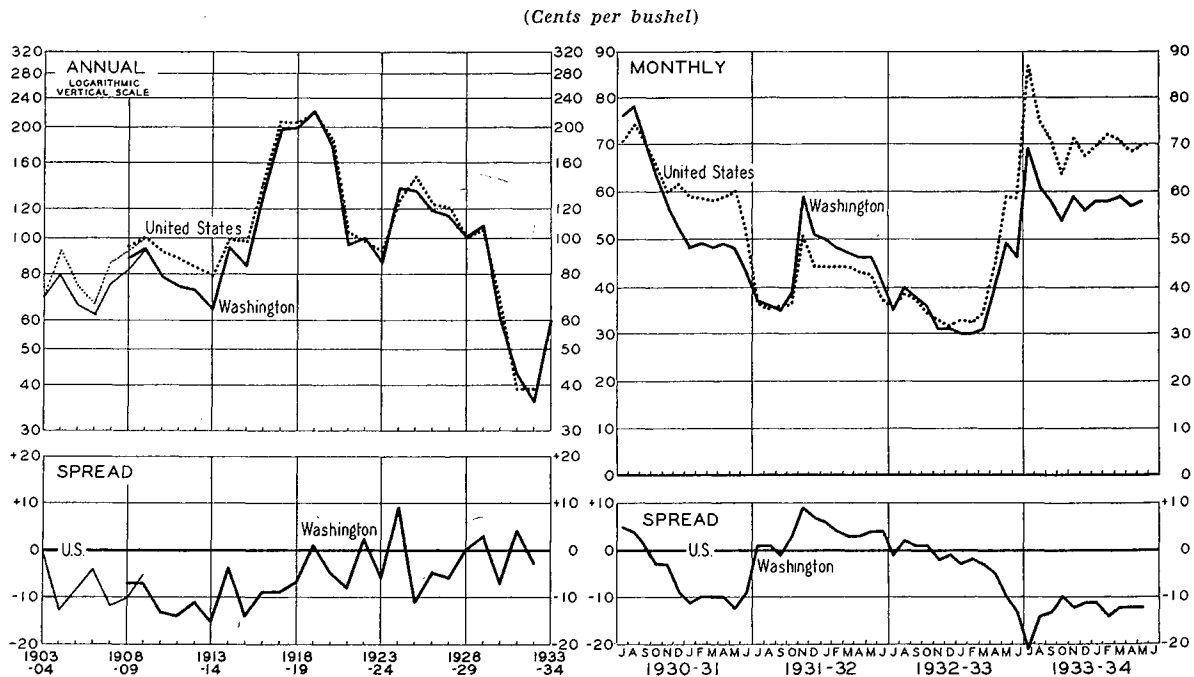
The general course of wheat prices in the Pacific Northwest is serviceably indicated by data on farm prices—which virtually represent values in the sack at country stations. The course of farm prices of wheat in Washington may be regarded as fairly representative of the entire wheat-surplus territory. Oregon prices average a little higher, chiefly because of the inclusion of the Willamette Valley, which is on the whole a deficit area. Prices in northern Idaho are but little lower than those in Washington; in Idaho as a whole prices average several cents lower, reflecting mainly the weight of prices in southern Idaho, where most of the surplus is in the intermountain region.

Weighted annual average farm prices of wheat in Washington are shown for a period of years, on a logarithmic or ratio scale, in the left-hand portion of Chart 8 in compari-

movements, (a) the pre-war slump from a peak in 1909–10 to a low in 1913–14; (b) the great advances during the war; (c) the post-war slump to levels that seemed very low by contrast; (d) the striking recovery in 1924–25, and maintenance of a high level in 1925–26 when the United States crop was short; (e) the gradual decline in the next four years; (f) the striking fall in 1930–31 and subsequent years to extremely low levels in 1932–33; and (g) the recovery in 1933–34 to a level 50 per cent higher though not as high as in 1930–31.

The right-hand portion of this chart shows monthly average prices in Washington and the United States as a whole during the past four crop years. Practically throughout this period farm prices of wheat in Washington have been below the average for the five years preceding the war—at their lowest only about 40 per cent of the pre-war average, and during

CHART 8.—ESTIMATED AVERAGE FARM PRICES OF WHEAT IN WASHINGTON AND THE UNITED STATES, AND SPREADS BETWEEN THESE, BY CROP YEARS FROM 1903-04 AND BY MONTHS FROM JULY 1930\*



\* Data in Tables XVIII and XIX. For years prior to 1908-09, December 1 average farm prices are used.

son with the corresponding averages for the United States as a whole (December 1 averages for 1903–07). These curves show, in addition to the broad similarity of the price

the past year of improved prices about 75 per cent of the pre-war average. Striking features revealed by the chart are (a) the drastic fall in the last five months of 1930,

when the world market declined heavily; (b) the effect of support subsequently given by Grain Stabilization Corporation purchases; (c) the marked advance under the stimulus of elimination of the current surplus through the sale to China for relief uses announced in September 1931;<sup>1</sup> (d) the decline to fresh low levels in 1932-33; (e) the advance in the spring of 1933 under the influence of crop scare, inflation talk, and speculation, culminating in an extreme peak in July 1933; and (f) the fall from this peak followed by semi-stabilization under the influence of crop shortage east of the Rockies and the operations of the Emergency Export Association. It was during the slump from the peak of July 1933 that, fearing its continuation to low levels approaching those of 1932-33, practically all wheat interests joined in urging another form of price support such as had been granted twice in the three preceding years.

As the spreads shown in Chart 8 suggest,<sup>2</sup> there is no normal relationship between prices of wheat in the Pacific Northwest and those in the great markets of Chicago, Minneapolis, and Kansas City, in the sense that holds over a period of years or even of months. A great many different factors cause the spreads to vary. Each year presents a different combination of conditions, and these change more or less during a season as well as over a period of years. A few examples will suggest the nature of these conditions.

In the years shortly preceding the war, the spread was wide because the Pacific Northwest had a substantial surplus, which had to move largely to Europe by the long and expensive route around the Horn. The narrower spread in the later war years was due to much smaller surpluses in the Pacific Northwest, and their shipment mainly east by rail at rates that had not yet been raised.

In the post-war years the Pacific Northwest averages have run closer to the national average. In six years out of the past fifteen, indeed, the average for Washington was equal to or above the national average; this was

true in 1919-20, 1922-23, 1924-25, 1928-29, 1929-30, and 1931-32. The exceptional relationship in 1924-25, when the Washington average farm price was substantially above the United States average, was due to the fact that the Pacific Northwest had a very short crop while prices in most of the country were at low export parity. Only two instances occurred in which the Washington average was more than 7 or 8 cents under the national average. These were 1925-26 and 1933-34, both years of short crops east of the Rocky Mountains; the Pacific Northwest had relatively big supplies, and the national average was 11 or 12 cents higher than that of Washington. For the five crop years from 1928-29 to 1932-33, the Washington average was almost identical with the national average.

This change in relative levels is due to several factors. With extensive use of the Panama Canal, the Pacific Northwest is much nearer, in an economic sense, both to European markets and to Atlantic and Gulf markets. Farm prices in the rest of the country are more affected by the higher post-war level of railway freight rates. The average farm price for the country as a whole is also somewhat depressed by the westward extension of wheat growing in the Grain Plains states. The post-war development of Oriental outlets for wheat and flour has also been a factor supporting prices in the Pacific Northwest. If and when, however, that region has a substantial surplus while in the rest of the country prices are held well above export parity—whether because of limited supplies as in 1934-35 or because of firm holding as in 1930-31 and 1933-34—the Pacific Northwest cannot expect its prices to share fully in the strength of other markets.

In recent years, the wide spread in the latter half of the crop year 1930-31, contrasting sharply with the narrow spread in the earlier part, was due to the fact that stabilization operations were conducted on a basis that supported prices in the rest of the country considerably more than in the Pacific Northwest.<sup>3</sup> The narrow spread in 1931-32, with Washington farm prices mostly above the national average, was due to the moderate crop in the Pacific Northwest, heavy sales to

<sup>1</sup> See WHEAT STUDIES, January 1932, VIII, 216, 226-27; December 1932, IX, 110-11.

<sup>2</sup> See also Chart 17, p. 408.

<sup>3</sup> See WHEAT STUDIES, December 1931, VIII, 151-54.

China under the relief loan, and very low levels of prices in the rest of the country after the cessation of stabilization purchases. The moderate spread in 1932-33 was mainly attributable to extensive farmer holding of wheat in the Pacific Northwest.

The spread widened in the spring of 1933 when, under the influence of crop disasters in the rest of the country and other factors affecting the speculative markets, prices in the major markets advanced greatly while Pacific Northwest markets, facing a huge carry-over, a good new crop, and very low export prices, followed only in part. This tendency culminated in July 1933, when the spread was extraordinarily wide for a brief period. After the collapse of the speculative advance, however, the spread promptly narrowed. Through the rest of the year it was wide because of the contrast between liberal supplies in the Pacific Northwest and short production in the rest of the country, though it presumably would have been a few cents wider (see below, pp. 409-10) if the export subsidy plan had not been discussed and then put into operation. The spread in the present crop year will again be wide, for, even though the Pacific Northwest crop is small, there is a surplus to be disposed of, and in the rest of the country supplies are unusually short.

What is true of average prices of all wheats in the Pacific Northwest, as reflected in the farm prices just discussed, is also true of the several types of wheats in the Pacific Northwest. From year to year, premiums on the various milling wheats as contrasted with the export wheats vary widely. This is due partly to the variations in the relative abundance of the different wheats in the crop, partly to variations in their respective qualities, partly to variations in the export demand for wheat and flour, and partly to variations in the domestic outlets. There is no persisting normal relationship.

Premiums on hard white wheats, for example, are not uncommonly 10 to 15 cents a bushel over export white wheats. If the crop of hard white is short and export wheats are abundant, the premium may be much higher. For several weeks in the winter of 1928-29,

the premiums ranged between 30 and 34 cents. If opposite conditions obtain, the premium may fall to 3 cents or below. An extreme instance occurred in the winter of 1926 when, under pressure of eastern demands for low-protein wheats from the Pacific Northwest, soft whites sold at a premium over hard white.<sup>1</sup> Other premium wheats are Dark Hard Winters, 12 and 11 per cent protein. Sometimes, as in 1933-34, this 12 per cent protein wheat sells above the hard white, and even an 11 per cent may be as dear or dearer. In general, price-supporting operations on export wheats, such as those of three of the past four crop years, naturally serve to diminish premiums on the milling wheats. In the past year, partly because of the large crop of hard white, premiums fell from around 9 or 10 cents a bushel in the early weeks of the season to 3 cents or lower after the export association began operations.

Formerly soft red winters (Western Red) sold at a discount. The expansion of the poultry industry in the Pacific Northwest, the decline in the regional production of soft red winter wheats, and the relative increase of a better variety of these wheats (Triplet) have led to reduction or elimination of this discount,<sup>2</sup> and occasionally to a premium on Triplet for feed use.

Smut is responsible for major discounts and dockages. A convenient index of the varying importance of smut is afforded by the following percentages of total wheat receipts at Columbia River terminal markets on which over .5 per cent of smut dockage was assessed:

Year	Per- cent- age	Year	Per- cent- age	Year	Per- cent- age
1919-20..	16.0	1924-25..	40.3	1929-30..	10.0
1920-21..	9.3	1925-26..	13.8	1930-31..	15.9
1921-22..	18.7	1926-27..	23.2	1931-32..	39.6
1922-23..	25.3	1927-28..	17.1	1932-33..	15.5
1923-24..	28.7	1928-29..	5.6	1933-34..	11.4

Statistics by types show that dockage of over .5 per cent as assessed is usually heaviest on soft red winters, heavy also on white wheats,

<sup>1</sup> *Commercial Review*, February 9, 1926, p. 11.

<sup>2</sup> They are now deliverable on futures contract without discount, whereas prior to 1933 they were subject to a discount of 3 cents a bushel.

considerably lighter on hard red winters, and slight on hard red spring. Percentages subject to dockage for smut, including that under .5 per cent, run considerably higher—usually over a fourth and often over a third of the total receipts. On all receipts subject to smut dockage, the average dockage ordinarily varies from 1.30 to 1.45 per cent.<sup>1</sup>

#### FUTURES TRADING AND HEDGING

The conditions just discussed help to explain why futures markets in the Pacific Northwest have not been successfully developed, and why hedging can be practiced by mills and merchants there only to a limited extent and by no means satisfactorily. Hedging serves to minimize risks of holding wheat where fluctuations in prices of particular types of grain in a particular cash market can be expected broadly to parallel fluctuations in the futures market chosen for hedging. Experience shows, however, that Seattle and Portland prices of even the commonest types of wheat do not fluctuate in close harmony with futures prices in Chicago or Liverpool. At best, therefore, such hedging can afford only a limited protection, and frequently price divergences are so marked that efforts to hedge increase rather than diminish the risks.

A futures market was established in Seattle in January 1926, and one in Portland on April 30, 1929.<sup>2</sup> The volume of trading on both is insignificant in comparison not only with that on most other futures markets in the United States, but with the size of the crop in the tributary area. The volume of futures trading on the Chicago Board of Trade in a crop year usually exceeds ten times the crop of the United States. The volume of trading in Seattle and Portland combined, at its peak in 1929-30, was only about 40 per cent as large as the crop of the Pacific Northwest. Because of the limited area served by these two Northwest futures markets, and the special risks involved in trading there, specu-

lators have not been attracted to them. Since the volume of speculative trading is so limited, the markets afford unsatisfactory facilities for hedging. This was true even more during 1933-34, when purchasing by the export association dominated price movements there during a considerable part of the crop year, and anticipation of its operations increased the risks of futures trading for two or three months before it began to function.

The practice in regard to hedging in the Pacific Northwest varies a good deal among different millers and dealers, and to some extent from year to year. Until recent years, hedging in that territory was distinctly exceptional, and some mills and dealers make no attempt to practice it even now. Routine hedging, such as is commonly practiced by millers and dealers in much of the rest of the country, is very exceptional in the Pacific Northwest, if indeed it exists. At least in its early years the Farmers National Grain Corporation made a practice of hedging all its holdings, including those in the Pacific Northwest, using for the most part the Chicago futures market. The results of its experience in this respect have not been made public. In general, exporters have sought to make sales for export and then promptly cover them by purchases, adjusting their sales offers so as to take care of what they could ordinarily expect to purchase at a suitable price. For some years at least, under more normal export conditions than have recently prevailed, exporters would make forward sales before harvest and carry the risks of covering them by purchases when the grain began to move. Flexibility in their operations was afforded by their practice of receiving wheat "on consignment," subject to later decision by the grower as to the time of definitive sale.<sup>3</sup> Millers as well as exporters have sought to maintain as nearly an even position as possible. Various millers, however, do some hedging—occasionally on the Seattle futures market, more rarely if at all in the Portland market, more often in eastern markets. Montana wheats shipped into the Pacific Northwest are commonly hedged in the Minneapolis futures markets. At times a little wheat in the Pacific Northwest may be hedged in Liverpool.

<sup>1</sup> Data of Federal Grain Supervision, Portland, furnished by R. L. Baldwin.

<sup>2</sup> *Commercial Review*, May 7, 1929, p. 3.

<sup>3</sup> This is essentially the same practice as that under "price-to-be-fixed" contracts in Argentina, which has been in vogue there until recently.

Under some conditions the eastern futures markets afford a valuable "cushion" if not what may be strictly called a hedge. When in July 1933 prices skyrocketed in Chicago, and the spread between Chicago and Seattle-Portland futures ran above 20 cents a bushel, Pacific Northwest merchants and millers bought cash wheat and sold Chicago futures against it. At least one large grain firm there made a large proportion of the year's purchases during that period of high prices and would have bought more if farmers had been more willing to sell. It was convinced that with such a cushion it could offer attractive bargains to Gulf, southeastern, and Atlantic Coast mills, and that once the wheat were introduced to these mills they would continue to use it in their blends even in the absence of bargain prices. The plan worked, and a considerable part of the wheat shipments to Atlantic-Gulf ports during the year were sold under the protection of such hedging sales made in Chicago early in the summer of 1933. Probably a fair part of the flour sales to eastern seaboard were similarly protected.

During the present crop year, when a large proportion of the Pacific Northwest surplus is likely to move east (as it did in 1904-05, in some war years, and in 1925-26), merchants and millers there are likely to make much greater use of eastern futures markets than is customary.

#### OUTLETS, DOMESTIC AND FOREIGN

Satisfactory statistics of disposition of the crop of the Pacific Northwest are lacking, as for supplies of the region proper. What one would like to get is some such statement as indicated below:

Carryover .....	...
Crop:	
Washington .....	...
Oregon .....	...
Northern Idaho .....	...
Inshipments:	
Montana .....	...
Other .....	... ..
Local use:	
Seed .....	...
Food .....	...
Feed .....	...

Domestic shipments:	
East by rail .....	...
California .....	...
Atlantic Gulf .....	... ..
Shipped to possessions:	
Alaska .....	...
Hawaii .....	... ..
Exports:	
Philippines .....	...
Europe .....	...
Orient .....	...
Central and South America ..	...
Other .....	... ..
Carryover .....	... ..

With certain items available from official or trade sources, the preparation of some such statement is attempted by millers and others in the trade. Even these, however, admit uncertainty as to important elements, and their estimates vary one from another and are not easily reconciled with available official data. Perhaps the largest error lies in feed use, but on several others discrepancies may be wide.

The total quantity used for seed depends largely on the acreage sown. This, however, varies greatly, and much more than the acreage harvested. When seeding conditions permit heavy sowings in the fall, and winter conditions are favorable, little reseeded is necessary and seed use is moderate. On the other hand, when a large percentage of the fall-sown wheat is abandoned and reseeded in the spring, seed use is heavy. The past two years afford a contrast: in 1932-33, when abandonment was very heavy, some 9 million bushels were used for seed in the three states; in 1933-34, when abandonment was light, about 7 million.<sup>1</sup> For each of the crops of 1927-29 the three states used about 7.3 million bushels for seed, and this may be taken as a roughly normal figure which may be materially exceeded in bad years for fall-sown wheat. Excluding southern Idaho, the ordinary total probably lies between 5 and 6 million, though trade estimates are generally lower.<sup>2</sup>

Even the amount of flour used in the Pacific Northwest proper has not been closely ascertained. At the census of 1930 the population

<sup>1</sup> A similar contrast, at a slightly lower level, appears between 1924-25 and 1925-26. Estimates of U.S. Department of Agriculture.

<sup>2</sup> See above, pp. 375-76.

of the Pacific Northwest (including northern but not southern Idaho) was 2,637,122. We infer that per capita flour consumption in the area is rather above than below the national average, and that for 1929-30 the total may have been 11 or 12 million bushels.

A large and increasing fraction of the wheat in the Pacific Northwest is fed to poultry, particularly in western Washington. The amount varies more or less according to the relative prices of wheat and corn, since barley has too much fiber to be fed efficiently. During the worst of the depression, when wheat was exceptionally cheap, farmers of the region rapidly increased their livestock as a means of disposing of their wheat, and considerable amounts were fed to hogs and cattle. When in 1933, however, wheat rose in price, the proportion used for poultry diminished and many farmers got rid of their other livestock. In 1933-34, at prices strengthened by the export subsidy, farmers found wheat too dear to feed much to hogs and cattle; and many farmers in the region reduced their swine so much that they were able to take advantage of corn-hog allotment contracts without further reductions.

According to estimates of the Bureau of Agricultural Economics, feed use on wheat farms in the three states from the crops of 1924-28 ranged from 4,130,000 bushels from the very small crop of 1924 to 7,546,000 bushels from the bumper crop of 1927, and averaged 5,693,000 bushels, or 6.8 per cent of the average crop. In 1932-33, when prices were lowest, wheat fed on farms was estimated to have reached 13,096,000 bushels, or 14.4 per cent of the crop; and in 1933-34, at prices still regarded as low, feed use on wheat farms in the region was forecast at 11,434,000 bushels, or about 14 per cent of the crop. Such figures presumably materially understate the total feed use of wheat in the three states. Though feed use on wheat farms is especially heavy in southern Idaho, in some years the amount used for feed in the Pacific Northwest proper may exceed that used for food there. Clearly, variations in feed use significantly affect the amount of the region's surplus for disposal outside the area.

The principal inshipments are from Mon-

tana, of high-protein hard wheats (mostly hard red spring), with a little durum sometimes from as far as Minneapolis. Occasionally some wheat comes in from southwestern Idaho, but in the past decade shipments to that section from Oregon or Washington have been more common. There is usually some small movement east by rail, of special types for special purposes. Heavy eastward shipments by rail are exceptional nowadays. They were important in 1925-26, when soft white wheats moved east in substitution for soft red winter. This summer an unusual development is the rail shipment east of hard white wheats in fair volume.

Shipments by water to California, of both wheat and flour, have long been heavy. For a decade before the war, wheat grain predominated in these shipments (Table XII). At its pre-war peak, this movement exceeded 13 million bushels of wheat and flour combined. After the war the movement was generally lower, and flour shipments usually predominated. In 1931-32 and 1933-34, however, the pre-war peak was passed and wheat shipments again exceeded flour shipments. The volume of this movement by months in the past four crop years is shown in Chart 9 (p. 390). The reduction in 1933-34 was due primarily to a larger crop in California.

For fifty years Pacific Northwest millers have sold flour in the Southeast (particularly the Carolinas) and on the Atlantic seaboard. Before the war this flour moved by rail, but rates were too high to permit heavy movement.<sup>1</sup> The commercial effects of the opening of the Panama Canal were delayed by the war and the consequent shortage of shipping. In the depression following the post-war boom, when rail rates had been raised, water rates to the Atlantic seaboard sank to only a fraction of pre-war rail rates,<sup>2</sup> and for some time were around 65 to 70 cents a barrel to New York. In recent years rates have fallen lower.<sup>3</sup> Flour shipments by water to Atlan-

<sup>1</sup> Cf. article on Seattle in *Northwestern Miller*, August 7, 1929, p. 512.

<sup>2</sup> The rate to New York was \$1.10 per 100 pounds, or over \$2.00 a barrel, shortly before the opening of the Panama Canal.

<sup>3</sup> Interoceanic Conference rates on flour from Pacific Northwest ports via the Panama Canal to Atlantic and



tic and Gulf ports rose to 83,000 barrels in 1921-22. Table XIII shows the subsequent growth in this movement, and the striking increases registered in 1924-25 and in the past two years.

In the past year, for the first time, grain shipments east by water to Atlantic and Gulf ports have been important.<sup>1</sup> In spite of the operations of the export association this movement reached 5 million bushels, exceeding wheat shipments to California. The movement continued until, in May, the port tie-up stopped it. Apparently most of the wheat went to Gulf ports, with quite a little to the southeastern seaboard.

Flour shipments east in 1933-34 were nearly twice as large as the wheat shipments, and far larger than ever before (Table XVII). Shipments east of wheat and flour combined exceeded shipments to California for the first time in history, and approached the record shipments to California in the two preceding years. The destinations of flour shipments are broadly indicated by the record for July-September 1933. That total, about 510,000 barrels, was well distributed along the Atlantic seaboard, with small quantities to a few Gulf ports. Summary figures are as follows:<sup>2</sup>

Ports	Barrels	Percentage of total
New York .....	225,565	44.2
Other North Atlantic.....	183,063	35.9
Baltimore to Jacksonville..	92,101	18.1
Gulf (including Memphis)..	9,207	1.8

New York led, with 44 per cent of the total. The other most important receiving markets were Boston, Philadelphia, Newark, and

Gulf ports have been established as follows, in cents per 100 pounds:

Effective date	Atlantic	Gulf
May 15, 1926.....	30	..
July 15, 1928.....	33	..
Sept. 15, 1931.....	25	..
April 1, 1929.....	..	33
May 1, 1932.....	28+3%	..
July 25, 1934.....	29	29

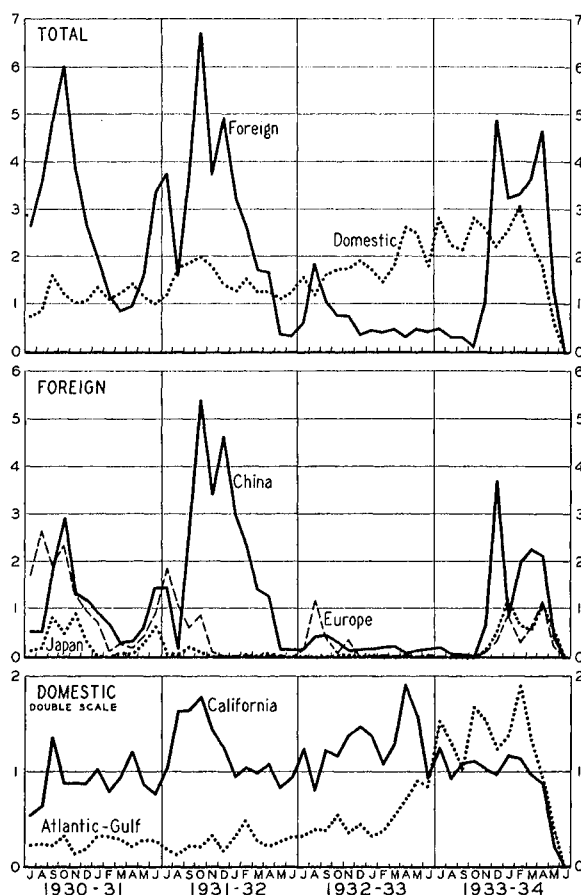
The rates are the same from all Pacific Coast ports to all Atlantic ports and to all Gulf ports, except sometimes for small variations in the case of minor ports of destination.

<sup>1</sup> For special reasons, see above, p. 388.

<sup>2</sup> Summarized from *Commercial Review*, October 31, 1933, p. 12.

Charleston. Nearly two-thirds of the total was shipped from Columbia River ports. Such shipments are of various types, but mainly weak flours for pastry and biscuits.

CHART 9.—WATER SHIPMENTS OF WHEAT AND FLOUR FROM THE PACIFIC NORTHWEST, EXPORT AND DOMESTIC, MONTHLY 1930-31 TO 1933-34\* (Million bushels)



\* Data in Table XVI.

The eastward movement by rail and water bids fair to be still heavier in the present crop year, as a result of extreme crop shortage due to the drought. Efforts are being made to get the railroads to reduce rates from the Pacific Northwest so that they may get a larger share of the business. It is also reported that official steps are in contemplation to influence the distribution of this wheat so as to moderate its competition in certain areas, and also to negotiate a sort of exchange of Pacific soft white wheats for Canadian durum.

The broad course of exports from the Pacific Northwest has already been presented in Charts 3 and 4 (pp. 367 and 368). In Chart 9 are shown monthly unofficial data on exports to certain major areas in the past four crop years, in comparison with domestic water shipments. Europe, formerly the major customer (see Table XI), has taken much less in recent years. Shipments to the Orient have varied widely from year to year, but on the whole increased in relative importance. China and Japan are usually the principal customers, Japan for wheat and China for varying proportions of wheat and flour. Heavy shipments to China in 1931-32 were the result of the Farm Board loan to finance the purchase of 15 million bushels of wheat for famine relief, for which by no means all of it was used.<sup>1</sup> Similarly, an RFC loan to China has been responsible for China's predominance in the export trade of 1933-34.

The Philippines have become a substantial market for flour of high grade, in sharp distinction from the lower-grade "export straights" that predominate in flour exports to China. In recent years, Australian and Japanese millers (who operate with a drawback of the duty on imported wheat) have "invaded" the Philippine market as well as that of China; and Pacific Northwest exports

to that market have declined in spite of the protection afforded by a duty of 42 cents a barrel.

Export shipments of flour are made from the Pacific Northwest to a great variety of destinations, including many in Central and South America and the West Indies; and to some of these, notably Salvador and Peru, some wheat grain is exported. This trade too has shrunk in recent years, with less cheap wheat and flour available in this country, with erection of higher foreign barriers to imports, and with lower purchasing power in the several importing countries during the depression.

Export shipments shrank in 1932-33 to their lowest point since 1890, with the sole exception of the war year 1916-17 when the Pacific Northwest had a small crop and ocean shipping rates were extraordinarily high. The extreme drop in exports in 1932-33 occurred, on the contrary, in the face of abundant supplies in the region and exceptionally low ocean freights. It was due to the fact that, for a combination of reasons,<sup>2</sup> export prices were so extremely low that growers in the Pacific Northwest would not sell at prices that dealers could pay and then sell the wheat abroad. This situation led to the agitation for an export subsidy in 1933-34.

## V. EMERGENCE OF THE EXPORT ARRANGEMENT

### THE IMMEDIATE BACKGROUND

During 1932-33, as we have seen, wheat prices fell to unprecedentedly low levels in the Pacific Northwest. The crop of 1932 was not exceptionally large. The export situation, however, was distinctly unfavorable, especially because Australia had harvested three huge crops in 1930-32 and sold wheat heavily in Oriental markets. Though wheat farmers of the region were generally hard pressed for cash, they held on to such wheat as they could, and creditor banks generally supported them rather than lose by pressing them to

sell. Unusually large amounts were fed to livestock in the area, particularly as farmers in the wheat regions increased their livestock operations (especially hogs) as a means of marketing the wheat crop. Throughout the year, consequently, market prices of wheat were above levels that would permit free commercial movement into export; and exports of wheat and flour to foreign ports (exclusive of the Philippines) reached only 6.2 million bushels. As in 1931-32, California took heavy shipments—nearly 15 million bushels—and over 6 million bushels (chiefly flour) were shipped to Atlantic and Gulf ports. Shipments to Alaska and Hawaii were of normal size, but small in total. To the Philippines, where Australian competition increased in spite of the restrictive duty of 42 cents per

<sup>1</sup> See WHEAT STUDIES, December 1932, IX, 110-12.

<sup>2</sup> See our "Review of the Crop Year," in WHEAT STUDIES, December 1933, X, 92-97, and corresponding "Reviews" for preceding years.

barrel, exports were well below the average of recent preceding years. (See Charts 8 and 9, pp. 384 and 390, and Tables XI–XIII.)

In spite of heavy feed use and exceptionally liberal sales to other domestic markets, the regional carryover was unprecedentedly large. A commonly accepted trade estimate of the carryover on July 1, 1933, is 25 million bushels, exclusive of stocks on farms which are considered negligible from a commercial standpoint. For the three states of Washington, Oregon, and all of Idaho, the sum of official estimates (as now standing) of stocks on farms, at country stations, in mills and mill elevators, and in commercial stocks is 39,850,000 bushels, including 6,497,000 on farms (Table XVII). This was nearly 50 per cent larger than the corresponding figure for 1930, when farmers had held firmly in the face of extreme price declines; and 11 million bushels above the previous record carryover of recent years, that of 1931, when the Grain Stabilization Corporation had acquired most of it. The 1933 stocks were heavy in all four positions, and probably of record size except in terminal positions where the stocks of 1931 were far larger. While stocks in southern Idaho were probably especially large, it seems probable that the carryover of the Pacific Northwest proper was between 30 and 33 million bushels, and represented over 40 per cent of the preceding crop.

An adverse winter in 1932–33 caused extremely heavy abandonment of fall-sown wheat acreage, but a favorable spring made possible extensive reseeding; and continued favorable conditions resulted in a fairly good crop, nearly as large as in 1932 though well below those of several preceding years. In some sections of Washington, in particular, the crop was really large; this was the case in the Big Bend area which produces much hard white wheat (mostly Baart). With a record carryover, surplus supplies appeared as big as in some previous years of large crops, when export outlets were readily available. Estimates of the surplus for export, even after liberal shipments to California and the East, and allowing for a reasonable outward carryover, were commonly put at 40 million bushels.

Sharp advances in Chicago wheat prices took place in April–May and from mid-June to mid-July, chiefly under the joint influence of crop disaster to winter wheat and part of the spring-wheat crop (especially South Dakota), the abandonment of the gold standard and inflationary measures, and speculative enthusiasm based largely on these developments. In the Pacific Northwest, those advances were followed enough to put the region farther out of line for export, but not enough to prevent the development of unusually wide discounts under Chicago prices. Shipments to Atlantic and Gulf ports consequently increased in April–June, and much more in July, when the discounts reached their peak before the speculative collapse late in the month. (See Chart 9, p. 390, and Chart 16, p. 407).

In an effort to promote export sales, the Reconstruction Finance Corporation established on June 5 a credit to the Chinese government authorizing it to borrow \$50,000,000 for purchase of raw cotton and wheat and flour. Of this total, \$10,000,000 was earmarked for the purchase of wheat and flour (naturally to be secured in the Pacific Northwest); at least 40 per cent of this was to be used for purchase of flour, and at least half of the shipments were to be made in vessels flying the American flag. Up to the end of October, however, the Chinese government made no use of this part of the loan. China had had a good wheat crop and a big rice crop. Australian wheat (and even Argentine to some extent) was selling freely in Chinese ports at c.i.f. prices well below market prices in Portland and Seattle. It seems safe to infer that China deferred its purchases under the loan in the hope of making them later at lower prices. Exports during July–October, to all destinations, continued to run at extremely low levels (Chart 9, p. 390, and Table XV).

Under these circumstances practically all interests in the Pacific Northwest joined in urging the opening of export channels by resort to some form of bounty or subsidy. Wheat growers of the region sought what they regarded as their fair share of the advance in wheat prices, and feared that, unless exports were subsidized, wheat prices would

fall to export-parity levels approaching the disastrously low prices that had prevailed in 1932-33. Grain exporters wished to avoid repetition of the extremely unsatisfactory export season of 1932-33, and saw no prospect of liberal or large exports except with government aid. Both growers and exporters faced serious congestion of storage facilities at numerous shipping points unless exports could be thus "facilitated." Bankers serving wheat growers, directly or indirectly, feared the effects of lower prices on their loans, and were eager to see wheat prices raised by means of an export subsidy. Millers in the region also supported the move, provided it could be put through in such a way as to maintain or increase, instead of handicapping, their flour trade with foreign and other domestic markets. Furthermore, grain and milling interests in the Southwest, East, and Southeast raised their voices in support of such a move in order to prevent or at least check the "invasion" of their usual markets by Pacific Northwest wheat and flour in large volume.

The North Pacific Grain Growers and the North Pacific Grain Dealers Association took the lead in pressing for prompt and effective action. The wheat growers, broadly speaking, had been for years in favor of farm relief by one means or another. They had supported the McNary-Haugen plan, welcomed the export debenture plan as an alternative, accepted the Farm Board's stabilization operations, urged another scheme when these were about to be discontinued, and were ready to support any move that promised better prices for wheat. The exporters had been intermittently urging government action of some sort since November 1932.<sup>1</sup>

#### FORMULATION OF THE AGREEMENT

To sell for export for less than in the domestic market has long been considered "dump-

<sup>1</sup> See editorial in *Commercial Review*, October 10, 1933. Mr. E. A. Boyd of the dealers' association was very active in this effort.

<sup>2</sup> See J. S. Davis, *The Farm Export Debenture Plan* (Food Research Institute, 1929), chapter ix. Last spring the Secretary of the Treasury refused to apply an additional duty on rye imported from Poland with the aid of an export bounty.

<sup>3</sup> See *WHEAT STUDIES*, December 1931, VIII, 157-58.

ing," and the United States, as well as many other countries, has long had legislation giving administrative officials authority to levy compensatory duties against dumped goods.<sup>2</sup> The McNary-Haugen plan had as a central feature the raising of farm prices in domestic markets by resort to the sale of surpluses for export for what they would bring. Under the export debenture plans the rise of domestic prices was sought through a virtual bounty on exports equal to one-half of the tariff duty (on wheat, 42 cents a bushel) on the same product when imported. In the absence of legislation with presidential sanction, however, neither of these types of plans had been put to the test. To a limited extent under the Federal Farm Board, the Grain Stabilization Corporation absorbed some losses on export sales of wheat and flour, either directly or through special arrangements with millers.<sup>3</sup> But the United States has had almost no practical experience with open or disguised export subsidies or, hitherto, with bounties to domestic producers.

The Agricultural Adjustment Act of May 12, 1933, however, authorized the Secretary of Agriculture (Sec. 8) "to enter into marketing agreements with processors, associations of producers, and others engaged in the handling, in the current of interstate or foreign commerce of any agricultural commodity or product thereof, after due notice and opportunity for hearing to interested parties . . ." Section 12 (b) also contained an inconspicuous provision making proceeds of processing taxes available to the Secretary of Agriculture "for expansion of markets and removal of surplus agricultural products . . ." Under this authority, the Secretary announced on July 24, 1933, that two cents out of the 30-cent processing tax on wheat (imposed from July 9) would be reserved for financing wheat exports if opportunity should arise; and three days later the possibility of subsidizing wheat exports from the Pacific Northwest was officially recognized. Leaders in the Adjustment Administration, however, made clear that such resort was exceptional in the adjustment program; and that in seeking to raise farm prices the main reliance would be on restraint of production, while disposition of

surpluses within the country would generally be preferred to their sale abroad at reduced prices.<sup>1</sup>

At a preliminary informal hearing before representatives of the AAA in Portland on August 21-22, testimony was received from spokesmen for all the interests of the region who were at all closely concerned with wheat: farmers, wheat co-operatives, farm organizations, agricultural economists, dealers, millers, exporters, bankers, and public officials. Stress was laid on congestion of facilities and the necessity of prompt action to relieve it. Practically all parties interested strongly urged immediate adoption of some form of export subsidy or bounty scheme.<sup>2</sup> Divergent plans, still largely in crude form, were submitted by the North Pacific Grain Growers, Inc., and the North Pacific Grain Exporters Association. At the close of this hearing a drafting committee of four (representing producers, exporters, millers, and bankers) drew up a draft agreement which, late on August 23, was sent to the Secretary of Agriculture.<sup>3</sup> This was more or less revised in Washington. A form of agreement was formally filed with the AAA on September 12. This was mimeographed and made the subject of a formal public hearing in Portland on September 15-17.<sup>4</sup> Numerous points then remained to be ironed out, and despite insistence on the need of haste, it was not until

October 10 that the agreement was signed to become effective October 11.<sup>5</sup>

An agreement was also negotiated between the Secretary of Agriculture and the National Republic of China, subject to termination when the North Pacific agreement is terminated.<sup>6</sup> Under its terms the Chinese government agreed to draw upon funds to be loaned by the RFC to buy \$10,000,000 worth of wheat and flour under the North Pacific marketing agreement, and to pay for this an approved bid price *plus 5 cents per bushel of wheat*. The Secretary reserved the right to approve or reject the Chinese government's bids, and to direct the export association to sell to it on approved bids.

Progress in pushing through the North Pacific agreement was retarded by several factors. It was a new task for the AAA officials. It had delicate aspects in view of the danger of adverse reactions abroad. Pressure on the Washington officials concerned was extremely heavy. Moreover, the divergences of viewpoints in the Pacific Northwest, on the general set-up and as to matters of important detail, were not readily reconciled; and the AAA deemed it essential that the wheat growers should be assured of the major benefits.

The North Pacific Grain Growers, Inc., through their manager Mr. A. C. Adams, proposed at the preliminary hearing the organization of an export pool to be managed by the North Pacific under the supervision of the AAA. Membership was to be open to all who might have wheat of export grades and varieties, in the territory normally tributary to Pacific Northwest export markets. It was to have authority to buy, from day to day, all of the export-type wheat offered from old stocks or new crop. It was to pay the full market price, grade and variety considered, on the day of purchase. This price was to be considered an advance, subject to supplementary pro rata payments out of the profits of the pool (if any). The pool was to sell from day to day, at prices acceptable to the AAA and to foreign or export buyers and mills selling flour for export. To the extent that losses on sales would be involved, these were to be covered by a "drawback" paid from funds reserved from the processing tax.

<sup>1</sup> The agreement eventually adopted contains this significant provision: "(15) The plans and arrangements herein specified shall not be considered as the adoption of any definite form of policy by the Secretary, but this Agreement shall be considered only as being necessary for the solution of the present critical condition in the aforesaid Pacific Northwest area."

<sup>2</sup> A transcript of testimony at this hearing was made, which the author was able to consult through the courtesy of Mr. A. E. Sutton, of Portland.

<sup>3</sup> *Morning Oregonian*, Portland, August 21-24, 1933.

<sup>4</sup> *U.S. Department of Agriculture Press Release 596-34*, September 12, 1933. A transcript of testimony at this hearing has also been consulted.

<sup>5</sup> *Marketing Agreement for Disposal of North Pacific Wheat Surplus*, No. 14 of the AAA Marketing Agreement series.

<sup>6</sup> The fact of some such agreement was known early, but so far as we are aware it was first publicly announced and summarized in *Agricultural Adjustment*, the official presentation of operations under the Act up to February 1934 (released March 26, 1934), pp. 63-64.

The spokesman for the exporters, Mr. H. E. Sanford, presented two alternative proposals. The simplest was to pay exporters a flat bounty of, say, 30 cents a bushel on proof of export shipment. It was represented that with such an export bounty exporters would absorb the loss on export sales and reflect the full advantage back to the growers. Alternatively, it was suggested that the subsidy should be varied in such a way as to keep North Pacific market prices at a fixed discount under Chicago prices—say, 10 cents a bushel under the current Chicago future, for Western White, Soft White, Western Red, and Hard Winter wheats, all basis No. 1 sacked on track at Coast terminals. It was proposed that members of the North Pacific Grain Exporters Association (which the Farmers National Grain Corporation would be invited to join), working in conjunction with the AAA, should be authorized to accumulate export varieties of wheat on this basis, with the AAA contracting to protect them on the basis of this 10-cent spread. Export sales were to be negotiated by the association or its individual members on behalf of the association, at prices and in quantities approved by the resident representative of the AAA, basis No. 2 bulk f.o.b. ship. Such agreements were to be reached while the Chicago market was open, so that members could place or remove hedges if they so desired. Under this plan the AAA would refund to members making sales simply the difference between the current Chicago option less 10 cents a bushel and the selling price basis No. 2 bulk f.o.b. ship, with the addition of 1 cent per bushel commission. Members would provide for carrying charges, deducting them from country buying prices at the rate of one-half cent a bushel per half-month.

The millers, through their spokesman, Mr. O. D. Fisher of Seattle, offered no specific plan, but urged a number of considerations concerning its form and content. To compensate for special handicaps in export sales of flour, such as higher rates of ocean freight and higher duties on flour in export markets, and burdens imposed by the NRA and the collection of the processing tax, they asked that the subsidy on flour be made the equivalent of 10 or 11 cents a bushel higher than on

wheat. They also were eager that the purchasing operations on subsidy payments should be made in such a way as not to disturb market relationships and endanger the mills' domestic business.

#### TERMS OF THE AGREEMENT

The agreement finally adopted represents largely a compromise among the various plans proposed at the hearings. The operations were intrusted neither to the North Pacific Grain Growers nor to the Exporters' Association, but to a newly formed non-profit corporation organized under Oregon laws called the "North Pacific Emergency Export Association."<sup>1</sup> Its membership was opened to any producer or association of producers of wheat in Washington, Oregon, and northern Idaho, and to any person, firm, or corporation, or association of any such, in this region who were regularly engaged in exporting wheat or flour and had the necessary facilities for handling, financing, and/or manufacturing wheat or flour. Conduct of the operations of the association was intrusted to an executive committee of nine members, appointed subject to the written approval of the Secretary of Agriculture. One of these was to be a resident representative of the Secretary. Of the other eight, two (having one vote between them) were to be chosen by each of four organizations: the North Pacific Grain Growers, Inc., the wheat-growers co-operative; the Farmers National Grain Corporation, the wheat-growers national co-operative marketing agency; the North Pacific Grain Exporters Association, to which practically all the grain exporters belong; and the North Pacific Millers Association, comprising practically all the exporting mills.

In the executive committee, therefore, the farmer groups were given a voice equal to that of the combined groups of grain exporters and millers, and the president of the North Pacific was elected president of the association and an exporter vice-president.<sup>2</sup> A grain

<sup>1</sup> Under the draft agreement it was called the "North Pacific Export Equalization Association."

<sup>2</sup> The officers and directors selected, and approved at the signing of the agreement, were: *President*, Oris Dorman, of North Pacific Grain Growers, Inc.;

man with long experience in the Orient was named (with the approval of the Secretary of Agriculture) secretary-treasurer and general manager. The agreement, however, provided: "Any and all action to be taken by such managing agent, Executive Committee, or by the Association, shall be subject to the approval of the Secretary [of Agriculture]." In effect, this meant that the resident representative of the Secretary of Agriculture, in close touch with his superiors in Washington, had the effective voice in the association's actions as well as large powers of directing its operations.

The association, in fact, was to serve essentially "as a clearing house for arranging details of purchasing, shipping, handling, and selling the wheat and/or flour purchased for export or otherwise . . .," and for maintaining an adequate and accurate system of accounts. Members of the association bought wheat for it, and this wheat was resold by it to members making sales. The physical handling of the wheat continued much the same as it would have been in the absence of the association, but the legal title to that purchased rested for a time with the association. The Secretary of Agriculture was given power to inspect all records of the association and also of members so far as their records pertained to the agreement; and the association and its members agreed to furnish data to the Secretary on forms supplied by him. As the scheme was operated, this involved voluminous records, which the exporters felt entailed excessive clerical effort as compared with the simpler plan they had proposed.

The agreement provided that the Secretary (in effect his resident representative, proceeding in consultation with Washington) should

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*Vice-President*, Preston W. Smith, of Kerr Gifford & Co.; *Secretary-Treasurer*, George V. Hayes, Seattle (also general manager); *Directors*, Orris Dorman, Spokane, and A. R. Shumway, Milton, Oregon, of North Pacific Grain Growers, Inc.; A. A. Ryer, Portland, and George C. Baer, Portland, of Farmers National Grain Corporation; P. W. Smith, Portland, and A. E. Sutton, Portland, of North Pacific Grain Exporters Association; P. J. McKenney, Portland, and O. D. Fisher, Seattle, of North Pacific Millers Association.

Mr. Douglas McIntyre was the resident representative of the Secretary of Agriculture during most of the crop year.

<sup>1</sup> *Commercial Review*, November 7, 1933.

give written instructions to the executive committee or its managing agent directing it to contract for the purchase of specified quantities of wheat produced in the designated area of the Pacific Northwest, to be purchased on the basis set forth in Exhibit A appended to the agreement (practically reproducing the regulations already in force on the grain exchanges there), at prices and on terms specified, and indicating whether the purchases were to be made "from producers, associations of producers, local or terminal warehouses, or others." The association was not to have at any one time net purchases of more than a million bushels of wheat in excess of outstanding sales or sales contracts. In practice, "bid prices" were announced almost daily, shortly after the close of the Chicago market, good till one-half hour before its opening next morning. The Secretary's representative named these prices and fixed the total quantity to be purchased, and the managing agent notified the members of the price and their individual quotas. Before six o'clock next morning the purchasing members advised the Secretary's representative of what they had bought; and in some cases purchases in excess of the assigned quotas would be accepted.

The agreement also provided that the association should receive written bids from its members for purchases from the association and the sale of any such wheat (basis No. 2 bulk, f.o.b. ship) or flour (f.a.s. basis) with supplementary details. Such bids were to be subject to acceptance or rejection by the Secretary, who was to give written instructions confirming the sale. Even the chartering of tonnage to move export shipments was made subject to the approval of the Secretary of Agriculture. In practice, the Secretary's representative commonly named daily selling prices at which he would approve sales up to specified limits, and business offered at these prices was promptly accepted.

Bids for filling sales to the Chinese government, which had its own buying agent in Portland (J. J. Lavin), were treated in the same way as other bids. For purchasing wheat to cover these sales, however, a different set of percentage allotments was adopted,<sup>1</sup> and

the initial allotments were altered after the first ninety days on the basis of the proportions of other export sales that had been made by the different export firms.

Most of the wheat was purchased in the country, under the instructions given out. At times, however, authorization was given to buy wheat at terminals.<sup>1</sup> To fill sales, allocations were made of the wheat purchased, where possible allocating to the exporting merchant or miller wheat that he had purchased for the association.

The agreement further provided that, with respect to each sale of wheat or flour, a verified statement should be prepared, on forms to be furnished, showing the purchase price of the wheat and the net sales price. For the difference between these two prices the Secretary was to reimburse the association, which in turn was to settle with its members. To cover administrative costs of the association, members purchasing wheat from the association were to be assessed monthly in proportion to their sales in the preceding month. In practice the members have not found the costs burdensome. Exhibit B of the agreement provided that the purchase price of wheat f.o.b. track at terminal would be calculated by adjusting the terminal price of No. 1 sacked in accordance with the schedules set forth in Exhibit A. In addition, deduction from the purchase price was to be made for the current value of empty sacks in an amount subject to approval by the Secretary. Following is the schedule of allowances

(in cents per bushel) in the cost of handling wheat, to be deducted from the f.o.b. sales price to determine the net sales price:

Unloading and handling.....	.36 (sacked, .84)
Wharfage .....	.75
Loading on vessel.....	.24
Inspection .....	.12
Cleaning smutty wheat	
Smut: ½ to 1 per cent....	1.05
1½ to 3 per cent....	1.35
3½ to 7 per cent....	1.95
7½ to 15 per cent....	2.55

Carrying charges beginning twenty days after delivery in tidewater terminal elevators were also allowed at the rate of  $\frac{1}{30}$  cent per bushel per day until loaded on the steamer; and 1 cent per bushel for "selling costs" was allowed to be included in the cost in connection with each sale.<sup>2</sup> In general exporters were satisfied with the terms thus granted, though some felt that as the agreement worked out they had to carry wheat longer than they had expected.

On flour sales (under Exhibit C) the purchase price of wheat was to be determined in the same way as on wheat sales. The conversion of flour-sales prices to wheat prices was to be made by taking the net sale price f.a.s. per barrel of 196 pounds of straight flour; deducting (a) wharfage charge of 65 cents per ton, (b) a conversion charge of 50 cents per barrel,<sup>3</sup> and (c) the per-barrel cost of flour sacks based on current purchase cost in 1,000 lots; adding a mill-feed credit (70 pounds per barrel)<sup>4</sup> on the basis of current car-lot prices, less \$1.50 per ton;<sup>5</sup> and dividing the resulting net price of flour "by 4.45, the quantity of wheat in bushels required to make a barrel of 196 pounds of straight flour."

This conversion figure of 4.45 was a compromise between the figure of 4.355, in the draft agreement, and 4.5, which the millers asked for. The latter figure is customarily used in trade circles of the Pacific Northwest in expressing flour exports in terms of wheat; but it is generally recognized that the wheats of that region commonly yield considerably more export flour than this rate implies.<sup>6</sup> The figure adopted represented a concession to the millers, who were not granted their re-

<sup>1</sup> Appended to Exhibit A was the following provision: "The Secretary, on recommendation of the Executive Committee, may authorize the purchase of wheat contracts pursuant to Section 4 of the Agreement to relieve the immediate emergency of congested terminal tidewater elevators on an F.O.B. No. 2 bulk basis."

<sup>2</sup> The draft contract had provided for a commission of 1 per cent of the selling price.

<sup>3</sup> The draft agreement as it came from Washington provided for a conversion charge of 42.2 cents per bushel; the millers asked for 55 cents.

<sup>4</sup> The draft agreement had put this at 64 pounds.

<sup>5</sup> The millers had asked that this be made \$2.00.

<sup>6</sup> Low moisture content of the wheat is an important factor. For the country as a whole 4.7 bushels per barrel is the customary conversion factor, though the larger mills usually require somewhat less.



quest for an additional subsidy of 10 or 11 cents per bushel.

Exhibit C provided also that the association might establish, with the approval of the Secretary of Agriculture, differentials in prices for grades of flour other than the basic grade, export straights.

In fixing bid prices for purchases, and in setting and approving sales prices, the Secretary's representative had to take into account several factors. It was desired to raise prices to growers in the region as much as possible, and to keep the spread under Chicago as narrow as possible—to 10 cents a bushel or less. The prescribed limit of one million bushels net long position might not be exceeded. It was sought to give no occasion for foreign

charges of dumping, hence to avoid setting sales prices too low. It was desired to get as much wheat as possible exported, as wheat or flour, at least up to 30 or 35 million bushels. Yet the net cost of the subsidy or drawback had to be kept within bounds, lest the funds allocated from the processing tax be overdrawn. As it turned out, the policies pursued proved conservative, in that sales and subsidy cost both fell well below their maxima,<sup>1</sup> and that shipments east and the outward carry-over were larger than had been planned for. In large part, however, these consequences were the result of unforeseeable developments, including, late in the season, the port tie-up and the marked advance in eastern markets following extreme drought.

## VI. OPERATIONS UNDER THE EXPORT AGREEMENT<sup>2</sup>

### SUMMARY OF OPERATIONS TO JUNE 30

The export association began its purchases on October 19, 1933, and made its first sale on October 31. The operations under the agreement up to June 30, 1934, may be broadly summarized as follows, in bushels:

Total purchases .....	27,165,328	
Long position June 30, 1934.....	678,802	
Sales:		
Wheat .....	21,726,766	
Flour .....	4,759,760	26,486,526
Shipments to June 30, 1934:		
American-flag vessels ...	8,184,167	
Foreign-flag vessels....	14,398,627	22,582,795
Balance sold but not shipped.....		3,903,731

Total sales were only about three-fourths as large as the early estimates of 35 million bushels. The "differential" on all sales of wheat and flour up to July 1 averaged 22.95 cents per bushel. Taking the sales as given above, this implies a total subsidy cost of \$6,078,658, as compared with early estimates of 7 to 8 million dollars.

The strike that tied up shipping in the Columbia River and Puget Sound practically stopped all shipments from May 9, 1934. This was mainly responsible for the large balance

of 3.9 million bushels sold but not yet shipped on July 1. The tie-up also seriously hampered sales. Whereas up to the time of the strike sales of wheat and flour had averaged 921,000 bushels a week, in 7½ weeks from May 9 to June 30 export sales totaled only 602,000 bushels of wheat and 512,000 bushels in the form of flour. Of these wheat sales

<sup>1</sup> Speaking on September 20 in Chicago, Mr. Theis said: "It may be necessary for the government to spend \$7,000,000 or \$8,000,000 in this deal." The actual cost to June 30 was little over \$6,000,000. Early estimates of the subsidy cost per bushel were as high as 25 cents a bushel. Because of the special arrangement on sales to the Chinese government, the average did not reach this figure.

<sup>2</sup> At the request of the author, Mr. Frank A. Theis of the AAA kindly made available to the Food Research Institute for the purpose of this study a considerable amount of detailed data which are, in the main, presented and summarized in the following pages. As chief of the Grain Processing and Marketing Section of the AAA from its inception, Mr. Theis bore the major official responsibility in connection with the emergence of the export agreement, and presided at the formal hearing in Portland on September 17-18, 1933. Since the agreement came into operation, the resident representative of the Secretary of Agriculture in the Pacific Northwest (formerly Mr. Douglas McIntyre, now Mr. W. J. Clohessy) has worked under Mr. Theis's direction. The Institute appreciates his invaluable aid in enabling us to present a much more adequate analysis of the operation than would otherwise have been possible. For inferences based on the data, which are indicated at various points, the author takes sole responsibility.

over half were made when the strike was very young; from May 15 to June 30 only seven sales were made, totaling 275,000 bushels. Flour sales, however, continued to be made through May and June. In the first few days of the tie-up, the association continued to make purchases, building up its long position from 434,784 bushels on May 8 to 934,802 on May 11. In subsequent days and weeks it covered part of its new sales by additional purchases, but reduced its net long position to 678,802 bushels on June 30. (See Chart 10, p. 402.)

Had there been no strike, however, export sales would presumably have fallen off materially toward the end of the season. The Chinese loan quota available for wheat purchases was practically exhausted by the middle of April,<sup>1</sup> and the Chinese government, under pressure from domestic millers, was not ready to proceed with purchases of flour. Chinese mills were well stocked with imported wheat, and over 800,000 bushels on previous China sales remained to be shipped when the tie-up occurred.<sup>2</sup> The 1934 wheat prospects in China were excellent, and the crop later turned out well. Furthermore, under the stimulus of drought and severe crop curtailment in the Great Plains states, wheat prices in the United States advanced sharply in May and remained in June well above earlier levels (see Chart 15, p. 405). Under such conditions, it is doubtful whether the total sales would have exceeded 28 to 29 million bushels by June 30 if ocean traffic had been unimpeded.

<sup>1</sup> We infer that the last wheat sale under the loan was made on April 13.

<sup>2</sup> Total wheat and flour sales to China up to June 30 exceeded shipments to China up to that date by 968,637 bushels. Of this total, about 145,000 bushels represented flour sales made in May-June, and all the rest represented unshipped wheat and flour sold prior to May 1.

<sup>3</sup> China's purchases under the loan were made at prices 5 cents above those paid by other buyers (see p. 394). Sales at some such premium totaled nearly 10.8 million bushels, and at the prices paid (averaging, we estimate, 55.65 cents per bushel) the total cost of these works out to about \$6,000,000, the amount available for wheat purchases under the RFC loan.

Sales of wheat grain, by area of destination, were as shown below:

Area	Bushels	Percentage of total
China .....	11,646,666	53.6
Japan .....	4,946,666	22.8
Ireland .....	2,376,266	10.9
Other Europe ....	2,068,131 <sup>a</sup>	9.5
South America ...	235,866 <sup>b</sup>	1.1
Central America ..	126,166 <sup>c</sup>	.6
Unknown .....	327,005 <sup>d</sup>	1.5

<sup>a</sup> Specific destinations are known for only a small part of this total, and it may include some for Ireland.

<sup>b</sup> The largest item was 158,066 bushels for Peru.

<sup>c</sup> The largest item was 77,000 bushels for Salvador.

<sup>d</sup> Including 286,666 bushels shipped to Colon for orders and the difference (3,006) between the stated total and the sum of items separately given.

Over three-fourths of the total wheat sales were to the Orient. China was by far the principal buyer, with over half of the total. Most of this wheat was purchased by the Chinese government under its loan; though the precise quantity has not been made available to us, we infer that wheat sales to other Chinese buyers may have approximated 850,000 bushels.<sup>3</sup> Japanese buyers, who presumably purchased American wheat chiefly to mill into flour for export to China, took nearly 5 million bushels, or about 23 per cent of the total sales. Sales to all Europe were about as large as to Japan. The third best wheat customer was Ireland, presumably the Irish Free State, where the mills have long had a preference for considerable quantities of Soft White and Western White wheat from the Pacific Northwest. Other sales to various European countries totaled nearly as much as to Ireland, for presumably part of the shipments to Colon for orders went to Europe, as well as some other shipments of unknown destination. The ultimate destinations of sales to Europe cannot be clearly ascertained from data made available to us, but presumably a fair portion went to England and Scotland. Small shipments to South America and Central America, which went in particular to Peru and Salvador, made up the balance.

Export sales of wheat to June 30, 1934, were distributed by types and grades as follows:

Type	Thousand bushels			Percent- age of total
	No. 1	No. 2	Total	
Western White . . . . .	60	14,365	14,444 <sup>a</sup>	66.7
Western and Soft				
White . . . . .		3,608 <sup>b</sup>	3,608	16.7
Soft White . . . . .	48	1,097	1,242 <sup>c</sup>	5.7
Hard White . . . . .		919 <sup>d</sup>	919 <sup>d</sup>	4.2
Hard Winter . . . . .		1,339	1,360	6.3
Western Red . . . . .	23	70	80	.4
Total . . . . .	131	21,406	21,653 <sup>e</sup>	100.0

<sup>a</sup> Including 18,666 bushels of Sample Western White.

<sup>b</sup> Including 128,000 bushels of No. 2 Soft, No. 2 Western, and No. 2 Hard White.

<sup>c</sup> Including 97,006 bushels of No. 1 and No. 2 Soft White.

<sup>d</sup> Including 67,166 bushels of No. 2 Hard and Western White.

<sup>e</sup> This total is 73,550 bushels less than the cumulative totals given on p. 398; apparently one or more sales were omitted from the data here summarized.

Strongly predominating was Western White—the club wheats that usually form a large portion of the surplus of the region. Two-thirds of the total sales were of this type, and another sixth of Western and Soft White. Soft White ranked a poor second, even including that sold along with Western White. Together these constituted 89.1 per cent of the total wheat sales. Hard Winter wheats constituted about 6 per cent of the total and Hard Whites over 4 per cent. Western Red, or Soft Red Winters, were a negligible fraction, and no Hard Red Spring or Durum was exported under the scheme. Practically all of the export sales were of No. 2 grade. About half of one per cent of the total was sold as No. 1 Western, Soft, or Red. One small sale of Sample Western White was made, presumably for feed use.

The flour sales, in terms of bushels of wheat, were distributed by destinations as tabulated in the next column.

Over 42 per cent of the flour sold for export under the plan was for the Philippine Islands, and small additional quantities were shipped to Guam and the Virgin Islands, also United States possessions. Including Hong Kong, which is technically outside, China took about 20 per cent of the total; most if not all of this was sold to private buyers rather than to the Chinese government under its loan.<sup>1</sup> According to trade information, nearly all of these sales were made to South China, very largely

to Hong Kong; even with the subsidy, Pacific Northwest millers found it hard to compete with Chinese and Australian millers in North China. Manchuria was also a large customer, apparently surpassing all others except Norway. Altogether, including small quantities shipped to Japan, southeastern Asia, and Sumatra, about two-thirds of the flour sold was for Oriental destinations.

Area	Bushels	Percentage of total
Philippine Islands . . . . .	2,008,537	42.2
China . . . . .	949,273	19.9
Manchuria . . . . .	223,723	4.7
Other Asia . . . . .	14,327	.3
Total Asia . . . . .	3,195,860	67.1
Central America (in- cluding Mexico) . . . . .	812,455 <sup>a</sup>	17.1 <sup>a</sup>
West Indies . . . . .	120,437	2.5
Ecuador . . . . .	120,799	2.5
Other South America . . . . .	67,351 <sup>a</sup>	1.5 <sup>a</sup>
Norway . . . . .	224,989	4.7
United Kingdom . . . . .	163,377	3.4
Other Europe . . . . .	45,710	1.0
Other . . . . .	8,782	.2

<sup>a</sup> Sales of 160,157 bushels designated as to "Central America and South America" are here included under Central America. Sales to Mexico were only 7,954 bushels.

Nearly 24 per cent of the total flour was sold to various countries of Central America, the West Indies, and South America, with Central American countries the largest takers. Apparently the leading customers were Guatemala, Nicaragua, and Ecuador. Flour sales to Europe, mostly to Norway and Scotland, constituted about 9 per cent of the total.

Of the wheat and flour shipped on export sales up to June 30, 1934, only about 36 per cent moved in vessels flying the American flag, but the distribution varied greatly according to the country of destination. Largely owing to control exercised under the RFC loan, somewhat more than half of the shipments to China were in American steamers. Nearly all of the shipments to Japan moved in foreign vessels, presumably Japanese. All

<sup>1</sup> From the price data we infer that a few small sales of flour were made to the Chinese government in the early weeks. The *Commercial Review* reports sales of 21,575 barrels to Shanghai during the year, and we infer that little of this can have gone on private account.

of the shipments to Ireland, Scotland, Norway, Holland, Denmark, and Finland, as well as to Mexico and most of the minor purchasers outside Europe and the Americas, were shipped in foreign vessels. So were nearly all of the shipments to England, and nearly half of the shipments to Belgium. Five-sixths of the shipments to the Philippines, and all of the shipments to Manchuria, Indo-China, and Guam, moved in American steamers. Nearly all of the shipments to Central America, the West Indies, and most countries of South America also moved in American vessels, though well over half of the shipments to Ecuador and Peru went in vessels flying foreign flags.

Official data on exports from the Pacific Northwest in 1933-34 are not yet available. According to trade data summarized in the *Commercial Review* of Portland, exports for the year totaled 23,269,000 bushels, including flour converted to wheat at 4.5 bushels per barrel. The same source shows exports in July-October, before shipments began under the association, as 1,194,000 bushels, including 711,000 bushels (as flour) to the Philippines. For the rest of the year the corresponding figure is 22,075,000 bushels. This is 507,000 bushels less than the association reports having sold for export and shipped out. We infer that most of this difference represents shipments (chiefly of flour) reported in the *Commercial Review* as to California, but really destined for export through California ports. Preliminary data indicate that total exports of wheat and flour from the Pacific Northwest during the crop year approached 24 million bushels, over 90 per cent of the exports of wheat and flour from the United States during the crop year, apart from flour milled in bond from imported Canadian wheat.

#### COURSE OF OPERATIONS

The course of operations under the agreement to June 30, 1934, is shown in some detail by daily data plotted on Charts 10 and 11.

At the formal hearing a leading exporter had favored a policy of having the association make export sales and then cover them with purchases—in other words, having a net

short position most of the time. The association did not choose to follow this policy. It did not make its first sale until it had bought nearly 700,000 bushels; and throughout most of the year it maintained a long position, several times approaching the limit of 1 million bushels set by the agreement. On seven different occasions, however, the association made sales in excess of the quantities it had purchased and not yet sold. On four of these occasions the resulting short position was more than covered next day, and on another within two days. On two occasions in February and March, however, exceptionally heavy sales were responsible for a short position lasting nearly a week, and on three different days the association was short over 850,000 bushels.

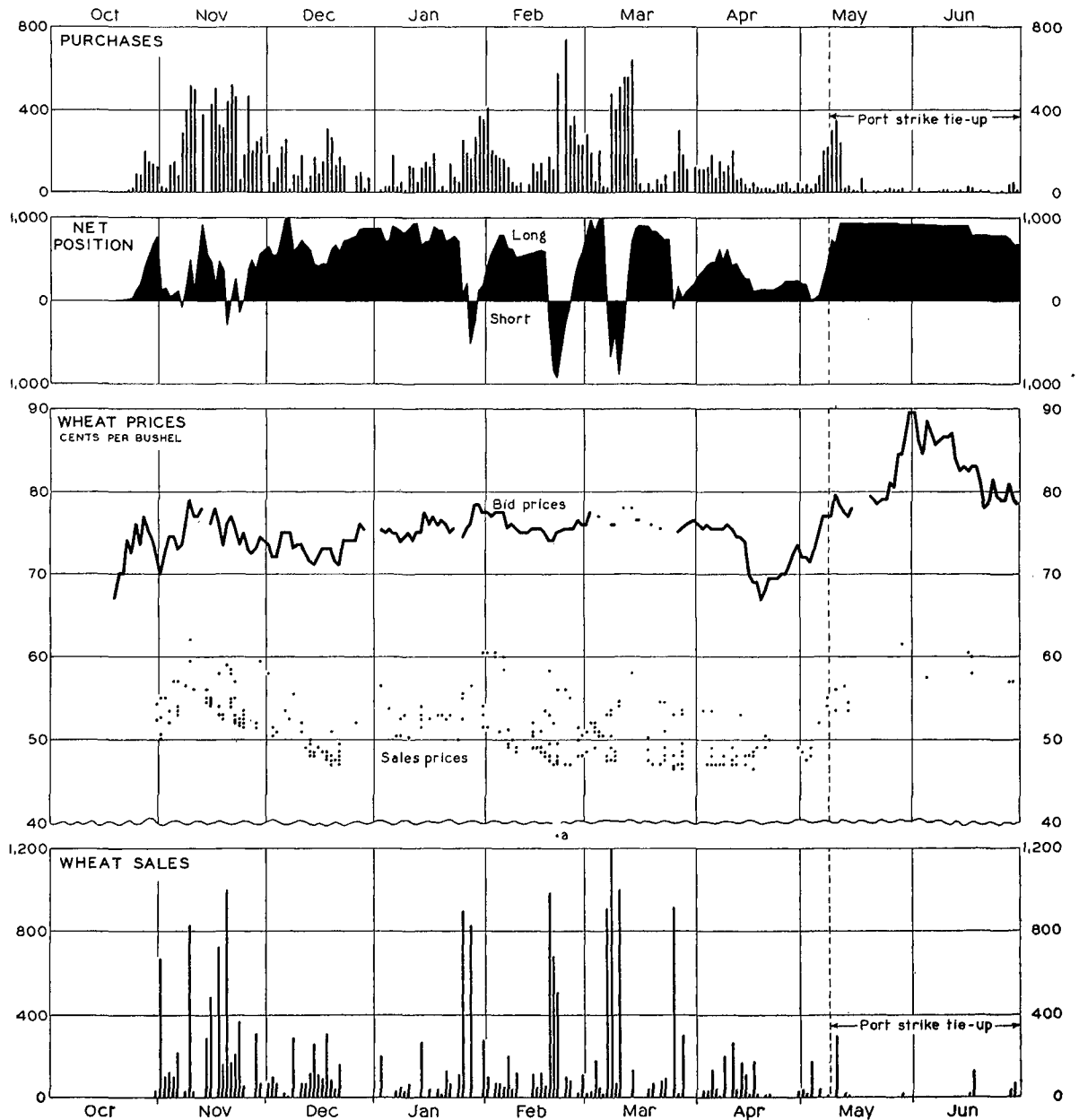
Buying quotas were assigned daily to the different grain firms according to fixed percentages for each, including a liberal percentage for the Farmers National.<sup>1</sup> In the first few days of the operations, when bid prices were under 75 cents a bushel, the quotas were not filled; and subsequently, when the bid prices were at levels which farmers considered too low, the same thing occurred. Above a certain price level (75 cents at the outset), however, farmers offered freely, and several times the buying quotas operated to restrict the amounts obtained. When the association was short, or found its long position dwindling because of heavy sales, it sometimes raised its bid price and sometimes merely increased the aggregate quota. When its long position was so large as to necessitate restriction of purchases, it usually lowered its bid price and/or lowered the limit that it would buy. Sometimes, as on November 14, December 29, January 24, February 9, and several days in March, no bid price was put out; and after May 15 the bid prices were for very limited quantities, chiefly to cover flour sales and to establish a basis for computing differential payments.

<sup>1</sup> These were determined by the executive committee, with the advice of the representative of the Secretary of Agriculture. As indicated above, pp. 396-97, different percentages were employed on purchases to fill sales to the Chinese government, and these were altered after the first ninety days.

Although purchasing by the association began on October 19, the first sales were made on October 31: 35,000 bushels of No. 2 West- through the period from October 31 are shown in Chart 12 (p. 404), in which we have made an approximate separation of wheat sales be-

CHART 10.—EXPORT ASSOCIATION PURCHASES, WHEAT SALES, NET POSITION, AND PURCHASE AND SALE PRICES, DAILY 1933-34\*

(Thousand bushels, except as noted)



\* Data kindly furnished us by Mr. Frank A. Theis. See note, p. 398.

ern White (to Japan, according to trade reports) and 1,360 barrels of export straight flour. Weekly sales of wheat and flour

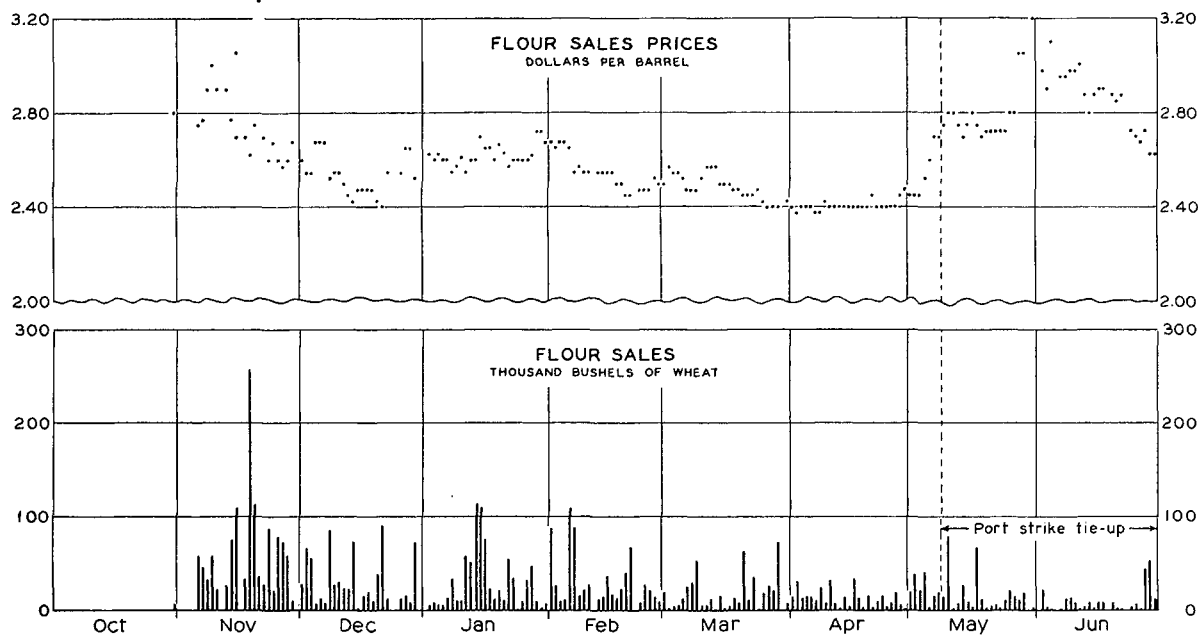
tween the Chinese government and other buyers. The lower section shows the cumulation of weekly totals.

During November sales were numerous and heavy; we infer that the Chinese government bought at least 3.3 million bushels of wheat, and total wheat sales were nearly 6 million. Flour sales requiring an additional 1.2 million bushels were far heavier than in any

sales, because of the continued strike, were the lowest of the year—less than ½ million bushels of wheat and flour combined.

Chart 13 (p. 404) shows approximately the volume purchased at each of the various bid prices, including our estimates of purchase

CHART 11.—EXPORT ASSOCIATION FLOUR SALES AND SALES PRICES, EXPORT STRAIGHTS BASIS, DAILY 1933-34\*



\* Sources as for Chart 10.

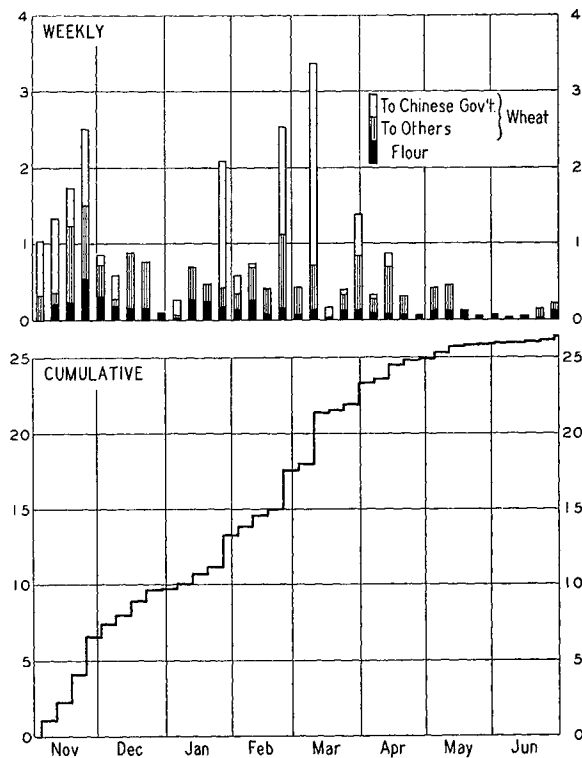
subsequent month. December wheat sales were less than a third of those in November; the Chinese government apparently bought very moderate quantities, and sales to other buyers were considerably less than in November. Flour sales kept up better than wheat sales, but were only about 60 per cent as large as in November. January and February were good months, and March still better, with Chinese government purchases apparently playing a large rôle. Wheat sales in March were 5.1 million bushels as compared with 5.9 in November, but, since flour sales were much lower, total sales were less than 80 per cent of those in November. Sales fell off heavily in April, in spite of the low prices for the season that ruled in the latter half of the month. The April total was only 1.6 million bushels, of which 1.3 million were wheat. May wheat sales were only about half as large as in April, but flour sales were larger. June

prices on days when no bid price was put out, together with a cumulative curve showing the per cent of total purchases made at or below each indicated price. For the entire period from October 19 to June 30 the average of bid prices weighted according to purchases was approximately 75.82 cents,<sup>1</sup> and the largest purchases were made at 76 cents. The lowest level of bid prices was reached in the second half of April, when for ten business days bid prices were 70 cents or below, and on April 19 and 20, respectively, 67 and 68 cents (see Chart 10, opposite). With export sales very light, the association evidently felt constrained to hold down its long position. In these ten days purchases aggregated 304,421 bushels, less than was often bought in a single day at higher prices; and sales of

<sup>1</sup> Excluding purchases made on days when no bid price was put out, the weighted average would be 75.74 cents.

wheat and flour totaled only 340,286 bushels, less than was often sold in a single day, though selling prices on wheat and flour were

CHART 12.—SALES OF WHEAT AND FLOUR BY THE EXPORT ASSOCIATION, WEEKLY, 1933-34\*  
(Million bushels)



\* Data in Table XX.

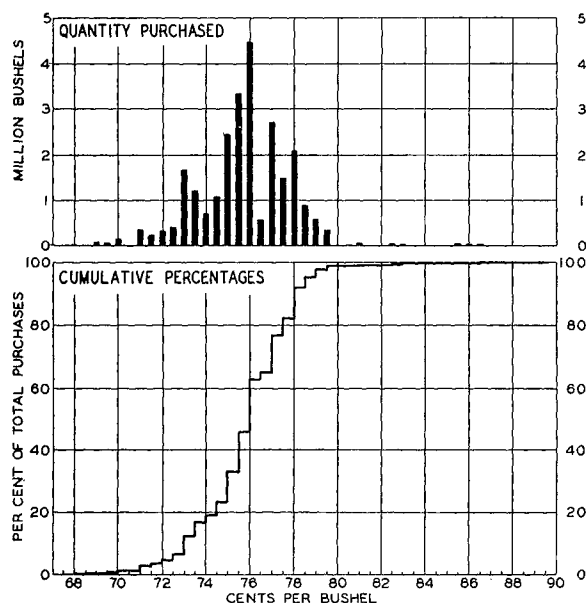
close to the lowest for the year. Except in this period and during the first three days of operations, the bid price was below 72 cents a bushel on only six days—November 1, December 13-14 and 20-21, and May 3. Up to May 9, 1934, the bid price had never exceeded 79 cents, and reached this only once (on November 9), and there were only 14 days out of 151 when the bid price was over 77 cents.

The quantities of wheat and flour (as wheat) sold at various prices are shown in Charts 14 and 15, together with cumulative curves showing percentages of the total sold at or below the several prices. In the wheat chart we have ventured (on the basis of our inferences) to distinguish sales made to the Chinese government from those made to other buyers.

The weighted average price of all wheat

sales to June 30, 1934, was 53 cents a bushel. According to our inferences from sales and price data, wheat sales to the Chinese government under its loan consisted mainly of No. 2 Western White (about 9.9 million bushels) with about 9 per cent of No. 2 Hard Winter (nearly .9 million). We deduce that the price paid averaged 55.65 cents a bushel—for Western White averaging a shade less and ranging from 52 to 62 cents, and for Hard Winter averaging about 2 cents higher and ranging from 53½ to 60½ cents. Exclu-

CHART 13.—EXPORT ASSOCIATION PURCHASES OF WHEAT AT VARIOUS PRICES, 1933-34\*



\* Data in Table XXI.

sive of sales that we infer were made to the Chinese government, the prices realized show ranges and averages as follows, in cents per bushel:

Type and grade	Range to May 8	Range from May 9	Weighted average	Thousand bushels
Western White	46½-56½ <sup>a</sup>	56½-61½	50.95	4,550
Western and Soft				
White	46½-54	53½-58	49.05	3,608 <sup>b</sup>
Soft White	47-54	53½-57½	50.01	1,242
Hard White	48-58	60	51.98	919 <sup>c</sup>
Hard Winter	47½-58½	60½	52.57	466
Western Red	48-55	54½	50.80	81
All types and grades	46½-58½	53½-61½	50.36	10,866

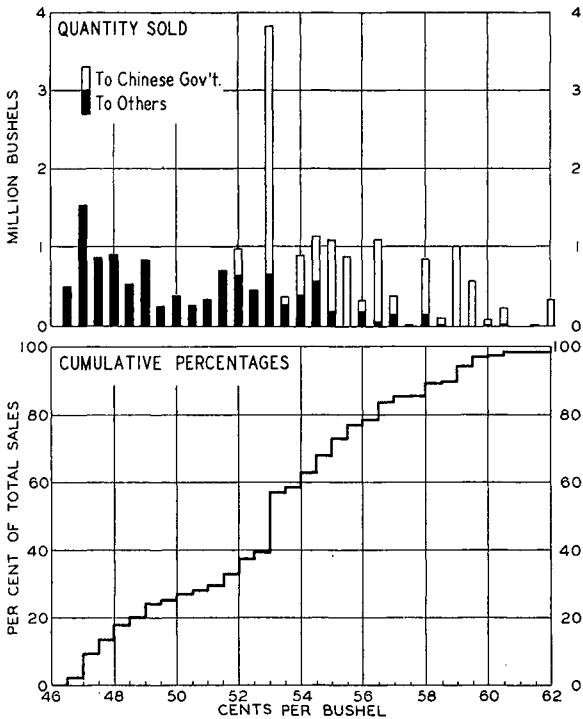
<sup>a</sup> Excluding one sale of Sample Western at 38½ cents.

<sup>b</sup> Including one small sale containing some Hard White, at 51.5 cents.

<sup>c</sup> Including one sale of mixed Hard White and Western White, at 47 cents.

The weighted average price on sales of wheat, excluding those that we infer were made to the Chinese government, was 50.36 cents a bushel, a little more than 5 cents under our estimate of the average price to China. The highest price on any wheat sale was 62 cents for No. 2 Western White on November 9, apparently to the Chinese government under its loan. We infer that, up to the last five weeks of the season, the highest price on sales other than to the Chinese government was 58½ cents, and prices above 56 cents were chiefly for better types or higher grades. The few wheat sales made between May 15 and June 30, during the tie-up of the ports, brought 57 to 61½ cents a bushel; but this was after prices in all United States

CHART 14.—EXPORT ASSOCIATION SALES OF WHEAT AT VARIOUS PRICES, 1933-34\*

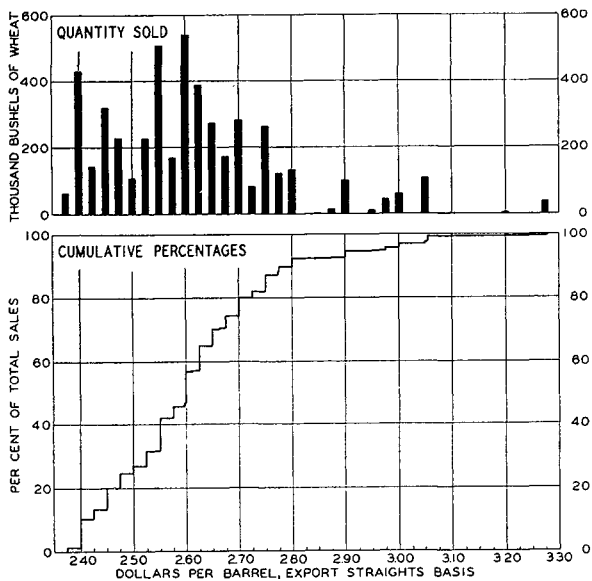


\* Data in Table XXI.

markets had advanced considerably. Except in this period the maximum price range for sales other than to the Chinese government was only 12 cents, for all types and grades, if we ignore a small sale of sample grade Western White at 38½ cents (on February 21).

The lowest price at which other sales were effected was 46½ cents a bushel. This was touched only on March 26, 28, and April 17, but on several occasions—late in December, in March, and in April—sales were made at 47 and 47½ cents.

CHART 15.—EXPORT ASSOCIATION SALES OF FLOUR AT VARIOUS PRICES, 1933-34\*



\* Data in Table XXI.

As compared with Western White, the predominantly export type, Soft White usually sold at a slight premium or none, Western Red at 1 to 2 cents premium, Hard White at from 1 to 3 cents premium, and Hard Winter at 1 to 4 cents premium. No. 1 grades usually commanded a premium of 1½ to 3 cents over No. 2's. The averages shown fail to reflect these differences, because of the varying levels of prices at which different types of wheat were mainly taken.

Prices on flour sales as made available to us are all on the basis of export straights. This is a representative type, but variations from the basis price were made for other types and grades. On this basis, export prices on flour sales went only once as high as \$3.28 per barrel (November 21), and few sales were made above \$3.00 even after May 15. The lowest price, on the same basis, was \$2.375 on April 3, 7, and 9; but prices as low as \$2.40



were registered on December 21 and on several days between March 27 and April 27. Nearly 96 per cent of the flour sales were made at prices between \$2.40 and \$2.80, export straights basis, with \$2.60 as the median price and the one at which the largest sales were made. The weighted average price was \$2.632.

The difference between the weighted average purchase price, as we have computed it, and the weighted average sales price of wheat sales to June 30 is 22.82 cents. The two prices are not directly comparable, for purchases were made basis No. 1 White, sacked, on track at terminal ports, while sales prices were on the basis of No. 2 bulk wheat f.o.b. steamer. On March 31, for example, the association's bid price was 76½ cents a bushel for No. 1 Soft White, sacked, track Portland, and wheat was offered for export at 48 cents a bushel, basis No. 2 Soft White, f.o.b. Portland or Seattle.<sup>1</sup> Taking these figures as they stand, this would seem to imply a differential of 28½ cents a bushel, and it was in such terms that the differential was customarily discussed.

Because of the difference in bases, however, the "drawback" on export would not work out so simply. Sacked wheat at terminals commanded a premium of 3 cents a bushel over bulk wheat, on the broad ground that the second-hand sack was worth that much above the cost of desacking. Costs of transfer from track to steamers intervene. Most of the wheat sold, moreover, was of No. 2 grades, which are worth less than corresponding No. 1 grades. For these reasons and others, the difference stated above is not properly comparable with the average "differential" or subsidy cost which was given to us as 22.95 cents a bushel on sales up to June 30. On our less accurate basis of calculation, we infer that the average difference was 20.17 cents on sales to China under the loan, and 25.46 cents on other wheat sales. We have no reliable basis for reckoning the average differential on flour sales, but on various occasions it appears to have been well above 25 cents a bushel.

#### EFFECTS OF THE SUBSIDY OPERATIONS

We have noted that up to June 30, 1934, the export association had bought 27.2 million bushels, sold 26.5 million, and shipped out 22.6 million; and that the net subsidy had averaged 22.95 cents a bushel costing a little over 6 million dollars. What, broadly, were the effects of these operations? It is impossible to answer this question with precision, or even to reach an answer that will appear convincing to those who already have firm opinions on the subject. A few observations, however, can be made with the aid of some available evidence.

There is no doubt that in direct consequence of these operations exports of wheat and flour combined were larger, and shipments to the eastern part of the United States were smaller. Flour exports may have been larger than they would otherwise have been, but flour shipments east were probably smaller. Very probably the carryover was reduced more substantially, and feed use was smaller, because of the operations. Farm and market prices of wheat in the Pacific Northwest were higher, not only during the operations but for some time before, than they otherwise would have been. While the direction of these effects seems fairly clear, it is another matter to appraise their several magnitudes.

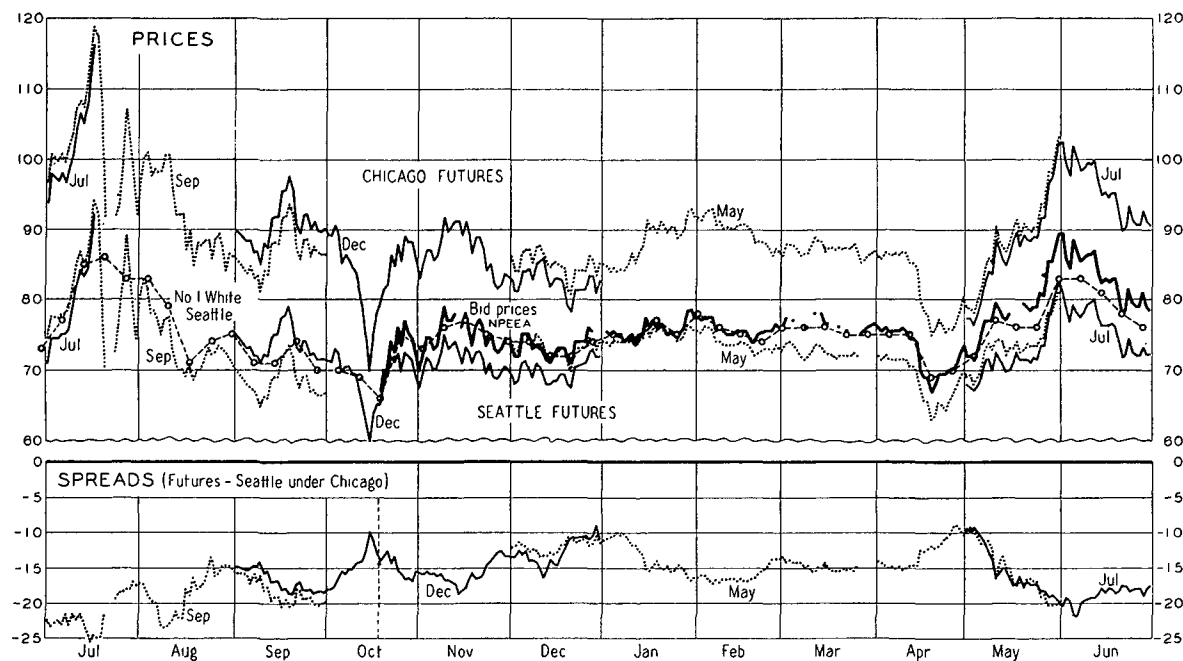
As long as the export association was buying actively, it largely determined the price in the Pacific Northwest for the principal export types of wheat. This is shown by the comparison of the association's daily bid prices with the weekly average price of No. 1 White wheat at Seattle, and by the comparison of the bid prices with the daily closing prices on the Seattle futures market, if allowance is made for the 3-cent discount on bulk wheat deliverable on futures contracts (Chart 16). When buying quotas were very limited, as occasionally in the early weeks and sometimes thereafter, the local market price fell away somewhat from the bid price. After the strike was on and the association's purchases were very small, the market price followed only within a wider margin the bid prices put out for limited quantities to cover

<sup>1</sup> AAA Press Release 2302-34, April 5, 1934.

flour sales. It was largely due to the association's operations that, from late in October to a bushel on July 15, and that it was later narrowed to 9 or 10 cents a bushel.<sup>2</sup> Some

CHART 16.—CLOSING PRICES OF NEAR FUTURES AT CHICAGO AND SEATTLE, THE SPREAD BETWEEN THESE PRICES, DAILY 1933-34, WITH COMPARATIVE CASH PRICES IN SEATTLE\*

(Cents per bushel)



\* Futures prices at Chicago from *Daily Trade Bulletin*, and at Seattle from *Commercial Review* (Portland); spreads computed by the Food Research Institute. Weekly unweighted average cash prices at Seattle for No. 1 White wheat, from *Foreign Crops and Markets*. Daily bid prices of the export association as on Chart 10.

early April, the market price of export wheats at Portland and Seattle varied within narrow limits above and below 75 cents a bushel.

The effects on prices of premium types and grades of wheat, however, were much less than on export wheats. For example, premiums on Hard White wheats (mostly Baart, though often quoted as Big Bend Bluestem) were around 9 to 10 cents a bushel in the early months of the crop year, but around 3 cents in most of the later period when the export association was operating.

In private discussions and published statements, official and unofficial, stress was laid on the effect of the association's operations in narrowing the spread between futures prices in Chicago and cash wheat prices in the Pacific Northwest. An avowed objective of the association was to narrow this spread and keep it narrow.<sup>1</sup> A common statement is to the effect that the spread was 25 or 26 cents

have even reckoned that prices in the Pacific Northwest were raised above what they would

<sup>1</sup> From published statements it would appear that this objective was taken more seriously than its real importance warranted. The explanation lies in the fact that Pacific Northwest growers felt they had a right to share in the price strength of the eastern markets.

<sup>2</sup> Speaking before the Kansas Agricultural Convention at Topeka on January 11, 1934, Mr. Theis said: "Success and progress of this emergency export effort is more clearly demonstrated by the fact that when the plan was first discussed, No. 1 Soft White Wheat, which is the largest accumulation of surplus in that area, was selling at approximately 26 cents under the Chicago December price, basis delivered Portland, Oregon; whereas on the last day of December the Association was bidding the producer for the same wheat 6 cents under Chicago December, showing a 20-cent advance in basic value. . . . This plan has not only offered tremendous relief to the producers in the Pacific Northwest in disposing of this burdensome surplus, but it has prevented the low price competition of that wheat from depressing domestic values throughout the entire United States."—AAA Release 1562-34.

otherwise have been by the full amount of the subsidy per bushel; and have gone so far as to imply that the farmers there gained on all of their sales by 20 to 25 cents a bushel, and that wheat prices in the country as a whole were held up to some such extent.<sup>1</sup>

In order to arrive at an opinion resting on evidence, we have made three comparisons. The first of these is a spread between daily closing prices and the comparable near futures in Chicago and Seattle during the crop year (Chart 16, lowest section). In July 1933, when Chicago prices skyrocketed, Seattle prices were below Chicago prices by 21 to 24 cents a bushel, and for several days at the climax the spread was around 25 cents. It narrowed late in July, but widened again in mid-August. Late in August it narrowed to around 15 cents a bushel, but widened again until, in the second half of September, the spread was around 20 cents on September futures and around 18 on December futures. In October, perhaps in anticipation of the export operations, Pacific Northwest markets only partially followed Chicago on the severe drop that then occurred; indeed, on the day that prices were lowest, the spread was only 10 cents. During most of the period of the operations, the spread ranged between 10 and 17 cents a bushel. Late in the season, when the strike tied up Northwest ports and the

<sup>1</sup> Cf. editorial in *Commercial Review*, Portland, February 27, 1934:

"Anyone familiar with the situation will tell you that by subsidizing the farmers to an extent of 20-22 cents a bushel, on 25 to 30 million bushels, or a net loss to the government of around \$7,000,000, the entire crop of the United States has been enhanced in value by those figures [i.e., 20-22 cents a bushel]. We may safely say that by the expenditure of \$7,000,000 in the Pacific Northwest farmers of the entire country have benefited to the extent of over \$100,000,000. How?

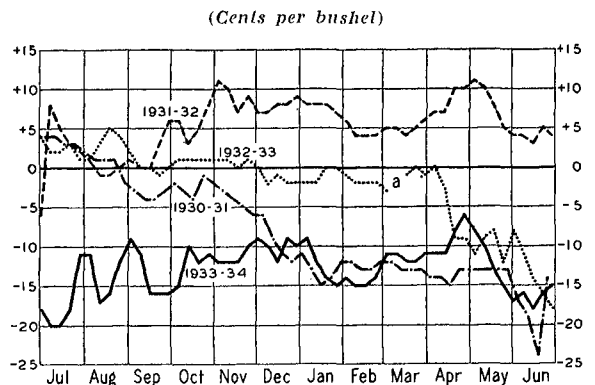
"If the subsidy had not been adopted, wheat prices in the Pacific Northwest would have sagged to the world level, around 50 cents a bushel. How could eastern prices have held up to present levels of around 90 cents for the May option? Pacific Northwest would have flooded the Gulf and the Atlantic with wheat and we in the Northwest could have moved the entire crop in that direction. As it is, a large amount has already been moved and is still moving. Your Chicago option would have been worth 25-30 cents a bushel less today. This wheat out here had to move some place and eastern prices could not have held above shipping level from here."

export association bought little, and when drought caused great advances in Chicago, Pacific Northwest markets followed only part way, and the spread widened to 18-20 cents a bushel.

This evidence suggests that the operations of the association may have narrowed the spread, from November through April, by between 5 and 10 cents a bushel, but seldom by much more. During this period the spread averaged 13 or 14 cents a bushel. We see no good ground for supposing that it would have averaged much if any over 20 cents a bushel in the absence of the subsidy operations.

To supplement this, we show in Chart 17 spreads between cash wheat prices in Chicago and Seattle, weekly in each of the past four

CHART 17.—SPREADS BETWEEN WEEKLY AVERAGE PRICES OF NO. 1 WHITE WHEAT, SEATTLE, AND OF LOWEST CONTRACT CASH WHEAT, CHICAGO, 1930-31 TO 1933-34\*



\* Computed from data compiled by the Food Research Institute; Seattle prices from *Foreign Crops and Markets*.

years. At its widest in mid-July, Seattle No. 1 White (sacked basis) was 20 cents a bushel under the lowest cash price of deliverable grades in Chicago. From late July to late September this spread ranged from 9 to 17 cents. From 16 cents late in September it narrowed to 12 cents in early November, and in two intervening weeks was slightly less. For four weeks in December and early January it was as narrow as 10 or 11 cents. Late in the winter it was once as wide as 14 or 15 cents. At its narrowest late in April, when Chicago prices dropped and the Pacific Northwest did not follow fully, it narrowed to 6

cents. During the strike, it widened to over 15 cents in June. From mid-October to the time of the port tie-up, the spread mostly ranged from 9 to 15 cents, and averaged about 12. From this chart, too, it would appear that the narrowing due to the export association operations was between 5 and 10 cents a bushel, rather than more. Even allowing for the anticipatory influence, the average difference seems likely not to have exceeded 7 cents.

Chart 8 (p. 384) shows the monthly spread between average farm prices of wheat in the United States as a whole and in Washington. At its maximum in mid-July 1933 this spread was 21 cents; but in mid-August, it had narrowed to 14 cents. This was before the export arrangement was assured, and it could have been affected only in limited degree by expectations of its adoption. In the rest of the crop year this spread averaged 12 cents a bushel, and was only once (in October) as low as 10 cents. If one attributes the wide spread in July 1933 to the extraordinary speculative advance in Chicago, one can hardly find basis for crediting the export arrangement with narrowing this spread by over 5 cents a bushel, if that much.

It has sometimes been assumed that, in the absence of the export subsidy or an equivalent, wheat prices in the Pacific Northwest would have fallen to normal export parity, such as to permit free movement into export. Had this occurred, prices in the region might well have averaged, during 1933-34, 15 cents or more below what they were. Some such fall, or a greater one, was feared there last summer, if no emergency action were taken. In retrospect it appears that so great a decline would not have occurred. With less reduction in prices the situation would probably have been met by a combination of some exports, increased shipments eastward, larger feed use, and more farmer holding; and these would have prevented drastic declines.

On the whole, we are disposed to infer that the net effect of the export arrangement, during its active operation, was to raise export wheat prices in the Pacific Northwest by something like 5 to 7 cents a bushel, on the average, above what they would otherwise have been, and much less on "milling" wheats than on

export wheats. The net effect on the weighted average price for the year as a whole was presumably less than 6 cents a bushel, for a good deal of the wheat was sold early in the season, and some late in the season, when the operations had little effect on the price. Over the crop year as a whole, we think it improbable that wheat growers of the Pacific Northwest gained 3 million dollars on their wheat over what they would have received if the scheme had not been adopted, though they probably sold more of it during the crop year than they otherwise would have done. We present this opinion in spite of the fact that all members of the trade whose opinion we asked estimated the net advantage of the operations to the grower at 12 to 15 cents a bushel or more.

By contrast it has sometimes been assumed (sometimes even by those making the previous assumption) that there would have been practically no exports had the subsidy plan not been adopted. We hold this view to be too extreme.

At prices for export wheats averaging 6 to 9 cents a bushel less than prevailed in the Pacific Northwest—at times farther below, at others not so far—some exports would have been worked. Wheat prices in the Orient were probably lower because of the subsidy operations, and it is by no means certain that the Chinese government would have raised its duty on flour if it had not had wheat to sell in large volume to its millers, who were thus in a position to demand protection.<sup>1</sup> The Chinese government would presumably have taken some wheat under its loan without the subsidy. Some flour would have gone to the Philippines and other well-established markets. At times during the year other sales would probably have been made. We think it not unreasonable to assume that at least 5 million bushels, as wheat and flour, would have been exported without the subsidy, and probably somewhat more.

Shipments of wheat and flour to the east were heavy in spite of the export operations. Apparently the total movement by water was

<sup>1</sup> According to some trade reports, Chinese millers refused to take United States wheat if flour was imported under the loan. *Southwestern Miller*, January 9, 1934, p. 22.

nearly 15 million bushels, and rail shipments were probably nearly 2 million more. Much of this moved under the protection of hedging sales made when spreads were wide in July 1933.<sup>1</sup> In the absence of price support in the Pacific Northwest, 10 to 15 million bushels more might have moved east, and perhaps a little more to California.

The effect of such additional shipments east would have been felt in certain quarters, at certain times. In the light of the year's events as a whole, however, we greatly doubt whether such additional shipments would have appreciably lowered the *average* farm or market price of wheat east of the Rockies. In the main, the major wheat markets have been so dominated by other factors that additional shipments of 10 to 15 million bushels of Pacific wheat and flour would have had no important bearing on their general levels.

It is probable that, in the absence of the subsidy, such additional shipments would have contributed something toward lowering the relative position of soft red winter wheats in the price structure, and toward moderating some of the extreme advances in prices that have occurred during the year. Conceivably Red Winter would have been an effectively deliverable grade in Chicago, and this might have prevented the tightness that developed in May. The tightness of the cash position might also have been eased slightly.

In addition, at somewhat lower prices, feed use in the Pacific Northwest might well have been higher by 1 or 2 million bushels or so, and the regional carryover on July 1, 1934, might have been 5 to 10 million bushels higher than it was. Even so, partly because of the port tie-up, the carryover remained well above normal levels (Table XVII).

We give these inferences subject to correction. Our considered view is, however, that the advantage of the subsidy arrangement to wheat growers in the Pacific Northwest has been commonly exaggerated, and that the favorable effects on prices to growers in the rest of the United States have been even more substantially overstated.

Other effects of the subsidy operation deserve brief comment. Its costs reduced benefit payments under the AAA program by 2 cents a bushel on allotments to wheat growers. It raised prices of flour to Pacific Northwest consumers somewhat, but probably not greatly, and prices of feed wheat to the poultry industry there somewhat more. It probably did not greatly alter the volume of milling in the Pacific Northwest, though it modified its direction and may have favorably affected its net returns for the year. It was responsible for larger sales of wheat, and considerably larger exports, to the advantage of dealers and exporters. It altered the relative volume of business of the various concerns, for those especially equipped to handle export shipments gained much more than those specializing more in domestic business.

#### REACTIONS TO THE AGREEMENT

Whatever the actual effects, there is no doubt that nearly all of those affected felt, at the close of the year, that the scheme had worked substantial advantages to all the wheat interests of the Pacific Northwest. On minor points, of course, there were complaints in various quarters, and among the millers there were those who were disappointed at the outcome; but few acts of "government interference" have won so nearly unanimous approval and excited so little attack. The *Southwestern Miller* (Kansas City) editorially commended the operations, and presented a news item in its issue of June 19, 1934, stating: "Observers of the A.A.A. work hold that the subsidy plan has been the most constructive measure provided for wheat." When the question of continuing the agreement in 1934-35 was up, support was general and open opposition conspicuous by its absence.

Milling interests in the Southwest and Southeast, however, were by no means satisfied with the achievement of the export association. The Southeastern Millers Association, meeting at Louisville on March 10, adopted a long resolution of protest,<sup>2</sup> stating in part:

Efforts of the government to control the price at Pacific Coast ports have been counteracted to the extent that very little relief from this "dump-

<sup>1</sup> See above, p. 388.

<sup>2</sup> *Northwestern Miller*, April 4, 1934, p. 40.

ing" of cheap wheat has up to the present been accomplished. As a result operations of flour mills in central and southern states have decreased 30 to 20 per cent, while Pacific Coast mills show a substantial increase in their operations as compared with a year ago. Many flour mills in central and southern states are now grinding wheat produced in the states of Washington and Oregon, thus curtailing to a large extent a demand for wheat grown in the large producing sections of the central west, Southwest and Northwest.

Millers in the Pacific Northwest, moreover, were greatly disappointed in the volume of flour moved under the agreement. The millers had urged at the formal hearing that, in view of past records of exports from the region, the operations should be conducted so that half of the exports would go out as flour. Actually, less than 20 per cent of the sales were flour sales. In particular, millers were angered by the absence of flour business with China under the RFC loan. Trade reports in April<sup>1</sup> indicated that China was willing to take flour but not to pay more than world market prices; to meet this, it was said, would require increasing the subsidy on flour sales to 35 or 40 cents a bushel, as compared with the recent spread of 28½ cents a bushel of wheat grain. It was not until during the strike that some fresh agreement appears to have been reached, under which China began to place large orders for flour in July.

Foreign reactions to the export subsidy plan

<sup>1</sup> See *Southwestern Miller*, April 10, 1934, p. 22.

<sup>2</sup> *AAA Release 1562-34*.

<sup>3</sup> According to the *Southwestern Miller* of October 17, 1933 (p. 22), the Prime Minister of Australia cabled to the Australian High Commissioner in London, saying that Far Eastern business had practically ceased after the announcement of the plan. The cessation, however, was not of long duration.

<sup>4</sup> Effective July 3, 1934, the unit of weight was changed from the picul to the kilo. See *Foreign Crops and Markets*, July 23, 1934, XXIX, 80. Allowing for this, the new rates on these products were identical with the old, and not higher as stated in the source cited. The higher American equivalents on July 3, 1934, were merely the result of further depreciation of the dollar in terms of gold.

<sup>5</sup> Mr. O. D. Fisher, leading Seattle miller, stated at the preliminary hearing in Portland on August 21 that he understood that the Chinese government was pledged under the RFC agreement to deposit funds from the then existing flour duty to insure payment of the loan.

proved of no major importance. Speaking at Topeka, Kansas, on January 11, Mr. Theis admitted: "We have already encountered some difficulty from other exporting nations, claiming that this operation constituted dumping and one importing country threatened invoking an anti-dumping clause, until it was explained that this was strictly an emergency program."<sup>2</sup> Australia, at least, made some kind of protest, on the ground that Australian sales in the Orient were adversely affected by the arrangement.<sup>3</sup> There may have been others to which little or no publicity was given. We know of no nation that put in force anti-dumping legislation against imports of this wheat or flour. Yet there is reason to believe that legitimate concern to avoid exciting retaliatory action continuously affected the administration of the wheat plan.

It is important to add, however, that, effective December 16, 1933, China imposed import duties on wheat, rice, and paddy, which had previously been duty-free, and greatly raised the duties on flour. The rates on wheat and flour were as follows, in Chinese "gold units":

Product	Per picul of 133½ lbs.	Per kilo
Wheat .....	.30	.50
Flour .....	.75	1.24

The wheat rate was equivalent to 8 cents a bushel, and the flour rate to 69 cents per barrel, at rates of exchange prevailing on December 16, and somewhat higher at rates that came subsequently to prevail.<sup>4</sup> We infer that the imposition of these duties was not unrelated to the adoption of the Pacific Northwest agreement,<sup>5</sup> and that Chinese millers were able to demand the increase in the flour duty in return for paying their government an acceptable price for American wheat.

While the data we have summarized cover only the period up to the end of June, the export arrangement continues in effect thus far without formal change. In the third week of July announcement was made of the sale of some 20,000 tons of flour (requiring around a million bushels of wheat) to the Chinese government, all to be shipped in American bottoms through July–September. This was by

far the largest single sale of flour yet made, and more than had been sold on public and private Chinese account in the whole period up to the time it was made. Several times the trade had lost hope that the Chinese government would buy any significant quantities of flour. This sale, however, gave rise to expectations of further sales in view of the strength in world wheat markets, a rice crop in China below anticipations, and the desire of the Chinese government to take advantage of the loan in accordance with its agreement.<sup>1</sup> Another substantial sale (apparently nearly half as large) was reported later in July.

As we have already noted, sales made but unshipped on July 1 amounted to 3,904,000 bushels of wheat and flour as wheat. Some shipments (including one full cargo of wheat from Portland to China) were made shortly

after the middle of July,<sup>2</sup> but comparatively little wheat was moved out till the ports were effectively reopened on July 31, following the vote of the longshoremen agreeing to submit the issues to arbitration. The prolongation of the strike not merely retarded shipments of old wheat but held up the movement of new-crop wheat as well.

In view of the small wheat crop in the Pacific Northwest in 1934, and the very short crops east of the Rocky Mountains, the Pacific Northwest has a much smaller surplus than in 1933-34 and the rest of the country has more need of most of that surplus. Operations of the export association will therefore be on a much more modest scale than last year, apart from sales to China under the loan; but latest official announcements indicate no date for its termination.<sup>3</sup>

## VII. CONCLUDING NOTE

Substantial progress has been made in grappling with many of the wheat problems of the Pacific Northwest, though several must be wrestled with continuously instead of being solved once and for all. The central problem of recent years—what to do when wheat export prices are persistently and seriously unremunerative—still defies solution. The emergency measures of government aid in the past four years have afforded relief in some degree, for a time—no more. For various reasons, none appears clearly appropriate for continuous operation.

The region is well developed agriculturally, though in many directions it will doubtless develop much further. There are no large areas of land well suited to wheat growing that are not in wheat or other crops. Yet given sufficiently attractive prices, the wheat production of the Pacific Northwest could be materially increased, in five principal ways: (1) by planting wheat on lands that are sub-

marginal at recent levels of prices, chiefly because of low yields or risk of crop failure due to low rainfall; (2) by putting under wheat farm lands in western Oregon, and to a lesser extent in western Washington, which have been diverted from wheat to other uses because wheat is less profitable at low prices; (3) by increasing the cultivation of wheat in existing irrigated sections, where high yields per acre can be obtained; (4) by extending the area under irrigation and devoting a considerable part of this area to wheat raising; (5) by applying nitrogenous fertilizers (now little used), or employing a rotation system using leguminous forage crops to increase the nitrogen content of the soil.

At various times in recent years, attractive prices for wheat have led to expansion of output by the first three of these methods. Such expansion is not now in prospect. Increased output through higher yields also seems unlikely to be important, for in some degree the spread of higher-yielding varieties and more efficient farming practices merely offset soil depletion.

Under conditions of low wheat prices, such as have prevailed in recent years, the problem is to reduce rather than to expand. Up to a certain point, contraction of acreage simply

<sup>1</sup> *Commercial Review*, July 24, 1934. According to the official *Grain Market Review*, of the Federal-State Market News Service, San Francisco, the association put out a bid price of 86½ cents to cover this sale, and one of 89 cents to cover the next one.

<sup>2</sup> *Commercial Review*, July 24, 1934.

<sup>3</sup> See *AAA Release 244-35*, August 2, 1934.

means a reversion of irrigated lands or land in diversified farming areas to other farming uses. To a certain extent, forced economies in cultivation reduce yields. Beyond these, contraction is difficult. In the major wheat regions no considerable resort to alternative crops or livestock farming is financially feasible if it be agriculturally possible; and contraction under economic pressure means either abandonment of farms now submarginal or letting farms and equipment go cheaply enough to others so that they can afford to keep on producing wheat.

To the latter, the debt readjustment process now under way is an alternative, and in most of the principal wheat sections there have been few farm mortgages foreclosed. Elimination of submarginal farms, particularly in some drier sections and in scattered locations elsewhere, has not gone far, but it is not yet clear whether it can be indefinitely checked. The horizontal reduction program of the AAA, with benefit payments to all who contract to

reduce their wheat acreage by specified percentages, for the time being helps growers to stick to submarginal land as well as helping other farmers to "get by" more comfortably.

The great drought in other wheat-growing sections of the country in 1934 bids fair to improve the Pacific Northwest wheat position substantially this year. If later developments support early August prospects for eliminating most of the surplus world wheat carryovers this year, a more lasting change for the better in the regional wheat outlook may be wrought. But unless and until the nations of the world return to saner freedom of international trade, Pacific Northwest wheat interests will be peculiarly vulnerable. From national measures of our own in this direction, of which the Secretary of Agriculture is a vigorous advocate, the region has far more to gain than from continuation of an export subsidy such as the one that has been applied, with smoothness and general satisfaction, since October 1933.

*This study is the work of Joseph S. Davis, with the assistance of Ennis C. Blake, Adelaide M. Hobe, P. Stanley King, and Robert F. Lundy of the Institute staff. For essential materials, the author is especially indebted to Mr. Frank A. Theis of the AAA, Mr. R. L. Baldwin of the Federal Grain Supervision, Portland, Oregon, and Dr. O. C. Stine of the Bureau of Agricultural Economics, Washington, D.C. Additional information was generously furnished, orally or in writing, by a number of men familiar with different phases of the Pacific Northwest wheat situation. For the presentation as it stands, with such errors of fact and interpretation as it may contain, the author must accept sole responsibility*



# APPENDIX

TABLE I.—WHEAT ACREAGE AND PRODUCTION IN THE PACIFIC NORTHWEST, CENSUS YEARS 1889-1929\*

Area	Acreage (thousand acres)						Production (thousand bushels)					
	1889	1899	1909	1919	1924	1929	1889	1899	1909	1919	1924	1929
Pacific Northwest.	964	2,103	3,023	3,926	2,869	3,793	16,302	38,852	58,570	67,874	43,892	74,666
Washington .....	373	1,088	2,118	2,494	1,747	2,295	6,345	21,188	40,920	41,838	24,765	42,589
Oregon .....	553	873	763	1,080	860	1,075	9,297	14,509	12,457	19,527	14,270	21,527
Northern Idaho.....	38 <sup>a</sup>	142 <sup>a</sup>	142 <sup>a</sup>	352	262	423	660 <sup>a</sup>	3,155 <sup>a</sup>	5,193 <sup>a</sup>	6,509	4,857	10,550
Southwestern Idaho.	7 <sup>a</sup>	15 <sup>a</sup>	53 <sup>a</sup>	187	90	173	131 <sup>a</sup>	311 <sup>a</sup>	1,118 <sup>a</sup>	3,617	1,540	4,119
Southeastern Idaho..	19 <sup>a</sup>	109 <sup>a</sup>	204 <sup>a</sup>	602	457	699	386 <sup>a</sup>	1,874 <sup>a</sup>	3,927 <sup>a</sup>	7,751	6,844	13,922
Total Idaho .....	64	266	399	1,141	809	1,295	1,177	5,340	10,238	17,877	13,241	28,591

\* Data from *Eleventh Census of the United States, 1890, Statistics of Agriculture*, pp. 362, 381, and 389; *Twelfth Census of the United States, 1900, Vol. VI, Agriculture, Part 2*, pp. 92, 159, 180, 189; *Thirteenth Census of the United States, 1910, Vol. VI, Agriculture*, pp. 396-98; *ibid.*, Vol. VII, *Agriculture*, pp. 418, 848; *Fourteenth Census of the United States, 1920, Vol. VI, Agriculture, Part 3*, pp. 132, 142-45, 290, 300, 316, 327; *United States Census of Agriculture, 1925, Part 3*, pp. 154-59, 386, 424; *Fifteenth Census of the United States, 1930, Agriculture, Vol. II, Part 3*, pp. 190-93, 444, 490. Division between southwestern and southeastern Idaho according to line in Edwin Bates, *Commercial Survey of the Pacific Northwest* (Washington, 1932). Northern Idaho (south to and including the present Idaho County) alone is totaled with Pacific Northwest.

<sup>a</sup> Because of changes in county boundaries, these figures cannot be made strictly comparable with those for later censuses. Northern Idaho here includes some areas later included in southwestern Idaho, and southwestern Idaho includes areas later classified in southeastern Idaho. The divergences from close accuracy are, however, overshadowed by changes in market flow over the period that cannot readily be determined.

TABLE II.—WINTER AND SPRING WHEAT, HARVESTED ACREAGE, AND YIELD PER HARVESTED ACRE, IN PACIFIC NORTHWEST STATES, 1919-34\*  
(Thousand acres; bushels per acre)

Year	Winter-wheat acreage			Spring-wheat acreage			Winter-wheat yield			Spring-wheat yield		
	Wash- ington	Oregon	Idaho	Wash- ington	Oregon	Idaho	Wash- ington	Oregon	Idaho	Wash- ington	Oregon	Idaho
1919.....	1,167	817	438	1,328	263	704	21.0	22.0	14.5	13.0	13.0	17.0
1920.....	1,025	762	499	1,300	287	609	24.0	22.2	18.5	11.9	17.0	21.0
1921.....	1,372	765	484	780	227	609	27.9	24.0	20.5	15.0	17.0	23.5
1922.....	1,262	799	508	796	191	560	16.3	19.0	15.5	9.3	11.5	21.0
1923.....	1,186	771	462	812	145	493	27.5	25.0	24.5	22.0	21.0	25.5
1925.....	1,115	790	416	650	100	395	17.0	17.0	15.0	9.2	15.0	18.0
1925.....	357	350	441	1,600	614	513	23.5	21.0	22.5	16.2	18.8	26.5
1926.....	805	880	520	1,183	184	590	23.0	19.0	19.5	16.5	13.6	22.5
1927.....	1,167	900	603	970	202	662	28.5	26.0	20.0	20.0	20.5	27.0
1928.....	1,354	837	615	795	182	695	25.0	24.0	19.5	15.4	17.0	26.5
1929.....	1,151	926	703	1,144	149	591	23.5	20.0	20.0	13.7	20.0	25.0
1930.....	875	833	731	1,430	194	514	22.5	23.0	23.0	13.0	23.0	27.0
1931.....	1,311	825	621	1,037	120	360	23.0	18.5	17.0	12.0	20.0	19.5
1932.....	1,114	751	652	1,089	240	540	24.0	20.0	23.0	12.5	21.0	29.0
1933.....	557	225	535	1,579	672	540	23.5	19.5	15.0	21.0	19.5	21.0
1934.....	933	619	535	947	202	508	24.9	17.0	17.5	12.5	15.2	23.1

\* Estimates of the U.S. Department of Agriculture, here compiled from *Wheat and Rye Statistics* (Statistical Bulletin No. 12, January 1926), pp. 8, 10, 11, 13, for 1909-18; tentative revision as of April 20, 1932 (mimeographed release), for 1919-28; *Agriculture Yearbook, 1932*, pp. 581-82, for 1929 and 1930; *Crops and Markets*, December 1933, X, 457, for 1931-33; and *General Crop Report*, July 1, 1934, for 1934. Summations of winter and spring acreage here reported agree with the data in Table I except for Washington in 1928, 1929, and 1930 when the summations are too small by 74, 80, and 80 thousand acres, respectively.

TABLE III.—WHEAT PRODUCTION, ACREAGE, AND YIELD PER ACRE IN PACIFIC NORTHWEST STATES, 1879-1933\*

Year	Production (thousand bushels)				Acreage (thousand acres)				Yield per acre (bushels)			
	Total	Wash- ington	Oregon	Idaho	Total	Wash- ington	Oregon	Idaho	Total	Wash- ington	Oregon	Idaho
1879.....	9,950	1,935	7,476	539	549	82	445	22	18.1	23.6	16.8	24.5
1880.....	11,476	1,660	9,300	516	572	83	465	24	20.1	20.0	20.0	21.5
1881.....	12,240	1,976	9,652	612	624	104	495	25	19.6	19.0	19.5	24.5
1882.....	13,138	2,664	9,700	774	669	148	485	36	19.6	18.0	20.0	21.5
1883.....	13,270	3,230	9,095	945	750	170	535	45	17.7	19.0	17.0	21.0
1884.....	15,761	3,390	10,925	1,446	860	226	575	59	18.3	15.0	19.0	24.5
1885.....	16,718	4,700	10,530	1,488	882	235	585	62	19.0	20.0	18.0	24.0
1886.....	15,039	4,824	8,850	1,365	923	268	590	65	16.3	18.0	15.0	21.0
1887.....	18,108	5,752	10,980	1,376	969	295	610	64	18.7	19.5	18.0	21.5
1888.....	17,898	6,290	10,030	1,578	1,007	340	590	77	17.8	18.5	17.0	20.5
1889.....	17,247	6,341	9,408	1,498	1,014	373	560	81	17.0	17.0	16.8	18.5
1890.....	20,048	8,400	10,030	1,618	1,073	400	590	83	18.7	21.0	17.0	19.5
1891.....	23,073	9,200	11,780	2,093	1,171	460	620	91	19.7	20.0	19.0	23.0
1892.....	23,170	9,010	11,610	2,550	1,275	530	645	100	18.2	17.0	18.0	25.5
1893.....	27,727	12,812	12,635	2,280	1,410	625	665	120	19.7	20.5	19.0	19.0
1894.....	27,698	11,468	12,870	3,360	1,495	695	660	140	18.5	16.5	19.5	24.0
1895.....	26,950	10,850	13,700	2,400	1,535	700	685	150	17.6	15.5	20.0	16.0
1896.....	28,910	11,550	13,490	3,870	1,660	770	710	180	17.4	15.0	19.0	21.5
1897.....	37,980	18,400	14,630	4,950	1,915	920	770	225	19.8	20.0	19.0	22.0
1898.....	43,855	21,730	15,750	6,375	2,185	1,060	875	250	20.1	20.5	18.0	25.5
1899.....	41,055	21,216	14,492	5,347	2,227	1,088	873	266	18.4	19.5	16.6	20.1
1900.....	43,227	25,478	11,890	5,859	2,434	1,290	865	279	17.8	19.8	13.7	21.0
1901.....	56,576	33,460	16,480	6,636	2,429	1,360	775	294	23.3	24.6	21.3	22.6
1902.....	45,848	23,827	15,555	6,466	2,211	1,195	750	266	20.7	19.9	20.7	24.3
1903.....	43,526	24,275	12,448	6,803	2,445	1,460	680	305	17.8	16.6	18.3	22.3
1904.....	49,439	29,800	11,817	7,822	2,521	1,540	655	326	19.6	19.4	18.0	24.0
1905.....	52,481	31,432	12,195	8,854	2,536	1,535	670	331	20.7	20.5	18.2	26.7
1906.....	47,455	28,700	10,610	8,145	2,450	1,550	555	345	19.4	18.5	19.1	23.6
1907.....	61,375	40,065	13,030	8,280	2,655	1,725	585	345	23.1	23.2	22.3	24.0
1908.....	49,595	27,870	12,067	9,658	2,971	1,910	680	381	16.7	14.6	17.7	25.3
1909.....	63,626	40,925	12,455	10,246	3,281	2,118	764	399	19.4	19.3	16.3	25.7
1910.....	55,632	31,550	13,938	10,144	3,287	2,100	715	472	16.9	15.0	19.5	21.5
1911.....	75,396	44,350	16,995	14,051	3,557	2,230	810	517	21.2	19.9	21.0	27.2
1912.....	78,382	45,780	19,860	12,742	3,660	2,280	870	510	21.4	20.1	22.8	25.0
1913.....	70,990	42,530	16,392	12,068	3,443	2,160	795	488	20.6	19.7	20.6	24.7
1914.....	73,268	42,738	18,000	12,530	3,391	1,995	870	526	21.6	21.4	20.7	23.8
1915.....	87,370	50,920	21,090	15,360	3,740	2,170	960	610	23.4	23.5	22.0	25.2
1916.....	64,207	34,090	17,475	12,642	3,115	1,670	840	605	20.6	20.4	20.8	20.9
1917.....	55,548	25,528	12,820	17,200	3,550	1,805	810	935	15.6	14.1	15.8	18.4
1918.....	67,195	28,975	16,660	21,560	4,520	2,315	1,095	1,110	14.9	12.5	15.2	19.4
1919.....	79,966	41,888	19,759	18,319	4,717	2,495	1,080	1,142	17.0	16.8	18.3	16.0
1920.....	83,886	40,070	21,795	22,021	4,482	2,325	1,049	1,108	18.7	17.2	20.8	19.9
1921.....	96,432	49,979	22,219	24,234	4,237	2,152	992	1,093	22.8	23.2	22.4	22.2
1922.....	64,985	27,974	17,377	19,634	4,116	2,058	990	1,068	15.8	13.6	17.6	18.4
1923.....	96,690	50,479	22,320	23,891	3,869	1,998	916	955	25.0	25.3	24.4	25.0
1924.....	53,215	24,935	14,930	13,350	3,466	1,765	890	811	15.4	14.1	16.8	16.5
1925.....	76,719	34,310	18,893	23,516	3,875	1,957	964	954	19.8	17.5	19.6	24.6
1926.....	80,672	38,035	19,222	23,415	4,162	1,988	1,064	1,110	19.4	19.1	18.1	21.1
1927.....	110,135	52,660	27,541	29,934	4,504	2,137	1,102	1,265	24.5	24.6	25.0	23.7
1928.....	101,266	47,674	23,182	30,410	4,552	2,223	1,019	1,310	22.2	21.4	22.7	23.2
1929.....	94,534	44,199	21,500	28,835	4,744	2,375	1,075	1,294	19.9	18.6	20.0	22.3
1930.....	93,174	39,593	23,621	29,960	4,657	2,385	1,027	1,245	20.0	16.6	23.0	24.1
1931.....	77,836	42,597	17,662	17,577	4,274	2,348	945	981	18.2	18.1	18.7	17.9
1932.....	91,064	40,348	20,060	30,656	4,386	2,203	991	1,192	20.8	18.3	20.2	25.7
1933.....	83,106	46,249	17,492	19,365	4,108	2,136	897	1,075	20.2	21.7	19.5	18.0

\* Latest revised data of the U.S. Department of Agriculture. Annual estimates are available for Oregon for 1869-78, but for Washington and Idaho only from 1879. As indicated in the text, and in Table I, only part of the Idaho crop belongs within the Pacific Northwest proper.

TABLE IV.—WINTER WHEAT ACREAGE ABANDONED IN PACIFIC NORTHWEST STATES, 1901-34\*  
(Percentage of acreage sown)

Year	Wash- ington	Oregon	Idaho	Year	Wash- ington	Oregon	Idaho	Year	Wash- ington	Oregon	Idaho
1901.....	4.0	2.1	4.4	1913.....	5.6	5.0	5.0	1925.....	70.0	65.0	15.0
1902.....	39.0	6.0	5.0	1914.....	4.5	2.0	2.0	1926.....	4.0	3.0	6.0
1903.....	5.5	3.6	1.0	1915.....	4.0	2.5	4.0	1927.....	6.0	1.0	4.0
1904.....	5.0	7.0	3.8	1916.....	20.0	2.0	5.5	1928.....	6.0	3.0	5.0
1905.....	15.1	14.6	3.2	1917.....	33.0	11.0	10.0	1929.....	10.0	3.0	3.0
1906.....	26.0	19.0	9.0	1918.....	5.0	2.0	4.0	1930.....	28.0	5.0	4.0
1907.....	9.0	14.0	3.0	1919.....	3.0	1.5	2.0	1931.....	4.0	5.0	4.0
1908.....	4.0	2.5	3.5	1920.....	20.0	3.0	10.0	1932.....	6.0	4.0	7.0
1909.....	4.0	3.0	4.2	1921.....	2.0	1.0	3.0	1933.....	60.0	75.0	20.0
1910.....	7.6	6.0	4.0	1922.....	7.0	4.0	4.5	1934.....	7.0	10.0	10.0
1911.....	4.9	3.9	4.7	1923.....	5.0	3.0	4.0				
1912.....	4.5	1.6	3.8	1924.....	25.0	8.0	11.0				

\* Estimates of the U.S. Department of Agriculture, based on area abandoned to May 1. Here compiled from *Wheat and Rye Statistics* (Statistical Bulletin, No. 12, January 1926), p. 3, for 1901-21; *Wheat Acreage 1922-29* (mimeographed release, October 1929), p. 3, for 1922-25; *Agricultural Yearbook, 1931*, p. 588, for 1926-28; *ibid.*, 1932, p. 579, for 1929-31; and *Crop Reports* for 1933-34.

TABLE V.—WHEAT ACREAGE CLASSIFIED BY MAJOR TYPES IN CROP-REPORTING DISTRICTS OF THE PACIFIC NORTHWEST, 1929\*

State	Section	District	Major types (thousand acres)					Percentage of total acreage			
			White	Hard red winter	Soft red winter	Hard red spring	Total	White	Hard red winter	Soft red winter	Hard red spring
Washington	West .....	1	10.0	.6	5.7	2.5	18.8	53.2	3.2	30.1	13.5
	Center .....	2	139.8	16.1	15.0	1.7	172.6	81.0	9.3	8.7	1.0
	Northeast .....	3	119.9	15.2	26.3	7.3	168.7	71.1	9.0	15.6	4.3
	East center .....	5	729.7	225.5	47.0	41.7	1,043.9	69.9	21.6	4.5	4.0
	Southeast .....	9	468.7	233.5	171.1	17.8	891.1	52.6	26.2	19.2	2.0
Idaho	North .....	1	273.1	57.4	45.1	47.7	423.3	64.5	13.5	10.7	11.3
	Northeast .....	3	350.3	6.6	3.7	3.6	364.2	96.2	1.8	1.0	1.0
Oregon	North center .....	2	216.3	233.6	1.8	1.8	453.5	47.7	51.5	.4	.4
	Other east and center .....	8	49.9	27.9	.0	4.1	82.0 <sup>a</sup>	60.9	34.0	.0	5.0
	Southwest .....	7	15.7	.0	.2	.8	16.7	93.8	.0	1.6	4.6
	Northwest .....	1	133.6	.8	3.0	21.3	158.8 <sup>a</sup>	84.1	.5	1.9	13.4
Total .....			2,507.0	817.2	318.9	150.3	3,793.6	66.4	21.5	8.1	4.0
Five major districts.....			2,038.1	756.6	268.7	112.6	3,176.0	64.2	23.9	8.4	3.5

\* Data from J. Allen Clark and K. S. Quisenberry, *Distribution of the Varieties and Classes of Wheat in the United States in 1929* (U.S. Department of Agriculture, Circular No. 283), November 1933, pp. 35-36.

<sup>a</sup> Including small acreages of durum.

TABLE VI.—ACREAGE IMPORTANCE OF LEADING TYPES AND VARIETIES OF WHEAT IN THREE PACIFIC NORTHWEST STATES, CENSUS YEARS 1919, 1924, 1929\*  
(Percentage of acreage harvested)

Type and variety	Three states			Washington			Oregon			Idaho		
	1919	1924	1929	1919	1924	1929	1919	1924	1929	1919	1924	1929
<b>Soft White</b>												
Federation .....	...	1.0	14.7	...	.1	9.9	...	1.7	23.1	...	2.1	16.3
Goldcoin .....	10.0	7.6	8.9	9.0	5.9	7.0	14.4	10.4	13.4	8.1	8.4	8.7
Dicklow .....	3.4	2.6	4.2	...	... <sup>b</sup>	.3	...	.2	.1	14.0	10.6	14.7
Others <sup>c</sup> .....	6.1	4.0	3.2	1.1	.3	1.2	17.6	11.7	10.6	6.1	3.8	.4
<b>Total</b> .....	19.5	15.2	31.0	10.1	6.3	18.4	32.0	24.0	47.2	28.2	24.9	40.1
<b>Club</b>												
Hybrid 128 .....	6.1	12.2	7.6	7.4	9.2	8.5	9.6	29.4	12.6	.2	.4	2.0
Jenkin .....	1.4	3.3	1.9	1.6	3.5	1.5	.4	2.0	2.0	1.9	4.3	2.8
Albit .....	...	...	1.7	...	...	3.3	...	...	...	...	...	.2
Hybrid 123 .....	.6	1.5	.6	1.1	2.9	1.1	.1	.2	.1	...	... <sup>b</sup>	... <sup>b</sup>
Others <sup>c</sup> .....	9.6	4.4	2.0	9.0	4.7	1.8	13.2	3.7	2.2	7.5	4.2	2.1
<b>Total</b> .....	17.7	21.4	13.8	19.1	20.3	16.2	23.3	35.3	16.9	9.6	8.9	7.1
<b>Hard White</b>												
Baart .....	7.7	10.3	12.5	12.3	14.6	20.0	3.7	.8	1.3	1.3	11.1	8.6
Pacific Bluestem..	18.7	9.1	5.6	24.9	13.0	9.0	11.3	3.2	1.4	12.4	6.8	3.3
Hard Federation..	...	.3	1.0	...	... <sup>b</sup>	.4	...	1.1	3.3	...	.1	.2
Quality .....	...	.1	.5	...	.2	.1	...	...	.2	...	.1	1.1
Bunyip .....	...	...	.2	...	...	.4	...	...	...	...	...	... <sup>b</sup>
<b>Total</b> .....	26.4	19.8	19.8	37.2	27.8	29.9	15.0	5.1	6.2	13.7	18.1	13.2
<b>Hard Red Winter</b>												
Turkey .....	10.8	25.4	18.8	7.6	24.5	15.6	13.2	26.0	24.4	15.6	26.7	19.9
Ridit .....	...	...	3.6	...	... <sup>b</sup>	5.6	...	...	.2	...	...	2.8
Others <sup>c</sup> .....	...	.2	1.0	...	...	...	...	...	.1	...	.9	3.4
<b>Total</b> .....	10.8	25.6	23.4	7.6	24.5	21.2	13.2	26.0	24.7	15.6	27.6	26.1
<b>Soft Red Winter</b>												
Triplet .....	...	2.9	3.6	...	4.7	6.6	...	.1	.4	...	2.3	.9
Jones Fife .....	5.1	4.4	1.5	8.7	7.6	2.4	...	.8	... <sup>b</sup>	2.2	1.3	1.2
Red Russian .....	3.3	1.5	1.3	4.3	1.6	1.1	.7	1.3	.3	3.4	1.2	2.3
Others <sup>c</sup> .....	.4	.1	.1	... <sup>b</sup>	.1	... <sup>b</sup>	.1	.1	...	1.6	.1	.3
<b>Total</b> .....	8.8	8.9	6.5	13.0	14.0	10.1	.8	2.3	.7	7.2	4.9	4.7
<b>Hard Red Spring</b>												
Marquis .....	9.4	5.6	3.6	9.3	3.3	2.6	2.2	1.7	1.3	16.2	14.8	7.3
Others <sup>c</sup> .....	1.1	1.0	.6	...	...	.4	4.4	3.9	1.5	.2	...	.1
<b>Total</b> .....	10.5	6.6	4.2	9.3	3.3	3.0	6.6	5.6	2.8	16.4	14.8	7.4
<b>All others<sup>c</sup></b> .....	6.3	2.5	1.3	3.7	3.8	1.2	9.1	1.7	1.5	9.3	.8	1.4

\* Based on data in Clark and Quisenberry, *op. cit.*, pp. 7-8, 18-19, 22-23.

<sup>a</sup> Including varieties not reported.

<sup>c</sup> Chiefly varieties belonging within the foregoing groups

<sup>b</sup> Variety reported but estimate not given or less than 0.1 per cent of the total acreage of the state. but not reported so as to be classified.

TABLE VII.—NUMBER OF WHEAT FARMS\* AND WHEAT YIELD PER ACRE ON IRRIGATED AND UNIRRIGATED LAND,† IN PACIFIC NORTHWEST STATES, 1929  
(Number; bushels per acre)

Area	All farms	Farms raising:				Winter and spring			Unirrigated		Irrigated	
		Wheat	Winter wheat	Spring ex-durum	Durum	Total	Unirrigated	Irrigated	Winter	Spring	Winter	Spring
Pacific Northwest...	135,018	35,516 <sup>a</sup>	23,985	16,114	29	19.7	23.1	32.8	22.6	13.6	28.1	33.3
Washington .....	70,904	14,690	8,533	8,600	13	18.6	18.1	37.1	23.4	12.6	30.9	37.6
Oregon .....	55,153	15,657	12,121	4,960	12	20.0	19.6	28.4	20.0	16.6	26.1	28.7
Northern Idaho .....	8,961	5,169 <sup>a</sup>	3,331	2,554	4	24.9	24.9	15.9	27.8	19.3	12.3	16.1
Southwestern Idaho..	12,176	5,334 <sup>a</sup>	700	5,375	1	23.8	11.6	34.2	11.8	11.4	31.4	34.3
Southeastern Idaho...	20,537	12,815 <sup>a</sup>	2,998	11,590	8	19.9	14.7	33.8	14.6	15.0	22.6	34.2
Total Idaho .....	41,674	23,318	7,029	19,519	13	22.1	18.8	33.9	19.8	16.6	25.3	34.3

\* Data from *Fifteenth Census of the United States, 1930, Agriculture*, Vol. II, Part 3, pp. 23, 79-80, 174-77, 190-93; *ibid.*, Vol. IV, p. 738. Northern Idaho alone is included in Pacific Northwest total.

† Based on data reported in *Fifteenth Census of the United States, 1930, Irrigation of Agricultural Lands*, pp. 120-23, 202, 243, 398-401, 440, and 472; *ibid.*, *Agriculture*, Vol II, Part 3, pp. 190-93, 444, and 490.

<sup>a</sup> Not given by the census, but calculated on the rough in each of the three subdivisions of Idaho as in the state assumption that the proportion of duplication was the same as a whole (87.8 per cent).

TABLE VIII.—CENSUS DATA ON DEGREE OF IMPORTANCE OF WHEAT ACREAGE AND PRODUCTION UNDER IRRIGATION IN THE PACIFIC NORTHWEST, 1929\*

Area	Irrigated area (thousand acres)			Wheat acreage (thousand acres)			Wheat production (million bushels)			Wheat yield per acre (bushels)		
	Total area	Cropped for wheat	Percentage in wheat	Total	Irrigated	Percentage irrigated	Total	Irrigated	Percentage irrigated	Total	Irrigated	Unirrigated
Pacific Northwest..	1,412	102	7.2	3,793	102	2.7	74.7	3.35	4.5	19.7	32.8	23.1
Washington .....	499	53	10.6	2,295	53	2.3	42.6	1.95	4.6	18.6	37.1	18.1
Oregon .....	899	49	5.5	1,075	49	4.6	21.5	1.40	6.5	20.0	28.4	19.6
Northern Idaho .....	14	0	.7	423	0	.02	10.6	....	.01	24.9	15.9	24.9
Southwestern Idaho..	708	93	13.2	174	93	53.8	4.1	3.19	77.4	23.8	34.2	11.6
Southeastern Idaho..	1,459	191	13.1	698	193	27.4	13.9	6.45	46.3	19.9	33.8	14.7
Total Idaho.....	2,181	284	13.0	1,295	284	22.0	28.6	9.64	33.7	22.1	33.9	18.8

\* Source as in Table VII, footnote†. Northern Idaho alone is included in Pacific Northwest total.

TABLE IX.—WHEAT RECEIPTS AT PACIFIC NORTHWEST PORT TERMINALS, ANNUALLY FROM 1919-20\*  
(Thousand bushels, except as noted)

Year	Grand total	Columbia River	Puget Sound	Sacked			Bulk			Percentage sacked		
				Total	C.R.	P.S.	Total	C.R.	P.S.	Total	C.R.	P.S.
1919-20.....	.....	14,431	.....	.....	10,618	.....	.....	3,813	.....	.....	73.6	.....
1920-21.....	.....	29,648	.....	.....	23,717	.....	.....	5,931	.....	.....	80.0	.....
1921-22.....	.....	41,837	.....	.....	34,272	.....	.....	7,565	.....	.....	81.9	.....
1922-23.....	.....	23,584	.....	.....	16,593	.....	.....	6,991	.....	.....	70.4	.....
1923-24.....	58,810	36,824	21,986	47,036	29,469	17,567	11,774	7,355	4,419	80.0	80.0	79.9
1924-25.....	34,259	20,736	13,523	23,954	15,100	8,854	10,305	5,636	4,669	69.9	72.8	65.5
1925-26.....	42,385	26,354	16,031	32,862	20,182	12,680	9,523	6,172	3,351	77.5	76.6	79.1
1926-27.....	54,127	33,828	20,299	40,077	23,838	16,239	14,050	9,990	4,060	74.0	70.5	80.0
1927-28.....	78,811	44,562	34,249	58,336	32,786	25,550	20,475	11,776	8,699	74.0	73.6	74.6
1928-29.....	51,896	28,969	22,927	33,313	19,648	13,665	18,583	9,321	9,262	64.2	67.8	59.4
1929-30.....	49,955	27,911	22,044	31,311	17,335	13,976	18,644	10,576	8,068	62.7	62.1	63.4
1930-31.....	54,971	30,146	24,825	35,387	19,644	15,743	19,584	10,502	9,082	64.4	65.2	63.4
1931-32.....	41,712	20,946	20,766	26,663	13,352	13,311	15,049	7,594	7,455	63.9	63.7	64.1
1932-33.....	30,529	15,030	15,499	16,865	8,170	8,695	13,664	6,860	6,804	55.2	54.4	56.1
1933-34.....	46,844	26,270	20,574	30,792	17,337	13,455	16,052	8,933	7,119	65.7	66.0	65.4

\* Data compiled by R. L. Baldwin, from records of Pacific Coast Headquarters, Federal Grain Supervision, Portland, Oregon. Receipts in Puget Sound ports in bushels are computed from carload receipts at the average number of bushels per car as found in inspections at Columbia River ports (for 1934, at 1,500 bushels per car). Data include Montana wheat, which is all shipped in bulk. Dots (.....) indicate that data are unavailable.

TABLE X.—EXPORTS OF WHEAT AND FLOUR FROM THE PACIFIC NORTHWEST, ANNUALLY  
FROM 1864-65 TO 1928-29\*  
(Thousand bushels, except as noted)

Year July-June	Total as wheat			Total as wheat		Wheat		Flour as wheat		Flour (thousand bbls.)	
	Total	Wheat	Flour	Columbia River	Puget Sound	Columbia River	Puget Sound	Columbia River	Puget Sound	Columbia River	Puget Sound
1864-65.....	74	9	65	66	8	7	2	59	6	13	1
1865-66.....	..	..	..	..	..	..	..	..	..	..	..
1866-67.....	63	8	55	60	3	8	0	52	3	12	1
1867-68.....	88	11	77	78	10	9	2	69	8	15	2
1868-69.....	171	59	112	165	6	58	1	107	5	24	1
1869-70.....	118	26	92	116	2	26	0	90	2	20	0
1870-71.....	480	363	117	477	3	363	0	114	3	25	1
1871-72.....	458	356	102	453	5	356	0	97	5	22	1
1872-73.....	1,083	883	200	1,080	3	883	0	197	3	44	1
1873-74.....	2,161	1,682	479	2,139	22	1,681	1	458	21	102	5
1874-75.....	2,921	2,191	730	2,872	49	2,187	4	685	45	152	10
1875-76.....	3,490	2,895	595	3,437	53	2,890	5	547	48	122	11
1876-77.....	3,092	2,417	675	3,024	68	2,413	4	611	64	136	14
1877-78.....	3,960	3,677	283	3,898	62	3,672	5	226	57	50	13
1878-79.....	3,880	2,870	1,010	3,831	49	2,863	7	968	42	215	9
1879-80.....	4,231	3,424	807	4,207	24	3,423	1	784	23	174	5
1880-81.....	3,770	2,307	1,463	3,737	33	2,303	4	1,434	29	319	7
1881-82.....	8,693	6,337	2,356	8,529	164	6,260	77	2,269	87	504	19
1882-83.....	4,994	3,305	1,689	4,548	446	2,996	309	1,552	137	345	31
1883-84.....	5,606	3,865	1,741	5,384	222	3,778	87	1,606	135	357	30

\* Based on data compiled from official sources by R. L. Baldwin, Pacific Coast Headquarters, Federal Grain Supervision, Portland. Flour converted to wheat at 4.5 bushels per barrel. See Table XI for *Commercial Review* series through 1933-34.

TABLE X (Continued)

Year July-June	Total as wheat			Total as wheat		Wheat		Flour as wheat		Flour (thousand bbls.)	
	Total	Wheat	Flour	Columbia River	Puget Sound	Columbia River	Puget Sound	Columbia River	Puget Sound	Columbia River	Puget Sound
1884-85.....	6,296	5,241	1,055	6,082	214	5,222	19	860	195	191	43
1885-86.....	8,581	6,857	1,724	8,108	473	6,584	273	1,524	200	339	44
1886-87.....	7,359	5,290	2,069	7,207	152	5,281	9	1,926	143	428	32
1887-88.....	8,148	6,147	2,001	7,012	1,136	5,308	839	1,704	297	379	66
1888-89.....	9,350	6,764	2,586	6,961	2,389	4,467	2,297	2,494	92	554	20
1889-90.....	6,725	4,632	2,093	4,817	1,908	2,896	1,736	1,921	172	427	38
1890-91.....	11,513	8,511	3,002	7,061	4,452	4,836	3,675	2,225	777	495	173
1891-92.....	12,004	9,975	2,029	7,351	4,653	5,788	4,187	1,563	466	347	104
1892-93.....	11,538	9,005	2,533	6,970	4,568	5,221	3,784	1,749	784	389	174
1893-94.....	12,440	9,840	2,600	6,981	5,459	5,628	4,212	1,353	1,247	301	277
1894-95.....	16,346	13,144	3,202	10,668	5,678	9,142	4,002	1,526	1,676	339	372
1895-96.....	12,727	8,395	4,332	8,177	4,550	5,656	2,739	2,521	1,811	560	402
1896-97.....	13,345	8,657	4,688	8,599	4,746	6,200	2,457	2,399	2,289	533	509
1897-98.....	27,243	21,603	5,640	16,451	10,792	13,579	8,024	2,872	2,768	638	615
1898-99.....	21,906	15,401	6,505	13,399	8,507	9,992	5,409	3,407	3,098	757	689
1899-1900...	20,799	12,543	8,256	12,563	8,236	8,976	3,567	3,587	4,669	797	1,038
1900-01.....	29,658	21,680	7,978	16,193	13,465	13,061	8,619	3,132	4,846	696	1,077
1901-02.....	35,255	26,564	8,691	15,573	19,682	12,710	13,854	2,863	5,828	636	1,295
1902-03.....	30,265	17,689	12,576	12,399	17,866	8,760	8,929	3,639	8,937	809	1,986
1903-04.....	17,047	5,203	11,844	7,605	9,442	3,478	1,725	4,127	7,717	917	1,715
1904-05.....	13,412	2,721	10,691	4,924	8,488	1,474	1,247	3,450	7,241	767	1,609
1905-06.....	28,022	14,011	14,011	10,221	17,801	5,658	8,353	4,563	9,448	1,014	2,100
1906-07.....	33,113	13,212	19,901	12,778	20,335	7,199	6,013	5,579	14,322	1,240	3,183
1907-08.....	40,587	28,118	12,469	17,277	23,310	13,412	14,706	3,865	8,604	859	1,912
1908-09.....	18,218	10,980	7,238	8,836	9,382	6,350	4,630	2,486	4,752	552	1,056
1909-10.....	17,441	10,627	6,814	6,749	10,692	5,770	4,857	979	5,835	217	1,297
1910-11.....	21,597	11,343	10,254	9,883	11,714	7,346	3,997	2,537	7,717	564	1,715
1911-12.....	25,533	10,022	15,511	10,299	15,234	6,830	3,192	3,469	12,042	771	2,676
1912-13.....	26,866	13,835	13,031	10,796	16,070	8,147	5,688	2,649	10,382	589	2,307
1913-14.....	24,506	11,762	12,744	9,841	14,665	6,693	5,069	3,148	9,596	700	2,132
1914-15.....	29,682	20,203	9,479	13,743	15,939	11,998	8,205	1,745	7,734	388	1,719
1915-16.....	18,221	10,226	7,995	7,770	10,451	6,586	3,640	1,184	6,811	263	1,514
1916-17.....	5,597	3,063	2,534	1,322	4,275	1,321	1,742	1	2,533	0	563
1917-18.....	5,235	867	4,368	3,511	1,724	439	428	3,072	1,296	683	288
1918-19.....	13,381	1,317	12,064	11,337	2,044	1,316	1	10,021	2,043	2,227	454
1919-20.....	11,900	2,582	9,318	9,680	2,220	2,423	159	7,257	2,061	1,613	458
1920-21.....	40,845	29,653	11,192	30,938	9,907	25,618	4,035	5,320	5,872	1,182	1,305
1921-22.....	61,122	44,435	16,687	42,160	18,962	35,604	8,831	6,556	10,131	1,458	2,251
1922-23.....	36,350	18,908	17,442	21,438	14,912	15,205	3,703	6,233	11,209	1,385	2,491
1923-24.....	59,412	32,183	27,229	38,369	21,043	25,724	6,459	12,645	14,584	2,810	3,241
1924-25.....	27,003	17,513	9,490	17,269	9,734	13,687	3,826	3,582	5,908	796	1,313
1925-26.....	30,517	20,819	9,698	21,733	8,784	17,543	3,276	4,190	5,508	931	1,224
1926-27.....	46,001	34,833	11,168	31,751	14,250	28,363	6,470	3,388	7,780	753	1,729
1927-28.....	63,065	48,467	14,598	43,753	19,312	38,997	9,570	4,856	9,742	1,079	2,165
1928-29.....	45,410	27,608	17,802	28,706	16,704	22,726	4,882	5,980	11,822	1,329	2,627

TABLE XI.—WATER SHIPMENTS OF WHEAT AND FLOUR FROM THE PACIFIC NORTHWEST, BY AREAS OF DESTINATION, ANNUALLY FROM 1900-01\*

(Thousand bushels)

Year July-June	Total	Domestic	Foreign <sup>a</sup>	Europe	Orient <sup>b</sup>	China <sup>c</sup>	Japan	Philippines <sup>d</sup>	South and Central America	Miscellaneous	Alaska <sup>d</sup>	Hawaii <sup>d</sup>
1900-01.....	33,191	1,980	31,191	21,656	6,313	4,176	1,394	...	845	2,377	...	20
1901-02.....	37,012	1,509	35,465	22,915	6,662	3,950	1,767	...	780	5,108	...	39
1902-03.....	30,533	2,711	27,735	9,928	8,200	5,983	1,713	...	661	8,946	...	87
1903-04.....	20,959	4,030	16,831	3,884	11,560	3,604	7,498	25	234	1,128	...	98
1904-05.....	18,193	5,330	12,766	3,022	8,800	3,001	5,799	45	552	347	...	97
1905-06.....	36,905	9,187	26,993	11,072	13,602	3,873	7,696	84	1,581	654	...	95
1906-07.....	35,286	3,221	31,943	9,203	20,529	10,011	6,583	122	1,574	515	...	122
1907-08.....	45,645	5,587	39,888	22,983	12,897	6,451	4,377	...	1,349	2,659	...	170
1908-09.....	26,542	8,462	18,080	10,531	6,045	4,576	1,019	316	737	451	...	...
1909-10.....	25,672	9,150	16,522	9,035	4,283	3,094	965	1,043	1,274	887	...	...
1910-11.....	30,598	8,727	21,871	8,919	10,589	6,916	3,673	882	1,347	134	...	...
1911-12.....	34,234	8,910	25,324	8,806	13,562	8,908	4,637	1,170	907	879	...	...
1912-13.....	39,495	13,425	26,070	9,061	13,968	5,854	8,114	1,459	1,178	404	...	...
1913-14.....	38,172	13,208	24,512	7,365	14,341	5,302	8,441	882	1,492	432	...	452
1914-15.....	38,006	10,424	28,105	17,455	3,927	47	1,126	1,229	2,005	3,489	...	477
1915-16.....	30,351	11,734	18,538	8,838	1,776	169	170	1,892	4,164	1,868	...	79
1916-17.....	14,831	9,176	5,654	3,305	613	...	...	...	1,571	165	...	2
1917-18.....	19,132	4,806	14,326	13,880	8	...	...	...	438	...	...	...
1918-19.....	32,220	4,450	27,654	27,463	136	...	...	...	54	1	...	116
1919-20.....	38,707	4,109	33,967	32,096	1,461	...	...	...	259	151	199	432
1920-21.....	40,288	3,112	36,578	32,048	2,646	...	1,276	...	1,522	362	127	472
1921-22.....	68,741	7,294	60,932	32,135	24,570	...	11,945	...	2,588	1,639	96	419
1922-23.....	42,620	6,319	35,774	14,211	17,683	10,693	6,210	1,596	1,460	824	112	415
1923-24.....	70,762	10,582	59,152	15,336	39,996	21,879	10,560	2,394	1,315	111	120	906
1924-25.....	36,888	8,087	28,155	15,193	8,901	2,764	6,053	2,411	936	714	164	481
1925-26.....	41,677	10,667	30,414	16,281	9,896	4,551	5,262	2,445	1,642	150	208	441
1926-27.....	55,215	8,530	45,940	25,316	13,986	5,237	7,371	2,773	3,235	630	213	532
1927-28.....	74,459	10,054	63,569	43,235	14,973	8,662	6,245	3,046	2,149	166	258	578
1928-29.....	56,194	9,486	45,825	22,430	17,386	12,224	3,886	3,699	1,499	811	182	701
1929-30.....	51,834	9,546	41,436	16,827	19,576	10,220	9,131	3,220	992	821	236	616
1930-31.....	48,292	13,706	33,776	13,316	16,107	10,132	3,759	2,934	871	548	191	619
1931-32.....	54,195	17,865	35,370	4,663	26,519	11,231	610	2,729	401	1,058	339	621
1932-33.....	30,601	20,998	8,687	2,397	2,673	2,555	106	2,489	342	786	230	686
1933-34.....	48,977	24,995	23,269	3,509	16,746	1,325	4,585	2,231	463	320	214	499

\* Basic data from *Commercial Review*, Portland, Oregon; for 1900-01 to 1924-25 from compilation by John B. Watkins presented in his *Wheat Exporting from the Pacific Northwest* (State College of Washington, Agricultural Experiment Station, Bulletin 201), May 1926. Flour converted to wheat at 4.5 bushels per barrel. The data cannot be regarded as strictly comparable throughout the period. See notes c and d. Watkins summarized some data on water shipments prior to 1900-01, but these are less trustworthy.

<sup>a</sup> Including Philippines, but not Alaska or Hawaii.

<sup>b</sup> Excluding Philippines, but including more or less important shipments to Siberia in certain years.

<sup>c</sup> Flour only, since separate data for wheat are not given for earlier years. Wheat grain shipments to China for 1925-26 and subsequent years are given as follows: 83;

1,283; 67; 1,276; 225; 2,216; 14,679; 12; 10,836. They were also heavy in 1923-24. See *WHEAT STUDIES*, December 1933, X, 131.

<sup>d</sup> Flour only. Small shipments of wheat to Hawaii are included under Domestic.



TABLE XII.—WATER SHIPMENTS OF WHEAT AND FLOUR FROM THE PACIFIC NORTHWEST TO CALIFORNIA, ANNUALLY 1900-01 TO 1921-22\*

Year July-June	Wheat and flour (thousand bushels)			Flour (thousand barrels)	Year July-June	Wheat and flour (thousand bushels)			Flour (thousand barrels)
	Total	Wheat	Flour			Total	Wheat	Flour	
1900-01	1,980	187	1,793	398	1911-12	8,910	4,804	4,106	912
1901-02	1,508	10	1,498	333	1912-13	13,426	9,130	4,296	955
1902-03	2,711	1,091	1,620	360	1913-14	13,129	8,479	4,650	1,033
1903-04	4,030	1,982	2,048	455	1914-15	9,626	4,527	5,099	1,133
1904-05	5,341	3,124	2,217	493	1915-16	11,430	5,104	6,326	1,406
1905-06	9,817	8,172	1,645	366	1916-17	9,029	2,529	6,500	1,444
1906-07	3,221	1,349	1,872	416	1917-18	4,705	617	4,088	908
1907-08	5,756	3,646	2,110	469	1918-19	4,235	456	3,779	840
1908-09	8,778	6,020	2,758	613	1919-20	4,080	28	4,052	900
1909-10	9,149	6,595	2,554	568	1920-21	2,413	445	1,968	437
1910-11	8,727	5,480	3,247	722	1921-22	6,400	334	6,066	1,348

\* Basic data from *Commercial Review*, here compiled from John B. Watkins, *op. cit.*, p. 281. Flour converted to equivalent bushels of wheat at 4.5 bushels per barrel.

TABLE XIII.—WATER SHIPMENTS OF WHEAT AND FLOUR FROM THE PACIFIC NORTHWEST TO CALIFORNIA AND TO ATLANTIC AND GULF PORTS, ANNUALLY FROM 1922-23\*  
(Thousand bushels, except as noted)

Year July-June	Total as wheat			Total as wheat		Wheat		Flour as wheat		Flour (thousand barrels)		
	Total	Wheat	Flour	Columbia River	Puget Sound	Columbia River	Puget Sound	Columbia River	Puget Sound	Columbia River	Puget Sound	Total
To CALIFORNIA												
1922-23	5,456	244	5,212	2,575	2,881	223	21	2,352	2,860	522.6	635.5	1,158
1923-24	9,751	2,323	7,428	4,738	5,013	1,558	765	3,180	4,248	706.6	944.1	1,651
1924-25	8,961	2,652	6,309	6,060	2,901	2,286	366	3,774	2,535	838.6	563.4	1,402
1925-26	7,980	2,828	5,152	5,729	2,251	2,664	164	3,065	2,087	681.2	463.8	1,145
1926-27	5,810	1,454	4,356	4,207	1,603	982	472	3,225	1,131	716.6	251.4	968
1927-28	7,337	1,515	5,822	4,744	2,593	369	1,146	4,375	1,447	972.2	321.5	1,294
1928-29	5,599	867	4,732	4,365	1,234	155	712	4,210	522	935.5	115.9	1,051
1929-30	7,063	1,280	5,783	4,683	2,380	456	824	4,227	1,556	939.3	345.8	1,285
1930-31	10,546	3,978	6,568	6,811	3,735	2,874	1,104	3,937	2,631	874.8	584.7	1,460
1931-32	14,633	8,365	6,268	9,537	5,096	5,321	3,044	4,216	2,052	936.9	455.9	1,393
1932-33	14,884	7,604	7,280	9,987	4,897	4,991	2,613	4,996	2,284	1,110.3	507.6	1,618
1933-34	10,377	3,766	6,611	5,990	4,387	1,626	2,140	4,364	2,247	969.8	499.3	1,469
To ATLANTIC AND GULF PORTS												
1922-23	815	...	815	408	407	...	...	408	407	90.7	90.4	181
1923-24	1,134	292	842	814	320	292	...	522	320	115.9	71.0	187
1924-25	1,390	...	1,390	1,224	166	...	...	1,224	166	272.0	37.0	309
1925-26	2,633	68	2,565	1,801	832	68	...	1,733	832	385.2	185.0	570
1926-27	2,656	28	2,628	1,348	1,308	26	2	1,322	1,306	293.7	290.2	584
1927-28	2,652	67	2,585	1,482	1,170	28	39	1,454	1,131	323.2	251.3	574
1928-29	3,818	566	3,252	2,323	1,495	343	223	1,980	1,272	439.9	282.7	723
1929-30	2,429	36	2,393	1,538	891	36	...	1,502	891	333.8	198.0	532
1930-31	3,086	36	3,050	1,985	1,101	34	2	1,951	1,099	433.5	244.2	678
1931-32	3,172	18	3,154	1,804	1,368	0	18	1,804	1,350	401.0	300.0	701
1932-33	6,060	141	5,919	3,535	2,525	127	14	3,408	2,511	757.4	558.1	1,316
1933-34	14,583	5,092	9,491	9,334	5,249	4,218	874	5,116	4,375	1,136.9	972.2	2,109

\* Basic data from *Commercial Review*. Flour converted to equivalent bushels of wheat at 4.5 bushels per barrel.

TABLE XIV.—WHEAT GRAIN EXPORTS FROM THE PACIFIC NORTHWEST, BY CLASSES, 1922-23 TO 1933-34\*

Year	Thousand bushels								Percentage of total						Mixed
	W. W.	S. W.	H. Wh.	S. R. W.	H. R. W.	H. R. S.	Mixed	Total	W. W.	S. W.	H. Wh.	S. R. W.	H. R. W.	H. R. S.	
1922-23.....	11,532	2,324	35	2,169	2,311	421	477	19,269	59.8	12.1	.2	11.2	12.0	2.2	2.5
1923-24.....	15,753	2,967	195	4,895	7,477	449	428	32,164	49.0	9.2	.6	15.2	23.2	1.4	1.3
1924-25.....	10,514	461	...	2,037	2,382	381	383	16,158	65.1	2.8	...	12.6	14.7	2.4	2.4
1925-26.....	11,255	4,333	1,477	634	304	342	1,571	19,916	56.5	21.8	7.4	3.2	1.5	1.7	7.9
1926-27.....	16,706	8,070	2,202	2,991	3,846	686	967	35,468	47.1	22.8	6.2	8.4	10.9	1.9	2.7
1927-28.....	14,696	12,130	1,498	1,694	15,340	1,624	1,683	48,665	30.2	24.9	3.1	3.5	31.5	3.3	3.5
1928-29.....	9,066	5,381	188	2,530	9,231	979	263	27,638	32.8	19.5	.7	9.2	33.4	3.5	.9
1929-30.....	10,588	7,005	7	2,002	3,609	1,347	...	24,558	30.6	20.3	.0	5.8	10.4	3.9	...
1930-31.....	7,270	5,879	77	1,858	955	395	17	16,451	44.2	35.7	.5	11.3	5.8	2.4	.1
1931-32.....	11,573	2,477	13	2,044	3,459	0	37	19,603	59.0	12.6	.1	10.4	17.7	0	.2
1932-33.....	1,261	742	11	...	2	...	...	2,016	62.6	36.8	.5	...	.1	...	...
1933-34.....	15,473	1,335	974	71	1,310	...	...	19,163	80.7	7.0	5.1	.4	6.8	...	...
Average annual exports, 1922-32, by areas of destination									Percentage of total to each area						
Total.....	11,896	5,103	569	2,285	4,892	662	583	25,989	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Europe....	6,856	4,989	361	455	3,629	297	566	17,154	57.6	97.8	63.4	19.9	74.2	44.9	97.1
Orient....	4,961	45	39	1,827	1,193	313	17	8,394	41.7	.9	6.9	80.0	24.4	47.3	2.9
Americas..	42	38	168	3	66	52	...	368	.4	.7	29.5	.1	1.3	7.8	...
Other.....	37	31	1	0	4	...	0	73	.3	.6	.2	.0	.1	...	.0

\* Based on data compiled by R. L. Baldwin from records from Pacific Coast Headquarters, Federal Grain Supervision, Portland, Oregon. The abbreviations used in the headings correspond to designations given on p. 358.

TABLE XV.—EXPORTS OF WHEAT AND FLOUR FROM THE PACIFIC NORTHWEST, MONTHLY FROM JULY 1924 TO JUNE 1934\*  
(Thousand bushels)

Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1924-25.....	1,578	1,597	3,853	5,840	5,484	3,027	1,048	686	941	521	376	781
1925-26.....	886	676	3,999	3,154	2,333	2,065	2,834	1,800	1,791	1,378	3,758	4,856
1926-27.....	2,330	5,207	9,381	7,136	6,058	4,054	2,194	1,297	2,188	3,056	2,037	703
1927-28.....	1,284	5,826	13,203	12,314	9,040	5,039	4,543	2,303	3,311	3,481	2,194	853
1928-29.....	1,717	4,844	5,701	6,115	3,775	4,541	3,627	4,837	3,633	2,709	1,906	2,014
1929-30.....	3,642	4,247	5,460	4,381	3,519	4,470	3,470	3,099	1,836	1,647	1,999	2,845
1930-31.....	2,629	3,555	4,859	6,011	3,859	2,631	1,897	1,138	820	930	1,551	3,360
1931-32.....	3,757	1,568	3,651	6,682	3,723	4,959	3,235	2,628	1,707	1,679	376	347
1932-33.....	514	1,831	1,045	790	766	369	432	410	477	326	504	888
1933-34.....	489	301	290	101	1,025	4,834	3,201	3,279	3,600	4,602	1,229	...
Average 1924-30.....	1,906	3,733	6,933	6,490	5,035	3,866	2,953	2,337	2,283	2,132	2,045	2,009

\* Based on data in July issues of *Commercial Review*. Including shipments to the Philippines but not those to Alaska and Hawaii.

TABLE XVI.—WATER SHIPMENTS OF WHEAT AND FLOUR FROM THE PACIFIC NORTHWEST, MONTHLY, 1930-31 TO 1933-34\*

(Thousand bushels)

Month	Total	Foreign exports	Phillip-pines	Alaska, Hawaii	Calif-ornia	Atlantic Gulf	Month	Total	Foreign exports	Phillip-pines	Alaska, Hawaii	Calif-ornia	Atlantic Gulf
1930-31							1932-33						
July	3,490	2,420	215	85	543	227	July	2,270	466	151	86	1,241	326
Aug.	4,499	3,374	186	490	635	244	Aug.	3,125	1,613	219	107	800	386
Sept.	6,496	4,591	270	62	1,357	216	Sept.	2,763	876	182	114	1,206	385
Oct.	7,283	5,829	193	56	884	321	Oct.	2,580	464	326	84	1,162	544
Nov.	4,964	3,524	345	72	882	141	Nov.	2,567	522	246	71	1,372	356
Dec.	3,765	2,433	203	72	866	191	Dec.	2,353	172	200	60	1,472	449
Jan.	3,381	1,692	260	87	1,018	324	Jan.	2,259	278	184	90	1,381	326
Feb.	2,313	856	284	73	794	306	Feb.	1,918	271	141	45	1,085	376
Mar.	2,162	663	203	72	931	293	Mar.	2,359	273	208	58	1,285	535
Apr.	2,412	696	244	68	1,197	207	Apr.	3,039	152	175	96	1,900	716
May	2,783	1,301	252	78	868	284	May	3,075	208	297	83	1,589	898
June	4,484	3,080	281	97	757	269	June	2,306	280	159	90	939	838
1931-32							1933-34						
July	5,077	3,397	369	103	1,031	177	July	3,352	211	281	86	1,241	1,533
Aug.	3,405	1,377	209	62	1,636	121	Aug.	2,615	124	178	90	928	1,295
Sept.	5,593	3,460	195	77	1,649	212	Sept.	2,488	101	193	72	1,084	1,038
Oct.	8,831	6,397	314	128	1,781	211	Oct.	2,965	47	59	76	1,098	1,685
Nov.	5,608	3,573	175	88	1,453	319	Nov.	3,640	884	144	49	1,027	1,536
Dec.	6,882	4,707	273	484	1,252	166	Dec.	7,122	4,592	246	78	966	1,240
Jan.	4,583	3,070	180	67	947	319	Jan.	5,794	2,971	233	49	1,160	1,381
Feb.	4,254	2,480	150	91	1,043	490	Feb.	6,375	2,966	324	56	1,129	1,900
Mar.	2,997	1,451	262	24	986	274	Mar.	5,995	3,425	183	85	962	1,340
Apr.	3,023	1,372	274	96	1,069	212	Apr.	6,475	4,308	301	53	870	943
May	1,573	232	147	88	844	262	May	1,864	1,141	89	46	202	386
June	1,700	174	179	95	942	310	June	9	..	..	9	..	..

\* Based on data reported in *Commercial Review*. Flour converted to equivalent bushels of wheat at 4.5 bushels per barrel. These figures exclude transshipments of wheat and flour. Dots (...) indicate no shipments reported.

TABLE XVII.—WHEAT STOCKS IN WASHINGTON, OREGON, AND IDAHO, JULY 1, 1927-34\*

(Thousand bushels)

Year	Total	Mills <sup>a</sup>	Visible <sup>b</sup>	Country <sup>c</sup>	Farms <sup>d</sup>	Total	Mills <sup>a</sup>	Visible <sup>b</sup>	Country <sup>c</sup>	Farms <sup>d</sup>
THREE STATES						WASHINGTON				
1927.....	6,320	2,153	726	1,930	1,511	4,021	1,354	1,053	1,000	614
1928.....	9,908	2,747	843	3,875	2,443	6,162	1,689	1,171	2,425	877
1929.....	16,940	3,099	720	9,800	3,321	10,908	1,601	1,104	6,500	1,703
1930.....	27,089	2,572	1,576	18,000	4,941	16,343	1,213	994	12,000	2,136
1931.....	28,712	1,511	11,617	11,350	4,234	8,278	847	1,665	5,000	766
1932.....	16,460	2,061	908	9,250	4,241	9,027	978	919	5,000	2,130
1933.....	39,850	5,929	2,024 <sup>e</sup>	25,400	6,497	18,962	2,730	2,118	12,500	1,614
1934.....	31,117	3,978	3,610	18,300	5,229	16,594	2,168	2,251	11,250	925
OREGON						IDAHO				
1927.....	2,165	515	919	450	281	1,380	284	..	480	616
1928.....	2,373	496	557	650	670	2,258	562	..	800	896
1929.....	3,165	879	520	1,300	466	3,771	619	..	2,000	1,152
1930.....	6,753	902	1,776	3,000	1,075	5,187	457	..	3,000	1,730
1931.....	11,548	295	8,031	2,750	472	6,965	369	..	3,600	2,996
1932.....	4,301	706	842	2,400	353	3,985	377	..	1,850	1,758
1933.....	10,534	1,697	1,633	6,000	1,204	12,081	1,502	..	6,900	3,679
1934.....	9,008	1,457	2,852	3,600	1,399	6,708	353	..	3,450	2,905

\* Based on data reported in *Commercial Review*. See note, Table XVII.

<sup>a</sup> Mills and mill elevators. Data from U.S. Bureau of the Census. No allowance made for non-reporting mills.

<sup>b</sup> Totals are U.S. Department of Agriculture data for Pacific Coast commercial stocks. Washington and Oregon figures are computed from Bradstreet's for weekly date nearest June 30; their sum does not equal the official figures, partly because Bradstreet's probably includes some small stocks.

<sup>c</sup> "Interior mills and elevators," mainly country warehouses and elevators. Data from *Crops and Markets and Crop Reports*.

<sup>d</sup> Data compiled from July issues of *Crops and Markets*, accepting latest revisions, and *Crop Report* for July 1934.

<sup>e</sup> June 24; July 1 data not available.

TABLE XVIII.—ESTIMATED AVERAGE FARM PRICES OF WHEAT IN THE UNITED STATES AND PACIFIC NORTHWEST STATES, ANNUALLY FROM 1908-09\*  
(Cents per bushel)

Year July-June	Unweighted averages				Weighted average		
	United States	Washington	Oregon	Idaho	United States	Washington	Difference
1908-09.....	100	93	94	85	95	88	- 7
1909-10.....	102	95	96	90	101	94	- 7
1910-11.....	90	77	84	73	92	79	-13
1911-12.....	91	76	80	71	88	74	-14
1912-13.....	82	74	76	69	83	72	-11
1913-14.....	81	75	77	67	79	64	-15
1914-15.....	110	101	104	92	99	95	- 4
1915-16.....	100	85	86	82	98	84	-14
1916-17.....	167	148	147	147	144	135	- 9
1917-18.....	205	195	189	188	206	197	- 9
1918-19.....	211	200	203	197	206	199	- 7
1919-20.....	228	228	221	221	219	220	+ 1
1920-21.....	166	160	157	150	183	178	- 5
1921-22.....	106	99	96	87	104	96	- 8
1922-23.....	101	102	105	93	98	100	+ 2
1923-24.....	94	86	90	80	92	86	- 6
1924-25.....	140	144	145	139	127	136	+ 9
1925-26.....	146	134	137	128	146	135	-11
1926-27.....	123	119	121	110	124	119	- 5
1927-28.....	122	116	118	112	121	115	- 6
1928-29.....	99	101	103	94	101	101	0
1929-30.....	101	104	103	93	105	108	+ 3
1930-31.....	62	57	58	50	68	61	- 7
1931-32.....	41	45	46	41	39	43	+ 4
1932-33.....	39	36	40	31	39	36	- 3
1933-34.....	72	59	61	54	...	59	...

\* Unweighted averages our computations (1) for United States, from monthly prices reported in *Crops and Markets*, December 1933, p. 499, and following issues; (2) for Washington, Oregon, and Idaho, from monthly prices reported in *Prices of Farm Products Received by Producers, Mountain and Pacific States* (U.S.D.A., Statistical Bulletin No. 17, March 1927) for 1908-25; thereafter from *Crops and Markets*. Weighted average for United States from *ibid.*, December 1933, p. 499; for Washington direct from Mr. C. C. Hampson of the State College of Washington.

TABLE XIX.—ESTIMATED FARM PRICES OF WHEAT IN WASHINGTON, MID-MONTHLY FROM JULY 1925, AND SPREAD FROM UNITED STATES AVERAGE FARM PRICES, MID-MONTHLY FROM JULY 1930\*  
(Cents per bushel)

Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June
1925-26.....	145	142	137	118	130	147	141	146	134	124	120	125
1926-27.....	124	123	111	117	117	118	116	118	116	115	125	129
1927-28.....	126	118	115	105	109	110	109	113	120	127	128	118
1928-29.....	117	102	100	100	96	99	101	101	102	103	93	93
1929-30.....	105	118	115	113	105	110	109	102	94	96	88	88
1930-31.....	76	78	71	63	57	52	48	49	48	49	48	43
1931-32.....	37	36	35	39	59	51	50	48	47	46	46	41
1932-33.....	35	40	38	36	31	31	30	30	31	40	49	46
1933-34.....	69	61	58	54	59	56	58	58	59	57	58	63
	SPREAD FROM UNITED STATES AVERAGE FARM PRICES											
1930-31.....	+ 5	+ 4	+ 1	- 3	- 3	- 9	-11	-10	-10	-10	-12	- 9
1931-32.....	+ 1	+ 1	- 1	+ 3	+ 9	+ 7	+ 6	+ 4	+ 3	+ 3	+ 4	+ 4
1932-33.....	- 1	+ 2	+ 1	+ 1	- 2	- 1	- 3	- 2	- 3	- 5	-10	-13
1933-34.....	-21	-14	-13	-10	-12	-11	-11	-14	-12	-12	-12	-16

\* Washington price data compiled from *Crops and Markets* (earlier data accessible in bulletin cited under Table XIX). Spreads computed from United States averages given in *Crops and Markets*, December 1933, X, 499, and subsequent issues.

TABLE XX.—WHEAT PURCHASES AND SALES OF WHEAT AND FLOUR UNDER THE EXPORT ASSOCIATION, WEEKLY 1933-34\*

(Thousand bushels)

Week ending	Purchases	Wheat and flour sales	Wheat sales			Flour sales
			Chinese government <sup>a</sup>	Other	Total	
1933						
Oct. 21.....	2	...	...	...	...	...
28.....	541	...	...	...	...	...
Nov. 4.....	600	1,030	700	324	1,024	6
11.....	1,786	1,334	967	155	1,122	212
18.....	1,961	1,732	500	990	1,490	242
25.....	2,144	2,499	1,000	962	1,962	537
Dec. 2.....	957	848	133	406	539	309
9.....	769	580	293	95	388	192
16.....	678	877	...	716	716	161
23.....	1,014	756	...	588	588	168
30.....	272	107	...	2	2	105
1934						
Jan. 6.....	277	272	200	37	237	35
13.....	482	694	...	421	421	273
20.....	516	470	...	222	222	248
27.....	868	2,089	1,667	245	1,912	177
Feb. 3.....	1,791	582	233	210	443	139
10.....	578	740	52	421	473	267
17.....	474	421	...	332	332	89
24.....	1,927	2,524	1,417	944	2,361	163
Mar. 3.....	1,347	430	...	363	363	67
10.....	1,634	3,369	2,667	574	3,241	128
17.....	1,965	169	133	...	133	36
24.....	232	399	58	214	272	127
31.....	805	1,374	533	700	1,233	141
Apr. 7.....	745	343	67	182	249	94
14.....	522	863	167	614	781	82
21.....	166	305	...	237	237	68
28.....	163	59	...	...	...	59
May 5.....	251	422	...	301	301	121
12.....	1,337	459	...	327	327	132
19.....	121	128	...	10	10	118
26.....	54	54	...	...	...	54
June 2.....	52	72	...	20	20	52
9.....	22	30	...	3	3	27
16.....	49	49	...	19	19	30
23.....	34	147	...	129	129	18
30.....	115	219	...	104	104	115

\* Summarized from detailed data on purchases and sales; see note, p. 398.

<sup>a</sup> The separation of sales to the Chinese government from other sales is based on our inferences from price data, and is not official.

TABLE XXI.—WHEAT PURCHASES AND WHEAT AND FLOUR SALES AT VARIOUS PRICES UNDER THE EXPORT ASSOCIATION, 1933-34\*

(Cents per bushel, and thousand bushels, except as noted)

Wheat purchases <sup>a</sup>			Wheat sales <sup>b</sup>				Flour sales	
Price	Total A	Total B	Price	Total	Chinese government	Other	Price (per bbl.)	Total
\$0.67	20	20	\$0.38½	19	...	19	\$2.37½	63
.68	25	25	.46½	487	...	487	2.40	432
.69	81	81	.47	1,531	...	1,531	2.42½	142
.69½	70	70	.47½	866	...	866	2.45	319
.70	142	142	.48	898	...	898	2.47½	228
.71	359	359	.48½	534	...	534	2.50	105
.71½	226	226	.49	839	...	839	2.52½	227
.72	327	327	.49½	249	...	249	2.55	506
.72½	399	399	.50	376	...	376	2.57½	168
.73	1,668	1,668	.50½	259	...	259	2.60	538
.73½	1,219	1,219	.51	359	...	359	2.62½	388
.74	710	710	.51½	702	...	702	2.65	274
.74½	1,086	1,086	.52	976	333	643	2.67½	169
.75	2,448	2,593	.52½	455	...	455	2.70	280
.75½	3,346	3,593	.53	3,822	3,167	655	2.72½	79
.76	4,473	4,544	.53½	367	100	267	2.75	263
.76½	572	576	.54	892	500	392	2.77½	119
.77	2,714	3,253	.54½	1,115	558	557	2.80	130
.77½	1,489	1,544	.55	1,078	900	178	2.85	1
.78	2,098	2,662	.55½	877	877	...	2.87½	13
.78½	902	906	.56	316	133	183	2.90	97
.79	590	667	.56½	1,085	1,033	52	2.95	11
.79½	352	352	.57	375	233	142	2.97½	41
.80½	14	14	.57½	3	...	3	3.00	59
.81	69	69	.58	845	700	145	3.05	105
.82½	35	35	.58½	104	85	19	3.10	1
.83	23	23	.59	1,000	1,000	...	3.20	3
.84	3	3	.59½	567	567	...	3.28	35
.84½	3	3	.60	83	67	16	...	...
.85½	28	28	.60½	219	200	19	...	...
.86	27	27	.61½	20	...	20	...	...
.86½	20	20	.62	333	333	...	...	...
.87	1	1	...	...	...	...	...	...
.88½	1	1	...	...	...	...	...	...
.89½	3	3	...	...	...	...	...	...

\* Summarized from detailed data on purchases and sales; see note, p. 398.

<sup>a</sup> Column A shows totals for days on which bid prices were put out, and Column B includes (for the price range 75 to 79 cents) our approximate classification of purchases on days when no bid prices were announced.<sup>b</sup> The separation of sales to the Chinese government from other sales is based on our inferences from price data, and is not official.