WHEAT STUDIES

of the FOOD RESEARCH INSTITUTE

VOL. XVII, NO. 7 (Price $1.00) APRIL 1941

WHEAT IN THE POST-SURPLUS PERIOD 1900-09 WITH RECENT ANALOGIES AND CONTRASTS

Helen C. Farnsworth

The wheat-surplus period of the 1890's was followed by a decade characterized by extremely heavy wheat output. In per capita terms, this output was larger than that responsible for the burdensome surplus stocks of the mid-'nineties or that later associated with the depressing surplus of 1928–35. But the early years of this century witnessed no piling up of surplus stocks comparable with the accumulations of 1892–96 and 1929–35. Historical and statistical analysis suggests that this extraordinary outcome was largely due to three factors: (1) the sharper upward trend and higher level of per capita normal wheat disappearance in the early 1900's; (2) the more favorable timing of crop surpluses and deficits in those years; and (3) the fact that wheat disappearance was then farther above normal than in 1928–35.

In the absence of burdensome wheat stocks, the purchasing power of British import wheat, trend considered, was moderate rather than low during 1898–1909. Except in 1898–99 and 1901–02, deflated prices of such wheat reflected reasonably well the wheat commodity position of each of the crop years considered. From about 1902 to the beginning of the World War, the trend of purchasing power of British import wheat was horizontal, in sharp contrast with downward trends during the 15 to 20 years prior to 1902 and from 1922 to 1939.

Since 1938 the world's wheat output has again been heavy, and existing wheat stocks are unprecedentedly large. These might conceivably be reduced to normal by two successive years of abnormally low yields per acre, or by prompt expansion of wheat consumption following an early peace; but neither of these developments can at present be expected. Nor would such reduction in wheat acreage as now appears in prospect suffice to bring stocks to a normal level by 1943. Although future developments are not predictable, it now seems probable that the next few years will be characterized by the persistence of some degree of wheat surplus.

STANFORD UNIVERSITY, CALIFORNIA

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FOOD RESEARCH INSTITUTE

Entered as second-class matter February 11, 1925, at the Post Office at Palo Alto, Stanford University Branch, California, under the Act of August 24, 1912.

Published eight times a year by Stanford University for the Food Research Institute.

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"History repeats itself." This expression, known to every schoolchild in America, is perhaps nowhere better illustrated, with its limitations, than in the charted course of international wheat prices during the past decade. The sharp decline in British import prices of wheat from 1929–30 to 1933–34, the subsequent striking recovery to 1936–37, and the new collapse in 1938–39 are all reminiscent of roughly similar developments in the 1890's. These similarities are readily observable in Charts 1 and 2.

The two major periods of price depression, 1892–96 and 1930–36, were associated with extremely heavy wheat supplies and the persistence of burdensome world carryovers of wheat. Subsequently, prices recovered to relatively high levels in 1897–98 and 1936–38 under the influence of short crops and small aggregate wheat supplies. But bumper harvests in 1898 and 1938 foreshadowed the accumulation of new burdensome surpluses, and the price and purchasing power of wheat again declined sharply.

These spectacular changes in the level of wheat prices were so closely tied to prominent crop changes that one might be tempted to conclude that any period of years characterized by abnormally heavy wheat output would necessarily be a period of depressed wheat prices. Such a conclusion, however, is clearly contradicted by the available supply and price statistics for the early years of the twentieth century.

After the bumper wheat harvest of 1898, the price of British import wheat declined only moderately in 1898–99, then tended slightly upward for about a decade in the face of several successive large crops. This was due in part to the influence of general economic and monetary factors that were reflected in rising prices in many other commodity markets. But it was also partly due to strengthening elements within the wheat position itself, a situation suggested by the lack of persistent depression in the purchasing power of wheat during this period. Only in two years, 1899–1900 and 1906–07, was

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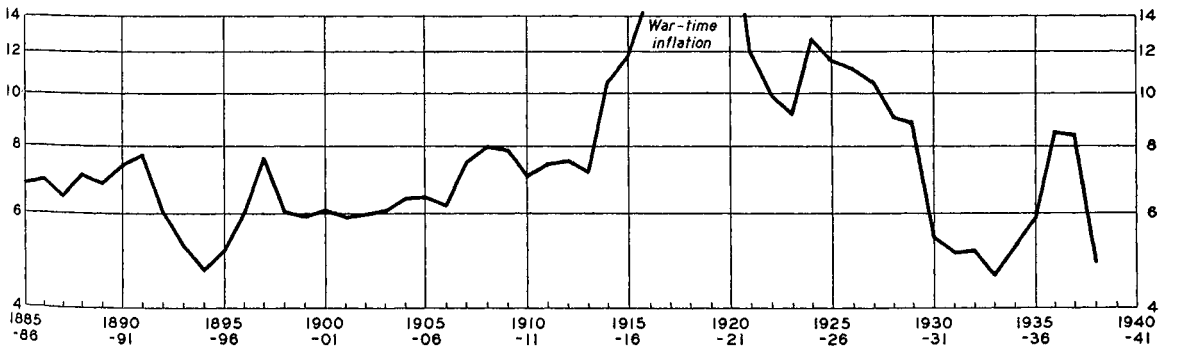
CHART 1.—ANNUAL AVERAGE PRICES OF BRITISH IMPORT WHEAT, 1885–1916 AND 1921–39*

(Shillings per cental; logarithmic vertical scale)

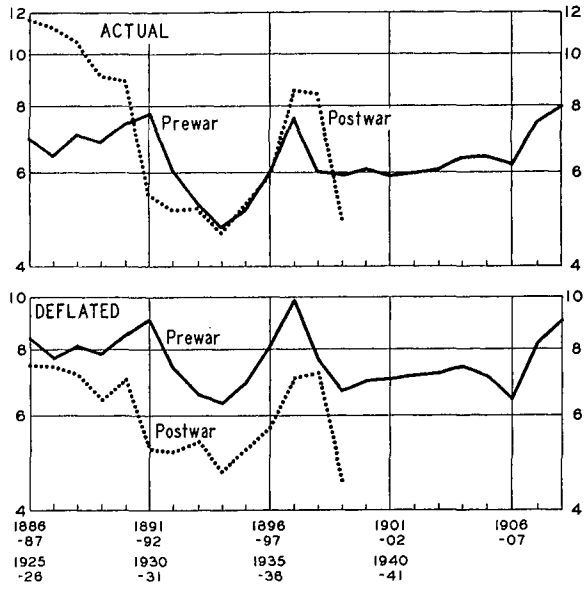


* August–July averages of monthly values per cental of the wheat imported into Great Britain. Basic price data from Great Britain, Commons, *Accounts Relating to Trade of the United Kingdom*, for the period of years covered.

wheat priced unusually low relative to commodity prices in general; and in neither of those years was the "deflated" price of British import wheat far below what we judge to have been the normal level (see Chart 6, p. 328).

CHART 2.—ANNUAL AVERAGE PRICES OF BRITISH IMPORT WHEAT, ACTUAL AND DEFLATED, 1886–1909 AND 1925–39*

(Shillings per cental; logarithmic vertical scale)



* Actual prices as in Chart 1. Deflated prices computed by dividing the actual monthly prices by corresponding averages of the Sauerbeck-Statist index of wholesale commodity prices expressed in terms of its average for 1910–14.

The relatively favorable price response to heavy wheat output in 1898–1908, as contrasted with the early 1890's and the 1930's, suggests that intensive study of the wheat situation in the early years of the present century might throw new light upon the recent wheat-surplus problem. This, in turn, should improve our interpretation of current conditions and our judgment as to the outlook for the future.

The present study of wheat developments in 1900–09 was undertaken with these considerations in mind. Special attention has therefore been devoted to the question: Why was the heavy wheat output of 1898–1908 (and especially of 1902–08) not associated with an accumulation of burdensome wheat carryovers and a depression of wheat prices, such as characterized the early 1890's and the early 1930's? The answer to this question, treated in the first two sections of the study, is not a simple one. A number of factors appear to have been significant; but of these the most important were: (1) the varying trend of per capita normal wheat disappearance in the different periods, (2) the different magnitude and timing of crop surpluses and crop deficiencies, and (3) differences in the deviations of wheat consumption from the normal trend. These factors exerted different degrees of influence in the several periods compared.

In order to understand the wheat consumption and price situation in 1900–09, it was necessary to collect, study, and interpret a great mass of statistical data and market information for each of the crop years covered. These detailed materials, which have an independent historical value, are summarized in the crop-year wheat reviews presented as Part Two of the present study. Long after interest in the current wheat-surplus problem has subsided, these annual reviews should prove useful in analysis of other problems that may arise in connection with wheat supplies, trade, consumption, carryovers, and prices.

As a contribution to economic history, this study should be considered not alone but in its relation to earlier WHEAT STUDIES based on similar historical materials. Since 1923–24 the Food Research Institute has published comprehensive annual reviews of the world wheat situation, which now afford students of economic history a continuous view of world wheat developments over the past 17 years. For the years prior to 1923–24 no such comprehensive reviews are available. But the World War period is reviewed in M. K. Bennett's "Wheat and War, 1914–18 and Now" (WHEAT STUDIES, November 1939); and the decade of the 1890's in the present writer's "The Decline and Recovery of Wheat Prices in the 'Nineties" (*ibid.*, June–July 1934). The present study brings the historical record of wheat developments through the following nine years, and a study now in progress will deal with the five crop years immediately preceding the World War of 1914–18.

PART ONE

I. ABSORPTION OF HEAVY SUPPLIES AFTER 1898

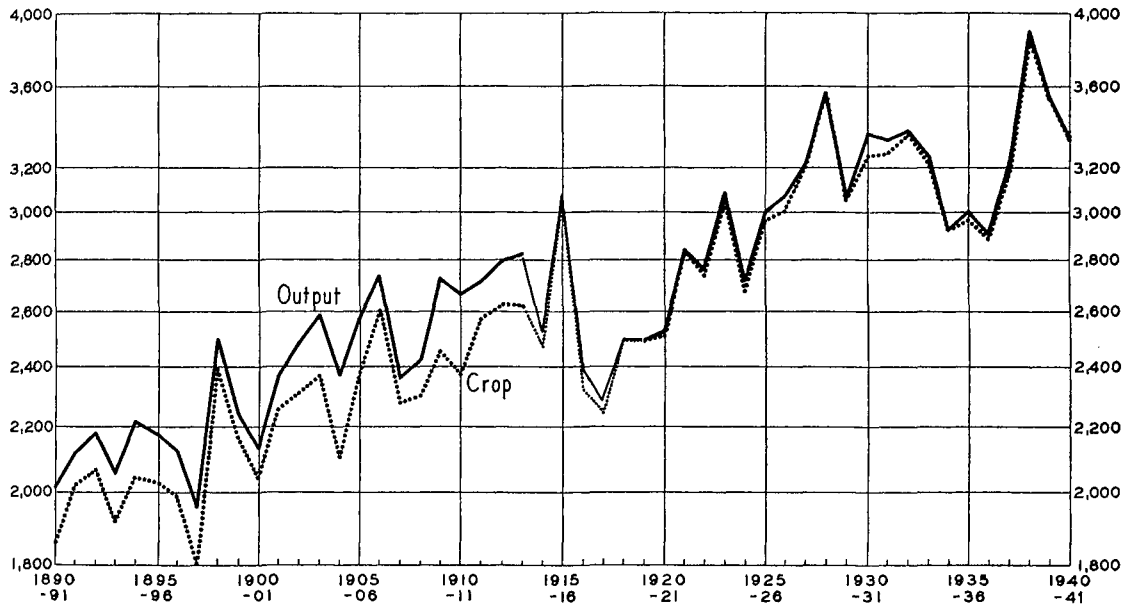
To one familiar only with the world wheat developments of the past quarter of a century, the raw data on per capita wheat output and prices in the decade following 1898 would suggest many questions. These would doubtless center around the problem: How were wheat prices so well maintained after 1898 in the face of such heavy per capita wheat output? In the light of recent experience, one would certainly suppose that the early years of the twentieth century should have been characterized by an accumulation of burdensome wheat stocks similar to that of the 1930's.

What factors operated to prevent such an accumulation of stocks after 1898? The crop-year reviews of the wheat developments in 1900–09, presented in Part Two of this study, constitute the detailed basis for answering this question. But there the answer is buried in details and no comparison with recent years is attempted. The present section has therefore been designed to focus attention on this particular problem by means of broad statistical comparisons of supplies and consumption in the three periods of heaviest per capita wheat output: 1891–96, 1898–1908, and 1928–35.

Chart 3 shows in historical perspective the wheat crops of 1898–1908 in the world exclusive of the old Russian Empire and of India, China, the Near East, and several minor wheat-producing countries.[1] For this re-

CHART 3.—WHEAT CROP AND OUTPUT IN THE WORLD EX-RUSSIA EX-INDIA, 1890–1941*

(Million bushels)



* Data for 1895–1909 from Tables I and IX. As used in this study, "world wheat output" refers to the wheat production in the wheat-producing world defined in the accompanying text, plus exports from India and from the territory (approximate after the World War) in the prewar Russian empire. Owing to the less adequate information available on crops and exports in wartime, the figures shown for 1914–19 and 1939–41 are probably less accurate than those for other years.

[1] For China and the Near East, wheat-production data have not been available until recently, and these countries are therefore necessarily excluded from all "world" production series extending backward more than about a decade. Russia and India, for which official production estimates are available at least from the early 'nineties, are here excluded on other grounds: (1) because the annual official production estimates are not properly comparable and reliable; (2) because Russia and India are such large and variable producers and consumers of wheat that variations in their aggregate production and consumption would markedly influence the course of any "world" production or consumption series that included these

stricted wheat-producing world, designated in the present study as the "world ex-Russia ex-India," or more simply as the "world," two series are presented in the chart. One, called "production" or "crop," shows the course of wheat production within the world ex-Russia ex-India; and the other, designated "output," shows this production supplemented by crop-year net exports from India and from the territory (only approximate from 1919–20) in the old Russian Empire.

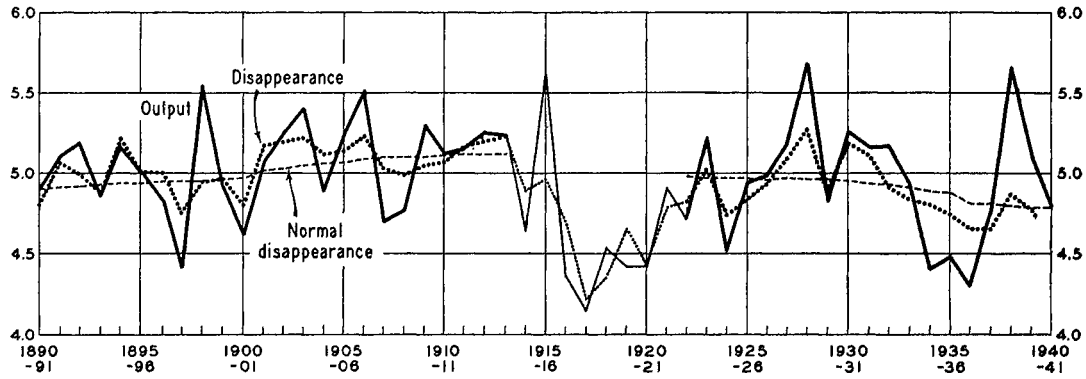
The latter series, by far the more meaningful, is shown in per capita terms along with other data in Chart 4. The generally high level of per capita wheat output in the decade following 1898 stands out prominently. In terms of averages, the per capita output approximated 5.11 bushels in 1898–1908 as compared with only 5.06 bushels in each of the two major *wheat-surplus* periods of 1891–96 and 1928–35.[1]

For purposes of summarized analysis it seems advisable to treat the crop decade 1898–1908 not as a single unit, but as composed of two intervals of four and six years respectively—1898–1902 and 1902–08. These two periods may well be compared statistically with the two recognized wheat-surplus periods of 1891–96 and 1928–35.

On the supply side, the four periods under consideration differed significantly with regard to (1) the average level of per capita wheat output; (2) the size of the annual output relative to the trend of normal disappearance; (3) the size and timing of large and small crops; and (4) the proportion of the annual production located in those areas in which consumption responds most readily to changes in production. On the demand side, the four periods were characterized chiefly by differences in (1) the level and trend of normal wheat disappearance, and (2) the magnitude and timing of abnormally heavy and abnormally light consumption. Most of these differences are reflected in the per capita figures presented in Table 1 for the world ex-Russia ex-India.

CHART 4.—PER CAPITA WHEAT OUTPUT AND DISAPPEARANCE IN THE WORLD EX-RUSSIA EX-INDIA, 1890–1941*

(Bushels per capita)



* World wheat disappearance represents the world wheat "output" plus the total estimated inward carryover (exclusive of surplus Russian stocks) minus the estimated outward carryover. The annual disappearance figures so calculated are shown in the chart divided by the estimated population in the wheat-consuming world ex-Russia ex-India. Since our population and stocks estimates, in particular, are not trustworthy for 1914–15 to 1921–22, the figures for these years are shown connected by lighter lines than are used for other years. For the meaning and method of approximation of the trend of "normal" disappearance, see text, pp. 319–20.

TREND OF NORMAL DISAPPEARANCE

Basic to our analysis of wheat supplies and consumption in the four periods under consideration is the concept of "normal" wheat

two countries; and (3) because over the past two decades, at least, large variations in Russian and Indian production have had slight effect upon the wheat situation in the rest of the world.

[1] Throughout this study, groups of crop years are referred to by noting the beginning of the first crop year and the end of the last crop year covered. Thus, 1891–96 refers to the period from 1891–92 through 1895–96.

TABLE 1.—RELATION OF WORLD WHEAT OUTPUT AND ESTIMATED ACTUAL DISAPPEARANCE TO APPROXIMATE "NORMAL" DISAPPEARANCE, PER CAPITA BASIS, IN FOUR PERIODS OF LARGE CROPS*

(Bushels per capita)

Crop year	Output	Actual disappearance	"Normal" disappearance	Deviation from "normal" disappearance			Change in stocks	
				Output		Actual disappearance	Annual	Cumulated
				Annual	Cumulated			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1891-92.....	5.10	5.06	4.91	+.19	+ .19	+.15	+.04	+.04
1892-93.....	5.19	4.99	4.92	+.27	+ .46	+.07	+.20	+.24
1893-94.....	4.85	4.87	4.93	−.08	+ .38	−.06	−.02	+.22
1894-95.....	5.16	5.21	4.94	+.22	+ .60	+.27	−.05	+.17
1895-96.....	5.01	5.01	4.94	+.07	+ .67	+.07	.00	+.17
Av.....	5.06	5.03	4.93	+.13	.....	+.10	+.03	.....
1898-99.....	5.54	4.94	4.95	+.59	+ .59	−.01	+.60	+.60
1899-1900.....	4.92	4.96	4.96	−.04	+ .55	.00	−.04	+.56
1900-01.....	4.62	4.80	4.97	−.35	+ .20	−.17	−.18	+.38
1901-02.....	5.07	5.17	5.02	+.05	+ .25	+.15	−.10	+.28
Av.....	5.04	4.97	4.98	+.06	.....	−.01	+.07	.....
1902-03.....	5.25	5.19	5.03	+.22	+ .22	+.16	+.06	+.06
1903-04.....	5.40	5.22	5.05	+.35	+ .57	+.17	+.18	+.24
1904-05.....	4.89	5.12	5.06	−.17	+ .40	+.06	−.23	+.01
1905-06.....	5.25	5.14	5.07	+.18	+ .58	+.07	+.11	+.12
1906-07.....	5.51	5.23	5.09	+.42	+1.00	+.14	+.28	+.40
1907-08.....	4.70	5.03	5.10	−.40	+ .60	−.07	−.33	+.07
Av.....	5.16	5.16	5.07	+.10	.....	+.09	+.01	.....
1928-29.....	5.68	5.27	4.96	+.72	+ .72	+.31	+.41	+.41
1929-30.....	4.83	4.88	4.96	−.13	+ .59	−.08	−.05	+.36
1930-31.....	5.25	5.18	4.95	+.30	+ .89	+.23	+.07	+.43
1931-32.....	5.16	5.11	4.94	+.22	+1.11	+.17	+.05	+.48
1932-33.....	5.17	4.91	4.93	+.24	+1.35	−.02	+.26	+.74
1933-34.....	4.94	4.83	4.91	+.03	+1.38	−.08	+.11	+.85
1934-35.....	4.40	4.80	4.89	−.49	+ .89	−.09	−.40	+.45
Av.....	5.06	5.00	4.93	+.13	.....	+.06	+.06	.....

* See Chart 4 and footnotes. The first three columns of the table show for the specified years the values that are plotted in Chart 4. Column 4 shows the annual differences between columns 1 and 3; and column 6 shows the differences between columns 2 and 3. Column 7, showing annual changes in year-end stocks, represents the difference between columns 1 and 2. At the same time the figures there presented necessarily check with the annual changes in our "world" stocks series (ex-Russian surplus) reduced to a per capita basis by use of the "world" population figures employed in computing per capita supplies and per capita disappearance. The cumulated figures in columns 5 and 8 show for each period the algebraic cumulation of the deviations in the preceding column; they do not take account of the level of stocks at the beginning of each period but show only the cumulated changes over the period covered.

disappearance. To judge the true meaning of an average per capita wheat output of 5.16 bushels in 1902–08, as contrasted with 5.06 bushels in 1891–96 and 1928–35, it is essential to have some norm of disappearance or norm of supplies with which these particular figures can be compared. Specifically, one wants to know whether the larger average per capita output of 1902–08 was more readily absorbed than the smaller per capita output of 1891–96 and 1928–35 mainly because of trend changes in *normal* consumption, or as a result of *abnormal* expansion of consumption in 1902–08, or *abnormal* contraction of consumption in 1891–96 and 1928–35.

For purposes of the present analysis, "normal" disappearance is taken to represent the disappearance that might have been witnessed in each country, considered separately, (1) if the available supplies of wheat and competi-

tive cereals had not been extraordinarily large or extraordinarily small, trends considered, (2) if the price of wheat relative to other commodity prices had not been unsually high or low, (3) if direct and indirect governmental restrictions on wheat consumption had not been notably severe, (4) if international financial and exchange relationships had not been so unfavorable as seriously to restrict wheat imports or temporarily so favorable as sharply to stimulate them, and (5) if general economic conditions had been neither exceptionally good nor exceptionally bad. Obviously, a trend of normal disappearance based upon these considerations is not subject to precise calculation; and the trend figures shown in column 4 of Table 1 (also in Chart 4) represent simply the summation of our appraised "normal-disappearance" values for the various individual countries and areas included in the world ex-Russia ex-India.[1]

The possibility of errors in judgment is much greater for years since the World War than for prewar years,[2] since the past two decades have been characterized by extreme abnormalities and irregularities in agricultural production, economic conditions, and financial and exchange relationships, and by governmental measures that have materially affected both production and consumption. No attempt has been made to approximate the course of normal disappearance over the World War period, which presents special problems too difficult to attack without detailed study.

As here approximated, the trend of per capita normal wheat disappearance in the world ex-Russia ex-India is not a smooth line but one with several pronounced jogs, the three most prominent of which occurred between 1900–01 and 1901–02, between 1935–36 and 1936–37, and sometime between 1913–14 and 1922–23 (see Chart 4, p. 318). The indicated sharp increase in "normal" disappearance between 1900–01 and 1901–02 mainly reflects changes in methods of crop estimation in Italy and Spain rather than a true change in wheat consumption; and similarly, the substantial reduction between 1935–36 and 1936–37 reflects a sudden, marked change in French wheat-production statistics. In contrast, the change in level of wheat disappearance between 1913–14 and 1922–23 is a complex phenomenon, attributable partly to boundary changes that make it impossible to present entirely comparable prewar and postwar statistics of the world ex-Russia ex-India, partly to changes in methods of crop estimation, and partly to actual changes in average per capita wheat consumption.

If the major jogs be disregarded, the trend of per capita normal wheat consumption shown in Chart 4 rises moderately (on the average by slightly less than .010 bushel annually) during the 'nineties, rises more rapidly (by roughly .015 bushel annually) through 1907–08, and then tends upward at a definitely slower pace (by about .003 bushel annually) up to the beginning of the World War. The postwar trend is almost imperceptibly downward until 1930–31, and thereafter is more markedly downward.

The decline since 1930–31 is still too recent to be confidently appraised, especially in view of the financial disorganization and economic depression which characterized this period, and which in many countries were associated with the establishment and strengthening of governmental restrictions on wheat imports and consumption. A decade or so from now it may well appear that the per capita normal disappearance did not decline significantly from 1930 to 1940, and that the depression below the normal level was greater than we now estimate. On the other hand, some of the depressive economic and governmental factors that we now regard as temporary or short-term factors may later become established as at least semi-permanent; if so, the trend of normal disappearance during the 1930's may later appear to decline more steeply than here indicated. But in any case, there is now no reason to believe that later developments may suggest an upward rather than a horizontal or downward trend during these years.

The changing trend of normal wheat disap-

[1] Included also is the appraised trend of annual "residual" disappearance, representing mainly losses in transit and shipments from the world ex-Russia ex-India to outside areas.

[2] In this study "prewar" refers to the years preceding the World War of 1914–18.

pearance over the past half-century partly explains why serious wheat surpluses were faced in 1891–96 and 1928–35 but not in 1898–1902 or 1902–08. In 1891–96 and 1928–35, the average per capita wheat output of 5.06 bushels in each period was .13 bushel above the appraised average level of normal disappearance; whereas in 1898–1902 and 1902–08 average per capita output of 5.04 and 5.16 bushels, respectively, was only .06 and .10 bushel above the normal level (Table 1, columns 1, 3, and 4). Other factors equal, these figures alone would imply that 1891–96 and 1928–35 should have witnessed materially greater wheat-surplus problems than either of the other periods here considered, though perhaps not much greater than 1902–08.

Positive Correlation between Output and Disappearance

Annual variations in wheat disappearance from the normal trend are determined by a large number of factors. Several of the most important of these are related either directly or indirectly to the magnitude of wheat production, locally or in total. Perhaps most obvious is the fact that errors in wheat-production estimates tend to be reflected in errors of estimation of wheat disappearance, if estimates of year-end stocks are reasonably reliable. For example, if United States wheat production is overestimated or underestimated by 50 million bushels in a particular year, the error[1] is reflected not only in the statistics of world wheat production but also in the statistics of world wheat disappearance, since United States carryover figures rest upon independent calculations made without reference to production estimates. Even for countries such as France, for which completely independent stocks estimates are not available, there is a tendency for errors in production estimates to be at least partly reflected in the estimates of consumption.

A second factor which causes wheat disappearance to be positively associated with wheat production is the tendency in certain areas for wheat consumption to expand with increased domestic production and to contract with decreased production. In the world ex-Russia ex-India, the areas in which this relationship is most clear are the Danube basin, French North Africa, and Spain. In other areas there is some response of disappearance to production (if only through the amount of wheat wasted and lost in cleaning), but the response is much less marked. Heavy wheat production in the Danube basin, northern Africa, and Spain is not necessarily associated with heavy world wheat production; but there is some tendency toward this association, if for no reason other than that the aggregate production in these particular areas normally constituted 15 to 20 per cent of the total wheat output of the world ex-Russia ex-India both prior to the World War and during 1922–39.[2]

Finally, a heavy wheat output in the world ex-Russia ex-India is normally reflected in low wheat prices, which in turn are likely to be associated with increased consumption. When wheat is cheap, particularly in relation to rye, corn, rice, and other cereals, increased

[1] We refer here only to the *occasional* errors in the official statistics which remain uncorrected in the production series employed in this study. Such errors are presumably largest for the United States, partly because the crops of this country are absolutely larger than the crops of any other individual country in the world ex-Russia ex-India; and partly because errors are most likely to be present in the agricultural statistics of countries like the United States that extend over a large area and that have developed rapidly during the period covered by the statistics.

Working's wheat-production series for the United States, employed in this study, includes correction for official understatement of the *level* of wheat production but involves no correction for scattered errors in individual years (see Holbrook Working, "Wheat Acreage and Production in the United States since 1866: A Revision of Official Estimates," Wheat Studies, June 1926, II, 237–64). Moreover, Working's estimates were based on the official figures of yield standing prior to 1934, when the U.S. Department of Agriculture published a revised series of estimates of wheat acreage, yield, and production back to 1866. Since even the 1934 official revisions appear to understate the level of United States wheat production through 1910, at least, we have here used Working's published estimates through that year in preference to the revised official figures. However, in so far as the revised estimates reflect annual changes in acreage and yield per acre more accurately than the previous official estimates, Working's figures may not reflect as well as the new official estimates some of the year-to-year changes in production.

[2] Other factors may also be involved. For example, it is possible that there is a positive correlation between wheat yields in these areas and yields in some other major producing areas, such as Russia and/or other European countries.

amounts of wheat are likely to be used for food in the rye-consuming countries of Europe and in the Danube basin, northern Africa, and the Orient. The same price relationships encourage increased feeding of wheat in North America, the British Isles, Belgium, Holland, and Scandinavia. Conversely, short wheat supplies, associated with high wheat prices, are often reflected in reduced wheat consumption.

As a result of these three factors in particular, one might reasonably expect annual deviations in wheat disappearance above or below normal to be positively correlated with annual deviations in wheat output. Yet other consumption factors, unrelated to wheat supplies, have undoubtedly operated to modify this tendency. At certain times and in certain countries, variations in wheat consumption have been materially affected by governmental regulations, general economic conditions, and international trade and financial relationships, which have been virtually unrelated to the size of wheat supplies. For example, the normal price effects of heavy wheat supplies were rendered partially or wholly inoperative during the past decade in many importing nations, where economic depression and growing nationalism resulted in severe governmental restrictions upon the importation and consumption of foreign wheat.

The combined net effect of these and all other factors tending to produce annual variations in per capita world wheat disappearance is reflected in Chart 4 in the deviations of per capita disappearance from "normal." These deviations are shown in Chart 5 in relation to corresponding deviations in per capita wheat output. This chart clearly indicates a significant tendency for per capita world wheat disappearance to vary with, though relatively less than, per capita wheat output. When per capita output exceeds the normal level, per capita disappearance also tends to be above normal; and, on the average, each increase of .10 bushel in per capita output tends to be associated with an increase of roughly .03 bushel in per capita disappearance. On the other hand, when per capita output falls below normal, per capita disappearance also tends to be below normal, declining about .03 bushel with each additional decrease of .10 bushel in the output.

The average relationship between per capita disappearance and per capita *total* wheat supplies (including initial carryovers) is quite similar. However, since deviations in per capita initial wheat stocks (from normal) are not significantly related to deviations in per capita wheat disappearance, and since the correlation and regression coefficients representing this relationship differ significantly from the corresponding coefficients representing the relationship between deviations in per capita output and per capita disappearance,[1] it seems not unreasonable to confine attention here to the relationship between disappearance and wheat output.[2]

Chart 5, with the regression line shown thereon, affords a good rough basis for appraising consumption developments in the four periods of years here under consideration. Average values for the four periods are indicated on the chart by crosses, which show that consumption was materially above its usual relation to wheat output only in 1891–96 and 1902–08. The relatively heavier consumption in these two periods partly reflected more favorable geographical distribution of the wheat

[1] The correlation and regression coefficients referred to here are as follows:

1. Deviations from normal in per capita disappearance vs. deviations in per capita wheat output: $r_{12} = +.734 \pm .074$; $b_{12} = .304$.
2. Deviations from normal in per capita disappearance vs. deviations in per capita total supplies: $r_{13} = +.617 \pm .099$; $b_{13} = .237$.
3. Deviations from normal in per capita disappearance vs. deviations in per capita initial wheat stocks: $r_{14} = -.085 \pm .159$; $b_{14} = -.043$.

The usual statistical tests for significance indicate that the differences between r_{12} and r_{14} and between b_{12} and b_{14} are unquestionably significant. Therefore, one may properly assume that deviations in per capita wheat consumption are more closely related to deviations in per capita wheat output than to deviations in per capita total supplies, even though there is no clear statistical evidence that the difference between r_{12} and r_{13} is significant.

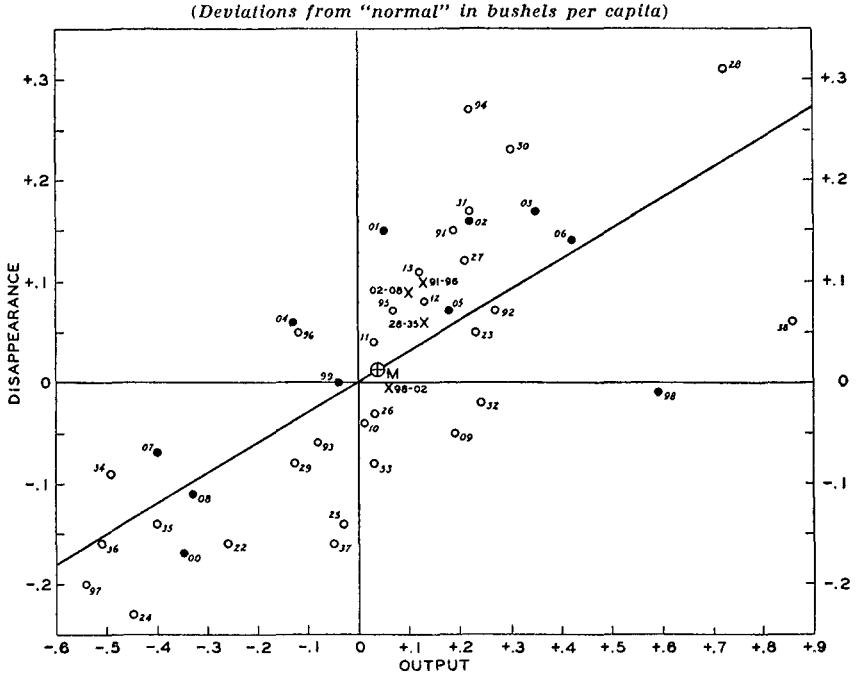
[2] Actually, the differences in the correlation coefficients given in the preceding footnote are noteworthy in that they show no evidence that price has any material influence on wheat disappearance. The present writer regards this statistical indication as an understatement of the actual effect of price on disappearance and thinks it probable that the indicated relationships have been affected in some peculiar manner by factors not here taken into account. This matter appears to warrant further study.

production,[1] and partly the absence of governmental barriers to consumption so restrictive in 1928–35; but other less conspicuous influences were also important in the aggregate.

In contrast, the small excess of wheat output in 1898–1902 went not to swell consumption, which averaged below normal, but to add to year-end stocks, which had been reduced to an abnormally low level by the extreme wheat shortage of 1897–98.[2] In the fourth period, 1928–35, average per capita disappearance was substantially above normal, but only slightly above the indicated line of regression. Moreover, if that line should be adjusted (slope increased) to offset the effects of governmental measures in curtailing wheat consumption in recent years, the disappearance of 1928–35 would perhaps stand at about the "expected" level and not above it.

CHART 5.—RELATION OF PER CAPITA WORLD WHEAT DISAPPEARANCE TO PER CAPITA WHEAT OUTPUT, 1891–1914 AND 1922–39*

(Deviations from "normal" in bushels per capita)



* Based upon the data shown in Chart 4. The figures attached to the various points refer to the years of harvest or the beginning of the crop years represented: thus, *98* refers to the crop year 1898–99. The years covered by the present study are indicated by solid circles. The regression equation is: $Y = .3044\,X + .0013$.

TIMING OF HEAVY AND LIGHT OUTPUT AND CONSUMPTION

Average values and *average* deviations of output and consumption fail to present a complete picture. In any given period, the size and timing of heavy and light crops and of heavy and light consumption have an important bearing upon year-end stocks. With respect to these factors, the major principles as they affect year-end wheat stocks may be summarized as follows.

As to variations in output:

1. The larger the excess in wheat output above normal, the greater the probable addition to year-end stocks; and the greater the deficiency in wheat output below normal, the larger the probable reduction in year-end stocks.

2. The longer the time interval between a

[1] In the eight countries in which consumption tends to respond most strongly to changes in domestic wheat production (the Danube basin, French North Africa, Spain), annual deviations in per capita production from trend averaged as follows in the four periods: 1891–96, +.07; 1898–1902, —.04; 1902–08, +.03; and 1928–35, +.00.

[2] Although somewhat low in relation to output, disappearance stood at about a normal level in 1898–1902 in relation to *total* supplies.

bumper output and a following notably deficient output, the greater the chance of persistence of burdensome surplus stocks. Conversely, the shorter the time interval between a bumper output and a following deficient output, the greater the chance of avoiding persistent surplus stocks.

3. Although two or three moderately excessive crops or outputs can leave cumulated stocks as large at the end of a given period of years as one huge crop followed by several normal crops, the former arrangement of crops results in a maximum surplus only at the end of the period, whereas the latter arrangement of crops results in the earlier emergence of such a surplus and in the persistence of heavy stocks throughout the entire period.

As to variations in disappearance:

1. The heavier the annual disappearance is in relation to the "expected" level implied by the regression line in Chart 5, p. 323, the less chance there is that year-end wheat stocks will be built up to, or maintained at, an excessively high level. The converse of this statement is equally true.

2. If persistence of surplus stocks is to be avoided, it is particularly important that disappearance be above the "expected" level during and immediately after a year of surplus output. The longer the time interval between heavy output and heavy consumption, the longer is the period of surplus and the greater is the chance that the surplus stocks will become burdensome.

Since annual variations in wheat output actually cover a much wider range than annual variations in wheat consumption, the time arrangement of the former is the more important with regard to stocks accumulations. The differing stocks positions of the four periods of heavy output here considered rested in considerable part upon the different size and timing of surplus and deficit wheat output. The greatest annual surplus of output recorded during the half-century from 1885 to 1935 was in 1928–29, when it was .72 bushel per capita. This huge surplus output and the fact that the following year was characterized by only a moderate deficiency in output were in substantial measure responsible for the extreme seriousness of the wheat-surplus problem of 1928–35.

The size and timing of surplus and deficit crops were less unfavorable in the other three periods (Table 1, p. 319). The smaller surpluses built up by excessive output in 1891–93, 1898–99, and 1902–04 were partly needed to make up for deficiencies in output in 1893–94, 1899–1901, and 1904–05. And the heavy stocks resulting from the huge output of 1906–07 were immediately required to offset the large deficiency in 1907–08.

The importance of the timing of surplus and deficit output can perhaps best be illustrated by observing that in each of the four periods under consideration, an existing or potential surplus could have been diminished or augmented simply by temporal rearrangement of the annual surpluses and deficits shown in the fourth column of Table 1, p. 319.[1] For example, the period 1891–96 would probably not have stood out as a period of persistent surplus stocks if the fairly large surplus output of 1892 had not appeared until three years later, and if the small surplus of 1895 had come instead in 1892. Even the serious wheat-surplus problem of 1928–35 might have been greatly reduced in severity if the wheat deficiency of 1934 could have come in 1930 and the 1930 surplus output could have been postponed until 1934. It might have been even further reduced if the slight surplus output of 1933 had been interchanged with the sizable surplus of 1931. In contrast, the period 1902–08, which in actual fact had no persistent surplus problem, would probably now be known as a wheat-surplus period if the 1904 deficit and the 1906 surplus had been interchanged.

Even with surplus and deficit supplies sized

[1] This discussion neglects the influence, largely through the medium of prices, that a large or small output in one year may have upon the acreage sown for the following crop. In the past, year-to-year changes in wheat acreage in response to price changes seem to have had but little influence upon the wheat output of the following year. Moreover, significant acreage contraction in response to low wheat prices is much less probable than significant expansion in response to high prices. In all cases, the effect of weather conditions upon wheat sowings and wheat yields per acre has been much more important than acreage adjustment to price in determining the appearance of surplus and deficit crops.

and timed as they actually were, the period 1902–08 would have ranked along with 1891–96 and 1928–35 as a period of heavy cumulation of surplus stocks; if world wheat disappearance had not been considerably above normal and also above the "expected" disappearance suggested by the regression line in Chart 5, p. 323.

In the four periods here considered, deviations in wheat disappearance from normal compared as follows, in bushels per capita, with the "expected" deviations. This tabulation shows that the worst timing of consumption variations was in 1898–1902, when in the first year of heavy production per capita disappearance fell .19 bushel *below* the "expected" level and over the first three years averaged .08 bushel below. In contrast, the best timing was in 1902–08: then per capita disappearance averaged .09 bushel *above* the "expected" level during the first two years, as compared with .04 and .03 bushel above, respectively, in the first two years of 1891–96 and 1928–35. However, in 1891–96 and 1928–35, the timing of variations in consumption played but a minor role in determining the persistence of surplus stocks; and in 1898–1902, when such timing was most unfavorable, surplus stocks existed only in the first two years and did not persist to become truly burdensome. Even in 1902–08, when favorable timing of consumption responses undoubtedly helped to keep year-end wheat stocks from becoming burdensome, other factors contributed more heavily to the same result.

Year	"Expected"	Actual	Difference[a]	Year	"Expected"	Actual	Difference[a]
1891–92..	+.06	+.15	+.09	1898–99..	+.18	−.01	−.19
1892–93..	+.08	+.07	−.01	1899–1900	−.01	.00	+.01
1893–94..	−.02	−.06	−.04	1900–01..	−.11	−.17	−.06
1894–95..	+.07	+.27	+.20	1901–02..	+.02	+.15	+.13
1895–96..	+.02	+.07	+.05				
				Av....	+.02	−.01	−.03
Av....	+.04	+.10	+.06				
				1928–29..	+.22	+.31	+.09
1902–03..	+.07	+.16	+.09	1929–30..	−.04	−.08	−.04
1903–04..	+.11	+.17	+.06	1930–31..	+.09	+.23	+.14
1904–05..	−.04	+.06	+.10	1931–32..	+.07	+.17	+.10
1905–06..	+.06	+.07	+.01	1932–33..	+.07	−.02	−.09
1906–07..	+.13	+.14	+.01	1933–34..	+.01	−.08	−.09
1907–08..	−.12	−.07	+.05	1934–35..	−.15	−.09	+.06
Av....	+.04	+.09	+.05	Av....	+.04	+.06	+.02

[a] Excess (+) or deficiency (−) of actual disappearance as compared with the "expected" value indicated by the regression line in Chart 5.

General comparison. — To summarize, in 1898–1902 and 1902–08 average per capita wheat output about as heavy as or heavier than in 1891–96 and 1928–35 was absorbed without the accumulation of persistent surplus stocks such as depressed world wheat markets in 1891–96 and 1928–35. This was primarily due to five factors, the importance of which varied materially in the different periods.

Of great general importance was the course of normal wheat disappearance, which was itself due to a complex group of factors that need not be discussed here—changes in standards of living, changes in population age-structures, changes in the availability of different food products, long-time changes in food-price relationships, and other long-term factors influencing national dietary habits. In relation to the apparent trend of consumption, per capita output was not nearly so excessive on the average during 1898–1902 as it was in each of the other three periods; and it was appreciably lower in 1902–08 than in 1891–96 or 1928–35.

Second, the size and timing of surpluses and deficiencies in output were much more unfavorable in 1928–35 than in any of the other three periods—a fact which contributed to the extreme seriousness of the wheat-surplus problem of 1928–35. In contrast, the favorable timing of crop surpluses and deficits in 1902–08 was a significant factor in preventing the accumulation of heavy surplus stocks.

The two factors mentioned above, though of great importance, could not alone have kept 1902–08 from standing out as a period of depressive wheat surplus. For this a third factor was also essential—*abnormally* heavy consumption.

In three of the four periods under consideration—1891–96, 1902–08, and 1928–35—per capita wheat disappearance averaged above normal and also above the "expected" level; but it was less markedly above the "expected" level in 1928–35 than in 1891–96 and 1902–08, when the Danube basin, French North Africa, and Spain contributed larger portions of the

world's wheat output. The *timing* of heavy consumption was perhaps most favorable in 1902–08; but this factor was of minor significance in determining the persistence of surplus stocks in 1891–96 and 1928–35.

The period 1898–1902 warrants special attention, because of the importance of the level of initial wheat stocks. In the summer of 1898, per capita world stocks were farther below normal than in any other year of the past half-century. Because of this fact, the huge output of 1898–99, even though associated with a relatively low disappearance, did not raise per capita year-end stocks to as high a level (including surplus Russian stocks) as had been witnessed in 1893–96. The sizable surplus stocks of 1899 were only slightly reduced in 1899–1900, in reflection of a moderate output associated with normal disappearance; but during the following year, the stocks were drawn down to "normal" as a result of a notably light output.

In none of the other three periods here considered did the level of wheat stocks at the beginning of the period exert as great an influence as in 1898–1902. However, the general stocks position during 1902–08 was materially helped by the low level of the carryover in 1902; the surplus wheat condition in the mid-'nineties was somewhat less serious than it would have been if stocks had not been a little below normal in 1891; and the surplus problem of 1928–35 was made slightly worse by the fact that in 1928 stocks were already somewhat above the normal level.

One other factor warrants mention because of its important bearing on the wheat-surplus position of the mid-'nineties: the level of Russian wheat stocks. Since we have been concerned in this section with the relation between wheat output and disappearance in the world ex-Russia ex-India, we have disregarded Russia's wheat position except in so far as that was reflected in Russian exports. But complete disregard of the size of year-end Russian stocks (as in columns 5, 7, and 8, of Table 1) leaves an incomplete picture of the world stocks position in years prior to the World War, when Russian supplies had a significant bearing upon world wheat prices. Inclusion of surplus Russian stocks in the accumulations shown in column 8 of Table 1 would not materially change the apparent world stocks positions for 1898–1902 or 1902–08; but it would materially raise the level of the surplus indicated for 1891–96.

II. PRICE TENDENCIES, 1898–1909

Since no persistent burdensome surplus weighed on the world's wheat markets during the decade following the huge wheat harvest of 1898, it is not surprising that world wheat prices, adjusted for changes in commodity prices in general,[1] showed no major depression in that period. Only in two isolated crop years when world wheat supplies were notably heavy, namely, in 1899–1900 and 1906–07, was the deflated price of British import wheat about as low as it had been in the mid-'nineties; and in neither of these two years was the price as far below "normal" as it had been during 1893–96. These and other annual relationships between per capita world wheat carryovers and deflated British wheat prices are apparent in Chart 6.

The trend lines shown in that chart warrant brief comment. For stocks, the indicated trend is the summation of the writer's approximations to the annual "low normal" stocks[2] in each of the countries and positions covered, raised 30 per cent, and divided by the aggregate population in the countries concerned. The trend of prices is a statistically derived curve based upon (1) the "normal" trend of stocks and (2) the general relationship between percentage changes in price and changes in percentage deviations of stocks from normal. This curve is not a trend line in the sense that the deviations or the squares

[1] Specifically, the adjustment is for changes in average prices of the commodities (mainly raw materials) covered by the Sauerbeck-Statist index, but there seems no reason to believe that use of a more comprehensive index number would yield materially different results in this respect.

[2] For a description of the concept of "low normal" stocks, see H. C. Farnsworth, "'World' Wheat Stocks, 1890–1914 and 1922–39," WHEAT STUDIES, October 1939, XVI, 51–52.

of the deviations about it are statistically at a minimum; nor can it be said to describe the general drift of deflated wheat prices since 1890–91.[1] Rather it shows the level of wheat prices that might have been expected in each year if per capita year-end wheat stocks had been at the "normal" level indicated by the stocks trend. If our approximations to per capita "normal" stocks are markedly in error as to trend, then there is a considerable error, too, in the "normal" price trend. Inspection alone suggests that the latter trend moves downward less steeply than it should in the later interwar period, particularly since about 1930. For recent years one can have no great confidence in any "normal" trend line, no matter how constructed; yet consideration of the many factors outside the stocks position that have tended to depress prices *abnormally* over the past decade has led the present writer to conclude that even for recent years the price trend shown in Chart 5 is not definitely unreasonable as an indicator of approximate "normal" prices.[2]

In terms of percentages of "normal," per capita stocks on August 1 of the years designated and deflated British wheat prices in the crop years ending in the designated years were associated as indicated in Chart 7. Even allowing for a substantial amount of error in judgment, it is evident from this chart that the wheat prices of 1898–1909 discounted fairly well the wheat-commodity positions of those years. This holds true despite the fact that significant irregularities are apparent for several years, particularly 1898–99 (designated *99*) and 1901–02 (designated *02*); these irregularities probably mainly reflect the influence of special non-wheat factors.[3]

The bumper wheat crop of 1898, associated as it was with below- normal consumption in 1898–99 (size of supplies considered), left a relatively heavy carryover at the end of the crop year. Despite this fact, the purchasing power of British import wheat declined only 32 cents per bushel between 1897–98 and 1898–99—materially less than the commodity position alone would have warranted. Speculative holding, influenced by recollection of the high wheat prices of the preceding year, by serious underestimation of the 1898 harvest, and by general optimism in business and trade circles, appears to have been mainly responsible for the relatively high wheat prices of 1898–99.

In 1899–1900 crop returns pointing to a second successive year of heavy wheat supplies discouraged the speculative demand for wheat, although at the same time speculation was rife in many other commodity markets, commodity prices in general were advancing rapidly, and there was widespread prosperity in business and trade (Chart 18, p. 378). Under these conditions, the price of British import wheat remained virtually unchanged, while the purchasing power fell sharply to a level roughly consistent with the world wheat commodity position as reflected in the slight decline of per capita year-end stocks from their high level in 1899.

The following year of strikingly reduced wheat supplies witnessed continued stability of wheat prices in the face of decline in other commodities markets and business recession throughout western and central Europe. Thus, the purchasing power of imported wheat rose —and almost enough to discount the changed wheat position. But despite further tightening of that position in 1901–02, British import wheat prices declined along with other commodity prices; and the purchasing power of wheat was definitely lower than the wheat situation alone seemed to warrant. Monetary and psychological factors associated with the deepening of business depression throughout Europe were presumably partly responsible

[1] In this respect, it differs considerably from the trend- and drift-lines shown on the British import price chart published as an appendix chart in many of our recent annual wheat reviews: e.g., J. S. Davis, "The World Wheat Situation, 1938–39," WHEAT STUDIES, December 1939, XVI, 203.

[2] For some supporting considerations, see V. P. Timoshenko, "Monetary Influences on Postwar Wheat Prices," WHEAT STUDIES, April 1938, XIV, 263–318, and V. P. Timoshenko, "Wheat Subsidization and Exports: The Experience of 1938–39," *ibid.*, October 1940, XVII, 39–99.

[3] Some of the irregularities may also reflect differences in the geographical location of surplus and deficit stocks in different years and errors in our estimates of world wheat stocks. We have noted previously that the statistical data upon which our stocks approximations mainly rest are less adequate for the years prior to the World War than for more recent years. See Farnsworth, *op. cit.*, pp. 43, 50–51.

for the relatively low wheat prices of 1901–02; but perhaps equally important was the concentration of wheat supplies in North America, where visible stocks were conspicuously large, especially during the winter months.

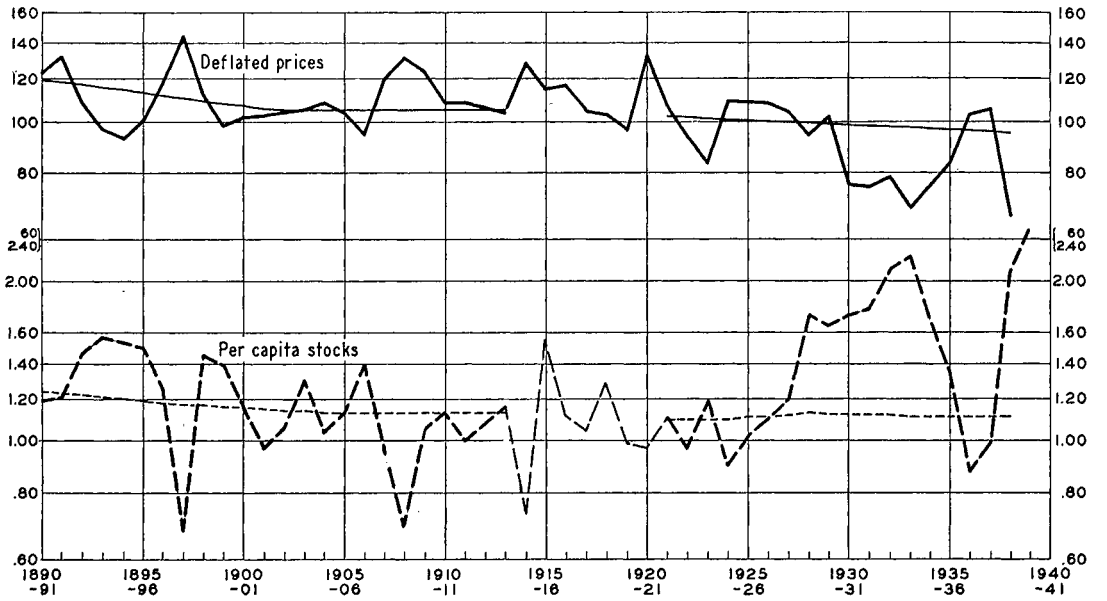
An approximate but apparently not complete price readjustment came in 1902–03, when wheat supplies were of moderate size and there was little change in average wholesale commodity prices (Chart 7). The following year, 1903–04, brought a substantial easing in the wheat-commodity position. This was associated not with a decline but with a small advance in British import wheat prices, both actual and deflated; and the purchasing power of British import wheat stood slightly higher than normal in relation to the size of year-end world wheat stocks. This may have been due in part to increased speculative holding of wheat, associated with renewal of optimism in various commodity markets and with improvement in European economic conditions. But presumably more important were (1) the great underestimation of crop-year wheat supplies in the early months of 1903–04 (p. 351); (2) the outbreak, in midwinter, of the Russo-Japanese war, which temporarily threatened curtailment of exportable wheat supplies; and (3) unfavorable development of the 1904 world wheat crop in the late spring and summer.

The following year of short supplies, 1904–05, brought a closer price adjustment, which was not seriously disturbed over the next four years, except perhaps in 1907–08. This five-year period was a period of general peace (aside from revolutionary activities in Russia in 1905 and 1906), and until 1907–08 it was characterized by widespread economic prosperity and advancing commodity prices. In 1904–05 and 1905–06 the purchasing power of British import wheat was not far from "normal," but in 1906–07 it declined markedly in response to the bumper harvest of 1906 which raised year-end stocks to the highest level in seven years.

The surplus stocks of 1907 were completely absorbed during the following year of deficient wheat output, and the purchasing power of wheat was the highest it had been since 1897–

CHART 6.—DEFLATED BRITISH IMPORT WHEAT PRICES AND PER CAPITA YEAR-END WHEAT STOCKS, 1890–1940*

(U.S. cents per bushel; bushels per capita)



* See notes to Charts 1 and 2. For source of stocks figures see general footnote to Table VI. Stocks figures reduced to a per capita basis by use of population figures for the particular countries covered by the stocks estimates. Trends described in text, pp. 326–27.

98. The increase in purchasing power of British import wheat between 1906–07 and 1907–08 not only fully discounted the concurrent change from an easy to a tight international wheat position, but was perhaps even greater than the change in the commodity position (Chart 7).

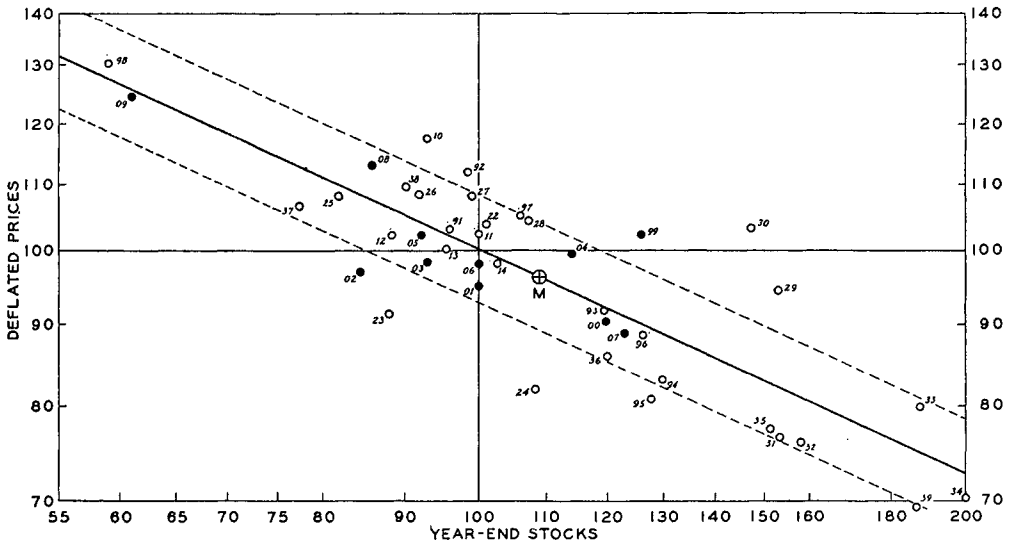
The excessive increase in purchasing power of British import wheat in 1907–08, particularly noteworthy in view of the depressing financial crisis in the United States in the fall of 1907, seems mainly attributable to three circumstances: (1) the wheat deficiency of 1907–08 was early recognized and even somewhat exaggerated in the trade press, (2) there was increasing evidence in the latter part of the year that the 1908 harvest would also be deficient, and (3) the prices of a number of the commodities included in the Sauerbeck-Statist index were more adversely affected by the general business and financial situation than were wheat prices. With further tightening of the international wheat position in 1908–09, the price and purchasing power of British import wheat increased still further, though less strikingly than in the preceding year; and the average level was once again closely in line with the adjudged wheat position.

The above summary of annual price developments during 1898–1909 suggests that monetary and other non-wheat factors significantly influenced the fluctuations in British import wheat prices during this period. But perhaps equally or more noteworthy is the fact that such non-wheat factors were apparently less important in the world wheat market in the fifteen years prior to the World War than they became in the later interwar period.[1]

Chart 6 indicates a second striking contrast in the price situation immediately prior to and after the World War—the difference in slope of the indicated trend of deflated British import prices. Prior to about 1900–02, the purchasing power of British import wheat was tending downward more or less rapidly; but the declining tendency gave way at the

CHART 7.—RELATION OF DEFLATED BRITISH IMPORT PRICES TO PER CAPITA YEAR-END WHEAT STOCKS, 1890–1914 AND 1921–39*

(Prices and stocks as percentages of "normal"; logarithmic scale)



* Based upon the data shown in Chart 6; the "normal" trend values there shown are here represented by 100 per cent. The figures attached to the various points refer to the end of the crop years represented; thus, *99* refers to the crop year 1898–99, whereas in Chart 5, *98* refers to the same crop year. The years covered by the present study are indicated by solid circles. The regression equation is: Log $Y = -.4535 \log X + 2.908$. The dotted lines show the standard error of estimate laid off on each side of the regression line.

[1] See Timoshenko, "Monetary Influences" and "Wheat Subsidization."

turn of the century to an approximately horizontal trend. After the World War there seems to have been a renewed downward movement, but one less marked than in the last decade or two of the previous century.

Why were the twelve years prior to the World War characterized by a horizontal trend of "normal" deflated wheat prices, when both earlier and later periods seem to have been characterized by declining price trends? This question cannot be adequately answered here; but certain aspects of the answer warrant brief discussion.

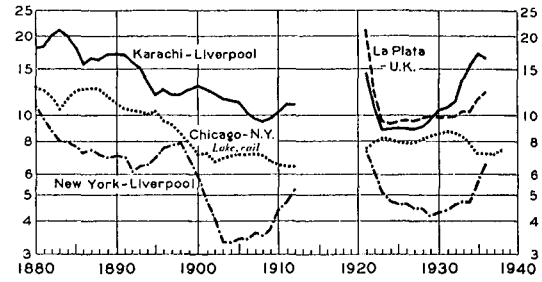
Such evidence as is available in the literature on prices and in the form of long statistical price series suggests that not one but many factors were responsible for the changing trend of deflated British import prices of wheat. This evidence implies, too, that the set of factors primarily responsible for the downward tendency prior to 1902 may have been quite different from the group chiefly responsible for the less marked downward tendency in 1920–40, and that still a third group of factors was perhaps largely responsible for the horizontal movement during 1902–14.

Of the various factors which seem most likely to have influenced the general course of deflated British import prices of wheat, the clearest case can be made for changing costs of transportation. British import wheat is drawn from all over the world and, historically, ocean and other freight rates have obviously had an important bearing on the price of wheat laid down in Great Britain. Moreover, over the past 60 years freight rates on wheat have been subject to large movements, reflecting not only the diverse influences tending to affect commodity prices in general but also influences bearing specifically on costs of transportation. This may be seen from Chart 8, which shows five-year moving averages of several representative freight rate series for wheat deflated by the Sauerbeck-Statist index of wholesale commodity prices in Great Britain.

There can be little question that declining transportation costs played an important part in the declining trend of deflated British import wheat prices during the last decade or two of the nineteenth century. Moreover, the fact that these costs were fairly stationary from about 1902 to 1914 presumably contributed materially to the horizontal trend of deflated wheat prices during that period. But it is important to note that (1) the further decline in purchasing power of British import wheat after 1922 was associated with stable or rising freight rates (deflated), and (2) in the two decades prior to 1902 the prices of numerous imported commodities failed entirely to reflect the downward trend of ocean and rail freights. It is clear, therefore, that changing transportation costs furnish but a partial explanation of the changing trend of deflated British wheat prices.

CHART 8.—DEFLATED FREIGHT RATES ON WHEAT, 1878–1914 AND 1920–40*

(U.S. cents per bushel; 5-year moving averages; logarithmic vertical scale)



* Freight-rate quotations from various issues of the Chicago Board of Trade, *Annual Report of the Trade and Commerce of Chicago; Annual Statistical Report of the New York Produce Exchange; International Yearbook of Agricultural Statistics; Statistical Abstract for British India* (published annually in Parliamentary Papers); Broomhall's *Corn Trade Year Book*. Quoted freight rates deflated by the Sauerbeck-Statist index of wholesale commodity prices, based on 1910–14; rates in British currency converted to U.S. cents at par of exchange.

A somewhat fuller explanation is supplied by Chart 19 (p. 386) which shows the Sauerbeck price index of each of the major commodity groups divided by the general price index. This indicates that the downward trend of purchasing power of wheat prior to 1902 was materially greater than the concurrent decline in purchasing power of the grain-potatoes group, but less marked than the decline of the sugar-coffee-tea group, which was virtually confined to 1897–1902. With the purchasing power of meat and animal products about stationary during 1880–1900, the tendency of the general food-price

index was downward, but presumably less sharply downward than the trend of purchasing power of wheat.[1]

This may be partly explained by the fact that some of the foods included in the food index were produced domestically or in nearby European countries without serious competition from overseas products and without material benefit from declining freight rates. However, the more marked decline in purchasing power of British import wheat prior to 1902 also reflected declining *real* costs of wheat production, based upon expansion of wheat acreage under exceptionally favorable cost conditions in the overseas exporting countries, and upon the introduction of improved types of agricultural machinery, of better methods of wheat cultivation, and of improved wheat varieties.[2] Technological and cultural improvements undoubtedly affected costs of production of other commodities besides wheat during 1880–1900; but we judge that over this period wheat was especially favored in this respect, particularly as compared with most of the commodities (almost all raw materials) included in the Sauerbeck index.

Finally, it should be noted that the downward trends of deflated wheat and food prices during 1880–1900 were to some slight extent simply the counterpart of a concurrent increase in purchasing power of minerals. Consequently, the decline in deflated wheat prices cannot be fully explained without reference to the special group of factors that was then operating to raise the purchasing power of iron, coal, tin, copper, and lead—factors that do not warrant further attention here.

The twelve years prior to the World War were years of unusually stable price relationships. This is readily apparent from Chart 19. After the diverse changes in these relationships during the last two decades of the nineteenth century, there was little further secular change up to the World War. The purchasing power of each of the six major commodity groups in the Sauerbeck index—grains and potatoes, animal products, the sugar-tea-coffee group, minerals, textiles, and sundry nonfood materials—fluctuated from year to year about a constant level during this period. Why this should have been so is not entirely clear. However, it may be pertinent to note that, since prices in general were tending gradually upward, there was less economic incentive for technological and agricultural improvements and other changes than had existed over the preceding quarter-century under conditions of price decline. The principal change in price relationship over this particular period seems to have been a relative increase in raw material and agricultural prices as compared with prices of processed goods.[3] But this is reflected only in minor degree in the Sauerbeck index or in commodity prices deflated by the Sauerbeck index, because very few highly processed commodities are included in that index.

The slight downward trend of deflated British import wheat prices since 1922 reflects a complex group of individual factors, the relative importance of which can not yet be well assessed. The interwar period was a period of great changes—in agricultural and industrial production, and in the machinery and methods employed in production; in commodity prices in general, associated with world-wide deflation and a severe and prolonged depression in trade, industry, and agriculture; in international economic, financial, and political relationships, partly associated with the World War of 1914–18 and partly with preparations for the present war; in the rate of population growth; in the distri-

[1] Since our estimates of world wheat stocks go back only to 1890, it is impossible to extend backward beyond that date the statistically determined trend of deflated wheat prices shown in Chart 19. However, we have enough information on the wheat situation in the 1880's to feel certain that the normal trend of purchasing power of wheat declined during that decade also, though probably at a somewhat less rapid rate than during 1890–1902.

[2] These and other factors contributing to the declining trend of deflated British import wheat prices during 1880–1900 are discussed in more detail in H. C. Farnsworth, "Decline and Recovery of Wheat Prices in the 'Nineties," WHEAT STUDIES, June and July 1934, X, 290–303.

[3] This is apparent from census data and from price data for different groups of commodities included in the United States Bureau of Labor Statistics index. These materials are well assembled and discussed in F. C. Mills, *The Anatomy of Prices, 1890–1940* (National Bureau of Economic Research Bull. 80, Sept. 9, 1940).

bution of income among different classes; in dietary habits; and in the scope of governmental enterprise. Practically all of these changes affected wheat prices in some degree. But many of them had as much or more influence upon other commodity prices and are therefore not reflected in the downward trend of *deflated* British import wheat prices shown in Chart 6.

Among the factors which seem likely to have contributed most to the downward trend of purchasing power of wheat are the improvements that have taken place in methods of wheat production—in the machinery employed,[1] in the type of seed used, in the cultural practices followed. These have certainly brought increased efficiency in the production of wheat. However, concurrent improvements in technology and methods have been introduced in the production of other commodities, both agricultural and industrial. Consequently, it is probable rather than certain that the increased efficiency in wheat production since the World War has contributed materially to the decline of deflated wheat prices.

Possibly other factors have been equally or more important. Labor costs and general processing and distribution costs apparently rose relative to raw-material costs in the interwar period, and industrial taxes probably increased more per unit of product than the taxes borne by agriculture. These developments presumably tended to reduce unit costs of crop production as compared with unit costs of production of manufactured and highly processed goods. However, these changes can scarcely have had much influence on the deflated price of British import wheat shown in Chart 6, since the Sauerbeck index, here used for deflation purposes, is based mainly upon prices of raw materials.

In this connection, it is perhaps pertinent to note the indication in Chart 19 that the interwar period was characterized by a higher level and rising trend of purchasing power of "animals and animal products," one of the more highly processed of the commodity groups included in the Sauerbeck index. The factors responsible for this are not clear; but the recent downward trend of deflated wheat prices shown in Chart 6 is apparently somehow associated with the concurrent rising trend of purchasing power of animal products.

Finally, many of the interwar maladjustments and changes in agriculture and general economic conditions are known to have had a depressing effect on wheat prices; and these may have contributed significantly to decline in the purchasing power of wheat. Expansion of wheat production in Europe ex-Russia after the World War was artificially stimulated after about 1928 by special governmental measures designed to conserve needed foreign exchange, to protect domestic wheat producers against the decline in world wheat prices, and to promote national self-sufficiency. This sharply reduced the European import demand for wheat and put upon the four major exporting countries the burden of contraction of wheat acreage.[2] But the exporting countries, faced with severe economic depression, attempted to aid their own wheat growers by methods which maintained or expanded sown wheat acreage until 1939, and encouraged wheat exports at uneconomic prices. This resulted in an unprecedented piling up of wheat stocks, and perhaps also in a decline of purchasing power of wheat even greater than the stocks position alone would have warranted. World-wide monetary depreciation and other factors associated with the economic maladjustments of the period may also have contributed to the decline in purchasing power of wheat, though it is not clear that these factors affected wheat prices more than other commodity prices over the interwar period as a whole.

For the present study, especially for purposes of considering the current outlook for

[1] Particularly important for wheat have been the changes in construction, cost, and use of tractors and combines.

[2] The increasing world population would have obviated the necessity for acreage contraction if per capita wheat consumption had tended upward, as in the prewar period, or had even remained stable at the average level in 1900–13. But per capita wheat consumption, under the influence of changing dietary habits in some countries and of adverse economic conditions and restrictive governmental measures in other countries, was distinctly lower in the interwar period than in 1900–13, and after about 1928 it declined further (Chart 4, p. 318).

wheat prices, the pertinent points noted in the foregoing discussion may be summarized as follows: (1) the "normal" trend line for deflated British import prices shown in Chart 6 reflects the combined net effect of all price influences except those directly pertaining to the wheat-stocks position, which was ruled out by the method of construction of the trend; (2) over the past half-century or more the "normal" trend of purchasing power of British import wheat has declined, with the decline confined to the last decades of the nineteenth century and to the period since the World War; (3) the two downward secular movements (prior to 1902 and since 1922) appear to have rested at least partly upon different groups of factors; (4) the horizontal trend of 1902–14 is not properly to be regarded as a temporary interruption of a single underlying tendency for the purchasing power of British import wheat to decline, but rather as a conditioned price trend, apparently as normal for its period as the declining tendencies of the late nineteenth century and the recent interwar period; and (5) current knowledge of secular price movements and of commodity price relationships is not sufficiently developed to warrant a forecast of the direction of the trend of purchasing power of British import wheat over the next decade or two.

III. SOME ASPECTS OF THE CURRENT OUTLOOK

Against the historical background afforded by the two preceding sections, the outlook for wheat in the coming decade might profitably have been discussed in some detail if the uncertainties of the present European war had not been injected into the picture. But these uncertainties are so great and have so important a bearing upon the world wheat situation that only a few aspects of the outlook now appear to deserve comment.

Among these, the most fundamental and most certain is the present world wheat-surplus position. The record world crop of 1938 introduced a new period of heavy wheat supplies which bids fair to result in a persistent surplus similar to that of 1928–35. In 1938–39 per capita total wheat supplies were equal to the high average for 1928–35; the following year they established a new record, higher even than that of 1928–29; and in 1940–41 they were maintained at about the peak level of the previous year. The world wheat carryover on August 1, 1941 is certain to be unprecedentedly large. Although it is still too early to forecast the level of wheat supplies in 1941–42, they will be of record or near-record size if the 1941 world crop does not fall short of the preceding moderate harvest by more than 175 million bushels.

Does the current heavy surplus suggest that we must look forward to a long period of chronically burdensome wheat supplies similar to that of 1928–35? Or is it reasonable to expect more or less prompt adjustment of the existing surplus condition through (1) the occurrence of a year or two of notably low yields of wheat per sown acre, or (2) an expansion of wheat consumption such as took place in the first decade of the twentieth century, or (3) a downward adjustment of the world's wheat acreage? It is obvious that material reduction of the existing surplus cannot be brought about by cessation of Russian and Indian exports, since these have recently been very small. This situation is in sharp contrast with that of the World War period. In the five years prior to the World War, aggregate Russian and Indian exports averaged 215 million bushels, and their immediate sharp reduction at the onset of war greatly intensified the wheat shortage in the world ex-Russia ex-India over the World War period. If Russian and Indian exports had been as large during 1934–39 as during 1909–14, their prospective sharp curtailment during the present war could be expected to contribute materially to absorption of the existing world wheat surplus; but since these exports averaged only 36 million bushels annually during 1934–39, their cessation would have little effect on the world wheat position.

What of the prospect for reduced yields per acre? The present wheat surplus is so large that *one* year of notably low yields could only reduce and not eliminate the burdensome surplus. To bring stocks down to about a normal

level by 1943, without a sharp increase in consumption or a further downward adjustment of acreage, at least two successive years of low yields would be required in the immediate future. If the lowest annual yields of the interwar period (those of 1936 and 1937) should be repeated in 1941 and 1942 on a total sown acreage no larger than the reduced average in 1939 and 1940, and if the low yields should be due to adverse conditions in the overseas exporting countries rather than in Europe, the present wheat-surplus problem would temporarily be solved. Such an unusual development might occur; but the historical record furnishes slight basis for any real anticipation of this solution, and reports to date hold the prospect of a reasonably satisfactory yield in 1941.

The fact that the last three years of the World War were characterized by abnormally low average yields of wheat per acre does not afford valid ground for expecting several successive years of low yields if the present European war should be prolonged. The low world yields of 1917–19 mainly reflected unfavorable weather conditions in widely separated areas, and only in much smaller degree such war influences as shortage of fertilizer, labor, and draft power in Europe and elsewhere.[1] Furthermore, the agricultural situation in Europe today differs markedly from that in the World War period. European supplies of fertilizers, particularly nitrogen, are much more adequate now; agricultural production is much better organized in most of the wide German-dominated area; and both the character of the military operations in this war and the extensive German-enforced plans for labor utilization seem to preclude such a shortage of farm labor as would lead to sharply lower yields of grain.

Nor is there now reasonable basis for expecting the existing world wheat surplus to be promptly absorbed through sharp expansion of wheat consumption. The future course of wheat consumption will depend primarily upon the duration and outcome of the present wars in Europe and the Orient, upon the character of the postwar transition period, and upon the kind of peace that is finally established.

As long as the present wars continue, with associated naval blockades, shortage and high cost of ocean-shipping space, difficulties of financing international trade in commodities, and factors operating against extensive expansion of wheat production in the war areas, the average per capita disappearance of wheat in the world ex-Russia ex-India may be expected to remain low, even materially below the four-year average of about 4.70 bushels in 1934–38. Even if the major exporting nations, faced with heavy surpluses and very limited export outlets, should adopt special measures to increase wheat utilization within their own boundaries and should offer large amounts of free wheat to certain importing countries, no marked increase in per capita utilization could be expected. In the exporting countries, wheat utilization seems unlikely to be substantially increased except through diversion of large quantities of wheat to feed—an improbable development, at least as long as the United States and Argentina carry embarrassingly large corn surpluses. Moreover, importing countries cannot materially expand their consumption, even of free wheat, if adequate shipping facilities are not available to carry the grain to their shores. Thus, it seems most reasonable to count upon low per capita wheat consumption at least for the duration of the present European war.

Should the war continue long, without heavy destruction of wheat stocks, and should the wartime crops of the world ex-Russia ex-India be of moderate size (say equal to the 1925–39 average yield per acre on a sown area equal to the estimated low average for 1939 and 1940), the present world wheat surplus would be reduced very slowly—on the average, perhaps, by something like 150 million bushels annually over the next five years. Such a slow reduction would mean the persistence of a chronic wheat surplus, roughly similar to that of 1928–35.

Wheat consumption would probably be somewhat less light and the reduction in wheat stocks somewhat less slow, if the world wheat output (of the size indicated) should

[1] M. K. Bennett, "Wheat and War, 1914–18 and Now," WHEAT STUDIES, November 1939, XVI, pp. 77–81.

be concentrated more heavily in Continental Europe than it has been in previous years. This might result from German-supervised expansion of wheat sowings in Continental Europe, offset by contraction elsewhere; from weather conditions specially favorable to European crops; and/or from heavy Russian exports of wheat. However, Germany's needs for certain other agricultural crops are at present more pressing than her needs for increased supplies of bread grain; European weather conditions are unlikely to be either extremely favorable or extremely unfavorable for more than two years in succession; heavy Russian exports are not reasonably to be expected, though they may occur; and any substantial increase in Europe's wheat supplies would probably go in considerable part to strengthen war reserves.

The return of peace—almost any conceivable form of peace—would promptly result in a higher level of world wheat consumption than seems likely to be witnessed under conditions of continued warfare and naval blockade. But a peace holding no promise for improved international economic and political relations (a peace that would be in fact only an armed truce) might not bring much if any increase in per capita wheat consumption over the 1934–38 average of 4.70 bushels. Under such a peace, the international confidence and co-operation necessary to divert food surpluses promptly to the war-torn deficit areas would be lacking, and governmental efforts would be directed toward conservation of foreign exchange, development of superior military strength, and attainment of national or "bloc" self-sufficiency in food production.

On the other hand, if peace should be established in both Europe and the Orient under conditions making for international confidence and improved international financial and trade relations, much of the wheat and other food surpluses which then existed might be quickly sold, bartered, or given to the destitute populations of the embattled areas and not left to be carried as a burden by the major exporting countries.[1] Not only immediately, but for many years thereafter, such a peace might well be associated with increased per capita wheat consumption in various countries where it has been depressed. Indeed, the following decade might conceivably witness a reversal of the recent downward trend of per capita wheat consumption.

Without notably low yields of wheat per acre or a marked increase in per capita wheat consumption, the existing wheat surplus might still be absorbed promptly as a result of contraction of wheat acreage. From the peak of world sown acreage in 1937 and 1938, there has already been an unprecedented reduction of something over 20 million acres. The contraction came mainly in 1939, primarily under the influence of the American agricultural adjustment program, though there was apparently some further reduction in 1940.

In 1937 and 1938 the world's wheat acreage was undoubtedly overexpanded. At an average (1925–39) yield per acre and without allowance for any Russian or Indian exports, the acreage sown in those years would produce 5.05 bushels per capita for the anticipated average population of 1941–46, as compared with an apparent actual average consumption of 4.75 bushels in 1933–40, and a restricted wartime consumption of something like 4.50 to 4.55 bushels in 1940–41.

In contrast, the reduced average acreage of 1939 and 1940 would produce at an average yield about, or slightly less than, the amount of wheat that might be expected to disappear under existing war conditions in the coming crop year. Thus, the average acreage of 1939 and 1940 was not over-expanded in relation to the prospective level of consumption. Yet that level of acreage, at average yields, would produce too much wheat to allow speedy absorption of the huge surplus stocks already in existence, unless there should be a sharp rise in per capita wheat consumption in the near future. Indeed, assuming average yields per acre on the estimated average sown acreage of 1939 and 1940, and an average per capita consumption of 4.70 bushels, the outlook would

[1] We assume here and also in subsequent discussion of prospective conditions under restored peace that the world's shipping facilities will not be so greatly reduced during the present war as seriously to curtail the international movement of wheat after peace is re-established.

be for the persistence of heavy surplus wheat stocks for at least four more years. The average acreage of 1939 and 1940 may therefore be called excessive in relation to the prospective total supply-demand situation.

For 1941 and 1942, it is perhaps reasonable to anticipate some further reduction of the world's sown acreage, if the present wars are prolonged or if the postwar world assumes the aspects of a semi-war economy. Under such conditions, expansion rather than contraction of wheat acreage would probably take place in Europe; but the four overseas exporting countries, confronted with limited export markets and heavy surplus stocks, could probably be counted on to curtail wheat plantings.

In the United States, the present outlook is for a large wheat crop in 1941, which may well be made subject to marketing quotas. For the following crop, it seems reasonable to expect a reduction in the national wheat acreage allotment from 62 million acres for 1941 to the minimum legal figure of 55 million acres. It is conceivable that the legal minimum allotment might even be lowered by Congress, but at present this is not to be expected.

In Canada, Australia, and Argentina, where most of the wheat plantings have not yet been made for the 1941 harvest, there is good prospect that some reduction in sown acreage will occur this year, as compared with the average for 1939 and 1940. The Canadian government has recently announced that wheat marketings in 1941–42 will be restricted to 230 million bushels, with a bonus of $4.00 per acre to be paid for reduced wheat acreage that is summer-fallowed this spring in the Prairie Provinces, and smaller bonuses for reduced wheat acreage sown to other specified crops. In Australia, the government has arranged for the licensing of wheat farmers, under a plan involving restriction of wheat sowings in 1941 to the average or "normal" areas sown in the last three or four years, and compulsory marketing through the Wheat Board at a basic minimum price of 3*s.* 10*d.* per bushel (f.o.b. ports) for deliveries up to 140 million bushels. Finally, in Argentina, farmers who take advantage of the Grain Board's offer to buy their 1940 wheat at the basic minimum price of 6.75 pesos per 100 kilos (roughly 55 U.S. cents per bushel), f.a.s. Buenos Aires, have to promise not to increase their plantings in 1941, and, if so requested, to reduce their sown acreage up to 10 per cent. So far (April 14) no announcement of required acreage reduction has been made under this provision.

Whether these three countries will take further steps to reduce wheat production in 1942 will presumably depend mainly on the size of their 1941 wheat harvests, on export developments related to continued war or peace, and on possible labor shortage in Canada and Australia, if the war continues well through a third year.

In summary, the unprecedentedly heavy world wheat stocks of 1941 reflect a three-year accumulation of unutilized wheat which now threatens to persist as a chronic burdensome surplus similar to that of 1928–35. Prompt sharp reduction of these stocks might conceivably come as a result of two successive years of abnormally low yields per acre; but this is no more to be expected than two successive years of notably high yields.

Similarly, early disappearance of the existing heavy surplus might be effected through prompt expansion of per capita wheat consumption in the world ex-Russia ex-India; yet as long as the present wars in Europe and the Orient continue, per capita wheat consumption must be expected to fall below the relatively low average for the past five years. Even restoration of peace might bring little increase, if the postwar world should be organized as a semi-war economy, with certain blocs of countries allied economically against other blocs. But a peace promoting international co-operation, reorganization of international financial relationships, and increased world trade would probably be associated with a marked expansion of wheat consumption.

It is still too early to tell what form of peace and what type of world economy will come out of the present conflicts. Consequently, it now seems more reasonable to stress the possibility of elimination of the current heavy wheat surplus through contraction of wheat acreage in the four major exporting countries. Between the periods 1937–

38 and 1939–40 the total sown wheat area in these countries was reduced by almost 20 million acres.[1] Presumably there will be some further reduction for the 1941 crop (mainly in Canada) and an added decline (chiefly in the United States) in 1942. But at average yields, and with per capita world wheat consumption not exceeding 4.70 bushels, reductions in acreage larger than are now in fair prospect for 1941 and 1942 would be required to bring year-end world stocks down to a normal level by 1943.

These four countries have recently moved in the direction of increased governmental control over agriculture; and such control seems likely to be maintained and even extended under continued war conditions and in at least the early stages of any peace economy. Moreover, governmental control may be applied not only to production adjustment aimed at wheat-surplus prevention but also to special schemes to promote wheat-surplus disposal. Governmental trade agreements involving the sale or barter of available wheat surpluses, governmental gifts of commodity surpluses to destitute peoples in other nations, and governmental subsidization of domestic programs calling for diversion of wheat surpluses to feed or other nonfood channels may be part of the world picture over the next few years.

Uncertain as is the present outlook for world wheat supplies, the outlook for wheat prices is still more uncertain. Even if burdensome surplus stocks should persist for many years, the purchasing power of wheat in the principal exporting countries might or might not reflect this condition as it did in 1892–96 and 1930–35. What the future may bring in governmental price controls or abandonment of such controls as already exist cannot now be foreseen; there is no good basis for anticipating the direction of the *trend* of purchasing power of wheat over the next decade or two (p. 333); and there is no certainty even as to the future course of commodity prices in general, though recent developments encourage the guess that commodity price indexes are more likely to rise than to decline over the next few years. These uncertainties and many others, scarcely worth enumerating, suggest that any attempt to appraise briefly the outlook for wheat prices under varying hypotheses as to war and peace would be without material value to the present study.

PART TWO

IV. ANNUAL WHEAT DEVELOPMENTS, 1900–09

On January 1, 1900, wheat traders "taking stock" of the world situation probably saw little in the future to foster either extreme optimism or extreme pessimism. Current wheat supplies were clearly excessive, though less strikingly so than in 1892–95, and the purchasing power of wheat was fairly low. However, most traders still vividly recalled the world scarcity of wheat in 1897–98, which had forced British prices above $1.40 per bushel within three years after a depressing surplus had been associated with prices below 65 cents. Future price developments thus depended almost wholly upon the outturn of the coming wheat crop, not then far enough advanced to be predictable. With a crop failure in 1900 as bad as that of 1897, the excessive current stocks would later prove inadequate; whereas a 1900 crop equal to either of the two crops immediately preceding might again raise the specter of persistent, burdensome surplus that had haunted world wheat markets in the mid-'nineties.

The Crop Year 1900–01

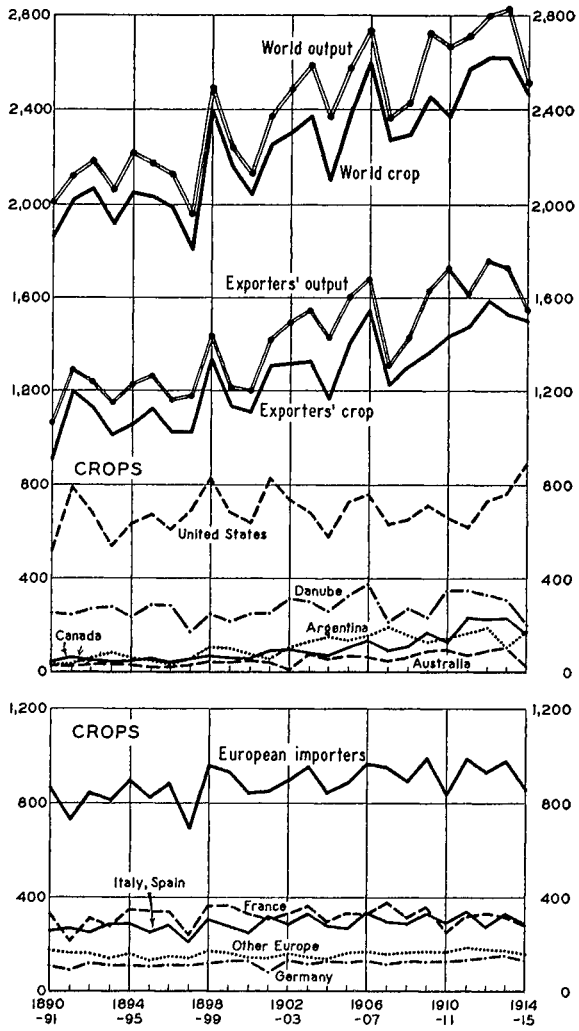
The wheat supply position.—Actually, the 1900 wheat crop in the world ex-Russia ex-India turned out to be somewhat below normal (Chart 9). But combined with the heavy carryover of old-crop wheat and with relatively small exports from Russia and India, it brought total wheat supplies to almost

[1] This was in spite of a small increase in Canada.

2,625 million bushels—practically 275 million bushels above the supplies of 1897–98, though over 100 million below the high records of 1898–99 and 1899–1900 (Chart 12, p. 343). More important, the total supplies of 1900–01 were fairly small in per capita terms, substantially exceeding only the supplies of 1897–98 in the preceding decade.

CHART 9.—PRINCIPAL WHEAT CROPS AND WHEAT OUTPUT IN THE WORLD EX-RUSSIA EX-INDIA, 1890–1915*

(Million bushels)



* Data from Tables I and IX.

In all principal producing areas except Australia and the Danube basin, domestic wheat supplies (including carryovers) were smaller in 1900–01 than in either of the two preceding years of substantial surplus. This widespread reduction reflected both curtailed wheat plantings and unfavorable growing weather. Only a few countries—Australia, Germany, the Scandinavian countries, Algeria and Japan—were favored with bumper crops, resulting wholly or in part from high yields per acre. Elsewhere yields were mostly average or below.

Among the larger producers, the United States suffered the greatest reduction in yield. The national average yield per harvested acre was one of the lowest in several decades, mainly as a result of severe spring and summer drought in the Northwest and heavy infestation of Hessian fly and some late frosts in the principal soft winter-wheat states. The *planted* acreage, though still relatively large, was probably somewhat smaller than in the preceding year of higher prices; and abandonment of sown acreage, particularly of spring-sown acreage, must have been fairly heavy. Despite the low average yield per acre and the reduction in harvested acreage from its peak in 1898 and 1899, the United States wheat crop of 1900 was a fairly good one, and perhaps somewhat larger than our production figures indicate.[1] Since the inward carryover was of near-record size, aggregate wheat supplies in this country were therefore fairly large. This important fact was not recognized in the early part of 1900–01.

Outside the world ex-Russia ex-India, wheat sowings were significantly expanded in Russia, but substantially contracted in India, where drought prevailed during the fall and winter. The harvested acreage in India was the smallest in many years, smaller even than in the famine year 1896–97, when fall sowings had been similarly curtailed by persistent serious drought. In Russia unfavorable weather operated not to reduce sowings but to lower yields per acre. The resulting wheat harvests of India and Russia were moderate to fairly small, and the combined net exports

[1] For some pertinent information on the crop series here used, see footnote 1, p. 321. Working has expressed the belief that his production estimates for 1898, 1899, and 1900 are too low and those for 1896 and 1901 are too high (Holbrook Working, "Disposition of American Wheat since 1896, with Special Reference to Changes in Year-End Stocks," WHEAT STUDIES, February 1928, IV, 161–62).

from these countries in 1900–01 were smaller than in any of the 15 preceding years except 1899–1900.

Rye and feed-grain crops. — Grain crops other than wheat were fair to good in 1900. Oats and corn were relatively abundant, while supplies of rye and barley were moderate or somewhat smaller. In European rye-consuming countries, relatively high rye prices may have encouraged some slight increase in wheat consumption; but wheat probably did not sell low enough in relation to rye to warrant much substitution in bakeries, and the high rye prices may have been reflected chiefly in reduced feeding of rye to animals. In spite of the moderate shortage of rye and barley, no material scarcity of feed grains was felt in 1900–01; and wheat of millable quality was fed sparingly, if at all. The only real tightness that appeared in the feed-grain situation developed in the late spring and summer, when oats and corn prices advanced relative to wheat prices, mainly in reflection of the rather unfavorable outlook for the growing feed crops of 1901 in both Europe and America.

International trade.—The volume of international trade in wheat and flour in 1900–01 was somewhat larger than in any preceding year (Chart 14, p. 348). More striking than the total volume of trade, however, were the huge exports of the United States. Drawn from fairly large domestic supplies, these exports established a new high record in August–July, a record not broken until 1914–15. Such large American exports were quite unexpected, not only because of the current low estimates of the domestic crop, but also because these were supported by relatively small North American shipments during August–November—usually the period of seasonally heavy exports. Indeed, in 1900–01 the normal seasonal flow of wheat from this continent was practically reversed (Chart 10). August–November shipments were not only smaller than those in the following April–July, but smaller also than the midwinter shipments of December–March. No such striking reversal of seasonal movement had been witnessed in the preceding decade;[1] nor was it repeated prior to the World War.

The large American exports were important not only for the world wheat situation but also for the general economic position of the United States. In the spring of 1900, economic prosperity seemed to be yielding to recession in both Europe and America. During the summer and fall, harvests of various crops showed relatively large outturns in the United States and some substantial deficits in Europe. American grain, cotton, meat, and other agricultural products moved to export in large quantities,[2] benefiting American railroads, processors, exporters, and other handlers, as well as farmers. Partly as a result of these developments, economic recession was abruptly terminated in the United States late in 1900; and general prosperity prevailed here throughout the two following years when economic depression was deepening in most European countries (Chart 18, p. 378).[3]

Australian wheat exports, like those of the United States, were unprecedentedly large. In contrast, Indian and Russian exports were small, and exports from Argentina and the Danube basin were of moderate[4] size. From all areas except North America the shipments were seasonally distributed about as usual; but in reflection of the relatively heavy winter and spring movement from the United States, world shipments were concentrated in unusual degree in the later months of the crop year (Chart 10).

Importing countries, both European and non-European, took large quantities of foreign wheat in 1900–01. Non-European imports were of record or near-record size, with small increases recorded for a large number of countries. European net imports fell below the levels of 1891–92, 1894–95, and perhaps 1897–98, but in no other earlier year had they been

[1] See Farnsworth, "Decline and Recovery of Wheat Prices in the 'Nineties," pp. 315, 331.

[2] The total value of agricultural exports from the United States in July–June 1900–01 was $951,628,331—a new high record. Of this total, wheat accounted for $96,771,743, corn for $82,527,983, animals and animal products for $256,416,722, and cotton for $315,105,047.

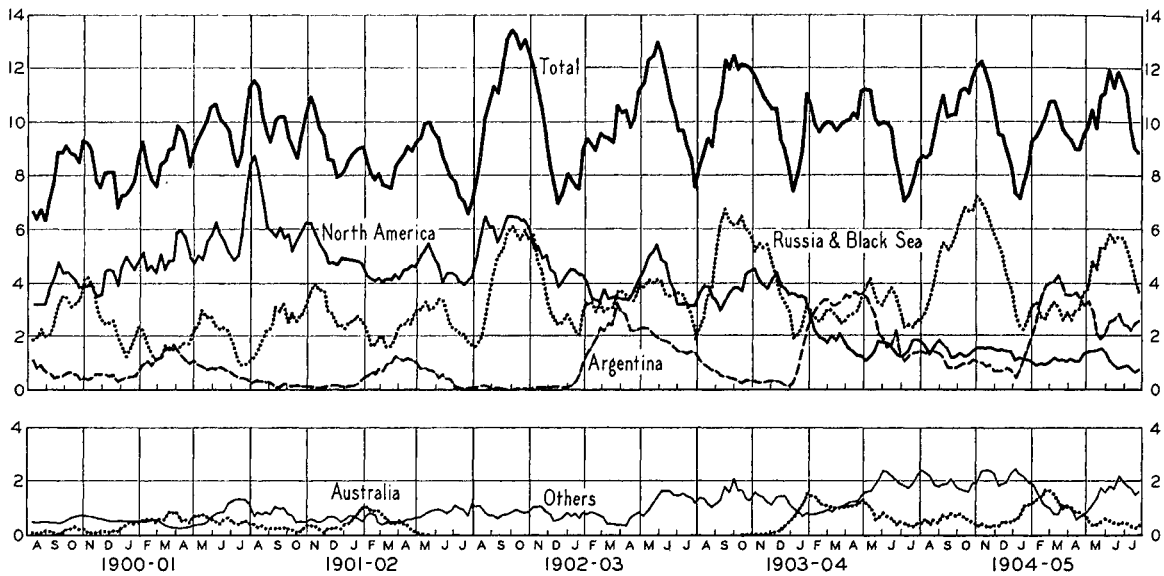
[3] Cf. also W. L. Thorp, *Business Annals* (Publications of the National Bureau of Economic Research 8, New York, 1926).

[4] Throughout this study, we use the term "moderate" to mean not far from normal size, trend considered.

larger. Italian takings were practically of record size; British imports had been exceeded only in 1894–95; and German imports, though thrice surpassed in earlier years, were substantially smaller only than in 1891–92. The large Italian and British imports no more than compensated for reduced domestic wheat supplies, but Germany's sizable takings permitted a small increase in wheat consumption real. There is good reason to suppose that more flour was consumed in the United States in 1900–01 than in 1899–1900, in reflection of an increased population; and although flour stocks may have been drawn down and wheat feeding may have been slightly reduced, any decline in the total domestic use of wheat must have been extremely small. Statistical wheat disappearance in this country was al-

CHART 10.—WORLD SHIPMENTS OF WHEAT AND FLOUR, BY SOURCES, FROM AUGUST 1900 TO JULY 1905*

(Million bushels; 3-week moving average)



* Based on Broomhall's weekly shipment data, summarized by crop years in Table VII.

and also some addition to year-end stocks. In contrast, France, with a moderately small crop that was considerably underestimated early in the crop year, reported next to the smallest imports in more than two decades—only 8 million bushels. These small imports presumably reflected reduction of heavy (though unreported) stocks built up during the two preceding crop years.

Disappearance and carryovers.—Our present estimates of crops, trade, and stocks for 1900–01 suggest an abnormally low level of world wheat disappearance in that year and an appreciable reduction from 1899–1900 (Chart 4, p. 318). The reduction, mainly attributable to an indicated decline of 30 million bushels in wheat disappearance ex-seed in the United States, is perhaps more statistical than ready low in 1899–1900; and even without any further reduction in 1900–01, the disappearance of that year, too, would be low. For both years our figures probably understate the wheat production of the United States[1] and similarly understate the consumption, with the understatement greater for 1900–01 than for 1899–1900.

In several other countries wheat disappearance fell or remained below its line of trend in 1900–01; and in a few there was a further slight reduction from 1899–1900. The Danube countries and Spain had small crops in both years, and these were associated with below-normal consumption. Moreover, in northwestern Europe, feeding of wheat was abnor-

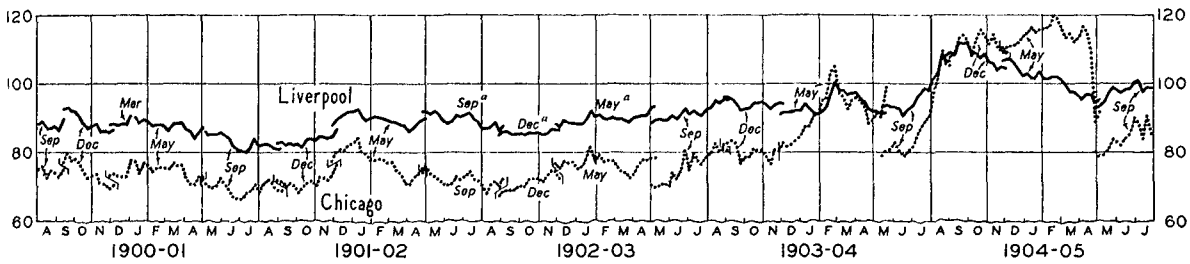
[1] See footnote 1, p. 338.

mally light in 1900–01 (as it had been also in 1899–1900), tending to keep total wheat consumption low in that region.

Despite the low level of world wheat disappearance in 1900–01, the disappearance was substantially higher than the total wheat output of that year. Stocks of old-crop wheat were therefore materially reduced. Whereas at the beginning of 1900–01 the world carryover had been about as heavy as at the height of the wheat depression in the mid-'nineties, by the end of the crop year it was reduced to moderate proportions both in total and in individual countries (Chart 7, p. 329, and Table VI).

CHART 11.—WEEKLY PRICES OF WHEAT FUTURES AT LIVERPOOL AND CHICAGO, AUGUST 1900 TO JULY 1905*

(*U.S. cents per bushel*)



* Closing prices at Chicago on one day a week, usually Friday, from Holbrook Working, "Prices of Cash Wheat and Futures at Chicago since 1883," WHEAT STUDIES, November 1934, XI, 107–09; closing prices at Liverpool for corresponding dates, as reported in Broomhall's *Corn Trade News*, converted to U.S. cents at the par of exchange.

[a] Price inclusive of the required duty of 3*d.* per cwt. (3.3 cents per bushel).

The reduction in stocks was heaviest in the United States, but substantial also in importing Europe—mainly in France, Italy, and Spain. Of the principal consuming countries, only Germany appears to have held a larger carryover at the end than at the beginning of 1900–01. There and in France, year-end stocks were moderately large in 1901; but in practically all other countries they were about of average size or somewhat lower. Afloat stocks, however, stood at a new record-high level for August 1, in reflection of heavy June–July shipments to European countries, faced with rapid decline of spot supplies and fair to poor prospects for their growing crops.

Level and course of prices.—Wheat prices in 1900–01 were notably stable at a level slightly higher than in 1899–1900, a level that seems to have reflected fairly well the tightened wheat supply position and the slight change in commodity prices in general. The maximum range of daily closing prices of wheat futures during the crop year was exceptionally small, roughly only 15 cents per bushel at Liverpool and 16 cents at Chicago.

In the principal futures markets, the highest prices of the crop year were recorded in September (Chart 11); yet these were slightly below peaks established a few months earlier in response to sensational reports of crop damage in North America at the same time that the Boxer movement in China finally provoked the intervention of outside powers.[1] The speculative June peak had been followed, as is usual in such instances, by price reaction; and by the end of July the markets had lost about half of the earlier gain of roughly 10 to 15 cents per bushel. There was some further slight weakening of prices in August; but in September the markets firmed again, partly in reflection of unwanted rains in the North American spring-wheat area and reduced estimates of several western European crops. Broomhall ascribed at least part of the current strength to general bullish sentiment, commenting on September 18: "It is not so much the statistical position which is inspiring confidence as much as [*sic*] the feeling throughout all commercial circles that the

[1] Although historically important, the Boxer uprising and the associated intervention of various nations had but slight effect on wheat-futures prices at Liverpool and Chicago. Nor was the Boer War, which continued throughout 1900–01 and well into the following crop year, a significant market influence during these two years.

days of ruinous cheapness are gone for good."[1] That this "feeling" contributed materially to the moderate and temporary price recovery of September 1900 may be doubted, but it unquestionably furnished significant support to the general level of wheat prices during 1900–01 and subsequent years.

The small price rise in September attracted increased shipments of wheat from both southeastern Europe and North America. These enlarged shipments, increased marketings of European and American wheats, and improved weather conditions in the North American spring-wheat belt so weakened market confidence that wheat prices drifted downward with but slight interruption during October–November. British port stocks, moderately large in September, rose in October–November to the highest levels since 1895; and despite the reported small American crop, North American visible supplies continued to stand higher than in the same months of any preceding year except 1894–95 (Chart 13, p. 346). In Europe "Declining freights . . . . likewise added to the feeling of depression which the accumulation of large stocks originated."[2]

But the picture was not without its bright points, especially after late November. Russian and Danubian shipments then fell off sharply and the European demand, well sustained, was diverted mainly to North American export markets. American traders were encouraged not only by the increased export buying but by reduced domestic marketings. The American visible showed a smaller increase than usual during October–November, and thereafter declined instead of increasing as usual up to early January. Encouraging, too, was the accumulation of evidence that the new Argentine crop was substantially smaller than the two preceding bumper harvests; and the indicated increase in Australia was not large enough to offset the reduction in Argentina.

Such influences held wheat futures prices firm during December–March, in the face of a more or less disappointing European import demand, persistent large visible supplies, and an unusually favorable winter outlook for the growing wheat crops.[3] But when crop reports continued optimistic (particularly for the United States but also for most European countries except Germany and later France), discouraged traders liquidated large holdings, forcing prices downward in April and again in June. From the lowest point reached by futures prices in early July there was but slight recovery before the end of the crop year. The crop outlook in North America continued so promising that traders remained unexcited by reports of less favorable prospects in France and several other importing countries, by rapid disappearance of current wheat supplies, and by reports of serious damage to important feed crops in both Europe and America.

The Crop Year 1901–02

Wheat supplies.—The early excellent promise for the two major North American crops was brilliantly fulfilled. The United States harvest, now estimated at 829 million bushels, had been exceeded only once before (in 1898) and was not exceeded again until 1914.[4] Canada's crop was also a bumper, 22 million bushels larger than the previous record. In contrast, the aggregate wheat crops in importing Europe and the Danube basin were mediocre; Argentina obtained a relatively poor harvest; and Australia's crop was only of fair size, smaller than any of the three preceding ones (Chart 9, p. 338).

In short, among the principal producing areas, only Canada and the United States secured abundant wheat harvests in 1901. But with these two countries so favored, and crops elsewhere in the world ex-Russia ex-India about the same as in 1900, world production was over 200 million bushels larger than in the preceding year, almost 100 million larger

[1] Broomhall's *Corn Trade News*, Sept. 18, 1900, p. 772.

[2] *Ibid.*, Oct. 23, 1900, p. 1,116.

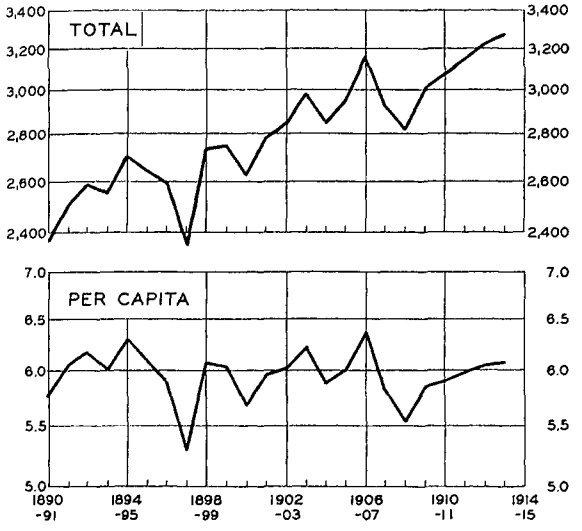
[3] On March 5, 1901, Broomhall commented on the "distinctly favourable prospects for the new crop," noting that "throughout the world, compared with former years, there are far fewer complaints" (*ibid.*, Mar. 5, 1901, p. 610).

[4] As in earlier years, the United States harvest was greatly underestimated by the government; but private estimates were more reliable, ranging around 750 million bushels as compared with Working's published estimate of 829 million.

than in 1899, and substantially exceeded only by the huge outturn of 1898. A moderate carryover of old-crop wheat and rather small Russian and Indian exports brought the total quantity of wheat available to a record high level, comparable only with the supplies of 1898–99 and 1899–1900 (Chart 12).[1]

CHART 12.—WORLD WHEAT SUPPLIES (INCLUDING INITIAL CARRYOVERS), TOTAL AND PER CAPITA, 1890–1914*

(Million bushels; bushels per capita; logarithmic vertical scale)



* Total world wheat supplies include the wheat production in the world ex-Russia ex-India, plus August–July net exports from Russia and India, plus world initial wheat stocks (exclusive of surplus stocks in Russia). The basic data for 1895–1909 are given in Tables I, VI, and IX.

Other grain crops.—One of the most striking features of the crop year 1901–02 was the feed-supply position. In the United States, corn made an extremely poor harvest, reaching only 1,716 million bushels as against a normal output of roughly 2,500 million; and the oats crop also was distinctly below average. On western European markets the feed position was tight, not only because small corn exports from the United States were not fully offset by increased exports from Argentina, the Danube countries, and Russia, but also because oats yielded poorly in northwestern Europe and the outturn of rye was below normal.

International trade.—The broad outlines of the international wheat position of 1901–02 were well foreseen at the beginning of the crop year. Broomhall's early high forecasts of total exports and European imports proved more nearly correct than his corresponding forecasts for any other year of the two prewar decades except 1895–96 and 1898–99. Moreover, most students of the wheat market correctly predicted that unusually large quantities of wheat would be used for feed in both Europe and America—a factor which influenced both the volume and distribution of world trade.

Although world net exports were unprecedentedly large in 1901–02, they exceeded only slightly the previous record exports of 1900–01 (Chart 14, p. 348). In Europe, net imports reached a new high total; but only Germany's imports were far above previous years, in reflection of a serious crop deficiency recognized several months before harvest. Non-European takings were also large, though only slightly heavier than in 1900–01 and perhaps a trifle smaller than in 1896–97.[2]

From her record wheat supplies, the United States in July–June shipped record exports, over 10 million bushels larger than in 1891–92 and almost 20 million larger than in 1900–01; but in the European crop year August–July, United States exports were slightly smaller than at their peak in 1900–01 (Chart 14, p. 348). Among other important exporting countries, only Canada shipped an exceptionally large amount, her exports exceeding 30 million bushels for the first time. Shipments from other countries were moderate to small. Russian and Indian exports were not quite so small as in 1900–01, Australian and Danubian exports a little smaller, and Argentine exports materially smaller and appreciably below trend.

Consumption and carryovers.—World wheat disappearance in 1901–02 was larger than ever before. *Per capita* disappearance,

[1] If, as we believe, the United States crop of 1901 is somewhat overestimated and the 1899 crop materially underestimated, the total wheat supplies of 1901–02 may actually have been smaller than those of 1899–1900.

[2] Broomhall's reported shipments to non-Europe show an increase of 12 million bushels to a new high peak; but incomplete import data for a large number of non-European countries suggest that the actual increase over 1900–01 was small.

too, was strikingly heavy, though probably not quite so heavy as is indicated by Chart 4, (p. 318), which apparently somewhat overstates the actual wheat utilization in the United States, particularly as compared with the three preceding years.[1]

In 1901–02, as in 1894–95, a tight feed position played an important part in the expansion of wheat consumption. This was most evident in the United States, where some 40 to 60 million bushels of wheat were believed to have been diverted to feed use,[2] but wheat feeding was apparently unusually heavy also in Canada and northwestern Europe. Human consumption of wheat presumably expanded significantly in the Mediterranean region (especially Spain) as a result of large domestic wheat crops; but in the Danube basin wheat disappearance was again below "normal," with continued light consumption in Hungary fully offsetting small increases in Rumania and Bulgaria, where wheat was of poor quality and corn was dear.

For the third successive year, world wheat disappearance exceeded the current wheat output. Year-end stocks were substantially reduced; and in August 1902 they were presumably smaller both in total and per capita than in any year of the preceding decade except 1898 (Chart 6, p. 328). Throughout Europe, carryovers were relatively low except in Spain, Italy, and Rumania; and among the overseas exporting countries only the United States and Canada carried good stocks of old-crop wheat.

Prices.—In 1901–02, as in the preceding crop year, wheat prices remained relatively stable at an intermediate level (Chart 1, p. 315). British import prices averaged slightly lower than in 1900–01,[3] Chicago basic cash prices a trifle higher; but more striking was the general sameness in level of prices in these two years of appreciably different wheat supplies. The larger per capita supplies of 1901–02 would presumably have been reflected in lower prices if the normal consumptive demand for wheat had not been swelled by extraordinarily heavy use of wheat for feed. But in view of the expanded demand, it is surprising not that British import prices were as high as they were in 1901–02 but that they did not average higher (Chart 7, p. 329).[4] Probably monetary factors, associated with the current business depression in many European countries, exerted a significant influence.

The course of prices during 1901–02 was characterized by four major phases: (1) general price stability, with a slight tendency toward weakness, from August to mid-October, (2) a minor advance amounting to less than 10 cents per bushel between mid-October and early January, (3) a price decline, smaller than the preceding advance, from January to the end of March, and (4) a fairly horizontal course thereafter.

During August–October, bullish features in the form of a heavy Continental import demand, strength in corn prices, and increasing evidence of farm feeding of wheat apparently about offset the bearish market influence of

[1] The increase in wheat disappearance ex-seed in the United States between 1900–01 and 1901–02 is indicated by our figures to be 130 million bushels, but this is a greater increase than could possibly have occurred. Even if 25 to 40 million bushels more wheat were fed in 1901–02 and if flour stocks were built up by something like a million barrels (say 5 million bushels in terms of wheat) and if 8 to 10 million bushels more were required for food consumption of the larger population of 1901–02, the actual increase in the total domestic use of wheat would not have exceeded 55 million bushels. The much larger increase indicated by our figures presumably mainly reflects: (1) a fairly large understatement of the 1900 crop, and (2) a smaller overstatement of the 1901 crop. It is possible, too, that our estimate of United States stocks as of July 1, 1901 is too large and/or the carryover estimate for 1902 is too small; but as tested by the relationship of United States stocks to price spreads between the May and July and the July and September wheat futures at Chicago, the stocks estimates for 1901 and 1902 appear fairly reasonable, with some indication that the 1902 estimate may be a little too low. See Holbrook Working, "Price Relations between May and New-Crop Wheat Futures at Chicago since 1885," WHEAT STUDIES, February 1934, X, Charts 2 and 3, pp. 190–91.

[2] *Daily Trade Bulletin*, July 17, 1902, p. 3, and *Corn Trade News*, Aug. 12, 1902, p. 446.

[3] This was partly due to the fact that in 1900–01 import prices were relatively higher than usual in relation to prices of Liverpool futures and of "good red" wheat sold in Liverpool.

[4] However, it is possible that we have overestimated the consumption of wheat in Europe in 1901–02 and underestimated the year-end stocks. If so, there may have been less reduction in the world carryover than is indicated, and the slight change in British import prices from 1900–01 to 1901–02 may be explained mainly on the basis of the wheat-commodity position.

enlarged wheat supplies. The distribution of the available exportable supplies was also a supporting factor: Southern Hemisphere countries had kept relatively little old-crop wheat for export during August–December; wheat supplies in the Danube basin and Russia were believed to be moderately small (an opinion strengthened by fairly light current shipments from the Black Sea); and the only exporters with abundant immediate supplies were the two strong holding countries in North America.

The upward movement of prices from mid-October to early January reflected an apparent tightening of the international wheat position which later proved partly illusory. On the supply side, drought, resulting in reduced crop estimates for Argentina and India, received some attention. But stress was laid primarily on the heavy disappearance of wheat in European countries, where recent large imports had not resulted in big increases in visible stocks. In wheat markets influenced by accumulated evidence that American farmers were feeding wheat more heavily than anticipated,[1] these facts seemed to imply that Europeans also were diverting exceptional quantities of wheat to feed. But after about mid-December, the European import demand abruptly subsided. At first this could be interpreted as the normally slow trade of the holiday season; but with virtually no improvement of the demand in the first two weeks of January, traders became convinced that the earlier heavy shipments had gone in considerable measure to build up invisible reserves. This view was strengthened as days and weeks passed without marked recovery in import buying; and it was broadly reflected in the downward drift of prices through March.

After early April, wheat futures prices were relatively firm under the joint influence of rapidly declining visible supplies and an uncertain outlook for the new world wheat crop. Between February 1 and April 1, the reduction in world visible supplies had been large but by no means unprecedented (Chart 13). After April 1, however, the decline in visibles up to July 1—roughly 26 million bushels monthly—was quite without precedent; and by August 1 these supplies had fallen to 94 million bushels, a level not far above the lows recorded for August 1897 and 1898.

During the same months, and especially prior to July, there was considerable concern over the relatively low official figures on the condition of the United States winter-wheat crop, and over the backwardness of crops in Europe. But the American spring-wheat crop continued to develop favorably, and in Europe, the outlook was improved by better weather in July. The last weeks of the crop year witnessed some decline in prices; but the decline was slight, being held in check by the light stocks of wheat in Europe and on ocean passage to Europe and by the somewhat small supplies remaining in exporting countries.

Throughout 1901–02, Chicago wheat futures prices stood 10 cents or more per bushel under corresponding futures at Liverpool, a spread that permitted free exportation. Canadian prices too were on a free shipping basis; but old-crop Argentine wheat was not quoted at Liverpool after September, and new-crop Argentine wheat sold on a competitive basis with other wheats only for a few months following the 1901 harvest.

At Liverpool, near futures generally commanded premiums over distant futures after March in reflection of light spot supplies. But Liverpool price spreads were complicated by the imposition of a revenue duty of 3*d.* per hundredweight (3.3 cents per bushel) on British wheat imports, effective April 15;[2] May and July futures contracts thereafter continued to be quoted duty unpaid, whereas the September future opened and was always quoted on a duty-paid basis.

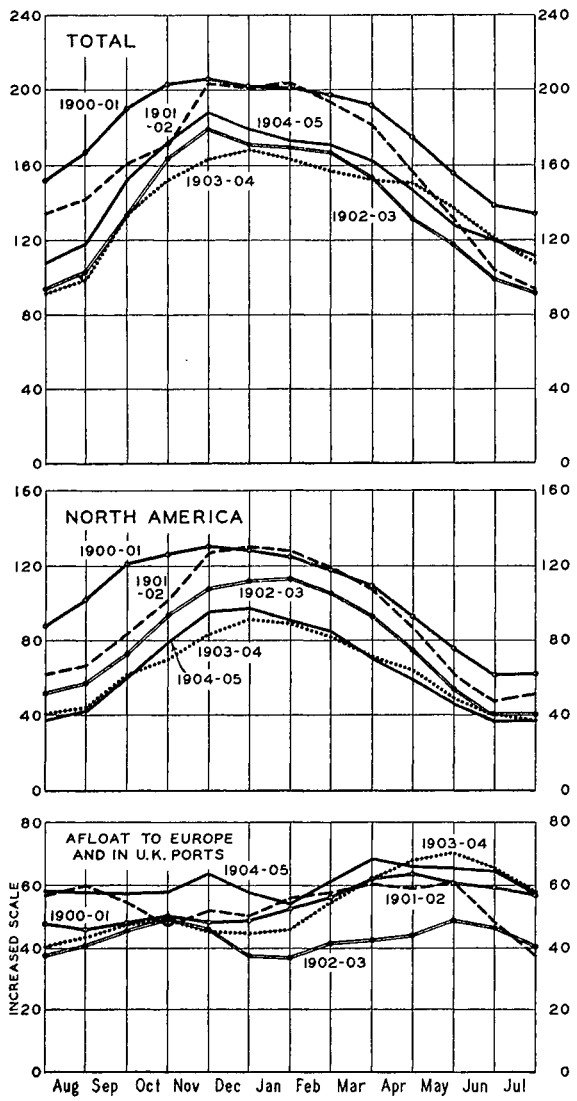
[1] On Sept. 17, 1901, Broomhall forecast feed use of wheat in the United States in 1901–02 at 10–20 million bushels. On Nov. 12, his journal reported (p. 1310) that an "unfinished investigation" by the *Modern Miller* suggested that the quantity of wheat likely to be fed in the American corn belt would probably exceed 50 million bushels. At that time Broomhall commented: "This figure of 50,000,000 is what has been in most people's minds for some time."

[2] From 1869 until 1932 wheat imports were admitted duty-free into the United Kingdom except during the short period from April 15, 1901, to July 1, 1902. For a brief discussion of the history of British wheat policy, see A. F. Wyman and J. S. Davis, "Britain's New Wheat Policy in Perspective," WHEAT STUDIES, July 1933, IX, 307–12.

At Chicago the May–July spread was slightly positive from early February to mid-May; the July–September spread negative through July. The latter but not the former spread well reflected the July 1 stocks position as we now appraise it. In July, tightness developed in cash wheat at Chicago, and distant futures fell to larger discounts under nearer futures. Stocks of contract wheat in Chicago elevators had been reduced as of July 1 to the lowest level since 1898, and current wheat receipts were grading too low for delivery on contracts. This situation encouraged J. Ogden Armour to accumulate September wheat, apparently in an effort to "run a corner" in that future.[1]

CHART 13.—VISIBLE WHEAT SUPPLIES, IN TOTAL AND IN CERTAIN POSITIONS, MONTHLY, CROP YEARS 1900–01 TO 1904–05*

(Million bushels)



* Data from Broomhall's *Corn Trade News*.

THE CROP YEAR 1902–03

Wheat supplies.—The wheat supply position of 1902–03 was much like that of 1901–02. The new world crop ex-Russia ex-India was slightly larger, and aggregate Russian and Indian exports were considerably heavier; but these increases were mainly offset by a reduction in the carryover of old-crop wheat. Consequently, per capita wheat supplies were again moderate, about the same as in 1901–02.

In distribution, however, there were significant differences between the supplies of 1901–02 and 1902–03. The world crop of 1902 was more evenly distributed than the preceding one. It was of good size, not because of exceptional outturns in a few countries, but as a result of moderate to large harvests in practically all areas except Australia[2] (Chart 9, p. 338). In importing Europe, Germany obtained a record crop and most other countries secured above-average outturns; Canada surpassed her record production of 1901; Argentina almost equaled her 1898 record; and the Danube exporters reported an unprecedentedly large aggregate harvest. Russia, too, secured a record outturn; and although India's 1902 crop was mediocre, her harvest in March–April 1903 was of near-record size.

The United States secured a sizable crop, but one substantially below the bumper harvest of 1901. Sown on a somewhat reduced acreage,[3] the new winter-wheat crop suffered

[1] C. H. Taylor, *History of the Board of Trade of the City of Chicago* (Chicago, 1917), II, 1043, 1045.

[2] Severe and prolonged drought cut the Australian yield per acre to 2.4 bushels, the lowest ever reported.

[3] Official wheat acreage and production statistics for years prior to 1909 do not differentiate between spring and winter wheat, nor do they give information on acreage *sown*. The available data on harvested acreage indicate that in 1902 reductions were largest as compared with 1898–1901 in Tennessee, Kentucky, Ohio, Michigan, Minnesota, Iowa, South Dakota, North Dakota, and California. In most of these states, heavy abandonment of winter-wheat acreage accounted for a major part of the reduction, but there was apparently also some intentional curtailment of sowings on land that could be used for competing crops.

in the East from a poor start and alternate freezing and thawing and in the West (including the Pacific Coast) from persistent drought. Abandonment of acreage to May 1 was therefore heavy, roughly 15 per cent. In the spring-wheat territory, late rains apparently prevented some planned sowings of wheat, but intentional substitution of feed grains and flaxseed (for which prices were more satisfactory) was probably mainly responsible for the indicated sharp reduction in spring-wheat plantings. The total harvested wheat acreage was the smallest in six years.

Since the wheat carryovers of most countries were small in the summer of 1902, they did not significantly alter the broad distribution of supplies indicated by the 1902 harvest. Total domestic supplies were unpredecentedly large in Canada and the Danube basin, fairly large in Argentina and the United States, moderate in importing Europe, and notably small only in Australia.

Quality factors assumed greater importance than usual in 1902–03. In the United States, excessive rains in June–July materially lowered the grading of the winter-wheat crop, though the milling quality apparently did not suffer significantly.[1] In northwestern Europe, too, rainy weather in the late ripening and harvesting periods did considerable damage. Complaints of irregular quality and of unusually large amounts of rain-damaged wheat came not only from Britain, Belgium, Netherlands, and Scandinavia, but also from France and Germany.

Other grain crops.—If low-quality wheat had not been freely available during 1902–03, extensive feeding of wheat would probably have been confined to the first quarter or third of the season when corn was still scarce and dear; and the total quantity of wheat fed would have been moderate rather than large. In both Europe and America, supplies of rye, barley, and oats were abundant; and though the European corn crop was short, the United States crop was a bumper. On most markets feed grain prices remained fairly high relative to wheat prices in the early months of the season, mainly in reflection of the tight position in old-crop corn. But after the American corn harvest, feed-grain prices were relatively weak, despite only moderate exports from the United States.

International trade.—In view of the increased bread-grain crops in importing Europe, it seemed reasonable at the beginning of 1902–03 to anticipate a somewhat smaller volume of international trade in wheat than had been reported in 1901–02. Actually, however, world net exports reached a new high level, with a considerable expansion of shipments to Europe and a small increase in non-European imports (Chart 14).

Every European importing country took more foreign wheat than Broomhall's early trade forecast implied. Various factors were responsible. Probably most important was the added need for import wheat to replace the substantial quantity of low-quality domestic grain that was diverted to feed use in western and central Europe. Scarcely less significant, perhaps, was expansion of wheat consumption for food in Germany and several other importing countries, where high potato prices and general business revival may have combined to stimulate the consumption of wheat. Finally, there seems to have been a general tendency among importing countries to restore year-end wheat stocks to higher, more normal levels than those at the end of the preceding crop year.

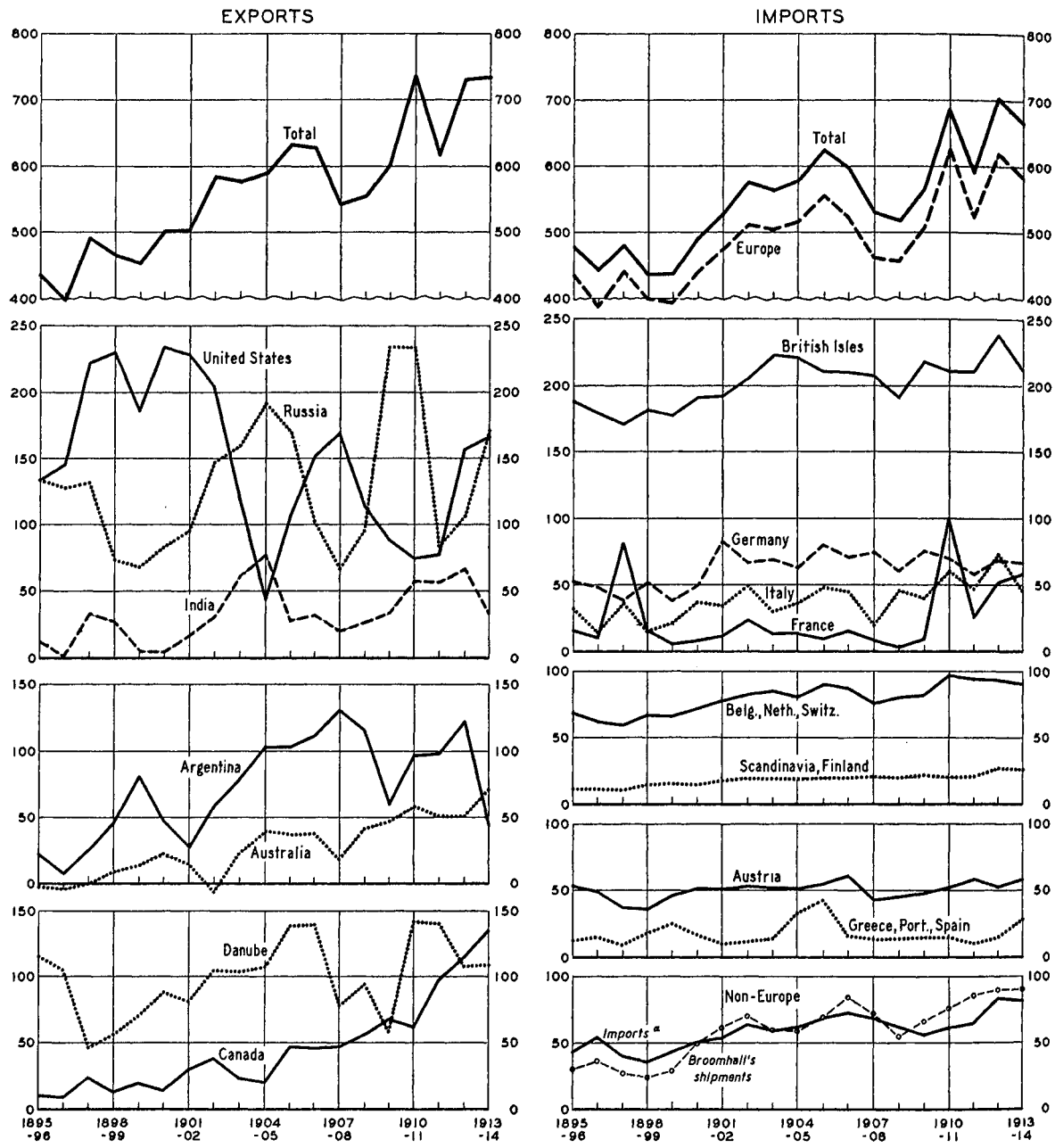
Thus, in spite of increased domestic crops, most European countries except Germany took heavier imports in 1902–03 than in 1901–02; and Germany's imports were reduced only 15 million bushels as contrasted with an increase of 46 million in her crop. Britain, Italy, Belgium, the Netherlands, Switzerland, and most of the Scandinavian countries reported record imports, though none of these countries except Italy had a small crop.

Record non-European imports apparently mainly reflected the deficiencies in several non-European crops; but expansion of wheat consumption in response to low prices was perhaps also a significant factor. Australia, normally a net exporter, imported net over 6 million bushels of foreign wheat in August–July 1902–03, and Japan and South Africa

[1] *Daily Trade Bulletin*, July 26, 1902 (citing *Modern Miller*); and *ibid.*, Dec. 31, 1902 ("Annual Review").

CHART 14.—CROP-YEAR NET EXPORTS AND NET IMPORTS OF PRINCIPAL EXPORTING AND IMPORTING COUNTRIES, 1895–96 TO 1913–14*

(Million bushels)



* See Table IX.

[a] For description of series, see footnote [c] to Table IX.

both took unprecedentedly large imports to supplement mediocre harvests.

The heavy export movement of 1902–03 reflected a record flow of wheat from Canada, near-record shipments from Russia and the Danube countries, and relatively large exports from all other important exporting countries except Australia. India's exports, large in view of the mediocre Indian harvest of 1902 and the low level of world wheat prices, were

drawn mainly from the bumper crop harvested in March–April 1903.

World wheat shipments were concentrated to an extraordinary degree in the early fall and late spring months (Chart 10, p. 340). European importing countries, faced with a late, wet harvest and with depleted stocks of old-crop wheat, bought heavily in the early months of the season. Total shipments, mainly from North America and the Black Sea, averaged about 12.5 million bushels weekly during September–October; yet they exerted virtually no real pressure on the markets. Port stocks in importing countries remained at a low level, indicating heavy disappearance. Although consumption was doubtless heavy, a significant quantity of wheat apparently went to increase invisible stocks. Import buying fell off sharply in November–December, and shipments remained relatively low through March. But by late March the accumulated stocks of import wheat had been practically exhausted, and confidence had been restored by the continued light pressure of wheat supplies on European markets. Import buying then increased markedly, bringing shipments in May to the highest seasonal level since 1898, when a similar exhaustion of spot supplies had been reinforced by the outbreak of war between the United States and Spain.

Consumption and carryovers. — An outstanding feature of 1902–03 was the heavy disappearance of wheat into consumption. Some expansion of consumption was early anticipated, but the actual expansion apparently exceeded early expectations. In October 1902 Broomhall recorded his belief that a considerable amount of low-quality wheat in western and central Europe would be fed to livestock; but apparently he did not anticipate that more than one or two million quarters (8 to 16 million bushels) would disappear in this way. In early January, however, he estimated that in Europe and America combined the total amount of additional wheat diverted to feed might reach 80 million bushels, and by the following September–October he had apparently concluded that something like the following amounts had been fed: 40 million bushels in the United States, 20 million in France, 10 to 12 million in the United Kingdom, and a substantial but unestimated quantity in Germany, Scandinavia, Belgium, and Holland.

Our own consumption estimates allow for relatively heavy feeding of wheat in Europe but not in America; and for Europe our approximations differ from Broomhall's chiefly in implying a negligible expansion in wheat feeding in France and somewhat greater expansion in consumption in Scandinavia, the Low Countries, and Germany, where wheat prices were low in relation to the prices of many other foods and business revival tended to strengthen the normal tendency toward substitution of wheat for rye. Although United States farmers may have fed substantial quantities of low-grade wheat, this is not suggested by the American utilization figure, nor is it in line with the opinion expressed in 1903 by the Chicago *Daily Trade Bulletin*.[1]

As compared with 1901–02, wheat disappearance ex-seed in the United States declined 47 million bushels, according to the available statistics. Feed use of wheat was doubtless reduced, perhaps by 25 to 30 million bushels, and year-end stocks of flour, built up in 1901–02, may have been drawn down by a million barrels or more (say about 5 million bushels in terms of wheat). The somewhat greater reduction indicated by the statistics probably mainly reflects relative overestimation of the 1901 harvest.[2]

Despite the substantial reduction in wheat disappearance in the United States, our data imply that world wheat disappearance was unprecedentedly large in 1902–03. This was due mainly to expansion of human consumption of wheat in various areas, though partly to unusually heavy feeding of low-quality wheat in northern and central Europe. The expansion of human consumption reflected in part merely the current rapid increase in world population and the general upward trend in per capita wheat consumption in a number of countries. But it also reflected exceptional crops and associated heavy consumption in Spain and the Danube basin, where scarcity of corn was also a factor. *Per*

[1] July 17, 1903, p. 3.

[2] See footnote 1, p. 344.

capita world wheat consumption was apparently slightly higher in 1902–03 than in 1901–02 and higher than in any preceding year except 1894–95.

Year-end stocks of wheat, distinctly low in the summer of 1902, stood only a little higher in 1903. In the United States and Australia carryovers were even reduced, while the indicated increases in importing Europe and Argentina were fairly small. The largest building up of stocks occurred in the Danube basin, where the carryover of 1903 was apparently larger than in any but three of the ten preceding years. In Russia, estimated surplus stocks were materially but not heavily increased.

Prices.—The small increase in per capita world wheat stocks between August 1, 1902 and 1903 was associated not with a decline but with an advance in the level of deflated import wheat prices in Great Britain. Presumably this was a deferred price adjustment, which more general economic factors had prevented in 1901–02 (p. 344).

As in the two preceding years, daily and weekly price changes were notably small in the leading wheat futures markets. At Liverpool the course was slightly upward, with net gains concentrated in November–January and in April. At Chicago, an upward tendency in October–January was followed by moderate reaction from late January through March; but in April cash wheat and the May future again showed real strength and thereafter remained firm while the September future advanced.

The chief factors responsible for the principal price movements of 1902–03 are not easily traceable in the daily market news. General strength at Liverpool seems mainly to have reflected the growing conviction of importers and millers that the international wheat position was less easy than many had earlier anticipated. Three considerations probably played an important role: (1) Russia's shipments, though heavy, were less large than might have been expected in view of the official crop estimate;[1] (2) an accumulation of evidence pointed toward substantial expansion of wheat consumption in Europe; and (3) world visible supplies, at no time as large as in the three preceding years, were smaller during May–July than in any year of the preceding decade except 1897 and 1898.

At Chicago, the principal price movements seem to have been more closely related to the speculative operations of leading local interests than to routine market news. Opportunities for speculative manipulation were made possible chiefly by a shortage of wheat of contract grade, a shortage based more on crop quality than on size. As early as July 1902 there was some evidence of concentrated buying of the Chicago September future; but most of the long line which later proved to be controlled by Armour was accumulated quietly. The market was affected but slightly, if at all, until the last ten days of September, when shorts, attempting to cover, were confronted with sharply higher prices. Between September 20 and 30 the price of the September future rose from 74 to 95 cents, and Armour is reported to have made something like $150,000 on the completed "squeeze."[2]

Other Chicago futures were practically unaffected by this manipulation; but the same factors that had made possible the successful completion of the September squeeze continued to operate, though somewhat less strongly, during October–May.[3] The January advance at Chicago also depended heavily on Armour's speculations, and the following decline was mainly a reaction associated with "outside" liquidation. In April–May, prices rose again, largely under the influence of a heavy European import demand and reports of crop damage, though not without active support from the leading "bull" interest.

These speculative manipulations, based on shortage of contract-grade wheat, finally led the Chicago Board of Trade to include Nos. 1 and 2 Hard Winter wheat as deliverable grades at a discount of 5 cents. This necessitated trading in "old" and "new" contracts for

[1] Late in January, Broomhall recorded his belief that the Russian crop had been overestimated by 80 to 160 million bushels (*Corn Trade News*, Jan. 27, 1903, p. 256).

[2] Taylor, *op. cit.*, II, 1043.

[3] For monthly data on stocks of contract grades of wheat at Chicago, see Holbrook Working, "Prices of Cash Wheat and Futures at Chicago since 1883," WHEAT STUDIES, November 1934, XI, 122–23.

the July, September, and December deliveries, with premiums of roughly ⅛ to ⅜ cents on the "old" contracts.

At Liverpool, too, trading was complicated late in 1902–03 by the introduction of a new type of futures contract. Whereas the "old" contract specified delivery of No. 2 American Red wheat, the new or "Graded Red Wheat contract" permitted delivery of a wider group of specified wheats, of which only the best or Grade A wheats were acceptable for delivery at the contract price.[1] Thus the new-type contract commanded a premium of 1½*d.* to 2*d.* per cental over the price of the older contract form.

Removal of the duty on British wheat imports, announced April 23 to take effect July 1, also influenced spreads between Liverpool futures in April–July 1903. The "old" and "new" July futures continued to be quoted with the duty included, both subject to a final reduction to the buyer of 3*d.* per hundredweight (3.3 cents per bushel)—the amount of the duty. But since trading in the September future opened after announcement of the planned removal of the import duty, no adjustment of its quoted price was necessary.

[1] For a more detailed description of these contracts, see Holbrook Working and Sidney Hoos, "Wheat Futures Prices and Trading at Liverpool since 1886," *ibid.*, November 1938, XV, 144–47.

[2] See *Daily Trade Bulletin*, July 17, 1903, p. 3; Broomhall's *Corn Trade News*, Aug. 11, 1903, p. 394; *Weekly Northwestern Miller*, Sept. 23, 1903, p. 681. One of the few authorities who anticipated an increase in 1903 was the Hungarian Minister of Agriculture. Details of his estimates are available in the U.S. Dept. Agr. *Crop Reporter*, October 1903, p. 46. In earlier comments thereon, a Department official noted: "It is . . . . generally believed that the world's wheat crop of this year will be considerably smaller than that of 1902" (*ibid.*, September 1903, p. 37).

[3] Broomhall's estimates of December 1903 showed the 1903 crop, either including or excluding Russia and India, larger than the crop of 1902. But in the following July, Broomhall's figures indicated that the 1903 crop was smaller than that of 1902. Other authorities continued to regard the 1903 crop as the larger. Figures published in the summer of 1904 indicate that Beerbohm then put the increase in production between 1902 and 1903 in the world including Russia and India at 60 million bushels, and Dornbusch estimated the increase at 80 million (*Crop Reporter*, August 1904, p. 31). Our present estimates indicate an increase of about 145 million bushels for the world including Russia and India, and an increase of 60 million for the world ex-Russia ex-India.

The Crop Year 1903–04

Wheat supplies.—In the early months of 1903–04, most authorities believed that the new world wheat crop was significantly smaller than the crop of 1902. In mid-July, the *Daily Trade Bulletin* suggested that the decrease in production (including Russia and India) might approximate 55 million bushels; in early August, Broomhall estimated the reduction at something less than 160 million bushels; and in early September, the foreign representative of the *Northwestern Miller* set the decrease at about 100 million bushels.[2] But the Southern Hemisphere crops turned out larger than expected, and the crop estimates for several Northern Hemisphere countries were revised upward.[3]

Estimates now available indicate that the 1903 crop of the world ex-Russia ex-India was substantially larger than the 1902 harvest, and that the world output (including Russian and Indian exports) was larger than the previous record of 1898–99. The sown acreage, about the same as or slightly larger than in 1902, was reduced less than usual by drought and winterkill. The area remaining for harvest in the world ex-Russia ex-India was thus considerably larger than in 1902, but it was still significantly below the peak acreage of 1899. High yields per harvested acre were obtained in all important producing countries except the United States, and record yields were reported by three of the largest producers—France, Italy, and Australia.

Combined with a rather small carryover and unprecedentedly large Russian and Indian exports, the bumper crop of 1903 brought total wheat supplies in the world ex-Russia ex-India to a new record level. Even per capita wheat supplies were larger than in any of the preceding 15 years except 1894–95. Never before had total domestic wheat supplies been so large in Argentina, Australia, the Danube basin, or importing Europe. Russia, too, had unprecedentedly heavy supplies; and India, favored with a bumper harvest in 1903, secured a new record crop in March–April 1904. In contrast, wheat supplies in the United States were below normal and substantially smaller than in any of the five preceding years.

Quality factors, influential in 1902–03, were again important in 1903–04. In northwestern Europe harvest rains did considerable damage, though only in the United Kingdom was there apparently more unmillable wheat than in 1902. Complaints of low grading of wheat came also from North America. Although the United States winter-wheat crop was apparently of better quality than in 1902, the spring-wheat crops of both Canada and the United States graded considerably lower and contained a substantial quantity of wheat reported to be "unmillable."

Other grains.—Supplies of rye and feed grains were unusually large in 1903–04. Market-price relationships did not favor substitution of wheat flour for rye flour or substantial feeding of millable wheat. In central and northern Europe, however, potatoes were relatively scarce and high-priced, and meats sold higher in relation to bread than for several years. Some contemporary observers believed that these factors stimulated consumption of wheat bread among the lower-income classes,[1] but the evidence on this is far from clear.

International trade.—World wheat exports in 1903–04 were only slightly smaller than the record exports of 1902–03. Although importing Europe apparently had about 70 million bushels more wheat available than in the preceding year, European net imports fell only 6 million short of the 1902–03 record. British imports, in particular, were notably heavy;[2] and the takings of other northwestern European countries, Germany, and Switzerland were also fairly large.[3] These heavy imports were associated mainly with heavy consumption, which was encouraged by the combination of several factors: the substantial amount of tail wheat (suitable mainly for feed) in northwestern Europe, the business revival in Germany and other rye-consuming countries, and the large domestic wheat supplies in the Danube basin, Spain, and northern Africa.

Non-European imports declined 5 to 10 million bushels from their peak in 1902–03. This primarily reflected the return of Australia to the position of a net exporter. Reduced imports into China, South Africa, and several minor importing countries were more than offset by the increased takings of Japan, Brazil, and Egypt.

Outstanding features of the export movement in 1903–04 were (1) notably light exports from the United States, (2) record exports from Russia, India, and Australia, and (3) unusually heavy but not record exports from Argentina and the Danube basin.

Not for 13 years (since 1890–91) had United States exports fallen so low; and in the preceding quarter of a century they had never represented such a small proportion of the world movement. The supply position of the United States was not such as to prohibit somewhat larger exports; but the abundance of wheat elsewhere (partly reflected in large Russian shipments in the autumn), and the questionable outlook for the United States crop of 1904 in the latter part of the crop year encouraged Americans to hold moderate stocks willingly and after January to keep United States wheat prices above a free-export basis.

At 61 million bushels, Indian exports were unprecedentedly large in 1903–04 in reflection of a huge domestic surplus from two successive bumper crops. Exports from Russia, Australia, Argentina, and the Danube basin were also of record or near-record proportions as a result of large domestic supplies, and they left sizable stocks in these countries.

Consumption and year-end stocks.—Throughout the world (including Russia and India) wheat consumption was unusually heavy in 1903–04. The available statistics for the world ex-Russia ex-India show a higher per capita disappearance than in any preceding year; but the indicated increase over the previous highs of 1894–95, 1901–02, and1902–03 is slight. The differences among these four years mainly reflect (besides errors) the rising trend of per capita wheat consumption (Chart 4, p. 318), the greater temporary ex-

[1] See Broomhall's *Corn Trade News*, Dec. 8, 1903, p. 1564.

[2] These were 17 million bushels larger than the record British imports of 1902–03.

[3] Spain, with large domestic supplies, did not take large imports despite temporary reduction of the Spanish tariff on wheat in March 1904. The reduction was made following the advance in international prices and was to remain in effect as long as the price of wheat in Spain exceeded $1.42 per bushel.

pansion in wheat consumption for food and feed in 1894–95 than in any of the later years, and the somewhat heavier feeding of wheat in 1901–02 than in 1902–03 or 1903–04.

In the United States, per capita wheat disappearance was slightly larger in 1903–04 than in the preceding year. Flour stocks were probably increased, and slightly more wheat may have been required per barrel of flour because of the low milling quality of much of the 1903 spring-wheat crop. Moreover, there was probably some increase in wheat feeding, though the difference of opinion expressed on this point by contemporary observers suggests that any change in feeding between 1902–03 and 1903–04 must have been small.[1]

Heavy world wheat consumption in 1903–04 was associated with a substantial increase in year-end world wheat stocks. Record or near-record stocks were carried on August 1, 1904 in the two Southern Hemisphere exporting countries, the Danube basin, and importing Europe (including afloat to Europe); but in North America carryovers were somewhat low. "World" stocks (either including or excluding surplus Russian stocks) were therefore large, but in per capita terms not nearly so large as they had been in the mid-'nineties or at the turn of the century (Chart 6, p. 328).

That the world carryover was not larger in 1904 following two years of record wheat supplies was truly remarkable; and it was so regarded at the time.[2] An adequate explanation would include consideration of many factors: population growth and the current net upward trend in per capita wheat consumption, the geographical distribution of the large crops of 1902 and 1903, the exceptional quantities of low-quality wheat in those two crops, the scarcity and relatively high prices of several competing foodstuffs (especially corn in the Danube basin and potatoes in northwestern Europe), and business revival and rising standards of living in countries where the demand for wheat was relatively elastic. But recognition of the principal factors involved does not imply knowledge of the differential weights that should be ascribed to them.

Prices and spreads.—The sizable increases in world wheat supplies and year-end carryovers between 1902–03 and 1903–04 were surprisingly associated with a slight rise in wheat prices. On the British import market, prices averaged higher in 1903–04, both as reported and in terms of purchasing power over other commodities. Although it seems probable that the wheat prices of 1902–03 were not quite so high as the demand-supply position of that year warranted, there is also reason to believe that in 1903–04 the level of prices was somewhat too high (Chart 7, p. 329). The relatively high deflated import prices of 1903–04 appear to have been mainly due to three factors: (1) underestimation of crop-year supplies in the early months of the season; (2) outbreak of hostilities between Russia and Japan in February; and (3) the notably poor start and unfavorable development of 1904 crops in the United States, Russia, and France.

During August–October traders continued to believe that current wheat supplies were smaller than those of the preceding year, despite upward revisions of the crop estimates for several leading Northern Hemisphere countries and reported excellent progress of the Southern Hemisphere crops. Broomhall distrusted the official upward revisions for France, Canada, and the United States,[3] and

[1] Broomhall's comments suggest that wheat feeding was reduced in 1903–04, whereas the *Daily Trade Bulletin* (July 19, 1904) implies that such feeding was increased. This may merely reflect what we believe was Broomhall's error in estimating a high level of wheat feeding in 1902–03.

[2] Cf. Broomhall's *Corn Trade News*, Aug. 2, 1904, p. 312.

[3] In late September Broomhall commented that it seemed to be the "fashion" to raise estimates of the French crop. "The proposition that France this year, on a decreased acreage, can have grown a larger crop than last year's is incredible" (*Corn Trade News*, Sept. 29, 1903, p. 878).

The official July crop report for the United States was interpreted to indicate a wheat crop of around 688 million bushels; the August report showed a reduction in spring-wheat prospects and was believed to imply a total crop of only 636 million. In September and October, however, the official reports were more optimistic, being interpreted to indicate outturns of 645 and 673 million bushels respectively, as contrasted with 670 million in 1902 (*Daily Trade Bulletin*, Dec. 31, 1903, and July 19, 1904). Although the official estimate of the 1903 crop, issued in December 1903, was only 638 million bushels, some trade sources continued to place more faith in the earlier, higher crop indications. Thus, through January–May, the *Daily Trade Bulletin* calculated current United States wheat supplies on the basis of a 1903 crop of

observed that the standing crop estimates for Britain and some other western European countries should be discounted to allow for substantial amounts of unmillable wheat.

By the time it became clear that Australia and Argentina would secure record or near-record harvests, and that the French crop was actually a bumper, traders were beginning to pay attention to reports of poor condition of the growing wheat crops in the United States, Russia, and France, and to indications that the American crop of 1903 had been overestimated. News of a threatening crisis in the Orient added strength to world wheat markets in January; but only United States prices advanced, and these were apparently influenced primarily by increased evidence of the scarcity of good hard spring wheat in the Northwest, by reports of the poor condition of the growing winter crop, and by the operations of a "bull" interest at Chicago, where stocks of contract wheat were light.

The actual outbreak of hostilities between Japan and Russia served as a major bullish factor during February 1904. Price advances of about 11 cents per bushel at Liverpool and 14 cents at Chicago were based mainly on fears associated with the Russo-Japanese war: that other powers might become involved, that the war would interfere with the free shipment of Russian wheat, and that Russian farmers and exporters would hold for higher prices. Significant secondary factors were increased evidence of strength in the American wheat position (threatened shortage of good spring wheat and a continued poor outlook for the growing crop), unfavorable crop reports from Europe, and news of an extended railroad strike in Argentina. Moreover, since "outside" speculation in wheat futures was one of the features of the February advance, particularly at Chicago, bullish rumors did not have to be valid to be effective.

March brought a general price reaction that continued through April. Despite the Russo-Japanese war, the Argentine railroad strike, and virtual withdrawal of the United States from the export market, world wheat shipments had been unusually heavy in February. This emphasized the world-wide abundance of wheat and suggested that all major exporting countries except the United States were ready sellers at prevailing prices. The heavy world shipments thus played a significant part in bringing about the decline of prices in March. But the decline was probably mainly a reaction from the previous advance, which had been based largely on war fears that did not materialize. Even in the United States, where the condition of the growing crop on April 1 was officially reported to be the lowest in 19 years, prices weakened during March–April under the influence of heavy profit-taking and liquidation. Despite the general price decline, Argentine, Australian, Russian, and Danubian shipments remained exceedingly heavy, warranting fear of pressure on import markets from prospective heavy arrivals.

From early May to mid-June, bullish and bearish influences seemed about to balance each other, the current superabundance of supplies being offset by the disturbing possibility of relative scarcity of export wheat in August–October.[1] But from late June the outlook for reduced wheat supplies in 1904–05 assumed greater importance, and wheat prices advanced sharply during the remaining weeks of the season. Reports of declining crop prospects came not only from the United States winter-wheat belt, where a wet harvest put some additional damaging touches on a poor crop, but also from the Danube basin and southern Russia. Finally, toward the end of July, there were sensational reports of rust in the southern spring-wheat states.

Price spreads between futures at Liverpool and Chicago were sufficiently wide through December to permit relatively free exports of United States wheat. But the January advance at Chicago had no counterpart in the Liverpool market, and the resulting narrowing of

675 million bushels—"the most conservative figure that could be placed on the advices of the *Daily Trade Bulletin*" (*Daily Trade Bulletin*, May 12, 1904). But wheat marketing developments during January–March probably seemed to most traders to support the lower December official estimate.

[1] In his *Corn Trade News* for May 17, 1904 (p. 1334), Broomhall commented: "If we had to sum up the outlook in a few words, we would feel inclined to describe it as a present abundance to be followed by a long period of relative scarcity and dependence upon Russia, a country engaged in a serious struggle with a powerful adversary."

spreads practically removed the United States from active competition in the export market. After early February, only American hard winters, which in 1903–04 sold at substantial discounts under other wheats in United States markets,[1] continued to be quoted regularly at Liverpool.

At Liverpool distant futures commanded only slight premiums over near futures, while at Chicago the small American wheat supplies were reflected in substantial negative carrying charges after January. In fact, the size of the United States carryover on July 1, 1904 seems not to have warranted as large a negative spread as prevailed between the July and September futures at Chicago during February–June. That unusual spread, abnormally large also in relation to the price spread then prevailing between May and July wheat, has been attributed by Working to the corner run at that time in No. 2 Red wheat at St. Louis.[2]

The Chicago futures contract was slightly changed in February 1904 to permit delivery of Nos. 1 and 2 Hard Winter wheat at a discount of only 2 cents, as contrasted with a previous discount of 5 cents. This involved the introduction of "new" July, September, and December contracts, which sold about 1 to ½ cents below the corresponding "old" contracts.

The Crop Year 1904–05

Wheat supplies.—For many years 1904–05 was remembered chiefly as "the great rust year in America." Well might it be so designated, for the small American crop of notably poor quality affected wheat supplies, trade, consumption, and prices more than any other single factor. It is true that the American crop would have been relatively small in the absence of the severe rust infestation in the spring-wheat territory; but, whereas world markets had responded feebly to the prospect of a small winter-wheat crop in the United States, they advanced sharply in August–September on the additional threat of a reduced spring-wheat crop damaged by rust.

In the late spring of 1904 it was already evident that the new world crop would be materially smaller than the preceding record harvest. Although there was some improvement in the outlook for United States winter wheat after April 1, when the official condition figure had been the lowest in 19 years, the heavy acreage abandonment prior to May 1 and the damage previously suffered definitely precluded a good-sized outturn. Moreover, complaints of poor crop development had been coming from France and Russia since midwinter, and the late spring brought reports of damaging drought in Rumania and Hungary. With this background of knowledge, various authorities early estimated reductions in the world crop (inclusive of Russia and India) ranging from 40 to 170 million bushels.[3]

As the weeks passed and it became clear that rust was taking heavy toll of spring wheat in North America, estimates of the available wheat supplies were further reduced. In early November Broomhall reported that the world harvest of 1904 would be about 350 million bushels smaller than the preceding crop, and his estimates for the world ex-Russia ex-India showed a reduction of 245 million bushels.[4]

Our present production figures for the world ex-Russia ex-India show practically the same relationship between the crops of 1903 and 1904 as was suggested by Broomhall's estimates of November 1904. But the

[1] Throughout 1903–04, No. 2 Hard wheat at Kansas City sold at unusually heavy discounts under basic cash wheat at Chicago (see Chart 1 in Working's "Prices of Cash Wheat and Futures at Chicago since 1883," p. 80). This relationship made possible continued exports of United States hard winter wheats after February 1904, when Chicago "old" futures were selling only a couple of cents under corresponding Liverpool futures.

[2] See Holbrook Working, "Price Relations between July and September Wheat Futures at Chicago since 1885," Wheat Studies, March 1933, IX, 210, and "Price Relations between May and New-Crop Wheat Futures at Chicago since 1885," *ibid.*, February 1934, X, 197.

[3] These figures pertain to estimates made by Broomhall, Dornbusch, and Beerbohm, presumably in July (*Crop Reporter*, August 1904, p. 31). The smallest reduction was indicated by Broomhall, who was at that time considerably underestimating the size of the 1903 world crop.

[4] Part of the difference between Broomhall's July and November estimates of the reduction in the world crop is attributable to upward revision of his figures for 1903. Moreover, all standing estimates of the Russian crop of 1904 were then too low as compared with the final official figure, which represented an extraordinary increase over early semiofficial indications.

Russian crop proved much larger than was then anticipated, and Russian and Indian exports unexpectedly reached a new high level in 1904–05, almost 50 million bushels above the previous record in 1903–04.

Enlarged too by a sizable old-crop carryover, total wheat supplies in the world ex-Russia ex-India fell only about 125 million bushels short of the 1903–04 record and were somewhat larger than in any earlier year. But since the world population was growing rapidly, per capita wheat supplies were slightly below normal (trend considered), ranking significantly lower than in 6 of the 10 preceding years.

Of the various producing countries, the United States alone had extraordinarily small wheat supplies in 1904–05: at roughly 685 million bushels, these were considerably the the smallest since 1890–91. Yet in importing Europe and Canada, too, the wheat supplies of 1904–05 were somewhat below trend. In contrast, Australia and the Danube basin had moderate supplies, while Argentina, with a record crop, had more wheat available than ever before.

Except in North America, the quality of the wheat produced in 1904 was quite satisfactory. Indeed, in western Europe, where quality had been poor in the two preceding years, it was described in 1904 as good to excellent. But the North American spring-wheat crop, damaged by rust, presented milling problems never before encountered. In Canada only two-thirds of the crop graded No. 3 Northern or better, and there was a large proportion of "no-grade" wheat. United States spring wheat was rated by operative millers as "the worst crop they ever had to handle, so varying and uncertain was it in quality."[1] In fact, some American millers claimed that 11 to 20 per cent more wheat than usual was required to produce a barrel of patent flour; but we doubt that the increase was so large.[2]

Other grains.—An outstanding feature of grain production in 1904 was the virtual failure of the maize crop in eastern Europe. Not since 1894 had the four Danubian countries secured so small a harvest.[3] Nor were other European grain crops large enough to compensate for the reduced output of corn. Although rye made a fairly good harvest, the outturns of barley and oats were small. Moreover, in central and eastern Europe the potato crop was distinctly poor. Exporting countries outside of Europe produced large feed-grain crops in 1904, but they did not send unusually heavy exports to Europe.

Despite the indicated shortage of feed grains in Europe in 1904–05, feed-grain prices did not stand high relative to wheat prices except in parts of the Danube basin. In contrast, the potato shortage in central Europe was reflected in relatively high potato prices, particularly in Germany. In the United States, where wheat was held above export parity, prices of feed grains and potatoes stood lower than usual in relation to the price of wheat.

International trade.—Most striking of the chief developments in international trade in 1904–05 were the abnormally small exports of United States wheat and flour—the smallest since the early 'seventies. These exports, almost wholly in the form of established brands of flour for which the export demand was least elastic,[4] were a natural reflection of the extraordinarily small domestic wheat supplies

[1] *Weekly Northwestern Miller*, Sept. 13, 1905, p. 644.

[2] For the estimate of 20 per cent, see *ibid.*, Sept. 13, 1905, p. 644. The *Daily Trade Bulletin*, July 21, 1905, comments: "Millers estimated that it required about one-half bushel more of this kind of Wheat to produce a barrel of Flour than during the year previous." This suggests an increase of about 11 per cent as compared with 1903–04, when the quality of the spring crop was probably below average. Such increases in wheat utilization may well have taken place at certain times, in certain mills; but it seems doubtful that the average increase for spring wheat was this large. Census data for the calendar year 1904 (including three months or more in which spring wheat of the 1904 crop was ground) show an increase as compared with the preceding census year (1899) of only 1.7 per cent in the amount of wheat ground per barrel of flour in Minnesota and an average increase of only 2.0 per cent in North Dakota, South Dakota, and Montana. For the crop year 1904–05 the increase was undoubtedly larger, perhaps even three to four times that indicated by the 1904 census.

[3] Rumania, at least, put an embargo on exports of corn.

[4] Gross wheat-grain exports totaled only about 4 million bushels, as contrasted with an average of 106 million during the preceding decade. Flour exports, better sustained, represented the equivalent of about 40 million bushels or roughly half of the 10-year average (Table VIII). Wheat and flour imports, largely from Canada, totaled over 3 million bushels and were the largest since 1863–64.

and the problems encountered in milling the rusted spring wheat. Scarcely less noteworthy, however, were the record exports from Russia, India, Argentina, and Australia, and the near-record shipments from the Danube basin. With the United States virtually out of the competitive export market, and with the total import demand heavier than ever before, extraordinarily heavy exports could be made not only by countries with unprecedentedly large domestic supplies, such as Argentina, Russia, and India, but also by Australia and the group of Danube countries, whose supplies were materially smaller than in the preceding crop year.

The distribution of European imports in 1904–05 was not well foreseen, nor is it even now readily explainable. The slightly reduced takings of the northwestern Continental countries, early anticipated, reflected merely the increased supply of good millable domestic wheat in that area. Moreover, the British imports, though unexpectedly almost as large as the record takings of 1903–04, in retrospect appear quite normal in view of the reduced British crop and the prevailing upward trend of British wheat utilization. But even in retrospect, it is difficult to explain why France, in the face of a notably short crop, did not import more wheat in 1904–05, or why Spain, Germany, and Italy took as much wheat as they did. Apparently the French wheat carryover of 1904 went further than expected toward compensating for the reduced harvest; and the improved quality of the 1904 French crop may have tended to reduce the amount of wheat required per barrel of flour. Yet even under these circumstances, French imports only 1 million bushels larger in 1904–05 than in 1903–04 appear extraordinarily small.

Record-large Spanish imports of 23 million bushels were surprising in view of the higher level of world wheat prices and of a 1904 domestic crop about the same size as the crops of 1896, 1897, and 1899—crops which had been associated with imports of only 5, 0, and 13 million bushels respectively. Reduction of the Spanish tariff on wheat, effective from April 6, 1905, so long as the price of wheat in Spain exceeded $1.47 per bushel, probably had no effect on imports.

German and Italian imports were of fair size in 1904–05, in the face of fairly large domestic wheat supplies and relatively high wheat prices. Per capita wheat consumption in Germany and Italy apparently remained about as high as in 1903–04, and somewhat above normal (trend considered). The factors responsible for this—if, indeed, it is not mainly attributable to errors in production statistics or in our approximations of year-end stocks—are not entirely clear. Higher wheat prices, business recession in Germany, and the better quality of the German wheat crop of 1904 presumably tended to reduce per capita wheat consumption in 1904–05. For Germany, but not Italy, our per capita consumption figures actually show a slight decrease; and the decline might perhaps have been larger if the German potato crop had not turned out so poorly in 1904, with resulting high potato prices. In Italy, large domestic wheat supplies and continued general prosperity probably combined to maintain wheat consumption at a high level.

Unlike European imports, which reached a new peak in 1904–05, the takings of non-European countries were smaller than in 1902–03, when Australia temporarily ranked as a net importer. Of the principal non-European importing countries for which trade data are available, only Egypt and Brazil took significantly more wheat in 1904–05 than in either of the two preceding years.

Consumption and carryovers.—Wheat disappearance in the world ex-Russia ex-India was only slightly reduced in 1904–05 from the record high level of 1903–04; and per capita disappearance was above normal, though lower than in any of the three preceding crop years (Chart 4, p. 318).

The small reduction in world wheat disappearance from 1903–04 chiefly reflected decreased feeding of wheat in northwestern Europe, decreased consumption of wheat for food in Spain and northern Africa, and minor statistical decreases, not entirely explicable on theoretical grounds, in France,[1] Canada, and several other countries.

The indicated statistical reduction of 8 mil-

[1] See above.

lion bushels in wheat disappearance ex-seed in Canada and the negligible increase recorded for the United States appear questionable in view of (1) the rapidly growing populations of these two countries, and (2) the poor quality of the North American spring-wheat crop. It is true that there had been some complaints of the quality of American spring wheat in 1903–04, and that the higher wheat prices of 1904–05 might have discouraged feeding of some grades that would have been considered "unmillable" in the previous year. But since the 1904 spring-wheat crop contained so much more poor-quality wheat than the 1903 crop, wheat feeding in the North American spring-wheat territory was perhaps about the same in 1904–05 as in 1903–04. The poor quality of the spring wheat was reflected also in an increased requirement of wheat per barrel of flour milled, an increase that perhaps amounted to 6 to 8 per cent[1] in the United States spring-wheat territory and perhaps a little less in Canada. In the light of these considerations, it is difficult to credit the implication of our crop, trade, and stocks figures that per capita wheat consumption ex-seed declined in both Canada and the United States between 1903–04 and 1904–05.

In early August 1905, "world" wheat stocks exclusive of surplus Russian stocks were notably low—apparently somewhat lower in relation to current wheat consumption than they had been even in 1902 (Chart 6, p. 328). But whereas in 1902 Russia had held no surplus stocks, in 1905 she held the largest surplus in eight years. In no major country except Argentina were wheat stocks even moderately large in 1905 (trend considered). On the other hand, stocks were nowhere so nearly exhausted as they had been in 1898. With the exception of that year, however, the United States carryover was the smallest in at least 15 years and, over the same period, stocks in importing Europe had stood lower only in 1890, 1898, and 1902.

Prices.—Between 1903–04 and 1904–05 the deflated average price of British import wheat rose only about 3 cents. As a reflection of the change in the world wheat position, this increase was notably small; but since British prices had stood relatively high in 1903–04 (p. 353), the slightly higher prices of 1904–05 discounted reasonably well the tighter wheat position of 1904–05.

Recorded wheat prices at Liverpool stood higher in 1904–05 than in any of the 12 preceding years except 1897–98; and at Chicago, where wheat was held above export parity, the average price of basic cash wheat was the highest since 1881–82. General price factors influencing wheat along with many other commodities were probably partly responsible, but more important was the moderate tightness of the wheat position in 1904–05.

During 1904–05 the course of futures prices at Liverpool was sharply upward from early July to mid-September, slowly downward to early April, and roughly horizontal or slightly upward thereafter. These movements, which broadly reflected the changing opinions of traders as to the degree of tightness in the current world wheat position, were only partially mirrored in the Chicago market. There, the July–August advance was even greater, and prices were well sustained during September–February. In March, however, weakness developed in distant futures at Chicago, followed in April by a sharp collapse of the May future and further substantial losses in the July and September futures. During May–July, Chicago cash and futures prices showed partial recovery.

The steep advance in world wheat prices in July–August 1904 was led by Chicago and Minneapolis, the two markets which felt the first and greatest impact of the startling reports of spreading rust in the North American spring-wheat belt. For some weeks it was impossible for traders to do more than guess at the accuracy of the diverse crop advices from the spring-wheat region. Some observers persisted in forecasting a sizable exportable surplus; at the other extreme, some went so far as to predict that the United States would be a wheat importer on balance in 1904–05. The American public, attracted by the rising prices, was reported to have gone "buying mad."[2] Yet, after the upward price movement had culminated in mid-September, and

[1] See footnote 2, p. 356.

[2] See "Wheat Summary for 1904," *Daily Trade Bulletin*, Dec. 31, 1904.

Liverpool prices started to drift downward under the joint influence of fairly heavy Russian and Indian shipments and somewhat better crop reports from North America, Chicago futures prices weakened but slightly, and then rose to a higher peak in mid-October. Nor was delayed liquidation prominent at Chicago during the next few months; despite continued weakness in British markets, Chicago prices remained firm until March at levels above corresponding futures at Liverpool.

Meanwhile, Liverpool wheat prices were declining slowly but steadily. Increased estimates of the United States crop in September–October,[1] pressure of heavy Russian and Indian shipments on European import markets through early December, and the reported excellent progress and large outturn of Argentine wheat convinced many traders that current wheat prices more than discounted the reduction in effective wheat supplies. This belief was apparently supported by the available data on visible supplies: the "world" visible was larger in September–April 1904–05 than it had been in either of the two preceding years of relatively heavy total supplies, and during November–April the European visible (including stocks afloat) stood higher than in any year since 1899–1900.

But developments were not all bearish. During December–February, the large spot stocks in Europe did not prevent importers from being somewhat concerned about the adequacy of future supplies. Not only had Russian shipments fallen off sharply with the close of navigation, but complaints of the new Indian crop had been followed by decline of Indian shipments, and the political crisis in Russia was interpreted as somewhat bullish. These factors checked the tendency for price decline in the two mid-winter months; but after the large Argentine and Australian shipments got well under way, the price decline was resumed.

By May, however, it became apparent that the peak of the Southern Hemisphere movement had passed and that North American exports were not increasing as they usually did in the spring. Moreover, the outlook for the new world wheat crop was not especially bright. Reflecting these influences, Liverpool prices tended upward. Russian shipments again became large and Indian exports also increased. But although world shipments proved heavy in June–July, they were rapidly absorbed in importing countries, where native wheat supplies were virtually exhausted. Changing prospects for the new world harvest were an important price influence in July, and wheat futures markets then ruled irregularly firm.

From September to late April, near futures at Chicago were priced higher than corresponding futures at Liverpool. This mainly reflected the small available supplies of United States wheat, though concentrated holding of the May future, aided by light stocks of contract wheat at Chicago, was important during March and April. As early as January, there were rumors that Chicago May wheat was being accumulated for a squeeze; and in March the evidence seemed clearer when May wheat remained firm while the July and September futures went to heavy discounts under the May. But the relatively high prices for cash and May wheat attracted heavier country marketings, and several of the Chicago elevator companies took steps in April to increase the available supply of contract wheat in that city.[2]

The "leading bull," said to be John W. Gates, gave up all hope of controlling the market and from mid-April sold wheat freely. At first prices declined moderately, supported by moderate offers and short covering. But on April 22 the price of the May future dropped 10 cents and the next market period witnessed a further drop of 7½ cents. Thereafter, liquidation continued on a moderate scale, carrying the price 5 cents lower by the end of the month.[3] New-crop futures at Chicago were

[1] The course of official United States crop estimates as interpreted by the *Daily Trade Bulletin* from official condition figures during August–October and as finally reported in December were as follows, in million bushels: August, 591; September, 530; October, 551; December, 552.

[2] As of about April 1, contract stocks at Chicago totaled only 1,298,000 bushels; but at the beginning of May they stood at 2,138,000 bushels.

[3] The Gates interests are reported to have sold 10 million bushels on April 22 at an average loss of 10 cents per bushel and 8 million bushels on April 24 at an average loss as great or greater (Taylor, *op. cit.*, II, pp. 1091–92).

not significantly affected by the collapse of the May future in April, but tended generally to follow the same course as corresponding futures at Liverpool. At both Liverpool and Chicago, the July and September or October futures advanced irregularly in price during May–July, influenced partly by evidence of scant old-crop supplies and partly by changing new-crop prospects.

The Crop Year 1905–06

Wheat supplies.—Planted on an increased acreage and subjected to unusually light winterkilling, the 1905 world wheat crop ex-Russia ex-India proved slightly larger than the 1903 crop, and second only to the bumper harvest of 1898 (Chart 9, p. 338). It exceeded the short crop of 1904 by about 274 million bushels. Aggregate Russian and Indian exports were again large, though substantially smaller than in either of the two preceding years. Only the carryover of old-crop wheat was definitely small. The aggregate wheat supplies available for 1905–06 were therefore of near-record size—smaller only than in 1903–04. But per capita supplies were only slightly above normal and substantially smaller than in 1903–04.

With some minor exceptions, the broad facts of the wheat supply position of 1905–06 were fairly well recognized at the beginning of the crop year. There were no spectacular changes in crop outlook such as had occurred in the preceding year, and though the Russian crop was again seriously underestimated, early forecasts of total Indian and Russian exports proved reasonably accurate.

The distribution of the available supplies as between importing and exporting countries foreshadowed a heavy volume of international trade. In importing Europe, domestic wheat supplies were as small as they had been in 1904–05; in the Danubian and overseas exporting countries the aggregate supplies were almost 185 million bushels larger. Most countries, having secured ordinary harvests in 1905, had mediocre supplies of wheat for the crop year; but Canada and the Danube countries, with crops of record size, and Argentina and Australia, with crops of near-record proportions, had relatively large surpluses. In the face of a good crop, United States wheat supplies were only of moderate size because of the notably small inward carryover. Within importing Europe, 1905 crops were particularly poor in the western Mediterranean area, especially in Spain and Portugal. Italy's crop and total supplies were of ordinary dimensions, though somewhat on the small side in view of her growing population.

Quality played a minor role in the wheat situation of 1905–06 except in Rumania and perhaps Hungary. In these countries low-quality wheat was abundant and supplies of corn were below normal. Outside of the Danube basin there were few complaints of wheat quality except in Germany, where prolonged rains in August–September damaged the quality not only of unharvested grain but of potatoes and roots as well. This may have led to somewhat heavier consumption of wheat in Germany than otherwise would have been the case; but the evidence is not clear.

Other grains and potatoes.—In Europe ex-Russia potatoes were extraordinarily abundant, rye fairly so, and feed-grain supplies somewhat short. The Danubian corn crop, though below normal, was much larger than in the preceding year.

Through October or November, corn prices stood notably high in Hungary and probably also in other parts of the Danube basin; but after the newly harvested corn was freely available, the price declined and thereafter ruled only moderately high in relation to the price of wheat. On western European and American markets, corn and other feed-grain prices were relatively low throughout 1905–06. And potatoes, which had commanded high prices in Europe (particularly in Germany) in 1904–05, sold again on a more normal basis in relation to wheat.

International trade.—As foreshadowed by the distribution of wheat supplies, international trade in wheat was heavy—indeed, of record size. World net exports totaled 631 million bushels as compared with the previous record of 589 million in 1904–05.

Although the United Kingdom, favored with a fairly good crop, imported 10 to 12 million bushels less than in either of the two

preceding years, total European imports were almost 40 million bushels larger than the standing record for 1904–05. Never before, not even in 1891–92, had the per capita imports of Continental Europe been so heavy. Unprecedentedly large net imports were reported by Spain, Belgium, the Scandinavian countries, Austria, and Switzerland, and near-record imports by Italy, Germany, and several minor countries. Of the principal European importers, only France took an abnormally small amount of foreign wheat; this, like her small imports in 1904–05, reflected not large domestic supplies but reduced disappearance (perhaps partly attributable to faulty statistics).

Non-Euroean imports were also unprecedentedly large in 1905–06. Egypt, Chile, Japan, and apparently China took heavy imports to compensate for small domestic wheat crops, while Brazil's imports continued their upward trend in response to a rapidly growing population. Swelling Broomhall's shipments, though not total net exports or non-European net imports, were exports of 2 to 3 million bushels of foreign wheat to Asiatic Russia. This trade was prompted mainly by internal transportation difficulties associated with political upheaval in Russia.

For the third successive year Russia was the world's largest exporter of wheat—despite internal revolution, a reduced bread-grain crop and widespread appeals in western Europe and America for funds for Russian famine relief. To judge by standing wheat and rye statistics, the total supply of bread grains in Russia in 1905–06 was adequate to provide for normal domestic consumption and exports of about the size effected. But internal disorganization so interfered with the distribution of these supplies that serious famine conditions prevailed in certain areas. Numerous strikes (in factories, in agricultural districts, and on the railroads),[1] appropriation of grain supplies by revolting peasants, and pillage and destruction of many of the large agricultural estates, prevented the normal flow of grain from surplus to deficit areas. In addition, part of the Russian population went hungry because of lack of purchasing power and the inadequacy of relief measures.

Russian exports, though large, were over 20 million bushels smaller than the peak exports of the preceding year. In contrast, Danubian and Canadian exports established new high records and Argentine and Australian exports were about the same as at their peak in 1904–05. An increase of almost 65 million bushels in United States exports more than offset a 50-million reduction in exports from India, where wheat consumption expanded as partial compensation for poor crops of native grains. Although substantially larger than in the preceding year, United States exports were otherwise the smallest since 1888–89; they were small, too, as compared with current wheat supplies, leaving the United States carryover more than 60 million bushels above its low level in 1905. Net exports from "other" countries, which in most years totaled 7 to 9 million bushels, fell to less than 1 million in 1905–06; at this figure they were the smallest on record from 1890 to 1914 (Table IX).

Consumption and stocks. — Wheat consumption in the world ex-Russia ex-India was apparently unprecedentedly heavy in 1905–06, but only because of continued rapid growth of the world's population. *Per capita* disappearance was scarcely higher than in 1904–05, and was appreciably lower than in any of the three preceding years. Wheat prices fairly high in relation to feed-grain prices, and good wheat quality discouraged feeding of wheat, particularly in North America. Wheat disappearance in France was inexplicably light for the second successive year; and even in the Danube basin, where large supplies of low-quality wheat and below average supplies of corn tended to encourage wheat consumption, the per capita use of wheat was about the same as in 1904–05 and materially lower than in either of the two preceding years.

While no particular year can be selected as

[1] According to official data, about two-sevenths of the industrial workers went on strike during October 1905, and the total was swelled during later months. During January–June 1906, the number of registered strikers "was almost nine times as great as the total for any entire year before the revolution" (G. T. Robinson, *Rural Russia under the Old Regime* [London, 1932], pp. 165, 170).

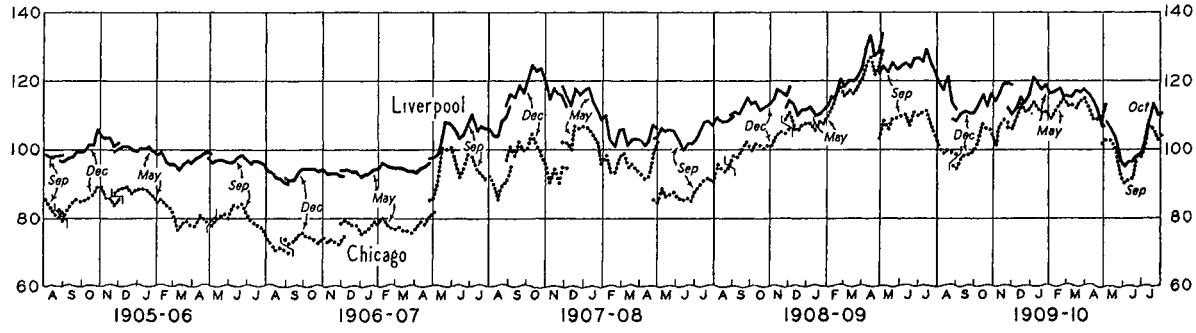
the precise turning point in any national trend of per capita wheat consumption, available utilization data suggest that in 1905–06, or a year or so earlier, there was in a number of countries either (1) a leveling off of an earlier upward trend in normal per capita wheat consumption, (2) a change from a horizontal to a declining trend, or (3) a change from a slight downward trend to a more marked downward trend. This broad tendency, observable in the United States, Canada, Germany, Austria, Switzerland, Belgium, and Spain, was probably partly responsible for the moderate per capita disappearance figure for the world ex-Russia ex-India in 1905–06. Underlying this tendency were widespread reductions in hours of employment, improvement in housing conditions, and, in the more prosperous countries, increased diversification of diet associated with urbanization, rising planes of living, and technological improvements in both transportation and agriculture. Since these factors obviously did not center in any particular year, it may seem improper to ascribe special importance to them in 1905–06. But the widespread industrial prosperity culminating in that year and in 1906–07 was perhaps partly responsible for the timing of changes in many consumption trends, since periods of prosperity often lend impetus both to labor agitation for reduced hours of employment and to diversification of diets.

At the end of 1905–06 wheat carryovers were somewhat larger than a year earlier; but the world total was only of about normal size, trend considered (Chart 6, p. 328). As compared with 1905, the largest increase in year-end stocks was in the United States. The carryover there, though not notably heavy, was larger than in any of the five preceding years. Elsewhere in the world ex-Russia ex-India 1906 carryovers were characteristically of normal size or below. This holds true even for Canada, Australia, and the group of Danube exporters, countries which had record or near-record supplies of wheat available for 1905–06. Particularly noteworthy, in the face of internal revolution and local famine, were the sizable stocks reported in Russia. These were only moderately smaller than in 1905, about the same as in 1904, and otherwise the largest since 1897.

Prices.—In practically all leading markets, wheat prices averaged lower in 1905–06 than in 1904–05, reflecting the easier international supply position. In most countries price reductions were small to moderate, but in the United States the reduction reached 24 cents per bushel, as American wheat prices changed from a domestic basis in 1904–05 to international export parity in 1905–06. Most of the adjustment in price level, both in this country and abroad, was completed by the end of July 1905.

CHART 15.—WEEKLY PRICES OF WHEAT FUTURES AT LIVERPOOL AND CHICAGO, AUGUST 1905 TO JULY 1910*

(U.S. cents per bushel)



* See general note to Chart 11.

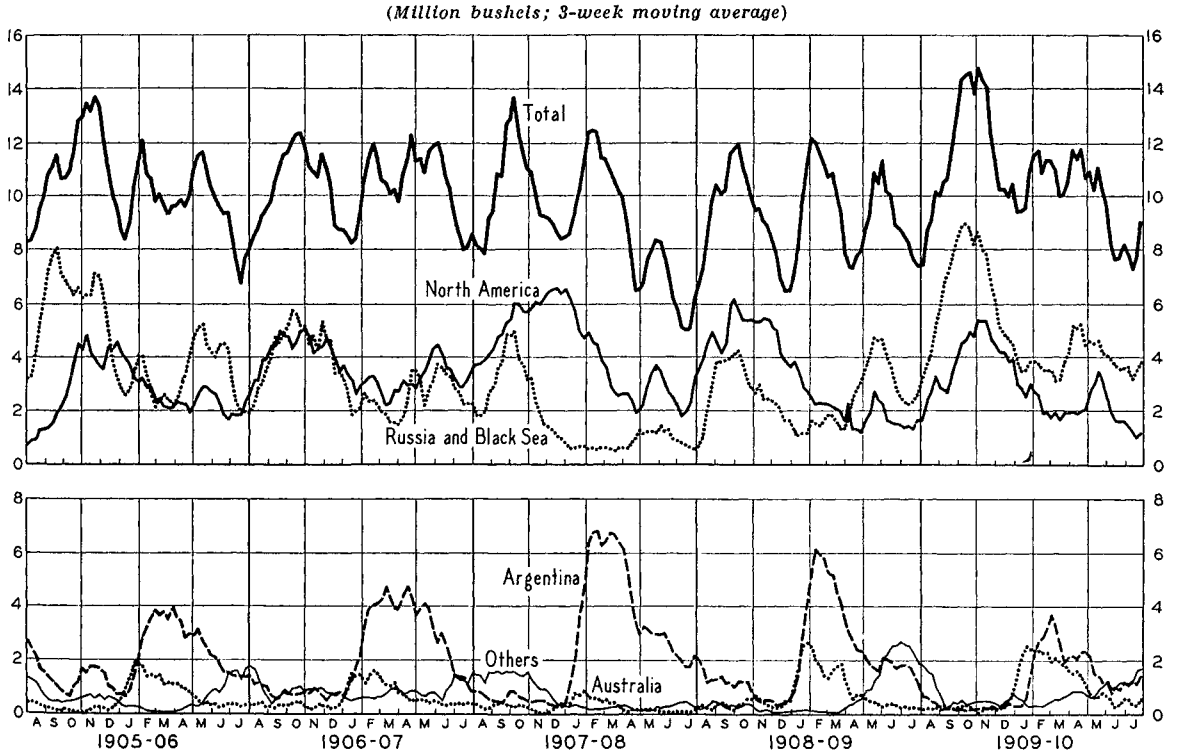
During August United States prices continued their adjustment to a full export basis, while wheat prices in import markets remained firm (Chart 15). Subsequent price movements at Liverpool and Chicago were

broadly the same until mid-May 1906, when Liverpool prices remained unresponsive to temporary strength in American markets.

In contrast with 1904–05, futures prices at Liverpool and Chicago moved within a narrow range during 1905–06. From the beginning of September, prices rose moderately to the end of October, then declined slowly and irregularly to early March. During April–July 1906, Liverpool prices remained practically stationary while prices at Chicago gained about 5 cents through May and then lost slightly more than that amount during June–July.

CHART 16.—WORLD SHIPMENTS OF WHEAT AND FLOUR, BY SOURCES, FROM AUGUST 1905 TO JULY 1910*

(Million bushels; 3-week moving average)



* Based on Broomhall's weekly shipment data, summarized by crop years in Table VII.

The September–October advance was in response to an abnormally heavy demand for wheat from Continental Europe, where domestic crops were moderate to small and importers and merchants appeared willing to build up import stocks at the existing prices. To meet the heavy demand in August–October, there were notably large weekly shipments from Russia but only small exports from other areas (Chart 16). North American shipments did not become sizable until late October, when the spring-wheat crop began to move; Indian exports were much smaller than in the two preceding years, when better native crops had left a larger surplus of wheat for export; and Southern Hemisphere shipments, though larger than in most past years, were, as usual, small in absolute terms.[1] With shipments light from all areas except Russia, the current reports of revolutionary activity and famine conditions in that country assumed considerable importance as a bullish factor in world wheat markets.

In late October, however, when North American shipments rose to 4 million bushels weekly and Russia continued to export over 6 million bushels per week, wheat prices tended to weaken in all markets. Favorable

[1] It is obvious from Chart 12 (p. 343) that Argentine shipments were abnormally large during this period, but even so the weekly average fell short of 1.5 million bushels.

crop developments in the Southern Hemisphere were also somewhat bearish. Yet prices declined only slightly through January, because they were supported by a sustained heavy import demand and by a general willingness on the part of many farmers, merchants, and millers to hold sizable wheat reserves.[1]

After the beginning of February, prices declined more noticeably, registering a net loss of about 6 cents at Chicago and 4 cents at Liverpool by early March. This mainly reflected subsidence of the European demand[2] at a time when pressure from Southern Hemisphere shipments was reaching its seasonal maximum. But in the United States there was some evidence also of planned "bear raids" in late February[3]—raids aided not only by the simultaneous timing of a declining European demand and increasing shipments from the Southern Hemisphere, but also by large visible wheat supplies, and favorable reports of growing wheat crops in both Europe and America.

From the low point of prices in early March, Liverpool futures showed substantial recovery to mid-April, then remained fairly stable during the rest of the crop year. World visible supplies, notably large as of April 1, declined rapidly during subsequent months; immediate exportable supplies were sizable but offset by an exceptionally good import demand; and prospects for the world crop of 1906 continued to be interpreted as satisfactory, though by no means brilliant.[4] There remained, too, the uncertain effect upon exports of unpredictable political developments in Russia.

United States markets, affected by these same influences, reacted more strongly than did Liverpool to changing prospects for the North American wheat crop and (perhaps) to rumors of market manipulation. Attempted manipulation and fear of manipulation was apparently confined to the Chicago May future and seems to have been without much price effect. From early April to mid-June, however, reports of crop damage in the Southwest contributed temporary strength to American markets, while in late June and July increasing evidence that the North American crop would be large was a dominant depressing factor.

The Crop Year 1906–07

Wheat supplies.—Contrary to early anticipations and estimates, the world wheat crop of 1906 proved to be a bumper; and total wheat supplies in the world ex-Russia ex-India reached a new high level, roughly 180 million bushels above the previous record of 1903–04. Moreover, despite the rapid growth of population, per capita supplies were larger than ever before; and they remained unsurpassed until 1928–29.

The phenomenal wheat crop of 1906 reflected both a record wheat acreage and a record yield per acre.[5] The yield per acre of that year stands even now as one of the highest ever recorded, comparable with the outstanding yields of 1915, 1928, 1938, and 1939. On a harvested acreage basis, the 1906 yield

[1] On Dec. 19, 1905, Broomhall commented in his *Corn Trade News* (p. 1660): "The attitude of holders towards the market appears to be entirely changed; ten years ago they had their faces fixed in the direction of lower prices, their hearts replete with apprehension, and their contract books full of undesirable bargains, or their farms encumbered with mortgages, while in the present year of grace the conditions are reversed. Holders are now full of confidence begotten of replenished bank balances and redeemed mortgages, and, impressed by the steady growth of the demand for the premier cereal, appear to be almost oblivious of the actual size of the crop, however large it may be."

[2] Germany's temporary withdrawal from the import market, associated with earlier buying in anticipation of the increase in German grain duties on March 1, 1906 (definitely planned in 1902), was a significant factor.

[3] Taylor (*op. cit.*, II, 1109) mentions among winning leaders of the bear campaign: J. A. Patten (Chicago), C. E. Lewis (Minneapolis), and Captain Phillips (Kansas City).

[4] On July 17, 1906, Broomhall commented in the *Corn Trade News* (p. 170): " . . . . practically speaking, every nation in the world is entering upon the new campaign with moderate or small reserves, while no country of importance has so far succeeded in raising a bumper crop." This opinion was in line with the ideas of other authorities in July 1906. Our present statistics indicate that record wheat crops were produced in Canada, Argentina, the Danube basin, Germany, Austria, and Spain, and that notably large crops were also harvested in Italy, the United States, India, and Australia.

[5] Record yields were reported in the United States, the Danube basin (Hungary, Rumania, Serbia), Sweden, the Netherlands, Switzerland, Austria, Spain, and Algeria. Near-record yields were reported by Italy, Germany, and the British Isles. No country suffered a really poor yield.

was certainly not exceeded before 1928 and perhaps not before 1938.[1]

Both importing and exporting countries were favored with increased wheat supplies in 1906–07. The new crops plus carryovers were unprecedentedly large in importing Europe, the Danube basin, Argentina, and Canada, while in Australia they were about equal to the record supplies of 1903–04. Moreover, although the United States had had about 65 million bushels more wheat available in 1901–02, her supplies in 1906–07 were larger than in any other prewar year except 1914–15. On a per capita basis, too, the wheat supplies of 1906–07 were above normal (trends considered) in importing Europe, the Danube basin, Canada, the United States, and Argentina; but only in the Danube basin and Canada were per capita supplies above previous record levels.

The distribution of the world's wheat supplies clearly foreshadowed two significant developments in 1906–07: (1) a decline in European wheat imports, and (2) a large increase in year-end stocks, particularly in exporting countries. The first of these was well anticipated. But early underestimation of the total exportable supplies tended to obscure the probability of a large increase in stocks until the crop year was well advanced.

Other grains and potatoes. — Not only wheat, but rye and feed grains as well, were abundant in 1906–07. In Europe, the principal potato crops were of moderate size and distinctly smaller than in 1905; but since feed grains were abundant and cheap, the reduction in potato supplies was of slight significance. In most countries, however, feed-grain prices were somewhat higher in relation to wheat prices than in either of the two preceding years; and since wheat prices averaged lower also in absolute terms, it seems probable that more millable wheat was fed than in 1904–05 or 1905–06.

International trade. — European importing countries, with some 85 million bushels more wheat available from crops and carryovers than in the preceding year, reduced their takings of foreign wheat by only 30 million bushels. In most of these countries, per capita wheat consumption was moderately but not unprecedentedly heavy, and wheat carryovers were materially increased. Record-large imports were taken by Austria, Denmark, Finland, and Greece, whereas only Spain and Portugal reported imports that were definitely light as compared with past years. French imports, moderate in absolute terms, were nevertheless smaller than the French domestic supply position seems to have warranted.

In spite of the reduction in European net imports in 1906–07, world net exports were almost as heavy as at their peak in 1905–06. As a partial offset to the reduction in European imports, non-European takings increased moderately to a new record level. China, threatened with famine conditions, accounted for most of the increase. United States net exports of wheat and flour to China and Hong Kong, which had totaled 5.1 million bushels in July–June 1905–06 and had never exceeded 7.1 million, rose in July–June 1906–07 to 16.2 million bushels. In addition, Brazilian imports continued their upward trend; Egyptian takings were about as large as at their peak in 1905–06; and Chile and New Zealand, normally net exporters, were small importers on balance in 1906–07. These enlarged takings were partially offset by reductions in the imports of Japan, South Africa, and several other areas; but the net increase in non-European net imports over 1905–06 was probably somewhere in the neighborhood of 10 to 11 million bushels.[2]

Marked shifts occurred in 1906–07 in the principal sources of wheat exports. Russia, the largest wheat exporter in the world during the three preceding years, fell to fourth place among exporting regions in 1906–07. Yet at 103 million bushels, Russian exports were surprisingly large in view of the poor breadgrain crop and the intense political disturbances in Russia. Larger exports came from only three regions, the United States (152 million bushels), the Danube countries (139 million), and Argentina (111 million). Ar-

[1] Changes in the boundaries of Russia after the World War make difficult comparisons involving small differences in yield.

[2] We believe that the net-import series for non-Europe shown in Chart 14 and Table IX understates the increase in these imports between 1905–06 and 1906–07.

gentine, Danubian, and North African exports were larger than ever before, while Australian and Canadian exports closely approximated previous record shipments.

Despite the huge exportable surplus available to the world ex-Russia ex-India, there was virtually no real export pressure. Stocks of wheat were willingly held at current prices, especially by farmers and traders in North America and the Danube basin. Southern Hemisphere and Russian exports were as large as or larger than usual in relation to available domestic supplies; but United States, Canadian, and Danubian exports were relatively small as compared with the surpluses in those areas.

World exports were concentrated to an unusual degree in 1906–07 in the second half of the crop year (Chart 16, p. 363). In the fall months, Russian shipments were not pressed as heavily as they had been in many past years; United States wheat was held firmly, with exports responding to import demand rather than exerting pressure on import markets; Canadian exports were moderate in the face of a large exportable surplus; and the combined shipments of Argentina, Australia, India, and "other" countries were the smallest since 1902–03. But Southern Hemisphere shipments increased rapidly in January and were unprecedentedly heavy during February–June. Meanwhile, the farm-holding movement weakened in the United States (p. 367), and higher wheat prices stimulated relatively heavy exports from this country and also from Canada and the Black Sea after early April. In so far as there was pressure of exports in 1906–07 it came in the latter half of the crop year; but even then, export pressure seems to have been less prominent than urgent import demand. The increased demand for Chinese imports was concentrated, as usual, in the later months; and so also was the relatively heavy Italian demand. Furthermore, during April–June, importers in other countries were influenced by poor crop prospects and rising wheat prices to buy additional foreign wheat for stocks building.

Consumption and carryovers.—In the world ex-Russia ex-India, wheat consumption rose to a new record level in 1906–07. This reflected not only the increasing world population, but also a notably heavy consumption of wheat per capita (Chart 4, p. 318).

In certain countries, large domestic wheat crops and low wheat prices encouraged heavy use of wheat for food: such was presumably the case in the Danube basin and Spain. In some other countries, among which we count Germany, Austria, Italy, Belgium, and Scandinavia and Finland, a long-standing tendency for per capita wheat consumption to increase was supplemented in 1906–07 by low wheat prices and unusual economic prosperity, which may have stimulated luxury consumption of wheat in the form of wheaten rolls, pastries, and cakes, and may have encouraged bakers to increase the proportion of wheat flour to rye flour in the common bread.[1] Furthermore, in northwestern Europe, feeding of wheat was probably heavier than in 1904–05 or 1905–06, though less important than in several earlier years. In Canada, statistical evidence of heavy wheat utilization may perhaps be partly attributed to fairly heavy feeding, though it may mainly reflect overestimation of the 1906 Canadian crop.

As noted above, the world wheat supplies of 1906–07 were far in excess of normal consumption requirements, even increased as these were by the size and distribution of the world wheat crop, low wheat prices, and other factors. Consequently, at the end of the crop year, world wheat stocks were strikingly large—indeed, of record size. But either excluding or including surplus Russian stocks, the world carryover was less far above normal than it had been in 1894–96 and again in 1899.

As in former years of large carryover, the surplus stocks of 1907 were heavily concentrated in the United States; but Canada, the Danube basin, and importing Europe, too, held above normal carryovers. In all of these areas wheat was apparently held willingly and not as a burden, with holders encouraged by recent advances in commodity prices.

Prices.—More important for the level of

[1] During several months of 1906–07 domestic wheat sold at Berlin (Germany) and Gröningen (the Netherlands) at prices scarcely, if any, higher than domestic rye.

recorded wheat prices in 1906–07 than any other single factor was the rising trend of commodity prices in general. The transition from 1904–05, a year of relative tightness in the international wheat position, to 1906–07, a year of sizable surplus, was associated with a decline of less than 3 cents per bushel in the recorded average price of British import wheat. But the deflated price fell 14 cents, reflecting fairly well the change in the supply position. It is reasonable to suppose that if most commodity prices had not risen so rapidly from the summer of 1904 to the summer of 1907, wheat stocks would have been held less willingly, and recorded prices at leading markets would have stood considerably lower in 1906–07.

At Liverpool and Chicago, wheat futures prices declined 6 to 10 cents per bushel during July–August 1906, as traders attempted to adjust to current prospects for increased wheat supplies. But after a slight reaction during the first two weeks of September, futures prices remained remarkably stable through March, in the face of accumulating evidence that the supplies were even larger than had been earlier anticipated.

Probably the one factor that operated most strongly to support wheat prices during this period was the light movement of wheat to primary markets in the United States. During July and early August market receipts of winter wheat had been heavy; but by mid-August prices had fallen so low that farmers were no longer willing to market freely. This holding movement, most prominent during September, persisted at least through January. Reported market receipts in that period were the smallest in six years, totaling only 118 million bushels as compared with 136 million in the same months of the preceding year, when the available wheat supplies were supposedly much smaller.[1] The light receipts in the fall and early winter of 1906–07 led many traders, and Broomhall as well, to believe that the United States wheat crop of 1906 had been overestimated. Thus, for at least five months, there was little market pressure, either physical or psychological, from the large American wheat supplies.

Other firming factors during the first half of 1906–07 were (1) a good European import demand (see p. 365) and (2) moderate Russian exports. Despite the huge Danubian surplus, Russian and Black Sea shipments were substantially smaller during August–January 1906–07 than they had been in any of the three preceding years (Charts 10 and 16, pp. 340, 363). Moreover, there was the constant threat that political developments might suddenly bring an end to Russian exports and even interfere with shipments from the Danube countries.[2]

As long as the Southern Hemisphere crops remained uncertain and there was disagreement as to the size of United States wheat supplies and prospective Russian exports, one could reasonably question whether the total exportable supplies would be adequate to cover the expected large import demand of 1906–07.[3] But after the full size of the Southern Hemisphere crops became known (in January) and the passage of time had brought cumulated weekly shipments from Russia to a sizable figure, uncertainty as to the existence of a heavy world wheat surplus could rest only upon serious underestimation of the American crop or overestimation of the import demand. During February and March, Broomhall persisted in his belief that American supplies had been overestimated; and there is also some indication that his forecasts of the year's import requirements were then somewhat too high.[4] But March and April brought a gradual change in Broomhall's wording with respect to the international supply position. By April 2, he stated a bit uncertainly: "we must still expect supplies to be fair to liberal, but probably not above the demand." And on May 7 he observed: "there is no disguising the

[1] See Table V.

[2] In April 1907 Broomhall reported that the Association of Danubian Exporters had asked German importers to grant an extra month on the filling of contracts, because the movement of wheat had been hindered by an uprising of the peasants (*Corn Trade News*, Apr. 2, 1907, p. 902).

[3] *Ibid.*, Oct. 30, 1906, p. 1206, and Nov. 27, 1906, p. 1488.

[4] Broomhall laid stress upon the prevailing famines in Russia and China, and the recent buying of bread grains by the Russian government, which had finally moved to aid the famine-stricken areas. *Cf. ibid.*, Mar. 5, 1907, p. 632.

fact that the supplies in sight are ample or even super-abundant if the crop prospects should presently take a change for the better."

One of the primary factors responsible for the change in Broomhall's evaluation of the wheat position was the abnormally heavy receipts of wheat in United States markets during February–May (Table V). With receipts heavy and exports moderate, the American visible supply declined less than usual during February–March and actually increased slightly during April—a development quite without precedent (Chart 17). During the same weeks Argentine shipments were heavier than ever before, and the world visible supply, declining slowly, stood after March 1 at the highest level seen during that season of the year since the mid-'nineties.

More than offsetting these developments, however, were the sensational reports and rumors of poor crop prospects circulated after the beginning of April. In the United States and in central and southeastern Europe, abandonment of winter-wheat acreage was heavier than usual, and the condition of several of the most important crops was below average in early May. In the United States Southwest, drought and "green bugs" furnished the basis for bullish predictions; and in the North American spring-wheat region, prolonged cold weather delayed and curtailed wheat seedings. Published (often exaggerated) statements of these unfavorable conditions encouraged public buying of wheat futures in North American markets, and forced wheat prices sharply upward in the face of earlier severe declines in the New York stock market. Reports of serious drought in the Danube countries and Russia contributed to the bullish sentiment; and farmers, merchants, and importers, previously willing to hold sizable stocks of wheat, suddenly became anxious to do so.

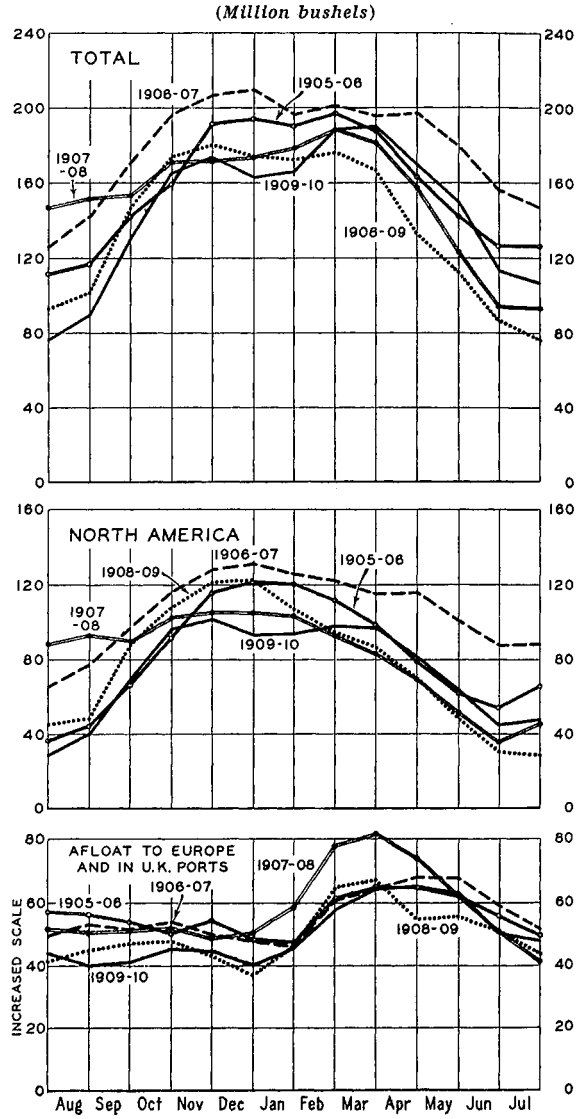
Wheat price developments at Liverpool and Chicago during April–July showed many of the characteristics of a normal crop-scare cycle, but in retrospect it appears surprising that the original advance was not greater.[1]

[1] This was probably due partly to the pressure of immediate large wheat supplies and to some restrictive influence from bearish sentiment in the New York stock market. Of the latter, however, there is no real evidence in the daily reports on the wheat market.

The April–May rise was followed by reaction in June; and, after a short interruption attributable to further bad crop news, the downward movement continued during July and the first

CHART 17.—VISIBLE WHEAT SUPPLIES, IN TOTAL AND IN CERTAIN POSITIONS, MONTHLY, CROP YEARS 1904–05 TO 1909–10*

(*Million bushels*)



* Data from Broomhall's *Corn Trade News*.

half of August. But in mid-August wheat futures prices still stood substantially above the levels of early April. As is usual during crop-scare cycles, Chicago prices showed stronger movements than Liverpool prices; and on the April–May advance Liverpool–Chicago price spreads narrowed considerably, only to widen again when reaction set in.

Throughout the crop year, inter-option price spreads at Chicago reflected the abundance of immediate wheat supplies. For the first time in five years, distant futures at Chicago more or less constantly commanded premiums over the near futures and over cash wheat.

THE CROP YEAR 1907–08

Wheat supplies.—The large deficiency in the world wheat harvest of 1907 was well reflected in the crop forecasts published by Broomhall and other leading authorities in July–August 1907. Although the early forecasts proved too optimistic for Russia and somewhat wide of the mark for several other countries, they were reasonably accurate for the world ex-Russia ex-India as a whole. For this "world," Broomhall forecast a reduction in outturn from 1906 of roughly 340 million bushels,[1] not very different from the reduction of 326 million bushels indicated by crop data now at hand. In contrast, the Russian crop, which in late July and August 1907 was expected to exceed the poor harvest of the previous year by 75 to 100 million bushels, later proved to be only insignificantly larger; and Russia unexpectedly contributed less wheat to international trade in 1907–08 than in any of the preceding 15 years. Nor was India able to compensate for the decline in Russian shipments. Rather, the combined exports of these two countries were next to the smallest recorded since 1885–86, exceeding only the notably small exports of 1899–1900.

Even the huge wheat carryover of 1907 could only partially offset the large deficiency in the 1907 wheat output. Five years earlier the total supplies available for 1907–08 would have appeared relatively large, but a rapidly growing population had so changed the situation that the amount of wheat available per capita in 1907–08 was small, smaller than in all but two of the fifteen preceding years.

[1] *Corn Trade News*, July 2, 1907, p. 33, and Aug. 20, 1907, p. 545. For comparative purposes, we give Broomhall's estimated reduction for the countries included in our world total, excluding from his published total not only Russia and India but also Turkey, Persia, etc.

[2] This was apparently true even in Canada, where only 51 per cent of the western crop graded No. 3 Northern or higher.

The wheat supplies of 1907–08 were light in exporting rather than in importing countries. In importing Europe, total domestic supplies of wheat were unprecedentedly large, and even in per capita terms they were of good size. The greatest reduction in the world ex-Russia ex-India was in the Danube basin, where per capita supplies were lower than in any of the preceding 15 years except 1897–98. Australia and the United States also had small wheat harvests and relatively low per capita supplies; and Canadian supplies, though larger than in most past years, were below their trend. Indeed, among the chief exporting areas, only Argentina had large supplies of wheat, trend considered: her supplies were of record size, both in total and per capita.

Rye, potatoes, and feed grains.—In 1907–08 the supply of rye was short in Europe ex-Russia, the outturn of potatoes was small in the British Isles and Scandinavia, and most European corn and barley crops were mediocre. In contrast, oats made a bumper crop in Europe ex-Russia. In the United States there were no bumper crops; the outturn of oats was considerably below average, and yields of corn and barley were mediocre.

In most countries rye and feed grains commanded high prices in 1907–08; but since the price of wheat was also high, grain-price relationships were about as usual. Probably most abnormal were the price relationships in the United States. There oats and barley sold unusually high as compared with wheat, and in the summer of 1908 the price of corn rose rapidly in relation to wheat prices. Under those circumstances and despite good wheat quality, somewhat more wheat than usual may have been fed in this country (an inference in line with the available utilization statistics). Elsewhere, however, wheat feeding was more commonly below than above normal levels.[2]

International trade.—The large wheat supplies in importing Europe, the high level of world wheat prices, and general recession and depression in economic activity so restricted wheat imports in 1907–08 that the total volume of world trade was the smallest in six years.

Although the estimated wheat supplies in

importing Europe were only about 20 million bushels larger in 1907–08 than in 1906–07, the aggregate net imports of that area were reduced 63 million bushels in the face of an increasing population. Both British and Continental imports were smaller than for several years. Countries such as Austria, Switzerland, Belgium, Denmark, and Greece, whose annual import requirements had previously been tending upward, not only checked further expansion of imports and consumption, but actually reduced these in 1907–08. Of the four principal variable importers (France, Italy, Germany, and Spain), only Germany took moderate or fairly large imports, and only France was favored with such a large domestic crop that small imports were adequate to provide for relatively heavy consumption. Indeed, even the sizable German imports were apparently not large enough to maintain per capita wheat consumption in Germany at as high a level as had prevailed in the five preceding years.

Outside of Europe, China imported 6 or 7 million bushels less wheat than in 1906–07 and the takings of other non-European countries were probably reduced several million bushels more.[1] In total, European and non-European net imports seem to have declined almost 75 million bushels from 1906–07, the reduced imports being reflected partly in reduction of wheat stocks, partly in reduction of per capita wheat consumption.

The wheat export movement of 1907–08 was characterized by two distinctive features: (1) unusually light exports from southeastern Europe, combined with unprecedentedly large exports from the four chief overseas exporting countries; and (2) abnormally light world shipments in the last quarter of the crop year. The notably small exports of wheat from the Danube basin and Russia may be readily explained on the basis of the small surpluses available in those areas. The record overseas exports reflected exceptionally heavy Argentine shipments and good-sized exports from North America. Large Argentine and Canadian exports were the direct result of large wheat supplies, which in Argentina were above trend but in Canada were below. United States exports were the largest in five years, not because of larger per capita wheat supplies but because of the pulling force of high wheat prices at a time when financial disturbances made the holding of wheat difficult and expensive.

In response to rising wheat prices and a good import demand, American and Black Sea shipments increased sharply during August–September 1907, bringing total wheat shipments to an abnormally high peak about the first of October. Thereafter, exports from the Black Sea declined about as rapidly as they had previously increased, and after mid-December averaged only ½ to 1 million bushels weekly. Meanwhile, North American shipments, partly forced by the financial crisis in the United States, continued heavy in the face of declining prices until about the end of December; then they tended steadily downward through April.

After early January, Argentine shipments assumed increasing importance, rising to a well-sustained peak in February–March that far surpassed similar peaks in earlier years. But by mid-April, the Argentine movement had spent its force; exportable supplies had been reduced to notably low levels in other exporting countries; and European importers, lulled to inaction by the promise of large arrivals in the near future, were reluctant to make future commitments. Reflecting these diverse factors, world wheat shipments during May–July were extraordinarily small (Chart 16, p. 363), and in relation to the crop-year's shipments they were smaller than in any other prewar year from 1890 to 1913.

Consumption and carryovers.—There is no question that 1907–08 witnessed a substantial and widespread reduction in per capita wheat consumption in the world ex-Russia ex-India. But the exact magnitude of the reduction is uncertain: it may have been either greater or less than is suggested by Chart 4, p. 318.[2]

In the Danube basin and the western Mediterranean area, where coarse grains serve as important supplementary foods, especially in

[1] This brings the total indicated reduction in non-European imports to at least 10 million bushels, a figure appreciably larger than is suggested by Table IX.

[2] Important basic data for this chart are our estimates of annual year-end carryovers, which are open

years of small domestic wheat crops such as 1907, wheat was undoubtedly used more sparingly in 1907–08 than for some years past. In another group of countries, where per capita wheat consumption had been tending upward —Germany, Austria, Belgium, the Netherlands, and Switzerland (perhaps also Italy)— the relatively high wheat prices of 1907–08 and the onset of general business recession apparently resulted in a material reduction in consumption. Curtailment of luxury uses of wheat in these countries and reduction of wheat feeding in Belgium and the Netherlands (also in the British Isles) were important developments. In Scandinavia and Finland the upward trend of per capita consumption was temporarily checked but not reversed. In contrast, France, with a bumper harvest, was able to expand consumption without recourse to large imports.[1]

Disappearance data for the overseas exporting countries suggest a new high record for per capita consumption ex-seed in Argentina, moderate per capita consumption in the United States, and relatively low per capita consumption in Australia and Canada. To some extent these apparent differences are probably attributable to errors in estimates of crops, carryovers, and population. But in any case, it seems not unlikely that Canada and Australia, with smaller crops in 1907 than in 1906, utilized somewhat less wheat per capita for flour stocks and feed than they had in 1906–07; whereas Argentina, with a bumper harvest and a prevailing upward trend of per capita wheat utilization, perhaps used and wasted more wheat per capita than she ever had before.

At the end of 1907–08, year-end stocks of wheat were quite low in the United States, the Danube basin, and on ocean passage to Europe, and fairly high only in importing Europe, where large carryovers in France and the United Kingdom more than offset low to moderate carryovers elsewhere. For the second successive year Russia held no surplus stocks. "World" stocks were thus reduced from a notably high level on August 1, 1907 to a fairly low level on August 1, 1908. Indeed, in relation to estimated "normal" stocks requirements (Chart 6, p. 328), the 1908 carryover was roughly comparable with the small carryover of 1902 and smaller than in any other year since 1898.

Prices.—International wheat prices seem fully to have reflected the change from an easy world wheat position in 1906–07 to a tight position in 1907–08. Recorded cash wheat prices during 1907–08 averaged 19 cents per bushel higher on the British import market and 17 cents higher at Chicago than they had during 1906–07; and the same prices deflated were 26 and 19 cents higher, respectively. Over the 15 preceding years, beginning with 1892–93, British import wheat prices, both actual and deflated, had stood lower in every year except 1897–98.

As noted above (p. 368), reaction from the price advance of April–May 1907 continued through mid-August. Then, however, the reaction was checked, and prices started an upward movement which lasted until early October. The renewed strength at Chicago was in a sense extraordinary: the previous price movement from early April had shown the characteristic earmarks of a simple crop-scare cycle, in which the summer weakness might have been expected to persist longer and until prices should have fallen considerably below the level that had been reached by mid-August. That prices turned upward at that time was thus remarkable. It is true that the latter part of August witnessed increased reports of suspected crop damage—frosts and wet harvest weather in the North American spring-wheat region[2] and apparent confirmation of poor grain crops in Germany; but these developments would not have been sufficient to sustain prices in the downward phase of an ordinary crop-scare cycle. Much more important was the growing conviction among

to the greatest question in pairs of years such as 1906–07 and 1907–08, of which the earlier is characterized by heavy wheat supplies and apparently heavy consumption and the latter by substantially reduced supplies and consumption.

[1] In 1907–08 French wheat prices stood lower relative to British import wheat prices than they had for at least five years.

[2] These were not reflected in the official estimates of the total United States crop, currently interpreted as follows, in million bushels, during July–December: July, 633; August, 639; September, 634; October, 626; December, 634.

traders in both Europe and America that the supplies of wheat available for 1907–08 would fall considerably short of the demand at current price levels. And at Chicago, there were rumors in late August that J. A. Patten and several other large traders were accumulating large quantities of wheat in connection with a big "bull" campaign.

In leading European markets, traders who had only partially followed the advancing tendency at Chicago during April–May willingly bid up prices with but little active support from Chicago during August–October. To these traders the international supply situation for 1907–08 appeared definitely bullish. On August 6 Broomhall commented in his *Corn Trade News* (p. 391): "The difference between the debit and credit side of the season's prospective supplies amounts to 9,200,000 quarters [74 million bushels]. . . . . This deficiency is bigger than any we have set down in these columns in recent years, in fact we cannot trace any former exhibit at all comparable with it." The next two weeks witnessed continued small Russian shipments, improvement in the Continental import demand, and reports of frosts and later rains in the North American spring-wheat belt. On August 27 Broomhall noted (p. 613): "We are now well into the new season, and as it progresses it seems to develop strength, crop estimates are not being raised . . . . but on the contrary are being shaded off. . . . ."

In response to these developments, wheat prices rose sharply in all markets. Broomhall then began to consider what effect the higher level of prices would have in (1) curtailing the demand and (2) increasing exportable supplies. His revised trade forecast of September 10 showed a much smaller deficiency of supplies than his earlier calculation, but the deficiency was still large, roughly 38 million bushels. Several days later, publication of an unprecedentedly low official crop estimate for Russia induced many traders to raise their estimates of the indicated deficiency. Prices continued to rise, more strikingly in European than in American markets.

Not until mid-October was the price advance checked by sudden weakness, most prominent at Chicago. Current market data had been bearish for several weeks, the European import demand had become less active, and United States wheat markets were beginning to react to the unsettled feeling in American financial circles. From October 16 to November 8 the May and December wheat futures at Chicago declined 10½ and 14½ cents respectively, or 10 and 14 per cent—declines which, though large, appear fairly moderate in view of the attendant circumstances. These circumstances included bank and business failures in all parts of the country; widespread public hoarding of money, with development of significant premiums on currency; temporary increase in interest rates on call money to 75–125 per cent; renewed substantial declines in the New York stock market; declines of varying degree in all other commodity markets; closure of the Duluth grain exchange; and in most large cities resort to "cashless" bank checks and later to clearing-house certificates as means of payment.

Even after the worst of the financial crisis had passed, tight money conditions interfered with the normal merchandising of American wheat; and wheat that ordinarily would have been held in this country several months longer was pushed promptly into export channels—most rapidly during October–December, but at a continuing abnormal rate during January–February. This prolonged and unexpected pressure of American exports, coinciding after November with increasing evidence of and later actual pressure from the huge Argentine surplus, caused traders and importers to revise their ideas as to the tightness of the current wheat position.[1] As a result, the price decline which originated in mid-October continued with but slight interruption through mid-February.[2]

[1] In early December Broomhall was counting on an Argentine surplus of 15 million quarters; on January 7 he noted that "everyone" was expecting a surplus of 17 million quarters; and by early March he was quite willing to accept the revised official Argentine crop estimate which implied a surplus of 19 million quarters.

[2] During most of this period, there was heavy speculative trading at Chicago by Patten and the Bartlett, Frazier and Carrington interests, known as the "bulls," and in January, at least, by Armour, who was then operating as a bear. See Taylor, *op. cit.*, II, pp. 1126, 1133.

From late February through June, wheat futures prices were irregularly firm at levels about the same as had temporarily prevailed in mid-August 1907, prior to the big price advance. Important among the developments of this period were: (1) a marked subsidence of export pressure, first from the United States and later from Argentina as well; (2) light purchases of foreign wheat by European importers and millers during April–June; (3) crop news that was neither notably favorable nor notably unfavorable; and (4) an extraordinarily rapid decline of world visible wheat supplies to a level on July 1 that was the lowest for that date since 1898. At Chicago, the period was marked by successful manipulation of a squeeze in May wheat led by Armour and of squeezes in May oats and May corn led by Patten. May wheat, which in mid-April was selling at a premium of less than 7 cents over the July future, sold for a while in May at premiums of more than 15 cents.

During July, wheat prices in all leading markets commenced a slow persistent advance which continued until the following April. Weekly shipments remained low in July and stocks of old-crop wheat dwindled. Moreover, although crop developments were nowhere sensationally bad, estimates for most of the principal producing regions were shaded downward during the month. The wheat situation thus appeared somewhat bullish at the end of 1907–08, both for immediate wheat supplies and for the supplies of the coming crop year.

The Crop Year 1908–09

Wheat supplies.—By August 1908, most observers were agreed that the new world wheat crop (including Russia) did not differ by more than 100 million bushels from the short crop of 1907.[1] In addition, there was general recognition that the carryover of old-crop wheat was relatively small and that the total available supplies were likely to be short in relation to the prospective demand.

As now appraised, the 1908 world crop ex-Russia ex-India appears to have been only 23 million bushels larger than the small crop of 1907, and, like that crop, roughly 100 million bushels below the line of trend. Moreover, although Russian and Indian exports in 1908–09 were somewhat larger than in the preceding year, this increase was much more than offset by reduction in the old-crop carryover. Total wheat supplies were over 100 million bushels smaller than in 1907–08, and per capita supplies were distinctly the smallest in 20 years, with the single exception of 1897–98.

Of the principal producing countries, none had notably large per capita supplies, and in many the supplies were distinctly small, trends considered. In the United States per capita supplies were slightly larger than they had been in 1904–05, but otherwise they were the smallest in more than twenty years. During the same two decades, per capita supplies in importing Europe and in the Danube basin had been equally small or smaller in only four years. Even in Canada, Australia, and Argentina, where wheat production had been tending upward and per capita wheat supplies were larger than in most of the preceding twenty years, the supplies were still moderate to low, trends considered.

Potatoes, rye, and feed grains.—In Europe ex-Russia, potatoes and rye were in good supply in 1908–09, and it is possible that high wheat prices and economic depression in some countries encouraged somewhat heavier consumption of these foods at the expense of wheat. But substitution of cheaper foods for wheat was presumably most important in the Danube basin, Spain, and perhaps Italy, where small domestic wheat crops, high wheat prices, and moderate crops of corn and barley probably encouraged farmers to use less wheat and more corn and other cereals for food. Ample supplies of feed grains and high wheat prices in northwestern Europe apparently discouraged wheat feeding. In the United States, feed-grain supplies were rather small, but the shortage seems not to have been great enough to result in heavy feeding of wheat in the face of high wheat prices.

International trade.—The relatively low per capita wheat supplies in importing Europe

[1] At this time Broomhall was anticipating an increase in the 1908 harvest, whereas some other authorities were anticipating a small reduction.

at the beginning of 1908–09 were believed by Broomhall and others to foreshadow a heavy European import demand. Actually the European demand proved strikingly light. To judge by net-import data, it had not been so light since 1900–01; to judge by Broomhall's shipments to Europe, it had been lighter in 1907–08, but otherwise not since 1901–02. The small European imports cannot be ascribed to import developments in one or even several importing countries. Rather, every importing country in Europe except France, Sweden, and Norway took smaller imports than its domestic supply position alone would seem to have warranted. Not one European country reported record-large imports; and only Portugal, with a poor harvest, reported imports above normal, trend considered. Moreover, two of the most variable importers, France and Spain, took less than 3 million bushels of foreign wheat apiece. This was the smallest net import for France in 30 years; for Spain it was the third smallest in 25 years.

Non-European imports were also relatively light, probably mainly in reflection of the high level of world wheat prices. Of the various non-European importers, only Egypt and Tunis took unusually large amounts of foreign wheat in 1908–09, and even these countries did not import enough wheat to compensate for the exceptional deficiencies in their own crops. Broomhall's shipments figures suggest that total non-European takings were smaller in 1908–09 than in any year since 1900–01, but incomplete net-import data suggest that they were scarcely so low as in either 1901–02 or 1903–04, when Brazilian imports in particular were significantly smaller.

Although world net imports were smaller in 1908–09 than in 1907–08, world net exports were slightly larger in the later year. This discrepancy mainly reflected the more normal seasonal distribution of exports in 1908–09, and particularly the larger exports of June–July 1909. As in 1907–08, the North American surplus was exhausted before spring and the Southern Hemisphere countries had little wheat left to export after the end of April. But, as had not been true in 1907–08, Russia kept sizable reserves of wheat for export in May–July 1909, and India, favored with a good new crop, was able to contribute substantially to the export movement in these months.

Most exporting countries were encouraged by the high wheat prices of 1908–09 to export as much wheat as possible. Exports were exceptionally heavy in relation to available surpluses in the United States, Canada, Australia, Argentina, and several of the Danubian countries. Canada and Australia, with large but not record surpluses, exported more wheat than ever before. In the United States, notably small domestic wheat supplies naturally resulted in small exports, but the exports were less strikingly small in comparison with past years than were the total supplies. Argentina, with a wheat surplus reduced by 28 million from 1907–08, was able to keep her net exports within 16 million bushels of the record total for that year.

For the first time in history Argentina ranked in 1908–09 as the world's largest net exporter of wheat. At 115 million bushels, her exports barely exceeded the relatively light net exports of the United States; but Russian and Danubian exports, which in most past years had been substantially larger than Argentine exports, fell short of these by about 20 million bushels in 1908–09. The emergence of Argentina as the world's premier exporter was not, however, of great significance: it reflected for its time an abnormal distribution of exportable wheat supplies, and through 1940–41 has been repeated only twice.

Consumption and stocks.—More strikingly even than in 1907–08, wheat consumption was severely restricted in 1908–09 by high wheat prices, widespread economic depression, and the general distribution of the world's wheat crop. Per capita wheat disappearance in the world ex-Russia ex-India was lower than in any year since 1900–01, but in relation to trend, it was not nearly so low as in either 1900–01 or 1897–98.

Curtailment of wheat consumption in 1908–09 is suggested by the domestic utilization statistics of all heavy wheat-consuming

countries except the United States, Argentina,[1] Hungary, and France. In the Danube basin (exclusive of Hungary), Spain, North Africa, and perhaps Italy,[2] small domestic wheat supplies and high wheat prices encouraged substitution of coarse grains for wheat as food; and in Germany and Austria, economic depression and the high level of wheat prices in relation to rye prices curtailed luxury consumption of wheat products and temporarily checked the long-run tendency to shift from rye to wheat. The same factors perhaps operated on a small scale in Denmark, Holland, and Switzerland; but in these countries, as also in Belgium and the British Isles, the tendency for high wheat prices to reduce feeding of wheat was probably of major importance.

Almost everywhere old-crop stocks of wheat were drawn down to "low-normal" or minimum levels in the summer of 1909. The general stocks position was apparently somewhat less tight than it had been in 1898; but over the past half century, 1898 and 1909 stand out as the two most extreme examples of a tight world wheat situation in times of peace.[3]

Prices.—The tight wheat position of 1908–09 was reflected in a higher level of wheat prices than had prevailed in 1907–08. As recorded, British import prices averaged 7 cents higher and Chicago basic cash prices 15 cents higher. In terms of purchasing power over other commodities these increases both approximated 13 cents.[4] Yet deflated wheat prices were still appreciably lower than they had been in 1897–98, when the wheat-commodity position had been still tighter, and normal costs of production and transport had been somewhat higher.

The course of wheat prices in 1908–09 (after mid-October almost the reverse of that in 1907–08) is easily described in terms of its three major phases: (1) a prolonged upward movement from late June 1908 to the middle of April 1909, quite moderate through mid-January but definitely sharper thereafter; (2) sustained strength reflected in a price movement that was roughly horizontal to slightly upward from mid-April to mid-July; and (3) a sharp decline, beginning in mid-July 1908 and extending into the early weeks of the following crop year.

The extended price advance during the summer, fall, and winter of 1908–09 reflected the gradually growing conviction among traders and merchants that the current wheat supply position was distinctly tighter than it had been the year before. Early in the season Broomhall and other authorities did not seem greatly impressed with the inadequacy of the current wheat supplies. Broomhall was more cautious in his statements than a year earlier, perhaps partly influenced by recollections of the "false alarms" then given.[5] But probably more important were the notably heavy marketings of United States wheat through mid-October and the favorable early crop reports from the Southern Hemisphere, which implied the possibility of record harvests in both Argentina and Australia. After mid-October, however, wheat marketings fell off sharply in the United States and heavy frosts substantially damaged the Argentine crop. Broomhall's trade forecasts reflected this change of outlook. His first statistical summary, published October 27, showed an exact balance between import requirements and exportable surpluses; but his revised summary, published November 17, indicated a net deficit of 55 million bushels.

Had traders generally changed their views

[1] Errors in the statistics probably account for the exceptionally high per capita disappearance in Argentina, and also for the notably low per capita disappearance in Australia and Canada. There is little reason to suppose that in any of these three countries the actual per capita use of wheat was abnormally high or low, trend considered.

[2] It seems probable that in Italy reduction of luxury consumption of wheat as a result of the general economic depression was more important.

[3] For comparisons, see Farnsworth, "'World' Wheat Stocks, 1890–1914 and 1922–39," pp. 59–60.

[4] The striking differences between the recorded and deflated prices are attributable to the fact that the Sauerbeck index of wholesale prices *declined* 3.4 per cent between 1907–08 and 1908–09, while the U.S. Bureau of Labor Statistics index showed an average *increase* of 3.2 per cent.

[5] It will be recalled that in August 1907 Broomhall's estimates showed a deficiency in required exportable supplies of almost 75 million bushels, the largest deficiency he had ever calculated. This contrasted with his revised estimates, published in late October 1907, which showed a deficiency of only 16 million bushels.

of the wheat position as promptly as Broomhall did, wheat prices might have risen more rapidly between mid-October and the end of November. As it was, the price advance during this period was relatively small, mainly reflecting uncertainty concerning (1) the degree of damage suffered by the Argentine crop and (2) the amount of wheat remaining on farms in the United States.

These uncertainties persisted strongly through January, if not well into February. In late January, currently accepted estimates of the new Argentine surplus differed widely. Several unofficial estimates indicated a record surplus, the standing official crop estimate suggested a reduction of 12 million bushels from the record established in 1907, and Broomhall's agent maintained his earlier claim that the surplus had been reduced 36 million bushels.[1] Meanwhile Broomhall, accepting his agent's low estimate for Argentina, had become more openly and confidently bullish. On January 5 he published an estimate of the total exportable supplies available for Europe through July and thereon commented: "Such a prospective deficiency appears to be positively startling, but in the present temper of the trade with impending heavy shipments for ten or twelve weeks from Argentina and Australia it is regarded with equanimity."[2]

Not for long, however, did the trade maintain this attitude of complacency. After mid-January world wheat prices began to climb again, and during the next few weeks traders became more and more impressed by the accumulated evidence of inherent strength in the wheat position. In importing Europe, wheat reserves were low and the import demand was active; in southeastern Europe, port stocks were small and reports of gathering war clouds demanded attention; and in North America, exportable wheat supplies were virtually exhausted, wheat prices were already above an export parity, and there were rumors and increasing evidence of a large bull interest in the Chicago May future. In short, wheat reserves were everywhere light except in Argentina and Australia; and these two countries appeared quite incapable of meeting all the demands likely to be made upon them before the end of the Northern Hemisphere crop year. As knowledge of these facts increased, bullish sentiment mounted and prices rose sharply to mid-April.

Thereafter, until the middle of July, prices fluctuated about a horizontal or slightly rising trend on changing evaluations of the immediate wheat position and of the crop outlook for 1909–10. Tending to check further advances were the unexpectedly large shipments from India, Russia, and the Danube basin. But these exports, pulled out mainly by the current high prices, were badly needed in Europe; they did not depress prices, but simply prevented further substantial advances that would presumably have occurred in their absence. Crop developments were not spectacular during this period, and wheat-price movements were dominated by developments bearing on the immediate wheat position.

In the Chicago market, where the May wheat future was virtually under the control of Patten and his associates, there was no extreme price rise in April–May indicative of a squeeze. Yet Patten's operations, said to have involved a line of May wheat in the neighborhood of 30 to 40 million bushels,[3] were apparently terminated with handsome profits to the bull clique. No burdensome "corpse" remained, for May deliveries were relatively light and the cash demand was exceptionally good. At the end of May there was still a small outstanding short interest, which Patten allowed to settle at $1.34 per bushel,[4] a price that could publicly be justified as approximating the current economic value of wheat.

After mid-July, the new-crop position assumed greater importance in both American and European markets. Uniformly good reports of the Russian harvest called forth predictions of heavy Russian and Black Sea shipments in the near future, movement of the United States winter-wheat crop tended to depress cash premiums in the United States and to cheapen offers of American wheat on European markets, and improved weather in importing Europe encouraged observers to be

[1] *Corn Trade News*, Jan. 19, 1909, p. 189.
[2] *Ibid.*, Jan. 5, 1909, p. 39.
[3] Taylor, *op. cit.*, II, p. 1147.
[4] *Ibid.*

more optimistic about the world crop outlook. These factors were reflected in substantial price declines during the last two weeks of July: the Chicago July future fell about 20 cents per bushel, while the more distant Chicago futures and all Liverpool futures showed losses of 4 to 8 cents.

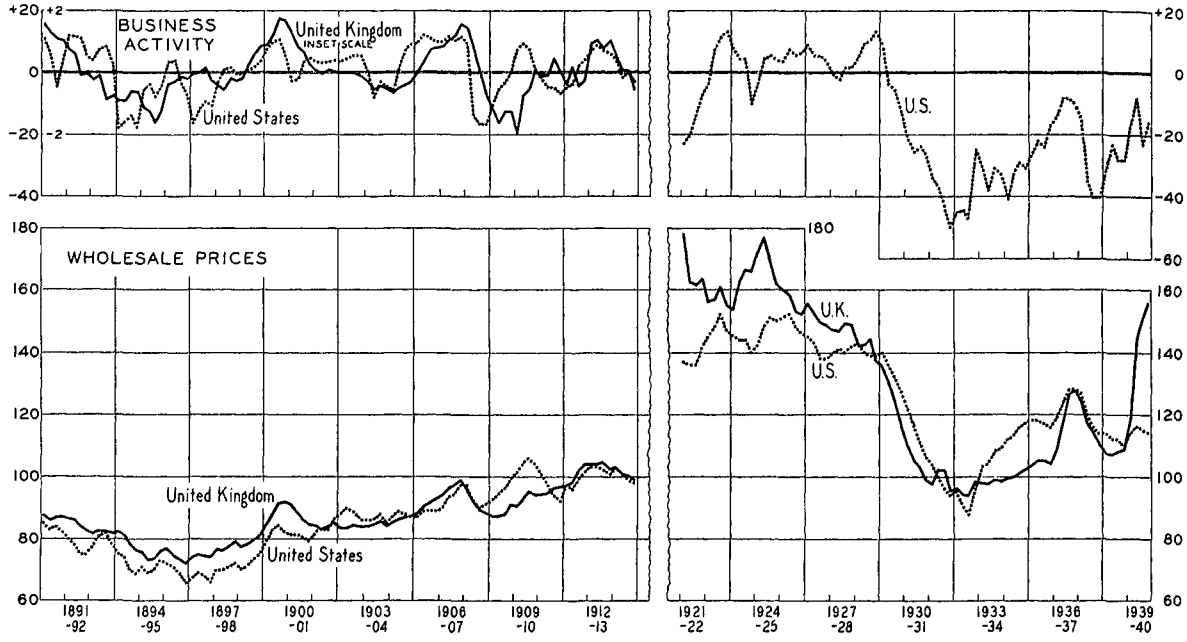
Negative price spreads between old-crop and new-crop futures at Chicago in the spring of 1909 well reflected the generally tight domestic wheat position. This was also reflected in the relationship between May futures at Liverpool and Chicago, the Chicago May future never standing at a sufficient discount under the Liverpool May to warrant expectation of sizable spring exports. At Liverpool, premiums on cash wheat and the nearer futures were relatively large throughout 1908–09 but especially so in the spring and summer months.

The writer is indebted to Holbrook Working for several suggestions bearing on statistical techniques, to Rosamond Peirce, Marion Theobald, and Jean Ballou for statistical and clerical aid, and to P. Stanley King for the charts.

APPENDIX CHARTS AND TABLES

CHART 18.—INDEXES OF BUSINESS ACTIVITY AND WHOLESALE COMMODITY PRICES IN THE UNITED KINGDOM AND THE UNITED STATES, QUARTERLY, AUGUST 1890–JULY 1914 AND AUGUST 1921–JULY 1940*

(Percentage deviations from "normal"; standard deviations from secular trend of business activity in the U.K.; price indexes based on 1910–14 as 100)



* For Cleveland Trust Company index of business activity in the United States (percentage deviations from "normal"), see L. P. Ayres, *Turning Points in Business Cycles* (New York, 1939), pp. 188–201; and for Dorothy Thomas index of business activity in the United Kingdom, see *Journal of the American Statistical Association*, March 1926, XXI, 60–63. A standard deviation of 1.0 from trend in the British index is plotted above as equivalent to a 10-per cent deviation from "normal" in the American index. The Sauerbeck-Statist index of wholesale prices in Great Britain is from various issues of the *Journal of the Royal Statistical Society*, expressed in terms of its average for 1910–14; and the United States Bureau of Labor Statistics index for the United States (1910–14 = 100) is from G. F. Warren and F. A. Pearson, *Prices* (New York, 1933), p. 351, and from various issues of *Farm Economics*, published by Cornell University.

TABLE I.—WHEAT PRODUCTION IN PRINCIPAL PRODUCING COUNTRIES AND AREAS, 1895–1909*

(Million bushels)

Year	World[a]	World ex-Russia ex-India	Four overseas exporters					Europe ex-Russia			Russia	India	French North Africa[d]	Other Northern Hemisphere[e]	Other Southern Hemisphere[f]
			United States[b]	Canada	Australia	Argentina	Total	Total	Lower Danube[c]	Others					
1895..	*2,756*	*2,028*	*668.9*	55.7	18.3	46.4	*789*	*1,108*	284	*824*	*466*	261	*45*	*58*	*28*
1896..	*2,655*	*1,992*	*612.6*	39.6	20.9	31.6	*705*	*1,167*	283	*884*	*462*	201	*40*	*55*	*25*
1897..	*2,389*	*1,809*	*685.0*	54.4	28.2	53.4	*821*	*864*	167	*697*	*382*	200	*36*	*55*	*31*
1898..	*3,175*	*2,390*	*831.6*	66.5	41.4	105.0	*1,045*	*1,204*	244	*960*	*516*	269	*45*	*57*	*39*
1899..	*2,926*	*2,162*	*682.2*	59.9	40.0	101.7	*884*	*1,148*	213	*935*	*508*	256	*39*	*58*	*33*
1900..	*2,715*	*2,043*	*638.6*	55.6	48.4	74.8	*817*	*1,091*	245	*846*	*472*	200	*50*	*60*	*25*
1901..	*2,997*	*2,256*	*828.9*	88.3	38.6	56.4	*1,012*	*1,105*	249	*856*	*476*	265	*49*	*61*	*28*
1902..	*3,210*	*2,307*	*737.9*	97.1	12.4	103.8	*951*	*1,218*	316	*902*	*676*	227	*50*	*59*	*29*
1903..	*3,354*	*2,367*	*681.5*	81.9	74.2	129.7	*967*	*1,259*	302	*957*	*690*	297	*54*	*48*	*39*
1904..	*3,203*	*2,104*	*581.0*	71.8	54.5	150.7	*858*	*1,107*	260	*847*	*739*	360	*46*	*58*	*35*
1905..	*3,364*	*2,378*	*727.2*	107.0	68.5	134.9	*1,038*	*1,214*	325	*889*	*703*	283	*42*	*54*	*30*
1906..	*3,484*	*2,603*	*759.7*	135.6	66.4	156.0	*1,118*	*1,341*	375	*966*	*561*	320	*52*	*58*	*34*
1907..	*3,165*	*2,277*	*636.8*	93.1	44.7	192.5	*967*	*1,161*	208	*953*	571	317	*51*	*60*	*38*
1908..	*3,157*	*2,300*	*654.5*	112.4	62.6	156.2	*986*	*1,168*	272	*896*	628	229	*46*	*58*	*42*
1909..	*3,587*	*2,456*	*712.7*	*140.0*[g]	90.4	131.1	*1,074*	*1,224*	234	*990*	846	285	*56*	60	*42*

Year	British Isles	France	Italy	Germany[h]	Austria	Switzerland	Belgium	Netherlands	Denmark	Norway	Sweden	Finland	Spain	Portugal	Greece
1895..	39.4	339.5	*153.1*	*104.9*	40.3	3.4	18.4	4.3	3.5	*.31*	3.8	.15	*99.4*	7.0	*7.0*
1896..	60.0	340.2	*188.8*	*113.1*	41.8	2.9	18.4	5.0	3.7	*.29*	4.8	.15	*92.5*	5.6	*7.1*
1897..	57.9	242.1	*113.0*	*107.9*	34.5	3.4	15.1	4.3	3.6	*.29*	4.7	.16	94.7	8.2	*7.2*
1898..	77.1	364.9	*178.5*	*119.3*	46.9	4.0	15.4	5.4	3.2	*.29*	4.7	.16	125.1	7.8	*7.3*
1899..	69.2	365.6	*179.3*	*127.2*	50.2	4.1	14.0	5.1	4.1	*.29*	4.7	.14	97.7	6.4	*7.4*
1900..	55.9	325.5	147.3	*127.0*	40.9	4.1	14.0	4.7	4.1	.33	5.5	.16	100.7	8.0	*7.5*
1901..	55.5	310.9	181.5	*82.6*	44.0	3.6	14.1	4.2	1.0	.32	4.5	.14	136.9	10.0	*7.6*
1902..	60.0	327.9	150.6	*129.0*	49.7	4.0	14.5	5.0	4.5	.26	4.7	.08	133.5	10.4	7.7
1903..	50.2	363.0	203.2	*117.6*	46.2	4.2	12.4	4.2	4.5	.31	5.5	.13	129.0	8.8	7.8
1904..	39.0	299.6	184.8	*125.8*	53.7	3.9	13.8	4.4	4.3	.21	5.2	.13	95.4	9.0	*8.0*
1905..	62.1	334.8	176.7	*122.3*	54.5	3.5	12.4	4.8	4.1	.33	5.5	.13	92.5	7.7	*8.1*
1906..	63.5	328.7	194.4	*130.3*	58.3	*3.0*	13.0	4.9	4.2	.30	6.7	.15	140.7	9.6	*8.2*
1907..	58.0	381.2	195.5	*115.0*	52.4	*3.0*	15.8	5.2	4.4	.29	6.2	.14	100.3	7.6	*8.3*
1908..	55.5	316.7	167.9	*124.6*	62.1	3.5	13.4	5.0	4.6	.33	7.0	.11	120.0	6.9	*8.4*
1909..	64.2	359.2	190.4	*124.2*	58.5	3.6	14.6	3.9	4.3	.31	7.4	.13	144.1	6.5	*8.5*

Year	Hungary	Bosnia-Herzegovina	Serbia	Rumania	Bulgaria	French Morocco	Algeria	Tunis	Egypt	Japan	Chosen	New Zealand	Uruguay	Chile	South Africa
1895..	172.0	2.6	8.8	68.4	32.0	*11.3*	26.1	7.5	*32.5*	19.2	*5.9*	6.8	4.1	12.0	*5.4*
1896..	161.3	2.5	8.1	71.2	40.0	*11.4*	22.8	5.6	*31.5*	17.2	*5.9*	5.9	3.6	10.5	*5.4*
1897..	87.0	1.5	13.2	36.4	28.9	*11.5*	19.8	5.0	*30.5*	18.4	*6.0*	5.7	6.0	14.0	*5.5*
1898..	139.6	2.3	9.6	58.5	34.0	*11.6*	27.2	6.5	*31.0*	20.2	*6.0*	13.1	7.2	13.0	*5.5*
1899..	150.3	3.0	11.8	26.1	21.6	*11.7*	22.4	4.8	*32.2*	20.0	*6.1*	8.6	6.9	12.0	*5.6*
1900..	152.1	2.3	8.1	56.7	25.9	*11.8*	33.4	4.9	*33.0*	20.5	*6.2*	6.5	3.7	9.0	*6.0*
1901..	134.6	2.2	8.1	71.7	32.0	*11.9*	32.3	4.6	*33.8*	21.1	*6.3*	4.0	7.6	10.6	*6.0*
1902..	182.9	2.4	11.4	79.0	40.0	*12.0*	33.8	4.3	*33.8*	19.1	*6.4*	7.4	5.2	10.1	*6.0*
1903..	176.6	3.9	10.9	75.3	35.6	*12.2*	34.2	7.8	*32.0*	9.0	*6.4*	7.9	7.0	17.9	*6.1*
1904..	146.9	3.8	11.7	55.5	42.2	*12.4*	25.4	8.7	*32.5*	18.6	*6.6*	9.1	7.6	12.1	*6.1*
1905..	170.6	3.0	11.3	104.8	34.9	*12.6*	25.7	4.1	*30.5*	17.4	*6.6*	6.8	4.6	12.2	*6.2*
1906..	207.6	2.7	13.2	112.3	39.1	*12.8*	34.2	5.1	*31.8*	19.1	*6.7*	5.6	6.9	15.8	*6.2*
1907..	130.8	2.2	8.4	42.8	23.5	*13.0*	31.2	6.5	*31.8*	21.5	*6.7*	5.6	7.4	18.9	*6.2*
1908..	165.3	3.0	11.5	55.5	36.5	*13.2*	29.8	3.7	*30.3*	21.3	*6.8*	8.8	8.6	17.7	*6.7*
1909..	124.9	2.6	16.1	58.8	32.1	*13.4*	35.6	6.4	34.1	21.6	3.8	8.7	7.8	19.7	*6.3*

* Based mainly upon official data and the estimates published in M. K. Bennett, "World Wheat Crops, 1885–1932," WHEAT STUDIES, April 1933, IX, 264–74. Revised figures are shown here for Canada, Germany, Japan, Italy in 1895–99, and Spain in 1895–96. Figures in italics represent our adjustments or approximations.

[a] Including Russian empire and India, but excluding China, Manchuria, Turkey and other Near Eastern countries, Brazil, Mexico, and some small producers.

[b] Adjusted estimates of Holbrook Working.

[c] Hungary, Bosnia-Herzegovina, Serbia, Rumania, Bulgaria.

[d] Morocco, Algeria, Tunis.

[e] Egypt, Japan, Chosen.

[f] Uruguay, Chile, New Zealand, South Africa.

[g] Our adjustment of official figure, which is believed to be too high.

[h] See Naum Jasny, "Wheat Problems and Policies in Germany," WHEAT STUDIES, November 1936, XIII, 127, 140.

TABLE II.—WHEAT ACREAGE IN PRINCIPAL PRODUCING COUNTRIES AND AREAS, 1895–1909*

(*Million acres*)

Year	World[a]	World ex-Russia ex-India	Four overseas exporters					Europe ex-Russia			Russia	India	French North Africa[d]	Other Northern Hemisphere[e]	Other Southern Hemisphere[f]
			United States[b]	Canada	Australia	Argentina	Total	Total	Lower Danube[c]	Others					
1895..	*210.9*	*134.9*	*48.12*	2.85	3.52	5.58	*60.1*	*64.0*	*14.8*	*49.2*	47.6	28.4	*5.4*	*2.9*	*2.5*
1896..	*213.3*	*137.7*	*49.40*	3.00	4.28	6.18	*62.9*	*64.2*	*15.0*	*49.2*	51.5	24.1	*5.2*	*2.9*	*2.5*
1897..	*213.3*	*140.3*	*51.50*	3.60	4.36	6.43	*65.9*	*63.7*	*14.5*	*49.2*	52.4	20.6	*5.2*	*2.9*	*2.6*
1898..	*225.9*	*148.6*	*55.07*	3.95	5.47	7.91	*72.4*	*65.2*	*14.6*	*50.6*	52.8	24.5	*5.3*	*2.9*	*2.8*
1899..	*232.3*	*151.3*	*56.38*	4.15	5.61	8.03	*74.2*	*66.0*	*15.8*	*50.2*	55.6	25.4	*5.4*	*2.9*	2.8
1900..	*226.9*	*149.9*	*54.58*	4.23	5.67	8.35	*72.8*	*66.2*	*15.8*	*50.4*	58.3	18.7	*5.5*	*3.0*	*2.4*
1901..	*232.5*	*148.2*	*55.26*	4.17	5.12	8.15	*72.7*	*64.6*	*16.0*	*48.6*	60.4	23.9	*5.4*	*3.1*	*2.4*
1902..	*229.2*	*144.4*	*50.54*	4.11	5.16	9.13	*68.9*	*64.5*	*15.7*	*48.8*	61.3	23.5	*5.7*	*3.1*	*2.2*
1903..	*236.6*	*149.7*	*52.83*	4.60	5.57	10.67	*73.7*	*64.5*	*16.3*	*48.2*	63.5	23.4	*5.9*	*3.0*	*2.6*
1904..	*241.7*	*147.7*	*46.48*	4.60	6.27	12.12	*69.5*	*66.8*	*16.8*	*50.0*	65.6	28.4	*5.9*	*3.0*	*2.5*
1905..	*250.7*	*153.5*	*49.47*	5.00	6.12	14.02	*74.6*	*67.9*	*17.7*	*50.2*	68.7	28.5	*5.6*	*2.9*	*2.5*
1906..	*250.9*	*154.3*	*48.08*	6.58	5.98	14.07	*74.7*	*68.5*	18.3	*50.2*	70.2	26.4	*5.6*	*2.9*	*2.6*
1907..	*245.0*	*149.1*	*45.16*	6.10	5.38	14.23	*70.9*	*66.6*	16.6	*50.0*	66.7	29.2	*5.7*	*2.9*	*3.0*
1908..	*244.7*	*153.4*	*46.75*	6.61	5.26	14.98	*73.6*	*67.8*	17.6	*50.2*	68.4	22.9	*6.0*	*2.9*	*3.1*
1909..	*248.0*	*150.1*	*45.11*	6.51	6.59	14.42	*72.6*	*66.2*	16.7	*49.5*	71.7	26.2	*5.8*	2.7	*2.8*

Year	British Isles	France	Italy	Germany	Austria	Switzerland	Belgium	Netherlands	Denmark	Norway	Sweden	Finland	Spain	Portugal	Greece
1895..	1.45	17.30	11.35	4.77	2.63	.16	.45	.15	.09	*.01*	.18	*.01*	*9.20*	*.70*	*.70*
1896..	1.73	16.98	*11.50*	4.76	2.62	.16	*.44*	.15	.08	*.01*	.18	*.01*	*9.16*	*.71*	*.71*
1897..	1.94	16.27	*11.60*	4.75	2.62	.16	*.43*	.15	.09	*.01*	.18	*.01*	9.53	*.71*	*.72*
1898..	2.16	17.21	*11.70*	4.87	2.61	.16	*.43*	.18	.09	*.01*	.18	*.01*	9.54	*.72*	*.73*
1899..	2.05	17.15	*11.75*	4.98	2.65	.16	*.42*	.18	.10	*.01*	.19	*.01*	9.05	*.72*	*.74*
1900..	1.90	16.96	*11.80*	5.06	2.63	.16	.42	.16	.10	.01	.19	*.01*	9.56	*.73*	*.75*
1901..	1.74	16.79	11.91	3.91	2.64	.16	.41	.14	.03	.01	.20	*.01*	9.17	*.73*	*.76*
1902..	1.77	16.22	11.74	4.73	2.61	.16	.42	.15	.10	.01	.20	*.01*	9.15	*.74*	*.78*
1903..	1.62	16.01	11.98	4.47	2.60	.16	.36	.14	.10	.01	.20	*.01*	8.98	.74	*.79*
1904..	1.41	16.13	13.34	4.74	2.75	.16	.39	.13	.10	.01	.20	*.01*	9.02	*.80*	*.80*
1905..	1.84	16.09	13.13	4.76	2.78	.16	.40	.15	.10	.01	.21	*.01*	8.88	*.86*	*.81*
1906..	1.80	16.10	12.69	4.78	2.88	.10	.37	.14	.10	.01	.21	*.01*	9.30	*.92*	*.82*
1907..	1.66	16.25	12.92	4.32	2.91	.10	.39	.13	.10	.01	.22	*.01*	9.14	*.98*	*.83*
1908..	1.66	16.22	12.62	4.66	2.96	.11	.38	.14	.11	.01	.22	*.01*	9.28	*1.03*	*.84*
1909..	1.87	16.30	11.64	4.52	2.94	.10	.39	.13	.11	.01	.24	.01	9.35	*1.09*	*.85*

Year	Hungary	Bosnia-Herzegovina	Serbia	Rumania	Bulgaria	French Morocco	Algeria	Tunis	Egypt	Japan	Chosen	New Zealand	Uruguay	Chile	South Africa
1895..	8.31	*.23*	*.73*	3.55	*2.00*	*1.13*	3.27	*1.00*	1.30	1.10	*.51*	.24	*.60*	*1.00*	.68
1896..	8.31	*.23*	*.70*	3.72	*2.00*	*1.14*	3.12	*1.00*	1.26	1.09	*.52*	.26	*.60*	*1.00*	.68
1897..	7.45	*.24*	.69	3.94	2.17	*1.15*	3.12	*1.00*	1.22	1.12	*.52*	.32	*.60*	*1.00*	*.69*
1898..	8.16	*.25*	.70	3.59	1.93	*1.16*	3.11	*1.00*	1.24	1.14	*.53*	.40	.68	*1.00*	*.69*
1899..	8.44	*.26*	1.00	4.11	2.04	*1.17*	3.22	*1.00*	1.29	1.14	*.53*	.27	.81	*1.00*	*.70*
1900..	8.81	*.26*	.77	3.93	2.03	*1.18*	3.26	*1.00*	1.32	1.15	*.54*	.21	.68	*.75*	*.70*
1901..	8.87	*.27*	.75	4.04	2.01	*1.19*	3.23	.99	1.35	1.19	*.55*	.16	.72	.86	*.71*
1902..	8.95	*.28*	.80	3.67	2.00	*1.20*	3.43	1.08	1.35	1.19	*.56*	.19	.66	.66	*.71*
1903..	9.23	*.29*	.86	3.97	2.00	*1.22*	3.50	1.14	1.28	1.15	*.56*	.23	*.65*	1.04	*.72*
1904..	9.13	*.29*	.90	4.25	2.26	*1.24*	3.43	1.20	1.30	1.12	*.57*	.26	.64	.96	*.72*
1905..	9.20	*.30*	.92	4.84	2.42	*1.26*	3.40	.91	1.22	1.11	*.58*	.22	.71	.90	*.73*
1906..	9.52	.32	.92	5.00	2.50	*1.28*	3.32	1.01	1.27	1.09	*.58*	.21	.62	1.00	*.73*
1907..	8.78	.25	.91	4.24	2.42	*1.30*	3.26	1.13	1.27	1.09	*.59*	.19	.93	1.14	*.74*
1908..	9.47	.27	.94	4.45	2.42	*1.32*	3.60	1.09	1.21	1.10	*.59*	.25	.68	1.38	*.74*
1909..	8.80	.20	.92	4.17	2.57	*1.34*	3.43	1.00	1.30	1.11	.27	.31	*.65*	1.09	*.75*

* For notes, see Table I. Data mainly for harvested acreage.

TABLE III.—WHEAT YIELD PER ACRE IN PRINCIPAL PRODUCING COUNTRIES AND AREAS, 1895–1909*

(Bushels per acre)

Year	World[a]	World ex-Russia ex-India	Four overseas exporters					Europe ex-Russia			Russia	India	French North Africa[d]	Other Northern Hemisphere[e]	Other Southern Hemisphere[f]
			United States[b]	Canada	Australia	Argentina	Total	Total	Lower Danube[c]	Others					
1895..	*13.1*	*15.0*	*13.90*	19.54	5.20	8.32	*13.1*	*17.3*	*19.2*	*16.7*	*9.8*	9.2	*8.3*	*20.0*	*11.2*
1896..	*12.4*	*14.5*	*12.40*	13.20	4.88	5.11	*11.2*	*18.2*	*18.9*	*18.0*	*9.0*	8.3	7.7	*19.0*	*10.0*
1897..	*11.2*	*12.9*	*13.30*	15.11	6.47	8.30	*12.5*	*13.6*	*11.5*	*14.2*	*7.3*	9.7	*6.9*	*19.0*	*11.9*
1898..	*14.1*	*16.1*	*15.10*	16.84	7.57	13.27	*14.4*	*18.5*	*16.7*	*19.0*	*9.8*	11.0	*8.5*	*19.7*	*13.9*
1899..	*12.6*	*14.3*	*12.10*	14.43	7.13	12.67	*11.9*	*17.4*	*13.5*	*18.6*	*9.1*	10.1	*7.2*	*20.0*	*11.8*
1900..	*12.0*	*13.6*	*11.70*	13.14	8.54	8.96	*11.2*	*16.5*	*15.5*	*16.8*	*8.1*	10.7	*9.1*	*20.0*	*10.4*
1901..	*12.9*	*15.2*	*15.00*	21.18	7.54	6.92	*13.9*	*17.1*	*15.6*	*17.6*	*7.9*	11.1	*9.1*	*19.7*	*11.7*
1902..	*14.0*	*16.0*	*14.60*	23.63	2.40	11.37	*13.8*	*18.9*	*20.1*	*18.5*	*11.0*	9.7	8.8	*19.0*	*13.2*
1903..	*14.2*	*15.8*	*12.90*	17.80	13.32	12.16	*13.1*	*19.5*	*18.5*	*19.9*	*10.9*	12.7	*9.2*	*16.0*	*15.0*
1904..	*13.3*	*14.2*	*12.50*	15.61	8.69	12.43	*12.3*	*16.6*	*15.5*	*16.9*	*11.3*	12.7	7.8	*19.3*	*14.0*
1905..	*13.4*	*15.5*	*14.70*	21.40	11.19	9.62	*13.9*	*17.9*	*18.4*	*17.7*	*10.2*	9.9	*7.5*	*18.6*	*12.0*
1906..	*13.9*	*16.9*	*15.80*	20.61	11.10	11.09	*15.0*	*19.6*	20.5	*19.2*	*8.0*	12.1	*9.3*	*20.0*	*13.1*
1907..	*12.9*	*15.3*	*14.10*	15.26	8.31	13.53	*13.6*	*17.4*	12.5	*19.1*	8.6	10.9	*8.9*	*20.7*	*12.7*
1908..	*12.9*	*15.0*	*14.00*	17.00	11.90	10.43	*13.4*	*17.2*	15.5	*17.8*	9.2	10.0	7.7	*20.0*	*13.5*
1909..	*14.5*	*16.4*	*15.80*	*21.51*	13.72	9.09	*14.8*	*18.5*	14.0	*20.0*	11.8	10.9	*9.7*	22.2	*15.0*

Year	British Isles	France	Italy	Germany	Austria	Switzerland	Belgium	Netherlands	Denmark	Norway	Sweden	Finland	Spain	Portugal	Greece
1895..	27.2	19.6	*13.5*	*22.0*	15.3	20.6	41.3	28.0	39.0	*27.9*	21.5	*16.3*	*10.8*	*9.9*	*10.0*
1896..	34.7	20.0	*16.4*	*23.8*	16.0	17.6	*41.8*	32.8	43.4	*26.7*	27.1	*16.6*	*10.1*	*7.9*	*10.0*
1897..	29.8	14.9	*9.7*	*22.7*	13.2	21.2	*34.8*	27.9	40.9	*26.7*	26.6	*17.6*	9.9	*11.5*	*10.0*
1898..	35.7	21.2	*15.3*	*24.5*	18.0	24.4	*35.9*	29.9	35.3	*26.7*	25.9	*17.7*	13.1	*10.9*	*10.0*
1899..	33.8	21.3	*15.3*	*25.5*	18.9	25.0	*33.1*	28.6	42.7	*26.7*	25.4	*16.0*	10.8	*8.9*	*10.0*
1900..	29.4	19.2	*12.5*	*25.1*	15.6	25.0	33.6	29.6	42.2	25.1	28.7	*17.6*	10.5	*11.0*	*10.0*
1901..	31.9	18.5	15.2	*21.1*	16.7	22.0	34.4	30.8	30.6	24.5	22.9	*15.6*	14.9	*13.7*	*10.0*
1902..	33.9	20.2	12.8	*27.3*	19.0	24.4	34.9	33.0	44.8	20.3	23.0	*9.9*	14.6	*14.1*	*10.0*
1903..	31.0	22.7	17.0	*26.3*	17.8	25.6	34.9	30.6	44.2	23.5	27.5	*16.2*	14.4	11.9	*10.0*
1904..	27.7	18.6	13.9	*26.5*	19.5	24.8	35.1	32.5	42.4	16.3	26.2	*16.6*	10.6	*11.3*	*10.0*
1905..	33.8	20.8	13.5	*25.7*	19.6	22.3	30.8	31.6	40.3	25.2	26.8	*16.1*	10.4	*9.0*	*10.0*
1906..	35.3	20.4	15.3	*27.3*	20.2	*30.0*	35.0	34.7	41.2	23.2	31.5	*18.9*	15.1	*10.4*	*10.0*
1907..	34.9	23.5	15.1	*26.6*	18.0	*30.0*	40.2	39.1	43.1	24.1	28.5	*17.5*	11.0	7.8	*10.0*
1908..	33.4	19.5	13.3	*26.7*	21.0	32.9	35.4	36.3	42.8	27.4	31.3	*13.9*	12.9	*6.7*	*10.0*
1909..	34.3	22.0	16.4	*27.4*	19.9	34.0	37.4	30.6	38.1	26.0	31.3	16.8	15.4	*5.9*	*10.0*

Year	Hungary	Bosnia-Herzegovina	Serbia	Rumania	Bulgaria	French Morocco	Algeria	Tunis	Egypt	Japan	Chosen	New Zealand	Uruguay	Chile	South Africa
1895..	20.7	*11.7*	*12.2*	19.3	*16.0*	*10.0*	8.0	*7.5*	*25.0*	17.5	*11.5*	27.9	*6.8*	*12.0*	*8.0*
1896..	19.4	*10.6*	*11.5*	19.1	*20.0*	*10.0*	7.3	*5.6*	*25.0*	15.8	*11.5*	22.9	*6.0*	*10.5*	*8.0*
1897..	11.7	*6.2*	19.1	9.2	13.3	*10.0*	6.3	*5.0*	*25.0*	16.4	*11.5*	17.9	*10.0*	*14.0*	*8.0*
1898..	17.1	*9.3*	13.7	16.3	17.6	*10.0*	8.7	*6.5*	*25.0*	17.7	*11.5*	32.8	10.6	*13.0*	*8.0*
1899..	17.8	*11.8*	11.8	6.4	10.6	*10.0*	7.0	*4.8*	*25.0*	17.5	*11.5*	31.8	8.5	*12.0*	*8.0*
1900..	17.3	*8.8*	10.5	14.4	12.8	*10.0*	10.2	*4.9*	*25.0*	17.8	*11.5*	31.7	5.4	*12.0*	*8.5*
1901..	15.2	*8.0*	10.8	17.7	15.9	*10.0*	10.0	4.6	*25.0*	17.7	*11.5*	24.8	10.5	12.3	*8.5*
1902..	20.4	*8.6*	14.2	21.5	20.0	*10.0*	9.9	4.0	*25.0*	16.1	*11.5*	38.4	8.0	15.3	*8.5*
1903..	19.1	*13.7*	12.7	19.0	17.8	*10.0*	9.8	6.8	*25.0*	7.8	*11.5*	34.3	*10.8*	17.2	*8.5*
1904..	16.1	*12.8*	12.9	13.1	18.7	*10.0*	7.4	7.3	*25.0*	16.6	*11.5*	35.3	11.8	12.6	*8.5*
1905..	18.5	*10.1*	12.2	21.7	14.4	*10.0*	7.6	4.5	*25.0*	15.7	*11.5*	30.6	6.5	13.6	*8.5*
1906..	21.8	8.3	14.3	22.5	15.6	*10.0*	10.3	5.0	*25.0*	17.5	*11.5*	27.2	11.0	15.8	*8.5*
1907..	14.9	8.8	9.2	10.1	9.7	*10.0*	9.6	5.8	*25.0*	19.7	*11.5*	28.8	8.0	16.6	*8.5*
1908..	17.5	11.1	12.2	12.5	15.1	*10.0*	8.3	3.4	*25.0*	19.4	*11.5*	34.8	12.6	12.8	*9.0*
1909..	14.2	12.7	17.5	14.1	12.5	*10.0*	10.4	6.4	26.2	19.5	14.1	27.8	*11.9*	18.1	*8.5*

* Computed from data in Tables I and II. See notes to those tables.

TABLE IV.—PRODUCTION OF OTHER GRAINS AND POTATOES IN PRINCIPAL PRODUCING AREAS, 1898–1908*

(*Million bushels*)

Year	Rye										Potatoes			
	Europe ex-Russia[a]	Russia[b]	Germany[c]	Austria	Hungary	Scandinavia, Finland	Belgium, Netherlands	France	Spain	United States	Europe ex-Russia[d]	Germany	British Isles	United States
1898..	678	738	356	80	46	51	33	67	21	29	2,672	1,168	233	240
1899..	664	912	342	85	50	51	30	67	21	26	2,897	1,414	218	273
1900..	629	920	337	55	42	58	33	59	21	27	2,982	1,491	171	260
1901..	644	755	321	76	44	53	35	58	28	31	3,375	1,789	263	207
1902..	682	919	374	82	53	52	36	46	26	34	3,069	1,597	221	297
1903..	720	912	390	81	51	56	36	58	23	29	3,003	1,576	197	276
1904..	709	1,008	396	92	46	49	35	53	17	28	2,803	1,333	233	349
1905..	732	737	378	98	53	58	35	59	27	31	3,586	1,776	268	301
1906..	736	667	379	99	54	59	34	51	31	30	3,173	1,578	227	341
1907..	700	808	384	86	42	49	38	56	27	28	3,395	1,673	195	333
1908..	776	782	423	113	48	57	38	52	26	29	3,526	1,703	266	305

Year	Maize							Barley				Oats		
	Europe ex-Russia[a]	Hungary	Rumania	Serbia, Bulgaria	Italy	Spain	United States	Europe ex-Russia[a]	Danube basin	Canada	United States	Europe ex-Russia[a]	Canada	United States
1898..	...	148	102	66	80	15	2,351	566	107	..	98	1,513	...	842
1899..	...	131	28	46	88	26	2,646	536	79	..	118	1,465	...	937
1900..	445	146	85	38	88	26	2,662	525	84	22	97	1,454	161	945
1901.	498	148	117	44	100	26	1,716	573	89	27	124	1,416	176	800
1902..	391	120	68	36	71	25	2,774	595	105	38	146	1,576	215	1,077
1903..	459	160	80	42	89	19	2,515	596	114	38	149	1,648	223	885
1904..	279	71	20	22	90	21	2,687	515	80	41	166	1,430	222	1,012
1905..	403	112	59	40	97	32	2,954	534	107	42	172	1,455	244	1,104
1906..	534	183	130	56	93	19	3,033	612	123	47	179	1,683	294	1,023
1907..	440	174	58	32	88	25	2,614	572	95	44	151	1,763	233	801
1908..	465	166	79	42	96	20	2,567	539	86	47	171	1,626	266	829

* Data from official sources; the U.S. Department of Agriculture, *Agricultural Statistics, 1940*, and Bureau of Statistics, Bull. 68, March 1908; the *International Yearbook of Agricultural Statistics;* and *Annuaire statistique de la France.*

[a] Aggregates as published in U.S. Department of Agriculture, *Agricultural Statistics, 1940*, pp. 37, 50, 65, 77.

[b] In 72 European and Asiatic provinces.

[c] Official German estimates, probably about 10 per cent too high. See Naum Jasny, "Wheat Problems and Policies in Germany," WHEAT STUDIES, November 1936, XIII, 127–28.

[d] From 1907 based on production aggregates for Europe published in *International Yearbook of Agricultural Statistics* for various years; earlier years computed from data in *Annuaire statistique de la France.*

TABLE V.—WHEAT RECEIPTS AT EIGHT PRIMARY MARKETS IN THE UNITED STATES, MONTHLY, JULY 1898–JUNE 1909*

(*Million bushels*)

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July-June
1898-99	7.3	17.6	34.1	44.1	41.8	33.5	18.7	13.0	14.8	10.6	11.6	23.2	270
1899-1900	21.6	17.2	29.1	32.2	24.6	16.1	11.9	12.4	17.5	11.5	11.7	15.8	222
1900-01	17.2	29.3	30.5	29.3	19.5	20.4	14.7	11.7	17.1	11.2	10.6	13.6	225
1901-02	24.5	28.2	35.6	31.4	30.9	23.0	14.0	10.9	11.6	7.0	6.6	11.0	235
1902-03	22.7	27.4	35.9	37.8	35.9	24.2	16.6	12.1	11.5	9.3	7.3	8.7	249
1903-04	12.4	17.9	28.5	31.3	34.7	27.8	18.4	15.4	14.1	7.0	5.2	7.7	220
1904-05	11.0	25.1	28.0	33.7	27.8	20.4	14.3	10.1	11.7	8.7	7.0	6.7	205
1905-06	19.4	23.0	30.0	35.5	31.4	22.1	16.9	12.4	11.7	8.7	7.5	7.8	226
1906-07	25.0	22.7	23.9	31.8	25.4	23.3	13.6	13.2	17.0	19.6	16.5	12.8	245
1907-08	16.9	24.8	22.6	29.0	21.6	22.8	16.0	10.0	13.6	8.1	9.8	8.7	204
1908-09	20.7	24.1	45.9	39.1	28.8	17.5	10.0	10.8	14.3	7.8	7.3	6.1	232

* Data, apparently for Chicago, Milwaukee, Minneapolis, Duluth, St. Louis, Toledo, Detroit, and Kansas City, originally compiled by the *Cincinnati Price Current* and published in Broomhall's *Corn Trade Year Book, 1901–02*, p. 175, and *Corn Trade News*, Oct. 2, 1906 and Nov. 3, 1914.

TABLE VI.—WORLD WHEAT STOCKS EX-ASIA, ABOUT AUGUST 1, 1898–1909*

(Million bushels)

Year	Total	Four overseas exporters					Russian surplus	Lower Danube[c]	Europe ex-Russia ex-Danube					Afloat to Europe[d]
		Total[a]	United States grain[a]	Canadian grain	Australia[b]	Argentina[b]			Total	British Isles	France	Germany, Italy	Others	
1898..	243	71	58.7	5.7	3.0	3.5	2.2	30	118	22.5	30.0	33.0	32.7	22.2
1899..	529	242	195.8	9.1	7.0	30.5	20.7	53	182	35.5	57.5	39.5	49.3	31.2
1900..	514	222	188.2	9.2	7.0	17.5	24.4	36	202	35.5	76.0	44.0	46.4	29.9
1901..	433	160	134.2	7.1	7.5	11.0	22.8	33	178	34.0	60.5	43.5	39.7	38.9
1902..	366	150	130.4	8.3	5.5	6.0	3.5	34	155	27.5	34.5	44.0	48.5	23.4
1903..	407	137	109.7	8.9	3.0	15.0	16.9	59	168	29.5	38.0	42.5	58.3	25.6
1904..	504	160	106.3	9.2	17.0	28.0	27.5	71	207	34.5	64.5	51.0	57.3	38.7
1905..	406	132	78.1	10.2	7.5	36.0	38.3	38	161	35.0	34.0	44.5	47.0	36.8
1906..	449	184	139.7	10.5	10.5	23.0	27.7	38	171	40.5	32.0	48.5	50.1	28.3
1907..	559	244	192.4	22.5	10.5	18.5	0	82	205	42.5	30.0	57.0	75.2	28.2
1908..	394	145	95.5	11.5	11.0	27.0	0	31	195	42.0	66.0	45.0	42.2	22.6
1909..	282	90	59.8	8.6	7.5	14.0	0	30	128	24.0	32.0	33.5	39.0	34.4

* Data from H. C. Farnsworth, "'World' Wheat Stocks, 1890–1914 and 1922–39," WHEAT STUDIES, October 1939, XVI, 63–65.

[a] United States data as of July 1.

[b] Exportable stocks.

[c] Hungary, Serbia, Rumania, Bulgaria.

[d] Broomhall's data.

TABLE VII.—INTERNATIONAL SHIPMENTS OF WHEAT AND FLOUR, 1898–99 TO 1908–09*

(Million bushels)

Year ending about Aug. 1	Total	Source of shipments							Destination of shipments			
		North America	Argentina	Australia	India	Russia	Balkans[a]	Others	Europe			Non-Europe
									Total	U.K.	Continent	
1898–99.....	410.3	224.0	41.3	9.1	25.8	68.6	27.4	14.1	384.9	195.8	189.1	25.4
1899–1900.....	371.8	188.2	79.4	7.0	3.8	59.0	18.4	16.0	342.1	176.3	165.8	29.7
1900–01[b].....	454.9	249.2	40.2	18.5	5.0	77.2	44.8	20.0	404.8	210.2	194.6	50.1
1901–02.....	463.4	261.3	21.2	14.8	15.6	87.4	45.5	17.6	401.6	194.6	207.0	61.8
1902–03.....	530.1	237.5	61.4	...	27.2	134.2	60.0	9.8	460.0	214.4	245.6	70.1
1903–04.....	519.1	142.1	81.1	28.3	57.0	138.1	61.9	10.6	458.7	235.3	223.4	60.4
1904–05.....	520.8	64.3	103.3	35.0	76.7	179.0	52.7	9.8	461.4	221.3	240.1	59.4
1905–06.....	536.7	140.9	104.5	30.1	25.6	154.9	78.1	2.6	467.2	205.7	261.5	69.5
1906–07[b].....	549.8	193.3	109.8	30.2	30.4	93.9	83.7	8.5	465.3	215.5	249.8	84.5
1907–08.....	479.0	218.2	130.3	14.2	19.6	60.7	23.8	12.2	407.4	204.2	203.2	71.6
1908–09.....	486.4	169.0	109.7	38.0	27.8	96.6	38.9	6.4	431.2	203.4	227.8	55.2

* Data from various issues of Broomhall's *Corn Trade News* and *Corn Trade Year Book.*

[a] Including Austria-Hungary through 1907–08; small Austro-Hungarian shipments included in "others" in 1908–09.

[b] Fifty-three weeks.

TABLE VIII.—NET EXPORTS OF WHEAT FLOUR (AS WHEAT) BY PRINCIPAL FLOUR EXPORTING COUNTRIES, 1898–99 TO 1908–09*

(Million bushels; in parentheses, net imports)

Aug.–July	Total	Four overseas exporters					India[c]	Russia[d]	Hungary	Rumania[e]	Bulgaria	Germany	France	Belgium
		Total	United States[a]	Canada	Australia[b]	Argentina[a]								
1898–99.....	136.9	94.8	87.8	3.3[a]	1.6	2.1	1.8	3.1	26.8	1.2	.3[e]	(.4)	8.9	(.2)[e]
1899–1900....	151.7	98.2	88.8	3.2[a]	3.4	2.8	1.4	3.5	32.0	1.2	.5[e]	(.2)	14.9	(.3)[e]
1900–01.....	155.8	102.6	89.7	4.8[a]	4.5	3.6	1.3	3.7	34.0	1.3	.7[e]	.1	12.1	(.1)[e]
1901–02.....	145.9	94.3	85.5	4.7[a]	1.1	3.0	1.3	3.0	31.0	1.0	.7[e]	(.6)	13.6	1.0[e]
1902–03.....	162.1	104.6	95.6	6.0	(3.1)	3.0	1.9	4.2	38.3	1.3	1.0[e]	(.6)	9.7	1.1
1903–04.....	161.7	99.0	82.5	6.8	5.2	4.5	2.1	4.9	38.9	.6	1.0	.3	12.6	2.3
1904–05.....	127.9	63.1	43.4	5.5	7.6	6.6	2.7	5.8	30.7	2.3	.9	3.4	15.0	4.0
1905–06.....	158.6	90.1	67.9	7.1	8.3	6.8	2.4	4.2	37.5	3.5	1.1	1.5	15.6	2.7
1906–07.....	171.2	99.4	75.9	6.8	9.2	7.5	2.2	3.7	41.9	2.6	1.5	3.4	14.8	1.7
1907–08.....	143.9	87.2	68.0	7.3	5.8	6.1	1.9	2.6	29.3	1.3	1.1	4.6	13.6	2.3
1908–09.....	139.0	73.4	51.8	8.9	7.0	5.7	1.2	3.4	32.2	1.6	1.6	7.3	16.4	1.9

* For sources, see general note to Table IX. Flour converted to wheat at 70 per cent extraction except for the United States (69 per cent), Canada (73 per cent), Australia (67 per cent), and Germany (75 per cent).

[a] July–June years.

[b] Calendar years, 1899 through 1906.

[c] April–March years.

[d] September–August years through 1904–05.

[e] Calendar years 1899 ff.

TABLE IX.—INTERNATIONAL TRADE IN WHEAT AND FLOUR, ANNUALLY, 1895–96 TO 1908–09*

(*Million bushels*)

A. NET EXPORTS (NET IMPORTS IN PARENTHESES)

Aug.–July	Total net exports[a]	Four overseas exporters					India	Russia	Danube exporters					Others
		Total	United States	Canada	Australia	Argentina			Total	Hungary	Serbia	Rumania	Bulgaria	
1895–96.....	*436*	*164*	133.4	10.4	*(2.5)*	*22.6*	*12.4*	*133.5*	*115*	*53.8*	*3.0*	*40.3*	*18.2*	*11*
1896–97.....	*399*	*158*	145.1	9.6	*(3.9)*	*7.4*	*1.1*	*127.5*	*106*	*51.8*	*2.5*	*34.1*	*17.1*	*6*
1897–98.....	*490*	*272*	222.3	24.4	*(.3)*	*25.4*	*32.9*	*132.0*	*47*	*17.8*	*1.6*	*18.5*	*9.0*	7
1898–99.....	*465*	*299*	229.8	13.6	*9.4*	*45.8*	27.5	*73.0*	*57*	*31.9*	*2.5*	*16.0*	*6.2*	*9*
1899–1900....	*453*	*301*	186.7	20.0	*13.8*	*80.5*	5.3	*67.8*	*70*	*47.4*	*3.1*	*15.1*	*4.9*	*9*
1900–01.....	*501*	*319*	234.5	14.5	*22.7*	*47.0*	4.8	*83.0*	*88*	*54.4*	*3.0*	*25.2*	*5.3*	7
1901–02.....	*503*	*301*	228.4	30.6	*14.4*	*27.4*	17.2	*95.4*	*81*	*43.9*	*2.1*	*27.6*	*7.3*	*9*
1902–03.....	*583*	*294*	203.9	38.5	*(6.2)*	*57.9*	30.6	*146.2*	*105*	*58.7*	*1.9*	*33.1*	*11.0*	7
1903–04.....	*577*	*244*	119.3	23.7	*23.3*	*77.9*	60.9	*158.9*	*104*	*56.8*	*2.5*	*29.1*	15.3	*9*
1904–05.....	*589*	*206*	43.9	20.4	*38.8*	*103.2*	77.6	190.7	*107*	*38.7*	*3.3*	*43.8*	21.6	7
1905–06.....	*631*	*294*	106.6	47.0	*36.8*	*103.2*	28.4	169.9	*138*	*55.2*	*3.4*	*65.7*	13.9	*1*
1906–07.....	*628*	*347*	151.8	46.2	37.7	*111.2*	32.0	102.6	*139*	66.7	*2.7*	*56.8*	12.7	*8*
1907–08.....	*542*	*365*	169.4	47.3	17.8	*130.6*	20.1	67.1	78	45.1	*2.7*	*25.1*	5.1	*12*
1908–09.....	*554*	327	114.2	56.5	41.5	114.8	26.9	96.4	*94*	43.9	*4.5*	34.5	11.3	*9*

B. NET IMPORTS (NET EXPORTS IN PARENTHESES)

Aug.–July	Total net imports[b]	Europe ex-Danube	Non-Europe[c]	British Isles	France	Italy	Germany	Austria	Switzerland	Belgium	Netherlands	Denmark	Norway	Sweden
1895–96.....	*478*	*435*	*43*	187.8	15.7	32.0	*52.5*	*53.4*	*16.5*	36.5	16.2	*2.56*	*2.10*	4.94
1896–97.....	*442*	*387*	*55*	178.7	10.2	14.2	47.7	*48.9*	*16.3*	30.7	14.6	*1.97*	*2.08*	4.65
1897–98.....	*480*	*440*	*40*	170.3	80.0	34.9	38.9	*37.5*	*14.6*	31.0	13.8	*2.05*	*2.07*	3.72
1898–99.....	*436*	*400*	*36*	180.7	16.2	14.8	51.9	*36.3*	*15.2*	35.5	16.5	*2.84*	*2.28*	7.10
1899–1900....	*438*	*394*	*44*	177.4	5.4	20.8	38.3	*46.4*	*15.3*	32.4	17.9	*2.63*	*2.49*	6.96
1900–01.....	*490*	*440*	*50*	190.4	8.4	36.8	49.4	*51.6*	*15.5*	39.3	16.8	*3.53*	*2.62*	5.07
1901–02.....	*528*	*475*	*53*	191.5	11.1	34.1	81.8	*51.2*	*16.7*	42.3	18.3	*4.83*	*2.63*	7.33
1902–03.....	*575*	*511*	*64*	205.4	23.6	49.0	66.4	*53.1*	16.8	45.5	19.8	4.56	*2.66*	8.88
1903–04.....	*564*	*505*	*59*	222.8	12.9	29.6	69.0	*52.2*	18.4	47.9	18.5	4.41	*2.70*	8.80
1904–05.....	*578*	*516*	*62*	220.8	14.0	35.6	62.4	*51.4*	18.0	44.6	17.2	4.71	*2.58*	8.14
1905–06.....	*624*	*555*	*69*	210.4	9.3	48.2	80.1	*54.8*	18.8	51.8	19.4	4.92	*3.00*	7.81
1906–07.....	*598*	*525*	*73*	209.7	15.5	44.5	71.2	61.2	18.3	49.4	19.3	5.15	*3.00*	7.18
1907–08.....	*531*	*462*	*69*	207.5	8.0	19.7	74.5	42.9	15.2	41.1	19.1	4.90	*3.59*	7.40
1908–09.....	*519*	*457*	*62*	190.6	2.8	44.9	59.9	45.3	16.8	45.7	17.4	4.50	*3.36*	7.49

Aug.–July	Finland	Spain	Portugal	Greece	Egypt	French North Africa			Union South Africa	New Zealand	Brazil	Uruguay	Chile	Japan
						Total[d]	Algeria	Tunis						
1895–96.....	*2.06*	2.9	*4.59*	*4.92*	*3.04*	*(3.2)*	*(3.2)*	*(.0)*	*3.6*	*(.6)*	....	*(1.9)*	*(4.8)*	*.39*
1896–97.....	*2.15*	5.2	*4.78*	*5.00*	*3.54*	*(.6)*	*(1.4)*	*.8*	*4.4*	*(.6)*	....	*(1.1)*	*(3.4)*	*.74*
1897–98.....	*2.31*	.0	3.97	*5.32*	*2.38*	*(.6)*	*(.8)*	*.2*	*5.3*	*(.1)*	....	*(3.0)*	*(3.1)*	*.85*
1898–99.....	*2.38*	9.1	*3.45*	*5.89*	*1.84*	*(1.4)*	*(1.2)*	*(.2)*	*5.1*	*(2.4)*	....	*(3.4)*	*(2.3)*	*.90*
1899–1900....	*2.99*	12.9	5.98	*6.18*	*2.53*	*(1.8)*	*(2.5)*	*.7*	*6.1*	*(3.0)*	....	*(2.6)*	*(.7)*	*2.19*
1900–01.....	*3.14*	6.4	4.32	*6.34*	*3.70*	*(2.7)*	*(3.6)*	*.9*	7.7	*(2.5)*	....	*(.4)*	*(.5)*	*2.50*
1901–02.....	*2.91*	3.3	.16	*6.39*	*3.74*	*(4.0)*	*(5.5)*	*1.5*	*9.3*	*(.5)*	*11.3*	*(1.9)*	*(1.0)*	*2.31*
1902–03.....	*3.30*	3.2	2.25	*6.20*	*3.57*	*(2.8)*	*(4.2)*	1.4	*11.6*	*.0*	*11.8*	*(.9)*	*(2.0)*	5.47
1903–04.....	*3.50*	5.8	2.86	*5.47*	*4.09*	(4.7)	(3.3)	(1.4)	*10.2*	*(.7)*	*13.3*	*(.4)*	*(3.0)*	9.04
1904–05.....	*3.63*	23.1	4.53	*5.47*	*6.20*	(3.1)	(3.6)	.5	*8.8*	*(.9)*	*14.7*	*(1.9)*	*(1.0)*	6.95
1905–06.....	*3.91*	31.5	4.30	*6.95*	*8.08*	.8	(.1)	1.9	*9.0*	*(.2)*	*16.1*	*(.5)*	.8	6.92
1906–07.....	*4.34*	7.8	.80	*7.64*	*8.07*	(6.1)	(6.7)	.6	*8.6*	*.1*	*18.3*	*(.5)*	*1.1*	5.20
1907–08.....	*4.67*	3.1	3.25	*6.98*	*7.12*	(5.6)	(6.0)	.4	*7.5*	*.4*	*18.3*	*(2.0)*	*(4.2)*	4.19
1908–09.....	4.50	2.5	4.90	*6.47*	*10.49*	.0	(2.5)	2.5	*6.6*	*(.4)*	*17.3*	*(2.1)*	*(4.4)*	1.16

* Data based on official trade reports, derived in large part from publications of the International Institute of Agriculture and the U.S. Department of Agriculture. Figures in italics represent our approximations to the August–July trade figures for countries for which trade reports were not available for the August–July period.

[a] Aggregate net exports of all net-exporting countries included in the table, regardless of their normal net-trade position.

[b] Sum of the two following columns.

[c] Incomplete net import data for non-European countries included in our production totals for the world ex-Russia plus estimated exports from the world ex-Russia to "outside" areas. For annual estimates of "outside shipments," see M. K. Bennett, "World Wheat Utilization since 1885–86," WHEAT STUDIES, June 1936, XII, 392.

[d] Net exports of Algeria and Tunis; the net trade of French Morocco was negligible during these years.

TABLE X.—WHEAT SUPPLIES AND DISPOSITION IN FOUR EXPORTING COUNTRIES, 1898–99 TO 1908–09*

(Million bushels)

Year	Supplies			Domestic utilization				Surplus over domestic use[e]	Net exports	Year-end stocks
	Initial stocks	Crop	Total	Food use[a]	Seed use[b]	Feed and residual[c]	Total[d]			
	A. UNITED STATES (JULY–JUNE)									
1898–99	59	832	891	397	85	−14	468	423	227	196
1899–1900	196	682	878	408	82	+ 9	499	379	191	188
1900–01	188	639	827	419	83	−31	471	356	222	134
1901–02	134	829	963	424	76	+93	593	370	240	130
1902–03	130	738	868	431	79	+38	548	320	210	110
1903–04	110	682	792	437	70	+52	559	233	127	106
1904–05	106	581	687	448	74	+42	564	123	45	78
1905–06	78	727	805	446	72	+44	562	243	103	140
1906–07	140	760	900	448	68	+39	555	345	153	192
1907–08	192	637	829	452	70	+43	565	264	168	96
1908–09	96	655	751	454	68	+51	573	178	118	60
	B. CANADA (AUGUST–JULY)									
1898–99	6	66	72	33	7	+ 9	49	23	14	9
1899–1900	9	60	69	33	7	0	40	29	20	9
1900–01	9	56	65	33	7	+ 4	44	21	14	7
1901–02	7	88	95	34	7	+15	56	39	31	8
1902–03	8	97	105	35	8	+15	58	47	39	8
1903–04	8	82	90	36	8	+13	57	33	24	9
1904–05	9	72	81	37	9	+ 5	51	30	20	10
1905–06	10	107	117	38	11	+11	60	57	47	10
1906–07	10	136	146	39	11	+28	78	68	46	22
1907–08	22	93	115	41	12	+ 4	57	58	47	11
1908–09	11	112	123	42	14	+ 2	58	65	57	8

* Crop and stocks data are from Tables I and VI. Trade data except for the United States (which are for July–June) are from Table IX. Other figures as explained below.

[a] United States figures based on estimates of Holbrook Working, "Statistics of American Wheat Milling and Flour Disposition since 1879," WHEAT STUDIES, December 1927, IV, 101. Canadian estimates based on assumption of per capita annual consumption of 6.25 bushels of wheat for food applied to Canadian population estimates as of January 1 (the figure of 6.25 bushels per capita has long been the official figure used for Canada for the prewar period). For Australia from 1904–05 and for Argentina from 1905–06, the food figures represent the wheat equivalent of flour production minus flour net exports for calendar years. Prior to these dates Australian food use estimated at 5.6 bushels per capita and Argentine food use estimated at 5.2 bushels per capita.

[b] Our estimates for Australia through 1903–04 and for other countries for the entire period, calculated by applying to the acreage figure for the following year (*sown* except in the United States) the following approximations to the amount of wheat sown per acre: 1.0 bushel in Australia, 1.2 bushels in Argentina, 1.5 bushels in the United States, and 1.75 bushels in Canada. From 1904–05 the Australian seed figures are official estimates.

[c] Difference between derived *total* domestic utilization and the sum of *food* and *seed* use. This represents the algebraic sum of wheat fed, the amount lost in cleaning, other minor uses of wheat, and errors in other items in the table.

[d] Total supplies less sum of net exports and year-end stocks.

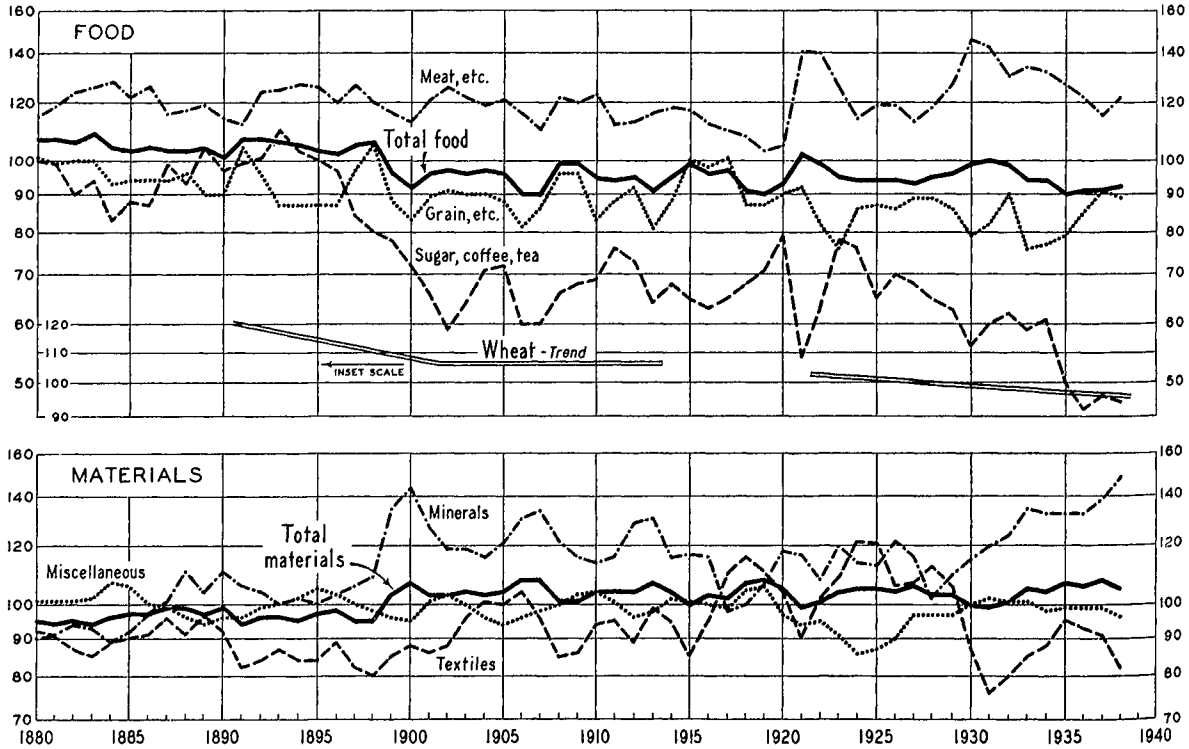
[e] Sum of the two following items.

TABLE X.—WHEAT SUPPLIES AND DISPOSITION IN FOUR EXPORTING COUNTRIES, 1898–99 TO 1908–09* (*Continued*)

Year	Supplies			Domestic utilization				Surplus over domestic use[e]	Net exports	Year-end stocks
	Initial stocks	Crop	Total	Food use[a]	Seed use[b]	Feed and residual[c]	Total[d]			
	C. AUSTRALIA (AUGUST–JULY)									
1898–99	10	41	51	21	7	0	28	23	9	14
1899–1900	14	40	54	21	7	— 2	26	28	14	14
1900–01	14	48	62	21	6	— 2	25	37	23	14
1901–02	14	39	53	22	6	— 1	27	26	14	12
1902–03	12	12	24	22	6	— 8	20	4	(6)	10
1903–04	10	74	84	22	7	+ 8	37	47	23	24
1904–05	24	55	79	22	7	— 4	25	54	39	15
1905–06	15	69	84	22	7	0	29	55	37	18
1906–07	18	66	84	25	6	— 3	28	56	38	18
1907–08	18	45	63	21	6	0	27	36	18	18
1908–09	18	63	81	23	7	— 6	24	57	42	15
	D. ARGENTINA (AUGUST–JULY)									
1898–99	12	105	117	24	9	— 1	32	85	46	39
1899–1900	39	102	141	24	10	0	34	107	80	27
1900–01	27	75	102	25	9	0	34	68	47	21
1901–02	21	56	77	26	10	— 3	33	44	27	17
1902–03	17	104	121	26	12	— 1	37	84	58	26
1903–04	26	130	156	27	14	— 2	39	117	78	39
1904–05	39	151	190	28	16	— 5	39	151	103	48
1905–06	48	135	183	31	16	— 3	44	139	103	36
1906–07	36	156	192	31	16	+ 2	49	143	111	32
1907–08	32	192	224	31	17	+ 4	52	172	131	41
1908–09	41	156	197	32	16	+ 6	54	143	115	28

CHART 19.—DEFLATED COMMODITY-GROUP PRICE INDEXES, 1880–1938, AND TREND OF DEFLATED BRITISH IMPORT WHEAT PRICES, 1890–1914 AND 1921–39*

(Percentages of prices in 1867–77; wheat-price trend in U.S. cents per bushel; logarithmic vertical scale)



* Major commodity group price indexes of Sauerbeck-Statist divided by the Sauerbeck-Statist price index for all commodities, based on 1867–77 = 100. Price index data from various issues of the *Journal of the Royal Statistical Society*. Trend of British wheat prices is that shown in Chart 6.

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