



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

*No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.*

# W H E A T   S T U D I E S

OF THE

## FOOD RESEARCH INSTITUTE

VOL. XI, NO. 10

(Price \$.75)

JUNE 1935

### INTERNATIONAL WHEAT POLICY AND PLANNING

**T**HE desire for a "planned" international control of wheat arose from the disorganization of agriculture and trade following the World War. In this study, the war control of wheat is first reviewed. Brief mention is then made of the several conferences in which direct and indirect attention was devoted to the subject. The Conference of 1933-35, recently prolonged until August 1936, is reviewed in more detail. What is designed in this study is a review of the philosophy, the theory, of international "planning" of production and distribution of wheat.

The development of "surplus" of wheat is reviewed and the major responsibility of the wheat-importing countries emphasized. Planning from the export side is contrasted with planning from the import side. The international movement of wheat is briefly surveyed. Then follows a verification of the important trade concept that wheat is not a unity; wheats are really a group of cereals. Importers' quotas and acreages are contrasted with exporters' quotas and acreages; the difficulties of acreage restriction and of quota adjustment are emphasized. The control of price is subjected to a critical analysis. Attention is then directed to several collateral methods of reducing "surpluses"—raising the consumption level and raising the feed fraction.

The technical difficulties of organization and control of any international wheat plan are set forth. In the summary and concluding observations, the vast difficulties and the limited facilities of control are contrasted, leading to the conclusion, contrary to superficial assumption, that wheat is not inherently adapted to a planned international control. Aspirations are unlimited but conflicting; power and discipline, also conflicting, are limited.

STANFORD UNIVERSITY, CALIFORNIA

June 1935

**WHEAT STUDIES**  
**OF THE**  
**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 ten times a year by Stanford University for the Food Research Institute.

*Copyright 1935, by the Board of Trustees of the Leland Stanford Junior University.*

# INTERNATIONAL WHEAT POLICY AND PLANNING

## I. INTRODUCTION

The wheat plan proposed at the International Wheat Conference of 1933-35 did not rise full-fledged like a phoenix from the ashes of the depression. Such a planned wheat control is not to be regarded as the obvious expression of the philosophy of the "New Deal," nor yet of a new order in international affairs. Instead, it is more appropriately regarded as a defensive policy, sought as a temporizing compromise in tactics and strategy between distressed wheat-surplus countries and self-assertive wheat-deficiency countries. In an appraisal of international control over wheat, a *planned economy* of wheat, one must have recourse to history as well as to prophecy. Experience embodies trial and error. A new social plan cannot ignore precedent and practice. Like many recent instances of reform or revolution, the genesis of, and the precedents for, international planning for wheat control derived directly from the World War. It is worth while, therefore, briefly to trace the developments over the past twenty-five years.

At the time of the sudden outbreak of the war in August 1914, the Northern Hemisphere was engaged in wheat harvest. The reported world crop for 1914-15, ex-Russia and ex-China, was the smallest in four years. The shortage, however, was in Canada, India, and Australia among the wheat-surplus countries; Russia had a large crop, and that of the previous year had been a record; the crop of the United States was the largest reported up to that time. The wheat crops of France and Germany, the chief combatants, were short. But at the onset of the conflict few foresaw a long trench war of attrition or realized the

coming importance of the wheat supply. On the part of the Central Powers it was confidently expected that, with the armies of Austria-Hungary holding the East Front against Russia, the armies of Germany, forging westward according to the von Schlieffen Plan,

would soon control the south side of the English Channel and thus separate Great Britain from France, and then encircle Paris to compel a surrender as quickly as in 1871. Even with the defeat of Germany in the Battle of the Marne, her consequent retreat, and the resultant prospect of a more prolonged conflict, the year 1915 brought few public apprehensions on the wheat supplies of the Allied countries.

The world wheat crop of 1915-16, ex-Russia and ex-China, touched a new record which was not again duplicated until 1923-24. Russia also had a crop above the average, which

promised internal security, even though it had become apparent that the Allies could not draw upon Russian wheat, which indeed seemed superfluous. The United States had its only billion-bushel crop; the crop of Canada was a new record. India and Argentina had average crops; that of Australia was a new record. Thus, as the war raged into its second year (1915-16), little concern for the wheat supplies of the Allies was in evidence, except in the minds of farseeing individuals who realized (a) that bumper crops are rarely repeated in successive years, (b) that crop calamities might produce a sudden stringency, (c) that the agricultures of the warring countries would rapidly deteriorate, with consequent increase in import requirements, and (d) that the submarine would seriously em-

### CONTENTS

	PAGE
<i>Introduction</i> .....	359
<i>Development of Surplus Problem</i> .....	365
<i>International Movement of Wheat</i> .....	368
<i>Wheat Is Not a Unity</i> .....	371
<i>Importers' Wheat Quotas and Wheat Acreages</i> .....	374
<i>Exporters' Wheat Quotas and Wheat Acreages</i> .....	379
<i>Controlled International Wheat Price</i> .....	386
<i>Raising the Consumption Level</i> .....	389
<i>Raising the Feed Fraction of Wheat</i> .....	392
<i>Supervision and Control of Program</i> .....	395
<i>Summary and Concluding Observations</i> .....	399
<i>Appendix Table</i> .....	404

barrass shipments of overseas wheat to the Allies.

The crop of 1916-17 fulfilled the gloomy fears of farseeing prophets and confounded the easy optimism of the Allies. The world crop ex-Russia and ex-China was the lowest in eight years, three-quarters of a billion bushels less than the year before. The crop of Europe gave apprehensive evidence of decline in agriculture. The wheat crop of Russia was probably scarcely more than half that of 1913-14. The United States had the shortest crop in five years, only two-thirds that of the previous year; the crop of Canada was two-thirds that of the previous year. India had an average crop, but Argentina had the shortest crop since 1901-02. Australia, however, had a good crop, though somewhat less than in the previous year. Two major facts came to loom large before the governments of the Allied Powers. First, the overseas carryover of wheat, which was large from the abundant crops of the previous two years, would be needed to make up the shortage in the crop of 1916-17. Second, with the increasing effectiveness of the submarine and the growing number of such weapons, the transportation of overseas wheat to Great Britain and France, and to Italy (which had entered the conflict), would become increasingly more hazardous. With this realization came to an end the policy of *laissez faire et laissez aller* in provisioning the Allies with wheat.

In October 1916 the British government established the Royal Commission on Wheat Supplies. In November 1916 the so-called Wheat Executive was established, under a co-ordinated action of the governments of the United Kingdom, France, and Italy called the Wheat Executive Agreement. The Wheat Executive sat in London, and early in 1917 the Royal Commission on Wheat Supplies became the administrative agent of the interallied Wheat Executive. With the entrance of the United States into the war in 1917 occurred further development in interallied wheat control, with the participation of the American Food Administration and the War Trade Board.

The functions of the Wheat Executive were direct and indirect. It used to be suspected,

and even was alleged, that the location of the Wheat Executive in London, the use of the Royal Commission on Wheat Supplies as central agent, and domination by Great Britain in the collection of wheat supplies throughout the world and their subsequent distribution worked out to the advantage of the United Kingdom and to the disadvantage of France and Italy. In particular, it was felt in France and Italy that freight rates on wheat from overseas (largely in British ships) were too high, just as it was felt that American prices for supplies were too high. Whatever the truth of these contentions, it is not to be questioned that in respect of organization and administration the British deserved the credit for the operative success of the Wheat Executive. The direct functions of the Executive were to supply wheat to the three major Allies in accordance with adopted programs of requirements, to support the operations of the Commission for Relief in Belgium, to make or recognize provision for the small belligerent countries on the side of the Allies, and to allot supplies to the neutral countries around Germany, in accordance with agreements under the blockade of the Central Powers. An important advisory function, though almost direct, was the control and disposition of ocean tonnage. The outstanding indirect governmental functions bearing on wheat supplies were the control of prices and the regulation of currencies and pegging of foreign exchanges.

From the beginning of the Executive, the imported foodstuffs of France and Italy, and especially the cereals, were in effect supplied to those countries on loans. Great Britain purchased wheat abroad for herself and her Allies, partly by the sale of foreign securities commandeered from British investors by the government, partly on short-term credits, and partly on loans or other advances by the exporting countries. With the entrance of the United States into the conflict, the European Allies purchased wheat in the United States in fact, and elsewhere in the world in effect, with money borrowed from the United States Treasury; practically from the beginning, rates of foreign exchanges were pegged more or less throughout the world. A final

indirect function of the Wheat Executive was to provide agricultural authorities in their countries and abroad with information on prospective requirements, to be used in promotion of stimulation of production.

Conditions still more difficult, if different, enveloped the wheat supplies of the Central Powers. Germany was a heavy net importer of wheat and a net exporter of rye. But since the import of wheat greatly exceeded the export of rye, the country was a net importer of bread grain. Germany found in the second year of the war that stores of wheat and rye which she possessed statistically were nonexistent. Austria-Hungary was a net exporter of bread grains and especially of wheat. Bulgaria was a net exporter of wheat, and from this Balkan ally the Central Powers expected substantial contributions. After the conquest of Rumania, another net-exporting region fell into the hands of the Central Powers, and from this area also much was expected. With the progress of the war, however, agriculture in the countries allied with Germany deteriorated so rapidly that the wheat expected from the Balkan states was not forthcoming. Also, when Germany conquered that part of Russia which corresponded to Congress Poland, bread grain had to be shipped from the west into that natural deficiency area. The Germans handled their food problem in a fashion alternately efficient and inefficient. The scientific report of the Eltzbacher Commission was not closely followed. The harvesting, milling, baking, and distribution of bread were minutely supervised. The acreages of wheat and rye were expanded in some areas. The feeding of bread grains to animals was prohibited. A higher extraction of flour was enforced. The use of stretching materials, such as potato, was made obligatory in bread. Bread was strictly rationed by card in Germany, but rationing in the countries of her allies was haphazard. On the whole, German control of wheat was well maintained; but with each succeeding month control was less well maintained in the countries of her allies. Wheat was of course not the all-important factor in Germany. In America we used to say, "Bread will win the war"; in Germany they used to say, "Rye will

win the war" or "Fat will win the war." If the war was won or lost by food at all, it would be more correct to say that fat won the war for the Allies and lost the war for Germany.

In retrospect, it is clear that directly and indirectly the war controls over wheat extended in various ramifications to all parts of the world, to importing as well as exporting countries, and affected other cereals as well as wheat. Supply was encouraged, waste restricted, disposition and distribution prescribed and proscribed, consumption rationed, export and import quotas established, and prices controlled—in short, adjustments of supply to demand were simultaneously sought in respect of acreage, export, and price. The wheat control during the war was a massive planned international economy.

With the re-establishment of peace began the intensive efforts at recovery and reconstruction of agriculture in Europe and Russia, which within a half-dozen years achieved success to a degree scarcely anticipated at the outset. In the meantime, agricultures with expanded wheat acreages in the overseas countries began to apprehend the prospective contraction of the European market. During the first half of the 'twenties, Europe borrowed abroad considerable money for purchase of imported food. The acreages of cereals showed a tendency to expand, even after the direct effect of the war had been overcome, and bread grain prices again rose or declined in accordance with varying supplies. The agriculturists of the countries of western Europe gradually came to appreciate that declining overseas outlets for the manufactures of their countries gave them the opportunity, and indeed seemed to impose the necessity, of adopting a viewpoint of greater "self-sufficiency" in food supply. Farseeing economists came to realize that if the net-debtor countries of Europe were both to pay their obligations and to maintain their currencies, they would need to restrict imports. The true trend of affairs was obscured in the 'twenties by the high prosperity of the United States, the surprising (if lower) prosperity of Europe, the employments in reconstruction activities, and the influence of American lending abroad. In particular, so long as Germany indirectly paid

reparations with borrowed money, the curtain did not rise on the play of liquidation of foreign trade.

At the International Economic Conference held in Geneva in 1927, the standpoint of agriculture was largely one of complaint of non-participation in current prosperity. It was indeed contended, and widely acknowledged, for certain crops and in certain countries that agriculture suffered peculiar disabilities, quite irrespective of the general state of welfare. But for the most part it was felt that the world had entered on a period of rising prosperity and improved standard of living, which it was believed would be long continued, of which agriculture everywhere claimed a larger and juster share. In short, it was felt that agriculture more or less everywhere was missing the benefits of the "New Era"—or, perhaps more accurately, was getting the full injury of the "New Era." This view held particularly for wheat. Following the drop of a dollar per bushel from 1920-21 to 1922-23 (judged by British prices), the price of wheat declined in 1923-24, then rose significantly during 1924-25, and maintained a relatively high position during the succeeding two crop years. At the time of the meeting of the International Economic Conference in 1927, therefore, the world price of wheat could hardly have been termed low. Nevertheless, because of undelated high costs and fixed charges and of high prices for the goods purchased by wheat growers, it was urged that some provision ought to be made to enable wheat growers to obtain a larger and more equitable share in the prosperity of their respective countries. It was apparently taken for granted that high urban prosperity justified a high farm price of wheat.

A number of international wheat conferences were held during 1930 and the early months of 1931.<sup>1</sup> These conferences included one devoted to the wheat questions of the members of the British Commonwealth of Nations, and one called by the International Institute of Agriculture in Rome. Otherwise, they were more or less directly under the

supervision of the League of Nations. For the most part these conferences dealt with the peculiar problems of the four new countries which had arisen in the Danube region. The transactions were for the most part desultory and to a large extent served no other purpose than exchange of views. It is probably fair to say that out of these conferences, however, developed some of the barter arrangements now in effect between the wheat-exporting states of the Danube region and the importing states of western Europe.

Following the onset of the depression, in consequence of the rapidly declining price of wheat, an International Wheat Conference was called in 1931, and met in London in May at a time when the British price of wheat had fallen below the equivalent of a dollar a bushel for the first time since the war. At this Conference it was no longer a question of relative disadvantage; the absolute disadvantage of wheat growers the world over was accepted by common agreement. A major branch of agriculture stood in distress. It was no longer a question of seeking in each country a juster share of prosperity, a fair part of the national dividend; it was a question of evading peculiar liabilities and excessive disabilities. Despite much dialectical discourse, it became clear from the statements of delegates that wheat growers in most countries were feeling their way toward state control, just as wheat growers in the United States had struggled with the equalization fee, the export debenture, and the Grain Stabilization Corporation. Indeed, the virtual impounding of excess wheat and the pegging of the wheat price under the American Federal Farm Board had a definitive effect in other countries in turning the attention of wheat growers and their political representatives toward the consideration of projects of state control.

Comprehensive schemes of international supervision of wheat were presented to the Conference, especially by delegates of France and Poland—proposals of a rather philosophical and grandiose type. Few of the delegates were prepared to consider acreage contraction for their countries; most of the delegates seemed to feel, or hope, that export and import

<sup>1</sup> These conferences were reviewed in "The International Wheat Conferences during 1930-31," *WHEAT STUDIES*, August 1931, VII, 439-75.

quotas could be relied on to restore higher prices. The unqualified refusal of the United States to participate in quota arrangements relieved other opposing countries, like the United Kingdom, from the unpleasant public odium of such opposition. Russia joined the United States in this policy. Otherwise, the wheat-surplus countries of the world (disregarding India) favored (on paper) the introduction of some system of quotas, to which project many of the importing countries of continental Europe also subscribed (again on paper). To what extent "agreement in principle" would have resulted in "agreement in details" was of course never found out, since with the opposition of the United States and Russia the scheme for quotas collapsed.

There are three major factors, three influencing variables, in an international plan of control of wheat. An analogy may be drawn by setting up a physical model. An international control of wheat may be compared with the arch of a gateway, which has two lateral supports and a keystone. Acreage, export, and price correspond to the two lateral supports and the keystone. Under *acreage* is implied supply, with assumed continuity of average yields. Under *export* is implied volume of international trade, the equation of exporters' surpluses with importers' requirements. Under *price* is implied some basic figure representative of production costs and transportation expenses, unmodified by subsidy or tariff duty. Which of the three—acreage, export, price—is the keystone of the arch?

According to an almost mechanistic formulation of the law of demand, with a naturally exaggerated geographical reflection, the preferences of different countries could be fitted into the simile of the arch. Every country realized, other things equal, that higher price tended quickly to increase acreage, while declining price tended to be less promptly effective in the opposite direction. Every country realized, other things equal, that higher price tended to contract international movement and lower price to expand it, but disproportionately. Every country realized, other things equal, that a large world crop would have an influence in lowering world price, depending partly upon the distribution

of the surpluses; also, that a short world crop would have an influence in raising price, dependent partly upon the distribution of the shortages.

The delegates in 1931 were afraid of recommendations on acreage and fearful of allocating to different countries stipulated shares of acreage contraction to be imposed, since they realized keenly and apprehensively that programs of contraction based on current acreage would be very different from those based on pre-war acreage.

The delegates in 1931 were afraid of fixed wheat prices. Countries with tariffs on wheat were already thus influencing their internal prices. Price fixing in the wheat-surplus countries could not be contemplated except under the leadership of the outstanding free-trade wheat-importing country, the United Kingdom. Also, it was felt that consumers would stand high bread prices due to short crops of wheat but would revolt against high prices due to government action. Subsidies, like skeletons in closets, were not regarded as discussible.

Thus, with particular aversion both to acreage control and to price control, the minds of the delegates in 1931 gravitated toward export control. Thus arose the proposal for export and import quotas. The control of export became for the moment the keystone of the arch. With subsequent decline in prices, however, it became suspected that the arch could not be constructed with uncontrolled acreage and uncontrolled price as the lateral supports, using controlled export as the keystone.

The subsequent developments, beginning with the International Wheat Conference of May 1933, are to be explained on the broad circumstance that those who believe in an international wheat control have come to realize the necessity of tripart control—of acreage, of price, and of export. If the wheat agriculture of the world were to receive a planned reorganization, passing through liquidation and refunding, it was assumed this implied a unified control of production, international movement, and price.

At the same time, while the development of the spirit of peace-time control under circumstances of worsening stress is understand-



able, it still remains somewhat strange that the reversal of the objectives in war-time control has attracted so little attention among agrarians. Every new objective is the opposite of the old; only the use of official power remains the same. Then it was sought to expand acreage, now it is sought to contract; then prices were restrained, now it is sought to have them supported; then shortage, now excess. In a sense, it is appropriate to say that rationing of the consumer was then the objective, now it has become rationing of the producer. Despite reversal of the objectives, it is widely felt that governments may devise measures which, under official compulsions, will be as appropriate in the one direction as they were in the other. It strikes us that the faith in bureaucracy has seldom been more strikingly exemplified.

The latest installment of the story, but not the concluding chapter, is to be found in the International Wheat Conference of 1933. This Conference met in Geneva in May, was adjourned to meet in London on May 29, and an "Agreement" was signed in London in August.<sup>1</sup> This Conference was participated in by practically all wheat-importing and wheat-exporting countries. Limitation of exports was agreed to; but the program could not be maintained or enforced. There was what may be termed a quasi agreement for the control of acreage, which also failed of enforcement. A basic gold price of wheat was adopted, above which the importing countries of Europe agreed to lower customs barriers and modify "the general régime of quantitative restriction of wheat imports." This came to nothing because the stipulated gold price of wheat was never attained, and to some extent the importing countries increased their barriers. The Conference did not adjourn, but continued a quasi existence in the form of a Wheat Advisory Committee, which met at irregular intervals. It was the purpose of this Committee to plan to meet developing contingencies, but nothing came of these activi-

ties. There was considerable discussion of minimum and of maximum prices and of differential prices within a range. The Wheat Advisory Committee was unable for the crop year 1934-35 to devise acreage restriction or impose export quotas. Though convinced of the necessity of simultaneous control of acreage, price, and export, no scheme of control could be devised that was acceptable to all countries concerned.

The Wheat Agreement adopted at the International Wheat Conference in 1933 was not enforced for the simple reason that it was obviously unenforceable. This Agreement, which was scheduled to expire on August 1, 1935, late in May was extended to August 1, 1936. The prolongation is merely on paper, the Agreement has not the semblance of content, since it is provided that no enforcement is contemplated. The history of this International Wheat Conference, which in one form or another has dragged along in a desultory manner for over two years, is nothing less than an illustration in diplomacy of much ado about nothing. It has, however, proved one thing—how much easier it is by agreement to facilitate wheat exports than to restrain them. The success attending the efforts to facilitate the export of wheat from France has been paralleled by the failure to restrain the exports from Argentina. The contrast, in our view, merely makes it manifest that the correct policy should have been to facilitate the exports of wheat from both France and Argentina, in order, so soon as possible, to reduce the aggregate of exportable wheat surpluses to a lower level.

The story of the envisaged and purported wheat controls of the last half-dozen years exemplifies a statement of Glenday: "Despite much discussion of what is euphemistically termed 'economic planning,' there is little understanding as to what it is that needs planning and even less as to what should be the test of validity or ultimate objective."<sup>2</sup> Both wheat-exporting and wheat-importing countries have yet to decide whether they intend to organize their agricultures to produce wheat or to employ wheat growers. If the immediate distress of wheat growers more or less the world over is an emergency, to be

<sup>1</sup> Cf. "The World Wheat Situation, 1933-34: A Review of the Crop Year," *WHEAT STUDIES*, December 1934, XI, 141-48.

<sup>2</sup> Roy Glenday, *The Economic Consequences of Progress* (London, Routledge, 1934), p. 222.

approached from the standpoint of what might be called the "welfare clause" of human nature, that is a limited problem, no matter how important. If, however, the circumstances are enduring and alleviation involves long-term adjustments, then the various pro-

posals for planning and control of the wheat supply of the world deserve particular attention. In what follows we consider these proposals, and especially the technical applications, from the standpoint of long-term considerations.

## II. DEVELOPMENT OF SURPLUS PROBLEM

If a wheat conference had been assembled in 1913 to set up adjustment of wheat acreage in the exporting and importing countries, the problem would have appeared relatively simple. Wheat growing in Europe then might properly have been termed stabilized, in relation to rate of growth of population. The rate of expansion of wheat growing in Canada, Argentina, and Australia seemed open to reasonable forecast. In the United States and Russia wheat growing was apparently stationary or declining, certainly in relation to rate of growth of population. The circumstances in India and in several of the small exporting countries did not present difficulties. With rate of growth of population predictable for the chief exporting and importing countries, it would have seemed statistically permissible, in connection with the trend of rising price level, to have set up programs of wheat acreage in the importing and exporting countries which would have maintained a fairly close and flexible adjustment between importers' requirements and exporters' surpluses. This held true because then there was a balance inherent in the rate of growth of population and the rate of expansion of wheat growing and of production in general.

The war spoiled this picture. Wheat growing in Russia passed into an eclipse that lasted through a decade. Directly and indirectly in consequence of the war, the wheat acreage of Argentina, Australia, and India was moderately expanded. Wheat acreage in the United States and Canada was disproportionately extended. Wheat growing in Europe (ex-Russia) was first prostrated, then abnormally expanded—at first as security against the spreading disorganization of currencies, and in later years as consequence of the depression. Most wheat-importing countries now practice one or another form of restriction of

import; most wheat-exporting countries now practice, in one or another form, the raising of the price of wheat. With notable retardation of the rate of growth of population in the Western Hemisphere and in Europe west of Russia, the curve of trend of consumption is flattened. Unless the situation between wheat-exporting and wheat-importing countries can be allowed to be liquidated on the basis of open price competition, attended with widespread losses to wheat-growing units within both exporting and importing countries, then the only early solution now regarded as practicable in political circles seems to be mandatory adjustment through acreage control. Adjustment through obligatory acreage control was rejected by the International Economic Conference in 1927, and by the International Wheat Conference of 1931, but accepted (on paper) by the Wheat Conference of 1933.

In forecasting circles it is customary to begin with a basal figure for the countries engaged in international commerce in wheat. In fact, however, this ought to be the last step and not the first, because such a figure can be nothing more than a summation. It is necessary to consider the exporting and importing countries separately. For each exporting country must be determined: the rate of growth of wheat acreage from the beginning of the century to the outbreak of the World War; the behavior of wheat acreage from the war to date; the state of the newer art of wheat growing; the characteristics of the wheat area and other acreage from the agricultural standpoint; the wheat supply in the different regions in each country; the claims made for particular types and varieties desired by the importing countries; the reversibility of wheat acreage (by which is meant reduction through contraction); and the internal relation of wheat growing to

other agriculture, and to urban industries and to population. Such a survey must include particularly Argentina, Australia, Canada, India, North Africa, Russia, and the United States.

For each country, what is the base line from which such consideration is to start: the last ten years before the war, the last five years before the war, the first ten years after the war, or the five years of the depression? Of course, for each of the surplus countries a great deal depends upon the gross amount of wheat pre-empted for total imports. Are these exporting countries to share in 500, 600, 700, 800, or 900 million bushels? Obviously before any program of partition or contraction can be discussed between the wheat-surplus countries, some limitation or stipulation of the foreign market must be accepted. Once this is arrived at, if it does occur, then the six major exporting countries might get together and divide the trade; thereafter, on the basis of their domestic requirements, each exporting country would then undertake such contraction of acreage as would represent adjustment to domestic demand plus the stipulated participation in the world market.

Unfortunately for the exporting countries, in the wheat market of the world demand for the time being is to be regarded as primary and supply secondary. The prerequisite appraisals outlined above for the major exporting countries would need to be worked out for a longer list of importing countries. The countries of Europe determine first what they will raise; subsequently they learn what they will, or must, import. The imports are (elastically) supplementary in most continental countries. The experiences in Europe since the war have shown that more wheat is raised at home on strictly domestic considerations, without reference to how much wheat may be offered from abroad and practically with secondary reference to the import price. There is little concern over comparative costs of production; the domestic wheat growing expands not because foreign supplies are not offered at attractive prices, but because internal circumstances seem to make domestic expansion at high cost preferable to importation at lower cost. Under these circumstances, the prelimi-

nary procedure is for each importing country to define for the immediate future the internal position of wheat growing, which then indicates the extent of the home requirement to be covered by domestic wheat. The stipulated domestic production would take account of the present art of wheat growing, of the characteristics of soil and climate, and of the availability of substitutes and supplements; it would be the reflection of a stipulated acreage planted to wheat, based supposedly on technical agricultural objectives. Thereupon, each country determines the per capita consumption of wheat regarded as appropriate to its population, which will give the total wheat requirement of the country. The difference between total requirement and stipulated domestic production represents import requirement.

It is important to amplify and summarize the argument. The natural and logical order of planning would be as follows:

1. The wheat-importing countries would determine their attained, or desired, level of intake of wheat, in terms of per capita consumption in crop units.

2. The wheat-importing countries would determine the attained, or desired, extent of acreage planted to wheat, in accordance with the state of agriculture and industry, and other considerations. From this would be derived the average wheat crop with usual yields; this is the domestic supply.

3. To the figure for food requirement would be added a figure for seed and for feed and waste; this gives the total requirement.

4. From this sum would be subtracted the estimate of crop; the difference is the import requirement.

5. The sum of the import requirements of the numerous importing countries is the total import requirement of the world, divided usually into European and ex-European requirements.

6. The major wheat-exporting countries, and the several minor wheat-exporting countries, would share in the total import requirements, according to some system of partition by agreement, or on the basis of price.

7. Each wheat-exporting country would determine its attained, or desired, per capita

intake of wheat. This figure, plus a figure for seed and for feed and waste, would represent the total domestic requirement of the wheat-exporting country.

8. The total domestic requirement of each exporting country plus its export quota would represent the total supply needed to be produced.

9. The total supply divided by the average yield per acre would give the required wheat acreage in each wheat-exporting country, with some leeway for winterkilling, etc.

10. The difference between the existing wheat acreage and the needed acreage determined under paragraph 9 would indicate the acreage contraction to be undertaken by the particular country.

Hypothetically it would be possible to reverse the procedure and approach the quotas from the standpoint of the exporters, though this is obviously less natural and logical.<sup>1</sup> The steps would be as follows:

1. Each exporting country would determine the wheat acreage regarded as representing the proper place of wheat in its agriculture.

2. With the stipulated acreage, and average yields, a figure for wheat crop would be forecast.

3. On the basis of established per capita intake, with allowances for seed, feed, and waste, a gross figure for wheat requirement would be arrived at.

4. The difference between the figure for crop and that for total requirement would represent the exportable surplus in each exporting country.

5. The exportable surpluses of all wheat-exporting countries would be combined into a gross figure of exporters' surplus for the particular year.

6. Efforts would then be made to induce the importing countries to partition the total exporters' surplus, to absorb it without accumulation of abnormal carryovers in exporting or importing countries.

7. In order to do this, it would become necessary for many importing countries either to contract domestic wheat acreage or to expand the use of wheat.

<sup>1</sup> This reversed order is, in the main, what the last International Wheat Conference tried to plan.

On the assumption of the broad theoretical postulate of economics that an overproduction of a "good," especially a "necessary," is impossible, the marketing efforts (with other commodities as well as wheat) tend at present to proceed from the side of the exporting countries. This, however, overlooks the fundamental distinction between physiological desire and effective economic demand in terms of money. If adjustments were to occur through the play of competitive forces of prices and costs, there would be some give and take by both exporting and importing countries. But if adjustment were to be planned on the basis of quotas, it is quite obvious that the first step ought to rest upon wheat acreage and wheat need in importing countries, and not upon the embarrassment of surpluses in exporting countries in a so-called "age of plenty."

Now, when acreage figures for wheat in continental European countries, importing and exporting alike, are contrasted with the acreage figures in the six principal wheat-exporting countries—and in each country the wheat acreage of the present is contrasted with the wheat acreage of the past, on both sides in the light of present population and of rate of growth of population—the immediate dilemma emerges. *For the time being, there is too much wheat growing—too much in the importing countries as a group, and too much also in the exporting countries as a group.* Too much, at least, for purchasing power in terms of money. The resultant persistent buyers' market has found expression in a profoundly depressed gold price of wheat. Acreage adjustment on both sides is invoked as representing the only statistical solution—adjustment calculated to approximate exporters' surpluses to importers' requirements and to raise the gold price of wheat. At what level of requirement is more or less glossed over. The allotment of export quotas is the reverse side of domestic allotment of acreage. If acreage contractions do not occur to some extent in each importing and exporting country under natural or forced incentives in individual growers, such contraction must be secured through international planning, if the depression in wheat growing is not to be perpetuated. So runs the argument.

The surprising expansion in the combined wheat acreage of the six major wheat-exporting countries is well shown in a table of annual averages by five-year periods over the past thirty-five years, in million acres:

1899-1900 to 1903-04 .....	155
1904-05 to 1908-09 .....	168
1909-10 to 1913-14 .....	187
1920-21 to 1924-25 .....	185
1925-26 to 1929-30 .....	216
1930-31 to 1934-35 .....	231

There was a sharp increase during the first fifteen years. Then after the war the average acreage from 1920-21 to 1924-25 was slightly lower than in the five-year period 1909-10 to 1913-14. Then occurred a sharp rise in each of the following five-year periods. Over the interval it is evident that the wheat acreage of these six countries expanded from 155 to 231 million acres, an increase of almost 50 per cent. This of course was out of all proportion to the rate of growth of population in those countries, and was certain to result in a relative overproduction unless compensated for by crop failure or recession of acreage in the importing countries of Europe, whose rate of growth of population over the interval did not justify the implied expectations of the wheat-surplus countries.

This was the immediate problem of the

wheat conferences of 1931 and 1933-35. Both failed. In 1931 widespread contraction of wheat acreage was not considered as practicable. The acreage contraction programs of the Conference of 1933-35 failed (for one reason or another) mainly because they were confined to the side of exporters. There was no program of contraction on the side of importers, but instead merely estimates of import requirements. The figures for import requirements were not set high enough to enforce a contraction of wheat acreage in the importing countries. But inherent in the dilemma remains the fundamental circumstance that a contraction in wheat acreage on the exporters' side could not succeed without a contraction of wheat acreage on the importers' side. Even with fixed price as the keystone of the arch, in the analogy previously used, contraction of wheat acreage for exporting countries and stipulation of acceptances for importing countries could not function as the two lateral supports. Effective contraction of acreage in both importing and exporting countries might indeed dispense with price fixing. But without lowered production on both sides, price fixing could not succeed. The surplus problem (underconsumption disregarded) is essentially one of bilateral overextension. Nor does any practicable upward revision of consumption disturb this conclusion.

### III. INTERNATIONAL MOVEMENT OF WHEAT

Any export or import quota plan implies, as prerequisite, a gross figure for international movement of wheat. For example, an estimated movement forecast in 1933 for the crop year 1933-34 was given as 560 million bushels, in terms of net exports. Such a figure cannot be stated to the exact million bushels, since this would imply an absurd pretense of precision. One would have to do as is always done in estimates of probable export movements—have a range, with a suggested central point. For example, using the illustration above, the range would be 530-90 million bushels, with the most probable export suggested as close to 560. Naturally, the wider the range, the easier the forecast. On the other hand, from the standpoint of the objectives and implication of

a quota, a too wide range is undesirable; also, it would be abused, by both importing and exporting countries, under certain circumstances.

The annual quota for international movement must have a dated beginning to cover a year. Our statistical crop year in the Northern Hemisphere begins on the first of August. This expresses merely the convenience of beginning the trading year with the new crop of the principal importing continent, Europe. It does not, of course, fit in with the crop years of all the exporting countries. It is impossible to fix any date to suit harvests in both the Northern and Southern Hemispheres; a quota year beginning the first of August is particularly exposed to the insecurity of crop estimates in

Argentina and Australia. But even in Canada, the frost hazard lies considerably after the first of August, and the European crop is by no means accurately to be appraised by August 1. Therefore, an estimate of quotas for a year to begin August 1 would be necessarily provisional and preliminary, subject to repeated revisions when the crops of Europe, Russia, Canada, Australia, and Argentina become known successively. Even when the revised estimates become available, it is customary to record the world crop of wheat as "ex-China and ex-Russia." Quite often, however, the "ex" turns out to be "x."

Such a gross figure for export movement would not merely need to be conditioned on crops of importing countries and of exporting countries, i.e., on importers' requirements and exporters' surpluses of new wheats, but must also take account of carryovers of old wheats. These carryovers are at best only very roughly measurable in even the important countries, and the most precise of the available information is not promptly made public. To a considerable extent, a carryover comes to be measured in the trade of the subsequent year; the larger the carryover, the less precise our information as a rule. Feed use and waste tend to be larger with heavier carryovers. Also, the carryover is influenced by the price level. The apparent assumption by diplomats and politicians is that a monthly figure is determinable for available wheat supply of the world, or even a monthly figure of exporters' surpluses and importers' requirements; this is unfounded. To a surprising extent, we learn important facts about a particular wheat season only during the subsequent season.

Wheat growers in exporting countries fail to appreciate that foreign wheat is not the primary supply of continental Europe but the supplementary supply. This was true historically and remains true today. In a few countries, like the United Kingdom, the supplementary supply is larger and more important than the domestic supply, largely on account of high proportion of urban population. On the continent, however, imported wheat is almost everywhere supplementary, and no system of quotas can be based upon a working assumption that the import allotments are pri-

mary and the domestic supply supplementary. This is particularly true when bread grain rather than wheat is considered. In a few importing countries outside of Europe, like Cuba, the imported wheat is the primary supply; but in the most important of these ex-European wheat-importing countries, too, the imported wheat is merely or largely supplementary.

We have now to explore in more detail the major question relating to the establishment of an international scheme of quotas, a plan of export movement of wheat. How would a quota-fixing agency determine the gross figure of international movement for a crop year?

Since the war, such institutions as the International Institute of Agriculture, the United States Department of Agriculture, and the Food Research Institute, with occasional outstanding commercial organizations such as Broomhall's *Corn Trade News*, issue forecasts for the international movement of wheat to be expected during the crop year. These forecasts are at the outset very provisional; in some years they soon become quite definitive, but in other years they remain provisional. Sometimes the final outcome is close to the forecasts, sometimes not at all close. The real purpose of such forecasts is not to make prediction, but to furnish a basis for subsequent discussion of adjustments of expectation and outcome.

Such a forecast represents primarily the addition of two numbers—the figure for European requirements and that for ex-European requirements. An advance estimate of European requirements has a moderately tangible and plausible basis; but the forecast of ex-European requirements is hardly more than a guess, as will be explained.

It is extremely difficult to attempt such a formulation at the beginning of the crop year of the Northern Hemisphere on August 1. In Europe, some sort of a forecast, but not a dependable estimate, is available in July for the new crop of wheat. Harvesting begins in North Africa in May and extends progressively northward. Acreage, winterkilling, condition during the summer, rainfall during the period of major development, and weather conditions at the harvest are fairly well known in most countries of Europe. Using the estimates of

experts in each country and subjecting these to corrections dictated by experience, on the first of August in "normal" years one can set up at least a plausible provisional forecast of the new European wheat crop, though not until threshing returns become available in September–October will the forecast assume the characteristics of an estimate. Quality is still conjectural for the most part—but quotas would pay little attention to quality. The crop in Russia will not be appraisable; in any event, the Russian crop belongs with the exporting countries.

Furthermore there are available in many countries certain estimates of stocks—on farms, in interior mills and elevators, in terminals, and especially at ports. There is an estimate of wheat on the ocean, to arrive during the early weeks of the new crop year. These several estimates of carryovers, in hand and to arrive, contrasted with the records of older carryovers, are provisional and often adjusted upward or downward during the crop year.

The estimates for the new crops plus the estimates of stocks (inward carryover), either with or without subtraction of set figures for minimum outward carryovers at the end of the following July, give provisional estimates for Europe of the domestic supplies of wheat for the current season.

An estimate of utilization, or disposition (sometimes called disappearance), is next undertaken. This is largely statistical, and represents the average, or the ordinates of trend, over a period of several years for each importing country. It is based upon previous crops and imports. It must take some account of price levels of wheat and of the competing substitutes, also of the availability of the substitutes. It must consider the prevailing rate of extraction in the grinding of wheat into flour in each country. Allowance is made for feed and waste. The estimate must include appraisal of the state of prosperity or depression, the extent of unemployment. All things considered, however, it is possible to present a forecast of the wheat (and of the bread grain) required during the forthcoming year. This may be set on the per capita basis if desired.

From the gross combined estimate of total

requirement may then be subtracted the gross combined estimate of supply, to secure a net gross estimate of import requirement. The imports may be forecast to come in part overland from Russia (including the Danube in part as overland); in part by water from Russia, the lower Danube, and North Africa; and for the remainder by water from overseas exporting countries. The figure of gross import requirement may then be adjusted to take account of the exportable surpluses within the continent of Europe—that is, the exportable surpluses of Bulgaria, Yugoslavia, Hungary, and Rumania in all years, of the North African region that really belongs to France, and of the supplies available from occasional net exporters such as Poland, France, and even Germany and Sweden. One may secure thus an estimate (*a*) of the inbound movement of all foreign wheat including Russian, and (*b*) of the overseas inbound movement separately, forecast for the forthcoming year. One may measure European import requirements either in terms of overseas shipments to Europe, as Broomhall does, or in terms of net imports into the several countries. Over a decade, the outcome may fall above or below the forecast by as much as 50 million bushels.

The estimate for ex-Europe is the summation of a series of guesses. Quite a group of estimates of requirements are fairly definitive, in such countries as Cuba, Brazil, South Africa, New Zealand, Chile, Peru, and sometimes also Japan. The crops in the ex-European net-importing countries will hardly be even guesses at the beginning of August. This is true in part on account of inherent defects in their crop-reporting systems; but it is so particularly because many of these net-importing countries are situated south of the equator and their wheat crops have barely sprouted in July. The Chinese crop is a sheer guess. It is of little practical use to combine various estimates of crops outside of Europe into a figure for ex-European supply; the crop estimates are too fragmentary and (in many countries) conjectural. In countries like Cuba and Brazil, averages or trends of previous imports may be trusted; but in a country like China, experience means practically nothing. In most of these ex-European countries, as contrasted

with Europe, wheat plays so small a part among the cereals of the diet that there is no basis for computation. In short, one cannot do with the net-importing countries of ex-Europe what one does with Europe—prepare an estimate of the new crop and an estimate of total anticipated requirement, and from these two obtain by subtraction an estimate of import requirement.

Even after a crop year is over, it is illusory to expect that from the official trade records one can take the estimates of imports and exports of wheat and wheat flour for the world and set up an approximate gross figure of wheat consumption. In the first place, the best reports are not by *crop* years but by *calendar* years. In the second place, estimates derived in one way are often contradicted by estimates derived in another. So far as Europe is concerned, such an estimate is feasible; but for ex-Europe it is a fatuous undertaking. What now are the respective proportions of the trade into Europe and ex-Europe?

This may be measured, though only roughly, by using Broomhall's tables of shipments. Even for Europe, Broomhall's shipments never agree with official reports. For movements outside of Europe, the records of shipments are perhaps the best of the crude estimates we possess. Table 1 gives the shipments of wheat and flour into European countries (ex-Russia), and into countries outside of Europe during the past ten years. The wide variations are immediately observed. Of the total, the lowest percentage falling to ex-European trade was 10.6 per cent, and the highest 27.0 per cent. In absolute units, the lowest amount in ex-European trade was 75 million bushels and the highest 225 million bushels. There is the semblance of a rule that the wheat takings of ex-Europe rise with low price and decline with high price, but the reverse pro-

portionally is not exact and glaring exceptions occur. If a quota-fixing committee were to confine its deliberations to Europe (ex-Russia) on the importing side, a fair advance estimate

TABLE 1.—INTERNATIONAL SHIPMENTS OF WHEAT AND WHEAT FLOUR, WITH PERCENTAGES GOING TO EUROPE AND TO EX-EUROPE, FROM 1924-25\*

(Million bushels; percentages)

Year ending about Aug. 1	Total shipments	Shipments to Europe		Shipments to ex-Europe	
		Amount	Percentage	Amount	Percentage
1924-25 .....	715	640	89.4	75	10.6
1925-26 .....	667	532	79.7	135	20.3
1926-27 .....	818	686	83.9	132	16.1
1927-28 .....	793	662	83.5	131	16.5
1928-29 <sup>a</sup> .....	928	703	75.8	225	24.2
Average					
1924-29 .....	784	645	82.3	139	17.7
1929-30 .....	612	483	78.9	129	21.1
1930-31 .....	787	608	77.2	179	22.8
1931-32 .....	770	582	75.6	188	24.4
1932-33 .....	615	449	73.0	166	27.0
1933-34 .....	524	402	76.7	122	23.3
Average					
1929-34 .....	662	505	76.3	157	23.7

\* Based on data in Table XX, WHEAT STUDIES, December 1934, XI, 184, Broomhall's cumulative totals.

<sup>a</sup> Fifty-three weeks.

might be made, adjustable from month to month, with occasional wide misses and occasional close hits. But when ex-Europe is brought into the picture, the close hits become purely accidental, the scatter of deviations is wide, and the frequency of extreme misses becomes prominent. Clearly what the statistician finds difficult to do in retrospect, an international wheat quota-fixing committee would find practically impossible in forecast. Yet precisely this is what is implied in a planned economy in world movement of wheat.

#### IV. WHEAT IS NOT A UNITY

Whenever an undertaking is launched to contract wheat acreage, establish import and export quotas, raise minimum wheat prices, adjust price differentials, or modify disposition of the supply, this implies a virtual rationing of consumers and a planning of utili-

zation in wheat-importing countries. The implication is for rationing upward to increase use; but it remains still a rationing, a regimentation, in respect of wheats of different types, varieties, grades, and qualities. Wheat cannot be treated as a unity. Many important



circumstances in the more recent international trade in wheat are based upon considerations of type, variety, grade, and quality. If the uses of different wheats are not kept in mind, a comprehensive wheat control would surely be oppressive to some exporting countries and injurious to many importing countries. This was so during the war.

To blend with domestic wheats, the mills of a country import wheats of different types and varieties to varying extents, depending on the proportions of domestic and foreign wheat in the mill mix of the country. If all importing countries in Europe were to fix their import requirements, how would these be defined and secured? In an ordinary year the export wheats of six countries would be available: the United States, Russia, Canada, Australia, Argentina, and India; also those of the internal area of Europe. The exports of the United States would contain no hard spring wheat, a variable amount of soft red winter wheat and/or hard red (or yellow) winter wheat, considerable durum wheat, and in some years a notable amount of soft white Pacific wheat. Would the imports of each of the European countries contain a proportion of each available export wheat of the United States? Russia would have available hard spring and hard winter wheats, and durums in varying amounts; would the imports of each importing European country contain stated amounts of these? Canada would have mainly hard spring wheat (bread wheat) to offer, usually in six grades; would the imports of each importing European country contain stated amounts of these? Argentina would have (in the future) principally hard winter wheat, in some years, however, considerable soft mixed wheat; would the imports of each importing European country contain stated amounts of these? Australia has principally soft white wheat to offer, especially used in biscuits and pastries; would the imports of each importing European country contain stated amounts of these? Finally, India has soft red and white wheats to offer, usually of lower grade; would the imports of each importing European country contain stated amounts of these? In short, would the import requirements of each country be designed to contain, more or less, a

proportion of the surplus wheats of the six exporting countries? The answer of course is in the negative.

Put in another way, do the imports of each European importing country make up the customary mill mix of that country? This is the case with the port mills of the United Kingdom. In most continental countries the mills import but a lesser part of the requirement and select wheats in part on price, in part on the basis of type, variety, grade, and quality. Now, if import quotas were apportioned, then the c.i.f. prices of the different wheats of the six exporting countries would have to be related to their respective values in the mixes of European mills. Otherwise, it could happen that the wheats of certain countries would be sought and those of other countries neglected—just as Europeans have recently drained Argentina of wheat and left a huge carryover in Canada. The quotas would need to include consideration of the qualities required in the importing countries, the types and varieties available, and also of the prices, since of course the mill mix can be varied to some extent to take account of prices. Further, the crops of the Northern Hemisphere and of the Southern Hemisphere come in at different times, which in most years would necessitate the revision of quotas twice a year, since quite routinely the mill mix in the fall differs from that in the spring.

On the side of the six major exporting countries, the plans of crop adjustment would need to bear some relation to type and variety of wheat desired in importing countries. So far as the export quota is concerned, the United States would not need to contract the acreage of hard spring wheat of bread type, but would need to contract the acreage of durum wheat; it might perhaps be acceptable to define soft red winter wheat as a domestic wheat without export rights; then, an export quota would be allotted to the hard winter wheat of Texas and Oklahoma and another to the soft white Pacific wheat, with a fraction assigned to durum—which would provoke a pretty political controversy. In the case of Canada and Australia, which raise mainly but one type of export wheat, no acute differential problem of adjustment to suit importers would arise, except

in some years in respect of the different grades. In the case of Argentina, the influence of a quota would tend to favor expansion in the growing of the southern hard winter wheat and contraction in the growing of the northern soft (or semihard) wheats of the so-called "up river" grade. Any effect of an export quota on the policy of adjustment of wheat acreage in India is unthinkable. A policy of adjustment of wheat acreage in Russia strikes us also as inconceivable, since the wheat export of Russia is so far below her pre-war level; yet, in an exceptional year of high yield, Russian exports would almost dominate the European market, as was the case in 1930-31. For two of the export countries, the United States and Argentina, a program of acreage adjustment would certainly provoke controversy between regions, if the export quotas stipulated stated amounts of the different wheats to meet importers' specifications.

Finally emerge considerations of price. In the mix of the majority of European mills what are equivalent to premium wheats are purchased to supply all the way from 10 to 30 per cent of the whole; this is the so-called strengthener wheat. The backbone of the mix is the domestic wheat (except in a few countries like the United Kingdom), with varying amounts of imported wheat of good grade but not of particular type, again especially in the United Kingdom. A large fraction (sometimes almost half) of the import wheats are filler wheats, purchased on a price basis. In some mills No. 1 Northern Manitoba may serve as strengthener, Nos. 4-6 as filler. Now, obviously, both the import quotas and the export quotas would need to take account of the prices of the different wheats within the range; otherwise the growers of the premium wheats might be penalized. Because of the hard type and high quality of No. 1 Northern Manitoba wheat and the high position of the Winnipeg futures price, Canadian export wheat is now being eschewed in Europe; European mills and bakers are learning to get along with as little Manitoba wheat as possible. If quality in wheat is to be accorded a recognition, then the import quotas of the European countries would need to contain some provision to that effect, i.e., premium wheats and discount

wheats must be accorded separate positions in quotas.

This seems to have been the view provisionally accepted as a basis for discussion in the scheme of minimum price and differential price considered by the International Wheat Conference in 1933-35. It is understood (the details were not made public) that between the top price, which was Canadian, and the lowest price, which was usually Argentine, was a range of some 20 cents (in experience often more), for illustration roughly from 60 to 80 cents a bushel. Now, unless stated quantities of the different wheats within the price range could be stipulated in the import quotas, obviously the export quotas could hardly be enforced. Higher price looks more attractive to sellers than lower price; yet it might be acceptable to Argentina to sell her exportable surplus at low price and unsatisfactory to Canada to sell her exportable surplus except at high price. If the price range were set narrow, the difficulty would be alleviated; but this would do violence to standards of quality and to varying relations of production costs in different countries. Also, if there were no price range, this would tend to exclude, or reduce, those purchases by ex-European countries which are based on price but are nevertheless indispensable for the adjustment of exporters' surpluses to importers' requirements. Yet in Europe, special import specifications would need to be accorded, and price alone could not determine imports. Stated in a broad way, what would be needed are measurements of the elasticities of supply of and demand for the different wheats, which, however, are not currently available.

In summary, it seems clear that a planned international trade in wheat would comprise no simple horizontal allocations; instead, there would need to be set up differential quotas in the importing countries of Europe, to take account of different types, varieties, grades, and qualities of wheat, and differentials also in respect of prices. On the open market these relations are now settled by trial and error, bids and tenders, premiums and discounts, with some exporting countries (e.g., Argentina) cleaning their bins of export wheats, while other exporting countries (e.g., Canada)

retain heavy carryovers. To substitute for this a comprehensive system of quotas based partly on type, variety, grade, and quality and partly on price, adjustable every few months as the successive harvests come in, and administered and enforced from a central point like London, would represent a scheme far more ambitious than the rationing of wheats during the war. And such a scheme is necessarily based on the assumption that import demand for wheat is relatively inelastic, that the supplemental foreign wheat has a higher ranking than the primary domestic supply, that substitution with other cereals would not disturb the operation of the plan (granted that other domestic and foreign cereals were not placed under quotas), and that the world price of wheat might thereby be substantially elevated. Apart from the inherent difficulties in administration, it is pertinent to point out that in the past high wheat prices, referring of course to duty-free gold prices, have usually been brought about by crop calamities and low wheat prices by bumper yields. Crop calamities would tend to disrupt the quota scheme or make it dispensable; but bumper crops would have the tendency to make the administration ineffective in the face of substitution with other cereals.

It is worth while to amplify the implication of the statement that wheat is not a cereal but a group of cereals. Those commodities to which international price fixing has been applied in the past, or attempted, are such as possess unity of composition and characteristics. Such are tin, copper, nickel, quinine, iodine, alcohol, rubber, and nitrate. Wool and cotton, however, are a group of fibers, with wide ranges of qualities. We have a number of types, varieties, grades, and qualities of wheat. We have bread wheats, biscuit wheats, and wheats for alimentary pastes. Similar differences exist in other cereals: we have flint corn and dent corn, malting barley and feeding barley. When the feed grains are priced upon a caloric basis per pound, it will be found that apart from exceptional seasons the price spread is no wider than is the price spread covering the group of wheats in the United Kingdom. No one wheat is representative of the group. Consumers' choices within the group rest both on price differences and on differences in composition and use. In recent decades this differentiation of the wheats has been amplified; and no concept of a regional price, a national price, or a world price of wheat is valid except with explicit consideration of commodity characteristics.

#### V. IMPORTERS' WHEAT QUOTAS AND WHEAT ACREAGES

Any plan to control the growing, regulate the distribution, and govern the prices of wheats in the world must be based on recognition of the fact, emphasized above, that wheat is not a unity either in exporting or in importing countries. The wheats are groups; but the groupings are not the same in exporting and in importing countries. Important, further, is the circumstance that the several importing countries are of different rankings as importers. It is permissible to distinguish roughly several orders in the ranking of wheat-importing countries.

The ranking of wheat-importing countries is based on regularity of import, volume of import, and price level of wheat. One may separate three ranks: importers of the first, of the second, and of the third order. It is immediately to be recognized that the orders

overlap; also, that an importing country may shift from one order to another. The United Kingdom of course occupies invariably the first position. A few years ago Holland, Belgium, Italy, France, and Germany ranked as importers of the first order. But recently France has been a net wheat-exporting country, and Germany has latterly imported so little wheat as to lose her ranking as an importer of the first order. Italy has also greatly curtailed her import of wheat, but during the next crop year will presumably again be an importer of the first rank.

Importers of the second rank are numerous and include such countries as Switzerland, Greece, and Czechoslovakia. Importers of the third rank not only have a lesser need of wheat imports but frequently shift from importer to exporter, of which Spain is a good illustra-

tion. A country like China would be classified as an importer of either the second or the third order, despite occasional years in which imports are really heavy.

It is important to realize that the classification of wheat importers before the war has been greatly modified by expansion of wheat growing under the urge of self-sufficiency, also by the effect of the depression on the foreign purchasing power of many countries. If one will analyze the decline in wheat imports into Europe during the past five years, one will obtain illustrations of these two influences. The effect of the depression on foreign purchasing power ought to subside; but the expansion of domestic wheat growing will probably prove more enduring.

Since in our view the proposed positions of importing countries would need to be stipulated in advance of the positions of exporting countries, we consider the import side first. How would the quota-fixing Central Committee determine the shares in the stipulated export movement to be assigned to the several named wheat-importing countries? Above in this section, the different ranks of importing countries were described as qualifying their capacities of absorption. How now, in a country of whatsoever ranking, are the factual import quota, and the domestic supply, to be technically arrived at? As stated above, we regard these to be preliminary to the export allocations.

The meaning of a wheat quota depends on relation of exporters' surplus to importers' demand. When there is a scarcity of wheat, i.e., when exporters' surpluses do not seem to meet importers' requirements, then in effect the wheat quota applies to the export side. It represents a pledge to export a certain amount, secured in the exporting country perhaps through a limitation of supply to domestic consumers. The United States Food Administration during the crop year 1917-18 imposed a low use of wheat in the United States, in order that a stipulated large amount of wheat might be exported to the Allied and Associated Powers in Europe. This form of quota, a quota in the state of shortage, might be termed a quota downward, a minimum.

The quotas recently, and now, under con-

sideration are those in an age of relative excess, when importers' requirements do not seem to equal exporters' surpluses and excessive carryovers lie in several exporting countries. Here in effect the quotas represent a limitation on the exporting countries; in the importing countries, the quotas represent agreements to take at least certain amounts. That is, they are quotas upward, maxima. Such import quotas would not be permissive but mandatory.

Table 1 (p. 371) gives the shipments to Europe and to ex-Europe (according to Broomhall) during the past ten years (1924-25 to 1933-34), and reveals (1) a decline in world shipments during the last five years compared with the first five years; (2) a sharp decline in shipments to Europe, as clearly revealed in the averages of the two five-year periods; and (3) an increase in the shipments to ex-Europe, as revealed in the comparison of averages of the two five-year periods. The decline in shipments to Europe during the last five years coincides with the depression; paradoxically to a superficial view, but correctly when objectively considered, the increase in shipments to ex-Europe during the last five years also coincides with the depression.<sup>1</sup> When the record of shipments to Europe is contrasted with the wheat crops of Europe and the rate of growth of population, it becomes evident that part of the decline in imports has been due to large domestic supplies; but to some extent, it must have been the result of artificially high price and relative underconsumption. Europe, despite the enlarged domestic supplies, with normal purchasing power would surely have taken more wheat at exporting countries' prices than was actually accepted. With normal purchasing power over the world, *Europe as well as ex-Europe* would have taken more wheat during the last five years at the prevailing low prices.

A program of import quotas would need to take account of the situation revealed in the table. The first step in adjustment of importers' requirements to exporters' surpluses

<sup>1</sup> An old rule was that use of wheat increases in hard times; but most European countries have held the wheat price high.

would be enlargement of shipments to Europe by at least a hundred million bushels a year. This could be done only by raising the figures for imports in the quotas of the individual countries. The combined figure for Europe is a statistical hint, but has no other practical meaning; it is the individual quotas that are important, and upon these the pressure for enlargement is to be applied, if at all.

How would importing countries fix such quotas, upward? One method would be to accept an average of the imports over a term of years, let us say five or ten years. Such a quota would assume an average crop and an average consumption; or, if not, the burden of adjustment would lie on the importing country. A second method would be to have the quota plus the estimated crop equal a stipulated per capita wheat intake for the year. This implies that after the crop is measured enough import wheat would be accepted to give a combined supply large enough to furnish the stated per capita intake, seed and feed of course to be provided for. Here the crop is the primary variable and the import depends on the crop in hand. A third method would be to accept as base line a stated per capita disposition of wheat, fix a stipulated quantity to be imported, perhaps an average, and then allow the domestic crop to exceed, to equal, or to fail to equal the gross figure, as the case might be. In case the domestic crop were short, the import quota could be enlarged, if desired; in case the domestic crop were large, then the stipulated import quota would still need to be accepted, and the excess of the domestic crop would remain as an enlarged domestic carryover.

Whichever method is employed to fix a quota for an importing country (in a period of general surplus of wheat throughout the world) depends to some extent upon the price level of wheat, upon the available substitutes, and upon the inducements (political, monetary, commercial) held out to the importing country. If the price level of wheat is low, i.e., low in the surplus-producing foreign countries, an importing country might readily be induced to take an amount that would otherwise be regarded as excessive. Wheat might be imported to larger extent for feed. If cereal

substitutes were sparsely available, this would favor imports. Wheat-importing countries, especially debtor countries, cannot pledge themselves to take stated amounts of wheats at stated prices, without reference to their other imports and to the exports with which their imports must be paid. Of course, domestic wheat and feed grain producers would have influence in the decisions. Wheat imports are supplementary to domestic supplies and are not designed to replace them. But within limits, larger amounts of wheat imports could be absorbed if the incentive to do so were outstanding.<sup>1</sup>

In particular, the reciprocal goods stipulated in return would in many countries be of deciding importance. For example, a country like Czechoslovakia might accept more wheat than she would otherwise use (price relations equal), increase the wheat intake and lower the rye intake of her people, transfer the domestic rye to animals, and lower the importation of corn from the lower Danube if the extra amount of wheat could be paid for with extra exports of glassware, metal ware, and leather goods. Possibly Finland would eat less fish and more wheat, if wheat were obtained for added exports of newsprint. Probably Italy would accept more wheat if she could pay for this with added exports of olive oil and wine.

In other words, the bare quotas are inflexible and have little meaning. When, however, the quota is designed to enable an importing country to exchange a high-priced product for a low-priced product (wheat), enlarged amounts of the low-priced product would often be accepted. Wheat is in general a low-priced foodstuff (per calorie), and a series of import and export quotas might be arranged in Europe which would provide for possibly an added international movement of 50 or 100 million bushels, if wheat were taken by the importing countries in barter for export of their higher-priced goods. But such a particularized trade could not be conducted through a central committee representing an international wheat conference which year after

<sup>1</sup> Perhaps our war debtors would buy more American wheat if the war debts were formally forgiven, or if wheat imports could be paid for with war bonds.

year sought to adjust exporters' surpluses to importers' requirements, or importers' requirements to exporters' surpluses, as the case might be. Such a trade implies bilateral negotiations between countries. No central committee dealing with wheat alone could conduct such negotiations.

Whatever figure might be set for total importers' requirements, it is worth while to emphasize that it is not permissible to lump the expected requirements of Europe and those of ex-Europe. These are of different orders, proceed from separate incentives, and are not parallel, but indeed are quite independent and in some years even conflicting. In the case of European import requirements, the needed imports are related to the domestic crop in a manner not at all the same as with ex-European requirements. Except under unusual relations of price, Europe imports wheat to bring her total supply up to a certain level in relation to other foodstuffs. If the price of wheat is low, somewhat more would be taken; if the price of wheat is high, somewhat less would be taken; but broadly the import demand of wheat in Europe is more inelastic than in the ex-European countries. In ex-Europe as a whole, certain countries, like Cuba, have an inelastic demand; but other countries, like China, have a very elastic demand. When the price of wheat is low, China tends to import freely, more or less irrespective of the prices of other cereals; when the price is high, less is imported even if the domestic crops are low, though the size of domestic crops is not without influence, as in 1925-26. A picture with much the same meaning is revealed in India, where high price stimulates exports even if the domestic crop is low, whereas if the price is low the exports decline even if the domestic supply is large. Year in and year out, ex-European import demand is a function of prices in a more pronounced manner than is European import demand. This circumstance brings it about that the ex-European absorption represents a sort of shock absorber in the disposition of the total movement of wheat in international trade.

One may allocate by quota, or ration, European demand, with some prospect of success;

but a corresponding allocation by quota, or rationing, of ex-European demand could not hope for a corresponding success. Telling India how much she may export and China how much she may import is enough to bring a smile to the face of the experienced Oriental trader. Chinese imports of wheat in some years exceed the combined imports of a number of the smaller countries of Europe whose voices are now strong in the council of European import policy. Does anyone seriously believe that Chinese imports and exports can be regimented except by one or another form of force? Yet in the past it has often been the imports of ex-European countries which have been the decisive factor in the world-wide adjustment of exporters' surpluses to importers' requirements. Ex-Europe has done well in wheat imports during the years of depression; it is the contracted wheat imports of Europe, with lower world prices, that have had the direct result of expanding the carryovers.

The case of Italy points more than a moral. From the standpoint of technique, Fascism presents in highly developed form the elements of planned production. Of this, the "battle of the grains" is a striking but not exceptional illustration. In this campaign for increased wheat production were three main objectives: (1) the utilization of land not in current use, to give employment to Italians otherwise working more or less continuously in foreign countries; (2) to lower import of wheat and thus reduce the debits of the international account and protect the national currency; and (3) to improve the diet of the people by substituting wheat for corn. These were not ephemeral objectives. If these purposes were sound, it seems to us obvious that the "battle of the grains" is irreversible and not open to question by outside countries. Certainly it would look like gratuitous advice to suggest to Italy that this policy is mistaken. Beyond that, what can the wheat-exporting countries offer Italy in exchange for a long-term reversal of policy? The case of Italy illustrates how worthless are generalities on the subject of European import requirements and how promptly emerge insuperable difficulties the moment that the internal circumstances

in the importing countries are objectively and sympathetically explored.

The disagreements that would arise in the execution of a world wheat plan are well illustrated by the divergence of views that has arisen between the United Kingdom and Canada.

In the Ottawa Agreement, the wheats of the dominions were accorded a preference by the levy on non-Empire wheat of an import duty of 2s. per quarter. The United Kingdom reserved the right to cancel the preference "if at any time Empire producers . . . are unable or unwilling to offer these commodities on first sale in the United Kingdom at *prices not exceeding the world prices* and in quantities sufficient to supply the requirements of the United Kingdom consumers." (Italics ours.)

For some months, the active wheat future at Winnipeg has stood above the corresponding Liverpool future by from 4 to 8 Canadian cents per bushel. In January 1935 British millers proposed the removal of the preference for Empire wheat on the ground that the letter and spirit of the Ottawa Agreement have been violated by the prices of Canadian wheat in the United Kingdom. We infer that the official opinion in Canada (not publicly stated in the United Kingdom prior to the date of the protest of the millers) is that the words "of each wheat" are to be understood to follow the words "not exceeding the world prices" so as to make the phrase read "not exceeding the world prices [of each wheat]." Under this interpretation the world price of Canadian wheat would be the cash sale price of that wheat in the United Kingdom, and the world price of Argentine wheat would be the cash sale price of that wheat in the United Kingdom. If this interpretation were granted, then under the Ottawa Agreement Canada never contracted to sell her wheat (i.e., No. 1 Northern Manitoba) in the United Kingdom at the same price as duty-paid Argentine wheat. The exact spirit of the letter of the Ottawa Agreement in relation to wheat preference will obviously need to be officially clarified; and in any event when the next agreement is drawn, the exact obligations of the Australian, Canadian, and Indian growers to British consumers will need to

be more explicitly formulated than they are at present.

Finally, the attitudes in the importing countries of Europe are determined to varying extents by the interests of the urban population. Great Britain has a small agriculture, but has a subsidy on domestic wheat and a tariff on ex-Empire wheat. Britain desires Australia and Canada to receive good prices for wheat, because that ought to stimulate their purchases of goods from the mother country; at the same time, the British live by world trade, and dear bread does not make for low prices of export goods. In Holland and Switzerland the influence of agriculture in recent years goes far beyond the proportion of peasants in the populations. In Germany the agriculture of the Ost is politically as strong as the industry of the Rhine. In France and in the Italy of today the influence of agriculture dominates. These are the circumstances that must be recognized in any undertaking to secure a concordant European policy on import quotas. Nowhere in Europe, however, would it be easy to fix and enforce a stated contraction of wheat acreage. Yet without such contraction of acreage, the import quotas float on air.

The several circumstances and considerations adduced above have found their reflection in the attitudes of the wheat-importing countries of Europe. Throughout the numerous international wheat conferences, the importing wheat countries of Europe have resisted commitments in respect of restriction of domestic wheat acreage and stipulated import of wheat. They have protected their wheat growers with high import tariffs and numerous other impediments to imports. They have sought to have the exporting countries influence wheat price upward by restriction of wheat acreage and establishment of export quotas. They have consistently resisted the view that the first plank in an international wheat control must be written by the importing countries. In our view, it is to this attitude of the wheat-importing countries of Europe that the collapse of the ambitious program of international wheat control was basically due. Perhaps this was to their credit, not their fault.

## VI. EXPORTERS' WHEAT QUOTAS AND WHEAT ACREAGES

In the preceding section we presented the view that in any general system of quotas the import quotas must precede the export quotas, and the latter should be adapted to the former. At the same time, it is appropriate to discuss export quotas as a separate topic. Such a discussion follows, with import requirements considered as "other things equal."

As in the wheat-importing countries, the wheat-exporting countries may be ranked into several orders. The classification depends on amount and regularity of export and on the influence of the wheat price level on export. Traditionally, the six major wheat-exporting countries—the United States, Russia, India, Canada, Australia, and Argentina—entered the second decade of the century as wheat exporters of the first rank; before the war the basin of the Danube was an exporting region of the first rank. Within recent years, however, significant changes have occurred. Just at present the only wheat-exporting countries of the first rank are Argentina, Australia, and Canada. (1) First the United States became a minor exporter, and at present we are a net wheat-importing country; presumably, with an enlarged wheat crop, we shall become again an exporter of the third, or possibly of the second, rank. (2) Russia, under the system of collectivization of agriculture, has become a minor exporter, of the third or second order. (3) India since the war has become a net-importing country in an occasional year; in any event, the exports have been quite as much a question of price as of supply. When the price of wheat is high, wheat may be freely exported from India, even if the crop is not large; when the price of wheat is low, the grain tends to remain for domestic use, even if the supply is large. Only in the event of a continuing high price could India again qualify as a wheat exporter of the first order. (4) The new states of the Danube basin have lost their pre-war ranking both in quantity and quality of wheat. These four states are now exporters of the second or even of the third rank, and in an occasional year wheat imports may be necessary.

Outside of the six traditional major wheat

exporters and the region of the Danube, there are many small or occasional wheat-exporting countries, which rank into the second or third order. North Africa stands here, really to be credited to France. Spain, Uruguay and Chile, France and Poland in occasional years, even Germany, are minor exporters. Some of the wheat exporters of the third order ship out one variety of wheat and bring back another. The lower orders of wheat exporters are of course of much less importance than the lower orders of wheat importers.

Self-sufficiency as economic policy in the exporting countries tends to lead to increase in exportable surplus of wheat. The effect of the depression, if any, tends to be in the same direction, unless restrained by governmental action. When the price of wheat is low, the tendency exists to raise more wheat in order partly to nullify the effect of the low price upon the gross income. Thus for the exporting countries as for the importing countries, the net tendencies of self-sufficiency and depression have been in the direction of enlargement of supply, with consequent diminution of international movement.

It is impossible to discuss export quotas without consideration of acreage contractions in exporting countries. In many wheat-importing countries, the relation of import quota to acreage would be indirect. In Argentina, Australia, and Canada, however, the wheat acreage would be the reverse side of the export quota. For these three countries, with their small populations, the export quota would be the cause and the acreage contraction the effect; in a lesser sense, the extent of acreage would be cause and the quota the effect. In the administrative sense, the quota would be enforcement of acreage policy, since it cannot be contemplated to impound wheat year after year in large amounts. Export quota and acreage contraction would be less directly reciprocal in the United States, Russia, and India.

At the International Wheat Conference of 1931 it was hoped that quota restrictions would result directly in acreage contraction. At present, however, it is accepted that both



must operate side by side—in Argentina, Australia, and Canada irrevocably, and in India, Russia, and the United States adaptably. Changes in consumption, in extraction rate, and in feed use might bring about adequate adjustment in India, Russia, and the United States, but could not do so in Argentina, Australia, and Canada. How would the quota-fixing central committee determine the shares in the stipulated export movement to be assigned to the several named surplus-exporting countries? And how would acreage contraction be assigned to, and achieved in, these same countries?

Above in this section we classified wheat-exporting countries in three ranks, according to regularity and volume of export. A quota-fixing committee would have to consider all three orders; the second and third orders may be discussed briefly in advance of the first order.

If the smaller, more or less incidental, exporters of wheat were not given consideration in an export program, they would be placed in position, perhaps forced, to dispose of their wheats outside of the scheme of allocation. In all experiences of control of trade, the small purveyor is the inveterate bootlegger. There is therefore no practical alternative to open recognition of the expectations of the small exporters. Bulgaria, Hungary, Rumania, and Yugoslavia would need to be accorded rights to sell their western neighbors all of their annual exportable surpluses—for the simple reason that since such export could not be prohibited it would best be accorded. Also, the exports of the countries that swing from the net-importing to the net-exporting status—Poland, France, Sweden, and Spain—would need to be accorded freedom, since they could not effectively be prohibited. North Africa holds the right to sell to France. When Chile and Peru have surpluses, they hold the geographical right to sell to their neighbors. In short, the wheat exporters of the second and third orders cannot be regimented; it would not be possible to order them to desist from exporting and build up stocks instead. At the same time, it is to be recognized that the cumulative sum of the wheat exports of the countries of the second and third orders might oc-

asionally run up to a decidedly large figure. From the standpoint of the quota-fixing committee, the exports of all countries outside of the first order would be an evil at the worst and a nuisance at the best. However, the only hope of regimenting the exporters of the first order would lie in a preliminary clearing of the export-deck of the surplus wheats of the exporters of the second and third orders.

In the allocation of export quotas for the six major exporting countries—Argentina, Australia, Canada, India, Russia, and the United States—it is first to be recognized that such export quotas cannot be divorced from acreages. For each of these countries, we have the course of wheat acreage for the fifteen years from July 1, 1899, to June 30, 1914, or for the ten years from July 1, 1904, to June 30, 1914, or perhaps best of all for the five years from July 1, 1909, to June 30, 1914. At whatever point of time one starts to set up the pre-war base line—whether in 1899, 1904, or 1909—the end of the term is the crop of 1913-14,<sup>1</sup> on June 30, 1914.

If, now, one takes these six countries for fifteen, ten, or five years ending with the crop year 1913-14 in the Northern Hemisphere (and with the following crop in the countries of the Southern Hemisphere), one observes very different trends in wheat acreage. The acreage in the United States may fairly be said to have been stabilized, but declining relative to population. In India also the acreage was relatively stable over the interval. In Russia the wheat acreage was still enlarging. The United States, Russia, and India had been major exporters for many years and were the older generation in the field; they had large populations relative to their crop acreages, with the difference that the population in the United States was increasingly urban, while those in India and Russia remained predominately rural. In short, these three countries had long been mature exporters. The war of course proved that they had not reached the limits of wheat culture; this was clearly illustrated in India and the United States, and

<sup>1</sup> This closing with the crop of 1913 is due to the fact that the estimates of the crop of 1914 in Europe were disturbed by war and were incomplete.

failed of illustration in Russia only on account of the exigencies of the conflict.

Argentina, Australia, and Canada were the new generation of major exporters. Beginning really in the 'eighties, in a significant sense they were scarcely important in the 'nineties.<sup>1</sup> But with each quinquennium their importance as exporters expanded, because rates of growth of wheat acreages were so much more rapid than rates of growth of population. At the outbreak of the war, these three exporters were still adolescent but lusty.<sup>2</sup>

The six years of the war period, including the crop years 1914-15 to 1919-20,<sup>3</sup> imposed a severe check on wheat culture in Russia, from 84 to 68 million acres. The raising of wheat in the United States was artificially and governmentally expanded to a pronounced extent, from 54 to 74 million acres. Wheat acreage in Canada rose from 10 to 19 million acres, in Argentina by much less. In Australia especially and in India, wheat growing was reduced by the distance from Europe and the danger of the voyage through the Mediterranean and up the western coast of Europe. The close of the war found the United States and Canada, as well as Russia, stripped of wheat stocks, while considerable exportable (if deteriorated) accumulations remained in India, Australia, and Argentina.<sup>4</sup>

With the return of peace, the wheat growers in the countries which had lost in wheat acreage looked backward in order to determine how much they had to recover. This was true in both wheat-importing and -exporting countries of Europe and in Russia as well. Northern Italy and northern France, whose agricultures had been depleted by war, returned at once to wheat culture. The four new states of the Danube region looked back at their old

regional records under the earlier boundaries and set about to recover at least what they had lost. Russia, with a regimented agriculture and prostrated by two years of famine, by no means forgot her pre-war export markets. In short, every country which had lost in wheat growing set about recovering the losses, with an added realization of the value of security (through self-sufficiency) in the wheat supply, taught by the experiences of the war.

On the side of the exporting countries, overseas wheat growers looked not backward but forward. They counted whatever acreages had been attained during the war as a permanent achievement. In India, with more or less stabilized wheat acreage and not much of a war-time stimulus, this was a matter of no importance in view of the large population. But in the United States, despite our large population, the expanded wheat acreage had more than reversed the pre-war tendency to relative decline. Australia promptly recovered from the injury done to wheat growing by distance, harvested over 10 million acres in 1924 and in 1930 passed 18 million. Wheat acreage expanded moderately in Argentina. The expansion of acreage in Canada was the outstanding performance; directly after the war the wheat acreage was maintained as a factor in post-war recovery, and the acreage quickly passed 20 million and soon approached 30 million.

The sharp decline in wheat price during 1920-21 had nowhere any significant effect in restraint. The Russian wheat famines of 1921-23 stimulated wheat-growing sentiment throughout the world—since this, in connection with the changed agriculture under communism, was regarded as indicating the withdrawal of Russia as a significant exporter of wheat. The sharp recovery of high wheat prices in 1925 was accepted as proving the case for a larger wheat acreage.

When depression struck the world in 1929-30 (following the bumper wheat crop of 1928), wheat acreage and the carryovers stood far above the effective purchasing power (in terms of gold) of importing countries. Then began the struggle for self-sufficiency by the net-importing countries (especially the net

<sup>1</sup> In 1895, their combined wheat area was only 13 million acres, less than one-third that of the United States.

<sup>2</sup> The combined acreage was 34 million in 1914.

<sup>3</sup> We include this crop year because the winter wheat was planted before the armistice and the spring wheat also stood under price control.

<sup>4</sup> The acreage figures used in this discussion are the revised estimates of the Food Research Institute contained in *WHEAT STUDIES*, April 1933, IX, 265-66. Cf. Table I, p. 404, below.

debtors), the search for markets by the exporting countries (especially the net debtors), with gradual disillusionment in the one exporting net-creditor country, the United States. Gradually the need for adjustment of physical supply to effective demand became realized and found expression first in the International Economic Conference of 1927, then in the International Wheat Conference of 1931, and finally in the International Conference of 1933-35.

No program of adjustment can disregard the background of the pre-war wheat acreage. In Table I we have brought together the acreages, averages, and the significant percentages of the six major wheat exporters. The exporting countries with extreme expansion of acreage since the war may reasonably object to an average of the fifteen or ten years prior to the war; but they cannot object to the five-year average 1909-10 to 1913-14. No adjustment of acreage, no allocation of quotas, no fixing of price, can equitably disregard the five-year pre-war average. On account of small populations in Argentina, Australia, and Canada, the export quotas apply directly to the acreages: if the quotas are reduced, acreage must be reduced directly. In the United States, Russia, and India, however, the large populations afford some scope for absorption of wheat after a reduced export quota, without immediate acreage reduction.

Now, for the post-war figures we regard it as preferable to consider the five years of depression—the crop years 1930-31 to 1934-35—and contrast these with the previous five years of prosperity, namely, 1925-26 to 1929-30. The five years 1920-21 to 1924-25 may be regarded as transitory. Any statistical measure must at least compare the five years 1930-31 to 1934-35 with the five years 1925-26 to 1929-30 and these both with the five years 1909-10 to 1913-14.

The first comparison is by acreage numbers. For each of these six countries the highest acreage, the lowest acreage, and the average, in each five-year period, were as shown in the next column, in million acres.

Thus, considered in absolute units (average of 1930-31 to 1934-35 minus average of 1909-10 to 1913-14), the acreage expansion has

been in the following order: Canada, Russia, Australia, United States, India, and Argentina. These increases (in total 44 million acres, as average, in an interval of twenty-five years) represented a rate of growth not in excess of the rate of growth of general production and

	United States	Canada	Australia	Argentina	India	Russia
1909-10 to 1913-14						
Highest acreage ....	50.2	11.1	9.3	16.6	31.1	82.6
Lowest acreage ....	45.1	7.8	6.6	13.2	26.2	71.7
Average acreage ....	47.5	10.0	7.6	14.9	29.2	78.0
1925-26 to 1929-30						
Highest acreage ....	63.3	25.3	15.0	22.4	32.2	77.4
Lowest acreage ....	52.4	20.8	10.2	15.9	30.5	61.5
Average acreage ....	58.3	23.1	12.8	19.0	31.6	71.0
1930-31 to 1934-35						
Highest acreage ....	62.7	27.2	18.2	19.5	36.1	92.1
Lowest acreage ....	42.2	24.0	13.0	16.0	31.7	80.5
Average acreage ....	53.4	25.7	15.3	17.7	33.4	85.8
Average						
1930-31 to 1934-35....	53.4	25.7	15.3	17.7	33.4	85.8
1909-10 to 1913-14....	47.5	10.0	7.6	14.9	29.2	78.0
Gain .....	5.9	15.7	7.7	2.8	4.2	7.8

trade, but in excess of the rate of growth of the population of the countries. In all countries the average acreage during the depression of 1930-31 to 1934-35 was higher than during the previous five years of prosperity, except in Argentina and the United States where some contraction took place.

The second method of comparison is to measure in each country the percentage of change over the pre-war level, using averages instead of highs or lows. These changes were as follows for the six countries, being the percentage increases of the average for 1930-31 to 1934-35 over that for 1909-10 to 1913-14:

	United States	Canada	Australia	Argentina	India	Russia
Average acreage (millions)						
1909-10 to 1913-14....	47.5	10.0	7.6	14.9	29.2	78.0
1930-31 to 1934-35....	53.4	25.7	15.3	17.7	33.4	85.8
Ratio .....	112	257	201	119	114	110

On this basis of scoring, Canada and Australia stand far in the lead of expansion, with Argentina, India, the United States, and Russia following in the order given. There was

little expansion in Russia, and no change of significance in India, population considered. Clearly, if from each country were to be taken what might be termed war wheat profits, in wheat acreage Canada stood to relinquish the most.

There is a third method of comparison. This is to contrast the combined average acreages of the six countries in the five pre-war years and in the five years 1930-31 to 1934-35, and thus determine the gross gain in the recent five-year period over the pre-war five-year period; then the average wheat acreage gain of each of the countries is given as a percentage of the combined gain of the six during the same period. These gains were as follows:

	Total	United States	Canada	Australia	Argentina	India	Russia
Average acreage (millions)							
1909-10 to 1913-14.....	187.2	47.5	10.0	7.6	14.9	29.2	78.0
1930-31 to 1934-35.....	231.3	53.4	25.7	15.3	17.7	33.4	85.8
Gain in acreage (millions)	44.1	5.9	15.7	7.7	2.8	4.2	7.8
Gain in acreage, expressed as percentage of total for six countries.....	100.0	13	36	17	6	10	18

Here Canada is again shown as leading in expansion, with Russia second, then Australia and the United States close behind; Argentina and India had but moderate expansion.

These three comparisons tell the same story of contributions of acreage. Canada carried the banner of expansion; if the pre-war acreage were to be used as base line, Canada would need to take the brunt of contraction. The outstanding wheat expansion in Canada, and the notable expansion in the United States, were due to our participation in the war and to our nearness to Europe. Meat naturally surpassed wheat as Australia's contribution to the food of the Allied and Associated Powers, and Argentina was both out of the war and distant. These circumstances, however, can hardly be used as shock absorbers by Canada and the United States to resist acreage contraction. The United States has tended to contract wheat acreage latterly, but Canada has revealed little tendency to do so.

The stipulation of acreage contraction would depend upon the accuracy of estimate

of pre-existing acreage. Land areas are not equally measurable in the six major wheat-exporting countries. On account of topography and characteristics of agriculture, changes in wheat acreage ought to be measured best in Canada, Australia, Argentina, and the United States, and less reliably in India and Russia, where subdivision of plots is irregular and the methods of recording primitive. In Europe, also, changes in wheat acreage would be ascertainable with some difficulty, mostly on account of extreme subdivision of fields but also on account of the psychology of the peasant. In France, for example, at the present time there is no question that wheat acreage is being concealed and the large crops incorrectly ascribed to high yields per hectare. Trying to estimate and confirm acreage changes in the small plots of the one-mule cotton growers in eastern southern United States gives an idea of the difficulties in estimating changes in wheat acreage in the older countries.

A supplementary comparison may be secured by study of the newer areas of wheat acreage in each country. In some countries it is practicable to intensify wheat culture, through seed selection and application of fertilizers, and thus secure a higher yield per acre. This has been done in importing countries, but such intensification has apparently not been significantly practiced in the major exporting countries. The increased crop is largely the result of enlarged acreage.

In all countries enlarged acreage has occurred both in the older and in the newer regions. In the older regions wheat acreage may be increased by less use of fallow, by change in rotation systems, or merely by planting more wheat and less of other crops. In each country a group of crop experts could determine the extent of such forms of expansion. In the United States it is revealed by mere comparison of acreages in the older states; conversely, some contraction in recent years is also thus revealed.

For the most part wheat cultivation in newer regions is responsible for the largest part of the acreage expansions, especially of the post-war as contrasted with the pre-war period. These have been veritably new pio-

neering enterprises. In Canada the wheat belt has expanded north and west, with introduction of new varieties of wheat, of which the Peace River development is perhaps the most striking illustration. A comparison of the extension of railways westward and northward through the three Prairie Provinces of Canada during the past thirty years furnishes a good illustration of the extension. In recent years, the expansion northward of wheat growing has been particularly significant. In the United States we have witnessed the development of new wheat regions in the Great Plains area lying to the east of the Rocky Mountains, and to some extent also in the Pacific Northwest. The extension of wheat growing into southwestern Kansas, western Oklahoma, and the Panhandle of Texas has been particularly significant. In Argentina the extension has been southward and westward. In Australia there has been some extension inland, but the largest development has been in Western Australia. The new acreage yields hard spring wheat in Canada, hard winter wheat in the United States and Argentina. But in all three countries high-grade wheats are yielded in the newer regions; this is also the case in Western Australia.

Further, in all four countries the new acreage tends to be devoted to single-crop agriculture, not to mixed farming. This circumstance has of course a particular bearing on acreage contraction. A change of rotation toward wheat in a region of mixed-farming practice is readily reversible; but wheat growing in a new region devoted to single-crop agriculture is not reversible, for there is no other practicable crop. In short, when a new region raises wheat as the single cash crop and the quality of the wheat is high, acreage contraction seems out of the question to the inhabitants. Railways have been extended into these new regions, towns have sprung up, roads have been laid out, and schools constructed—all to no purpose if continuation, and indeed free development, of wheat growing is not assured.

We meet here the broad distinction between expansion of wheat growing in the net-importing countries of Europe and expansion in the surplus-exporting countries overseas. In practically every country of Europe west of

Russia, wheat growing is a more or less intimate part of diversified agriculture. Wheat is one of the cereals rotated with pasture, hay, sugar beets, or other fodder crops. The newer varieties of wheat have facilitated the use of wheat in crop rotation. Developments in animal husbandry have tended to make feed grains less important, while bread grains have become relatively more important. It is hazardous to make direct comparisons of the gross wheat acreage in Europe year after year, since numerous up-and-down movements which have occurred have arisen outside of peasants' intentions to plant. The average wheat acreage of Europe ex-Russia in the five years before the war was a little over 70 million acres. Directly after the war the acreage was not much over 60 million. Gradually it revived, recovered to 70 million in 1928, and more recently has approximated 75 million acres. Such an increase, spread over a continent with the large (not overnourished!) population of Europe, is directly of minor significance; the expansion in the major wheat-exporting countries has been much larger in acres, especially in relation to population. But it must be realized that the yield of an extra 5 million acres applies directly to a reduction of the import requirements (with declining rate of growth of population), and is probably equivalent to 100 million bushels of wheat. Also, the increase is within a diversified agriculture and within limits is readily reversible. A moderate wheat acreage contraction in Europe west of Russia would bring up no question of disorganization of agriculture or of relocation of population. But a forced contraction of wheat acreage in the newer regions of the Canadian hard spring-wheat belt, in the newer extensions of the American hard winter-wheat belt, in southern Argentina, and in Western Australia would disorganize the regional agriculture and provoke problems of liquidation of improvements and relocation of population.

The peculiar difficulties attending contraction of wheat acreage in new countries like Argentina, Australia, and Canada ought to be fairly acknowledged on historical grounds. It is easy for the older countries to enjoin the younger countries to step back, to wait their

turn—not merely in wheat growing but also in manufactures. New lands invite pioneers, the spirit of the *voortrekker* is not easily bridled, on new land the costs are low and a fresh start is inviting. Only the middle-aged and the old talk of slowing down. In such new countries the prices of their exports fluctuate more violently than the prices of their imports, which leads to acreage expansion to secure larger gross income. These countries are net debtors, they must pay their obligations not only on grounds of faith but also to secure new foreign capital for further productive developments. The forces of social penetration into a frontier cannot be restrained by considerations of world price of farm products. The Canadians have only to point to our history when they reject advices to contract wheat acreage.

These several considerations intensify the conviction that one of the largest defects in the wheat acreage contraction program of the last International Wheat Conference lay in the failure to apportion the contraction initially and fairly upon net-importing Europe as well as on the net-exporting surplus overseas countries. A second defect was the failure to differentiate the newer countries (Argentina, Australia, and Canada) from the older countries (India, Russia, and the United States). The third defect lay in the inherent inability to impose contractions upon the several countries in proportion to their expansions over the pre-war acreage. In particular, the expansion of wheat acreage in Canada has been vastly greater than that in Argentina; to ask Argentina to accept a horizontal contraction would be obviously inequitable, but to ask Canada to accept a vertical contraction would be obviously unacceptable to a pioneer country. If one will contrast the positions of Argentina and Canada according to the three methods of comparison of pre-war and present wheat acreage given above, one will find no basis for setting up figures for acreage contraction that could be both equitable and politically acceptable to the peoples of these two countries. These fundamental differences in acreage characteristics in the United States, India, and Russia on the one hand and Argentina, Australia, and Canada on the other would

imply an outright distinction in the definition, technique, and execution of their respective wheat export quotas. Despite this, the delegates of these six countries, seated around a table, negotiated over quotas and acreages as though they were more or less in the same position in respect both to domestic and to international commitments.

It is not a digression to re-emphasize the contractual position in world trade. Four of the six major wheat-exporting countries have a particular justification for large export quotas that do not apply to the other two; Argentina, Australia, Canada, and India are heavy net-debtor countries. They do not need to take new goods for wheat; rather, they need to send out wheat to pay for goods received years ago. The creditor countries which are themselves net importers of wheat are in a historical sense pledged to let their debtors pay with wheat. At the same time, other interests in the net-creditor wheat-importing countries wish to pay for imported wheat with new goods. This implies, in the case of the four named wheat-exporting countries, that in the creditor countries the foreign lenders and investors dispute with manufacturers for the imported wheat. Export quotas which would tend to drive net-debtor wheat-exporting countries into default with their foreign creditors could hardly be defended in an international conference. In the case of the United States and Russia, however, no such situation holds, assuming that the Russian foreign debt is repudiated. These two countries must sell wheat for goods in direct return, unless they wish to sell wheat on credit in one form or another. Thus, with these two countries, the wheat export quotas they desire must depend directly on the goods they are prepared to receive in reciprocal trade, prices considered.

It would take us too far afield to consider further the various intricacies of contraction of wheat acreage. It is clear from experience that there are five possible methods, which in a sense are really successive stages, depending on how imperative the contraction is construed.

1. Acreage contraction may be sought through a program of education and persua-

sion, carried out as the voluntary expression of growers, and without the use of any machinery outside of co-operation. Many such campaigns of acreage reduction have been carried on, usually with more heat than light and always with disappointing results. The speaking tour of Secretary of Agriculture Hyde and Chairman Legge of the Federal Farm Board in 1930 is an illustration that comes to mind.

2. Voluntary reduction of acreage with payments for compliance, i.e., a subsidized contraction. This is the form of effort now in operation in this country.

3. Compulsory reduction of acreage. Anyone reading the bill of amendments to the AAA, which failed of passage in the last session of Congress, must have regarded compulsory reduction of acreage as an ultimate contingency.

4. Removal of submarginal wheat land by purchase from individual growers, and transferring it to public holdings. This theoretically sound procedure is like the weather—talked of a great deal but nothing has been done about it up to the present time.

5. The scissors of high farm purchase price

and low farm sale price may be allowed to reduce acreage through insolvency of growers and forfeiture of farms. Some of this has occurred already, in other countries as well as in ours.

In connection with an international plan of restriction, the question arises immediately whether each wheat-growing country of consequence, exporting and importing alike, would be permitted to elect one or more of the above methods. Some of the stated methods are rapid, others slow. If a rapid contraction is sought, then the rapid methods ought to be made obligatory in all countries; if only slow contraction is sought, then the slower methods ought to be made permissive to all countries. The scope and difficulties of the several methods of contraction are different for importing and exporting countries. Recognizing this, the delegates of different countries could hardly "swap" their difficulties. On grounds of personal experience in international conferences, the writer is unable to believe that the many governments meeting in conference could agree on any technical scheme of acreage contraction to be applied to their several countries.

## VII. CONTROLLED INTERNATIONAL WHEAT PRICE

Those who believe in wheat quotas and acreage contraction now hold also that some form of price control would be necessary in planning an international wheat economy. Any practicable scheme of price fixing would need to cover a range of prices, unless the commodity is a unity. Since wheat is not one wheat, but is many wheats, a group of bread grains, fixing the price of wheat for an international movement implies setting a price range. (a) This means minimum and maximum prices. (b) Within the range, it means a set of differentials applied to different types, varieties, grades, and even qualities of wheat; and for each of these there must be a range and not a point. The wheats sold at a common point like London over a period of years are disposed of over a surprisingly wide and variable range of prices.<sup>1</sup> The spread

may be over 30 cents a bushel; the spread may be a third of the top-wheat price. During the war the Wheat Executive charged different prices for different wheats delivered to the Allied and Associated Powers, and these differentials were the subject of considerable controversy. A price definition and control, set up as part of an international plan to regulate the wheat trade, would need to take account of such price differences inherent in the commodity. This was recognized in the futile proposal to fix wheat prices at the Wheat Conference during 1933-34; a range of prices, at a low price level, was tentatively proposed, which extended from roughly 60 to 80 cents. Naturally, the position of each wheat within the range would become the subject of more or less partisan and strenuous controversy.

There would need to be a common geographical point. This would naturally be the

<sup>1</sup> Cf. "Spreads between Wheat Prices in England," *WHEAT STUDIES*, April 1935, XI, 307-25.

United Kingdom, the single largest importer, with the most responsive cash and futures markets. This would really imply that British mill prices, or c.i.f. duty-paid port prices, would directly reflect and indirectly determine, or at least heavily influence, the range of differentials. Assuming that these mill prices accurately reflected consumers' choices, such a scale of prices would be the sound procedure, since in the final analysis consumers' choices must fix wheat import prices. Just how a basic British price should be computed is a different question. The Wheat Conference did the Food Research Institute the honor to accept the form of computation of the British parcels price developed by us for particular purposes—notably, convenient expression of the approximate center of the range of British prices of import wheats; but this parcels price was not devised for purpose of international price fixing, and we disclaim responsibility for the proposition that the basis of world wheat price in a planned regulation of that commodity ought properly to be based upon our British parcels price.

Each importing country of importance would need to have a differential price range related to that of the United Kingdom. This could be based upon a statistical relationship of past prices in the various European countries to past British prices. This must not be taken to imply that cost of wheat in the importing European country could be based on British price plus transshipment from a British port to the European country. Of course, most of the wheat imports of the other countries of Europe would come directly from the exporting countries, or at least their prices would be based on that assumption. But the ocean freight rate to Britain would be controlling. This would imply that the price in each European country would include consideration of the freight from the exporting country to the United Kingdom and/or to the other country in Europe, with some British parcels price regarded as basis for the outgoing f.o.b. price in the exporting country. For example, if the price of Baruso in Great Britain were taken as 80 cents and the total cost of transfer from Bahía Blanca to Great Britain were 15 cents, then the price in Spain

would be 65 cents plus the cost of transfer from Bahía Blanca to the Spanish port. This of course disregards open consignments, diversions of cargo, and fluctuations in ocean freight rates. Nevertheless, a working scheme of relationship of import prices between the various European countries could be developed, not initially but after a few years. We have assumed, of course, in the above illustration that the same type, variety, and grade of wheat were involved; surprisingly wide adjustments in respect of differentials on the commodity score would have to supplement the differences in costs of transfer.

Each exporting country of major importance would have to have an f.o.b. scale of prices corresponding with the set of differential prices in Europe, particularly in the United Kingdom. These could not be determined directly on the futures markets of the exporting countries. It requires only a glance at the futures markets in Chicago, Winnipeg, and Buenos Aires in recent years to show that these could not form the basis of fixed exporters' prices. Nor could one use the quoted cash prices on the spot markets of the exporting countries, since these stand directly under the influence of the futures prices. In Canada and Argentina, where the domestic consumption is a small part of the crop, the domestic cash prices ought presumably to be related to the cash prices of Europe, and this holds for Australia, which has no futures market. But exceptions are as prominent as the rule. In the United States, however, both the spot and futures markets are largely dominated by domestic influences. In India, Russia, and the United States, therefore, the export wheat prices would need to be determined separately from the domestic wheat prices.

There would be little else to do except to take prices of British parcels as a base and from it subtract stated costs of transfers—from the head of the Great Lakes and Vancouver for the Canadian wheats; from Pacific, Gulf, and Atlantic ports for the several United States wheats; from the three sets of ports for the several Argentine wheats; and from the several ports of the different states for the various Australian wheats. Less definite costs could be set up for the other odds-and-



ends of export wheats. This assumes, of course, foreseeability and continuity both of export f.o.b. prices and of ocean freight rates in different months and from different countries. It assumes obviously a relatively inflexible relationship between c.i.f. prices in the European countries and f.o.b. prices in the exporting countries, which historically has never existed. (Nothing resembling the Pittsburgh-plus steel price would work on the international wheat market.) To this set relationship of wheat as wheat between c.i.f. prices in European ports and f.o.b. prices in ports of exporting countries must be added the differentials for each country based on type, variety, grade, and quality of wheat. How complex such a scheme would be cannot be appreciated until merchants and millers make the attempt to work it out in a tentative schedule.

In the above we have used Europe as illustration, but in ex-European importing countries the situation would become much more complex. One can set up at least a plausible scheme of relationship between c.i.f. prices in the United Kingdom and f.o.b. prices in the (six or at least three) principal exporting countries. Somewhat less tangibly one could extend this scheme to include c.i.f. prices in other European countries. But if one were to attempt to use c.i.f. prices in Europe as a basis for adjudgment of c.i.f. prices in the numerous ex-European wheat-importing countries scattered over the world, one would develop sheer distraction. Nor could one take the f.o.b. prices in the principal exporting countries and on them superimpose transfer costs to the numerous importing countries, because the relationships of multangular transportation are too complex. These relationships simply could not be foreseen and the varying costs measured.

Of this, many illustrations could be given, but a few will suffice. (a) An ocean liner the day of sailing from New York finds she has vacant space in which parcels of wheat will be accepted at a cut rate, which may be half the rate of a cargo vessel. (b) The ships of certain countries have peculiarly low operating costs, and this enables them to cruise around the world looking for cargo at cut

rates; of this, a striking illustration is to be seen in the success of Greek boats in hauling cargo at cut rates from South American ports to Europe. (c) Argentina imports a large volume of jute, and the boats plying between South America and India will carry back wheat as part load at rates which cannot be matched except in relation to this return traffic. Without going into further details or illustrations, it may be stated as accepted in shipping circles that the data are not available to enable any central board to set up a series of differentials or spreads to hold between wheat prices in the importing countries of Europe and in the importing countries outside of Europe, or between European and ex-European importing countries and the wheat-surplus exporting countries. These spreads would be determined in every month of every year by trial and error and could not be forecast in advance, even for a short period.

The last degree of difficulty would be reached when a central board attempted to fix a relationship between f.o.b. export prices in the numerous minor exporting countries and those in the major exporting countries. Failing these, the board might attempt to fix a relationship between the f.o.b. export wheat prices in the minor exporting countries with the c.i.f. export wheat prices either in the importing countries of Europe or in those of ex-Europe. Both of these attempts would be found to be entirely futile, and under these circumstances the apparently somewhat simpler relationship between the f.o.b. prices of export wheats in the major exporting countries and the c.i.f. prices in the European importing countries would, in the course of conflicting trades, be found to be unenforceable.

Everything which has hitherto been said concerning wheat prices and their control in an international plan has been based on assumptions of stable internal values of monies in importing and exporting countries and of open and computable rates of foreign exchanges between importing and exporting countries. Only on such assumptions can f.o.b. and c.i.f. prices be compared at all. For the time being, however, nothing of the sort obtains in the world. Scarcely a half-dozen countries of the world have fixed parities of

money. In only a few countries is the internal value of the currency known through open trial and error; the majority of currencies are unmeasurably depreciated but still under some form of control. The majority of currencies are either overvalued or undervalued abroad. Counting France as a net-importing country, three of the net-importing countries of Europe have more or less fixed membership in the so-called gold bloc, i.e., their currencies are ostensibly based on gold and they have still the internal structure of a deflationary gold standard.<sup>1</sup> Germany, Poland, Belgium, and Italy are "on gold" on paper, on sufferance. The United Kingdom has a managed currency, as has also the United States; old-fashioned cynics remark that both have mismanaged currencies, though handled in recent months to maintain a fairly stable if fictitious dollar-sterling rate. The currencies of two of the chief wheat-exporting countries, Canada and Australia, are variously depreciated but still lie within the radius of influence of the pound sterling. The peso of Argentina is kept undervalued abroad, which facilitates export of wheat.<sup>2</sup> Quite naturally, the net-debtor states which export wheat use this transaction to facilitate the payment of

their obligations. All in all, the processes of international trade are in turmoil, and so long as this generalized disequilibrium exists, no wheat advisory committee can set up a schedule of prices which could do much more than does a weather vane—that is, to indicate the direction of the wind but not to control it.

Everything said above has taken the consumer for granted: he is classed among the "other things equal." But the consumer can evade in mild degree, resist in greater degree. Consumers have nullified the projects of many planners. French consumers have broken the fixed wheat price. Consumers broke the Stevenson rubber plan. Consumers nullified the Eighteenth Amendment. "Ersatz" has broken many blockades. Consumers are inarticulate beforehand, but they finally wield the weight of numbers. When one contemplates the wheat prices being sought in the major wheat-exporting countries and those already secured in some of the major wheat-importing countries, one comes to realize that the bread eater is the "forgotten man." But in the ultimate solution of fixed prices the consumer decides. Bread, long called the staff of life, may become the mentor of wheat price.

### VIII. RAISING THE CONSUMPTION LEVEL

What seems to us to have been the fatal weakness in all plans for wheat control proposed during the last decade has been disregard of the level of consumption. Apparently all plans have been based on the assumption of "other things equal," including consumption; or on the assumption that all factors of disposition, or utilization, of wheat might be disregarded. The effectiveness of war-time control of wheat was everywhere contingent on direct control of use. Limited supplies of wheat were made to go farther and prices were kept within bounds in most countries partly, or even largely, by restricting the per

capita use of wheat. Conversely, in a period of surplus of wheat, effort must be made to increase the per capita use. Demand for wheat is relatively inelastic; but a small change in per capita intake would use up a considerable volume of wheat in the large populations of the wheat-eating countries.

Little is to be hoped for in the wheat-surplus exporting countries in the lowering of stocks by increasing the use of wheat, apart from lower extraction in milling and/or expanding the use of wheat as feed, which is considered below. In these wheat-surplus countries wheat is low in price except where artificially sustained, as in the United States and Canada. In India, Australia, Argentina, and Russia the price of wheat (gold price and currency price) in recent years has been low, consumption has been free, and there has been a tendency in Argentina and Australia to use

<sup>1</sup> Still true, as of June 3, 1935, but likely soon to change!

<sup>2</sup> The undervaluation abroad of the American dollar has not facilitated export of wheat because of the countervailing upward influence of the Chicago future and the processing tax.

more wheat as animal feed, or such a tendency would have been in evidence had not the prices of feed grains also been very low. In Canada, the artificially high price of wheat probably tends in the direction of restriction of use, but the effect is slight since the population is small. In the United States, the high price of wheat, consequent upon the position of the Chicago future and the artificial increase of price due to the processing tax, make wheat flour and bread relatively dear foods. The per capita consumption of flour in 1935 will probably not be over 160 pounds. On account of the high price of corn, more wheat is being used as a feeding stuff than would otherwise be the case with the present price of wheat. Certainly the exportable surplus of the United States is exaggerated by the low level of per capita consumption. In India and in China, at present prices, the consumption of wheat is heavy. All in all, with due regard for the low intake of wheat in the United States, there is apparently little to be achieved in the direction of enlarged increase in consumption of wheat outside of Europe.

In the importing countries of Europe, on the other hand, the use of wheat, while relatively large in many countries, in most countries outside of the United Kingdom is smaller than it would be if the domestic prices of wheats were not maintained above the natural or competitive levels. Imported wheat is supplementary to domestic wheat, but the amount of the supplement accepted by a country is susceptible of enlargement. Not only are prices of wheats artificially high in most of the countries of the continent, but there are many official hindrances to importation and use of foreign wheat, such as milling regulations and blending prescriptions. The effect is to lower, or change, the accustomed quality of bread, which tends to discourage consumption. In many places, it is clear that bread has been relatively dear while meat has been relatively cheap. In Europe as a whole, outside of the United Kingdom, it is fair to say that the cultivation of wheat is artificially expanded, the price of wheat artificially high, and the quality of wheaten products artificially debased;

in consequence, one may be sure that the per capita consumption and imports of the close to 400 million inhabitants on the continent of Europe (ex-Russia) have been appreciably lower than would have been the case if, other things equal, the acreages were not forced, the prices not exaggerated, and the quality of bread not debased.

Two kinds of underconsumption of wheat are possible: the one represents an absolute reduction, while the other represents a relative reduction, or a failure to achieve an otherwise increase in use. It is not easy, until several years have passed, to determine just what has happened in any country. During 1925-26 to 1929-30 the average European imports were generous, the prices fairly high, and the carryovers moderate. During 1930-31 to 1934-35 the European imports were low, with declining price and (in some countries) accumulation of large carryovers. That is, a large supply of wheat available at a low price was not absorbed, but instead use was curtailed and surpluses piled up. This relative underconsumption implied that less foreign wheat was taken at a lower price than at a higher price. The cause was reduced European purchasing power, which declined more than the price of wheat declined. Certainly the experiences of the last decade suggest the futility of setting up import quotas in excess of purchasing power. As it is, the wheat trade of Europe has declined much less than foreign trade in general; therefore imposition of import quotas could hardly have the effect of enlarging wheat imports more rapidly than foreign trade as a whole can be expected to recover.

Just how much wheat is involved in the reduction of use below otherwise levels is of course conjectural. It is perhaps not extreme to suggest that, were conditions the opposite of what they are, the production of wheat in continental Europe would be 100 million bushels less than it is and the importation of wheat 100 million bushels more. Such an annual shift within several years would change the complexion of the wheat market of the world. It would rank with drought and other crop failure as corrective influences.

The international wheat conferences of recent years have concerned themselves largely with producing countries. Pious recommendations have been passed that European countries should not extol self-sufficiency in respect of bread, should lower their tariffs on wheat, and should abandon all direct and indirect restrictions which tend to lower the consumption of flour. But tangibly, nothing has been done. On paper, the European countries have agreed that they would commence (or "contemplate") lowering tariffs when the gold price of wheat reached a certain figure (63.02 cents gold, British parcels price). A general recommendation to increase the consumption of wheat and decrease consumption of rye, corn, barley, and oats as food might tend to relieve the pressure on the wheat market. But if lesser amounts of rye, corn, barley, and oats were consumed as food, these would have to be utilized to a greater extent as feeds. When these domestic grains were utilized to greater extent as feeds, this would mean that the importation of foreign feeds, especially oil seeds, would need to be reduced, unless the counts of domesticated animals were to be increased. Now the United Kingdom, Holland, Belgium, and France have extensive colonies from which these oil seeds are drawn, and it is not in the interest of the direct trade with their dependencies to have the European importation of oil seeds reduced. In addition, the huge margarin industry of Europe is based on vegetable (and marine) oils, and a curtailment of cheap edible fat is not regarded as in the interest of the working classes of the cities. Under these circumstances, with the high prices of domestic wheat on the continent, the use of low-priced substitute cereals is encouraged instead, the importation of wheat is curtailed, and the importation of oil seeds expanded.

It is possible to apply the traditional law of demand to the price of wheat in continental European countries. Whenever the price of a particular good is arbitrarily elevated above the context of prices of other goods, and above its otherwise position in the price group, it is necessary to apply the law of demand rigidly if one undertakes to estimate the influence on consumption of the

arbitrary elevation of the price of the particular good. In the original formulation of the demand law,  $D = F(p)$ , the amount demanded is the function of the price of the good. Amplified to include the influences of prices of other goods, we have

$$D = F(p_1 \cdot p_2 \cdot p_3 \cdot \dots \cdot p_n),$$

wherein is expressed the broad statement that the quantity of the particular commodity demanded is a function of the price of that commodity and of the concurrent prices of other commodities. For certain types of analysis it is sufficient to use, with the price of the particular commodity, the index number of prices of all commodities. When now, as in the case of flour, a heavy and peculiar elevation is artificially established by particular governmental action, the influence of other prices in the equation must be more specifically brought out. This can be done in the following formula:  $D$  (amount of flour demanded) =  $F$  (price of flour) · price of cereal substitutes for wheat flour · price of foods competitive with cereals . . . . . and prices of all non-food goods. Only in this way can the arbitrary elevation of  $p_1$  against the unaltered position of  $p_2$ ,  $p_3$ , and  $p_n$  be adequately evaluated. Since it is to be assumed in general that  $F$  is a decreasing function of  $p_1$  and conversely, it follows that arbitrarily to raise the price of flour by the equivalent of several dollars a barrel, in the present position of the other prices, must tend to have the effect of lowering the amount of flour demanded, to an extent corresponding with the unusual nature of the arbitrary elevation of the price of flour.

There is a vicious circle in foreign commerce. Europe has lost export outlets for manufactures; the purchasing power of European cities for foreign goods has been reduced. These cities thus import less wheat from abroad and turn to their own rural regions to supply them; these rural regions thus expand the growing of wheat. The foreign countries, when they sell less wheat to Europe, then adjust themselves to the consequent reduction of supplies of European goods by having similar or substitute goods made

at home. There will be no way of getting out of this vicious circle so long as the price of wheat within Europe is artificially held high and out of line with other foods. Also, there will be no simple way out of the vicious circle so long as surplus-wheat countries, like the United States and Canada, are endeavoring

artificially to raise the price of wheat. If it were not for the one large open market in the United Kingdom (disregarding the low tariff on non-Empire wheat) into which the low-priced wheats of Australia and Argentina can be absorbed, the wheat market of the world would be frozen completely.

#### IX. RAISING THE FEED FRACTION OF WHEAT

1. When wheat is scarce, the rate of extraction in milling is raised in order to stretch the supply of flour. When the rate of extraction is raised, more flour is secured but less millfeed; when the rate of extraction is lowered, less flour is secured but more millfeed. This is an almost universal practice in war time. The official war flour of the United States Food Administration represented an extraction of 84 per cent of the weight of the wheat; the pre-war extraction was around 70 per cent, and immediately after the restoration of peace the normal rate of extraction was resumed. In Europe most of the war flours were over 90 per cent; indeed, much of the wheat was ground whole.

Before the war, with increasing preference for refined flour, the tendency both here and in Europe was toward lower extraction. Some of the finest flours then represented extractions of less than 60 or even less than 50 per cent; there were usually three successively shorter patents below the straight flour, and two or three successively coarser clears above the straight flour. When wheats were freely available, millers modified blends, extraction rates, and processes in order to produce a variety of flours for different purposes. Thus were made available a wide variety of breads, pastes, rolls, cakes, and pastries.

Since the war the trend in milling, at home and abroad, has been toward higher extraction.<sup>1</sup> This is a natural technical achievement; the mills have learned how to obtain a larger yield of uniform flour out of the unit of wheat. Since flour is the high-priced principal product, and the offal (the millfeeds)

is the low-priced by-product, other things equal it is to the interest of the miller to raise the proportion of the principal product and lower that of the by-product. There have been advances in the art of tempering wheat and in other preparations for breaking; there have been improvements in the grinding and in the separating of flours of desired fineness. These arts have been more adapted to conditions in Europe than in the United States, but are clearly in evidence in widely scattered countries, for example in Argentina, where the average rate of extraction has risen significantly since the war. Also, in recent years the restrictions on imports of wheat into European countries have forced millers further to improve their processes. Part of the advance in this country especially has been due to improvement in the art of baking, which has enabled the bakers to use flours of higher extraction, with a satisfactory yield, color, and bloom in the loaves of bread.

The Wheat Advisory Committee of the International Wheat Conference has sponsored the proposal for a general reduction of the level, or rate, of extraction. This idea of using up more wheat without eating more bread is of course old. One method of securing thereby a larger utilization of world wheat would be to set the same level of extraction, horizontally, for all countries. This proposal, however, would be misleading, since different countries have different traditional standards of flour and bread, also different types and varieties of wheat. The correct procedure in each country would be to introduce a lowered rate of extraction (for "straight" flour) below the customary rule, for example, 2 or 5 per cent below the usual rate. This would permit the mills to utilize the different types, varieties, grades, and qual-

<sup>1</sup> The pre-war rate of extraction of straight flour in western Europe was below 70 per cent, now it is above 70 per cent; probably the net difference is around 4 per cent.

ities of wheat in the accustomed manner, without serious change in the composition, uniformity, and behavior of the flour. The regulation might be limited to the basal straight flour of each country, and not to the shortest patents; or all patents might also be made somewhat shorter. In each importing and exporting country, a technical committee of millers and bakers could readily arrange for an effective and appropriate reduction of the rates of extraction, *if wheats and prices were free*, without serious difficulty or disturbance on the flour side.

The added amount of wheat that would be used up in a world-wide reduction of the rate of extraction runs into large figures. A hundred million barrels of straight flour of 65 per cent extraction would require about 503 million bushels of wheat, whereas a hundred million barrels of 70 per cent extraction would require only 467 million bushels of wheat. If the importing countries of Europe, the United States, Canada, Argentina, and Australia were to reduce the average rate of extraction 5 per cent (that is, let us say, from 70 to 65 per cent), the wheat requirements would be raised by many million bushels. This increased utilization would be further augmented if all flours ground for export were similarly ground on a lowered extraction. Such a regulation could not be applied to Russia or India on the exporters' side, nor to such importing countries as China and Japan. If there were nothing involved but the change in the technique of milling, with the subsequent adaptation of baking methods, such a "reform" in the utilization of wheat would be very simple. Unfortunately, other factors intervene.

A lowered extraction in milling means of course higher-priced flour. This, quite naturally, the employing and working classes of the cities wish to avoid. It implies also, other things equal, a tendency toward glut in the feed market, with a lowering of the price of millfeed and a consequent lowering of the prices of corn, oats, barley, and concentrates. The world has had considerable experience in making adjustments among feeding stuffs consequent on shortage of millfeed and other concentrates; but we have little experience

with a general surplus of millfeed, such as would be the inevitable result of a general lowered extraction of flour in milling.

A regulation for lowered extraction of flour would need to be legally enforced; voluntary observance or automatic control would not be expected. Consumers as a class do not object to finer flour, that is, so long as prices are not changed; they do object to coarser flour. Bread eaters pay very little attention to a small change in the rate of extraction; most consumers would not notice the difference with a slightly finer flour. Country mills, especially custom mills, would be likely to object more than city mills, which could modify blends better to suit the lower extraction. In particular, local deviations in qualities of wheat would in one year favor the lower extraction and in another year disfavor it. Regional adjustments might be necessary. If in every country the increased volume of millfeed went into the milk supply, this would be a very advantageous disposition, on nutritional grounds. If, however, it went largely into the feeding of young pigs, the effect might be an artificial hog cycle, which farmers might not find advantageous.

The problem would be more complicated in countries that use two bread grains instead of one. In many countries rye outranks wheat as bread grain, and presumably the rate of extraction of rye flour would also need to be correspondingly shortened. This would be welcomed by the city folk, but not by the country folk. In countries like Italy and Rumania (and in our southern states) similar regulations would need to be introduced in the milling of corn. But, quite generally, the milling of rye and corn takes place more in small country mills and less in large city mills, which would make enforcement more difficult.

From many points of view there is a great deal to be said for such a proposal.<sup>1</sup> If we assume that possibly 2 billion bushels of wheat might be involved annually, a change of only 5 per cent in the net proportion of extraction (say, from 72 to 67 per cent) would have the effect of increasing mill require-

<sup>1</sup> In 1934-35, with a shortage of corn, the plan would have yielded notable advantages.

ments, against current surpluses, to the extent of a hundred million bushels. This would fall on the figure for exporters' surpluses. From many points of view this would seem preferable to acreage contraction, quota allocation, or price change designed to effect a similar end-result in adjustment of supply to demand.

2. The second way of increasing the feed fraction of a wheat supply is to raise the definition, or standard, of millable wheat and thereby enlarge the volume of unmillable feed wheat. Many countries have grade classifications for feed wheat, which may not be sold or used for milling purposes, though the regulations are often not enforced, especially under high wheat prices. There is an official grade of feed wheat in Canada, below No. 6 Manitoba; and in some years much of the No. 6 is not regarded as fit for milling. The classification of feed wheat is not a sanitary regulation but is one of trade standards, adopted in deference to milling and baking practices. Now and then practically the entire wheat crop of a country stands low in quality (Argentina, 1925; Canada, 1928).

In every wheat crop there is a variable proportion of "tail" wheat; of immature, rusted, frosted, bin-burnt, and tough kernels; and of kernels broken or otherwise under par. Low-grade wheat has always been used as feeding stuff; most of it, in Europe, is used on the farms where it is grown; in the exporting countries, much of it collects in the terminals with the screenings, weed seeds, and other refuse. Definitions of grades and regulations of mixing have the purpose of limiting the amounts of such kernels that millable wheats contain. These various unmillable fractions are fed to poultry or ground into mixed feeds. Even under conditions of shortage during the war, the authorities in most countries recognized the existence of feed-grade wheat and made special regulations for its disposition. In different countries and in different years from 5 to 15 per cent of the crop for one reason or another is regarded as unadapted to customary milling practice. In all European countries in some years, and in some countries like Belgium and Denmark in all years, a surprisingly large part of the wheat crop—more than half—is

used for feed. In the disposition of the wheat crop in every country, there is a statistical item for feed (and waste) wheat, which in the United States has exceeded 100 million bushels. This season good wheat has been fed to animals in the Southwest on account of the shortage of corn; and imports of feed wheat are permitted by special regulations. The wheat fed to animals is not all unmillable wheat but usually includes varying proportions of lower-grade wheat which goes into feed on a price basis. Naturally, when wheat is cheap lower-grade wheat gravitates to feed uses more readily than when wheat is dear.

The statistical item of unmillable wheat (including wheat retained on farms as unmarketable, screenings in interior and terminal elevators, and wheat graded as feed wheat on inspection) has not the same meaning in European wheat-importing countries as in the major wheat-exporting countries. The unmillable wheat fraction is an indirect asset in Europe; but in the major wheat-exporting countries it is usually a direct liability. Hence, exporting and importing countries, on local grounds, might react differently to a plan to raise the proportion of unmillable wheat, by definition, in all countries.

Now, to get rid of an oversupply of wheat, the grade limit of millable wheat may be raised and lower-grade (but still otherwise millable) wheat then denatured in order to force it into the feed market. Such denaturation is easily accomplished by the use of a dyestuff like eosin. The technical questions are not difficult. The classification could not be horizontal; it could not be 5, 10, or 15 per cent of the wheat crop of all countries. The grading of wheat within a crop varies widely from year to year; witness the different proportions of grades 1 to 6 in Canadian crops from year to year. But in each country a technical commission could determine, year after year, a reasonable but elevated limit separating newly defined millable wheat from newly defined feed wheat. In each country the mills would select the best wheats; and large-scale segregation and denaturation of inferior wheats would not be technically difficult.

Two price questions, however, immediately

arise: (a) Is the grower to be paid for feed wheat, under the new feed-wheat classification, the same price as for millable wheat, let us say, of the lowest grade? Or is the wheat competing with other feed cereals to be paid for on a strictly competitive basis? There is in every country an accepted ratio for animal feed of relative values of wheat, rye, barley, corn, and oats, in terms of nutritive units. The price of feed wheat, thus reclassified, might be fixed on the basis of the prices of other cereals. Reactions would be different in farmers who raise only wheat, in those who raise mostly feed grains, and in those who are engaged mostly in animal husbandry and are thus interested in low feed prices. (b) The second point concerns the prices of feed grains to farmers who are not wheat growers. A large compulsory increase in feed wheat in our hard spring- and hard winter-wheat belts would immediately depress the price of corn in the corn belt lying to the east of them. Quite certainly, the corn belt would resist any regulation throwing, let us say, 50 million bushels of wheat on the feed market. In some countries, like Canada, Australia, and even Argentina, the excess millfeed and feed wheat might need to be disposed of largely on export markets.

In short, flour price would tend to be raised, feed prices would tend to be reduced. When other feed crops are short, the effect would be welcomed by all buyers of feeds but not relished by sellers of other feeds. A glut in feeds with lowered prices tempts farmers to expand the raising of hogs and cattle. Thus the net effect might be dearer bread and cheaper meat. In the United States, the results would probably not be pronounced and might be largely regional. In the United Kingdom,

Germany, and France, the effect would be to cut down the imports of feeding stuffs, even of oil seeds. In the European countries that use rye as much, or more, than wheat, the effect of corresponding regulations of that grain would provoke peculiar problems.

Of course lower extraction and reclassification of feed wheat could be employed side by side and would appropriately supplement each other. If in 2 billion bushels of wheat, 100 million more bushels could be used up by lower extraction, certainly 100 million added bushels could be disposed of as feeding stuff. Large adjustments are thus technically feasible. If disorganization in the feed market is a matter of comparative, or secondary, indifference to those in control of wheat in all countries, by a systematic lowering of the rate of extraction of flour and raising of the level of grade of millable wheat the surplus of wheat can be gotten rid of more effectively than the Brazilians get rid of coffee by burning it. The technical questions are not arduous; but the administrative questions are difficult, and in many countries the price reactions would be likely to provoke widespread rural dissatisfaction. It must not be forgotten that what the farming class wants is not competition between different grains but a higher price for all of them, *by export*. Nevertheless, dealing with a choice of evils, it strikes us that, *if both importing and exporting groups of countries* could be gotten to adopt and enforce a lowered extraction in milling, a more rigid definition of millable wheat, and a mandatory segregation of feed wheat, the cumulative result would do more to adjust the importers' requirements to exporters' surpluses than could be secured through export quotas, acreage contraction, or price fixing.<sup>1</sup>

## X. SUPERVISION AND CONTROL OF PROGRAM

To our surprise, it seems to be widely assumed that a program of quota, acreage, and price of wheat, once adopted, would be self-executing. This of course is just the opposite of the reasonable expectation. During the war the writer was familiar with the reporting and accounting of shipments under the

Wheat Executive. Here authority was complete, there was no resistance in any quarter. Nevertheless, an elaborate bookkeeping system was required to keep track of dispatches,

<sup>1</sup> The experiences during 1934-35 in the export of undenatured feed wheat from Canada and of denatured feed wheat from France have been discouraging



movements, and deliveries.<sup>1</sup> For the small operations of the Commission for Relief in Belgium an elaborate reporting service was maintained. Illustrations from commercial experiences are to be found in the records of steel and potash cartels, and in the administration of rubber and coffee controls. It is not a difficult but merely a minute and tedious control that is required in the supervision of actual commercial shipments, yet even here it is not easy to have the accounts up to date. One may be sure that in the event of an international wheat control, with political considerations and illicit traffic involved, supervision and control would represent two outstanding administrative problems.

It would be necessary to maintain a central statistical committee, with power to exact and check reports. Reports would be required from the governments of all the exporting countries of importance (six) and also from the majority of importing countries. It would be necessary to have reports from all agents (both importing and exporting houses), and records of shipping documents as well. Only if reports are required from agents as well as from governments would it be possible to control diversions on the high seas, and re-exports from importing countries. When we recall how difficult it still is to separate American from Canadian wheat in the receipts of European countries from North America, we appreciate how much more difficult it would be correctly to segregate the receipts of wheats from half a dozen exporting countries into more than a score of importing countries.

Furthermore, it would be necessary to have reports of stocks in both importing and exporting countries; in the importing countries, the stocks to be reported would be of both domestic and imported wheat. In particular it would be necessary to keep accurate reports of stocks at ports in the importing countries. Finally, it would be advisable, if

to the proponents of the idea that wheat stocks could be reduced in this manner. Logical as is the procedure, it seems to provoke unforeseen complications in the customhouses of the importing countries and in the feed markets to which such shipments are consigned.

<sup>1</sup> Cf., for American part, Frank M. Surface, *The Grain Trade during the World War* (New York, Macmillan, 1928), pp. 169-211.

not necessary, to have reports of grindings of mills in importing countries, to serve as a check on current stocks, visible supplies, and year-end stocks.

Now most of these stipulated reports are not at present assembled in the majority of countries. Within these countries, both exporting and importing, it would be necessary to create new statistical organizations, under governmental supervision, to which the compilation and assembly of the appropriate domestic data would be entrusted.

The above stipulations were concerned solely with quantities—including crops, quotas, stocks, and disappearance. If now, also, the prices of wheat in the international movement were to be placed under control, this would involve still more intricate accounting. The very least that would be found essential would be the prices of cargoes and parcels of the export wheats passing week by week in quotas from the stipulated exporting countries into the stipulated importing countries. Whether f.o.b. prices of cargoes and parcels from the exporting countries could be determined and reported without comprehensive records of domestic prices in the ports of the same countries is to be questioned; probably their domestic prices would be required as a check on the f.o.b. prices. Conversely, in the importing countries the c.i.f. prices of cargoes and parcels from the stated exporting countries would need to be reported in minute detail. But the meaning of these c.i.f. prices in the importing countries would depend directly upon the availability of domestic prices in the same countries. It would be necessary to set up a system of price reporting in the importing countries which, for the most part, is not now in operation.

It is possible finally that effective control of quotas might necessitate the abolition of export of flour between net-importing countries. The importers of wheat, and the millers of imported and domestic wheats, in each country would be very much more under control, statistically and administratively, if their functions were strictly confined to their own countries. Such a regulation, for example, would permit France to ship wheat to England but not flour. Of course this would cause an

outcry in milling circles. But when one realizes the extent to which this "improvement trade" in flour is artificial and subsidized, it may seem best, or at least the choice of evils, in any form of control to remove it as a disturbing factor.

Broadly considered, in the supervision of quota and price control by a central committee, presumably located in London, the data on quotas and shipments and the data on prices would be directly comparable between countries. But still more, the quotas and movements would serve to check the prices, and the prices would serve to check the quotas and movements. It does not seem possible that comprehensive, trustworthy, and purposeful statistics in relation to such an international control could be carried through unless both values and amounts were subjected to a painstaking accounting, reliably verified and checked, and kept closely up to date.

Illicit trade in wheat and flour would develop, according to all experience, with surprising rapidity and to a widespread extent. This would occur especially in small countries and in the trade between small and large countries. It is not difficult to "run" wheat and flour across frontiers. Wheat and flour are being bootlegged now in Europe from countries of lower price to those of higher price. In our country there is evasion of the processing tax by customs mills. If the stake is large enough, elaborate manipulations in illicit traffic would be developed, particularly because smuggling between countries is nowhere regarded as equivalent to violation of laws within countries.

The Wheat Advisory Committee of the present Wheat Conference considered tentatively as a sort of basic wheat price the figure of 63 gold cents as British parcels price. This was the relative point above which the delegates of the importing countries of Europe professed a willingness to begin to build down their obstructions to imports of wheat. This figure might have been arrived at in several ways. It might have been merely an arithmetical average of prices within recent years, or of pre-war prices. This is probably what it was, one of these in one form or another. But if so, such a price could only be regarded

as a statistical illusion. In a recent issue of *WHEAT STUDIES*<sup>1</sup> we presented the data on the spread of wheat parcels prices, applied to milling wheats only, during the past ten years. The absolute spread ranged at different times from 1 to 14 shillings per quarter, at different price levels of wheat. In terms of percentages the variations in spread ranged from 4 to 35 per cent. Since the amounts of sales at different prices within the spread are not reported, no weighted average price could be determined. Medians could be determined both in currency units and in percentages, but it is doubtful whether these would indicate more than a bare arithmetical mean. Certainly an average parcels price of British wheat, with or without adjustment to take account of the spread from top to bottom, must be an arbitrary procedure. Certainly this figure had no relation to the import tariff duties on wheat in terms of gold cents, as they exist in the different importing countries of Europe. Presumably this price had no relation to the levels regarded as acceptable or remunerative to the wheat-growing peasants of different countries of Europe.

But possibly such a price might have been derived from consideration of foreign prices and circumstances. Sixty-three cents gold in London has been the equivalent of very little over 50 cents gold at Chicago or at the head of the Great Lakes. Certainly wheat growers in the few export areas of the United States and in the Prairie Provinces of Canada would resent the use of such a figure for price of wheat as base line for any purpose whatsoever. Merely as a market price, it would appear preposterous to farmers, when contrasted with futures in Chicago and Winnipeg. Such a price has certainly no relation to accepted views on production cost, i.e., accepted in either agricultural or industrial circles. In Australia and in Argentina, where the overhead costs of producing wheat are lower than in the United States, such a basic price for wheat in London, though unsatisfactory, might not appear preposterous. Australia has sold considerable wheat in China within recent years at even lower figures. Sixty-three cents gold in Great

<sup>1</sup>"Spreads between Wheat Prices in England," *WHEAT STUDIES*, April 1935, XI, 307-25.

Britain does not look so entirely preposterous when compared with 5.75 paper pesos per quintal, which has been the fixed price in Argentina. But as a reflection of the views of growers in the two chief wheat-exporting countries of the Southern Hemisphere, 63 cents gold as c.i.f. British price could not be regarded as anything else than the most modest beginning at the lowest figure.

But if, now, 63 cents were adopted for the dearest wheat in Great Britain, and the differentials frequently exhibited were applied to the f.a.q. wheat of Australia and especially that of Argentina, that would be a disillusionment of one order. If, on the other hand, the 63 cents were to be the price of the cheapest wheat and the premiums frequently accruing to Canadian wheat were then to be applied, this would represent a disillusionment in another quarter. If the 63 cents were the average parcels price of all wheats, then the range might extend from 58 to 68 cents, or even from 50 to 75 cents. The most casual appraisal of the implications of such a price definition, used as base line for any purpose, merely serves to illustrate how tenuous is the stream of evidence and experience leading up to such a definition. At the same time are illustrated the statistical difficulties in such a price control. Whether the buyers in importing countries and the sellers in exporting countries would have the discipline to maintain any scale of wheat prices is something for which we have no commercial precedents. Would international codes be more effective than national codes?

We have finally to consider the influence of flour movement on wheat movement. By common consent, the plans for control of international wheat movements have usually been envisaged to exclude flour, i.e., the plans applied only to wheat as grain. This has been done partly because of the lesser volume of movement of flour, but perhaps more largely to take account of the difficulties obviously provoked in extending to flour a control of imports and exports of wheat. Over the ten years 1924-33 the proportion of wheat exported as flour by the six major wheat-exporting countries was roughly 17 per cent of the total of wheat and flour. The proportion, in itself misleading however, varies widely from country

to country. It was highest from the United States; from this country the proportion going out as flour has usually been over a third. The proportion of exports of flour from India was very high in recent years, largely because the total export was low. Australian exports of flour have usually been over 20 per cent of the total, those from Canada have fallen somewhat short of this figure. Exports of flour from Argentina and Russia were low, usually less than 5 per cent of the total.

Flour in export trade is of two kinds: (a) flour milled in the country of origin of the wheat, and (b) flour milled from imported wheat for re-export. The milling of imported wheat for re-export of the flour is an important branch of the so-called "improvement trade." Of the six traditional major wheat-exporting countries, only one follows this practice to any extent; Canadian wheat is milled duty-free in bond in the United States for re-export of flour. But most of the countries of western Europe have an active trade in export of flour milled from imported wheat. Such a trade is also important in Japan.

As a rule, the import of wheat is favored over the import of flour in the principal wheat-importing countries, especially of Europe. Import duties on wheat as grain are lower, freight rates are less, and many obstacles are erected against imports of flour. Nevertheless, the exclusion of flour from the operations of an international wheat control would introduce new and undesirable difficulties. If there were quotas on wheat as grain and not quotas on wheat flour, in many instances it would prove feasible to circumvent the wheat quota by expanding the movement of flour. The United States, Canada, Argentina, and Australia have flour-milling facilities greatly in excess of domestic requirements; these would certainly be invoked if there were no export quotas on flour. Most of the importing countries of western Europe have flour-milling facilities in excess of domestic requirements; these would certainly be invoked if there were no import quotas on wheat flour.

But to impose on flour, as well as on wheat, export and import quotas would be to magnify the difficulties of control far in excess of the proportion of the total movement which

experience indicates might be expected to take place in the form of flour. This would be the case particularly if any attempt were to be made to control flour prices. A schedule of differentials of prices of different types, varieties, grades, and qualities of wheat might be set up, whatever the difficulties to which we have drawn attention. But these price differentials could not be transferred to flours because flours are so often not representative of particular wheats. Flours are usually blends; to these, only arbitrary price fixing would be found applicable even on paper. Just for illustration, let one consider the specific problem in the United Kingdom. Differential prices could be set on the several import wheats. Differential prices might be set on the several flours imported from ports in foreign countries which originate types of flour directly corresponding to particular wheats. But when a flour for re-export is blended from a dozen different wheats in the mills of the United

Kingdom, a fixed flour price based on differentials drawn from the wheat schedule would be so impractical as to border on the absurd. In short, the improvement trade in export flour could not possibly be brought under the scheme of control of wheat price and quota.

But if blended flours milled from imported wheat for export could not be controlled, then obviously the flours shipped from wheat-surplus countries could also not be controlled, without destroying the natural competitive relationships in the flour-import world between the two kinds of flour. Since the wheat-exporting countries could not countenance discrimination against their export flours being made in favor of flours exported from net wheat-importing countries, this would inevitably result in flour being excluded from the operations of an international wheat plan. But when flours are excluded from such a plan, such exclusion would make the plan practically unworkable.

## XI. SUMMARY AND CONCLUDING OBSERVATIONS

The quarter of a century from 1909 to 1935 may fairly be termed as important a political, social, and economic epoch as any in the history of the world. With the use of rounded averages of the wheat acreages in the five crop years before the war and in the last five crop years, a reasonable appraisal may be made of the trend during this period. The wheat acreage of the six major wheat-exporting countries expanded roughly from 187 (1909-10 to 1913-14 average) to 231 (1930-31 to 1934-35 average) million acres, an increase of 44 million acres. The rate of increase in wheat acreage was more than the rate of increase in population of the six countries, even including appropriate consideration of the population of India. The yield per acre was also increased.

Of the major wheat-exporting countries, three are old and three are new. The wheat acreage of the three old countries (India, Russia, and the United States) expanded roughly from 155 to 173 million acres. This was not a disproportionate expansion for the group, in relation to population. Even in the United States, an expansion from 48 to 53 million

acres in wheat cannot be termed a disproportionate extension. The wheat acreage of the three newer countries (Argentina, Australia, and Canada) expanded from 33 to 59 million acres. In the light of the present population of these three countries, not over 30 million combined, this expansion of wheat acreage has been highly disproportionate, and has presupposed a very high anticipation of demand in the foreign market.

In the importing region of Europe, ex-Russia, wheat acreage rose over the interval from about 70 to 75 million acres. This expansion cannot be called disproportionate to rate of growth of population. At the same time, the expansion of 5 million acres has had a particular implication, since the wheat harvested from these acres in effect was directly subtracted from the volume of imported wheat which would otherwise have been taken. Therefore, the expansion of wheat area in Europe, though only to the extent of 5 million acres, has been in direct opposition to the expectation of European demand held by the three newer wheat-exporting countries.

Of course these two sets of facts, on the exporting and importing sides, give too simple a layout. One must include on both sides consideration of the acreages of rye, oats, barley, corn, rice, and sorghum grains—all of which are substitutes for wheat and, except rice, are usually cheaper. The trend of production and consumption of wheat over the twenty-five years is not identical with the trend of production and consumption of all cereals. Nevertheless, with appropriate qualifications, the contrast between the wheat acreage in importing Europe and in the six major exporting countries serves as broad background of the present problem.

Also, an interpretation of the world wheat problem based solely on wheat acreage in importing Europe and in the six major exporting countries must be qualified by considerations drawn from the numerous countries outside of Europe and the six major exporting countries. These outside countries are more important as importers than as exporters, i.e., the wheat imports of ex-Europe are more important than the wheat exports from countries outside of Europe and the six major wheat exporters. Indeed, were it not for the expanded demands of the ex-European wheat-importing countries, the "surplus" problems of the six major wheat-exporting countries would be still worse than they are.

The picture presented in the wheat acreages and averages of the crop years 1930-31 to 1934-35 was already in prospect in the acreages and averages for the crop years 1925-26 to 1929-30. With the occurrence of bumper crops in a few countries and the nonoccurrence of significant crop failures anywhere, other things equal and without acreage contraction, it became clear that more wheat would come into the world than importing Europe desired, even supported by the customary takings of ex-European importing countries. Thus it became gradually evident that conditions preparatory to a wheat crisis were developing, even in the absence of a trade cycle. Such a wheat crisis would include declining price, nonadjustment of importers' requirements to exporters' surpluses, and accumulation of excessive carryovers. This was the situation in 1929.

Then came the world-wide depression. This would of itself have induced a wheat crisis; of course it intensified the one already under way. The prices of practically all primary materials declined heavily. It is broadly correct to say that during the five years of the depression the gold price of wheat has declined irregularly but continuously into 1934. Total wheat shipments of the six major wheat-exporting countries have been heavily reduced. There was no improvement during 1934-35. Though the ex-European importing countries have taken somewhat more wheat than in the previous five years, the imports of Europe have been depressed so much as to have nullified this small advantage. Wheat is now merely one of the many commodities in distress; wheat growers are merely like many other producer groups who find themselves in an embarrassing disparity between high costs and low prices. Short wheat crops in the United States have alleviated, but not cured, the distress.

If there were no world-wide depression, the crisis in wheat would represent a commodity problem. Even within a world-wide depression, the crisis in wheat still is in part a commodity problem. With recovery from the world-wide depression, the wheat crisis would be alleviated; but there would still remain the commodity problem associated with acreage expansion and the level of utilization. With recovery from the general depression, the commodity problem of wheat would become open to direct approach; but in the absence, or deferment, of recovery, a direct approach to the commodity problem of wheat holds little prospect. This seems to have been the misapprehension of the recent International Wheat Conference: the deliberations proceeded upon the assumption, or implication, that a solution for the wheat problem could be found directly through management of acreage, price, and export of wheat, without restoration in the world at large of indispensable equilibria between countries, between currencies, between goods and services, and between prices and costs.

It strikes us that the outstanding difficulties in the world wheat situation may be summarized somewhat arbitrarily as follows:

1. The first point of weakness lies in the lowered demand for import wheat in Europe. Reduction in European import demand is the result of contraction of the foreign purchasing power of European countries and expansion of wheat acreage in those countries. An offsetting influence is the increased demand of ex-European countries, but this will presumably subside in some degree as soon as the price of wheat rises.

2. The second point of weakness lies in the relatively low demand for wheat in the wheat-surplus countries, particularly in the United States. If the six major wheat-exporting countries had expanded the utilization of their domestic wheats to correspond with the low prices, as the ex-European importing countries have done during recent years, significantly larger amounts of wheat would have been disposed of and the world carryover substantially reduced.

3. An outstanding weakness lies in the persistence of wheat acreage in the six overseas surplus-producing countries. This persistence is outstanding in the three newer countries (Argentina, Australia, and Canada); but it is precisely in these countries that the wheat acreage is least reversible. No one of these six exporting countries has undertaken a program of elimination of submarginal land planted to wheat. No one of these countries, except the United States, has undertaken a program of contraction of wheat acreage based on growers' choice, supplemented by subsidy to cover losses. Otherwise, it is the individual grower who is expected (or advised) to undertake (collectively) the contraction. The wheat acreage in the six principal wheat-exporting countries was larger on the average during 1930-31 to 1934-35 than during 1925-26 to 1929-30, despite low prices of wheat—or perhaps partly on that account. An offsetting influence is the lack of a large exportable surplus in Russia, which, however, may again reappear.

4. The glaring point of weakness lies in the profound reduction of world trade, in the internal depreciation and devaluation of currencies, in the undervaluation or overvaluation of currencies abroad, and in the disorganization in foreign exchanges. These disequilibria

embarrass both importing and exporting countries and nullify both the direct and indirect attempts to bring the price of wheat to the position where exporters' surpluses might be equated with importers' requirements.

To rectify the weaknesses under paragraphs 1, 2, and 3, and in the foreground of the circumstances under paragraph 4, those who believe in international social and political planning offer more or less tentative programs of contraction of acreage, limitation of export, increase of utilization for other purposes than food, and the pegging of minimal and differential prices.<sup>1</sup> It seems quite impossible, however, for a realist in international affairs to have faith in a planned adjustment of production to consumption of wheat through international accord on acreage, exports, utilization, and price. Wheat is a large item on the debit or credit side of many countries; both volumes and prices are highly important. However large may be the pecuniary interests of wheat growers in net-creditor and net-debtor countries, and in wheat-exporting and wheat-importing countries, this factor can hardly extend deeply into international relations and, indeed, is easily exaggerated in domestic economies. If the ship of the world were riding on an even keel, as was the case before the war, an international adjustment of production to utilization of wheat might fairly be regarded as feasible on technical grounds, though inherently very difficult. But the abnormal circumstances of today make such international planning at once self-deceptive and self-destructive. Of the major wheat-exporting countries, five are net debtors and only the United States is a net creditor; this implies conflict in wheat export policy. Of the wheat-importing countries of Europe, five are net creditors (Great Britain, France, Switzerland, Holland, and Belgium—perhaps Sweden); net debtors are all the others including Germany and Italy; this implies conflict in wheat import policy. The wheat-exporting countries of the Danube area are all net debtors, while Russia has not this status; this

<sup>1</sup> The equivalent of our constitutional limitations of federal control over intrastate affairs is to be observed in limitation of international control over national affairs.

implies conflict in wheat export policy. The numerous ex-European wheat-importing countries, and the few ex-European wheat-exporting countries, are all net debtors. All but a few of the currencies of the world are internally depreciated; few have fixed parities; and most of them are either undervalued or overvalued abroad. The internal values of the currencies of most of the countries of the world are for the moment indeterminate; revaluation will need to be undertaken in most of the countries of the world prominent in the wheat trade. Once the internal values of the currencies are redefined, foreign exchange rates must be re-established and restabilized. Even if one were to grant a fair prospect of success to a world plan for wheat control as a commodity plan, other things equal, no such plan could hope to succeed in the near future until monetary reform and exchange reconstruction have been achieved.

Under all circumstances, the obvious limitations and difficulties are not to be disregarded. The wheat plan looks to some as one of the easy economic plans, among others; in fact, it would be one of the most difficult. International planning of this kind presupposes good intentions on all sides, comprehensive intelligence and adequate technical information, an appropriate instrument for the effectuation of the plans, and discipline in the various countries involved in order that compliance may be enforced. We question whether the intentions of the various countries concerned in the international wheat plan can be accepted as definitive and justified on economic grounds.<sup>1</sup> As we understand wheat and have recorded our observations in eleven volumes of *WHEAT STUDIES*, the comprehensive intelligence and the indispensable technical information are not in hand to enable a conference, or an advisory committee, to formulate, introduce, execute, and supervise such a plan. It is impossible for us to regard agreements for

contraction of wheat acreage, for allocation of export and import quotas, and for fixed minimum and differential prices as constituting separately or together the appropriate and reliable mechanism for the administration of such a planned economy of wheat.

Lastly, we find no reason in earlier history, or recent experience, to believe that the countries involved on the exporting or importing side have the discipline requisite for the continuing execution of such a plan. The prerequisite discipline is political as well as commercial, and it implies control of certain classes by other classes. Not only is it difficult to understand what ought to be done, but it is still more difficult to attain and maintain the will to do it. Because wheat is a well-understood crop, it does not follow that it is a crop easily controlled. Quite the contrary: by reason of extent of distribution, of characteristics of composition and use, of place in the diet, and of importance in agriculture, wheat seems to us to be inherently unadapted to international control. No country which has a bumper crop of wheat, after having been accorded an export quota based on a forecast of a moderate crop, can be expected to impound the excess of that wheat unless some international provision is made to make financial compensation therefor. Proximately, just such a situation contributed heavily to failure of the plan of export quotas in 1933-34. Of course, it may be urged that even an ineffectual plan will sooner or later be effectuated by wheat crop failure. On the other hand, bumper crops seem to occur about as frequently as crop failures. The wheat growers of the world are an extraordinarily scattered group and to a large extent they produce wheat and little else. If wheat were everywhere a rotation crop, control of acreage and utilization would be simplified; but to a large extent wheat is a single cash crop, or at least the principal crop. Those agriculturists who do not raise wheat, or raise only small amounts, would not support a wheat control, except in exchange of support for control of some other crop. Therefore the wheat growers of the world cannot be expected to present a united front. But sooner or later the bread eaters in the cities of the world will present a united front. Under these

<sup>1</sup> During the past six years nearly twenty international wheat conferences have been held in Europe. The Conference held in London in May 1931 has been reviewed, with references to the earlier meetings, in *WHEAT STUDIES*, August 1931, VII, 439-66. The present unadjoined Conference, continuing through an Advisory Committee until August 1, 1936, is merely more complex than the earlier meetings.

circumstances we have regarded the International Wheat Conference, continuing in the form of an Advisory Committee, as destined to end tardily in failure and adjournment, just as the International Wheat Conference in 1931 ended quickly in failure and adjournment.

Producers of primary materials the world over are beginning the search to secure a larger share of what may be called the international dividend. In the past those who were engaged in mining, in lumbering, in petroleum recovery, and in agriculture derived pecuniary returns in part out of operations but in large part out of capital appreciation and speculation. Since new developments are now distinctly limited, pecuniary returns of owners and workers must henceforth come out of sales of products. This implies readjustments between countries, just as a plan to assure agriculture a larger share of the national dividend implies readjustment within a country. But the scope and meaning of such readjustments between countries are demonstrably far more intricate and less tangible, far more difficult and less definable, than within a country. It is reasonable to inquire what is to be the basis of implications and measurements of readjustments between countries, when the simpler readjustments within countries are not yet accomplished. Just as a comparison and illustration, we may use currency relations between countries. As a matter of experience, it is found impossible to stabilize exchange rates between countries so long as values of currencies within countries are not established. Such adjustments cannot be regarded as provisions for emergencies; they must be approached as long-term improvements.

It may prove practicable for the growers of rubber, concentrated in one region of the world, to secure for their agriculture a larger part of the international dividend, on the assumption that new sources will not be discovered nor substitutes developed. It may be possible for the copper miners of the world, many of whom are now operating (at extreme

depths and with low concentrations) under the law of diminishing returns, to erect a cartel which shall ensure to them a larger proportion of the international dividend. Quite certainly, such an attainment is feasible for nickel and for tin; perhaps for sulphur. In the sense of a corresponding prospect, the attainment of a larger share, or a stipulated division, of the international dividend is not possible for silk, wool, cotton, and jute. An international cartelization might prove practicable for flaxseed but not for the tropical oil seeds. It seems quite certain that the rate of growth of trees, the available forest areas of the world, and the wide range of varieties of timber render impracticable an international control designed to secure to lumbermen a larger share of the international dividend. In the same sense, it is impossible to believe that any control over cereals throughout the world could be effectuated to the end of securing for cereal growers a larger proportion of the international dividend. Finally, applied to wheat as a single good, there is nothing in international experience to support the hope that in the foreseeable future the wheat growers of the world can secure a significantly larger pecuniary share of the international dividend by planned contraction of acreage, control of international movements, and regulation of price. There is experience to indicate that within a country wheat growers may secure a larger part of the national dividend by use of monopolistic, or socialistic, methods. But there is nothing to indicate that an extension internationally of monopolistic, or socialistic, methods to wheat can foreseeably result in lifting wheat growers significantly above the otherwise level of net pecuniary returns. So long as one uses a microscope within the committee room of an international wheat conference, an international socialization of wheat growing may appear definable. But when the telescope is turned on the wheat fields of the world, the international operation is seen to lie outside of the appraisable technique of effective planning.



# APPENDIX

TABLE I.—WHEAT ACREAGE (HARVESTED) OF PRINCIPAL WHEAT-EXPORTING COUNTRIES,  
1899-1900 TO 1934-35\*

(Million acres; percentages)

Crop year	United States	Canada	Australia	Argentina	India	Russia	Total
1899-1900 to 1903-04							
Average acreage .....	53.9	4.1	5.4	8.9 <sup>a</sup>	23.0	59.8	155.1
Percentage of total.....	34.8	2.6	3.5	5.7	14.8	38.6	100.0
1904-05 to 1908-09							
Average acreage .....	47.2	5.6	5.8	13.9 <sup>a</sup>	27.1	67.9	167.5
Percentage of total.....	28.2	3.3	3.5	8.3	16.2	40.5	100.0
1909-10 .....	45.1	7.8	6.6	13.2	26.2	71.7	170.6
1910-11 .....	46.8	8.9	7.4	14.5	28.1	77.9	183.6
1911-12 .....	49.5	11.1	7.4	15.7	30.6	80.1	194.4
1912-13 .....	45.8	11.0	7.3	16.6	31.1	77.8	189.6
1913-14 .....	50.2	11.0	9.3	14.4	30.1	82.6	197.6
Average acreage .....	47.5	10.0	7.6	14.9	29.2	78.0	187.2
Percentage of total.....	25.4	5.3	4.0	8.0	15.6	41.7	100.0
1920-21 .....	62.4	18.2	9.1	13.2	29.9	66.0	198.8
1921-22 .....	64.6	23.3	9.7	14.1	25.8	52.0	189.5
1922-23 .....	61.4	22.4	9.8	16.1	28.2	34.0	171.9
1923-24 .....	56.9	21.9	9.5	17.0	30.9	43.4	179.6
1924-25 .....	52.5	22.1	10.8	16.0	31.2	53.7	186.3
Average acreage .....	59.6	21.6	9.8	15.3	29.2	49.8	185.2
Percentage of total.....	32.2	11.6	5.3	8.3	15.7	26.9	100.0
1925-26 .....	52.4	20.8	10.2	17.6	31.8	61.5	194.3
1926-27 .....	56.8	22.9	11.7	19.0	30.5	73.9	214.8
1927-28 .....	59.6	22.5	12.3	20.2	31.3	77.4	223.3
1928-29 .....	59.2	24.1	14.8	22.4	32.2	68.5	221.2
1929-30 .....	63.3	25.3	15.0	15.9	32.0	73.5	225.0
Average acreage .....	58.3	23.1	12.8	19.0	31.6	71.0	215.7
Percentage of total.....	27.0	10.7	5.9	8.8	14.7	32.9	100.0
1930-31 .....	62.7	24.9	18.2	19.5	31.7	80.5	237.5
1931-32 .....	57.1	26.4	14.7	16.0	32.2	92.1	238.5
1932-33 .....	57.1	27.2	15.8	17.8	33.8	85.5	237.2
1933-34 .....	47.9	26.0	15.0	18.0	33.0	82.1	222.0
1934-35 .....	42.2	24.0	13.0 <sup>a</sup>	17.2	36.1	88.9	221.4
Average acreage .....	53.4	25.7	15.3	17.7	33.4	85.8	231.3
Percentage of total.....	23.1	11.1	6.6	7.7	14.4	37.1	100.0

\* Based on data published in "World Wheat Crops, 1885-1932," WHEAT STUDIES, April 1933, IX, 265-66. The acreage figures for Russia and for the United States are in some years the "adjusted" figures published in that study. Acreages for recent years from data of the U.S. Department of Agriculture and the International Institute of Agriculture.

<sup>a</sup> Sown acreage.

# WHEAT STUDIES of the FOOD RESEARCH INSTITUTE

## VOLUME X

- No. 1. *British Preference for Empire Wheat*. October 1933. \$.50
- No. 2. *Price Leadership and Interaction among Major Wheat Futures Markets*. November 1933. \$.75
- No. 3. *The World Wheat Situation, 1932-33: A Review of the Crop Year*. December 1933. \$1.00
- No. 4. *World Wheat Survey and Outlook, January 1934*. January 1934. \$.50
- No. 5. *Price Relations between May and New-Crop Wheat Futures at Chicago since 1885*. February 1934. \$.75
- No. 6. *Environment, Heredity, and Wheat Quality*. March 1934. \$.50
- No. 7. *World Wheat Survey and Outlook, May 1934*. May 1934. \$.50
- Nos. 8 and 9. *Decline and Recovery of Wheat Prices in the 'Nineties*. June and July 1934. \$1.00
- No. 10. *Pacific Northwest Wheat Problems and the Export Subsidy*. August 1934. \$.75

## VOLUME XI

- No. 1. *World Wheat Survey and Outlook, September 1934*. September 1934. \$.50
- No. 2. *Decline in Wheat-Flour Export during the Depression*. October 1934. \$.75
- No. 3. *Prices of Cash Wheat and Futures at Chicago since 1883*. November 1934. \$1.00
- No. 4. *The World Wheat Situation, 1933-34: A Review of the Crop Year*. December 1934. \$1.00
- No. 5. *World Wheat Survey and Outlook, January 1935*. January 1935. \$.50
- No. 6. *Starch and Flour Quality*. February 1935. \$.50
- No. 7. *Per Capita Wheat Consumption in Western Europe (I)*. March 1935. \$1.00
- No. 8. *Spreads between Wheat Prices in England*. April 1935. \$.50
- No. 9. *World Wheat Survey and Outlook, May 1935*. May 1935. \$.50
- No. 10. *International Wheat Policy and Planning*. June 1935. \$.75

## RECENT CONTRIBUTIONS FROM THE FOOD RESEARCH INSTITUTE

(Numbered reprints available free on request)

- G 62. *Land Utilization Investigations and Their Bearing on International Relations*, Carl L. Alsberg. Prepared for the Fifth Biennial Conference of the Institute of Pacific Relations, August 1933
- G 63. "Squaring the Circle of the International Account," Alonzo E. Taylor. *Harvard Business Review*, April 1933
- G 64. "Some Economic Consequences of Commodity Control," Carl L. Alsberg. *Law and Contemporary Problems*, December 1933  
*The A.A.A.*, Joseph S. Davis. (No. 7, 1934, of the Day and Hour Series of the University of Minnesota. Obtainable from the University of Minnesota Press, Minneapolis, price 25 cents.)
- G 65. "Wheat, Wheat Policies, and the Depression," Joseph S. Davis. *Review of Economic Statistics*, April 1934
- G 66. "New Chinese Agricultural Statistics," M. K. Bennett. *Journal of Farm Economics*, April 1934
- G 67. "A Random-Difference Series for Use in the Analysis of Time Series," Holbrook Working. *Journal of the American Statistical Association*, March 1934
- G 68. "Wheat Consumption during the Depression," Carl L. Alsberg. *Proceedings of the World's Grain Exhibition and Conference*, Regina, Canada, 1933
- G 69. "Observations on Wheat Consumption," Carl L. Alsberg. *Proceedings of the Fifth Pacific Science Congress*, Victoria and Vancouver, Canada, June-July, 1933
- G 70. "What about Wheat Prices?" Holbrook Working. *Proceedings of the Fifth Pacific Science Congress*, Victoria and Vancouver, Canada, June-July, 1933
- G 71. "British Wheat Yield per Acre for Seven Centuries," M. K. Bennett. *Economic History (Supplement)*, February 1935
- G 72. "AAA as a Force in Recovery," Joseph S. Davis. *Journal of Farm Economics*, February 1935
- E 44. "The Effect of Diet on the Distribution of Glycogen in the Skeletal Muscle of the Rat," Melville Sahyun, Ray Simmonds, and Holbrook Working. *The American Journal of Physiology*, June 1934
- E 45. "The Bitter Glucoside of the Olive," W. V. Cruess and C. L. Alsberg. *Journal of the American Chemical Society*, October 1934

# FOOD RESEARCH INSTITUTE

STANFORD UNIVERSITY, CALIFORNIA

A research department of Stanford University, established in 1921 jointly by Carnegie Corporation of New York and the Board of Trustees of the Leland Stanford Junior University, for research in the production, distribution, and consumption of food.

## DIRECTORS

CARL L. ALSBERG

JOSEPH S. DAVIS

ALONZO E. TAYLOR

## ECONOMISTS

MERRILL K. BENNETT

HOLBROOK WORKING

## PUBLICATIONS

### WHEAT STUDIES

Ten issues yearly, published at approximately monthly intervals; \$6.00 per volume. Each volume includes a comprehensive annual review of the world wheat situation, a survey and outlook at four-month intervals, and usually six special studies. For partial list, see inside back cover.

### GRAIN ECONOMICS SERIES

A series (books, issued irregularly) covering topics in grain economics not suited to full discussion in *Wheat Studies*.

### FATS AND OILS STUDIES

A series (books, issued irregularly) of studies in fats and oils of animal and vegetable origin, dealing primarily with economic aspects—production, trade, prices, and utilization—but with due reference to technical knowledge.

### MISCELLANEOUS PUBLICATIONS

A series (books, issued irregularly) embodying the results of research in fields other than those covered by the series listed above.

### CONTRIBUTIONS

Reprints from periodicals of articles written by members of the Food Research Institute.

List of publications available free on request. Address all communications to

## FOOD RESEARCH INSTITUTE

STANFORD UNIVERSITY, CALIFORNIA

### *European Sales Agents:*

Great Britain: P. S. KING & SON, LTD., 14, Great Smith Street, Westminster, S. W. 1, London  
Continental Europe: MARTINUS NIJHOFF, 9 Lange Voorhout, The Hague, Holland

# ANALYTICAL INDEX

VOLUME XI, 1934-35

The general index consists of seven separate indexes. The first covers topics discussed in four issues of *Wheat Studies*—the annual review of the crop year and the three surveys of current developments in the world wheat situation. The succeeding six parts are separate indexes of the six special studies that constitute the remainder of Volume XI of *Wheat Studies*.

## REVIEW AND SURVEY NUMBERS

### TEXT

- Acreage, wheat: in principal areas, 1933, 127-30; in 1934, 3-6, 198-200
- Agricultural Adjustment Act (*see* Governmental measures, United States), 136
- Argentine Grain Board, 15, 146-48, 157, 160 n.
- Barley, *see* Feedstuffs
- Bennett, M. K., contributor to *Wheat Studies*, 32, 174, 223, 351
- Carryovers, *see* Stocks
- Chicago Board of Trade, emergency regulations, 156
- China, purchases of United States subsidized wheat, 140
- Consumption, *see* Disappearance
- Corn, *see* Feedstuffs
- Czechoslovakian Cereal Company, 337
- Disappearance (*see* Exports; Imports): in ex-Europe, 170; in importing Europe, 166-70, 204, 330-31, 347; in North America, 25, 171-74, 203-04, 330-32, 346; in other exporting countries, 171-74, 347; world, 125, 203-04, 347
- Dollar revaluation in the United States, 158 n., 161-62
- Drought and winterkilling, 3-8, 129-30, 348-49
- Exports, flour (*see* Exports, wheat), 164
- Exports, wheat (*see* Outlook for exports): four chief exporters, 19-20, 28-29, 171-74, 208, 332-34; net, compared with International Wheat Agreement quotas, 21, 144; Pacific Northwest, 20, 140; world, 19-21, 162-66, 171-74, 204-05, 207-09, 332-34
- Farnsworth, Helen C., contributor to *Wheat Studies*, 32, 174, 223, 351
- Feeding of wheat (*see* Disappearance), 25, 330 n.
- Feedstuffs, 7-8, 131, 201-02
- Flour consumption, United States: under AAA, 138-39; decline in, since 1929-30, 139-40
- Flour production and consumption, *see* Disappearance
- "Gold clause" decision of the United States Supreme Court (*see* Dollar revaluation), 212, 339
- Governmental measures (*see* International Wheat Agreement): milling requirements, 16, 17, 336 n., 343; monopolies, 15, 16, 152 n., 215, 336, 337; subsidies and bounties, 16, 17, 140-41, 160-61, 169, 173, 336, 343; tariffs, 16, 17, 169, 170, 336 n., 338 n.
- European countries: Austria, 16; Danube countries, 14-16, 152 n., 215, 336, 337, 343; France, 14, 17-18, 169, 215, 330 n., 336, 343; Germany, 14, 16-17, 168, 215; Holland, 16, 169; Irish Free State, 16; Italy, 16, 168, 215, 336; other, 16, 169; Poland, 169, 336 n.; Scandinavia, 16; United Kingdom, 16
- ex-European countries: Argentina, 15, 146-48, 157, 160 n., 221-22; Australia, 15, 147; Canada, 11, 15, 34, 145, 173, 213, 221, 333-34; China, 170, 207, 338 n.
- fixed prices: Argentina, 15, 157, 221 - 22; Canada ("pegged" prices), 34, 221, 333-34; Danube countries, 14, 15, 152 n., 215, 343; France, 14, 17-18, 215, 343; Germany, 14, 16-17, 168, 215; Italy, 336; United Kingdom, 16
- United States: acreage reduction, 15, 136-38, 348; Agricultural Adjustment Act, 136; benefit payments, 136-37; export subsidy, 140-41, 160-61; FSRC distribution of wheat and feed, 140; North Pacific Emergency Export Association, 15, 140-41, 160-61, 342; processing tax, 14-15, 138-39; relief, purchases of wheat for, 140-41; wheat adjustment, 14-15, 135-41, 348
- Import requirements, 27-28, 144-45
- Imports, wheat (*see* Governmental measures; Outlook for international trade), 21-22, 166-71, 204-07, 334-38; United States, 207, 334
- International Wheat Agreement: and developments under, 18, 21, 125-26, 141-48; elements of, 141-42; objectives and methods, 142; quotas under, compared with actual exports, 21, 144; signatories to, 141; success of, 142-43
- McFarland, *see* Governmental measures, Canada
- Monetary factors, international, in prices (*see* Dollar revaluation), 157, 339
- Murray, Nat C., estimates of feed use, 30, 220 n., 346
- Newell, Martin E., 138 n., 139 n.
- North Pacific Emergency Export Association, 15, 140-41, 160-61, 342
- Oats, *see* Feedstuffs
- Outlook: for consumption, 217-20; for crops, 197, 347-50; for exports, 28-29, 204-05, 344-45; for international trade, 26-29, 215-17, 344-46; for prices, 30-32, 220-23, 350-51; for stocks and carryovers, 29-30, 198, 217-20, 346-47
- Price fixing, *see* Governmental measures
- Price indexes, 148, 151
- Price spreads: on British import markets, 160, 214, 342; on futures markets, 12-14, 159-61, 212-14, 341-44; outlook for, 30-32; on United States markets, 160-61, 214, 342
- Prices, wheat (*see* Outlook for prices; Governmental measures, fixed prices):
- cash: effect of International Wheat Agreement, 143-44; European, 14, 152-54, 214-15, 343-44; in four chief exporters, 151-52; international, 148; levels in various countries, 149-54; movements, 149-54; in the United States, 13
- futures, course of, 8-14, 154-61, 209-15, 338-41
- Processing tax, under AAA, *see* Governmental measures, United States
- Production, wheat:
- in 1933: Argentina, Australia, 130; Canada, 6, 130; Danube exporters, 4, 128; European importing countries, 3, 128; minor countries, 130; non-European importers, 128; Russia, 127; United States, 128-30; world, 127-30

Production, wheat (*continued*):  
 —in 1934: Argentina, Australia, 6-7, 200; Canada, 5-6, 200; Danube exporters, 4, 199; European importing countries, 4, 199; minor exporters, 6; non-European importers, 7, 200; outlook for, 2-7; Russia, 6; United States, 4-5, 200; world, 127, 198  
 —in 1935, outlook for, 219, 347-50  
 Purchasing power of wheat, 150f.  
 Quality, 5, 130-31  
 Rice production, 7, 200  
 Robson, Sir Herbert, 18  
 Rome trade agreement, 215 n.  
 Rye production, 7-8, 131, 201-02  
 Seed use, *see* Disappearance  
 Stocks, wheat (*see* Visible supplies): initial, August 1, 1933, 28, 126; North American, April 1, 1935, 331; outlook for, 29-30; by positions, 24, 203, 328; in principal countries, 22-25, 133-35, 203-04, 346-47; world, 23-25, 133, 200-201, 203, 328-32; year-end, 22-25, 29-30, 133-35, 203-04, 217-20, 346-47  
 Subsidies, *see* Governmental measures  
 "Subsidized" exports, 173  
 Tariffs, *see* Governmental measures  
 Trade, international, wheat and flour, *see* Exports; Imports; Outlook  
 Visible supplies: in 1933-34, 3, 131-33; in 1934-35, 328, 329-32; on May 1, 1934, 23; on August 1, 1934, 22-26; in January 1935, 198, 202-04  
 Wheat adjustment, *see* Governmental measures, United States  
 Wheat Advisory Committee (*see* International Wheat Agreement), 18, 147  
 Winnipeg Grain Exchange, *see* Governmental measures, Canada  
 Winterkilling, *see* Drought  
 Yield per acre, wheat, in principal countries, 3-6, 127-30, 198-200  
 Yugoslavian Privileged Export Company, 15, 215

## CHARTS

Acreage, wheat: in principal countries, from 1924, 129; world, from 1900, 127; world ex-Russia, 127  
 Barley production, 201  
 Corn production, 201  
 Currencies, leading, as percentages of gold parity, 161  
 Disappearance, wheat: by countries, 167; in Europe, 166  
 Exports, net, of wheat and flour from principal areas, 171  
 Futures prices: in Buenos Aires, Chicago, Liverpool, Winnipeg, weekly, in gold and domestic currency, 1933-34, 155; Chicago, 1933 and 1934, 12, 155, 209, 338; in leading markets, 9, 155, 209, 338; Liverpool, 1933 and 1934, 12, 155, 209, 338  
 Gold, dollar price of (*see* Prices), 161  
 Hay production, 201  
 Imports, wheat: by countries, 167; into Europe, 166  
 Oats production, 201  
 Price indexes: British commodity, from 1870, 149; Sauerbeck (currency and gold), 149; United States commodity, 161  
 Price spreads: British parcels, under International Wheat Agreement price, 143; significant, 12, 159, 213, 341  
 Prices, wheat (*see* Futures prices): British import, deflated, and in gold and currency, from 1870, 149; British parcels, weekly, 343; British parcels, weekly, compared with Wheat Agreement level, 143; in chief exporting countries, in gold and domestic currency, 151; deflated, British import, 149; domestic, in Bulgaria, France, Germany, Great Britain, Hungary, Italy, Yugoslavia, 153, 343; domestic, 1933-34, in various countries, as percentages of 1928-29, 150; European domestic, weekly, 343; gold, of British import wheat, 149; gold, in chief exporting countries, 151; gold, of futures in leading markets, 155  
 Production, wheat: in Europe, 166; by European importers, 129, 167, 199; by principal areas and countries, 1922-34, 2, 129, 199; world, from 1900, 127; world ex-Russia, from 1900, 127; world ex-Russia, from 1923, 126, 199

Rye production, 201

Shipments, wheat and flour: annually from 1900, 163; Argentina, 19, 165, 208, 333; Australia, 19, 165, 208, 333; to Europe and ex-Europe, annually from 1900, 163; to Europe and ex-Europe, weekly, 20, 170, 205, 335; minor exporters, 208, 333; 1933-34, with comparisons, 165; North America, 19, 165, 208, 333; Russia, 165; world, 19, 163, 165  
 Stocks, wheat, about August 1, 1922-34: Europe, and afloat to Europe, 133; four chief exporters, 133; world, 133  
 Supplies, wheat: British Isles, 167; Europe, 166, 167; Europe, eastern and western, 167; France, 167; Germany, 167; Italy, 167; world, ex-Russia, from 1923, 126  
 Visible supplies: afloat to Europe, 132; Australia, 132; Canada, 23, 132, 202, 329; North America, 132; United Kingdom, 132; United States, 23, 132, 202, 329; world, 132, 202, 329  
 Yield per acre: in principal countries, from 1924, 129; world, from 1900, 127

## APPENDIX TABLES

Acreage, wheat: abandoned, United States and Argentina, 179; Argentine, 179; in principal producing countries, 175, 177; United States, winter and spring, 177, 179  
 Barley production, 179  
 Carryovers, wheat (*see* Stocks, wheat, initial): United States, by classes, 183; United States and Canada, 34, 182  
 Corn production, 179  
 Disappearance, flour, United States domestic, 190  
 Disappearance, wheat: Europe, 193; in four chief exporters, 38, 191-92, 228, 358; world, 193  
 Disposition, *see* Disappearance  
 Exports, flour: chief countries, net, 186; United States, and shipments to possessions, annually, 190; United States, and shipments to possessions, monthly, 35, 225, 355  
 Exports, wheat and flour: Canada, annually, 183; to ex-Europe, 187-88; by sources, monthly, 36, 189, 228, 356; by sources, net, 184, 185; United States, 183; United States, to

- possessions, monthly, 355; United States, to possessions, from 1924-25, 183
- Exports, wheat grain, United States, by classes, 183
- Flour, United States (*see* Exports; Imports): disappearance, 190; net retention, 35, 225, 355; production, 35, 190, 225, 355
- Grades, *see* Quality
- Imports, flour: net, by countries, 186; as wheat, United States, 183
- Imports, wheat and flour: by countries, net, annually, 185, 188; by countries, net, monthly, 36, 189, 227, 356; Europe, net, 184; ex-Europe, 188; United States, annually, 183
- Imports, wheat grain, United States, 183
- International trade, *see* Exports; Imports; Shipments
- Marketings, *see* Receipts
- Oats production, 179
- Ocean freight rates, 188
- Potato production, 179
- Prices, wheat: domestic European, monthly, 37, 226, 357; European import and domestic, in current U.S. cents and pre-devaluation gold cents, 195; in four chief exporting countries, in current U.S. cents and pre-devaluation gold cents, 194; representative, weekly, 37, 226, 357
- Production, wheat: four chief exporters, from 1922, 191-92; minor producers, 1925-34, 180; principal countries and areas, 1924-33, 175-76; principal countries and areas, 1928-34, 33; principal countries and areas, 1929-34, 224, 353; United States, by classes, 179; United States winter and spring, 176
- Quality, Canadian spring wheat, 180
- Receipts at primary markets, United States and Canada, monthly: 1924-34, 180; 1934-35, 33, 224, 353
- Rye: international shipments (Broomhall), including flour, 184; production in principal countries, 179
- Seed use, *see* Disappearance
- Shipments, wheat and flour (Broomhall): annually, 184; weekly, 35, 227, 355
- Stocks, wheat: initial, Europe, four chief exporters, and world, 1924-34, 193; initial, four chief exporters, 1929-35, 38, 191-92, 228, 358; United States and Canada, by positions, April 1, 1930-35, 354; United States and Canada, by positions, year-end, 34; United States city mills, 1925-34, 182; world ex-Russia by countries, August 1, 1922-34, 181
- Trade, international, *see* Exports; Imports; Shipments
- Utilization, apparent domestic: in chief countries, 193; in specified countries, 188
- Visible supplies, world, 34, 181, 225, 354
- Yield per acre, wheat: in principal producing areas and countries, 175, 178; United States winter and spring, 178

## DECLINE IN WHEAT-FLOUR EXPORT DURING THE DEPRESSION

## TEXT

- Bilateral treaties, 61
- Credit risk, 58-59
- Currency depreciation, effect on imports, 59-60
- Demand, increased, for flour exports, 60-61
- Discrimination against flour imports, 55-57
- Domestic export of wheat and flour, 48 n.
- Dumping (flour), 52, 53
- Elasticity of demand, 44
- Empire preference, 56
- Exchange risk, 58-59
- Exports, flour: dumping, 52; index of value of, compared with total United States exports, 47; indexes of quantities, from principal countries, 45-46  
—United States: by customs districts, 48; decline in, to all, and to certain, destinations, 49-52; factors favoring increases in, 60-61; factors reducing, 52-60; origin of, 48; by quantities and values, 1924-33, and indexes of, 47
- Exports, wheat grain: indexes of quantities, from principal countries, 45-46  
—United States: decline in, 48-49; by quantities and values, 1924-33, and indexes of, 47
- Foreign exchange restrictions, 57-59
- Freight rates and other costs of movement, 55
- Import restrictions, 56-57
- Imports, flour, decline in, by important countries, 51
- Indexes of production, quantum, 1929-33, 44
- League of Nations, Economic and Financial Organization: data on world trade, 41, 44; indexes of production, 44
- Millfeed, 55
- Milling interests in importing countries, 55
- Monetary factors in increased flour exports, 61
- Monopolistic control of flour, 57
- Nationalistic propaganda, effect on imports, 60
- Political factors in increased flour exports, 61
- "Portfolio" securities and "direct" investments, 57-58
- Prices, wheat and flour: Chicago and Liverpool futures, 53-54; in importing compared with exporting countries, 53-54; influence on United States flour exports, 52-54
- Purchasing power in importing countries, 54-55
- Self-sufficiency propaganda, 60
- Standard of living, defined, 41
- Subsidized exports, 61
- Substitution of commodities, 44
- Tariffs, discriminatory, against flour, 55-56
- Taylor, A. E., contributor to *Wheat Studies*, 61
- Trade, United States, compared with world, 1929-33 (*see* World trade), 43
- Wheat grain, indexes of world trade in (*see* Exports, wheat grain), 46

World trade (*see* Exports; Imports): compared with United States flour exports, 47; compared with United States trade, 43; compared with world production, 43-44; indexes of value, 1929-33, 42; general decline in, 40-45; in particular commodities, with prices, 42-43; values of, 1929-33, 41-42  
 —wheat and flour: in chief exporting countries, 45; decline in, 45-46; development in the United States, 45

## APPENDIX TABLES

Exports, flour: as percentage of total wheat and flour exports, by chief exporters, from 1899-1903, 62, 63; as wheat, by chief exporters, from 1899-1903, 63  
 —United States: by customs districts, 1924-33, 62; by destinations, 1924-33, quantities and values of, 64-67; index numbers of quantities and values, by destinations, 1929-33, 72  
 Exports, wheat and flour, by chief

exporters, from 1899-1903, and percentage exported as flour, 62, 63

Exports, wheat grain, by chief exporters, from 1899-1903, 63

Imports, flour: by continents and by selected countries, index numbers of, 1929-33, 73; by importing countries, 1924-33, and percentage from the United States, 68-71

Prices, Chicago futures, above Liverpool, 62

## PRICES OF CASH WHEAT AND FUTURES AT CHICAGO SINCE 1883

## TEXT

Basic cash wheat prices: adjusting to premium or discount wheat, 78; correlations of, with other cash prices, 79-81; daily range in, 78; definition and determination of, 77; representative character of, 79-81; technical notes on, 97-101  
 Board of Trade, rules and practice, 87 n.; on storage charges, 88 n., 89; *Annual Reports*, 77  
 Cash-future price relations: and inter-option spreads, 75, 85, 95; data and methods required for analysis of, 82-84; "discount" and "premium" relations, 95-96; during 1884-85, 89-92; 1887-88, 92-94; factors affecting, 95-97; graphic representation of, 82-84; ideal, or simplified, assumptions, 85-86; seasonal and related tendencies in, 95-97; technical notes on, 97-101  
 Chicago wheat market, relative importance of, 77, 79-81  
 Contract wheat: classes and grades deliverable, changes in, 78, 97-101; effective, 77-78; "old" and "new" style, 98  
 Corners, squeezes, 79-81, 99; "Kershaw," 96  
 Correlations among leading price series, 81  
 Cost of storage (*see* Storage charges, "Full storage expense"): effect of, on cash-future price relations, 76, 85, 94, 95-96; often indeterminate, 86; and "full storage expense," 76, 84-85, 94  
*Daily Trade Bulletin*, 77, 89; definition of terms, 92 n.; description of rules for storage charges, 89; quotations, 98

Deliverable wheat, *see* Contract wheat

Delivery provisions, changes in, 97-101

Effective cost of carrying wheat, 84-85, 86; measured by premium, 95

"Full storage expense" as effective storage cost, 84-85, 88-95; reflections of, on cash-futures price relations, 88, 97

Futures, "new" and "old" style, 98-101; simultaneous trading in, 101

"Gilt edge" receipts, 92, 93, 94 n.

Hoffman, G. Wright, 82

Kansas City price series, representative, 81

"Kershaw" corner, 96

Minneapolis price series, 81

Price relations (*see* Cash-future price relations): among futures, 85-86; explanation of certain, 97-101; under influence of full storage expense, in 1884-85, 89-92; under influence of full storage expense, in 1887-88, 92-94

Prices, cash (*see* Basic cash wheat prices; Price relations): as base in graphic representation of cash-future relations, 82; seasonal cycle in, 86; variations due to time of quotation, place, and quality of wheat, 78-79

Prices, futures (*see* Price relations), 76-77; as base in graphic representation of cash-future price relations, 82-84;

rise in, as result of shift from "winter" to "summer" storage, 90; series compiled, 77; technical notes on, 97-101

Receipts: "gilt edge," "regular," "short," 92; warehouse, delivery of, 88 n.

St. Louis price series, 81

Scarcity, factor in price relations, 95

Seasonal cycle in prices, 96-97

Storage charges (*see* Cost of storage; "Winter storage"): "additional," 93-94; until 1888, 88-89; elements in, 86-89; influence of, 88-94; "first," 87, 88 n., 93, 94 n.; "free," 87, 88 n., 89; incidence on buyer and seller, 86-87; reduction in, effects of, 94, 98-99; reflected in discount of cash wheat under futures, 84-85, 88-95; in "regular" elevators, 86

"Summer storage," *see* "Winter storage"

Technical notes, 97-101

United States Department of Agriculture: method of representation of cash-future price relations, 82; weighted average price series, 79

Warehouse receipts, Board of Trade rules on delivery of, 88

"Winter storage" (and "summer"): charges, 88-89; effect of regulations on prices, 1884-85, 89-92; effect of regulations on prices, 1887-88, 92-94; period of, 87; shift to "summer storage," 90

Working, Holbrook, contributor to *Wheat Studies*, 101



## CHARTS AND PLATES

(Roman numerals refer to Plate numbers)

Basic cash wheat, Chicago: discounts under May futures, daily, November 1884–April 1885, 90; November 1887–88, 93; prices of, and premiums and discounts, weekly, 1883–1934, I–III; prices of, compared with other cash prices, monthly, 80

Futures prices: Chicago, weekly, May 1883–April 1901, I; May 1901–April 1919, II; from May 1919, III; discount under May, of basic cash wheat and other futures, 90, 93; hypothetical relations between, and with cash prices, 85

Prices (*see* Futures prices): basic cash wheat at Chicago, No. 2 Hard Winter at Kansas City, No. 1 Northern Spring at Minneapolis, monthly, 1900–1934, 80

—basic cash wheat, futures, and spreads between, at Chicago, weekly: May 1883–April 1901, I; May 1901–April 1919, II; from May 1919, III

## APPENDIX TABLES

Classes and grades of wheat: deliverable on regular futures contracts at Chicago, from 1883, 120; periods when basic to Chicago futures, 121

Futures prices, four leading, Chicago, weekly, 1883–1934, 103–17

Prices: basic cash wheat at Chicago, weekly, 1883–1934, 103–17; monthly average, 1883–1934, 118; futures, Chicago, weekly, 1883–1934, 103–17

Spreads between prices of leading futures and basic cash wheat at Chicago, weekly, 1883–1934, 103–17

Stocks of principal contract grades of wheat in Chicago public elevators, monthly, 1883–1917 and 1920–34, 122–24

Storage charges on grain in “regular” elevators at Chicago, 1883–1934, 119

## STARCH AND FLOUR QUALITY

## TEXT

Absorption: of calcium, effect on starch, 251; of diastase by starch, 234 n.; effect of baking, 240; effect of injury to starch granules, 245; effect of kneading, 234–36; effect of physical conditions, 236; effect of quantity of starch, 236; by flour, 250; by gluten, 235, 236; by loaf, ratio of starch, 237; of metals and minerals by starch, 250, 251; variability of, 247, 250

—of water by cellulose, 245 n.

—of water by flour, criterion of quality, 232; effect of granulation, 234; effect of overgrinding flour, 247; influence of starch and gluten, 236, 240

—of water by starch, effect of hydration capacity and structure, 247

Air spaces, relation of, to appearance, to hardness of wheat, and to strength, 230

Alcohol, in bread dough and in loaf, 238 n.

Alcohol-ether treatment, 239

$\alpha$ -amylose, 241 n.; action of hydrochloric acid and of malt diastase on, 242; content, 242, 249; phosphoric and fatty acids in, 241; properties, 242; proportion to size of potato-starch granules, 242; relation to resistance of starch to diastase, 252; solubility, 242; variability of percentage, in wheat species, 242

Alsberg, Carl L., contributor to *Wheat Studies*, 254; and E. E.

Perry, 232 n.; and E. P. Griffing, 239, 246, 248; and O. S. Rask, 244

Amylase, 230 n.; *see* Diastase

Amylopectin, 241 n.; *see* Alpha-amylose

Armstrong, E. F., 243

Bailey, C. H., 229 n., 238, 244, 245, 248, 249

Baking:

—diastatic action in, 236, 239

—of dough, behavior of, 238–40; effect of starch addition on, 238

—effect of, on gluten and starch, 238; on starch, 239; on water-absorption by starch and gluten, 240; on water capacity of starch, 239; on water distribution in loaf, 240

—gelatinization of starch by, 239; influence of variability of temperature on, 251

—quality of flour, effect of metals on, 251; relation to starch-granule size, 244

—relation to starch properties, 252

Barley: malt as source of diastase, 230; starch, 245; strength, relation to starch granule size, 243

Barm, 235

$\beta$ -amylose, 241 n., 242 n.; action of hydrochloric acid and malt diastase on, 242; content, 242, 249; in flour, 247; properties, 242; and resistance to diastase, 252; solubility of, 242; variability of percentage in starch

and in wheat species, 242; of wheat starch, 242

Blair, W. S., 235

Bound moisture, or water, *see* Water, of hydration

Bread: alcohol in, 238 n.; behavior of starch in, 240–41; crumb and crust, moisture in, 241; leavening of, 229, 238; role of starch in, 229–41, 253–54; staleness, Katz's method of determining and controlling, 241; staling, 240, 241, 253–54; water vapor in leavening, 238; yields, effect of addition of diastase on, 247; *see* Loaf

Buchanan, J. H., 243, 244

Calcium, effect of absorption on starch, 251

Carbonic acid gas, 229, 236, 237, 238

Cellulose, effect of grinding on water absorption by, 245 n.

Coleman, D. A., 231 n., 247

Collatz, F. A., 245, 251

Composition: of starch, 241; of starch granules, effect on resistance to diastase, 245; variability in chemical, 241–43; variation with size of granules, 245

Cook, W. H., 231, 232, 236, 239 n., 249, 250

Cooper, W. J., 246

Darbishire, A. D., 243

Denham, H. J., 235

Dextrines: formation, 230; role in bread staling, 241

- Diastase, 230 n.  
 —action in baking, 239; effect of mixing on dough, 237; in flour, relation to starch-granule size, 244; in wheat, 231  
 — $\alpha$ - and  $\beta$ -amylose and, 242  
 —content, and variability of flour streams, 245  
 —diffusibility in gluten, 234, 237  
 —dough, effect on, and on bread yields, 247; distribution of diastase in, 234 n.; fermentable sugar formation, 240; mixing effect, 237  
 —flour, action of proteolytic enzymes on, 247; effect of starch on water-binding power, 247; effect on starch in solution, 246  
 —resistance of starch to, 238, 241, 245, 251, 252; variability of, 238, 241, 251, 252  
 —role in baking quality of flour, 236  
 —solubility in flour, 246  
 —source, 230  
 —in wheat and flour, distribution of, 230-31
- Diastatic power of flour, 237; effect of degree of separation of starch from gluten on, 237; effect of grinding on, 237, 247; effect on leavening of dough, 237; effect of starch-granule injury on, 246, 251; effect of starch-granule size on, 245; improvement by addition of sprouted wheat, 251; improvement by overgrinding, 246
- Dough: alcohol in, 238 n.; behavior in oven, 238-40; behavior of water in, 233; carbonic acid gas in, 229; distribution of diastase in, 234 n.; effect of injury to starch granules, 246; elasticity and toughness of, 229; fermentable-sugar formation, 240; fermentation, 237, 245, 246, 251, 253; gluten in, 229, 253; kneading and mixing, effect on, 233, 234, 235, 237; leavening of, dependence on fermentation rate, diastatic power, yeast, and elasticity and tenacity of gluten, 237; moisture distribution in, 232-34; plasticity and starch-granule size, 244; pores, 233; proofing, 239; slackness of, 232, 238; starch in, 229-41; sugar in, 236; water held by starch and protein in, 232, 233; wheat flour, toughness and elasticity in, 229
- Dox, A. W., 244
- "Dress," *see* Granulation
- Drying, 231, 248; effect on gelatinization temperature of potato starch, 250; of gluten, 250; of starch, effect on swelling, 248, 249, 250
- Einkorn, *see* *Triticum monococcum*
- Emmer, starch, 242
- "Entrapped water," *see* Water
- Enzymes, proteolytic, action on diastase in flour, 247
- Fatty acids, in  $\alpha$ -amylose, 241
- Fermentation, 236-38; of dough, effect of rate on leavening, 237; effect of starch-granule injury on, 246; effect of starch-granule size on, 245; relation to diastatic action on starch, 251; role of diastase in, 236; role of starch in, 253
- Fernbach, A., 249, 251
- Flour: fermentable sugar in, 236, 237; grades of, 245; instability of, 247; production, 245; regional and seasonal influence on properties of, 250; scalding, 235; structure, 229-30; variability of, 292, 245; water absorption, 232, 233, 240  
 —absorption, 250; effect of brush-heat structure of gluten on, 236; effect of starch-granule injury on, 245; relation of kneading to, 234-36; role of starch in, 247, 252-53; variability in, 250  
 —baking quality, effect of metals on, 251; and starch, 244, 252  
 —diastase in, 236, 237 n.; action of proteolytic enzymes in, 247; action on soft- and hard-wheat, 240; starch and diastase in, 230-31  
 —diastatic power, 237; improvement by addition of sprouted wheat, 251; improvement by overgrinding, 246; injury of starch granules and, 246  
 —effect, of fine grinding on, 230, 237, 247; of granulation on absorption, 234; of milling injury on, 247, 251; of scalding, 235; of starch location on sugar formation, 237  
 —gluten, content, 236; granulation and, 236, 237; starch and, 230, 235, 237, 240  
 —hard-wheat, 240; action of diastase on, 240; relation of air-spaces to hardness, 230  
 —quality, absorption a criterion of, 232; influence of starch on, 229-54  
 —soft-wheat, action of diastase on, 240; effect of granulation on development of, 234
- Flour (*continued*):  
 —solubility, effect of diastase in, 246; of overgrinding, 246  
 —starch, behavior of added, 238; behavior of, in high-protein, 237; dilution with starch, 238; granulation of free, in, 230; in high- and low-gluten, 236; influence of, on quality of, 229-54; relation to gluten in, 230, 240; weight, 229  
 —strength, ratio to gluten percentage, 238; relation of air-spaces to, 230; and weakness, development of, 236  
 —sugars, organic and inorganic salts, diastase, and non-gluten proteins in, 234
- Francis, C. K., 244
- Gelatinization of starch, 231, 232, 240, 244; by baking, 239; by heat, water absorption during, 250  
 —temperature, 253; effect of drying and wetting on, 250; effect of past history of starch, 250; effect of variability of size distribution of granules, 244; effect of variability on baking, 251; of maize starch, 244; of potato starch, 243, 250; relation to starch maturity, 250
- Gels, *see* Gelatinization; Jellies
- Gluten: absorption, effect of high-speed mixer on, 233; brush-heap structure of, 233, 234, 235; coagulation by heat, 238, 240; development, 234; drying, 250; formation, relation to moisture content of wheat, 249; hydration, 233, 235, 236; swelling of, 233, 238; weakness, 235  
 —content, and absorption, 236; and fine granulation of flour, 237; ratio of percentage to flour strength, 238; ratio to hydration of flour, 235, 236, 237; ratio to leavening and volume of loaf, 237; ratio to starch in flour, 230; ratio to starch in wheat, 229, 230  
 —diastase in, 237  
 —in dough, 229; effect of kneading on development of, 234, 235; effect of tenacity and elasticity on leavening, 237; effect on pores in dough, 233  
 —effect of baking on, 238, 240; of degree of separation from starch on diastatic power of flour, 237; of overgrinding of flour, 233; of ratio to starch on appearance of wheat grain, 230; of size on diffusibility in, 234

- Gluten (*continued*):  
 —in flour, absorption of water by, 232; diastatic power, 237; hydration, 235, 236, 237; relation to starch, 230, 240  
 —solubility, 233; of substances in water in, 234  
 —in wheat, relation to starch, 229, 230
- Granulation ("dress"): effect of, on hard- and soft-wheat flour, 234; effect on absorption of water, 234; effect on development of gluten, 234, 237; fine, 234; and hydration, 237
- Graves, S. S., 239, 250
- Gregory, R. P., 243
- Grewe, E., 244, 245
- Griffing, E. P., 233, 239
- Grinding: effect on diastatic power of flour, 237, 247; effect on flour of fine, 230; effect on water absorption by cellulose, 245 n.
- Growing conditions, effect on wheat-starch properties, 249; *see* Seasonal influences, Regional influences
- Heat, coagulation of gluten, 238; gelatinization, and water absorption by starch, 250; of imbibition of wheat starches, 248; and starch-granule size, 244
- Hemicellulose, in starch, 241
- Hermano, A. J., 252
- Hesse, A., 247
- High-speed mixer, action of starch granules, 235; effect on gluten absorption, 235
- Humidity, influence on water absorption by starch, 231
- Humphries, A. E., 251
- Hydration: capacity of wheat starches, 248; of flour, ratio to gluten, 235, 236, 237; of gluten, 235, 236; and granulation, 236; of proteins, 233; of starch and gluten, 235; *see* Water, of hydration
- Hydrochloric acid, action on  $\alpha$ - and  $\beta$ -amylose, 242
- Iddles, H. A., 242
- Imbibition, heat, of wheat starches, 248; relation to starch-granule size, 244
- Injury:  
 —to flour by milling, 247  
 —to starch granules, 247; detection of, 246; effects of, 245-47, 251; by milling, 247, 250; relation to flour instability, 247; by wheat sprouting, 247, 251; *see* Overgrinding
- Iron, in starch, 241
- Jago, W. and W. C., 239
- Jellies: diffusion of mineral substances in, 234; shearing, 233; starch, 240; *see* Gelatinization
- Johannsen, W., 230 n., 243, 245, 249
- Johnson, A. H., 238
- Katz, J. R., 239, 240; method of determining and controlling bread staleness, 241
- Kneading: effect on absorption by flour, 234; on brush-heap structure of gluten, 234, 235; on distribution of water-soluble substance in dough, 234; on gluten development, 234, 235; on pores in dough, 233; on toughness and elasticity of dough, 235; relation to absorption by flour, 234-36
- LaWall, C. H., 239, 250
- Leavening, 236  
 —of bread, 229; role of water vapor in, 238  
 —of dough, dependence on rate of fermentation, diastatic power, yeast, and elasticity and tenacity of gluten, 237  
 —of loaf, ratio to gluten, 237; ratio to starch, 237
- Lenz, W., 243
- Loaf: alcohol in, 238 n.; effect of baking, 239, 240; ratio of leavening, volume, and absorption to starch, 237; ratio of leavening and volume to gluten, 237; relation of volume to starch-granule size, 244; size of, 237; spring of, 244
- Loeb, J., 233
- Maize starch, gelatinization temperature of, 244
- Malloch, J. G., 234 n., 237, 252
- Maltose, formation, 230
- Mangels, C. E., 242, 248, 249, 251
- Martin, F. J., 231
- Metals: absorption by starch, 250, 251; effect on dough and on baking quality of flour, 251
- Miller, E. S., 247
- Milling injury, to starch granules, 250; to starch and flour, 247
- Minerals, in starch by absorption, 241
- Mixing, effect on diastatic activity in dough, 237; effect on pores in dough, 233; effect on sugar formation in dough, 237
- Mohs, K., 235
- Moisture: absorption by flour, relation to kneading, 234-36; absorption by starch, 231-32; bound, 233; content of wheat, relation to gluten formation, 249; distribution in dough, 232-34; effect on structure of starch, 231; in bread crumb and crust, 241; in starch, effect of source, temperature, and humidity on, 231; *see* Water
- Naudain, G. G., 243, 244
- Newton, R., 231, 232, 236, 239 n., 249, 250
- Nyman, M., 239, 243, 250
- Overgrinding: effect of absorption of water by flour, 247; effect on solubility of flour and starch, 246; improvement of diastatic power of flour by, 246; of flour, effect on gluten, 233; *see* Injury
- Pea starch, 245
- Phosphoric acid: in  $\alpha$ -amylose, 241; proportion to size of potato-starch granule, 242; relation to  $\alpha$ - and  $\beta$ -amylose content of wheat starches, 242; seasonal variation in wheat starches, 242; variability in wheat starches, 242
- Phosphorus content, 249
- Pores, *see* Dough
- Potato:  
 —boiled, effect on staling of addition to dough, 235; water-binding capacity of, 232  
 —starch, effect of drying, 248, 250; effect of grinding, 245; gelatinization temperature of, 243, 250; granule size, ratio of  $\alpha$ -amylose and phosphoric acid, 242
- Pressure, in starch granule, 243; relation to swelling, 244
- Proofing of dough, 239
- Proteins: friability of high- and low-protein wheats, 237; hydration, 233; water-holding capacity in dough of, 232  
 —non-gluten, diffusibility in gluten, 234; in flour, 234; solubility in water in gluten, 234
- Proteolytic enzymes, *see* Enzymes
- Quality of flour: absorption of water a criterion of, 232; influence of starch on, 229-54; starch and diastase content and, 231
- Quantity of starch, effect on absorption by flour, 236

- Racke, O. C., 251
- Rask, O. S., 252
- Regional influences: on flour properties, 250; on swelling of wheat starches, 248
- Reichert, E. T., 241, 242, 250
- Rising, *see* Leavening
- Roark, G. W., Jr., 244
- Rodewald, H., 231, 249
- Rumsey, L. A., 245, 251
- Rye flour, 229
- Salts: absorption by starch granules, 234 n.; diffusibility in gluten, and in flour, 234; solubility in water in gluten, 234
- Samco, M., 250
- Seasonal influences: on flour properties, 250; on starch properties, 249; on wheat-starch formation, 248, 249; on phosphoric-acid variability in wheat starch, 242
- Shearing, of jellies, 233
- Shollenberger, J. H., 231 n., 247
- Silica, in starch, 241
- Simpson, A. G., 251
- Skovholt, O., 232 n., 233, 236, 237
- Smith, O. C., 244
- Solubility: of  $\alpha$ - and  $\beta$ -amylose, 242; of diastase in flour, 246; of flour and starch, effect of overgrinding on, 246; of gluten, 233; of starch, 231, 232, 233, 235, 245; of starch granules, effect of injury on, 245; of substances in water in gluten, 234
- Species, effect on size of wheat-starch granules, 243
- Sprouted wheat: improvement of diastatic power of flour by addition of, 251; injury to starch by sprouting, 247, 251
- Staining, effect of starch-granule injury on, 245, 246
- Staling, of bread, 235, 240; effect of addition of potato, 235; effect of temperature on, 240; Katz's method for determining and controlling, 241; rate of, 241; role of dextrines and starch in, 241, 253-54; soluble starch, relation to, 240; *see* Bread
- Starch: action of diastase on, 230, 239, 246; birefringence, 246; and bread staling, 240, 241, 253; components of, 241; crystals, 248; dilution of flour, 238; distribution in wheat and flour, 230-31; dough fermentation and diastatic action, 251; and flour absorption, 247, 252-53; hydration, 235; influence on flour quality, 229-54; injury to granules, 246, 251; jelly, 240; mineral substances absorbed in, 241; moisture, effect of source, temperature, and humidity on, 231; reactions of, 242; shrinking, 248; soluble, 240, 246, 247; structure, 229-30; sugar formation from hoiled, 246; swelling, 231, 232, 239, 248, 249; water binding, 250; water of hydration, 249; weight in flour, 229
- absorption, 239, 240; of diastase, 234 n.; effect of physical structure and hydration power on, 247; gain in oven, 240; of metals, 250, 251; of moisture, 231-32; of salts, 234 n.; of water during heat gelatinization, 250
- barley, 245; relation of granule size to strength, 243, 245
- behavior in bread, 240-41; in high-protein flour, 237; when added to flour, 238
- $\beta$ -amylose, relation to properties of, 249; and resistance to diastase, 252
- effect of baking on, 238, 239, 240; of calcium absorption on, 251; of degree of separation from gluten on diastatic power of flour, 237; of diastatic action on water-binding power, 247; on dough, 238; of drying and wetting on gelatinization temperature, 250; of kneading on, 235; of milling injury on, 247; of past history on gelatinization temperature of, 250; of quantity on absorption by flour, 236; of ratio to gluten in grain appearance, 230; on sugar formation, 237; on water in flour, 236
- emmer, 242
- free, in flour, 230; *see* granules, location
- gelatinization, 231, 232, 240, 244; by baking, 239
- and gluten, in flour, 240; in wheat, 229
- granules, of barley, 243; composition, 245; drying, 248; injury, 245-47, 250, 251; location, 236, 237; of potato, 242; pressure in, 243, 244; size, 243-45, 252; surface, relation to resistance of diastase, 252; of wheat, 243, 247
- in high- and low-gluten flour, 236
- maize, 244
- maturity, and gelatinization temperature, 250; and properties, 249; and resistance to diastase, 252
- pea, size and shape, 243, 245
- potato, effect of drying on swelling, 248; effect of grinding on, 245; gelatinization, 243, 250
- properties, effect of absorption of metals on, 251; influence of maturity on, 249; relation to  $\alpha$ -amylose and  $\beta$ -amylose content, 249; relation to baking quality, 252; role of variability, 250; seasonal influences, 249
- ratio to gluten, in flour and wheat, 229, 230; to leavening, volume of loaf, and absorption, 237
- role, in flour, dough, and bread, 229-41; in hydration, 233
- solubility, 231, 232, 233, 235, 245; effect of overgrinding on, 246
- T. dicoccum* and *T. vulgare*, 242
- variability, consequences of, 241-52; in  $\alpha$ - and  $\beta$ -amylose content, 242, 243 n.; in chemical composition, 241-43; in phosphoric acid in  $\alpha$ -amylose, 242 n.; in properties of, 229; in resistance to diastase, 241, 251-52; in size, 241, 243-45; in water-holding capacity, 241, 247-51
- varietal, regional, and seasonal influences on, 248
- water of hydration in, 249
- wheat, 242; effect of drying on swelling and of growing conditions on properties, 249; formation, seasonal effect, 242, 248, 249; heat of imbibition of, 248; hydration capacity of, and swelling, 241, 248; phosphoric acid and  $\alpha$ - and  $\beta$ -amylose content of, 242; size of granules, 229, 243; structure, 229
- Starch paste, 232; retrogradation, 240; structure, 232; variations with wheat variety, 244; viscosity, 244; water in, 232
- Streams of flour, 245
- Strength: of barley, and starch-granule size, 243; of flour, relation to air-spaces, 230; of flour, relation to gluten percentage, 238; of wheat, relation to starch-granule size, 243
- Structure of starch: distortion in kneading, 235; effect of absorption of water on, 231; and flour, 229-30; of starch paste, 232

- Sugar: diffusibility in gluten, 234; fermentable, 236, 240; in flour, 234; formation, 237, 246; role in dough, 236; solubility in water in gluten, 234
- Sugars, organic and inorganic salts, soluble in water, 233, 234
- Swelling: in cold water, 245; of crystals, 248; effect of injury of starch-granule, 243, 244, 245, 246; of gluten, 233, 238; of potato starch, 245, 248; relation to starch-granule size, 244; relation to starch-paste viscosity, 244; temperature, 244; of vegetable fibers, 248
- Syneresis, 235, 240
- Temperature: effect on staling, 240; influence on absorption of water by starch, 231; of gelatinization, 243, 244, 250; of swelling, 244
- Triticum dicoccum* (emmer), starch of, 242
- Triticum monococcum* (Einkorn), size of starch granules of, 243
- Triticum vulgare* (common wheat), starch of, 242
- van de Sande-Bakhuysen, H. L., 249
- Variability: of  $\alpha$ - and  $\beta$ -amylose percentages in starch, 242; of chemical composition, 241-43; of flour absorption, 250; of flour streams, 245; of gelatinization temperature, 251; of phosphoric acid, 242 n.; of properties, 250; in resistance to diastase, 238, 241, 251-52; in size, 241, 243-45; of starch, consequences of, 241-52; in water-holding capacity, 241, 247-51; of wheat, 242, 243
- Variety of wheat, influence on swelling of starch, 248; relation to starch-paste viscosity, 244; *see* Species
- Vegetable fiber, swelling, 248
- Volume of loaf: ratio to gluten, 237; ratio to starch, 237; relation to starch-granule size, 244
- Water: amount bound by starch, 231; behavior in dough, 232, 233; -binding capacity, 232, 250; and diastase, 247; "entrapped," 234, 235, 247; evaporation of, 233; "free," 234 n., 235; in gelatinization, 231, 232, 250; loss in baking, 247; loss in staling, 254
- absorption, by cellulose, 245 n.; criterion of quality, 232; effect of baking on, 240; by flour, 234, 247; by gluten, 232, 236; by starch in gelatinization, 231, 250; and strength of flour, 232
- distribution of, in dough, 238; effect of kneading, 234; in loaf, 239, 240
- of hydration, 232, 233, 239
- Water vapor (*see* Moisture), in leavening bread, 238
- Watts, G., 235
- Wheat: anatomy of berry, 230 n.; diastase in, 230, 231; distribution of starch and gluten in, 229, 230; hard, appearance, 230; high- and low-protein, 237; relation of air spaces to hardness, 230; relation of moisture content to gluten formation, 249; relation of starch to gluten, 229, 230; soft, appearance, 230; sprouting, injury by, 247, 251; starch, 242 (*see* Starch); tempering, 250; variability of  $\alpha$ - and  $\beta$ -amylose content of, 242; variety, effect on viscosity of starch paste, 244
- Wheat flours and rye flours, 229
- Whymper, R., 239, 245
- Wolff, J., 249, 251
- X-ray analysis, 248
- Yeast, effect on leavening of dough, 237; role in dough, 236

## PER CAPITA WHEAT CONSUMPTION IN WESTERN EUROPE.

## I. MEASUREMENT, FROM 1885-86

## TEXT

- Acreage, wheat, used in calculating seed use, 265-66
- Balestrieri, Mario, 288 n.
- Ballod, Carl, 275, 275 n.
- Belgium: consumption and food consumption, wheat, 291; deficiencies in crop and trade statistics, 264; extraction ratios, 284; flour production and net exports, 284; food consumption and feed consumption, wheat, 284-85; net imports and total supplies, wheat, 265; per capita food consumption, wheat and flour, post-war, 299-301; per capita utilization, consumption, and food consumption, wheat, levels of and changes in, 293-99; seed use, 266-67; utilization and consumption, wheat, 267-68
- Bennett, M. K., 263 n., 264 n., 274 n., 288 n.; contributor to *Wheat Studies*, 301
- British Isles: consumption and food consumption, wheat, 291; extraction ratios, 277-82; flour production and net imports, 277-82; food consumption and feed consumption, wheat, 276-82; net imports and total supplies, wheat, 265; per capita food consumption, wheat and flour, post-war, 299-301; per capita utilization, consumption, and food consumption, wheat, levels of and changes in, 293-99; seed use, 266-67; utilization and consumption, wheat, 267-68
- Carryovers, *see* Stocks
- Commission Scientifique Interallée du Ravitaillement, 263, 276, 277, 287, 288
- Conclusions, 255-56, 292-301
- Consumption, wheat:
- for feed: defined as total utilization minus seed use and human consumption, 269; estimated by countries by five-year periods from 1885-86, 269-90; magnitude of, allows wide scope for reduction of net imports by governmental diversion from feed to food uses, 292; in Western Europe, from 1885-86, 290
- for food: per capita, contrasted with flour utilization per capita, post-war, 298-301; per capita, by countries, from 1885-86, 293-95; total, contrasted with total consumption, by countries, pre-war and post-war, 291-92; total, defined to exclude seed use and feed consumption, 269; total, estimated by countries by five-year periods from 1885-86, 269-90

- Consumption, wheat (*continued*):  
—total: contrasted with food consumption, by countries, pre-war and post-war, 291–92; contrasted with utilization, by countries, pre-war and post-war, 267–68; defined to include food consumption and feed consumption but not seed use, 263; estimated by countries by five-year periods from 1885–86, 269–90; per capita, by countries, from 1885–86, 293–95
- Crop statistics, wheat, accuracy of, 264–65
- Definitions: basic statistics, 260; consumption, human or food, 262; disappearance, 261; disposition, 261; feed use, 262; industrial use, 262; loss, 262; seed use, 262; shrinkage, 262; supplies, gross total, net total, and total new, 260; utilization, 260; waste, 262
- Denmark: consumption and food consumption, wheat, 291; extraction ratios, 271–72; flour production and net imports, 271–72; food consumption and feed consumption, wheat, 271–72; net imports and total supplies, wheat, 265; per capita food consumption, wheat and flour, post-war, 299–301; per capita utilization, consumption, and food consumption, wheat, levels of and changes in, 293–99; seed use, 266–67; utilization and consumption, wheat, 267–68
- Diets, national, place of wheat in post-war, 295–97
- Disappearance of wheat, *see* Utilization
- Disposition of wheat, *see* Utilization
- Dockage, and feed use, 262
- El Norte del Castilla, 265 n.
- Eltzbacher, Paul, 263, 276, 275 n.
- Extraction ratios, 271, 299; *see also* under country headings
- Finland: consumption and food consumption, wheat, 291; flour net imports, 273; food consumption and feed consumption, wheat, 273–74; net imports and total supplies, wheat, 265; per capita food consumption, wheat and flour, post-war, 299–301; per capita utilization, consumption, and food consumption, wheat, levels of and changes in, 293–99; seed use, 266–67; utilization and consumption, wheat, 267–68
- Flour, wheat: consumption per capita, by countries, post-war, contrasted with food consumption of wheat per capita, 298–301; statistics of production and net imports of, as basis for estimating food consumption of wheat, 269; *see also* under country headings
- Flour Mills Control Committee (United Kingdom), 280
- France: consumption and food consumption, wheat, 291; extraction ratios, 286–88; food consumption and feed consumption, wheat, 286–88; net imports and total supplies, wheat, 265; per capita food consumption, wheat and flour, post-war, 299–301; per capita utilization, consumption, and food consumption, wheat, levels of and changes in, 293–99; seed use, 266–67; utilization and consumption, wheat, 267–68
- Garcia, R. del C., 265 n., 288 n.
- Germany: consumption and food consumption, wheat, 291; deficiencies in crop and trade statistics, 264, 274–75; extraction ratios, 275 n., 276 n.; flour production, net exports, and net imports, 275–76; food consumption and feed consumption, wheat, 274–76; net imports and total supplies, wheat, 265; per capita food consumption, wheat and flour, post-war, 299–301; per capita utilization, consumption, and food consumption, wheat, levels of and changes in, 293–99; seed use, 266–67; utilization and consumption, wheat, 267–68
- Halle, Pierre, 287
- Hanau, A., 263, 264 n., 276
- Human consumption of wheat, *see* Consumption, wheat, for food
- Imports, net, wheat and flour: accuracy of statistics of, 263–64; compared with world shipments, 258; in relation to total wheat supplies, by countries, 265; into Western Europe, from 1885–86, 258
- Ingestion, smaller than consumption, 295 n.
- Italy: consumption and food consumption, wheat, 291; deficiencies in crop statistics, 264; food consumption and feed consumption, 289–90; net imports and total supplies, 265; per capita food consumption, wheat and flour, post-war, 299–301; per capita utilization, consumption, and food consumption, levels of and changes in, 293–99; seed use, 266–67; utilization and consumption, wheat, 267–68
- Jasny, N., 263, 264 n., 276
- MacDonald, S. G., 273 n.
- MacGillivray, J. C., 282 n.
- Middleton, Thomas, 278
- Milling, *see* Flour, wheat; Extraction ratios
- Netherlands: consumption and food consumption, wheat, 291; extraction ratios, 283; flour production and net imports, 282–83; food consumption and feed consumption, wheat, 282–84; net imports and total supplies, wheat, 265; per capita food consumption, wheat and flour, post-war, 299–301; per capita utilization, consumption, and food consumption, levels of and changes in, 293–99; seed use, 266–67; utilization and consumption, wheat, 267–68
- Norway: consumption and food consumption, wheat, 291; deficiencies in crop and trade statistics, 264; flour production and net imports, 272–73; food consumption and feed consumption, wheat, 272–73; net imports and total supplies, wheat, 265; per capita food consumption, wheat and flour, post-war, 299–301; per capita utilization, consumption, and food consumption, wheat, levels of and changes in, 293–99; seed use, 266–67; utilization and consumption, wheat, 267–68
- Population: statistics, accuracy of, 265; of Western Europe and world, 257
- Portugal: consumption and food consumption, wheat, 291; food consumption and feed consumption, wheat, 289–90; net imports and total supplies, wheat, 265; per capita food consumption, wheat and flour, post-war, 299–301; per capita utilization, consumption, and

- food consumption, wheat, levels of and changes in, 293-99; seed use, 266-67; utilization and consumption, wheat, 267-68
- Royal Commission on Food Prices (United Kingdom), 281
- Royal Commission on Wheat Supplies (United Kingdom), 277, 278, 280, 281
- Rye: in Belgium, 284; in Switzerland, 285; tendency to be displaced by wheat, 256, 295
- Screenings, as element in feed use, 262
- Seed use of wheat: importance of, in total utilization, 266-67; method of estimating, 265-66; per acre, by countries, 266 n.; trends in, per acre, 266-67
- Shipments, wheat and flour, *see* Imports
- Shollenberger, J. H., 270 n., 271 n., 272 n., 284 n., 285 n., 286 n., 287 n., 288 n.
- Shrinkage, as element in feed use, 262-63
- Spain: consumption and food consumption, wheat, 291; deficiencies in crop statistics, 265; food consumption and feed consumption, wheat, 289-90; net imports and total supplies, wheat, 265; per capita food consumption, wheat and flour, post-war, 299-301; per capita utilization, consumption, and food consumption, wheat, levels of and changes in, 293-99; seed use, 266-67; utilization and consumption, wheat, 267-68
- Spelt: in Germany, 275, 276; in Switzerland, 285
- Stocks, year-end, of wheat and flour, importance in appraising changes in utilization, 260-61
- Sweden: consumption and food consumption, wheat, 291; extraction ratios, 270-71; flour production and net imports, 269-71; food consumption and feed consumption, wheat, 269-71; net imports and total supplies, wheat, 265; per capita food consumption, wheat and flour, post-war, 299-301; per capita utilization, consumption, and food consumption, wheat, levels of and changes in, 293-99; seed use, 266-67; utilization and consumption, wheat, 267-68
- Switzerland: consumption and food consumption, wheat, 291; deficiencies in crop statistics, 264; food consumption and feed consumption, wheat, 285-86; net imports and total supplies, wheat, 265; per capita food consumption, wheat and flour, post-war, 299-301; per capita utilization, consumption, and food consumption, wheat, levels of and changes in, 293-99; seed use, 266-67; utilization and consumption, wheat, 267-68
- Taylor, Alonzo E., 264 n.
- Terminology, *see* Definitions
- Trade statistics, wheat, accuracy of, 263-64
- Utilization, wheat: per capita, by countries, from 1885-86, 293-95; per capita, significance of changes in, with reference to national diets, 259; per capita, in Western Europe and non-Western Europe, 258-59; regarded as synonymous with disposition and disappearance, 262; total, categories of, 262-63; total, contrasted with total consumption, by countries, pre-war and post-war, 267-68; total, in Western Europe and non-Western Europe, 257-58
- Venn, J. A., 264 n.
- Vigor, H. D., 264 n.
- Western Europe: defined, 256; importance of, in world population, wheat trade, and wheat utilization, 257-59; utilization, consumption, food consumption, seed use, and feed consumption in, from 1885-86, 290-91
- Wheat Commission (United Kingdom), 281
- World ex-USSR, defined, 257 n.
- Norway, 273; Portugal, 290; Spain, 289; Sweden, 269; Switzerland, 286; Western Europe, 290
- Consumption, wheat, per capita by countries: by five-year periods from 1885-86, 294; in pre-war and post-war decades, 298; in post-war decade, 296-300
- Feed consumption, wheat, *see* Consumption, wheat
- Flour consumption, per capita post-war, by countries, 300
- Food consumption, wheat, *see* Consumption, wheat
- Food consumption, wheat, per capita by countries, *see* Consumption, wheat, per capita
- Imports, net, wheat flour: Finnish, annually from 1905, 274; Norwegian, annually from 1905, 273
- Imports, net, wheat and flour, Western European by five-year periods from 1885-86, 258
- Seed use of wheat, in Western Europe, 290
- Utilization, wheat: —per capita: by countries, by five-year periods from 1885-86, 294; by countries, by pre-war and post-war decades, 296, 298; in Western Europe, by five-year periods, 259, 294; in world ex-USSR, by five-year periods, 259 —total: in Western Europe, by five-year periods from 1885-86, 257, 290; in world ex-USSR, by five-year periods, 257

## APPENDIX TABLE

(All statistics covering the following topics are expressed as five-year averages, 1885-86 to 1933-34, and are given separately for Belgium, the British Isles, Denmark, Finland, France, Germany, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and Western Europe on pages 302-05.)

Consumption, wheat: for feed; for food; for food, per capita; total; total, per capita

Crops, wheat

Net imports, wheat and flour

Net imports, wheat and flour, as percentage of total supply

Population

Utilization, wheat: for seed; total; total, per capita

## CHARTS

Consumption, wheat (for feed, by five-year periods from 1885-86; for food, partial annual series and by five-year periods; total, annually and by five-year periods from 1885-86): Belgium, 285; British Isles, 278; Denmark, 272; Finland, 274; France, 287; Germany, 275; Italy, 289; Netherlands, 283;

## SPREADS BETWEEN WHEAT PRICES IN ENGLAND

## TEXT

- American wheat: futures prices, influence of Chicago exchange on, 318; imports into United Kingdom decline in last 3 years, 309
- Argentina: consideration of wheat price differentials, 320; effect of policies of net importing countries of continental Europe on, 317
- Argentinian wheat, application of world price to, 316-17; effect of competition on price, 315; price position on British market, 315, 316; prominence, 310 n.; sold f.a.q., 319
- Australia: consideration of wheat price differentials, 320; net indebtedness to United Kingdom of, and Empire preference, 309
- Australian wheat, application of world price to, 319; price position on British market, 315, 316; quality and price, 316-17; sold f.a.q., 319
- British parcels prices: effect of quality on spread between quotations, 1925-34, 317
- weekly average spread between quotations, and dumping, 314-15; implications to importing and exporting countries, 313; as percentages of weekly high prices, 1925-34, 313, 314; relation to price level, 314; scatter, 313; and world wheat price, 319
- Buy-at-home movement and Empire preference, 309
- Canada: consideration of wheat price differentials, 320; net indebtedness to United Kingdom reason for Empire preference, 309
- Canadian flour, effect of ad valorem import duty on, 308
- Canadian wheat: on British market, 1925-34, 315, 316, 317; imports into the United Kingdom, 308; quality, 316, 317; selling policy, 315; technique in milling, 319
- Cargo shipments, of Pacific wheats to United Kingdom, 316 n.
- Chicago exchange, influence on American and Winnipeg wheat futures price, 318
- Competition of wheats in United Kingdom, 1933-34, effect on price, 315
- Consumers' choice, influence on wheat price spreads in British markets, 1925-34, 318-19; of wheat by millers in Great Britain, 320
- Crop yield, relation to variability of wheat position, 320
- Danube wheats, price position on British markets, 1925-34, 316
- Differentials: between wheats, short-term equilibriums of, 320; of wheat prices, considered at International Wheat Conference, by Argentina, Australia, Canada, and United States, 307, 320; stipulated, of wheat, opposed by Great Britain, 320
- Discount wheat, influence of milling technique on demand for, 319
- Domestic wheat, in United Kingdom, subsidy on, 307
- Dominion price, 319
- Dumping of wheat: effect on price spread, 318; from continental Europe ex-Russia on British market, 1925-34, 316, 317; from Europe, relation to weekly average spreads between British wheat parcels measured as percentages of weekly high price, 1925-34, 314-15; influence on sales on British market, 1925-34, 318; and price, 316
- Durum wheat, quotations excluded in analysis, 310, 313
- Empire wheat, duty-free in United Kingdom, 307; Empire preference for, 307, 308, 319; influence of Empire preference for, on bread price in United Kingdom, 318; quality a reason for Empire preference, 309
- European net importing countries: continental, effect of policies on Argentina and Russia, 317; continental ex-Russia, 1930-34, 308
- European wheat: dumping, relation to price spreads, 1925-34, 314-15; in United Kingdom, 1933-34, 315
- Exchanges, grain: Chicago, 318; at London and Liverpool, 307
- Ex-Empire wheat, import duty into United Kingdom on, 319; price, 319
- Export quotas, enforced by wheat price control, 320
- Export regions, milling wheats from, number of weeks at highest and lowest price on British market, 1925-34, 315
- Exporters' surpluses: and importers' requirements, influence on wheat price spreads on British market, 1925-34, 317
- Exporting countries, implication of weekly average spread between quotations for British wheat parcels for 1925-34, 313
- f.a.q., wheats sold under, 319
- Feed wheat, quotations excluded in analysis, 310, 313; utilization in Western European countries, 302-05
- Fixed wheat price, 319-20; average, 320; maximum desired by Great Britain, Holland, and Norway, 319-20; minimum desired by France, Germany, and Italy, 319
- Flour: Canadian, effect of ad valorem duty on, in United Kingdom, 1925-34, 308; import of, into United Kingdom, 308; imported for re-exportation by United Kingdom, 307
- Foreign wheat, availability to millers in United Kingdom, 307; import duty in United Kingdom on, 307; influence on bread price, 318
- France: desire for fixed wheat price minimum, 319; imports of wheat into United Kingdom, 1925-34, from, 317; price position of French wheat on British market, 1925-34, 316
- Futures markets, *see* Markets
- Futures prices (*see* Price): influence of Chicago exchange on American and Winnipeg prices, 318; influence of government support on, 318; relations of Chicago, Winnipeg, and British, 318
- Futures trading, influence on wheat price spreads on British market, 1925-34, 318
- Germany: desire for fixed wheat price minimum, 319; price position of wheat on British market, 1925-34, 316



- Grades (*see* Quality of wheat), United States wheat sold on, 319
- Great Britain: cause of change of wheat imports sources, 309; desire for fixed wheat price maximum, 319-20; futures prices, 1934, 318; millers' choice of wheat, 320; opposition to pegged prices or stipulated differentials, 320
- Holland, desire for fixed wheat price maximum, 319-20
- Importers' requirements, relation to exporters' surpluses, influence on wheat price spreads on British wheat market, 1925-34, 317
- Importing countries: continental European, effect of policies on Argentina and Russia, 317; implications of weekly average spreads between quotations for British wheat parcels, 1925-34, for, 313
- Imports: annual, of wheat, 1925-34, 308; British wheat, cause of change of sources, 309; Canadian wheat, 1925-34, percentage and price position on British market, 316; direct by mills, wheat, 309; effect of ad valorem duty on flour, 308; review of trade, 307
- of flour, into United Kingdom, 1925-34, annual, 308
- of wheat, into United Kingdom, average annual net, 1925-34, 308; from America, decline, 309; from Argentina, 1925-34, 309, 316-17; from Australia and Canada, 1925-34, 308, 309; from Continental Europe ex-Russia, 1930-34, 308; from France, 1925-34, 317; from India, 1925-34, 308; from Russia, 1925-34, 308
- of wheat and wheat flour, percentage brought in as wheat, 308
- Indian wheat: application of world price to, 319; imports into United Kingdom, 1925-34, 308; price position on British market, 1925-34, 315, 316; quality, 317; sold on sample, 319
- International Wheat Conference, 319; and wheat price differentials, 307, 320
- Italy, desire of, for fixed wheat price minimum, 319
- Liverpool grain exchange, 307
- London grain exchange, 307
- Manitoba wheat, *see* Northern Manitoba wheat
- Market, wheat (*see* Price):
- British, 1925-34, 314; dumping by continental Europe, 317, 318; flexibility, 320; influence on price spreads, 317-19; origins of wheat on, 307-09; price on, 315, 317, 319, 320; price and quality, 317; sensitivity, 307, 309; variability of price spread, 320; weekly highs and lows, 311
- futures, location, 318
- import, proposal to establish wheat price differential on, 307
- world, restraint on, 317
- Marquis wheat, quality on British market, 1925-34, 316
- Millers: availability of foreign wheat in United Kingdom to, 307; choice of wheat in Great Britain, 320; scope of activity in United Kingdom, 308
- Milling:
- British, flexibility of wheat markets, 320; and quotations and sales on wheat parcels, 318; wheat blending by, 318, 319 n.
- in United Kingdom, direct importation of important wheats by, 309; localization, 308; rationalization of industry, 308, 318; technique, effect on price position of Canadian wheat, and on demand for premium and discount wheat, 319
- in United States, 308
- wheat, analysis of spreads, 310; from various export regions, 315
- Northern Manitoba wheat: premium over contract price, 315 n.; price, 311, 319; price position on British market, 1925-34, 315, 316, 320; quality on British market, 316; quotations, 310, 310 n., 313
- Norway, desire for fixed wheat price maximum, 319-20
- Origin of wheat: by countries, price position judged by, 315-16; on British market, 307-09
- Ottawa Agreements, 319; effect of, 309
- Pacific wheats, shipped to United Kingdom on cargoes, 316 n.
- Parcels price, *see* British parcels; Price
- Parcels sales, 310; highest and lowest, 312; sellers' quotations, *see* Quotations
- Pegged wheat price, *see* Price
- Poland, price position of wheat on British market, 1925-34, 316
- Premium, on Northern Manitoba wheat over contract price in delivering against a future contract, 315 n.; wheat, influence of milling technique on demand in United Kingdom, 319
- Price: average parcels, of wheat, computed, 320; of bread in United Kingdom, influences on, 318; of British wheat, 319; and crop yields, 320; Dominion, 319; and dumping, 315 (*see* Dumping); effect of control of, on wheat-producing and -consuming countries, 320; ex-Empire, 319; fixed wheat, 307, 319-20; futures, influences on, 318; of "milling" wheats, from various export regions, 315; Northern Manitoba, 311; Ottawa Agreement on, 309, 319; pegged, opposed by Great Britain, 320; percentage of high and low, 314-15; quality of wheats and range of, 318; quotations, 309-12, 313, 314 (*see* Quotations); and sales, 311-12; short-term wheat price levels, 320; of United States wheat, 319; variability of, 320; world, 319
- control, and enforcement of import and export quotas, 320; differential considered, 307, 320
- level, influences on, 314, 317; short-term equilibrium and spreads, 320
- parcels, British, 311; and dumping of European wheat, 1925-34, 314-15; and quotations, 313, 314, 315
- position, judged by countries of origin, 315-16; on British markets, 1925-34, 315, 316; of Manitoba wheat, 320; and milling technique, 319; variability with crop yields, 320
- spreads, between quotations, 313, 314, 317; and bottom prices, 315; and dumping, 318; judged by currency units, 313-14; judged by percentages of high, 314-15; judged by qualities of wheat, 316-17; range, 313, 314 (*see* Spread); between top and bottom, 320
- Quality of wheat: dumped, 318; effect on price and price position on British market, 1925-34, 316, 317; effect on spread between quotations on British parcels, 1925-34, 317; range, 318; spreads judged by, 316-17; variation, 318

- Quotas, import and export, enforced by wheat price control, 320
- Quotations, 309-11; comparisons, 311-13; excluded in analysis, 310, 310 n., 313; individual, 311; price, 313
- on British parcels, weekly average spread, 1925-34, 313, 314, 315
- on parcels, and British milling, 318
- sellers', 311-12, 313; parcels, 309-10; 311
- Re-exporting, of imported wheat and flour by United Kingdom, 307
- Russia, effect of policies of net importing countries of Europe on, 317
- Russian wheat: application of world price to, 319; imports into United Kingdom, relative unimportance, 1925-34, 308; on British market, 1925-34, price position, 315, 316; quality, 316, 317; selling policy, 317; sold on sample, 319
- Sales (*see* *Parcels*): basis, 319; on British market, 1925-34, influence of dumping on, 318
- Sample, Indian and Russian wheat sold on, 319
- Sellers' quotations, *see* *Quotations*
- Short-term equilibriums of wheat price levels, wheat price spreads, and differentials between wheats, 320
- Sources, of British wheat imports, cause of change, 309
- Spread, price, for wheat: on British market, 317-19, 320; and currency units, percentage of high price, and qualities of wheat, 313-17; between milling types of wheat, 310; between quotations on British parcels, 313, 314, 317; range, 313, 314; short-term equilibrium of, 320
- Subsidy, on domestic wheat in United Kingdom, 307
- Taylor, Alonzo E., contributor to *Wheat Studies*, 320
- Trade, direct, a reason for Empire preference, 309
- United Kingdom: bread price, 318; clearinghouse of world wheat, 307; diversion of foreign wheat, 307; effect on price of competition of wheats in, 1933-34, 315; Empire wheats duty-free, 307; import duty on flour, ad valorem, effect on imports of wheat and Canadian flour, 308, 311, 319; indebtedness of Australia and Canada reason for Empire preference for wheat of, 309; methods of selling wheat, 309; Pacific wheats shipped in cargoes to, 316 n.; re-exports of imported wheat and flour, 307; sensitivity of wheat market, 307, 309; subsidy on domestic wheat, 307
- import trade of, 307; annual highest and lowest, 1925-34, 308; from America, decline, 309; from Argentina, 1925-34, 309, 316-17; from Australia and Canada, 308; from continental Europe ex-Russia, 308; direct by mills, 309; of flour, 308; from France, 1925-34, 317; from India, decline, 308; review, 307; from Russia, relative unimportance, 308; of wheat, average annual net, 1925-34, 308
- millers in, availability of foreign wheat, 307; reasons for preferences, 309
- milling, localization, 308; "rationalized," 308, 318
- United States: consideration of wheat price differentials at International Wheat Conference, 320; milling, dispersion, 308
- wheat, application of world price to, 319; on British market, 1925-34, price position, 315, 316; quality, 316, 317; sold on grades, 319
- Wheat (*see* *Milling*, *Price*), blending by British mills, 318, 319 n.; classification by countries, 310; competition in United Kingdom, 1933-34, 315; -consuming countries, and price control, 320; duty-free, 307, 308; influence on bread price, 318, 319 n.; origin on British markets, 307-09; price level, 314, 317; price spread, *see* *Price*; -producing countries, and price control, 320; quotations, 309-11; sales, 318, 319; scarcity of, 315-16; shipping, 307; short-term equilibrium of price levels, price spreads, and differentials between, 320; use of, and price position on British market, 1925-34, 315; —dumping, from continental Europe ex-Russia, 316, 317; from Europe, and average spreads between parcels, 314-15; influence on sales, 318; and prices, 316
- Empire, reasons for British preference for, 307, 309, 318
- imported, 307; and flour, 308; *see* *Imports*
- international planning for, 320
- market, highest and lowest, 315; world, restraint on, 317; *see* *Market*
- Winnipeg: exchange, influence of government support on, 318; futures price, influence of Chicago exchange on, 318; relation to British futures prices, 1934, 318
- World wheat, market restraint, 317; price, *see* *Price*; United Kingdom a clearinghouse for, 307
- Yield of crop, relation to variability of wheat position, 320

## CHART

Highest and lowest sellers' quotations on wheat parcels (milling wheats) compared with highest and lowest sales of all parcels in the United Kingdom, weekly, 1925-34, 312

## TABLES

Gross wheat imports (wheat as grain, not including wheat flour or wheat offals) into the United Kingdom, calendar years, 1925-34, 308

Number of weeks in which "milling" wheats from various export regions were highest and lowest in price on the British market, 1925-34, 315

Number of weeks in which weekly average spreads between high and low quotations for British wheat parcels fell within special ranges, 1925-34, 313

Number of weeks in which weekly average spreads between high and low quotations for British wheat parcels (measured as percentages of weekly high prices) fell within special ranges, 1925-34, 314

## APPENDIX TABLE

Highs and lows and weekly average spreads between British parcels prices, 1925-34, 321-25; *see also* text, 311, 315

Import duty on ex-Empire wheats, 324 n.

## INTERNATIONAL WHEAT POLICY AND PLANNING

- AAA (Agricultural Adjustment Administration), 386, 401
- Acreage, wheat: adjustment or control, 362-67, 378, 379-86, 401; contraction, 362, 367, 368, 372-73, 378, 379-80, 384-86, 401; expansion, 361, 365, 366, 368, 381-85, 399-400; pre-war and post-war, 381 n., 382-84, 399, 400, 404; table of, 404; trends, 380-84, 399
- Agriculture, decline and recovery of, 359-61
- Barter arrangements, 362, 376
- "Battle of the Grains" (Italy), 377-78
- "Bootlegging" wheat, 380, 397
- Bread (*see* Consumers, Consumption), 361, 390, 392-93
- Broomhall's *Corn Trade News*, 369, 370, 371
- Carryovers, wheat, 360, 367, 369, 370, 372, 390
- Commission for Relief in Belgium, 360, 396
- Consumers, influence of, 389, 402; rationing of, 361, 371-72
- Consumption, wheat, 365, 366-67, 371, 375 n., 376, 389-92, 400
- Control, wheat (*see* Acreage, wheat; Planning, international; Prices, wheat; Quota plans): during World War, 359-61, 372, 386; objections, 363-64
- Corn, 377, 390, 391, 393
- Costs: of production, wheat, 362; of shipment, wheat, 360, 367-88
- Creditor-debtor status of countries, 361-62, 385, 401-02
- Crop failures or shortages, 359, 360, 374, 390, 393 n., 402
- Crop year, wheat, 368-69
- Currency instability, 365, 388-89, 401-02, 403
- Demand for wheat, 366, 367, 373, 374, 377, 389, 391, 399, 401
- Denatured wheat, 394, 395 n.
- Depression (*see* Importing countries), 362, 365, 375, 381-82, 400
- Disappearance, *see* Utilization
- Disposition, *see* Utilization
- Eltzbacher Commission, 361
- Exchange rates: control, 360; instability, international, 388-89, 401-02, 403
- Export quotas (*see* Quota plans), wheat, 361
- Exportable surpluses, wheat, 365, 367, 369, 370, 375, 379-80
- Exporting countries, wheat, 361, 363, 366-68, 370, 372, 379, 385, 394, 399, 400, 401, 404
- Exports, wheat (*see* Quota plans), 368, 389; facilitation of, 364
- Extraction, rate of flour, 370, 392-95
- Fats, edible, 361, 391
- Federal Farm Board, 360, 362, 386
- Feed fraction of wheat, 392-95
- Feed use of cereals, 374, 391, 394
- Filler wheats, 373
- Flour: consumption, 390; extraction, 370, 393-95; import quotas on, 398-99; international trade in, 396-98; prices, 399; wheats used in milling, 372-73, 390, 399
- Food Administration, United States, 360, 375, 392
- Food Research Institute, 369, 381 n., 387
- Glenday, Roy, 364
- Grain Stabilization Corporation, 362
- Hyde, Arthur M., 386
- Import quotas: flour, 398-99; wheat, 361, 372, 374-78, 398
- Import requirements, wheat, 366, 368, 369-71, 372-74, 375, 377
- Import restrictions, wheat and flour, 364, 365, 378, 390, 392, 398
- Importing countries, wheat, 361, 366, 374-75, 385, 394, 400-402
- Imports, wheat, 369, 370, 372, 375, 377, 390, 401
- "Improvement trade" in flour, 396-98
- International combinations, 403
- International dividend, 403
- International Economic Conference (1927), 362, 365, 382
- International Institute of Agriculture, 362, 369
- International quotas, 369
- International Wheat Agreement (1933), 364
- International Wheat Conferences, 359, 362-65, 367 n., 368, 373, 379, 382, 385, 386-87, 400, 402 n., 403
- League of Nations, 362
- Legge, Alexander, 386
- Loans, international, 360, 361-62, 376 n.
- Margarine industry, European, 391
- Milling, flour, *see* Flour
- Milling regulations, 361, 390
- "New Deal," 359
- "New Era," 362
- Oilseeds and vegetable oils, 391
- Ottawa Agreement, 378
- Overproduction, 367, 368
- Parcels price (wheat), British, 387, 391, 397-98
- Planning, international (*see* Acreage, wheat; International Wheat Conferences; Prices, wheat; Quota plans; Wheat Agreement), 359, 364-65, 401-02
- Population growth, in relation to wheat problem, 365, 368, 380, 382, 384, 399
- Premium wheats, 373
- Price-pegging or price fixing (*see* Prices, wheat), 362, 363, 368, 382, 386-89
- Price spreads, wheat, 373, 386, 388, 397, 399
- Prices:  
—flour, 391, 393, 395  
—wheat, 362, 363, 365, 367, 372-79, 381, 387, 389, 390, 394-95, 397-98, 400, 401  
—control of, 360, 362, 363, 364, 365, 368, 374, 378, 382, 386-89, 390, 392, 395-99, 401
- Processing tax, United States, 389 n., 390
- Production, wheat, 359, 360, 402
- Purchasing power, 367, 390, 391, 401
- Quality of wheat crop, 394
- Quota plans, wheat, 362-63, 366-67, 368-69, 371-86, 397, 402
- Royal Commission on Wheat Supplies, 360
- Rye, 361, 376, 391, 393
- Self-sufficiency in food supply, 361, 375, 379, 381-82, 391
- Shipments of wheat and flour, international, 370, 371, 375-76, 397

- Stevenson rubber plan, 389  
 Strengtheners wheats, 373  
 Subsidies, 363, 401  
 Supplies, wheat, 366-67, 370  
 Surplus problem, wheat (*see* Exportable surpluses), 365-68, 400  
 "Tail" wheat, 394  
 Tariffs, wheat and flour, 363, 378, 391, 397, 398  
 Taylor, A. E., contributor to *Wheat Studies*, 359-404  
 Underconsumption of wheat, 390  
 Utilization, wheat, 366-67, 370-71, 390, 392-95, 400, 401  
 War debts, 360, 376 n.
- Wheat: acreage, 374-85; bootlegged, 380, 397; carryovers, 360, 367, 369, 370, 372, 390; consumption, 365, 366-67, 371, 375 n., 376, 389-92, 400; control, *see* Control; costs, 360, 362, 367-88; crop year, 368-69; denatured, 394, 395 n.; exports, 364, 368, 389; feed fraction, 392-95; import restrictions on, 364, 365, 378, 390, 392, 398; imports, 369, 370, 372, 375, 377, 390, 401; parcels price of, 387, 391, 397-98; price spreads, 373, 386, 388, 397, 399; production, 359, 360, 402; quality, 394; quota plans, 362-63, 366-67, 368-69, 371-86, 397, 402; surplus problem, 365-68, 400; "tail," 394; utilization of, 366-67, 370-71, 390, 392-95, 400, 401
- Wheat Advisory Committee, international, 364, 392, 397-98, 403  
 Wheat Agreement, International, 364  
 Wheat crisis, 362, 365-67, 400; effect of depression on, 400  
 Wheat Executive, 360-61, 386, 395-96  
 Wheat growing, 365, 366, 367, 383-85  
 Wheats, diversity of, 371-74  
 World War, 359, 365; effects of, on wheat growing and trade, 381, 383; wheat control during, 359-61, 372, 386  
 Yields, wheat, 383, 399