WHEAT STUDIES

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WHEAT PROBLEMS AND POLICIES IN GERMANY

THE great depression now appears to be passing, the world over. But the days that are here are far different from the days of past prosperity. Recovery is largely a domestic affair in each country. International trade in general has regained only a small part of its loss. World trade in wheat continues strikingly below its pre-depression level.

This continuing low level of trade in wheat strongly reflects the struggle for national self-sufficiency in Germany and Italy, countries which a few years ago competed for second rank among the world's largest net importers of wheat. When such countries, with the aid of modern techniques, set themselves to reduce their dependence on foreign supplies of important foodstuffs, they can be expected to show substantial achievements. Among the products in which independence is being sought, wheat is one that can be produced at relatively small sacrifice even in countries where natural conditions are unfavorable for it. and even cheaply in comparison with fibers and their substitutes, fats, motor fuel, and rubber.

In the present study an attempt is made to illuminate various wheat problems of Germany, within the background of her resources, recent history, and national policy; and specifically to appraise the possibility that Germany may resume her former position as a heavy net importer of wheat. This bears upon the prospects for revival of world trade in wheat. World economic recovery may help to undermine policies of self-sufficiency, but the outlook for substantial enlargement of German wheat imports is by no means promising. Increased net imports may well occur over the next decade, but probably in a degree representing only fractional restoration of the pre-depression level of imports.

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GERMANY

Area over 500 meters

Canals

SCALE 0 20 40 60 80 100 MILES

6 8 10 12 14 16 18 20 22

54 52 50 48

DENMARK SWEDEN BALTIC SEA LITHUANIA

NORTH SEA

Great Belt

Kiel Bay

Kiel

SCHLESWIG

HOLSTEIN

Lübeck Bay

Lübeck

Hamburg

Pomeranian Bay

Gulf of Danzig

Danzig

Königsberg

EAST PRUSSIA

MECKLENBURG

POMERANIA

Stettin

POSEN-WEST PRUSSIA

POLAND

Warsaw

NETHERLANDS

Zuider Zee

Amsterdam

OLDENBURG

Bremen

Weser R.

Elbe R.

HANOVER

Hanover

PROVINCE

BRANDENBURG

BERLIN

Oder R.

POS.-W. PR.

Spree R.

SCH.-LIPPE

LIPPE

BRUNSWICK

Magdeburg

OF

ANHALT

Elbe R.

Rhine R.

WESTPHALIA

Essen

Dortmund

Duisburg

Ruhr R.

Krefeld

Düsseldorf

RHINE PROV.

Cologne

PROVINCE

HESSE NASSAU

THU.

SAXONY

Leipzig

Dresden

Chemnitz

Breslau

SILESIA

THURINGIA

Saale R.

Frankfurt

Main R.

BELGIUM

LUXEMBURG

To OLDENBURG

HESSE

Ludwigshafen

Mannheim

SAAR PALATINATE To BAVARIA

Nuremberg

CZECHOSLOVAKIA

Prague

FRANCE

Stuttgart

WÜRTTEMBERG

BAVARIA

Danube R.

Rhine R.

Munich

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LONGITUDE EAST OF GREENWICH

P.S. KI

WHEAT PROBLEMS AND POLICIES IN GERMANY

In the great slump in European wheat imports during the latest depression, and in their equally surprising failure to revive since business conditions in Europe have improved considerably, Germany has figured heavily. In the six crop years ending with 1929–30, with net imports of wheat and flour (in terms of wheat) averaging 74 million bushels a year, she competed with Italy for the position of the world's second largest net importer of wheat and the largest net importer of continental Europe. This rank Germany had held in the last fifteen prewar years. It was in line with her natural and economic conditions. A large proportion of the soil in this densely populated and highly industrialized country is quite unsuitable for wheat; the climate in some parts is more favorable for other crops; and wheat production costs are high. In these conditions, Germany was one of the last countries to be expected to become self-sufficient in wheat. Yet in the past four crop years, she has imported net only trifling quantities averaging 2.6 million bushels a year. Of the shrinkage in the net wheat imports of Europe ex-Danube between these two postwar periods, Germany has accounted for nearly one-third.

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The great contraction in Germany's wheat imports was the consequence of a notable increase in domestic production and a reduction in human consumption nearly as great. In 1934–35 and 1935–36, part of the gain in production was lost and part of the loss in consumption regained. Consequently, Germany has again become a wheat-deficit country; but with average yields, only the usual amount of feed consumption, and no change in carryover, the 1935 acreage would have called for net imports of only about 15 million bushels (inclusive of the Saar); this is about one-fifth of the net imports of pre-depression years.

Taking production as acreage multiplied by average yields, trend considered, wheat production was expanded by about 40 million bushels between 1927 and 1936; in 1933 the additional production even amounted to some 60 million bushels. About one-third of the increase in production from 1927 to 1936 was accounted for by higher yields. These improved at a rate of about two per cent per annum in the first five or six post-inflation years, and subsequently at a rate of about one per cent. Expansion of acreage has been the major factor in the production increase. The wheat area, which had already increased materially in the first post-inflation years, jumped from 4.32 million acres in 1927 to 5.73 million in 1933. Even after declining to 5.13 million in 1936, it still was 18.8 per cent greater than in 1927 and exceeded the 1913 acreage (postwar boundaries) by 23.9 per cent. This development is the more surprising when one considers that in the last prewar decade the wheat acreage had remained practically unchanged, and that over a longer prewar period its trend had even been slightly downward.

The striking expansion of Germany's wheat production in recent years has been due, to a considerable extent, to the unprecedented amount of protection bestowed upon domestic agriculture. It is true that German agriculture has not regained the full measure of prosperity that it had enjoyed before the World War, even though extreme inflation freed the farmers from their burdensome prewar indebtedness. On the whole, however, the postwar condition must be regarded as rather satisfactory, except for those farming the poorest lands. Even these farms could be kept running in the worst depression years. Moreover, the burdensome requirements for taxes and interest charges on new debts exerted pressure on farmers to raise production per acre to the utmost. Cheapness of artificial fertilizers fa-

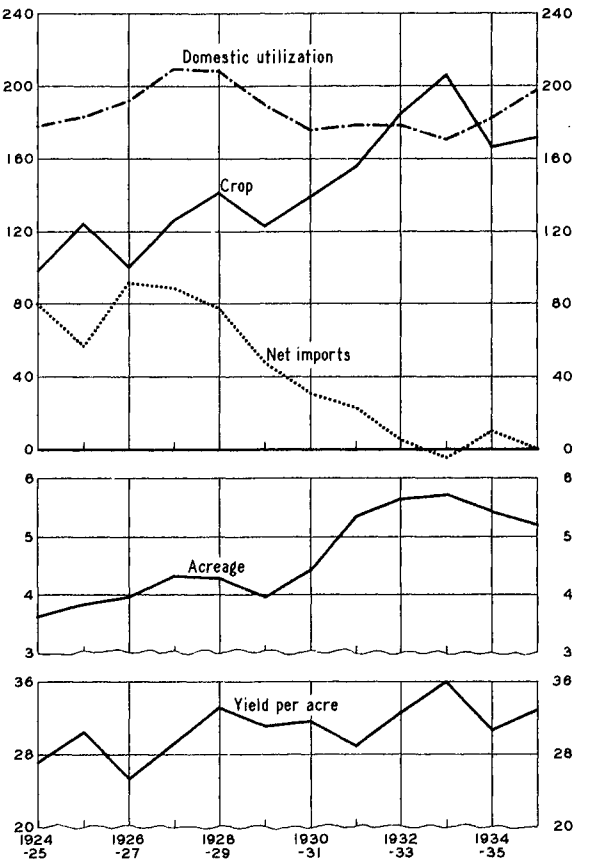
vorably affected yields still more powerfully. Hence the total volume of agricultural output increased rapidly in the early post-inflation years, and it continued to advance even in the worst years of the depression though at a considerably lower rate.

Wheat has won the lion's share of the increase in total agricultural production. This took place even though it was only in 1929–30 and 1930–31 that the relation of wheat prices to prices of other farm products—and particularly to the prices of rye, its main competitor in the rotation—was substantially more favorable to wheat than in the last prewar decade. Rye, rather than wheat, was the grain most favored by price relationships, on the average of all the post-inflation years. In so far as the development of wheat acreage was significantly different in the prewar and postwar years, in the face of similar price relationships, this may perhaps be explained by the fact that wheat gained more than its main competitors from the considerable cheapening of artificial fertilizers in postwar years. This was true with regard both to land previously used for wheat and to that considered unsuitable for it. Where intensive methods of cultivation are practiced, as in Germany, the proportion of land adapted to wheat is slowly but permanently expanding. A fall in prices of artificial fertilizers makes this change occur more rapidly. Progress in cultural practices (seed selection, changing the reaction of the soil from an acid to an alkaline one, etc.), and probably propaganda also, contributed to the shift to wheat. Finally, the less favorable situation in postwar years made farmers more eager to undertake changes that promised increased receipts or reduced expenditures.

The decline in wheat acreage after 1933 was in part due to the fact that some lands unsuitable for wheat had been used for this purpose in the preceding expansion. The main reasons were, however, that domestic wheat production exceeded consumption, which had been greatly contracted in the depression; and that a feed shortage developed in 1934–35 and grew worse in 1935–36, which favored production of rye and feed grains more than of wheat. It is indicative of the material increase in the possibilities of wheat growing, as compared with those in prewar years, that in 1936 wheat still held a large portion of the acreage added in the depression years.

CHART 1.—SELECTED GERMAN WHEAT STATISTICS, ANNUALLY FROM 1924–25*

(Million bushels)



* Data in Tables III and VIII.

Food consumption of wheat, after having increased by approximately 25 million bushels from 1924–25 to 1928–29, declined by about 40 million from 1928–29 to 1932–33. In 1935–36 it was still about 25 million bushels below the peaks of 1927–28 and 1928–29. Per capita food consumption of wheat had no sooner exceeded its prewar level than a fresh decline set in. It fell from 175 pounds per capita in 1928–29 to not more than 133 in 1932–33. Only a small portion of this loss had been regained by 1935–36.

The considerable reduction in the purchas-

ing power of the population was undoubtedly the major cause of this decline in per capita consumption. Germany is still a country of two bread grains, wheat being the luxurious kind. Moreover, potatoes, which are even cheaper than rye bread, are a staple food. These circumstances made possible a great contraction in consumption of the more expensive of the two bread grains in the recent unprecedented recession of business activity. The increase in rye consumption, however, offset only a small portion of the decline in wheat consumption. The unemployed were compelled to contract wheat consumption without making full replacement by substitutes. Part of the contraction in per capita food consumption of wheat, however, appears to reflect a long-run trend toward a diminished consumption of bread. In the last prewar decade, which was extremely favorable for the expansion of the purchasing power of the population, this trend was reflected in a substantial decline in food consumption of rye while food consumption of wheat remained unchanged. *Tempora mutantur!*

A minor factor in the face of the great variations in per capita food consumption, but one very important in its long-run effects on total consumption of wheat, was the slow rate of population growth in post-inflation years. This rate was, on the average, only about one-third of that in the prewar decade.

Developments in world trade, and the political and social policies of the present government of Germany, are not favorable to a rapid increase in the purchasing power of her nonagricultural population. Moreover, the shift from rye to wheat bread may be hampered by propaganda proclaiming that "rye bread is the bread of the Nordic race." We venture to estimate that, with prospects in general as they now appear, per capita food consumption of wheat some ten years hence is not likely to exceed the 1935–36 level by more than 20 per cent. More favorable developments may cause per capita food consumption of wheat to advance by 30 per cent, or even more, within a decade; but fundamental political and economic changes in Germany would probably be required if the higher level is to be attained.

Barring such basic changes in agricultural policy as would entail a considerable contraction in the use of artificial fertilizers, yields will probably proceed to increase at least twice as rapidly as the population grows.

Of the four factors that will determine Germany's future import requirements for wheat, acreage is the most uncertain, owing to the interchangeability of crops. But in the event of continuance of unfavorable economic conditions in general, and in foreign trade in particular, wheat may be expected to get enough protection to insure expansion of the acreage by 13 to 15 per cent over a decade, the amount required to provide for a 20 per cent increase in per capita consumption, with no larger average deficit than the 15 million bushels computed for 1935–36. It is by no means impossible that, in spite of the lack of good soils, the wheat area might even be increased to such an extent that no net imports would be required; for it is rather unlikely that, under the conditions assumed, much consideration would be given to the high cost of domestic wheat production. But some excess of requirements over production may be desired as a price-supporting measure. However, for a notable expansion of the wheat area to occur, conditions must not be such as to prevent overcoming the present feed shortage, which favors the production of rye and feed grains rather than wheat.

Under more favorable conditions, for which the higher estimate of consumption is made, the deficiency of suitable lands would be a more significant obstacle to covering total requirements without increasing net imports beyond the suggested low level of 15 million bushels. In this case, moreover, the cost of production may be expected to receive more consideration. Hence a substantial enlargement of net imports to about one-half the average for 1924–25 to 1929–30 would be probable. Net imports approaching the volume of the late prewar years or the post-inflation prosperity years can be looked for only in the event of a rapid advance in food consumption of wheat above the level of 1928–29.

These are some of the highlights in the more or less comprehensive picture of wheat production, trade, milling, and utilization in Germany which the present study provides.

The various wheat problems are necessarily considered within the general framework of German agriculture, consumption, and national policy. Attention is centered on the post-inflation years beginning with 1924–25. Some of the prewar background is presented; but the war years and the postwar inflation period are largely ignored, because of their manifold peculiarities and the unsatisfactory character of the statistics. The broader treatment is supplemented by consideration of regional aspects under the more important topics, and by a discussion of year-to-year and seasonal variations.

I. NATURAL CONDITIONS

Germany is one of the most densely populated countries of the world.[1] It is located between the 47.50th and 55th parallels, and between 6° and 22° east longitude. The main expanse of territory, extending from East Prussia to the Rhine province, is for the most part level; but southern Germany is hilly and partly mountainous, and to some extent central Germany is also. The folded map shows, in addition to the complicated political subdivisions,[2] the areas over 500 meters (1,640 feet) elevation.

Soil

In only a few countries of the temperate zone is the soil so ill-suited for wheat growing. As a study of the accompanying soil map[3] shows, Germany possesses only a few small stretches of steppe soils, black or dark brown. The largest area of these good wheat soils lies in the Prussian province of Saxony in the watershed of the Harz Mountains. Smaller islands of similar soils are found in the Prussian province of Silesia, in Thuringia, on the Rhine, in Hesse, and in a few other places. Patches of steppe soils of lighter color or partly degraded are found in Silesia and elsewhere, but they too are neither large nor numerous. In various parts there are stretches of heavy clay soils which, though costly to work, give high yields; but some of these are too wet for wheat.

Most of the country is covered with light, rust-colored forest soils, slightly to moderately podzolized (leached out).[4] Parts of these soils are suitable not even for oats, but only for rye, potatoes, and lupines; some can be used only for rye and lupines. The very light type of forest soils is especially widespread in the east and west. A substantial portion of the soils in the northwest consists of the still poorer type of rust-colored forest soils, strongly podzolized. The better types of forest soils—brown forest soils, partly podzolized—rank second in the east and west, but a far less important second. In the south they are intermingled with the lighter type of rust-colored forest soils, slightly to moderately podzolized. According to Roemer,[5] 60 per cent of German soils must be classed as light, and therefore unsuitable for wheat.

Although the state of land cultivation in general is high in Germany, obstacles to wheat growing arise also from defects from this side. In the opinion of competent students, a considerable area of soils could be made suitable for wheat growing by changing the soil reaction from an acid to an alkaline one, clearing fields of weeds, etc.

How large is the impediment to wheat growing which arises from the poor quality of soil is shown from the result of tests made in 1930–31 on a rather broad basis in eastern

[1] In 1933 there were 360.3 persons per square mile as against 344 in Italy (1931), 196 in France (1932), and only 41.5 in the United States (1930). Only a few countries of northwestern Europe—Great Britain, Belgium, and the Netherlands—are considerably more densely populated than Germany.

[2] The Nazi government has greatly reduced the powers of Prussia and the other states, and many of their functions have been taken over by the central government of the Reich.

[3] Primary source: Professor M. Stremme, Danzig, *Handbuch der Bodenlehre;* here as reproduced from M. Sering, *Die Deutsche Landwirtschaft unter Volks- und Weltwirtschaftlichen Gesichtspunkten* (Berlin, 1932), p. 211, by the Bureau of Agricultural Economics, U.S. Department of Agriculture, which has kindly granted permission for its use in this study.

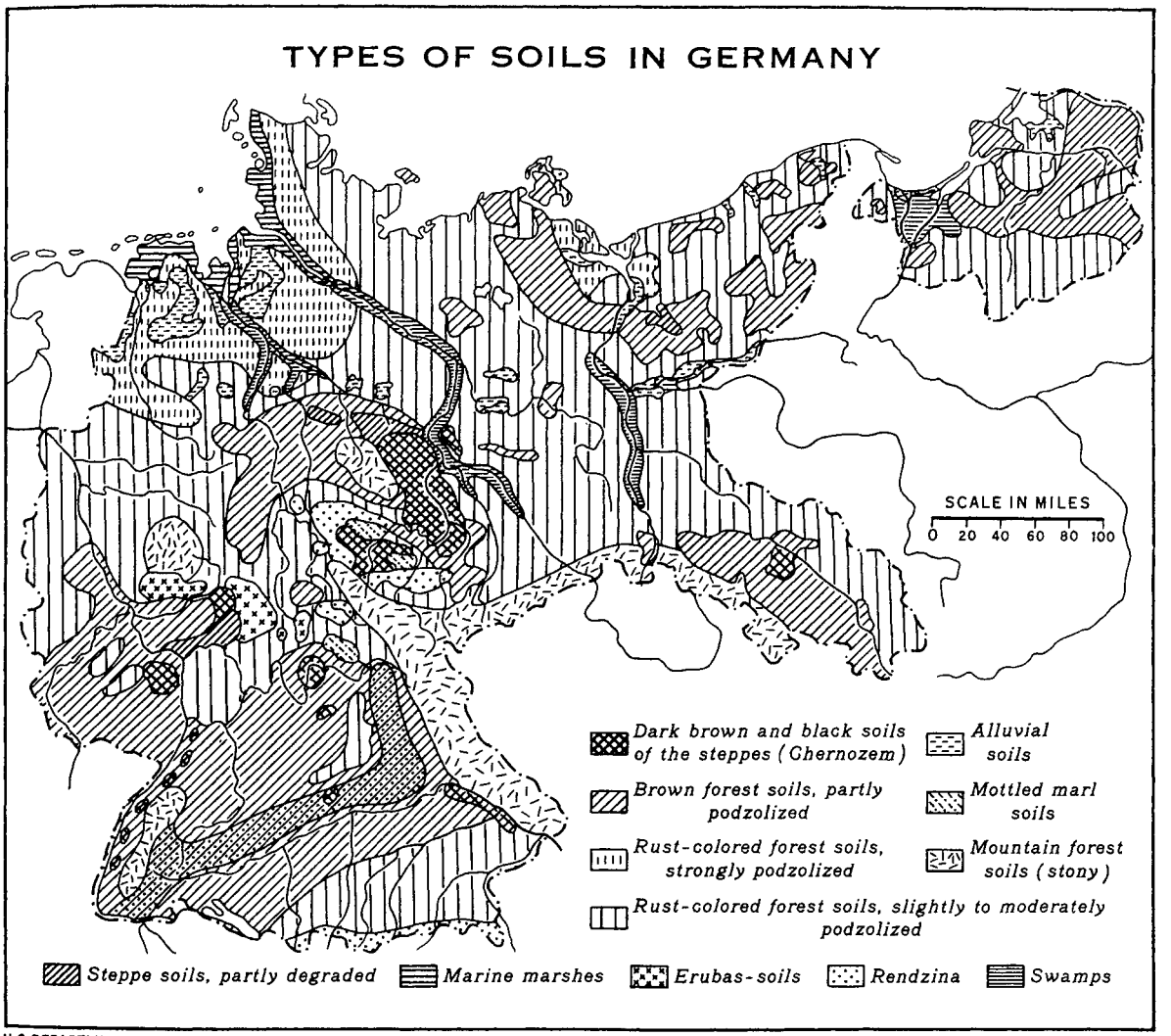
[4] Podzol soils contain no carbonates or other readily soluble salts, and low percentages of phosphoric acid and nitrogen. Their reaction is acid.

[5] Th. Roemer, "Die Kultur des Deutschen Bodens," in *Deutschland, die Natürlichen Grundlagen seiner Kultur* (Leipzig, 1928); quoted in E. Borsig, *Reagrarisierung Deutschlands?* (Jena, 1934), p. 9.

Germany.[1] Winter wheat and winter rye were grown simultaneously in forty-eight different places, mostly at experiment stations. The results were classified, according to the yields of *wheat,* into six groups each including eight places. In terms of 60-pound units per acre, the yields averaged as follows:

Grain	I	II	III	IV	V	VI
Winter wheat	49.8	43.0	37.6	30.6	24.8	18.0
Winter rye	45.9	41.0	40.9	32.0	31.7	29.6

Considering the care given to the crops in Germany (see pp. 74–75), the yields of wheat in half of the places must be accounted low. Moreover, in two-thirds of the places winter rye yielded better than winter wheat. On fairly good soil, winter wheat yields better than winter rye. The fact that only one-third of these places showed higher yields of wheat is therefore indicative of the great limitations upon wheat growing imposed by the low quality of German soils.



Climate

Germany's climate varies from a maritime climate in the northwestern corner of the country to a moderately continental climate

[1] W. Heusser, "Wintergetreideversuche in Ostdeutschland," *Landwirtschaftliche Jahrbücher,* 1932–33, LXXVI, 345–47. The tests were made in the Grenzmark Posen–West Prussia, East Prussia, Brandenburg, Pomerania, and Silesia.

in Silesia, East Prussia, and adjacent parts. By and large, the climate is adapted to wheat growing, and that of southwestern Germany is even considered ideal for this purpose. In some parts, however, wheat growing meets with some climatic difficulties, such that, even on soils suitable for wheat, it is found preferable to give the place that could be occupied by wheat to some other grain or a non-cereal crop.

The average yearly rainfall is 24 inches. The precipitation in May–July varies from 6.4 to over 16 inches. A shortage of moisture on the types of soils on which wheat is grown seldom occurs. Though lands getting the largest amounts of precipitation are little used for wheat, the wheat crop from time to time suffers from excessive rains during the growing season. Still more frequently, considerable damage to the crop is done by rains during harvest. Perhaps in two out of every five years the precipitation during harvest time is so large that the quality of the grain is badly injured and yields too are substantially reduced.[1] The result is that wet years frequently produce smaller wheat yields than dry years. On the whole, however, the year-to-year variations in yields are relatively moderate. The highest yield of wheat in the five years 1931–35 was only about 23 per cent larger than the lowest.

The proportion of cloudy days is rather high, particularly in the northwest. The resulting prolongation of the growing period tends to raise the yield, but impairs the quality of the wheat.

As to temperature, the situation in Germany is similar to that of the agricultural area of eastern Canada. So far as elevation is not an obstacle, wheat can be grown in all parts of the country, but in the north and east the severity of the climate and the shortness of the frost-free period are serious impediments.

The climate becomes too severe for winter wheat in central Germany at an elevation of about 1,000 feet, and in the Alps at about 1,500 feet. Above these levels, the farmers commonly shift to spring wheat and rye. In some of the elevated parts, spelt is grown to some extent instead of wheat.

In the east and northeast, winterkilling of the higher-yielding varieties is frequently rather large. The necessity of growing lower-yielding varieties of winter wheat causes some substitution of spring wheat, which yields less than winter wheat under conditions favorable for the latter. The seasonal distribution of power and labor requirements also is less favorable with spring wheat than with winter. The shift, therefore, is more often away from all kinds of wheat to rye, which withstands severe winters better than winter wheat and has other technical advantages over wheat that may now be touched upon.

Shortness of the frost-free period is a much greater handicap in countries which practice intensive methods of cultivation than in countries where extensive farming is in vogue. The intensive method requires a thorough preparation of the land but does not allow for land in fallow. Roots and tubers, which have a long vegetative period, must be included in the rotation. Costs of producing all crops, including those of wheat, are therefore raised by the shortness of the season considerably more than in countries with extensive methods of agriculture. Moreover, shortness of the season under intensive methods of cultivation makes the competition of wheat with other crops more difficult than it would be under other conditions. The place in the rotation most suitable for winter grain is after fallow; but, as indicated above, there is no fallow in the intensive method of agriculture. Where the season is short, winter wheat cannot follow roots and tubers, since these crops are not removed from the field at the time winter wheat must be sown. Nor can it be grown as a cover crop to clover. Thus it is difficult to find a suitable place in the rotation for winter wheat, and winter rye or oats (sown in the spring) is generally grown instead.

Where the season is short, it is sometimes necessary to reverse the usual sequence of grains in the rotation. Instead of spring grain after winter grain, winter grain will follow spring grain. But wheat is too exacting in its requirements to be grown successfully after

[1] Consequently, crop estimates made when the grain is ripe are often materially reduced later, for reasons having nothing to do with statistical technique. Such revisions are unusual in the United States.

another cereal, except maize.[1] This is particularly the case when oats is the spring grain with which the exchange of places is to be made, and oats is widely grown in Germany. Oats is very moderate in its requirements, and is mostly grown in the worst place of the rotation (*abtragende Frucht*). Hence, rye is usually preferred for the second place in the sequence when this place is to be occupied by a winter grain. There is still the possibility of retaining for wheat the first place by shifting to spring wheat.[2] Data on the spring wheat area, however, show that such an order is seldom chosen. The reasons are two: the high requirements of spring wheat with respect to soil quality, and its relatively low yields.

II. CROP PRODUCTION

Agricultural Area and Personnel

Area.—According to the 1935 census of land utilization, Germany's total area (including the Saar) was classified as follows:

Classification	Thousand acres	Percentage of total
Used for agricultural purposes	71,049	61.2
Forests	31,995	27.5
Unused moors	1,105	.9
Other unused, desolate land	3,605	3.1
Houses and farmsteads	1,957	1.7
Roadways, railways, cemeteries, parks, sport grounds, areas covered by water, etc.	6,469	5.6
Total	116,180	100.0

Only 4 per cent of the land was unused in 1935. Old countries such as Germany naturally leave no piece of land unused if it can be made available for some useful purpose at a cost not too excessive. Although the cost of reclamation is high, every year a small portion of the unused land has been converted into agricultural land. Moreover, much land is being used agriculturally that is little appropriate for this purpose. A substantial proportion of the great area deforested and turned over to agricultural uses has poor soils; ultimately, they will probably again be devoted to forests. The situation is similar with regard to some mountainous meadows and pastures. In spite of the additions of reclaimed land, the total agricultural area of postwar Germany (exclusive of the Saar) declined during the period 1913–27 from 73.5 million to 72.7 million acres. A further contraction, possibly at a considerably accelerated rate, was in prospect. The depression, however, was not favorable for taking agricultural land out of its current use, and the agricultural area declined very slightly (110,000 acres) from 1927 to 1933.[3]

The improvement of waste land[4] before the depression was in part undertaken by owners at their own expense, and in part subsidized by the government. Although the subsidy amounted to about one-third of the total cost, little headway could be made. The area of waste land improved during the period 1914–30 was estimated at 717,000 acres, of which only 136,000 acres were converted into plowland; the rest became meadows or improved pastures.[5] During the depression, the vast number of unemployed and the difficulties of procuring foreign exchange have aroused public sentiment in favor of a more vigorous policy of waste-land improvement. The Hitler government, having made the greatest possible self-sufficiency in staple agricultural products one of its primary aims, is extremely eager to make use of each piece of available

[1] Rye and oats are better adapted to follow cereals than are wheat and barley. Th. Roemer, *Umstellung des Deutschen Getreidebaus* (Berlin, 1930), p. 24.

[2] The following rotation is in vogue on the farms of the Lüneburger Heide, just south of Hamburg: rye, oats, potatoes, rye, oats, sugar beets, spring wheat, rye, clover. J. Seedorf, "Die Organisation der Landgutswirtschaft," *Handbuch der Landwirtschaft* (Berlin, 1930), I, 408.

[3] See Table I. (Tables numbered with Roman numerals will be found in Appendix Tables.) The 1935 census showed a further decline by 1,797,000 acres; but its data are not quite comparable with those of the preceding censuses. See Appendix Note A (1), pp. 128–29.

[4] "Waste land," as spoken of in Germany in connection with soil improvement, includes poor pasture. In the tabulation above and in Table I, however, these pastures are included in the area used for agricultural purposes.

[5] R. Stadermann, "Urbarmachung von Oedländereien," *Deutsche Agrarpolitik im Rahmen der Inneren und Aeusseren Wirtschaftspolitik* (Berlin, 1932).

land, without regard to cost. Subsidies have been increased, and labor free of charge has been provided.[1] The total waste land which could be improved is rather optimistically estimated by Stadermann at about 10 million acres.[2] He considers that 20 per cent of this area can be converted into plowland, the remainder being convertible only into meadows or improved pastures.

Personnel.—Preliminary data of the census of 1933 show the farm personnel classified as follows, in thousands:

Type of labor	Total	Men	Women
Operators			
Principal occupation	2,071	1,841	229
Part-time	954	869	84
Relatives (over 14 years) of operators principally occupied in agriculture			
Having a permanent occupation off the farm..	568	366	202
Unemployed in their usual occupations	165	142	23
Others	4,341	1,246	3,094
Relatives (over 14 years) of part-time operators ...	2,017	646	1,371
Hired labor			
Permanent	2,052	1,339	713
Temporary	808	407	402

This tabulation shows in all some 13 million persons permanently or temporarily occupied on the 65.8 million acres that comprised the farms with more than 1.235 acres (0.5 hectare) of total area per holding[3] in 1933. However, this figure contains some duplications, and it includes many persons who work only occasionally. Operators with agriculture as the principal occupation, members of their families without an occupation of their own off the farm, and permanent hired labor, over 14 years old, total about 8,463,000. These are supposed to represent the personnel permanently occupied on the farms. An extremely rough computation suggests that the permanent and temporary labor is equivalent to about 7,000,000 man-years. Thus less than 10 acres of agricultural area are available per man-year in German agriculture.

Size of farms.—As one would expect in an agriculture with an ample supply of labor, small farms widely predominate in Germany. The 1933 census first of all segregates the small gardens and "dwarf" farms, each with an area not over 1.235 acres. These numbered 5,278,972 and had a total area of 1.3 million acres, according to the preliminary census data. The remaining 3,017,887 farms, with more than 1.235 acres of total area each, contained 65.8 million acres of *agricultural* land[4] distributed as follows:

Size group (*acres of agricultural area*)	Number of farms (*thousands*)	Agricultural area (*thousand acres*)	Percentage of agricultural area
Under 4.94[a] ..	900.6	2,400	3.6
4.94– 12.35.	822.6	6,701	10.2
12.35– 49.40.	1,045.3	25,244	38.4
49.40–247.00.	230.9	19,422	29.5
247.00–494.00.	9.4	3,212	4.9
494.00 and over	9.0	8,811	13.4
Total	3,017.9	65,790[b]	100.0

[a] Including only farms with 1.235 acres or more of *total* area.

[b] This census figure plus the one for area in dwarf farms indicates a total agricultural area substantially smaller than is indicated by the crop survey data for the same year as shown in Table I. The official comment is merely that the discrepancy is due to the use of different methods. See *Wirtschaft und Statistik*, 1934, No. 17.

The very small farms having less than 12.35 acres of agricultural area accounted for nearly 60 per cent of the total number of farms with more than 1.235 acres of total area, and for about 13.8 per cent of the agricultural area. About one-third of the farms with more than 1.235 acres of total area were small farms with 12.35 to 49.40 acres of agri-

[1] The Voluntary Labor Service, converted in October 1935 into the compulsory Labor Service, is used almost exclusively on work intended to raise the cultural state of the land (improving land in cultivation and waste land, road-building, settlement, etc.). Of 203,000 persons in the labor service in the summer of 1935, 53 per cent were employed in improving land in cultivation through drainage and similar measures, and in making unused land suitable for agricultural purposes. However, the amount by which the value of the German agricultural land will be increased was estimated at only about 20,000,000 marks per year. "Der Deutsche Arbeitsdienst," *Wirtschaft und Statistik*, 1936, No. 4.

[2] A somewhat lower figure is given by I. Schäffer, Stabsabteilungsleiter im Reichsnährstand, *Deutsche Getreide-Zeitung*, Mar. 15, 1935.

[3] Including agricultural land, woodland, land occupied by farmsteads, etc. See tabulation opposite.

[4] Exclusive of woodland, land occupied by farmsteads, etc.

cultural area; their agricultural area represented about 40 per cent of the total. Less than half of the agricultural area is in farms with 50 acres or more per farm. There were 18,397 large farms, each with more than 247 acres of agricultural area—in number 0.6 per cent, in area over 18 per cent of the total.

The distribution of wheat-growing farms by size in 1933, with the area seeded to wheat, may be summarized from the preliminary census data as follows:

Size group (*acres of total area*[a])	Number growing wheat (*thousands*)	Wheat area seeded (*thousand acres*)	Percentage of wheat area seeded	Average wheat area per farm (*acres*)
1.235– 4.94..	242.8	122	2.1	.5
4.94– 12.35..	401.7	402	6.8	1.0
12.35– 49.40..	694.8	1,822	30.7	2.6
49.40–247.00..	220.2	1,918	32.4	8.7
247.00 and over	19.2	1,661	28.0	86.5
Total	1,578.8	5,925	100.0	3.8

[a] Including woodland, farmstead, etc.

In all, wheat was grown on somewhat more than half the total number of farms, but the wheat area per wheat-growing farm averaged less than 4 acres. Most of the farms of 50 acres or more raised wheat. Farms with 49.4 to 247 acres, on the average, planted merely 8.7 acres of wheat per farm. The acreage in wheat averaged large (about 86 acres) only on the 19,237 farms with 247 or more acres of total area per farm.

Utilization of Agricultural Area

The scarcity of land necessarily affects the utilization of the agricultural area greatly. In general, only the poorest lands are used as pasture. A considerable portion of pasture land is represented by mountainous slopes. Prior to the war, considerably more land was converted from pastures and meadows into plowland than was advisable, and a reverse trend has been noticeable since. The area in pasture increased from 5.7 million acres in 1913 to 7.2 million in 1935, and the area in meadows from 13.2 million acres in 1913 to 13.9 million in 1935 (Table I).

So far as climate permits, practically no fallowing is done. Uncropped plowland was reported as 2.8 million acres in 1913, 2.5 million in 1927, 2.2 million in 1930, and only 1.2 million acres or 2.4 per cent of the plowland in 1935.[1] This decline counterbalanced part of the reduction in total plowland. Cropped plowland declined from 50.2 million acres in 1913 to 46.6 million acres in 1935, or by 3.6 million acres, while total plowland contracted by 5.3 million acres.

The large supply of labor in relation to the supply of land greatly affects the distribution of plowland among different crops (see Table I, for the main crops and groups of crops). Industrial crops formerly played a large rôle, but have been reduced to a negligible amount. This is due in part to their inappropriateness for intensive agriculture, and in part to the competition of imported products. Similar are the reasons for the virtual discontinuance of the production of oilseeds. Cultivation of dry legumes has also been contracted, owing both to their inappropriateness for intensive agriculture and to the decline in human consumption of these products. The Hitler government is now making strenuous efforts to revive Germany's production of fibers and vegetable oils, but thus far with only moderate success.

Three groups of products are the cornerstones of Germany's production of seeded crops: sown grasses, roots and tubers, and grains. About 11 per cent of the 1935 cropped plowland[2] was in sown grasses (practically only grasses rich in protein are grown). This proportion is rather small, considering the shortage of protein feed in Germany.[3] One of the reasons is that sown grasses do not require much labor.

About 23 per cent of the cropped plowland was in roots and tubers in 1935. Because of

[1] Of this, 1.6 per cent was in fallow and 0.8 per cent in plowland from which no crop was harvested and which was not cultivated (*Ackerweide*). On the comparability of the data of the 1935 census with census data for earlier years, see Appendix Note A (1). The lack of full comparability, however, may affect only the *rate* of the decline of the land in fallow.

[2] In this paragraph and the next three, the base used for calculating percentages is *cropped plowland*, whereas in Table I the corresponding base is *total plowland* including fallow.

[3] The grass from natural meadows and pastures is rather poor in protein. The production of dry legumes for feed purposes is very small. Roots and tubers grown for feed contain practically no protein.

the thorough methods of cultivation required by these crops, the limited use of machinery, and the heavy yields,[1] roots and tubers provide an outlet for the large supply of labor available in agriculture. The labor factor would permit a still greater proportion of land to be in roots and tubers, but soil and climatic factors hinder such expansion. Moreover, the agricultural policy has for decades favored the production of grains. In the absence of this policy the area in roots and tubers and in sown grasses would be materially greater.

The 28.9 million acres of all grains harvested in 1935 represented 62.1 per cent of the plowland cropped in that year. This percentage is undoubtedly high for a country following intensive methods of cultivation. The proportion of total plowland devoted to grain is considerably smaller in the Netherlands, Denmark, Sweden, France, and several other countries.

Only 18.6 per cent of the area devoted to grains was in wheat in 1935. The poor quality of the soil is primarily responsible for the fact that so moderate an area is given to this highest-priced grain. The agricultural policy, however, also materially affects the choice among the individual grains. Hence a more detailed analysis of the proportion of plowland devoted to individual grains may be conveniently postponed until Germany's agricultural policy has been discussed (Section IV).

Production Practices and Costs

With the large supply of labor in proportion to the supply of land, intensive production practices seem inevitable. Between Germany and the United States, there is an immense difference in the amount of labor used for wheat production. On a very large estate in the province of Brandenburg, on the average of 1928 and 1929, 60 horse-hours and 37 man-hours per acre were spent on winter wheat up to harvest time, exclusive of the power and labor used in conserving manure.[2] These figures compare with only 2.6 horse-hours, .6 tractor-hours, and 2.0 man-hours used for winter wheat on much smaller farms in central Indiana.[3]

German farms are relatively well supplied with electricity. In 1933, besides 1,169,841 electric motors, there were available for belt work 26,719 steam engines and 80,010 internal-combustion engines. Little mechanical power, however, is used for drawbar work and hauling. In 1933 there were only 1,393 steam plows, 17,873 tractors with drawbar horsepower of 8 or more, 6,021 smaller tractors and cultivators, and 9,074 trucks. In spite of this there were, in the same year, only 3,229,178 horses on farms with more than 1.235 acres of total area per farm.

Compared with the amount of power work to be done, the farm supply of drawbar power is small, even considering the work of oxen and milk cows (slightly under 25 per cent of the milk cows are so used). To some extent this is due to the fact that work which could be performed by mechanical or animal power is done by man power. A much more important cause is that the intensive method of cultivation permits a very intensive utilization of power. In Germany, horses and tractors are used at least twice as many hours per year as in the United States. The higher annual use of power offsets the higher cost of feed. It may seem surprising, yet it is undoubtedly true, that on a per hour basis animal power is cheaper in Germany than in this country and even than in some countries with still lower feed costs.

The number of horses available on farms in 1933 was equivalent to about one-quarter of a horse per person permanently or temporarily employed on farms. Out of the more than 3 million farms, there were horses on only 1,233,009. Of this number, 430,311 farms had one horse each, 484,762 farms had two horses, and 317,936 farms had three or more horses each.

Even the large farms are not always equipped with machinery which is considered usual in North America. Small farms still

[1] Mangolds, the principal kind of roots grown for feed, yield as high as about 16 short tons per acre.

[2] A. Peters and R. Tismer, *Arbeitsverfahren und Arbeitsleistungen in der Landwirtschaft* (Berlin, 1930), 1 Teil, pp. 296–97.

[3] E. C. Young and G. W. Collier, *Labor and Power Used in Crop Production in Central Indiana*, Purdue University Agricultural Experiment Station, Bulletin 378, 1933, p. 14.

more frequently either have to do without machines or are overburdened with excessive charges for interest and depreciation of little-used machines. On the more than 3 million farms in 1933 with more than 1.235 acres per farm, there were available 667,692 seeding machines of different kinds, 949,895 mowers and grain harvesters,[1] 343,720 potato harvesters,[2] 153,665 manure spreaders, and 11,685 milking machines. Drills were used on 34.5 per cent of the farms with 12.35 to 49.40 acres each, and on 69.9 per cent of the farms with 49.40 to 247.0 acres each.[3] The corresponding percentages were 4.2 and 27.2 for manure spreaders, 53.5 and 88.0 for mowers or grain harvesters (5.0 and 29.9 for binders), 15.8 and 44.3 for potato harvesters, and 0.3 and 2.0 for milking machines. Even on some of the largest farms, such machines as binders, potato harvesters, and manure spreaders are not used. On small farms binding of grain and many similar operations are still exclusively done by hand.

Immense amounts of fertilizers are used on crops and pasture. Thus 468,000 short tons of nitrates, 596,000 tons of phosphates, and 898,000 tons of potassium (plant-food basis) were so used in 1934–35. These tonnages are equivalent, respectively, to 13.2, 16.9, and 25.4 pounds per acre of agricultural area. Only Belgium and the Netherlands have a still higher utilization of artificial fertilizers per acre of agricultural area, while the amounts used in Great Britain and the United States are almost negligible by comparison.[4]

Thorough cultivation and liberal application of artificial fertilizers insure rather high yields. But the immense application of power, even at moderate cost per hour, and of labor, even at low wages, makes the cost of production rather high. The total agricultural production would undoubtedly be considerably smaller than it now is if it were not for the vigorous protectionist policy. Production of only a few minor crops could have reached the present level if Germany had admitted agricultural products from other countries free of duty.

III. WHEAT, FLOUR, AND BREAD

The Wheat

Germany produces only common wheat (*Triticum vulgare*) and a negligible quantity of poulard wheat (*Triticum turgidum*), if one ignores spelt.[5] No durum or club wheat is produced. Almost all the wheats are red in color. About 90 per cent of the wheat is of winter habit. The winter wheats resemble American soft red wheats and the spring wheats are similar to American hard red spring wheats, but both are inferior in quality.

Dockage and foreign matter in wheat present no problem. Intensive methods of cultivation tend to insure cleanliness of the fields. Moreover, a considerable proportion of German soils is suitable for wheat only if kept in perfect condition. Hence wheat is harvested practically free of non-wheat.[6]

The quality of the wheat grain proper, however, is rather poor.[7] The climate is not suitable for the production of high-quality wheat. In the northwest, weather conditions are exceedingly unfavorable for quality; and not

[1] Most of these were hay mowers. Of the grain harvesters, only 169,807 were binders.

[2] Most of these are of simple construction; their service is limited to the lifting of the potatoes and putting them on the ground.

[3] A survey made in the same year showed that 82 per cent of the wheat was drilled and 18 per cent broadcast by hand.

[4] In 1928 Germany used 50.7 pounds of all three kinds of fertilizers (plant-food basis) per acre of agricultural area, as against 107.0 pounds in the Netherlands, 66.3 pounds in Belgium, and 10.2 pounds in the British Isles. In the United States, 8.3 pounds were used per crop acre. *Die Ernährung der Pflanze*, 1930, No. 13, p. 311.

[5] On spelt (*Triticum spelta*), see J. Percival, *The Wheat Plant* . . . . (London, 1921), especially chapter xxii, and below, pp. 92, 102.

[6] The wheat samples of the crop of 1935, tested by the Institut für Müllerei, Berlin, contained on the average 0.53 per cent of cereals other than wheat and 0.18 per cent of other impurities. "Die Deutsche Getreideernte 1935," *Zeitschrift für das Gesamte Getreide-, Mühlen- und Bäckereiwesen*, October 1935.

[7] In Appendix Note B (1) are summarized the regulations with respect to price differentials for quality of wheat under the fixed-price system. They provide little information as to the quality of German wheat, but are rather illuminating on the primitive manner of merchandising wheat that is still in vogue there.

infrequently this is true for the whole country. Particularly harmful are the considerable precipitation and the limited amount of sunshine during the ripening period and harvest season. Moreover, intensive cultivation does not favor wheat quality, for the high-yielding varieties best adapted to this method of production are of rather poor or extremely poor quality. Although German wheat, on the average, is appreciably better in quality than English wheat, for example, it too needs the admixture of a large proportion of strong wheat in order to make good bread flour.

The moisture content of the grain is usually high. Part of the wheat, in some years almost the whole crop, is harvested in a condition that does not permit storage without damage over a long period of time. Sprouted grain and bad odor are common. Without specific agreement to the contrary, grain with a "seasonal odor" cannot be rejected in the spring under the rules of the exchanges. The weather conditions in 1935 were comparatively favorable for quality. The samples sent to the Institut für Müllerei for testing were undoubtedly above average in quality, and the tests were made immediately after the harvest. Nevertheless, some of the samples already had the bad odor resulting from storing damp grain, and more than 15 per cent of all samples had a smutty odor.[1]

The kernels of German wheat are fairly large. A large number of samples from the crops of 1911–13, tested at the Versuchsanstalt für Getreideverarbeitung (Berlin), averaged 3.60 grams per 100 kernels, dry-matter basis, while the average for Red Winters from the United States was only 2.95 grams.[2]

Test weight is either average or low, owing to the high moisture content.

Protein content, though lower than that of American soft red winter, is not very low for the class of wheat. The samples of German wheat of the crops of 1912 and 1913, tested by Plötz and Kalning, contained about 8 per cent less crude protein than the samples of American soft red winter tested by them. The average crude protein content of German wheat is probably somewhat under 10 per cent; for the 1935 crop, as tested by the Institut für Müllerei, the average was 9.8 per cent.[3] Pelshenke[4] found the following percentage distribution of about 3,000 samples from the crops of 1931 and 1932, classified by the content of crude protein:

Crop	Over 11.2 per cent	11.2–10.4 per cent	10.3–9.6 per cent	9.5–8.6 per cent	Under 8.6 per cent
1931.....	13.1%	22.2%	36.0%	23.5%	6.1%
1932.....	8.4	15.7	26.7	28.8	20.4

The average content of dry gluten is about 8 per cent, dry-matter basis.[5] The average content of wet gluten is somewhat above 20 per cent, and the relation of wet gluten to dry gluten is about 2.5 or 2.6 to 1.[6] In the United States or in Great Britain one would expect a wheat flour of fair baking strength to contain not less than 30 per cent wet gluten, and the normal relation between wet and dry gluten is 3 to 1 or better.[7] According to Pelshenke, the quality of the gluten of the crops of 1934 and 1935 was poor in about 60 per cent of the tested samples, and good in about 5.5 per cent.[8]

According to tests recently made by Schnelle

[1] *Zeitschrift für das Gesamte Getreide-, Mühlen- und Bäckereiwesen, loc. cit.*

[2] Plötz and Kalning, in *Zeitschrift für das Gesamte Getreidewesen*, December 1914.

[3] The content of crude protein is reduced to the basis $N \times 5.7$, 13.5 per cent moisture, in order to make the figures comparable to those used in this country.

[4] P. Pelshenke, "Ueber die Qualität der Deutschen Weizenernte 1932," in *Das Mühlenlaboratorium*, October 1932. In corresponding issues for subsequent years appear similar data which are not reproduced here since they are derived by a different method.

[5] "Die Roggen- und Weizenmehle der Deutschen Ernte 1934," in *Zeitschrift für das Gesamte Getreide-, Mühlen- und Bäckereiwesen*, February 1935.

[6] The determination of wet and dry gluten by washing in a water current and subsequent drying is still a favorite method for determining the quality of the gluten in Germany. Sometimes the relation of wet gluten to dry gluten is also used for this purpose.

[7] A number of tests made by the Institut für Müllerei showed the following contents of gluten:

Type, or country of origin	Wet	Dry	Relation
Manitoba	36.83	11.80	3.1 to 1
Russia	37.79	12.27	3.1 to 1
United States	26.96	8.76	3.1 to 1
Argentine	30.11	9.53	3.2 to 1

See "Bericht über die Tätigkeit des Instituts für Müllerei," *Landwirtschaftliche Jahrbücher*, 1926, p. 46.

[8] P. Pelshenke, "Die Qualität der Deutschen Weizenernte," in *Das Mühlenlaboratorium*, October 1935.

and Heizer,[1] the volume of the bread made of Manitoba wheat was 35 per cent greater than that of the bread made from German wheat of Class C,[2] while the crumb textures were evaluated at 8.5 and 5.5, respectively, on a scale in which 10 signified "excellent" and 1 "very poor." With the addition of 20 per cent of Manitoba flour, the volume of the bread from Class C wheat was enlarged by about 15 per cent, and the texture of the crumb was improved to 7. In order to attain similar results by the admixture of domestic "strong" wheat, it is necessary to use about half Janetzkis Early Spring (one of the two best German wheats) and half wheat of Class C, according to Schnelle and Heiser.

The poor baking quality of German wheats is confirmed by American tests. Coleman and others[3] write: "As far as baking performance is concerned, German wheats resemble in a marked degree English-grown wheat." Their findings for some samples of German export wheats were: "The water absorption of the flour was distinctly low, the fermentation time of the dough was very short, and the resulting loaf was small in size, poor in color, and poor in texture of crumb." It is also noteworthy that, when tested for their behavior in milling, almost all samples of German wheat showed the further important disadvantage of yielding a soft, not granular, flour.[4]

Substantial variations in quality are registered according to variety and region. According to Schnelle and Heiser, about 5 per cent of German wheats belong to Class A and about 28 per cent to Class B, and not less than two-thirds are in Class C.[5] Langs Tassilo, the best winter wheat, is scarcely grown. Rimpaus Early Bastard, Kraffts Siegerländer, and Ackermans Bauernkönig, which belong to Class B, are a little more common. Such distinctly poor-quality varieties as Carsten V (the most common), Criewener 104, Strubes D, and Strubes General von Stocken predominate among winter wheats.

Spring wheat, which is grown but little (see p. 93), is on the average considerably better in quality. A large proportion of it is grown in regions where the climate is too severe for the sensitive wheats of the intensive agriculture, with their high yields but poor quality. Janetzkis Early Spring, the outstanding wheat of Class A, is rather widely distributed and is an excellent wheat for German conditions, but it is probably comparable to American hard red spring of poorer quality. Another frequently grown variety of spring wheat, Heines Kolben, belongs to Class B. Peragis, the variety of spring wheat that is by far the most widely grown, and Strubes roter Schlandstedter also, belong to Class B or sometimes to Class C. Only a rather small portion of the spring wheat produced is of distinctly poor quality.

The best wheats are grown in Bavaria; there both Tassilo and Janetzkis Early Spring are comparatively common, and less than half of the wheat produced belongs to Class C. Some good wheats are found also in the northeast (East Prussia, Pomerania, Mecklenburg, Silesia, etc.); Nordost Samland, which belongs to Class B, is widely grown. Both the province and the Free State of Saxony have a fair proportion of Class B wheats, the remainder consisting almost exclusively of Class C. Practically no Class A wheats are grown in the west, where the proportion of Class C rises to about three-fourths. Schleswig-Holstein and possibly Württemberg grow virtually no wheat above Class C.[6]

[1] "Die Selbstversorgung Deutschlands mit Qualitätsweizen," *Landwirtschaftliche Jahrbücher*, May 1935, LXXXI, No. 5.

[2] The grouping of German wheats by quality into Classes A, B, and C has recently become a widespread practice in Germany. "A" wheats are supposed to be usable for improving the wheats of poor baking quality, and are therefore considered strong wheats. "B" wheats are assumed to produce bread of fair quality, while "C" wheats require admixture of strong wheat. The characteristics of each group reflect Germany's low standards with respect to the quality of available wheats and of the bread produced. Even several varieties of Class A would not be regarded in England as good enough for use in the preparation of baking flour without admixture of really strong wheats.

[3] *Milling and Baking Qualities of World Wheats* (U.S. Department of Agriculture, Technical Bulletin 197), October 1930, pp. 118–26.

[4] *Ibid.*

[5] For analyses of recent crops, see also successive October issues of *Das Mühlenlaboratorium.*

[6] The foregoing discussion is based mainly on the reports of the Institut für Müllerei and Institut für Bäckerei, both in Berlin; on the cited study of Schnelle and Heiser; further on Th. Roemer and P. Pelshenke, "Qualitätsfragen im Deutschen Weizenbau und Wei-

Aside from the effect of climate on wheat quality, some influence is exerted by the position of the several regions with regard to supplies of foreign wheat. In wheat-deficit regions which depend heavily on imported wheat, the quality of domestic wheat tends to be poorer than in surplus regions or in those which are practically self-sufficient. The northeastern provinces of Prussia, and parts of Bavaria, have always been surplus regions. On the other hand, the west, Schleswig-Holstein, and possibly Württemberg, have for decades been heavy importers of wheat.

Only a few regions produced surpluses of wheat before the great expansion of the wheat area in the last few years. Commercial millers of practically the whole country had for decades been abundantly supplied with imported wheat. In some regions the proportion of domestic wheat in the mix of commercial mills was negligible. In any case, the millers could rely on imported wheat for protein content. When buying domestic wheat they looked for other qualities or, more frequently, ignored quality altogether, so moderate were consumer requirements with respect to quality of bread and flour. The indifference of the millers to the quality of domestic wheats made any considerable price differentiation impossible.[1]

Since the market offered producers no compensation for quality, they heartily welcomed the English Squareheads, famous alike for high yields and poor quality, and similar wheats from other countries. For decades there have been complaints that Germany was rendering herself entirely dependent upon foreign countries for supplies of strong wheat.[2] Producers, however, recognized the unreasonableness of sacrificing yields for the unrewarded quality. Consequently, local wheats (*Landweizen*) that were acknowledged to be superior in quality to the high-yielding varieties, either those imported or those developed from imported varieties in Germany, disappeared rapidly while new selections of better quality were given little attention. Hence the average quality of domestic wheat deteriorated with the lapse of time.

The situation has changed in the last few years, as Germany first greatly contracted her wheat imports and finally became practically independent of foreign supplies in terms of quantity. The "wheat exchange plan," introduced in 1931 (see p. 84), in part aimed to provide strong foreign wheat in exchange for weak domestic wheat. Temporary deficits in quantity have also been met primarily by imports of strong wheats. The total supply of these wheats, however, became inadequate to meet the large requirements for them, particularly in the west, a section used to a fairly good quality of bread.

The wheat exchange plan had to be suspended in 1934, when Germany became unable to pay the premiums that high-protein wheat commanded on the world markets. So far as direct imports of wheat have been necessary, Germany has felt compelled to import it from countries with which she happens to have reciprocal treaties and favorable trade balances. The outcome was that no protein wheat was imported by Germany in 1935 or thus far in 1936. Under these conditions, millers cannot help paying more attention to the quality of domestic wheat, and the problem of improving it has assumed practical significance.

In the fall of 1935 the Hauptvereinigung der Deutschen Getreidewirtschaft ordered a premium on protein wheat amounting to 20 marks per metric ton, or about 10 per cent of the fixed price for ordinary wheat. In establishing the requirements for protein wheat[3] it was evidently decided not to fix the lower limit so high that only wheats of Class A could pass it, probably in the fear that such action would put the premiums out of reach of most regions, owing to natural conditions unfavor-

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zenhandel," *Kühn-Archiv*, 1933, and P. Pelshenke, "Beiträge zur Qualitätszüchtung des Weizens," *Zeitschrift für Züchtung*, 1932, XVIII, No. 11.

[1] The character of the demand was reflected in the prevailing primitive methods of marketing. Test weight is the only factor considered by many buyers and sellers. It is also the main factor on which the present fixed prices for ordinary wheat are based; see Appendix B (1).

[2] See, for example, P. Holdefleiss, "Wodurch können wir in Deutschland den kleberreichen ausländischen Weizen entbehrlich machen?" *Fühlings Landwirtschaftliche Zeitung*, 1901.

[3] On the official method of distinguishing protein wheat from ordinary wheat, see Appendix Note B (1).

able for the production of the best quality of wheats. In the regulation for 1935–36, the limit was so fixed that a considerable part of the wheat of Class B could qualify for the premium. Occasionally even wheats of Class C found their way into the group of recognized protein wheats.[1]

Under the regulations for the current crop year, the requirements for protein wheat were raised somewhat, but they remain low. The required "test figure" is 25; but according to Pelshenke,[2] who developed the test-figure method, 25 is the minimum for Class B while that for Class A is twice as high. A premium of about 10 per cent for wheats barely above the minimum requirements for Class B must be considered fairly high.[3] This is indicative of the abnormal situation created on the German market by discontinuing importation of really strong wheats. For the time, the scarcity of protein wheats is met, not by raising the quality of wheats to the necessary level, but by reducing the requirements to the level of available supplies.

If Germany should continue, for any considerable length of time, to be shut off from supplies of imported strong wheats, breeding and growing will presumably shift to somewhat stronger wheats. The hope of developing a really strong wheat may remain unfulfilled, however, at least for a long time to come. So may remain the longing for a wheat adapted to light soil, the so-called "sand wheat." This desire is probably as old as the attempts to breed a protein wheat adapted to the rather humid climate of Germany and her intensive method of cultivation, without sacrificing yields.

Where only poor wheats are produced, and these furnish a large portion of the total consumption, bread of high quality is commonly a luxury; and the moderate level of income of the German population has permitted very limited development of luxurious habits. Prior to the great contraction of imports in recent years, although there was much lack of baking strength to be made up by imported strong wheats,[4] Germany was not a large-scale buyer of the highest grades of protein wheats. In prewar years the wheat imports consisted predominantly of Russian wheats, but not the best ones; in postwar years they consisted largely of medium-priced red wheats from Argentina, Canada, and the United States. Of Manitobas only the lower grades found a market in Germany. Since domestic wheats yield flour of white color, Australian and Pacific white wheats were never in demand. The largest market for the wheat exported from Germany in postwar years was Great Britain, where a small increase in the proportion of weak wheat in the mix was frequently welcomed.

The Flour

A large amount of chemical improvers is being used by many German millers, evidently not without some success. Hence part of the flour is better than the wheat from which it is made. The improvement attained is probably the larger, the greater the proportion of domestic flour in the mix.

So long as Germany imported wheat on a large scale, marked regional variations in the quality of flour were encountered. Although no best wheats were imported and the regions with the largest imports belonged to those producing the poorest wheats, these regions had the best flour and consequently the best baked products. This was especially true for the great section near the Rhine and some of its tributaries. High-quality flour was also turned out by some mills in the Free State of Saxony, another great deficiency region. The milling industry of the northwest, concentrated mainly in Hamburg and Bremen, pro-

[1] Out of 108 samples of the 1935 crop, tested in the Institut für Müllerei, at least two belonged to Class C (one Carsten V and one Criewener 104). In all, 28 samples, or about 26 per cent, met the requirements set for protein wheat, although only about 5 per cent of the wheat grown in Germany is considered to belong to Class A.

[2] "Die Bestimmung der Kleberqualität nach der Schrotgärmethode," *Zeitschrift für das Gesamte Getreide, Mühlen- und Bäckereiwesen*, March 1935.

[3] Producers of Class A wheat can hardly be satisfied to get for their wheat only as much as many producers of Class B wheat are receiving. If it is considered advisable to reward producers of Class B wheats, it may be found reasonable to set up two classes of protein wheats.

[4] Comparatively speaking, German wheats are not poorer in quality than those of other countries in northwestern Europe; see p. 76.

duced flour of materially poorer quality. Berlin, located close to the surplus region, was accustomed to even more inferior products.[1]

The elimination and virtual cessation of wheat imports has brought about a considerable leveling out of regional differences in the quality of flour produced. So far as differences persist, those regions which formerly had the best flour must now get along with a less desirable product than some of the regions that have a better than average type of domestic wheats at their disposal.

A very rough idea of the quality of the flour now used in Germany is conveyed by the official standards and price differentials summarized in Appendix Note B (2). Consideration is apparently given only to the ash content and to the proportion of imported wheat or recognized domestic protein wheat in the mill mix. The basic types are flours of very high extraction.[2] It is also noteworthy that the regulations for the crop year 1935–36 (retained in 1936–37 in somewhat reduced scope) fixed minimum premiums for types better than the basic ones, but maximum discounts for types lower than basic types. Both provisions are indicative of an effort to make flour of fair extraction a luxury not easily accessible to the masses of people.[3] These efforts can be compared with the official assertions that the government's policy is to make automobiles as accessible to consumers in Germany as they are in the United States.

[1] See p. 101 for some facts about the milling industry.

[2] The high ash content is probably partly due to the fact that the standards were intended to be such as could be met by small provincial mills that are not up to date. Moreover, the ash content of German flour is generally higher than that of American flours of equal extraction. J. H. Shollenberger, *Wheat Requirements in Europe*, U.S. Department of Agriculture, Technical Bulletin No. 535, 1936, p. 93. One of the explanations offered by Shollenberger seems plausible, namely, that German millers may not have been so particular in their separations in the production of high-grade flours, since, until quite recently, ash content was not used as a marketing factor.

[3] The measure described in the footnote on p. 92 is of similar character. The consumption of rather coarse rye flour and bread is fostered, and consumers of all kinds of wheat flour have to bear the cost.

[4] See Appendix Note A (3).

[5] Equal to one-half of a kilogram, or about 1.1 lbs. avoirdupois.

As in several other two-bread-grain countries, a considerable amount of second clears and "red dog" wheat flour is used in Germany for admixture into rye and mixed bread. This practice results in an appreciably higher total extraction of flour used for human food than, for example, in Great Britain.[4] Another consequence of this practice is that relatively more low-extraction wheat flours are available for utilization in fancy wheaten bread, pies, pastes and similar products, and for household purposes, than is the case in countries without such an outlet. Fancy patents of particularly short extraction (30–40 per cent of the wheat) are frequently used for household purposes as well as in bakeries for pies and similar products.

The Bread

The word "bread" (*Brot*) is reserved in Germany for bread baked in loaves weighing about 4.5 pounds each. It is made of rye or wheat flour or their mixture in all possible proportions. The rye flour most frequently used for this purpose is a straight-run flour of about 65 to 70 per cent extraction. But large amounts of rye flour of higher extraction up to coarse whole rye flour (*Roggenschrot*) are used in bread making. Clear wheat flours down to red-dog flours are used for admixture to rye flour in preparing mixed bread. For bread made without rye flour, or with only a small admixture of it, wheaten clear flours of higher quality are used. All kinds of large-loaf bread are prepared without other ingredients except water and salt, and yeast for bread with a large proportion of wheat flour.

Loaves weighing one metric pound[5] and one-half metric pound are frequently made of first clears or long-patent wheat flour, the only ingredients being flour, water, salt, and yeast. This bread is referred to as "wheat bread" (*Weizenbrot*), not simply as bread.

Wheat bread is consumed in Germany chiefly in the form of small rolls. The ordinary ones weigh about 1.5 to 1.8 ounces, and are made of nothing but flour (mostly first clears or long patents), water, salt, and yeast. A better kind of rolls is prepared with better ingredients; milk is largely substituted for

water, and patent flours, sometimes even fancy patents, are used. The west and the south consume whiter bread than the east, and larger cities usually have whiter products than small towns.[1]

Short and fancy patents are commonly used in bakeries for cakes and similar products.

The use of semolina made of durum wheat in preparation of macaroni, vermicelli, etc., was fast gaining ground before the depression, but was by no means universal. Noodles, and to some extent other pastes, were often made of common flour. At present the supply of durum is scarce and irregular, and consumers have to be satisfied with pastes made chiefly of common wheat.

IV. AGRICULTURAL PROTECTION AND PRICE RELATIONSHIPS

Germany's agricultural production has reached its present high level to a considerable extent because of the high protection given it in the last prewar decades and in the post-inflation years. The rôle of different agricultural products within German agriculture has been still more influenced by the amount of protection bestowed.[2]

The Prewar Period

Protection of wheat. — The more recent period of protection of the domestic wheat production by import duties dates back to 1880.[3] The prewar import duty, which was in force from March 1, 1906, was equivalent to about 32 per cent of the average price of imported wheat in German ports in 1909–13. This duty was one of the highest in the world at that time.

The effect of the import duties on German wheat prices was reinforced by a system of export certificates, a kind of drawback system, introduced in 1894. This gave German producers the opportunity to sell their wheat (also in the form of flour) in foreign markets without losing any of the protection afforded by the import duty. The wheat was mostly exported to various European countries, where weak German wheat could be used to better advantage than in the domestic market. By exporting part of the domestic wheat and replacing it with stronger foreign wheat, the excessive proportion of weak wheat in the German mill mix was reduced and the return for all German wheat enhanced. Also, some saving in transportation costs was effected by shipping wheat from the surplus regions to foreign countries instead of to domestic deficiency regions. So far as exports were in the form of flour, the regulations actually afforded an export bounty in excess of the import duty on wheat.[4] In the five years before the war

[1] For a detailed regional description of the flours used in bread making, at a time when the market was free and economic conditions favorable, see M. N. Neumann and A. Mülhaus, "Die in den Deutschen Bäckereien Gebrauchten Weizen- und Roggenmehle," *Zeitschrift für das Gesamte Getreide-, Mühlen- und Bäckereiwesen,* 1929, Heft 1. The regulations introduced in recent years, and probably the reduction in purchasing power of consumers, make these interesting data in part obsolete. See also M. N. Neumann, *Brotgetreide und Brot* (3d edition, Berlin, 1929).

[2] Of the abundant German literature on this subject, for prewar years, see L. Brentano, *Die Deutschen Getreidezölle* (3d ed., Stuttgart and Berlin, 1925); K. Diel, *Zur Frage der Getreidezölle* (Jena, 1911); F. Beckmann, *Einfuhrscheinsysteme,* Volkswirtschaftliche Abhandlungen der Badischen Hochschulen, N.F. 1–4 (Karlsruhe in Baden, 1911); Th. Ronkador, *Wesen und Wirkung der Agrarzölle* (Jena, 1911). See also L. Domeratzky, *Tariff Relations between Germany and Russia* (1890–1914), United States Department of Commerce, Tariff Series No. 38.

With respect to numerous phases of German postwar agricultural policy in general, see the comprehensive work on *Die Deutsche Agrarpolitik* (3 volumes, prepared under the auspices of the Friedrich List Gesellschaft); the monumental study of M. Sering (with many experienced students participating), *Die Deutsche Landwirtschaft unter Volks- und Weltwirtschaftlichen Gesichtspunkten* (Berlin, 1932); and publications already cited. Other pertinent works are: Fr. Aereboe, *Agrarpolitik* (Berlin, 1928); M. Sering, *Agrarkrisen und Agrarzolle* (Berlin and Leipzig, 1925); M. Sering, *Deutsche Agrarpolitik auf Geschichtlichen und Landeskundlicher Grundlage* (Leipzig, 1934); P. Rintelen, *Deutschlands Bevölkerungsentwicklung, Nahrungserzeugung und Nahrungsverbrauch* (Münster, 1932); H. Wilbrandt, *Das Deutsche Agrarproblem* (Berlin, 1933); N. Jasny, *Bevölkerungsgang und Landwirtschaft* (Berlin, 1932). The point of view of the Nazi movement is presented in W. R. Darré, *Neüadel aus Blut und Boden* (München, 1930); W. Darré, *Das Bauerntum als Lebensquell der Nordischen Rasse* (München, 1929); W. Willikens, *Nationalsozialistische Agrarpolitik* (München, 1931); W. Darré, "Der Gerechte Preis," *Nationalsozialistische Landpost,* Sept. 16, 1933; A. Moritz, "Nationalsozialistische Getreidepolitik," *Nazionalsozialistische Landpost,* June 29, 1934.

[3] See Appendix Note C. [4] See Appendix Note A (3).

Germany exported, on the average, 14.2 million bushels of wheat and 2 million barrels of flour a year (Table VIII).

Profitableness of wheat production.—The protection bestowed upon wheat undoubtedly affected the volume produced. Natural conditions are hardly more favorable for wheat growing in Germany than in Great Britain. Exposed to the unrestricted competition of imported wheat, German wheat would very likely have been unable to avoid the fate of British wheat.[1] Owing to the protection, however, German producers in the last five prewar years averaged about 32 cents per bushel more for their crop than British producers did for theirs. For many farmers this difference was enough to convert a losing proposition into a very profitable one.

The increase in land values in the last two prewar decades indicates that German agriculture was very profitable.[2] In an earlier study the present writer showed that the profitableness of rye, one of Germany's major crops, increased materially in the last two prewar decades.[3] The changes in the cost of items that are used in wheat production were similar to those for rye production. If there was a difference, the items used in wheat production went up in price somewhat less than those used for rye. Wheat prices, moreover, increased somewhat more than rye prices over the period.[4]

Price relationships among agricultural products.—The extent of wheat production, however, depended not only on the amount of profit which could be made on wheat but on the profitableness of other crops as well. It was of particular importance that the production of rye, the direct competitor of wheat for the place in the rotation, as well as of oats, was still more profitable. Although these grains were much more favored by soil conditions, they enjoyed a greater protection than wheat. The prewar import duties on rye and oats were only 9.1 per cent lower than on wheat, in terms of weight; and on an ad valorem basis they averaged about 37 per cent of the prices of imported goods as against about 32 per cent for wheat. The drawback system, too, was significantly more important for rye and oats than for wheat. For wheat, its effect was practically restricted to making possible the exchange of one quality for another, or the exchange of wheat in a less favorable place for wheat in a more favorable place, or the exchange of wheat at times of scarcity for wheat at times of plenty. Thus by means of exports of some domestic wheat, large wheat imports were converted into still larger imports. Rye and oats, however, continued to enjoy the full protection of the tariff even after domestic production had outgrown domestic requirements. Thus exports and even larger imports were turned into imports and still larger exports.

Barley was the only domestically produced grain which enjoyed less tariff protection than wheat. The import duty even on malting barley was sensibly smaller than that on wheat, but the protection was sufficient to insure domestic production practically equal to the entire demand for this type of barley. The import duty on barley used for feeding purposes was still lower than that on malting barley; from March 1, 1906, it was equal only to one-third of the latter. This was done in order to provide cheap feed for those hog producers who bought their feed. Immense quantities of barley were imported at the low duty. The attitude toward imported feeding barley prevented this grain from becoming

[1] See A. F. Wyman and J. S. Davis, "Britain's New Wheat Policy in Perspective," WHEAT STUDIES, July 1933, IX, 309–10.

[2] According to the computations of F. Wilken, *Volkswirtschaftliche Theorie der Landwirtschaftlichen Preissteigerungen in Deutschland von 1895 bis 1913* (Berlin, 1925), pp. 257–58, the prices of farms increased in Prussia, on the average, by 67 per cent from 1895 to 1912. The author believed that the actual increase was still greater.

[3] *Die Zukunft des Roggens* (Berlin, 1930). Rye prices in 1909–13 averaged about 30 per cent higher than in 1894–98. Agricultural machinery did not increase in price, but was materially improved in quality. The prices of two of the three principal artificial fertilizers (phosphates and potash) remained unchanged over the period. The price of nitrate in 1909–13 was about 30 per cent higher than in 1891–1900, but it was only as high as in 1881–90 and considerably lower than in 1871–80. Though wages increased substantially more than rye prices did, the portion of the rye price going to labor materially declined.

[4] From 1894–98 to 1909–13, Berlin prices rose by 36.1 per cent for wheat and by 33.8 per cent for rye; but in Mannheim (west) the increases were 33.4 and 19.1 per cent respectively.

dangerously competitive with the domestic production of wheat and other highly protected grains.

Of the other agricultural products, only beef and hogs (so far as concerned direct imports of hogs or pork) were strongly protected from foreign competition. The low duty on feeding barley, however, put some restraint on the rise of pork prices on the domestic markets. Milk products and eggs were almost unprotected, while feeds other than grains, as well as oilseeds, fibers, etc., were duty-free.

The consequences of the differences in the amount of protection accorded, and the variations in the appropriateness of the German soil to the production of different products, were the large proportion of grain in the rotation (see p. 74) and the moderate share of wheat in the total grain acreage. The acreage in wheat even declined in the last two prewar decades (see p. 94), in spite of the undoubtedly high profitableness of its production.

Wheat Protection in Post-Inflation Years

At the beginning of the war, import duties on grains and other agricultural products were abolished. Partly because of provisions in the Versailles Treaty, they were not reestablished until after the postwar inflation period. When tariffs were reimposed in 1925, the protection was raised at first by degrees and then, in the depression years, by leaps and bounds—eventually to dimensions, both as to the amount of protection and the number of products involved, which nobody had previously thought possible.

From 35 marks per metric ton on September 1, 1925, the duty on wheat was raised to 350 marks in October 1934; this was about five times the level of world wheat prices at that time. Import duties on flour have been kept at such a high level that only negligible amounts of fancy qualities could be imported, as was true also in the prewar period.

For a short time variable import duties were given a trial as a means of insuring stable domestic prices.[1] From February 11, 1930, the government was authorized to fix and alter the import duty on wheat within a range of 35–95 marks per metric ton. From March 26, 1930, the range was widened to 15–120 marks, and the government was given the right to exceed the upper limit in case of emergency. From April 18 all limits were abolished. In establishing the import duties,[2] the government had to use the prevailing market prices as a guide. For domestic wheat an average price of 260 marks per metric ton ($1.69 per bushel) was to be aimed at. Actually, the government used its powers to establish prohibitive duties.

This short-lived experiment failed, owing mainly to the high level of prices set as the objective. But the prescribed price level survived: 260 marks was accepted as a desirable average market price when the price of imported wheat in German ports was about 30 per cent lower; and it remained the objective when the price of imported wheat fell to 65–70 marks, less than one-third of the price to be assured to the domestic producers.

Since the general duties over the last several years have been prohibitive, numerous exceptions became inevitable. Lower duties were in operation for durum wheat from November 1, 1930, to July 31, 1933; and since January 15, 1931, lower rates have been charged on imported wheat used for the production of wheat starch.[3] From August 14, 1934, to July 31, 1935, the government agency intrusted with the regulation of the grain markets was permitted to import grain duty-free; since August 1, 1935, it has had the privilege of importing wheat at the comparatively low duty of 85 marks per metric ton (55 cents per bushel). Several other exceptions have been made, most of them for wheat to be used as feed. For getting some qualities of strong wheat, special provision was made under the "wheat exchange plan" discussed below (p. 84).

The drawback system was reintroduced on October 1, 1925, and operated in its prewar form up to the end of 1929. From 1925–26 through 1928–29 exports averaged 9.9 million

[1] F. Baade, "Gleitende Zölle," *Magasin der Wirtschaft*, Berlin, 1930.

[2] In Appendix Note C, only the duties which were actually in operation are shown.

[3] See Appendix Note C, p. 134.

bushels of wheat and 623,000 barrels of wheat flour a year. In postwar years, however, the government was more prone to recognize dangers in permitting ever-increasing exports of some kinds of grains, since the foreign demand for the grains primarily involved (rye and oats) was greatly reduced as compared with that of the late prewar years. In 1930, moreover, the import duties were raised to such an extent that the former policy of keeping the domestic wheat price at the world price plus import duty became impossible. The drawback system consequently became unworkable too.

After some temporary provisions which pertained mostly to grains other than wheat, a "wheat exchange plan" was put into operation early in the crop year 1931–32. Imports of wheat were permitted against exports of an equal amount of wheat. The primary aim of the measure was to prevent glutting of the domestic market in the fall.[1] To achieve this object, the wheat exports should generally be made in the first six months of the crop year. To promote this a stimulus was offered. No restrictions were imposed as to the time of imports; but in exchange for exports made in the first four months of the crop year, the foreign wheat was permitted to be imported duty-free, while 7.5 marks per metric ton had to be paid if the exports were made during December–January.[2] The plan permitted wheat to be exported in the form of flour on still more liberal terms. In 1930–31 (the crop year intermediate between the old regulations and the new) exports fell to 441,000 bushels of wheat and 65,000 barrels of flour. In the three following crop years, under the exchange plan, exports averaged 17,876,000 bushels of wheat and 1,339,000 barrels of flour. Since then, the wheat exchange plan has been nominally continued, but the tight situation in foreign exchange necessitated a suspension of its operation in 1934,[3] and it has not been revived in practice.

The year 1929 marked a fundamental change in the protection of German agriculture. Except during the war and inflation years, protective measures had been exclusively restricted to those pertaining to foreign trade. No restrictions whatever were put on any stage of marketing or processing of wheat or flour in the domestic market.[4] In the latest depression, however, regulating imports and exports proved insufficient to insure the exorbitant level of prices on the domestic market which was sought in the face of an unprecedented collapse of prices on world markets. The supplementary measures were introduced at the outset primarily for the benefit of rye, but later they became inevitable for wheat.

Quotas, fixing a minimum on the proportion of domestic wheat in the total grist of the mills, were the first measure pertaining to the domestic market. A special reason for adopting this scheme was to promote the absorption by mills of large stocks of domestic wheat left over from the big crop of 1928; but it was continued as a means of supporting prices of domestic wheat by forcing mills to use it up. In 1929–30 the quota rate did not get above 50 per cent. In 1930–31 the rate was 80 per cent from October through March, but lower early and late in the season.[5] In the next three crop years 70 per cent was the absolute minimum (67 per cent from May 1 to August 15, 1932), but it was 97 per cent except in so far as foreign wheat imported under the wheat exchange plan was used. Since August 15, 1934, the quota has been 80 per cent.

[1] Incidentally, it was intended to make possible exchange of the weak domestic for strong foreign wheat.

[2] At the outset, the import duty on exchange wheat had been fixed equal to 20 marks per ton, and exports had to be made prior to January. The time permitted for exports was sometimes extended.

[3] Exporting German wheat and importing an equal amount of strong wheat involves a considerable drain on foreign exchange. Since the mills were allowed to use only very small amounts of foreign wheat, imports of only the highest grades of Manitoba wheat became advisable. This wheat sometimes costs, duty-free, 60 to 80 per cent more than German export wheat brings.

[4] Except such measures as those regulating the trade in grain futures, etc.

[5] In these two crop years quotas were established as follows:

Date effective	Percentage	Date effective	Percentage
Aug. 1, 1929.....	40	Aug. 15, 1930.....	60
Oct. 1, 1929.....	50	Oct. 1, 1930.....	80
July 1, 1930.....	30	Apr. 1, 1931.....	50
Aug. 1, 1930.....	40	Aug. 1, 1931.....	60

For three years the increases of import duties on wheat, the above-mentioned quotas, and some other temporary measures mentioned below (p. 87), served their purpose. In 1932–33, following a good crop, they did it less efficiently. When the big 1933 crop came in, it was apparent that much more must be done if prices were not to fall far below the level considered necessary for domestic producers. A whole battery of measures, consisting of minimum prices to be paid to producers, compulsory storing of wheat by millers, and contingents for mill operations, was put in force in the fall of 1933. The minimum prices, introduced by the ordinance of September 29, 1933, were replaced by fixed prices in the fall of 1934. The latter have since been reintroduced every year. Like the minimum prices, the fixed prices were primarily intended for the protection of grain producers. But later, quite unexpectedly, the protection of bread consumers became the main issue.

The fixed prices vary according to region and month of delivery. In 1935–36 and 1936–37 there were twenty different price regions for wheat. Examples are given in Table 1, for regions in which prices are fairly comparable with the former quotations on the Berlin exchange for wheat from points in the province of Brandenburg.

[1] The fixed flour prices are based on the ash content. The ash contents, and the premiums or discounts on flours above or below the basic types for wheat and rye flour, are given in Appendix Note B (2).

[2] Basic contingents (*Grundkontingente*) are established that are valid indefinitely. Operating contingents (*Verarbeitungskontingente*) are expressed in percentages of the basic contingents and changed from year to year. The following monthly quotas for September 1934 to June 1935 are in percentages of the operating contingents; from July 1935 they are in percentages of basic contingents.

Month	Wheat			Rye		
	1934–35	1935–36	1936–37	1934–35	1935–36	1936–37
Aug.	—	9	8	—	8	7
Sept.	10	8		10	8	
Oct.	10	9		10	7	
Nov.	10	11		7	8	
Dec.	10	12		7	9	
Jan.	10	10		6	8	
Feb.	8	7		4	6	
Mar.	9	7		6	7	
Apr.	9	7		7	8	
May	8	7		8	8	
June	9	8		8	8	
July	9	8		8	9	

The fixed-price system has also been extended to flour, millfeed, and bread. All margins for the sales of wheat, wheat products, and bread, from producers to millers, wholesalers, retailers, and customers, are fixed in greatest detail.[1] While the fixed prices for wheat were primarily intended for the protection of producers, the fixed prices on flour, etc., were aimed at the protection of the consumers from the outset. There are doubts, however, as to whether the desired contraction of middlemen's margins was attained in all cases.

TABLE 1.—MINIMUM AND FIXED PRICES OF WHEAT, 1933–34 TO 1935–36*

(*Marks per metric ton*)

Period	1933–34 Region W III	1934–35 Region W VIII	1935–36[a] Region W IX
Aug. 16–31	—	191.0	189.0
Sept.	—	192.0	191.0
Oct.	180.0	194.0	193.0
Nov.	181.0	196.0	195.0
Dec.	182.0	197.5	197.0
Jan.	184.0	199.0	199.0
Feb.	185.5	200.5	201.0
Mar.	187.0	202.0	203.0
Apr.	189.0	203.0	205.0
May	191.0	—	207.0
May 1–Aug. 15	—	204.0	—
June 1–Aug. 15	193.0	—	209.0[b]

* Minimum prices for 1933–34; fixed prices thereafter. Because of changes in regional groupings, the numbers of the region selected are different in the different years.

[a] Applicable also to 1936–37, except as indicated in note *b*. On quality differentials for 1936–37 see Appendix Note B (1). Prices shown are for ordinary wheat; from Oct. 15, 1935, a premium of 20 marks had to be paid for recognized protein wheat.

[b] For 1936–37 this price is fixed only for June and July.

By the ordinance of November 5, 1933, all commercial mills were combined into a compulsory cartel, and each mill was given a yearly basic output allotment, or "contingent." Since September 1934 the yearly contingents have been subdivided into monthly quotas.[2] Fulfilment is controlled by sealing the mill products with special seals which can be procured only from the Association of Rye and Wheat Mills. The regulation was directed toward eliminating gluts in the flour market in the fall, and thus served as a link in the chain of measures directed toward supporting the wheat prices. Another aim of the measure

was to protect the small mills against the competition of the larger ones.

By the same ordinance of November 5, 1933, all mills except the very small ones having a basic yearly contingent of 750 metric tons, or less, were obliged to keep in store continually on their own account at least 150 per cent of their monthly average wheat grindings during the year ending July 31, 1933. Soon afterward this minimum was fixed at two-twelfths of each mill's yearly contingent. The regulation proved an effective measure for preventing wheat prices from being depressed by the marketing of the record crop of 1933. In April 1935 the quantity required to be stored by mills was reduced to the equivalent of one-twelfth of the basic contingent, but at the beginning of the crop year 1936–37 the requirement was again fixed at twice this figure.

From July 1934, deliveries of bread grains by producers have also been fixed by quotas, calculated to cover the requirements for bread grains for human consumption. The producers have the guarantee that the specified quantities will be bought from them at the fixed prices. Their obligations to deliver must be fulfilled in several instalments, for each of which definite time limits are set. Fulfilment is controlled by contingent stamps which must accompany the grain from the producer to the flour mill. This measure was intended to supplement the regulation of mill operations. Together they are designed to insure an even flow of bread grain, and to prevent glutting of the markets in the fall or winter and shortages in the summer.[1]

The establishment of quotas for deliveries of bread grains was the first measure the primary aim of which was not the support of wheat prices. The existing protection system was at that time elaborate enough to insure that wheat prices would not fall below the desired price level. On the other hand, with no intention to import bread grains and with the desire not to permit the contraction of the stocks accumulated by mills in compliance with the respective regulations, no absolute reliance could yet be placed on free market deliveries at fixed prices for full coverage of consumers' demands. When the quotas for deliveries of bread grains by producers and the fixed prices for grains were introduced in 1934, hardly anyone thought that a few months later the nature of the regulation of agricultural markets would be fundamentally changed from a means of raising prices to a measure for curbing price advances. The price regulations started from minimum prices in 1933. After some months the minimum prices were replaced by fixed prices. Shortly thereafter the fixed prices practically became maximum prices.

In 1934–35, and particularly in 1935–36, imports of most agricultural products were below requirements at the fixed prices. Notable shortages developed in the secluded German markets in the face of an oversupply in the world market. The shortages were particularly acute and persistent in all kinds of feedstuffs. Although wheat is normally used in Germany exclusively for food, the shortage of feed has latterly become so pronounced that substantial quantities of merchantable wheat have been diverted to feed use. Regulations concerning the merchandising of feed wheat, and their repeated strengthening, became necessary. The latest regulations (for 1936–37) prescribe that, on all transactions except for very small amounts, bread grains for feed must first be offered to the regional grain organization, which may prohibit the transaction or buy the lot itself. The feed shortage provides an additional protection of the fixed wheat prices, but this protection is no longer needed. Moreover, the feed shortage operates to restrict domestic wheat production by giving more stimulus to the production of other crops (see p. 92).

Profitableness of Wheat Production in Post-Inflation Years

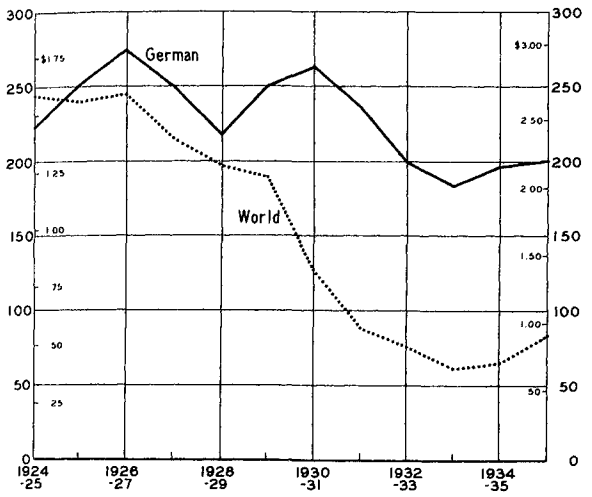
The protective measures taken before the depression, though mild as compared with those introduced later, raised domestic prices substantially above the world level (Chart 2). In the depression and later years, the battery

[1] The danger of these shortages has materially increased since Germany has practically shut off her markets from all communication with the outside world. The small imports of wheat under the wheat exchange plan usually ceased before summer. See below, pp. 121–25.

of sweeping measures described above, supplemented by several others,[1] some of them

CHART 2.—GERMAN AND WORLD WHEAT PRICES, ANNUALLY FROM 1924–25*

(Marks per metric ton[a])



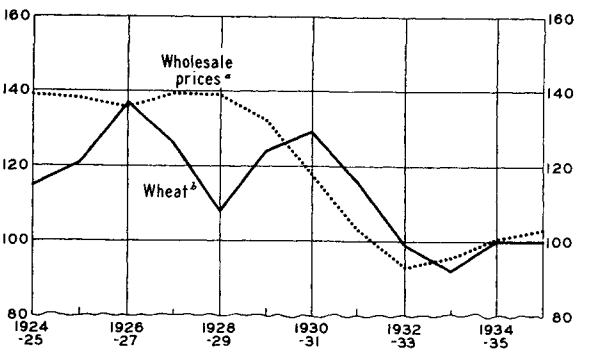
*Data of Statistisches Reichsamt, Berlin, for years beginning July 1. Prices in the province of Brandenburg are used to represent prices of German wheat, and prices of Barusso (Argentine) wheat c.i.f. Hamburg to represent world prices.

[a] The inset scales on the chart are in equivalent dollars per bushel—on the left, at former parities; on the right, at recent parities. A price of 200 marks per ton corresponds to about $1.30 or $2.19 per bushel of 60 pounds, according as one uses the former exchange parities or the recent ones.

very effective, produced the desired result. It insulated the domestic wheat market from the outside world, and insured to German producers prices of which farmers in most other countries did not even dare to dream. For several years, with only temporary interruptions, German wheat prices have been supported at a level two and a half to three times the prices on world markets. In only one year (1933–34) have German wheat prices been appreciably under the rather high level of prewar prices represented by 100 in Chart 3.[2]

In spite of the immense amount of protection given to wheat, wheat growing was not so profitable in post-inflation years as it was before the war. As in various other countries, the increase in cost of producing wheat in Germany has been greater than the increase in the index numbers of wholesale commodity prices during all of the post-inflation years. Yet in the pre-depression years even the indexes of wholesale commodity prices were materially higher than the indexes of wheat prices on a prewar base (Chart 3). In the depression years, the rigid control of agricultural markets at first prevented and afterward slowed down the decline of wheat prices. Hence wheat prices even became relatively higher than the general level of wholesale prices in 1930–31 to 1932–33. On the average of all post-inflation years, however, the indexes of wheat prices remained the lower.

CHART 3.—INDEX NUMBERS OF WHEAT PRICES AND GENERAL WHOLESALE PRICES IN GERMANY, ANNUALLY FROM 1924–25*



* Data of Statistisches Reichsamt, Berlin, for years beginning July 1.

[a] Average 1913 = 100.

[b] Average 1909–10 to 1913–14 = 100.

Light can be thrown on changes in the profitableness of wheat growing by consideration of changes in various elements in the

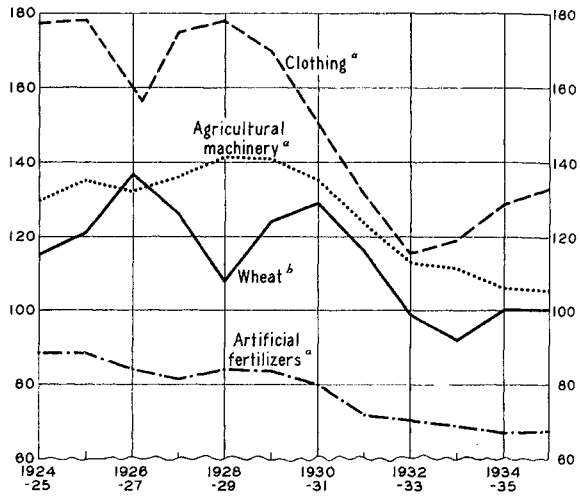
[1] Such as buying of wheat by government agencies for storage (started shortly before the depression), directing surplus wheat into the feed lot by subsidies, etc.

[2] The index numbers of prices of farm products presented in Charts 3 to 6 have been based in the last few years, to an increasing extent, on fixed prices. The latter, however, have lately become in part nominal, owing to the great shortages of a large number of products. Bootlegging in all possible forms developed. Market deliveries of the crops which can be used for feed, so far as they are not obligatory, became negligible. Even obligatory deliveries have not been fulfilled. Hence caution must be exercised in drawing conclusions from the official price indexes. Computations on the profitableness of wheat growing, it is true, are not impaired by using the fixed prices of wheat, since almost the whole crop is disposed of at these prices. But conclusions as to the competition of different crops for the land are made unsafe, because the fixed prices of these products give no clue to the value assigned to them by producers who use the products on their farms.

cost of producing wheat. The outlay for taxes in the period 1924–25 to 1929–30 was 3.7 times as high as before the war. Although substantially reduced in recent years, taxes in 1934–35 were still more than twice as high as in the late prewar years. The postwar inflation practically freed German agricultural producers from their great indebtedness. But the wasteful methods of production practiced during the war and inflation required replacements of the exhausted soil fertility, of livestock, etc. This was mostly impossible except by contracting new debts on a large scale. Moreover, interest rates on farm mortgages were about 3.5 times as high in 1924–25 as in 1913. In 1929–30 they still were nearly double the prewar level. Soon after the stabilization of the mark, the outlay for interest greatly exceeded the prewar amount. By drastic measures it was reduced from 1,005 million marks in 1931–32 to 600 million in 1933–34, but still remained considerably above the prewar level.[1]

The index of farm wages on a prewar base rose from 116 in 1924–25 to 154 on the average of 1927–28 to 1929–30, while the index of wheat prices in these same years averaged only 119. In the depression, the relation between wages and wheat prices at first became still more unsatisfactory for wheat producers, but later it improved considerably. At the present time the relation between farm wages and wheat prices is probably similar to that in the years 1927–28 to 1929–30. The price relation of practically all other items of farm outlay (both goods and services for production and for private use of the farmers) to wheat was considerably less favorable in the post-inflation years than in prewar years.[2] In Chart 4, this is shown in the relations between

CHART 4.—PRICE INDEXES OF WHEAT AND OF SOME GOODS BOUGHT BY FARMERS, ANNUALLY FROM 1924–25*



* Data of Statistisches Reichsamt, Berlin, for years beginning July 1.

[a] Average 1913 = 100.

[b] Average 1909–10 to 1913–14 = 100.

the price indexes of wheat, on the one hand, and the price indexes of agricultural machinery and of clothing, on the other hand.[3] The relative changes in the cost of building, and heat and light, were about the same as for clothing. There is only one exception to the rule that prices of goods and services that farmers buy were relatively higher than wheat prices, but this is a very important one. Artificial fertilizers were much cheaper than wheat, in terms of their respective prewar averages, during all the post-inflation years. In some years, indeed, the price index of artificial fertilizers was not much more than half of the price index of wheat.

No attempt at computing the relative costs of wheat growing in prewar and postwar years has been made, but there is no doubt that the cost-price relationship was less favorable in the postwar years. In this respect the situation

[1] Estimates of the interest outlay by German agriculture, made by the Institut für Konjunkturforschung, Berlin, run as follows in million marks:

1924–25	425	1929–30	950
1925–26	610	1930–31	950
1926–27	625	1931–32	1,005
1927–28	785	1932–33	710
1928–29	920	1933–34	600

[2] Of the indexes here discussed, those for agricultural machinery and heat and light are based on prices to consumers; those for cost of building, clothing, and artificial fertilizers are based on wholesale prices, but in the latter case the difference between wholesale prices and prices to consumers is hardly substantial.

[3] The actual situation was still more unfavorable for wheat than is shown by the data in the chart, since the use of 1913 or 1913–14 as the base year tends to lower the curves for the prices of goods that producers buy. The same is true for the indexes of building costs, and heat and light, which are not shown on the chart. So far as machinery is involved, however, the effect of the difference in the base years is greatly overcompensated by improvements in machinery that are not taken into account in the indexes.

in Germany was like that in most other areas where mechanization of wheat production made only moderate progress or none, though not nearly so bad as in many of them. In Germany, however, the relation between wheat prices and costs of production (including taxes and interest) did not become worse for wheat producers in the depression and later years as compared with the pre-depression period, owing to the greatly increased protection bestowed upon wheat. As a result of substantial enlargement of yields, per-acre incomes from wheat production today are probably even higher than in the post-inflation years before the depression.

The lesser profitableness of wheat growing in post-inflation years as compared with the prewar period was not so large as to affect production adversely. The burdensome taxes and outlay for interest could not bring about the abandonment of the best lands on which wheat is grown. Even on the poorest soils which are suitable only for rye and lupines, abandonment in order to avoid the burdensome charges was not resorted to.

So long as the land was used, the choice was merely between producing the wheat more or less intensively. Higher wages, higher prices of machinery, etc., tended to favor smaller production per acre, but their effect could be only very small under German conditions. On the other hand, high taxes and large outlay for interest tended to favor greater production per acre in order to spread the fixed cost over a larger number of units. The high prices that producers had to pay for personal goods had a similar effect. Moreover, whenever heavy costs have to be borne and expensive items have to be applied in production, there is a strong inducement to raise the yield per acre as much as possible by large applications of the cheap item—in this instance, artificial fertilizers. Generous applications of artificial fertilizers were undoubtedly profitable even on crops and lands where the production involved a considerable loss.[1] For these reasons, even though the relationships just considered were less favorable for farm incomes than they were in prewar years, they would have stimulated expansion of wheat *production* unless price relations between wheat and other farm products had been such as to force material curtailment of wheat *acreage*. Instead, as we shall see, these price relations were such as to permit expansion of wheat acreage.

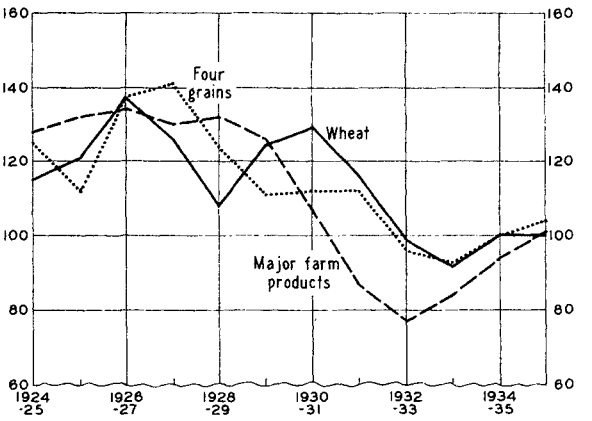
[1] The great reduction in the use of artificial fertilizers in the depression was due not so much to the fact that using them became unprofitable, but to a larger extent to financial difficulties of the producers which were caused chiefly by low prices of animal products.

Price Relationships among Agricultural Products in Post-Inflation Years

From 1924–25 to 1929–30 the index of wheat prices averaged substantially lower than the price index for all major farm products (Chart 5). Then a turn came. In the ensuing three crop years the prices of wheat were relatively much more favorable, and this held true to a less extent in 1933–34 and 1934–35. The index of major farm products again reached the level of wheat prices only in 1935–36. These comparisons suggest that price relationships were unfavorable for extending the wheat area in the pre-depression years, and favorable later on. This inference is supported and to some extent modified by more detailed analysis.

Chart 5.—Price Indexes of Wheat, Four Grains, and Major Farm Products, Annually from 1924–25*

(Average 1909–10 to 1913–14 = 100)



* Data of Statistisches Reichsamt, Berlin, for years beginning July 1. Grains include wheat, rye, barley, and oats. Major agricultural products include grains, potatoes, cattle, calves, hogs, sheep, butter, and eggs.

The effect of price relationships on the extent of the wheat area is more clearly revealed

if we consider first the relation of grain prices to prices of other farm products, and then the price changes between various grains. Up to 1933–34, price relationships between grains, as a group, and other farm products, as a group, favored further increase in the high proportion of area devoted to grain.The situation was particularly favorable to grain production in the depression years 1931–32 to 1933–34. So far as animals and animal products are concerned, only beef and milk are important competitors of grains for acreage. In a sense, pork is partly made of grain, and eggs are made almost exclusively of grain. In each of the years 1924–25 to 1930–31 the Four Grains price index was higher than the index of cattle prices; on the average it was higher by 13.9 per cent. The index of butter prices, it is true, on the average of the same years exceeded the Four Grains price index by 11.1 per cent. But production of protein feed was discouraged by the free importation of protein concentrates. On the average of 1931–32 to 1933–34, the Four Grains price index not only exceeded the index of cattle prices by 64.9 per cent, but was also higher than the index of butter prices by 7.5 per cent. In these three years the Four Grains price index averaged 26.3 per cent higher than the officially computed total index of major animals and animal products.[1] The stimulating effect on grain production from the duty-free importation of protein concentrates also became much stronger owing to the great fall in world prices of these products.[2] Prices of competitive farm products other than the major animals and animal products considered in the official index were also less favorable than those of grains until 1933–34.

In recent years, however, the price situation has become somewhat less favorable for grain production. The price relationship of oilseeds and fibers to other farm products has been substantially improved by protective measures in 1933 and later years, and the acreage in these crops has been greatly increased. In these same years, furthermore, the large equalization fee imposed on oilcake tended to stimulate production of crops rich in protein. In spite of the recent great expansion, however, the acreage in oilseeds and fibers remains negligible as compared to that in grains, while the acreage in crops rich in protein—sown grasses, dry legumes—does not yet show any net increase.[3] In any case, the decline shown by the grain area up to 1935 was small, and partly accounted for by changes in the method of collecting the data.[4]

With the price situation favorable for grain growing, price relationships between different grains determined the share of wheat in the big grain area. Three different periods can be distinguished with respect to the relative protection given to wheat and the other grains in the short span since 1925.

The first period covers the years up to 1929–30. As in prewar years, rye and oats enjoyed relatively greater protection than wheat. The import duties on rye and oats were relatively higher,[5] and the drawback system was more important for them than for wheat. From 1926–27 to 1928–29, rye prices were relatively much higher than wheat prices, and oats too were relatively more expensive than wheat in the last two of these three years (Chart 6). The prewar policy of admitting feeding barley at a low import duty was also continued. In this period, therefore, wheat had to meet strong competition from rye and oats, but was protected from the competition of barley.

In the second period, extending to about 1934, changes in tariff protection did not effectually discriminate against rye and oats.

[1] The latter includes only prices of cattle, calves, hogs, sheep, butter, and eggs. Since, in addition to these and the four grains, the Major Farm Products price index includes only potatoes, the relation between the price index of major animals and animal products and that of Four Grains can be roughly inferred from a comparison of the two more inclusive indexes shown in Chart 5.

[2] See the graph in "Die Landwirtschaftlichen Märkte, Rückblick 1932–Ausblick 1933," *Blätter für Landwirtschaftliche Marktforschung*, 1932–33, III, 372.

[3] The data in Table I actually show a decline of 384,000 acres, or 6.8 per cent, from 1933 to 1935; but this may be due, at least to a very large extent, to changes in the methods of collecting the data. The complete data of the 1936 survey of land utilization, published too late to be used in this study, show an increase of the area in sown grasses (inclusive of the Saar) by 209,000 acres, or 4.0 per cent, over that of 1935.

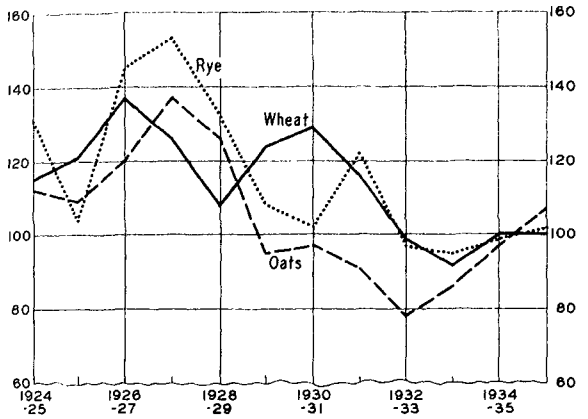
[4] See Appendix Note A (1). The acreage in grains declined in 1936 as compared to 1935 (inclusive of the Saar) by 158,000 acres or 0.5 per cent.

[5] See Appendix Note C.

True, the wheat duty was raised to 350 marks per metric ton, while the duties on rye and oats were increased only to 200 and 160 marks, respectively; but this made no practical difference, for all three duties were virtually prohibitive. The situation was different with respect to changes in export regulations. The loss of the advantages of the drawback system

CHART 6.—PRICE INDEXES OF WHEAT, RYE, AND OATS, ANNUALLY FROM 1924–25*

(Average 1909–10 to 1913–14 = 100)



* Data of Statistisches Reichsamt, Berlin, for years beginning July 1.

was relatively unimportant for wheat, and the "wheat exchange plan" provided an efficient substitute when it was in operation. Rye and oats, however, were definitely on an export basis when the drawback system was abolished in the crop year 1929–30. Under these conditions, the "rye exchange plan" was a poor substitute, even in the years when it was in operation. For oats even this kind of substitute was granted in a much more limited form.[1]

With rye and oats deprived of the advantages of the drawback system, the government was faced with the problem of dealing with surpluses of those grains. To get rid of these surpluses, the only efficient way was to let the prices fall to such an extent that increased consumption and reduced production would wipe them out. This solution was chosen for oats, and from 1929–30 to 1932–33 the oats price index averaged 22.9 per cent lower than the wheat price index (Chart 6).

The same course of action, however, was not considered proper for rye, owing to its great importance in eastern Germany. The government was not only unprepared to permit rye prices to decline; it even desired a price level for rye that was still higher relative to wheat.[2] A virtual drive was inaugurated to save the rye market. The adjustment between supplies and requirements had to be attained primarily by an increase in rye consumption. Increases in the prices of feeding barley and maize, relative to rye, were sought in order to enlarge the use of rye as feed. Propaganda in favor of rye bread was also undertaken. Only such contraction of rye acreage was considered desirable as could be attained by a shift to wheat brought about by making wheat growing still more attractive than rye growing. Hence resort was had to stronger protection of wheat prices reinforced by a propaganda campaign.[3] Since these measures were grossly insufficient to raise rye prices to the high level desired, they were supplemented by several others promising immediate effect. The government bought rye at high prices, denatured it, and then sold it at low prices for use as feed. Admixture of rye flour with wheat flour was also made compulsory. Although the drive did not fail to produce marked results,[4] the level of rye prices remained considerably below that of wheat prices in 1929–30 and 1930–31. Whether desired or unwelcome, the low prices of oats and rye compared with those of wheat effected a considerable redistribution of the grain area in favor of wheat in 1930–33 (see pp. 96–97).

[1] Imports of oats or some other products were permitted, from time to time, in exchange for exports of breakfast foods made of oats.

[2] As discussed on p. 83, the government was instructed in 1930 to adjust the wheat import duty so as to maintain domestic wheat prices at 260 marks per metric ton. Similar regulations set the goal for rye prices at 230 marks, only 12 per cent less.

[3] See *Umstellung des Deutschen Getreidebaus* (Berlin, 1930), with a preface by the Minister of Agriculture.

[4] Of the many semi-official pronouncements on the heroic endeavors to support rye prices at a level not warranted by the whole economic situation, two may be cited: Fr. Baade, Reichs-commissioner for Grains, *Deutsche Roggenpolitik* (Berlin, 1931); and K. Dietrich, Minister of Agriculture, "Zum Roggenproblem," *Weltwirtschaft*, Berlin, January 1930.

To raise prices of feeding barley and maize relative to rye, without permitting rye prices to decline substantially, involved the discontinuance of the long-established policy of allowing these two feed grains to be imported at low duties. The interests of small farmers who have to buy their hog feed were sacrificed, as well as those of consumers. Although the aim was to stimulate the feed use of rye, the great increase of barley prices could not fail to affect the area devoted to barley. Barley production has a material support in the fact that the farmer, by producing the barley he needs, saves handling charges both on the cash grain he sells and the feed that he buys. After the price relation was changed in favor of barley, it became a strong competitor for acreage.

There remains for discussion the third and most recent period in price relationships between wheat and other grains. Substantial shifts in the grain area in 1930–33 were accompanied by so considerable a decline in wheat consumption (see pp. 107–8) that further expansion of the wheat area became unnecessary. The situation was so altered that, in the fall of 1934, the fifth of "the ten commandments of the production drive for the German peasants" forbade producers to lay stress on the increase in the production of wheat, since "Germany has too much of it." While for 1934–35 the rye prices still were fixed at a level slightly lower relative to wheat prices, the relation was reversed in 1935–36.[1] The situation was similar with respect to oats, but with the difference that the price advance was still greater; for 1935–36 and 1936–37 oats prices were fixed at levels relatively (even absolutely) higher than those for rye. Fixed prices of feeding barley, which at first were about the same as fixed prices for rye, were raised in 1935 to about 4 per cent higher. Moreover, much of the feeding barley that comes on the market (sometimes all of it) is sold as industrial barley—that used for industrial purposes other than malting. Formerly this sold only slightly higher than feeding barley; but now a substantial premium is permitted, and current fixed prices for industrial barley are only a little under the fixed prices for wheat.

Still more important than the changes in fixed prices to the disadvantage of wheat was the shortage of feed that developed in the past two years. In 1934–35 market deliveries of feeding barley and oats were negligible. In 1935–36 all kinds of feeds, even one so undesirable as rye and one so expensive as wheat, were offered sparingly, since producers commonly used up their supplies in feeding their own livestock. The feed scarcity protected the fixed prices of wheat, as it protected fixed prices of all other kinds of grains. Moreover, it provided for wheat a large new outlet as feed (see pp. 110–11). The feed scarcity, nevertheless, operated to the disadvantage of wheat growing in its competition with other grains, for the latter gain from the feed scarcity much more than wheat. As a feed crop, wheat is a poor competitor in Germany.

V. GRAIN ACREAGE AND YIELDS

Wheat Acreage

Extent of wheat area.—Winter and spring wheat occupied 18 per cent of the area devoted to grains in 1936. To be exact, the small area in spelt (and emmer) should be added to the wheat area.[2] Spelt, with its closely adhering hulls removed, is a nearly adequate substitute for ordinary wheat in Germany, if the moderate quality of German wheat is considered. In 1936 it occupied 170,044 acres, or 0.6 per cent of the total area in grains.

[1] The fixed rye prices, however, were raised not merely in order to prevent further expansion of the wheat acreage. The idea of supporting rye production, always strong in Germany, gained momentum from the greater significance attached to defense considerations by the Nazi government, and from the Nazi doctrine that rye bread is the bread of the "Nordic race." Since the fall of 1935, wheat millers have had to pay a fee of 6 marks per metric ton (when found necessary, the fee is increased to 8 marks and for some mills to 9) into a fund, out of which a premium of 7.80 marks per metric ton is paid to millers producing the lower grades of rye flour (types 997 and 1,800; see Appendix Note B). By this arrangement, the margin between wheat and rye prices to the consumer is raised by about 40 per cent, without lowering the price paid to rye producers.

[2] In many German statistics, spelt is included with wheat.

Winter grains occupied about 60 per cent of the total grain acreage in 1936, and spring grains about 40 per cent.

Of the area in spring grains, only about 3.5 per cent was in spring wheat. The small extent of spring wheat growing is due in part to the high prices paid for malting barley, the advantage of having oats in the rotation, etc. But the principal reason is that, in so far as wheat cultivation is profitable, under German conditions winter wheat is more profitable than spring wheat. As we have seen, wheat growing is greatly limited by the small supply of suitable land; yet the requirements of the varieties of spring wheat grown, with respect to quality and preparation of the soil, are more exacting than those of winter wheat. Spring wheat yields somewhat less than winter wheat. Moreover, farmers count it an important advantage to have a fall-sown crop in the rotation, in order to enable them to reduce the pressure of work in the spring. For these varied reasons, the plantings of spring wheat are exceedingly spotty. It is sown, in fact, only under certain specific conditions. For example, some spring wheat is grown in the east and north, where winterkilling is relatively large; some is found in the mountainous regions of the south, where the climate is too severe for winter wheat; and some spring wheat replaces winterkilled winter wheat.

Even after the substantial increase in the area in winter wheat and the contraction in rye area in the past six years, about 65 per cent of the 1936 area in winter grains was devoted to rye, and only about 28 per cent was in wheat, the rest being winter barley. Several factors induce the producers to give preference to rye. The main factor, of course, is the great proportion of light soils, unsuitable for wheat. Other factors are: the soil is too weedy for wheat; winterkilling of wheat is too high; the place in the rotation which can be given to winter grain may be unsatisfactory for the more exacting wheat, for example, in case the winter grain must be sown after another or the same kind of grain.[1]

The great effect of the quality of the soil on the proportion of land in wheat is indicated by data on the regional distribution of wheat growing, shown in Table II and Chart 7 (p. 94). Grenzmark, comprising the remnants of the former provinces of West Prussia and Posen, has the poorest soil in Germany; in 1936, only 2.8 per cent of its grain area was in wheat, and the area in rye was about 25 times as large. The Prussian provinces of Pomerania and Brandenburg, where the same type of light sandy soil predominates, had 9.4 and 10.0 per cent of the grain area in wheat in 1936, the area in rye being more than five times as large. Soil conditions are also exceedingly unfavorable for wheat growing in large portions of the northwest. In 1934, Oldenburg proper[2] grew nearly twenty times as much rye as wheat, and Osnabrück in the province of Hanover had more than ten times as many acres in rye as in wheat. On the other hand, the province of Saxony, which boasts the best soil in Germany, had 26.7 per cent of its grain area in wheat in 1936; but even in this province the wheat area was less than the area in rye. Wheat occupies an area considerably larger than rye only in a small portion of central Germany (Thuringia, Brunswick) where the soil is relatively good, and in some parts of the south (Baden, Württemberg) where the climate is particularly favorable to wheat. In Bavaria, however, less wheat and more rye is grown.

As already stated, Roemer estimates that light soils prevail in 60 per cent of the total agricultural area. Assuming that for total plowland the proportion of light soil is 55 per cent, the 1936 area in wheat is equivalent to about 20 per cent of the better kind of plowland. Hence if all the better soils were used for wheat growing and no wheat were grown on light soils, wheat would have to return to the same land, on the average, every fifth year. Since some of the lands not counted as having light soils may still be too poor for wheat; the proportion of wheat in the rotation on lands on which it is grown may be somewhat higher. Under conditions of intensive agriculture, even a very profitable crop can seldom re-

[1] Growing winter grain after spring grain, instead of the usual reverse order, is frequently desirable in those parts of the country where, owing to the shortness of the season, winter grain cannot be sown in time after roots and potatoes (see pp. 70–71).

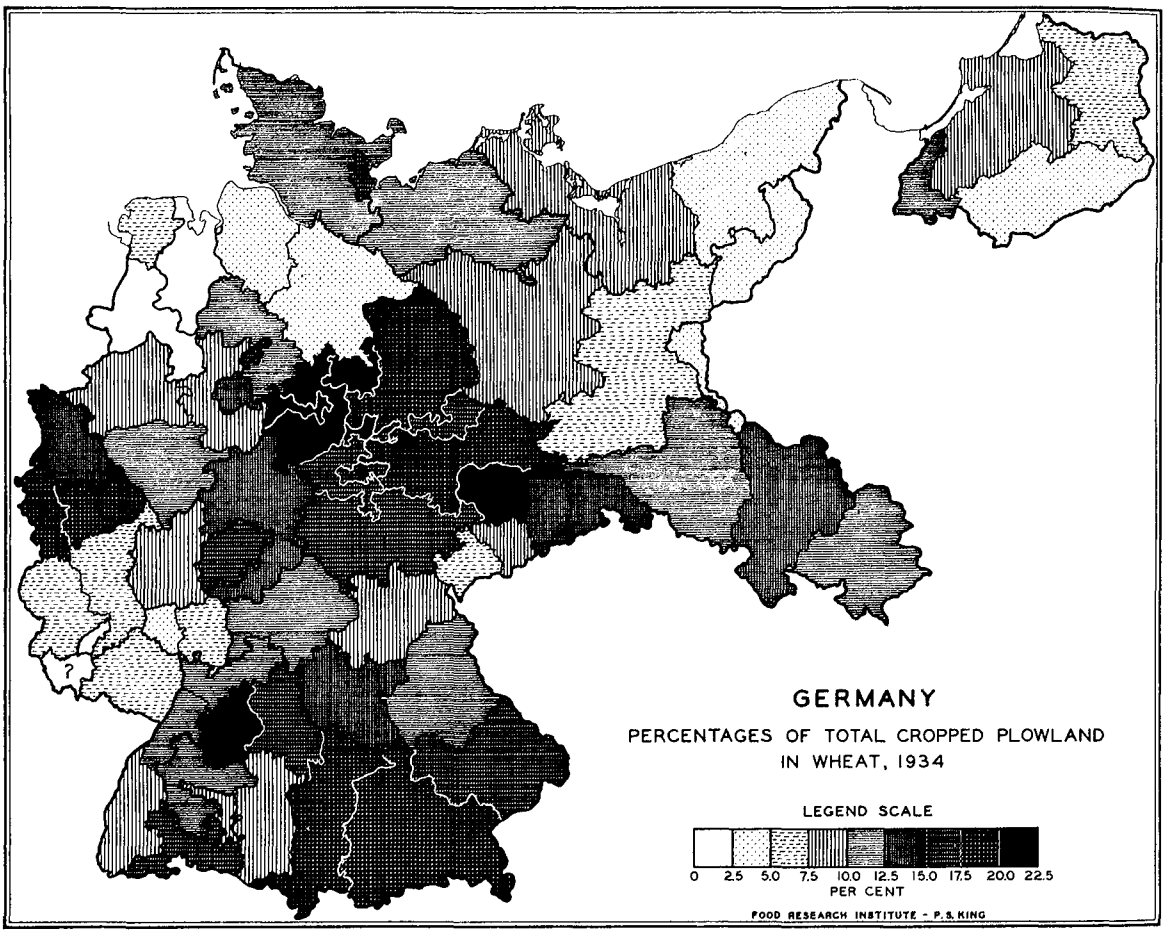
[2] I.e., exclusive of the two pieces separated from the main portion of the state.

turn more frequently than every third year, and sometimes the interval must be longer. Thus if only the better soils adapted to wheat are considered, the proportion of wheat to total plowland is not so small as it appears when no regard is had to the adaptability of the soil to wheat growing.

Past development.—The considerable area which was added to the plowland in the last prewar decades was for the most part so poor that it was suitable only for rye and other crops with moderate requirements as to soil. Wheat and barley had no part in those additions. In the same period, however, the possibility of wheat growing increased on land previously cultivated, owing to the great increase in the use of artificial fertilizers and in the number of livestock which resulted in a larger supply of manure. In spite of this advantage, the wheat area even declined by 1.7 per cent during the two prewar decades, while the area in rye expanded by 8.4 per cent and that of oats by 11.3 per cent.[1]

As shown above (p. 82), the decline in the wheat area cannot be explained by unprofitable wheat prices. The only logical explanation is that production of rye and oats was even more profitable than that of wheat.[2] Of

CHART 7.—REGIONAL DIFFERENCES IN IMPORTANCE OF WHEAT AREA, 1934*



* Corresponding official data for later years are not yet published. The decline in the wheat acreage in 1935 and 1936 was more pronounced in regions with a relatively small wheat area; hence the regional differences became greater than those shown for 1934. See p. 97.

[1] According to data of the land utilization censuses of 1893 and 1913.

[2] Aside from price relationships, rye competition in the period shortly before the war was stimulated by the fact that rye yields per acre increased more rapidly than wheat yields (see pp. 98–99).

some importance, perhaps, was the fact that farmers who made large profits on the grains their forefathers had been growing could afford to ignore the still more advantageous possibilities opened up by larger supplies of all kinds of fertilizers.

During the war, the wheat area declined more rapidly than the area in rye and oats, owing to the lack of artificial fertilizers and the impossibility of giving the land the thorough preparation required by wheat. The subsequent recovery of wheat production, however, was so much more pronounced that wheat emerged from the inflation period with a somewhat smaller net contraction of its area than the two other grains. In 1925 the area sown to wheat was less than in 1913 by about 9.5 per cent, while the areas sown to rye and oats were smaller by 11.5 and 12 per cent respectively, as shown by Table 2.[1] The price situation seems not to have been more favorable for wheat than for rye over the inflation years, but the availability of synthetic nitrates may have favorably affected the competitive position of wheat even at that early stage in their development.

The course of the development in the wheat area in the inflation years continued for some time after the mark was stabilized. Having increased (according to data on sown acreage) by 13.9 per cent from 1925 to 1927, the wheat area was 3.1 per cent larger in 1927 than in 1913. The rye and oats areas appear to have increased in 1925–27 by only 1.9 and 0.7 per cent respectively, and even these small increases may have been purely statistical.[2] The relation between the prices of different grains provides no satisfactory clue to this divergence in the development of the acreage. Presumably the considerable decline in prices of artificial fertilizers, in terms of grains, strengthened the competitive position of wheat relative to other crops. The spread of knowledge as to cultivation practices has probably also been slowly turning the wheel in the direction of wheat and barley, the cereals with higher requirements as to soil preparation. Finally, the considerably less favorable situation in agriculture exerted pressure toward all possible means of increasing incomes.

TABLE 2.—AREA SOWN TO FOUR PRINCIPAL GRAINS, 1913 AND 1924–36*

(Thousand acres)

Harvest year	Winter wheat	Spring wheat	Winter rye	Spring rye	Winter barley	Spring barley	Oats
1913 ...	3,734	531	12,988	262	116	3,425	9,696
1924 ...	3,366	482	11,564	336	247	3,308	8,710
1925 ...	3,526	334	11,515	212	314	3,239	8,530
1926 ...	3,702	361	11,708	198	400	3,274	8,589
1927 ...	4,003	395	11,739	210	428	3,227	8,589
1928 ...	3,946	432	11,639	222	467	3,301	8,695
1929 ...	3,877	324	11,695	195	549	3,390	8,794
1930 ...	4,023	405	11,476	180	487	3,267	8,500
1931 ...	4,836	702	10,937	178	581	3,440	8,310
1932 ...	4,932	751	10,885	166	610	3,267	8,117
1933 ...	5,056	717	11,072	161	675	3,272	7,863
1934 ...	4,959	761	11,075	166	781	3,012	7,774
1935 ...	4,764	470	11,144	143	964	2,956	6,915
1936 ...	4,748	393	11,003	139	1,074	2,961	6,843

* For postwar boundaries, not including the Saar. Data on spring grain are the usual official data which are collected in the spring and officially used as area harvested. The area in winter grain as ascertained in the spring is here converted into area sown by applying the official percentages (for 1913, prewar boundaries) of winter grains plowed under owing to winterkilling, etc. On the reliability of these percentages, see Appendix Note A (1). Caution must be exercised in using the thus-derived sown area in winter grains for computing the total area in each grain, since the area in grain of winter habit, if winterkilled, is to some extent resown to the same grain of spring habit. On the comparability of the official data for different years, particularly those of recent years with the data of earlier years, see Appendix Note A (1).

The acreage in spring barley did not change much in the period 1925–27, and remained somewhat below prewar levels. However, the requirements of the brewing industry were materially lower than before the war, and the portion of the crop that had to be used in competition with cheap imported feedstuffs was somewhat increased. The small acreage in winter barley was extended by 36.3 per cent from 1925 to 1927, to a figure nearly four times its prewar average. Winter barley is purely a feed product, but is preferred from the standpoint of seasonal distribution of power and labor requirements. Developments in subsequent years have shown that this crop, at last freed from long-continued price discrimination, is destined to become a serious

[1] The 1925 acreage probably was slightly underestimated; see Appendix Note A (1). But this hardly impairs the comparisons of the *rates* of decline in area of different grains from 1913 to 1925.

[2] See Appendix Note A (1).

competitor of both winter rye and winter wheat.

In the early years after the stabilization of the mark, expansion of the wheat area was checked by the fact that the post-inflation protective system at first favored rye and oats more than wheat. In 1930 the wheat acreage was barely larger than in 1927, after having been still lower in the intervening years. The acreage in oats increased from 1927 to 1929, while rye practically held its own under the protection of the drawback system, although both crops were produced in excess of domestic requirements. The area in spring barley remained at about previous levels, and winter barley continued its advance.

The year 1930–31 witnessed almost a revolution in Germany's wheat growing. (See harvested acreage, 1931, in Chart 8, p. 98.) The area sown to winter wheat increased by 20.5 per cent, and the small spring area by 73 per cent. In the years immediately following, this rate of advance could not be sustained, but further small gains were made. In 1933 the sown winter wheat area was 26.3 per cent greater than in 1927; and the spring wheat area was greater by 81.5 per cent, after having exceeded the area of 1927 by 90.1 per cent in 1932.[1] This great expansion can be explained primarily by the price situation, which was particularly favorable for wheat. Yet the increase exceeded the most optimistic expectations. Although part of the crop in these years was grown on land which must be considered unsuitable for wheat even according to the very liberal German standards of soil quality, the improved possibilities of wheat growing and the increased responsiveness of acreage to price changes had evidently not been fully appraised by the investigators. It seems probable that wheat no longer requires as high protection, compared with that granted to rye and oats, as it did before the war.

The expansion of the wheat area in 1927–33 was entirely at the expense of rye and oats. The area occupied by the four major grains increased by only 225,000 acres from 1927 to 1933, and the acreage in barley was 292,000 acres larger in 1933 than in 1927. Prior to the depression, the competition was primarily between wheat and rye, but the battle line was then widened to include oats. The oats area even contracted much more than the rye area: according to the yearly survey data, the sown acreage in rye declined by 423,000 acres or 3.6 per cent from 1930 to 1933, and the area in oats by 931,000 acres or 10.6 per cent from 1929 to 1933.[2]

As indicated by the data in Table II, all parts of the country participated in the increase of the wheat acreage in 1927–33, though in very different degrees. The east and north showed the greatest increases, e.g., Pomerania 64.3 per cent, Mecklenburg-Schwerin 61.3 per cent, Brandenburg 56.2 per cent, and East Prussia 45.6 per cent. On the other hand, the wheat area expanded only by 6.9, 18.2, and 19.8 per cent respectively in Westphalia, Hesse-Nassau, and the Rhine province. The increases in the south, although in general somewhat larger than in the west, were considerably smaller than in the east and north.

In his "expert opinion" set forth in *Umstellung des Deutschen Getreidebaus* (1930), Roemer stressed the view that much rye is produced on land suitable for wheat, and that the shift in grain production should consist primarily in the displacement of rye from land on which wheat had already been grown successfully. The fact that the province of Saxony could increase its wheat acreage by 34 per cent confirmed this opinion. It is also supported by computations as to the proportion of wheat acreage to the better kinds of soil available (see pp. 93–94). Even with the wheat area as large as that of 1933, wheat would probably not have to return in the rotation on better soils, on the average, appreciably more frequently than every fourth year.

[1] For this comparison, 1927 is used instead of 1930, because in 1927 a census of land utilization was taken. The net increase in wheat area from 1930 to 1933 was about the same as that from 1927 to 1933.

[2] Different years are used as the basis for computing these changes in acreage (1930 for rye and 1929 for oats), since the effect of a given price situation is felt earlier on the area in spring grain than on that of winter grain.

The data of the 1933 agricultural census led the official commentators to infer that the decline in oats area in 1930–34 was considerably larger than indicated by the yearly survey data. See *Wirtschaft und Statistik*, 1935, p. 784.

However, the course of development in the wheat area from 1930 to 1933 was in general not in the direction considered desirable. With some exceptions, the regions with the poorest soils and the smallest wheat acreage showed the largest expansion.

The supply position with respect to rye and oats appears to have materially influenced the rates of increase in the wheat area in different parts of the country. The regions with the largest expansion in wheat area were those with great surpluses in rye and oats; those regions which had not produced enough to cover their requirements in rye and oats, and had therefore suffered less severely from the overproduction of these grains, increased their wheat area to a considerably lesser extent.[1]

Glutting of the wheat market in 1932–33 and particularly in 1933–34, as well as the strengthening of the prices of rye and oats, brought about a setback in the development of the wheat area. By 1936 the wheat area had lost nearly half of the gain made from 1927 to 1933. But wheat retained more than half of its gains, even though the prewar and predepression price relationships between wheat, rye, and oats were again restored, and though the price relation between wheat and feeding barley became considerably more favorable to the latter than it had been for decades. This fact points to an appreciably larger possibility of growing wheat in Germany than had existed before the World War. Particularly significant was the small decline in the area sown to winter wheat for 1936 (only 0.4 per cent), in spite of the fact that the great feed shortage favored the production of barley, oats, and rye much more than that of wheat.

While the recession in the winter wheat area from 1933 to 1936 was comparatively moderate (6.1 per cent), the spring wheat area was contracted by not less than 47.8 per cent from 1932 to 1936. This bears out the statement that producers, in their eagerness to find a substitute for oats, had greatly overestimated the profitableness of growing spring wheat in Germany.

The recent decline in the wheat area was generally largest in those parts of the country where the increase in the preceding years had been greatest (Table II). With the exception of Westphalia and some minor areas, all regions retained at least part of the gains made in 1931–33. The regions with better soils and more favorable climate appear to have retained a larger portion of their smaller increase in wheat area than did the regions with poorer soil, less favorable climate, and larger gains in the preceding period. In Bavaria, Württemburg, and Baden the 1936 wheat area even exceeded that of 1933.[2]

The great expansion and subsequent contraction of the spring-wheat area in recent years, and the regional shifts in it, seem to indicate that the part of the sudden increase in the wheat acreage in 1931–33 which was unsound has since been eliminated. Unwarranted increases were replaced by expansion in more suitable places. The changes in wheat acreage accomplished by 1936 appear to represent more consolidated and more permanent ones.

Future development.—The outlook for the wheat area depends to a large extent on what Germany's wheat requirements will be. Hence we shall return to this topic after the future requirements have been considered (see pp. 114–16). Here a few points can be made without reference to requirements.

Unsuitable land was used for part of the wheat grown in 1933. On the other hand, by no means all the land which was good enough for wheat growing was so used. Even in 1933 a large amount of rye was grown on land suitable for wheat. The area so lost to wheat was probably several times larger than the area used for wheat though unsuitable for it. Hence the wheat area of 1933 was not the maximum attainable. Moreover, the area adapted to wheat is being extended permanently by improving the quality of the poorer soils. Humus

[1] As shown in Table 47 of *Die Zukunft des Roggens* (p. 79), on the average of 1926–28 all the eastern provinces of Prussia had great surpluses of rye, while the Rhine province and the province of Westphalia were the major deficit regions. South and central Germany were also rye-deficit regions. The situation with regard to oats was similar, the major exception being that the south had a surplus.

[2] This favorable showing may have been caused to some extent by a shift from spelt to wheat. Since the data on the spelt area are not very reliable, this shift may in part have occurred before 1933 but have been shown statistically after that year.

is being accumulated, soils too wet for wheat are being drained, acid soils are being converted into alkaline by application of lime, et cetera. This takes place in all countries which follow intensive methods of crop production.

Thus the wheat area can be increased materially beyond its present size, and the potential extent of the expansion becomes greater with the passage of time. Nevertheless, the limitations upon German wheat production that are imposed by the scarcity of good soil remain very significant. The 1933 wheat area could be reached only at a price level that was extremely favorable for wheat. Although the amount of protection, absolute and relative, necessary for extensive wheat growing in Germany is declining, it is still high, and the decline is slow and probably will continue slow in the future.

YIELDS

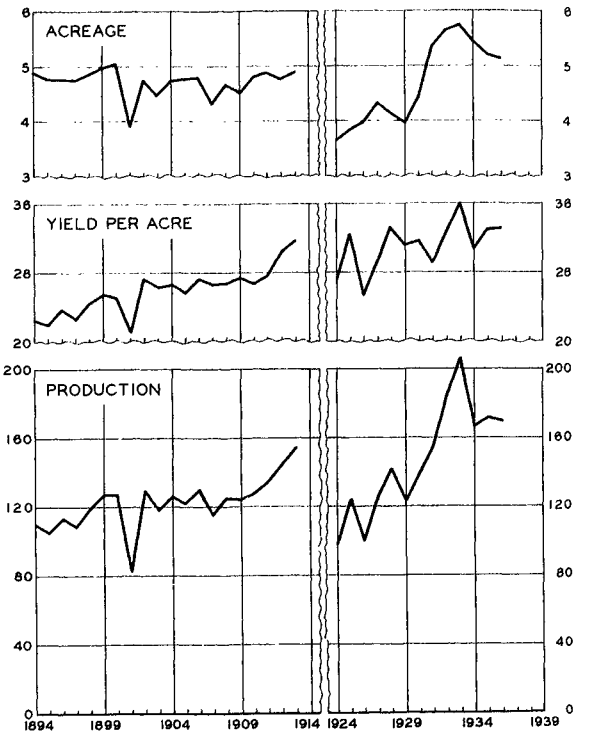
Thorough soil preparation, efficient crop rotation, and application of large quantities of manure and artificial fertilizers enable Germany to rank among the countries with the highest wheat yields per acre, in spite of the generally moderate quality of the soils used for wheat. In 1931–35 wheat averaged 32.3 bushels per acre, more than two and a half times the average yield in the United States. Only the United Kingdom, the Irish Free State, Belgium, the Netherlands, Denmark, and Sweden had yields still higher. In most of these latter countries cultivation is still more intensive than in Germany, and natural conditions also are to some extent more favorable for attaining high yields. Czechoslovakia, with a considerably better soil than that devoted to wheat in Germany, harvested on the average only 25.2 bushels per acre in 1931–35, and Hungary only 19.6 bushels. Lower precipitation in Czechoslovakia and Hungary is not fully responsible for the large differences in yields.

Past development.—The high yields are of comparatively recent date. In 1894–98 wheat averaged little over 23 bushels[1] per acre (Chart 8). From this average to that of 1909–13, i.e., in fifteen years, Germany succeeded in increasing her wheat yields by 24.2 per cent, equivalent to a rise of about 1.5 per cent per year. Few countries can boast similar gains in a period of such length. The improvement in yield was even greater in rye. In spite of a substantial addition of very poor soils to the rye area, yields of rye increased by 30.9 per cent over the same period. If the addition of poor soil to the area in oats is taken into account, yields of oats also increased more than wheat yields. The significance of these variations in rates of increase in yields was stressed above in discussing acreage developments (pp. 94–95).

The greater increases in yields of rye and oats than that of wheat require explanation, for it may be assumed that in general, on a given soil, wheat responds the more strongly to larger applications of fertilizers and improvements in cultural methods. One possible

CHART 8.—AREA, YIELDS, AND PRODUCTION OF WHEAT, 1894–1913 AND 1924–36*

(Million acres; bushels per acre; million bushels)



* Prewar data for prewar boundaries; postwar data for postwar boundaries, exclusive of the Saar. See Table VIII.

[1] The official figure is 25.7 bushels. See Appendix Note A (1).

explanation is that, before 1893, both improved cultural methods and artificial fertilizers had been applied to wheat much more extensively than to rye and oats, while the latter crops gained more from them during the last fifteen prewar years. By and large, rye growers were hardly as eager to accept innovations as wheat growers were. Moreover, the considerable rise in grain prices over this period may have been necessary to make application of large quantities of artificial fertilizers to the cheaper kinds of grain a paying proposition.

Another and perhaps more significant reason for the greater increase in yields of rye and oats may have been the fact that lands which are particularly deficient in nutrients gain more from the application of artificial fertilizers than richer soils do. Since rye, on the average, is sown on the poorest soils, it showed the greatest rise in yields; oats, which on the average occupies soils better than rye and poorer than wheat, took second place; and wheat, grown only on better soils, ranked last. Regional changes in average yields tend to support this explanation.[1] An additional factor in the case of rye in the prewar period was the rapid increase in the acreage sown with the high-yielding Petkus rye.[2]

From the great decline in yields during the war and inflation, there was a rapid recovery. An arbitrary trend based on adjusted data[3] for wheat suggests an increase of about 11 per cent in the six years 1924–30, or about 2 per cent per year, with the prewar average probably exceeded just before 1930.[4] In the same period, yields of rye possibly rose somewhat more than those of wheat, and yields of oats somewhat less.

This rapid increase in yields correctly reflected the great increase in the use of artificial fertilizers as compared with prewar years. If the losses in soil fertility during the war and inflation had been made good by 1929, yields higher than before the war should have been expected with the amount of artificial fertilizers applied in that year. Further increases in yields could hardly be expected to continue at as rapid a rate as when fertility was being restored. Moreover, a considerable decline in the use of artificial fertilizers took place from 1929–30 to 1931–32. Since then, the use of artificial fertilizers has been rising, but the level of 1928–29 was not reached until 1934–35. Furthermore, the additional land put into wheat after 1930 was mostly poorer than that previously used for wheat. While safe inferences can hardly be drawn from data for so short a period, those for 1930–35 suggest an upward trend at the rate of somewhat less than one per cent per year.

Future development.—Data of experiment stations and accounting farms leave no doubt that current average wheat yields are considerably below the level attainable with the present state of knowledge and warranted by the existing price relations. It is, however, by no means easy to estimate just what this level is.[5] To predict what level will be similarly

[1] See "Die Entwicklung der Deutschen Ernteerträge," *Wirtschaft und Statistik*, 1935, pp. 662–65. The east, with its poorest soils, showed for all grains the largest increases in yields during the last prewar decades.

[2] See "Steigerung der Ernten durch Düngung und Züchtung," in M. Sering, *Die Deutsche Landwirtschaft unter Volks- und Weltwirtschaftlichen Gesichtspunkten* (Berlin, 1932), p. 801.

[3] See Appendix Note A (1) on adjustments of official data on yields for the years 1924–27.

[4] Official data on prewar and postwar yields are recognized as not comparable. The statement is based on data for a small number of estates with records extending over a large number of years, and on considerations on the state of preparation and fertilization of the soil. On the same broad foundation are based the adjustments of prewar yield data discussed in Appendix Note A (1).

If the yield curve in Chart 8 for the prewar years seems to run somewhat too low in comparison with that for the postwar years, let it be noted that the prewar section would have to be raised by about 2 per cent in order to be properly comparable with the postwar section, for the yields in the area ceded by Germany (inclusive of the Saar) were lower than the country average.

[5] Kappen and Henkelmann (see "Düngung und Pflanzenzucht als Mittel der Produktionskostensenkung," in *Deutsche Agrarpolitik*, I, 663–66) reasoned that by using somewhat more artificial fertilizers than were used in 1930, and by shifting to high-quality seed, wheat yields could be raised 13 per cent above the average for 1930–34. The attainable increase in rye yields was considered to be about 20 per cent, and for oats and barley about 19 per cent. Although rye yields increased more than wheat yields in the last prewar decades, and perhaps also in the decade 1924–34, we should expect the upper limit of possible increase to be not less for wheat than for rye. With the rise of yields, water supply will increasingly become the limiting factor; and rye soils are supplied with water much less adequately than wheat soils. Moreover, the

attainable in future is altogether futile, for nobody can foresee what further progress will be made in seed selection, cultural methods, machinery, and cheapening of artificial fertilizers.

A considerable further increase in actual yields can be expected, but it is reasonable to assume that the rate of increase will decline as ever higher levels are reached. Farm accounting data show that in post-inflation years the lower yields of small farms were increasing more rapidly than the higher yields of larger farms.[1] It is likely that yields in general increased more rapidly where they were lower; in this development spreading of agricultural education among small peasants was undoubtedly a factor. Rates of advance in yields similar to those of 1925–30, when a level previously attained was regained, appear rather improbable for the future. Increases even at the rate of the two prewar decades are not very likely, at least for any long period. A rate of one per cent per annum, or somewhat less, seems more in line with previous developments. If the use of artificial fertilizers should increase considerably beyond the level attained in 1934–35, a somewhat larger advance may well occur for a few years.

VI. BREAD-GRAIN UTILIZATION

Consideration of the utilization of the two bread grains for food, and of wheat for other uses, may well be prefaced by a few words on transportation and the milling industry.

TRANSPORTATION

The extended network of rivers and canals provides the principal means of transporting grain in Germany,[2] while railways serve the local traffic almost exclusively. Even within individual regions and between adjacent regions, waterways are widely used for shipping grain and, to a lesser extent, flour also. For disposing of surpluses of the East in the West, the seemingly complicated route is down the Oder, Elbe, and other rivers, thence by sea to the mouth of the Rhine, and finally up the Rhine through the Netherlands. This is the route used for grain not only from East Prussia, Pomerania, and Mecklenburg, but even from Silesia. In 1934, for example, some 25 million bushels of German wheat were transported by sea from one German port to another at the sea or on the Rhine.

The usual procedure is to carry the grain by water (frequently a short railway haul is necessary to bring it to the shipping place on the water route) into the region where the consumers are located, grind it there, and complete the final distribution of the flour and millfeed by short railway hauls.[3] For two recent years the shipments by these different kinds of transport were reported as follows, in thousand metric tons:[4]

Means of transport	1933			1934		
	Wheat[a]	Rye	Flour[b]	Wheat[a]	Rye	Flour[b]
Railway.....	2,351[c]	1,836	1,376	2,413[c]	1,493	1,531
Interior waterway..	1,524	1,459	1,015	1,439	890	1,143
Sea.....	1,374[d]	914	480	1,323[d]	887	501

[a] Including spelt.

[b] Including semolina, cream of wheat, groats, breakfast cereals, and similar mill products.

[c] Two sub-classes of particular interest were as follows:

	1933	1934
From or to seaports.....	365	376
From or to interior waterways....	600	524

[d] Subdivided as follows:

	1933	1934
From domestic to domestic ports	141	288
To Netherlands (much of it reshipped into Germany).....	345	462
To other foreign countries.....	401	210
From foreign countries.....	487	363

higher prices of wheat permit going materially further in application of artificial fertilizers, cultivation, etc., than can be found profitable in the growing of rye and oats.

[1] H. L. Fensch, *Die Entwicklung der Landwirtschaftlichen Betriebsergebnisse seit der Neugestaltung der Währung* (Veröffentlichungen des Deutschen Landwirtschaftsrats, Berlin, 1932), p. 26.

[2] The difference in the use of waterways as compared with the United States is due, to a considerable extent, to the fact that German railway rates per mile have always been broadly the same for short and long distances, while in the United States the railways have been permitted to compete effectively with interior waterways, thus limiting the use and development of water transportation.

[3] For details see W. Teubert, *Getreidefrachten und Getreideverkehr auf Deutschen Eisenbahnen und Wasserwegen* (Berlin, 1912).

[4] Official data. See "Der Brotgetreideverkehr 1925 bis 1934," *Wirtschaft und Statistik*, 1936, No. 7.

In order properly to interpret such figures, it must be borne in mind that the average haul on waterways is several times as long as the average railway haul, and that many lots of wheat count both in rail shipments and water shipments.

The Milling Industry

The milling census of 1933 showed more than 30,000 establishments with a capacity of more than one metric ton of grain in 24 hours. Detailed census data covering the crop year 1927–28 showed the following distribution of mills by size groups, and the percentage of the total grist ground by mills of each group:[1]

Maximum daily capacity (*metric tons of grain*)	Number of mills	Wheat grist	Rye grist
Total	23,637	100.0	100.0
Under 5 tons	17,649	8.1	21.9
5 to under 20 tons	4,780	10.4	28.2
20 to under 80 tons	1,064	19.5	30.1
80 tons[a] and over	144	62.0	19.8

[a] Roughly equivalent to 700 barrels of flour.

Of the total wheat ground in these mills, 52 per cent was imported; for the different groups of mills the corresponding percentages were 1.5, 10.9, 23.7, and 74.3 respectively.

As the tabulation shows, the commercial milling of wheat is highly concentrated in the larger mills, while that of rye is not. The great difference is primarily due to the fact that the advantages of large-scale production are much greater in wheat milling than in rye milling. But requirements of milling technique are reinforced by other factors. To a considerable extent, rye flour is made of local raw material for local consumers, while a large part of the wheat flour reaches the ultimate consumer only after it (or usually the wheat of which it is produced) has been transported over long distances. A few years ago, oceans separated the places where the wheat was produced and the flour consumed, for more than half of the commercially ground wheat. Separation of the places of the production of the grain and the consumption of the flour favors concentration of the milling industry; and this is particularly stimulated when the haul involves transport by both railway and water, or water transport by different craft. Points of transfer from one means of transportation to another, especially points of transfer from water to railways, are "natural" points of location of large milling establishments. Such mills frequently receive directly from one means of transportation and deliver directly to another.

The most important wheat flour mills are located in the northwestern ports of Hamburg, Bremen, and Kiel, and along the Rhine and its tributaries. Practically every large city on the Rhine is a milling center; the most important are Mannheim, Ludwigshafen, Cologne, Krefeld, Düsseldorf, and Duisburg. Another but less significant chain of wheat mills is located along the Elbe and its tributaries, in Magdeburg, Berlin, Dresden, etc.

In 1927–28 the mills on the Rhine and in the northwestern ports ground nearly one-half of all the wheat commercially milled. During the period of heavy wheat imports, these mills were the most convenient places for grinding imported wheat and shipping the flour into the interior. Since wheat imports have shrunk to small dimensions, these mills have excess capacity; they have lost most of the advantage of access to imported grain, and the grain flows are frequently in directions opposite to what they were before. Under competitive conditions these mills would therefore be unable to use their capacity to the extent that it was used a few years ago. Compulsory cartelization (see pp. 85–86) saved them from most of the impending loss, for milling contingents are based on the turnover in the years 1927–32 when imports still averaged fairly high.

Food Consumption of Bread Grains

It is exceedingly important to keep in mind that Germany is a "two-bread-grain country." Changes in food consumption of rye may be accompanied by changes in food consumption of wheat in the same direction, or in the opposite direction. Shifts between wheat and rye take place the more readily because in part they occur without the consumer noticing

[1] Corresponding data for a later year are not yet available.

them; for in preparing mixed bread, bakers customarily alter the proportions of wheat and rye flour with changes in the price relationship between rye flours and wheaten clear flours. Moreover, about 400 pounds of potatoes are consumed per capita in Germany for food. To a considerable extent potatoes are a substitute for bread; hence changes in potato consumption may be reflected in bread consumption and vice versa.

Quantities of bread grains used.—Per capita food consumption of wheat, spelt,[1] and rye in 1935–36 amounted to about 310 pounds (Table IV). This compares with only about 240 pounds of wheat, corn, and rye used for food in the United States in that year. The figure for Germany is also slightly higher than that of per capita food consumption of wheat in the British Isles.[2] The German figure, however, appears materially higher than the British if the much larger consumption of potatoes in Germany is considered. Per capita food consumption of bread grains is still higher, however, in several other European countries in which the standard of living is mostly lower than in Germany.

Of the total food consumption of bread grains in 1935–36, about 47 per cent consisted of wheat and about 53 per cent of rye. In terms of flour, the proportion may have been slightly higher for wheat. So far as data are available, they do not indicate marked regional variations in the total per capita food consumption of bread grains; the only probable exception is that in southwestern Germany the average per capita consumption is considered to be about 10 per cent higher than in the rest of the country.

Regional variations in the proportion of the two individual grains are, however, very large. The computations of Seedorf and Hesse reproduced in Table 3, though not up to date, give a fairly reliable picture of the variations in the relative importance of wheat and rye as human foodstuffs in different parts of Germany. The extremes are striking: nine-tenths rye and one-tenth wheat in Posen–West Prussia on the one hand, and 15 per cent rye and 85 per cent wheat in southwestern Germany on the other hand. In general, wheat constituted less than one-third of the total in the east and north, while in the south and west it constituted 50 per cent or more.

TABLE 3.—FOOD CONSUMPTION OF WHEAT AND RYE, BY AREAS, AVERAGE 1925–29*

(Percentages of total for the two bread grains)

Provinces, state, or region	Wheat	Rye
Grenzmark Posen-West Prussia	11	89
East Prussia	21	79
Brandenburg	25	75
Lower Saxony	26	74
Pomerania	27	73
Mecklenburg	31	69
Nordmark	33	67
Silesia	34	66
State of Saxony	44	56
All Germany	*46*	*54*
Province of Saxony	47	53
Rhine province	49	51
Bavaria	58	42
Westphalia	62	38
Hesse	64	36
Southwestern Germany (Baden, Württemberg)	85	15

* W. Seedorf and P. Hesse, *Grundriss der Landwirtschaftlichen Marktlehre* (Berlin, 1932), p. 50.

How wheat is eaten.—Such figures on total food consumption of *wheat* as those just cited may easily convey an erroneous impression as to the significance of *wheat bread* in the German diet. While in 1935–36 the per capita food consumption of wheat was slightly less than that of rye, wheat bread made up hardly one-third of the total bread consumption.[3] In the prosperity years, when the total food consumption of wheat was much higher than in 1935–36, the proportion of wheat bread was also higher; but even then its share probably was not much more than one-third of the total. In addition, substantial amounts of wheat flour were and are used in bakeries for admixture with rye flour in rye and mixed breads. A survey made by the Statistisches Reichsamt in 1927–28, covering 2,000 city families of vari-

[1] About 3 pounds per capita.

[2] According to M. K. Bennett, the latter averaged 4.95 bushels or 297 pounds in the five crop years ending with 1933–34. "Per Capita Wheat Consumption in Western Europe," WHEAT STUDIES, March 1935, XI, 303.

[3] On the basis of the weight of flour used in the preparation of the bread. If the comparison were based on the weight of the bread, the showing would be still less favorable for wheat, because considerably more water is added and retained in the preparation of rye bread than of wheat bread.

ous occupations and income ranges,[1] showed the following consumption of bread, in pounds per equivalent adult male:

	Total	Wheat	Rye and mixed
Families of			
Laborers	233.7	44.5	189.2
Clerks	211.6	54.0	157.6
Government officials	222.9	52.0	170.9

Altogether, hardly as much as one-half of the wheat consumed for food was used for the preparation of wheat bread in 1935–36. While practically all rye consumed as food is used for the preparation of bread, many different food products are made of wheat. Some of these can be called bread only in a very broad sense, and some cannot be called such at all. According to the milling census of 1927–28, for example, 1,047,000 and 985,000 barrels of semolina were prepared in mills from durum and common wheat respectively. Semolina is used for the preparation of alimentary paste and as a cereal.

Household flour is another item of food consumption of wheat not in the form of bread. According to the official survey of city families in 1927–28, cited above, laborers' families consumed 32.4 pounds of flour per adult male equivalent, families of clerks 27.3 pounds, and families of government officials 33.3 pounds. If these figures were fairly representative, the home consumption of flour in that year must have equaled several million barrels. A comparison of the prices paid by the consumers covered by this survey, with retail prices in cities in the year of investigation, shows that the flour used in homes was exclusively or almost exclusively wheat flour. It must be assumed further that none (or only a negligible quantity) of the wheat flour bought by housewives was used for bread making.

Thus the total supply of wheat flour melts down materially before reaching the bakery. However, bakers too use only part of the wheat flour for bread making. The survey of foodstuffs consumed by the city population in 1927–28 showed that laborers' families bought (per adult male equivalent) 13.7 pounds of baked products other than rye, mixed, and wheat bread; clerks' families and government officials' families bought 20.9 and 19.0 pounds respectively. These products consisted of cakes and similar expensive goods made of wheat flour; the average price paid for them by laborers' families was about 20 cents per pound.

The large loaves, the principal form in which bread is consumed by the masses of the population, are now made exclusively or primarily of wheat flour in only a relatively small portion of the country. According to a survey of the bread used in numerous cities in April 1935, made by the Statistisches Reichsamt,[2] wheat bread (with not more than 10 per cent of rye flour)[3] had an appreciable distribution in only a few cities, primarily in southwestern Germany. Mixed wheat bread (50–90 per cent of wheat flour) was used to a large extent as the second most important kind of loaf bread in western and southern Germany as well as along the North Sea. Where mixed wheat bread was the secondary sort, mixed rye bread (50–90 per cent of rye flour) was mostly the principal kind of loaf bread. Occasionally it was reported as a secondary sort in central and eastern Germany. The percentage of rye flour used in preparation of mixed wheat and mixed rye bread increased from the southwest to the east. The east, center, and some other parts of the country use rye bread[4] as the main sort, with mixed rye bread a second, frequently a very unimportant second.

In broad terms, we may describe the geographical variations thus: from the southwestern regions with pure wheat or (much more frequently) mixed wheat bread, we soon pass into regions with bread made of about equal proportions of wheat and rye flour, and

[1] Source cited under Chart 9, p. 105, which shows differences among income groups.

[2] "Brotsorten und Brotpreise in Deutschen Städten im April 1935," *Vierteljahrshefte zur Statistik des Deutschen Reichs*, XLIV, 115–21. The data pertain only to bread in the narrow sense, i.e., to bread in large loaves, of the standard qualities for each region.

[3] This is according to the rather liberal German regulation. In most other countries, bread made with an admixture of 10 per cent of flour other than wheat would not be called wheat bread.

[4] Rye bread is bread made with an admixture of wheat flour not exceeding 10 per cent; in Berlin, at the time of the official investigation cited, 3 per cent of wheat flour was added in the preparation of common rye bread.

after a short while have a long distance to travel over regions where rye bread is still the bread of the masses.[1] This picture clearly reflects the retreat of rye from the west toward the northeast which is typical for Europe as a whole (see p. 109). In the prosperity years the relation was much like that described above, but wheat and mixed wheat bread had then penetrated farther toward the northeast, and the proportion of wheat flour to total flour used in preparation of loaf bread was substantially higher than in 1935.

Any such data on bread in large loaves of standard qualities for various regions may create an erroneous impression as to the significance of wheat bread in the diet, but in a direction opposite to that suggested by the data in Table 3. Large loaves made of wheat flour were probably more frequently excluded from the survey as not of standard quality for the region than were large loaves made of rye flour or a mixture of rye and wheat flour. Moreover, only a small proportion of wheat bread is consumed in the form of large loaves. Pound and half-pound loaves are also made, and small rolls are the principal form of wheat bread (see p. 80). It is not easy for Americans to realize the large place held by small rolls in the bakery business and consumption of such countries as Germany, Austria, and Czechoslovakia. For the geographical aspect of the problem it is important that in most of the regions with large loaves not made of wheat flour, consumption of wheat rolls and small wheat loaves is probably greater than in regions with large loaves made of wheat flour.

Variations among income groups.—The survey of the consumption of the city population provided important information also on differences in consumption of bread and other products in three classes of families with different incomes. This is summarized in Chart 9. Total consumption of bread and other baked products showed a distinct, although not very strong, tendency to decline as incomes increased — among laborers' families, for instance, from about 260 pounds to about 235 per adult male equivalent. The variations in the kinds of bread consumed were much more striking. In the lowest income groups of laborers' families all kinds of wheat bread, cakes, etc., constituted only 15.5 per cent of the total, but they represented a percentage twice as high (33.2) in the highest income group of the same class of consumers.[2]

The great dependence of the consumption of wheat bread and cakes on adequacy of income is clearly shown by data from the same survey, when families with similar incomes are grouped according to the number of their children. Thus, for laborers' families with a yearly income of from 3,000 to 3,600 marks,[3] the consumption of three classes of products represented the following percentages of the total of the three:

Number of children	Rye and mixed bread	Wheat bread	Cakes, etc.
0	47	31	22
1	49	25	26
2	53	28	19
3	62	25	13
4–6	67	21	12

Two-thirds of the baked products bought by families with many children consisted of rye or mixed rye bread, while more than half of the baked products bought by families with no more than one child was wheat bread, cakes, etc.

Development of Bread-Grain Consumption

According to Bennett's computations,[4] per capita food consumption of wheat in Germany

[1] On the basis of population rather than of territory, the picture would be somewhat more favorable to wheat, since eastern Germany is much less densely populated than western and southwestern Germany. This consideration, however, seems not to change the situation materially. In October 1935 wheat flour made up on the average only 14.6 per cent of the flour used in cities in preparation of loaf bread of standard qualities. In eastern and central Germany, this percentage varied between 2.1 and 3.9 (in Berlin it was 3.9). In northwestern Germany it was 20.4, in western Germany 27.0, and in southern Germany 36.9. *Wirtschaft und Statistik,* 1936, No. 6.

[2] It may be useful to state that the average income per laborer's family of the highest income group covered by the study was 5,027 marks or $1,197. Corresponding figures were 7,744 marks or $1,845 for the clerks' families, and 9,768 marks or $2,327 for the government officials' families. In none of these groups did the average income reach $2,500, which has so prominently figured in recent American discussions as the minimum income insuring a decent standard of living.

[3] *Op. cit.,* I, 72.

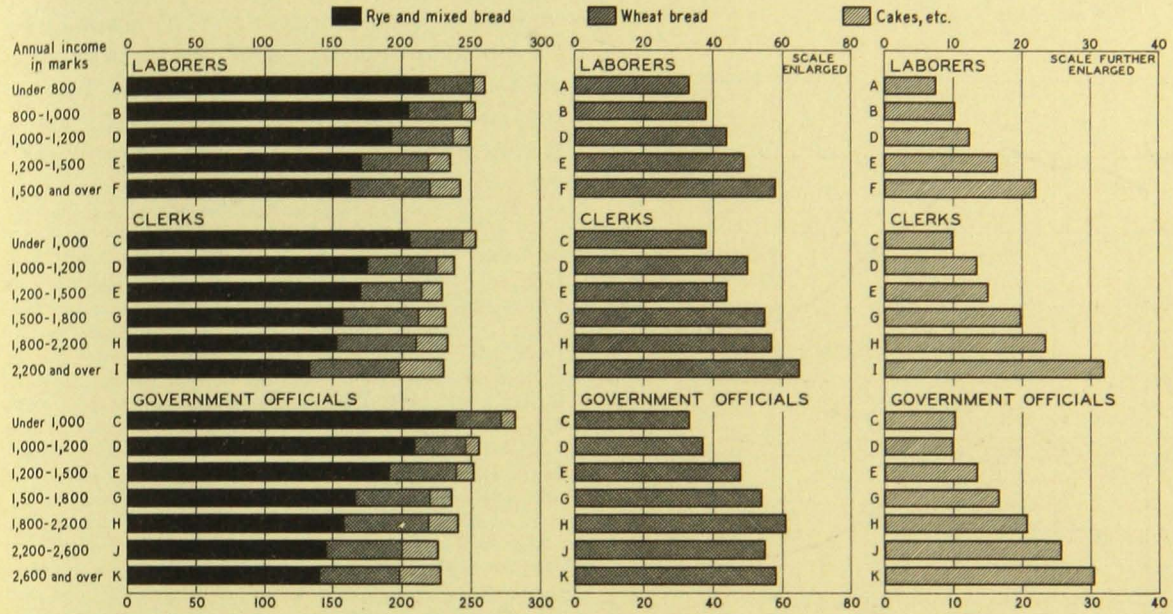
[4] Wheat Studies, March 1935, XI, 303.

rose from about 111 pounds on the average of 1885–86 to 1889–90 to 151 pounds on the average of 1894–95 to 1899–1900, i.e., by 36 per cent. In the next five years a further advance took place, but this amounted to only about 5.6 per cent. No further appreciable increase occurred in the following years up to the World War. This change in the trend was very significant; and if it had been given consideration in due time, many erroneous forecasts would have been avoided.

Per capita consumption of rye for food and feed purposes declined from 333 pounds on the average of 1893–94 to 1897–98 to 322 pounds on the average of 1909–10 to 1913–14.[1] For prewar years, unfortunately, no separate estimation of the food consumption of rye is feasible; but probably it declined much more than rye consumption for food and feed combined. It seems safe to say that total per capita food consumption of bread grains was declining in the prewar decade, with wheat consumption fairly stable and rye consumption bearing the loss.[2]

CHART 9.—CONSUMPTION OF BREAD AND OTHER BAKED PRODUCTS BY CITY FAMILIES IN DIFFERENT OCCUPATIONAL AND INCOME GROUPS, 1927–28*

(Pounds per adult male equivalent)



* Data from *Die Lebenshaltung von 2000 Arbeiten-, Angestellten- und Beamtenhaushaltungen* (2 vols., Berlin, 1932). About 85 per cent of the families covered by this study lived in large cities.

The milling census of 1909–10[3] indicated per capita consumption of wheat and rye flour as 121.3 and 132.9 pounds respectively. These census figures were considered too low, even in the official commentary on the census. To what extent this judgment was correct cannot now be ascertained.[4] At that time wheat flour may have made up about 47 per cent of the per capita food consumption of wheat and rye flour combined.

In post-inflation years up to 1927–28, per capita food consumption of the two bread grains showed a moderate upward trend (Chart 10, p. 106). Per capita consumption of wheat rapidly recovered from the great decline during the war, and in 1927–28 seems to have

[1] Official computation.

[2] The attempts to determine the significant trend in per capita food consumption of potatoes in prewar years are based on too weak a foundation to be relied upon.

[3] *Die Erhebungen über die Produktionsverhältnisse des Mühlengewerbes für die Erntejahre 1908–09 und 1909–10* (Berlin, 1913).

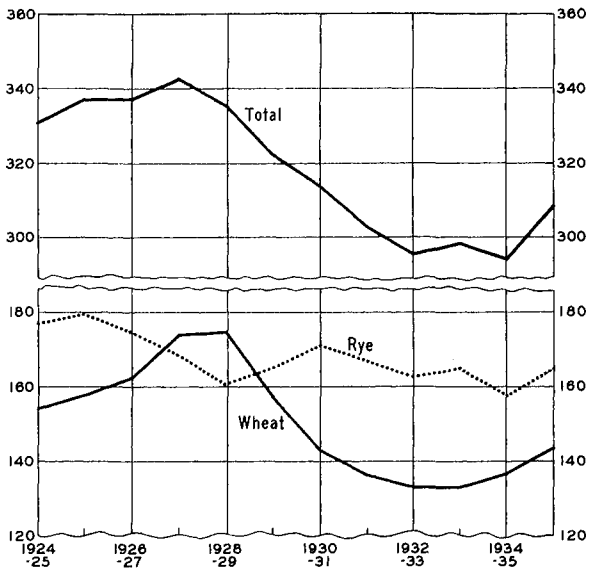
[4] See footnotes on p. 106.

slightly exceeded the prewar level.[1] Meanwhile, per capita bread consumption of rye continued its downward trend, and in 1927–28 it was less than that of wheat for the first time. A comparison of the data of the milling censuses of 1909–10 and 1927–28 indicates a decline of rye flour consumption per capita by 19.4 per cent over the period.[2] Total per capita food consumption of wheat and rye in 1927–28 was less than in 1909–10 by 8.1 per cent, according to the same data. The data in Table IV and Chart 10 indicate a further slight increase in food consumption of wheat in 1928–29 over the previous year, while rye consumption continued to decline. Food consumption of wheat amounted to about 55 per cent of the total food consumption of bread grains in that year; thus the position of the two bread grains was the reverse of the one prevailing in 1909–10.

There may seem to be a contradiction between the finding that consumption of wheaten bread, cakes, etc., was in 1927–28 considerably larger in families with higher incomes than in families with low incomes, and the other finding that the food consumption of wheat did not increase in the last prewar decade and exceeded the prewar level only slightly at the peak of postwar prosperity. The purchasing power of the masses was undoubtedly increasing in the last prewar decade and was greater in 1928–29 than before the war; but consumers in recent times have tended to spend a smaller proportion of their incomes for food, and such considerations may have led them to abstain from increasing their consumption of wheat products. The apparent contradiction can probably be explained also by the fact that the increased consumption of wheat resulting from the rise of incomes of

CHART 10.—PER CAPITA FOOD CONSUMPTION OF WHEAT AND RYE, ANNUALLY FROM 1924–25*

(*Pounds*)



* Computed, for wheat, from data in Table III; for rye, from data in an unpublished study by N. Jasny, *Germany's Agricultural Self-sufficiency*, Bureau of Agricultural Economics. See Table IV.

[1] The figure for wheat flour consumption derived from the data of the milling census of 1927–28 is 4.0 per cent higher than that of the milling census of 1909–10. Moreover, per capita food consumption of wheat before the war was somewhat smaller in Germany in present boundaries than in prewar boundaries. According to L. Michael (*Agricultural Survey of Europe: Germany*, U.S. Department of Agriculture, Bulletin No. 1399, 1926, p. 34), the apparent per capita disappearance ex-seed on the average in 1909–13 was 3.15 bushels in present boundaries exclusive of the Saar, and 3.21 bushels in prewar boundaries. With this adjustment, the increase in per capita consumption by 1927–28 comes to about 6 per cent. It has been rather generally accepted that the milling census of 1909–10 understated the facts considerably more than the milling census of 1927–28. *Blätter für Landwirtschaftliche Marktforschung*, September 1930, assumed that the prewar figures must be increased by 5 per cent in order to make them comparable with the postwar data, but mentioned that some informant considered an increase by 10 per cent necessary. However, at least one of the reasons for the assumption that the figures of the prewar milling census were materially too small was the fact that the milling census made it difficult to account for the total supplies calculated from official production and foreign trade statistics. Acceptance of a downward revision of the official prewar production statistics by 10 per cent (see Appendix Note A) necessitates a revision of the appraisal of the milling census of 1909–10 as well. In any case it is hardly probable that the difference in coverage between the two censuses was as large as 6 per cent. It is perhaps best to assume that per capita consumption was slightly larger in 1927–28 than in 1909–10, without attempting to estimate the exact extent of the change.

[2] Particular caution is necessary in accepting an understatement of the milling census of 1909–10 as compared with that of 1927–28, with respect to rye flour. The latter did not include the great number of mills with a capacity of not over one metric ton in 24 hours, which in the aggregate ground a substantial amount of rye into flour. Most of these mills, however, were covered by the census of 1909–10. The standing figures of the two censuses may be better than any estimates made without intensive study of the whole material.

the masses of the population was offset by the decline in food consumption of wheat by those who previously had not consumed much rye. Changing dietary habits induced the latter class of consumers to reduce their bread consumption; and, since they consumed wheat bread exclusively, or almost exclusively, wheat consumption felt most of the decline.

Changes in the food habits of the well-to-do, in regions where the masses eat primarily rye or mixed rye bread, could not have much weight as an offset to increased consumption by poorer consumers. But a reduction in food consumption of wheat in southwestern Germany, where the per capita consumption of bread grains is large and wheat bread has long played a dominant rôle as the bread of the masses, may have been important. Thus the trend toward increasing wheat consumption may have been counteracted by the trend toward a decline in consumption of bread of every kind. In the prewar decade the development took the form of a decline in rye consumption and an increase in the proportion of wheat to total bread-grain consumption, rather than of an increase in wheat consumption. In post-inflation years the situation was similar: the trend toward a smaller bread consumption prevented per capita food consumption of wheat from appreciably exceeding the prewar level.[1]

The immense decline in purchasing power of the masses of the population in the latest depression brought about great changes in consumption of almost all kinds of foodstuffs. Per capita food consumption of wheat fell by not less than 24 per cent from 1928–29 to 1933–34. On the other hand, per capita food consumption of rye increased, though without reaching the level of the early post-inflation years. As early as 1929–30 rye consumption again exceeded wheat consumption, and by 1931–32 its proportion of the total consumption of bread grains had become materially larger than in 1909–10. Per capita food consumption of bread grains declined over the period 1928–29 to 1933–34 by somewhat more than 10 per cent, according to the data in Chart 10.[2]

The decline in the food consumption of bread grains in the latest depression was in the face of a reduction in consumption of all other foodstuffs except cheap vegetables and potatoes.[3] The utilization of flour for pies, cookies, etc., was undoubtedly greatly contracted; but the reduction in those uses could account for only part of the decline in per capita consumption of wheat. Hence the expectation that a decline in purchasing power would lead to an increase in bread consumption did not materialize in Germany during the latest depression. Perhaps the consumption of bread in the narrowest sense of the word, as it is used in Germany (i.e., every man's daily bread made into large loaves), may have risen slightly. Even of that, however, one cannot be sure. The unemployed, and persons in similar situation, were compelled to contract their consumption of all foodstuffs except perhaps the cheapest vegetables and potatoes, but not excepting bread. Naturally, the consumption of the more expensive kinds of bread (pound and half-pound wheat loaves, and particularly wheat rolls) was contracted

[1] Shortness of the time between the end of the inflation and the beginning of the depression may also have been a factor.

[2] The computations of the Institut für Konjunkturforschung provide similar results (see Table IV). Total decline in per capita food consumption of both bread grains from 1928–29 to 1933–34 was 9.2 per cent according to the Institut as against 11.3 per cent computed by Hanau and the present writer. The computations of the *Allgemeine Deutsche Mühlenzeitung*, on the other hand, indicate a considerably greater reduction. According to it, per capita rye flour consumption declined by not less than 13.8 per cent from 1928–29 to 1933–34. The decline in per capita food consumption of wheat flour, according to the same source, was 29.0 per cent; and the total reduction in per capita food consumption of wheat and rye flour 21.7 per cent in those years.

[3] There is considerable divergence of opinion as to the course of food consumption of potatoes in the depression. An increase in per capita consumption would seem natural. Such an increase by about 10 per cent from 1928–29 to 1934–35 is, in fact, assumed by the Institut für Konjunkturforschung. On rather convincing evidence presented by Vogel of the Reichsforschungstelle für Landwirtschaftliches Marktwesen, however, Hanau and the present writer, not without considerable hesitation, accepted an unchanged total food consumption of potatoes over the depression years, equivalent to a negligible decline in per capita consumption. Even a 10 per cent increase in per capita food consumption of potatoes would have offset only a small part of the decline in food consumption of bread grains (on a calorie basis), leaving the contraction in all other foodstuffs without any compensation whatever.

most. But it seems by no means rash to assume that the course of per capita food consumption of bread grains since 1928–29 has reflected not only the changes in the purchasing power of the population but also a continuation of the long-run trend toward smaller food consumption of bread grains, inappropriate as depression conditions were for such a development.

Only a small part of the reduction in per capita food consumption of wheat in the depression could be regained in the recovery years up to 1935–36. The small increase in food consumption of wheat in 1934–35 shown in Chart 10 was caused, at least in part, by the fixing of the minimum extraction of rye flour at 75 per cent of the rye milled; hence more wheat flour had to be used for attaining the desired quality of mixed bread.[1] Thus a small shift to wheat bread may have taken place that would not otherwise have occurred. But there are some indications that the official milling statistics, on which the figures in Chart 10 for that year are based, somewhat understated the quantity of wheat milled in 1934–35. The further increase of wheat consumption in 1935–36 was entirely genuine and, since the high extraction of rye flour was no longer obligatory, the actual increase was presumably larger than appears from the data. Still, the per capita consumption of wheat in 1935–36 was probably about 18 per cent less than in 1928–29.

Per capita food consumption of rye declined in 1934–35 but recovered all of the loss in 1935–36, when the proportion of rye to the total food consumption of bread grains became nearly the same as in 1909–10. Per capita food consumption of the two bread grains combined fell slightly in 1934–35,[2] but in 1935–36 it was about 3 per cent higher than in 1933–34; the latest figure represents a decline of about 8 per cent from 1928–29 and of about 15 per cent from 1909–10. That food consumption of the two bread grains, and of wheat in particular, failed to recover more substantially in the past two years is due primarily to the fact that business recovery in Germany was not accompanied by sensible improvement in the purchasing power of the masses, except those on farms. Increases of the incomes of the formerly unemployed have been, at least to a large extent, offset by declines in incomes of persons who had been employed during the depression.

Outlook for Bread-Grain Consumption

The long-run decline in bread consumption probably has not yet reached bottom, but the further decline will hardly be rapid. The consumption of potatoes in many sections of Germany, particularly by the farm population of the east, seems to be much more excessive than that of bread. Hence potatoes may be involved in the prospective decline to a greater extent than bread grains, and the reduction in the consumption of the latter be retarded accordingly. A further decline in consumption of rye bread made of flour of high extraction may also tend to increase the per capita consumption of bread grains.[3] A failure of purchasing power to increase at all or to increase substantially—this seems rather likely in the present condition of Germany—would not be favorable for a reduction in bread consumption, but it would also not permit substantial reductions in potato consumption and rye flour extraction.

The consumption of alimentary pastes is small in Germany. It would not be surprising if part of the immense potato consumption were replaced by macaroni, provided macaroni of good quality should become available at a reasonable price. For this, however, the near prospect is not bright. The consumption of cakes, cookies, etc., might also rise materially,

[1] *Deutsche Getreide-Zeitung*, Dec. 29, 1935.

[2] The decrease in grain used is attributable to the high minimum extraction of rye flour prescribed for that year. In terms of flour there was a slight increase (Table IV).

[3] The present average extraction is commonly considered to be about 70 per cent, and may be higher. A reduction to 65–67 per cent in a rather short time would not be surprising. The extraction of rye flour in the United States is around 59 per cent. However, some other factors of similar character are at work, affecting total consumption of bread grains. The extraction of wheat flour is higher than that of rye flour; a shift from rye to wheat reduces the necessary amount of grain. Moreover, the volume of wheat bread is much larger than that of rye bread, even on a dry-matter basis. A rye loaf yields a substantially smaller number of slices than a wheat loaf made of the same weight of flour.

in case of a real improvement in purchasing power of the masses; but for this too the prospects are not favorable.

Increases in the consumption of wheat bread, cakes, etc., might take place much more rapidly than the declining long-run trend could operate. Consequently, a more or less substantial temporary increase in the food consumption of bread grains appears possible; but in the present situation of Germany, it seems not very probable. If such an increase should occur, the greater it is, the larger would presumably be the subsequent decline.

The history of food habits in Europe and other continents leads one to infer that, for the long run, rye as a major foodstuff is doomed, though considerable food use of rye may long persist. It is generally understood that rye bread is poor man's bread, and that it tends to disappear as the purchasing power of the masses increases.[1] Rye and maslin were important bread grains in Great Britain up to the sixteenth century.[2] Rye and mixed rye bread was the bread of the French masses prior to the French Revolution. No rye bread can be found in Great Britain now, and hardly any is consumed in France. The further one moves to the northeast in Europe, the larger is the position that rye held in the past and the more of that position it has preserved; but in all countries, those to the east and south of Germany not excepted, rye has been pushed more and more into retreat.[3] Rye bread has been able to show the largest resistance in the Scandinavian countries, northern and eastern Germany, Poland, and northern Russia; but in these countries too, most consumers who could afford it have turned more and more to wheat bread.[4]

Now it is proposed to reverse this development in Nazi Germany. Rye bread is proclaimed "the bread of the Nordic race."[5] Propaganda in favor of rye bread is supported by bold measures such as taxing wheat bread consumers in favor of the consumers of the coarser kinds of rye bread.[6] Are such efforts likely to change the long-run trend toward displacement of rye by wheat in German bread? The course of development in the past three years reveals no great effects of the attitude of the Nazi government toward wheat bread. The smallness of the increase of wheat consumption in 1934–35 and 1935–36 is satisfactorily explained by the small increase in the purchasing power of population. If no real pressure is exerted on consumers, the outcome will probably be at most some retardation of the downward trend in rye consumption. Of greater significance for the future distribution of bread-grain consumption between wheat and rye may be the fact that the increase in purchasing power of the masses occupies only a subsidiary place in the Nazi program.

An increase in food consumption of wheat may be confidently expected. We venture to estimate that, even under the present not very favorable conditions, barring such emergencies as wars, depressions of the latest pattern, etc., per capita food consumption of wheat is likely to increase by 20 per cent in ten years or at an average rate of about 2 per cent per annum. In the years immediately ahead, the rise may be somewhat more rapid, until the most neglected wants are again satisfied. Under anything like normal conditions the

[1] See the fundamental work of A. Maurizio, *Die Geschichte unserer Pflanzennahrung von den Urzeiten bis zur Gegenwart* (Berlin, 1927).

[2] See William J. Ashley, *The Bread of Our Forefathers; an Inquiry into Economic History* (Oxford, Clarendon Press, 1928).

[3] Mixed wheat-and-rye bread plays a great rôle in the retreat of rye. It is a kind of one-way bridge. Once started, the shift from pure rye bread to bread with an ever-increasing admixture of wheat flour goes on until the bread becomes purely wheaten. Except in emergencies, retreats have never been observed. Bakers have something to do with this shift. It is much easier to make good wheat than good rye bread. In so far as consumers are prepared to accept bread with less rye, and if price relationships permit the shift, bakers are only too eager to show the way.

[4] For details see N. Jasny, *Die Zukunft des Roggens* (Berlin, 1930). M. K. Bennett apparently leaves more room for rye as a bread grain of the future. See "World Wheat Utilization since 1885–86," WHEAT STUDIES, June 1936, XII, No. 10.

[5] Whether the Slavic peoples will recognize these claims as exclusive need not be considered here. Poland and north and central Russia have a much greater per capita food consumption of rye than Germany or any other representative of the so-called "Nordic race." On the validity of such race distinctions in Europe, see J. S. Huxley and A. C. Haddon, *We Europeans: A Survey of Racial Problems* (New York and London, 1936).

[6] See p. 92, footnote 1.

per capita wheat consumption that was reached prior to the war, and exceeded in pre-depression years, would be attained within no long period of time. Indeed, some increase beyond that level would also seem probable in the relatively near future. In our subsequent computations an increase by 30 per cent or somewhat more in ten years, or an average increase by 3 per cent or somewhat more per year, will be assumed for these more favorable conditions.[1]

Non-Food Uses of Wheat

Seed use is estimated at about 2.5 bushels per acre sown, or from 7 to 9 per cent of the crop. Only very small quantities of wheat or wheat flour are used industrially for such purposes as the production of starch, etc.

Feed must be cheap, and wheat has practically never been cheap in Germany. Until the last few years, as we have seen (pp. 82, 90, and 92), it was an accepted principle of the protective system not to impose burdensome import duties on maize and feeding barley. This policy made the margin between the prices of these grains and wheat considerably wider in Germany than in most other countries. The price situation was, therefore, extremely unfavorable for the use of merchantable wheat for feed, and in practice only the small amount of wheat not fit for milling was so used.[2]

An investigation by Fensch sheds some light on the feed consumption of domestic wheat on farms under fairly normal conditions before the onset of the depression. His results are summarized in Table 4. Large farms appear to have fed no merchantable wheat at all. The proportion of the wheat crop fed on very small farms (5–20 hectares) was moderate in East Prussia and Silesia, but rather larger in other regions. Some merchantable wheat was fed on farms of 20–50 hectares, and in a few regions on still larger farms. All told, however, the total merchantable grain fed on farms evidently amounted to little.

Table 4.—Feed Consumption of Wheat on Farms of Various Size, Average 1924–25 to 1927–28*

(Percentages of crop)

Region	Size of farms in hectares					
	5–20	20–50	50–100	100–200	200–400	Over 400
East Prussia	8	4	4	3	4	4
Silesia	9	6	3	2	2	2
Northern Germany	13	6	5	3	3	3
Central Germany	13	9	6	5	3	3
Northwestern Germany	27	13	10	7	4	4
Rhine region	15	9	5	3	–	–
Southwestern Germany	16	12	7	5	–	–
Bavaria	12	8	6	5	–	–

* Data from H. L. Fensch, *Verwendung der Deutschen Getreideernte* (Berlin, 1930). Fensch's data were computed for farms with more than 12.35 acres of agricultural area. The quantities shown as fed probably include grain lost in storage, etc. For comparison with the tabulation on p. 73, it should be noted that 100 hectares equals 247 acres. The size groupings here are slightly different.

In pre-depression years, neither domestic wheat which left the farm nor imported wheat was ever used for feed in more than negligible quantities.[3] Hence total feed consumption of wheat accounted for only a small percentage of the total wheat consumption,[4] while food consumption usually represented more than 85 per cent of the total utilization of wheat.

In recent years, conditions favorable for the feeding of wheat have been created from time to time, either as a means of providing owners of livestock (mostly poultry) with relatively cheap imported feed or, more frequently, for disposing of burdensome surpluses of domestic wheat. By government subsidies or similar measures the price of some wheat was so reduced as to make feas-

[1] A per capita consumption 30 per cent higher than that of 1935–36 would be not quite 6 per cent higher than that of 1928–29—a moderate progress for a period of nearly 20 years!

[2] Screenings constitute a very small percentage, since German wheat fields are generally free of weeds. In years of unfavorable harvest weather, the proportion of unmerchantable wheat is increased by the addition of the grain spoiled before threshing or in storage. Such damage, however, must be very large before the wheat is considered unfit for milling, for the quality requirements of the millers are moderate. "Seasonal odor" is not deemed an obstacle to the use of wheat in the mill (see p. 76).

[3] Since warehouses do not clean the grain, and mills grind the screenings and mix them into the bran, no wheat screenings are available in commercial channels.

[4] About 4 per cent of the total utilization, on the average of 1924–25 to 1928–29, according to the computations in Table III.

ible its use for feed, and the use of this wheat for human consumption was prevented by control measures.

In 1934–35, for the first time, it became advisable to divert substantial quantities of merchantable wheat to feed use, and again in 1935–36 the quantities so used were very large for German conditions (see Table III). The conditions responsible were the extreme feed shortage, due to shortage of funds for importing feedstuffs. The practice will presumably be short-lived. Since Germany is a high-cost wheat producer, it would be unreasonable for her to produce wheat for feed use. Many other products which can be used for feed can be grown at considerably lower cost. So long as the policy of insuring domestic producers a remunerative price is continued, no substantial feeding of wheat may be expected except under specific regulations and in such specific conditions as the present acute feed shortage.

VII. BALANCE BETWEEN PRODUCTION AND UTILIZATION

Wheat in the Prewar Period

Over the last prewar decade, seed requirements for wheat remained unchanged. The small feed consumption probably rose about in proportion to the increase in total utilization. Per capita food consumption practically did not change, after having greatly increased in the preceding decades. The shift from rye bread, so pronounced in the last decades of the nineteenth century, was limited to a decline in the food consumption of rye with per capita food consumption of wheat more or less stabilized. In these conditions the growth of population became the only salient factor causing total wheat utilization to advance. Comparing the average for the five years ending with 1913–14 with the corresponding average for a decade earlier, the population grew by 14.5 per cent while total wheat utilization advanced by some 15.5 per cent.

In the same period, domestic wheat production was increased by about 17.3 per cent, or not much more than total utilization. Of the two factors determining production, acreage remained virtually unchanged over the period,[1] and practically the whole increase in production was brought about by enhancement of yields.

The course of utilization and production was in the main determined by a single factor on each side: population growth for utilization; increase in yields for production. It was of course fortuitous that population and yields increased by practically the same percentages, and that both per capita consumption and acreage remained practically unchanged. But it is not surprising that changes in population and in yields were the dominant forces. Practically all land suitable for agricultural purposes had been allocated to crops. The area in cropped plowland had even been declining for a long time. Increases in production per unit of area were almost the only possible source of enlarging total agricultural production. The area of individual products, it is true, might be increased at the expense of others, but substantial shifts in acreage in a short period are unusual in old countries. Similarly, per capita consumption of total foodstuffs is fairly stable. Per capita consumption of individual products may be changed at the expense of other products, and in transitional periods such changes may even be violent; but on the whole, consumption of staple foodstuffs is characterized more by stability than by striking changes.

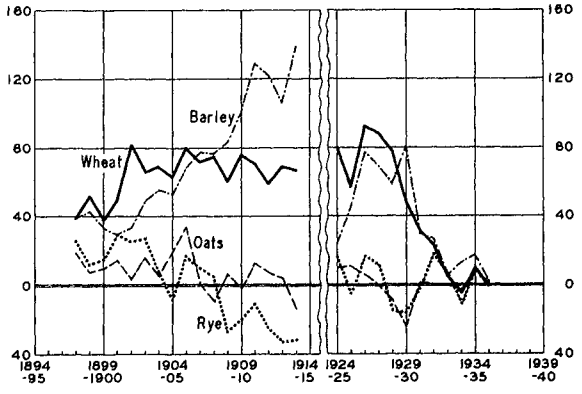
Since the production of wheat increased from 1899–1903 to 1909–13 slightly more than total utilization, imports did not need to advance so much as the latter. Net imports increased by only 12.3 per cent, in sharp contrast with rapid rates of increase in the preceding decades. Moreover, from 1901–02 on, the trend of net imports was slightly downward (see Chart 11, p. 112). Germany continued, however, to rank second only to the United Kingdom among wheat-importing countries. In four of the last five prewar years her gross imports were over 90 million bush-

[1] According to the annual crop statistics, the wheat area averaged 3.0 per cent larger in 1909–13 than in 1899–1903; but the census data for the years 1900 and 1913, which are more significant, indicated a decline of 1.8 per cent.

els, and the five-year average, 91.3 million, represented about 13 per cent of the international wheat movement. Her net imports in this period, 68.4 million bushels, were over 10 per cent of the net imports of all net-importing countries. Even at this lower level,

CHART 11.—NET IMPORTS OF WHEAT, RYE, BARLEY, AND OATS, 1897–98 TO 1913–14 AND 1924–25 TO 1935–36*

(Million units of 60 pounds)



* Based on official data, for years beginning Aug. 1. Data for wheat and rye include those for flour, converted to grain on the assumption of extraction rates as follows: *rye*, 70 per cent; *wheat*, 72.5 per cent for 1924–25 and 1925–26, and 75 per cent for all other years.

Where the curves fall below the zero line, they represent *net exports*.

these net imports constituted not much less than 40 per cent of the total food consumption of wheat. The proportion of foreign wheat in mill grindings was higher, since under the drawback system gross imports were substantially larger than net imports, and the wheat grain exports consisted almost wholly of domestic produce. The proportion of foreign wheat in the mix of commercial mills obviously exceeded the national average.

WHEAT IN THE POSTWAR PERIOD

While the course of German developments in the last prewar decade can be considered "normal" for agricultural products as they are produced and consumed in an old country, in the post-inflation years all the factors determining changes in wheat utilization and import requirements behaved more or less differently, and some of the differences were striking. The rate of population growth in the past twelve years was only about one-third of that in the last prewar decade. Thus the factor which was responsible for almost the whole increase in total utilization in the prewar decade, and which is generally the main factor causing total food use of such products to increase, lost much of its force.

Yields had first to make up losses due to war conditions. Increasing rapidly, around 1929 they reached the level attained prior to the war. From this point they rose further, though at a considerably slower rate. The rate of increase in yields after 1930 also was probably substantially lower than during the last prewar decade, but, in contrast to the prewar situation, it may have been about double the rate of population growth (see pp. 98–99).

If, as before the war, increases in population and yields had been the only factors determining the balance between utilization and production, Germany's dependence on foreign wheat supplies would have slowly declined. The great change in the rate of population growth materially altered the rôle of yields. When the population of a densely populated country with all the land taken up is growing rapidly, increases in yields are a means of defense against a rapid increase in the dependence on foreign supplies. Under conditions similar to those of prewar Germany, several countries would have been satisfied with increases in yields that did not fall much behind the increase of population. When population growth slows down greatly, increases in yields may be used in a fight for reducing that dependence, with self-sufficiency as the possible ultimate goal. From a weapon of defense, yields are turned into a weapon of attack.

Per capita consumption and acreage, which had remained practically stable in the late prewar years and may be said to have a general tendency toward stability, did not so behave in post-inflation years. On the contrary, changes in these factors were so violent that developments in utilization, production, and the balance between them lost the stabilized character that they seemed to have acquired in the last prewar decade. In foreign trade, a smooth course of development was replaced by radical changes in varying directions.

Three distinct phases can be discerned in the development of per capita consumption

and wheat acreage in the short period since 1924. Up to about 1927–28, per capita food consumption of wheat once more increased rapidly, to above the prewar level. It did not matter greatly that this increase was not so much a continuation of the prewar trend, as making up war-time shrinkage. The improvement was so rapid that the decline in rate of population growth could be largely offset, and total utilization of wheat increased much more than in the prewar decade. Restoration of requirements also outran restoration of production, although the considerable increase in yields was reinforced by a substantial expansion of the wheat area. Yields move relatively slowly even in restoration periods.[1] Hence, import requirements rose sharply. In the predepression years, owing in part to poor yields in 1926 and 1927, net imports came to exceed those of prewar years by a substantial margin.[2] Germany again became the second largest wheat importer,[3] with a share in the expanded world wheat trade once more equal to that of prewar years. But these years proved to be the turning point (Chart 11).

From 1929–30 through 1933–34, the great decline in per capita food consumption of wheat was reinforced by the low rate of population growth. Total utilization contracted from 208 million bushels in 1928–29 to 170 million in 1933–34. This development resembled that of the war period, though the rate of decline was not quite so large. But the course of wheat production was the reverse of that during the war. Wheat acreage expanded greatly at the expense of other crops. The slow but incessant advance in yields contributed to the increase in production, but could be only a minor factor in face of an almost revolutionary shift in acreage.

In the prewar and the first post-inflation periods, the principal factors determining developments in utilization and production had operated in the same direction; in the second post-inflation period, by contrast, their effects were in opposite directions. The outcome was an unprecedented slump in net imports. In 1927–28 nearly 45 per cent of the wheat consumed was imported. In 1932–33 Germany imported less than 3 per cent and added to carryover twice the amount of net imports. In 1933–34 Germany was a net exporter of wheat on a small scale, but another burdensome addition to carryover was made (Table III). Exceptionally good weather conditions played only a minor part in suddenly making self-sufficient in wheat a country which for decades had been one of the largest wheat importers of the world.

In the third period in the post-inflation development, it was again acreage and per capita food consumption of wheat that primarily accounted for changes. Acreage lost nearly half of the gains made in the preceding advance, and per capita food consumption regained a small part of its loss. The 1934 acreage would have produced all the wheat required by Germany for 1934–35, if yields had been average and feed consumption at the customary level. Since yields were actually below average and more wheat was fed than usual, the carryover was somewhat reduced, although net imports were 10.1 million bushels. The further decline in wheat acreage and the increase in per capita consumption in 1935–36 again re-established Germany as a deficit country. With normal feeding and no carryover in, the 1935 acreage would have necessitated importation of some 15 million bushels of wheat.[4] Actually imports were offset by exports and feeding was heavy. Hence the accumulated stocks had to be greatly worked down. Under the special conditions in Germany, the reduction of stocks to "normal" or nearly "normal" was accepted not as a liberation, but as a deprivation.

In 1936–37, per capita food consumption of wheat may increase rather substantially, if the

[1] While per capita consumption passed the prewar level in 1927–28, yields (trend considered) probably did not exceed the prewar level until 1930. See p. 99.

[2] For precise comparison, it should be observed that the postwar net imports were not as large as they would have been for the Germany of prewar boundaries. According to Michael, *op. cit.*, the wheat deficit of the area ceded by Germany and of the Saar averaged in 1909–13 the equivalent of 7.3 million bushels.

[3] In terms of gross imports; net imports of Italy in the pre-depression years approximately equaled those of Germany.

[4] This figure is computed for Germany including the Saar. With a population of over 800,000 and a wheat area of only 19,000 acres in 1936, the wheat deficit of the Saar is probably about 3 million bushels.

necessary supplies prove to be available, since the upward trend will be supported by the renewed establishment of a minimum extraction of rye flour. Probably feed consumption also will continue heavy. On the other hand, latest estimates (September 1936) point to yields about average or perhaps below. With average yields, normal feeding, and no restrictions on rye-flour extraction, Germany's deficit in 1936–37 would perhaps amount to something like 20 million bushels, about one-fourth of that in prewar and postwar prosperity years. With feed consumption above normal, still larger quantities would be required. But no information is as yet available as to whether the government can and will provide the foreign currency necessary to cover the deficit by imports, particularly at the materially advanced world prices. Extraordinary measures such as fixing milling quotas below the current requirements, increasing the extraction of flour going into bread, restrictions on the production of pies, etc., may perhaps be adopted.

Wheat and Total Grain Imports

During the prewar and first post-inflation periods, Germany's production was far short of her requirements not only for wheat, but for grains in the aggregate. Moreover, she ranked higher among importing countries in net imports of all grains than in net imports of wheat and, in the prewar period, total net imports of all grains increased more rapidly than net imports of wheat. Net imports of all grains as well as wheat were higher in 1926–27 and 1927–28 than on the average in the late prewar years. With grain imports large, it seemed only natural that these should consist of those grains of which there was a deficiency, wheat among them. Nobody thought of effecting savings by compelling consumers to substitute cheaper grains for wheat. On the contrary, net imports of wheat were stimulated by the drawback system. The creation of foreign markets for rye[1] and oats prevented the excess production of these grains from exerting a limiting influence on wheat imports. Their competition with wheat for land was strengthened, and the competition of rye for the bread consumer was weakened.

In the second post-inflation period, a fundamental change in the grain situation occurred. Net imports of all grains, formerly immense, rapidly shrank. In 1931–32 they were about 40 per cent of those of the peak years 1926–27 and 1927–28. In 1933 they were little more than one-tenth of the peak, and the situation was similar in the last two crop years. Net imports, it is true, would have been materially enlarged but for the shortage of foreign currency; they could not, however, have been really large at the present levels of grain production and utilization.

In Germany's changed position with regard to her total requirements for net imports of grains, there was no place for net imports of wheat on a very large scale. Had it not been possible to adjust domestic wheat supplies to the greatly reduced requirements by shifting some of the non-wheat area to wheat, food consumption of wheat would have been forced down even more drastically than it actually declined. The exchange of foreign wheat for domestic rye or oats, moreover, was no longer possible, for Germany could not afford to pay the price difference.[2] Besides, foreign markets for rye and oats became so narrow that they could no longer absorb the surpluses which, under the drawback system, had tended to grow almost indefinitely.

Forecasts of the import balance in grains can be made with only moderate dependability. Errors with respect to the determining factors may be reflected in it in greatly magnified form.

Wheat in the Future

Of the two factors (population and yields) which were the principal sources of changes in production and utilization of wheat in the prewar decade and were reduced to a subsidiary rôle in the post-inflation years, population growth is not likely to change its rôle in the near future, while improvement in yields will probably continue (as in post-in-

[1] Just before the war, Germany was the world's largest net exporter of rye.

[2] So long as foreign exchange is scarce, there is even a tendency to reduce the share of wheat in the necessary grain imports.

flation years) to be substantially greater than the rate of population growth.

Before the Nazi government came to power, it was generally reasoned that the rate of population growth would continue to fall for about 15 years, and that by 1960 the population would begin to decline. The measures taken by the present government to reverse the decline in rate of growth seem unlikely even to arrest its decline.[1] Whether that goal could be reached by a fundamental redistribution of national income, between families and persons with and without children, could probably be ascertained only by trial. Since no such measure is thus far contemplated, we assume in our computations an average population growth in the next ten years of perhaps 0.3 per cent per annum, with a possible maximum of 0.5 per cent.

The probable increase in yields we have estimated at around 1 per cent per annum (see p. 100), depending on the price relationship to fertilizers, etc. Such an excess of the increase in yields over the population growth would permit a slow enlargement in per capita consumption or a similar contraction of acreage without increasing the dependence on foreign supplies.

Of the two factors (per capita food consumption and acreage) which changed their behavior from practical stability in the prewar decade to violent shifts in post-inflation years, per capita consumption will presumably continue as the principal source of changes in utilization in the future. Changes in acreage may also be substantial, but it will not be surprising if yields should again become the more powerful factor.

For unfavorable conditions an increase in per capita food consumption of about 20 per cent in ten years was assumed (see p. 109). In order to make such an increase possible, without increasing the deficit of domestic supplies above the level computed for 1935–36 (about 15 million bushels, disregarding carryover; see p. 113), wheat acreage would have to be expanded by 13 to 15 per cent, or 3 to 5 per cent above the peak acreage of 1933. Such an acreage can probably be attained with no more encouragement than was given to wheat in prewar years. The 1933 wheat area, it is true, included some land unsuitable for wheat; but up to 1946 the land suitable for wheat will be somewhat extended beyond the 1933 level even without further increase in the use of artificial fertilizers. There are also no great obstacles to extending the production of wheat on soils suitable for it beyond the level reached in 1933. Some such expansion, in fact, could be observed in 1933–36 in spite of the substantial contraction of the total wheat area. Moreover, with enough persistency on the part of the government, the wheat acreage could be expanded to such an extent that no net imports would be required. But since some deficiency greatly facilitates price supporting, some small imports may be found desirable.[2] The indicated increases in acreage will hardly materialize, however, unless the present feed shortage can be overcome, so that the competition of feed grains for the acreage will again be restored to that which corresponds to the relationship between the fixed prices (or similar open-market prices) of feed grains and of wheat.

It is unlikely that an increase in per capita food consumption of wheat by 30 per cent or more in about 10 years (assumed in the event of material improvement in foreign trade conditions) would be unaccompanied by a material increase in import requirements beyond the level theoretically computed for 1935–36. This improvement can hardly be attained unless, in deciding upon protective measures, caution is exerted not to raise the cost of

[1] The birth rate rose to 18.0 and 18.2 per 1,000 in 1934 and 1935, after having declined from 20.8 per 1,000 in 1925 to 14.7 in 1933. The increase was in part due to business recovery, for marriages and births took place which had been postponed during the depression. It is impossible to evaluate the part of the increase that resulted from measures intended to stimulate births, such as marriage loans, restrictions of women's work in factories, etc. Even assuming that the birth rate will not fall below the 1935 level (figures for October–December 1935 indicate a renewal of the downward trend), this rate is insufficient to insure a population growth at the average rate of post-inflation years.

[2] The imports would be greatly welcomed by consumers, if they were to consist of strong wheat badly needed for admixture to the weak German wheat, and of durum wheat. Whether consumers' wishes will be decisive as regards the kinds of imported wheat will depend largely on the foreign exchange situation and political considerations.

living to the point of harming German export industries. Moreover, the limitations imposed by soil quality would be felt much more strongly as the increase in per capita food consumption approached the indicated level. If wheat acreage were not expanded beyond the 1933 peak, the deficiency would amount to 40 million bushels, or somewhat more, at the end of the ten-year period.

The increase in per capita food consumption will not necessarily proceed at a uniform annual rate. On the contrary, the recovery is likely to be somewhat more rapid in its earlier stages. Since yields will increase but gradually, import requirements may grow more rapidly at the outset and later remain more nearly constant. It is conceivable that per capita food consumption of wheat might in a few years again reach or somewhat exceed the level attained in 1927–28 while acreage remained at its present size; if so, net imports would have to reach a level not much short of that of the prosperity years. But such a development now seems highly improbable. The slower the increase in per capita food consumption, the more likely it is that the additional demand will be covered to a considerable extent out of increased domestic production.

Space does not permit detailed analysis of the probable course of developments in the future import requirements for all grains. Suffice it to say that these developments are likely to be such that the assumptions made for wheat will fit well into the general framework. In case of unfavorable general conditions, there will be a strong desire to do without substantial net imports of all grains, including wheat. In case of favorable general conditions, substantial grain imports are likely, and wheat may well be among the grains chiefly imported.

Surplus and Deficit Regions

Comparison of the data in Table 3 (p. 102) with Chart 7 (p. 94) indicates that generally per capita food consumption of wheat is greater in the regions with a relatively large wheat production. This is due not only to the fact that peasants' bread usually is made of the grain they produce, but also to the relatively much greater utilization of wheat for producing loaf bread in towns and cities of regions with a large wheat production. Such regions also are in general much more densely populated and are therefore mostly deficit regions, while regions with small wheat production are mostly less densely populated and several are wheat surplus regions.

The prewar statistics on shipments by railways and waterways afforded the possibility of computing regional deficits and surpluses, with some approach to accuracy, for such important products as wheat. In postwar years, unfortunately, the shipments data merge into one group all kinds of flour and similar products. No computations for the past few years are available, the most recent being those by Seedorf and Hesse. These show regional surpluses and deficits of wheat, rye, and flour for the average of 1909–13 and 1925–29.[1] Because of the form in which these results are expressed,[2] and for some other reasons, they can be used only for general orientation; but for this purpose they are better than no data at all.[3] If one considers the changes in acreage (see Table II) and the reduction in consumption since 1929 (Table IV), one can get a rough idea of the present position of different regions.

Germany's western industrial regions—the Rhine province and Baden especially, Hesse, Hesse-Nassau, and Westphalia, together with the Free State of Saxony—are the principal deficit regions. In all these areas, deficits have been reduced materially, but remain heavy still. Eastern and northeastern Germany, as well as the Prussian province of Saxony and Thuringia, which produced wheat in excess of their requirements prior to the latest expansion in acreage and the decline in wheat consumption, have become surplus regions on a large scale. In the south, the areas which are self-sufficient or produce surpluses have been materially extended.

[1] W. Seedorf and P. Hesse, *Grundriss der Landwirtschaftlichen Marktlehre* (Berlin, 1932), p. 118.

[2] In 100 kilos per 100 hectares of agricultural area, for areas which often do not correspond to the states and provinces and are not wholly comparable for the two periods involved.

[3] For the late prewar years, see Michael's chart of deficit and surplus regions; *op. cit.*, p. 35.

VIII. YEAR-TO-YEAR AND SEASONAL VARIATIONS

In considering various phases of wheat in Germany, we have thus far dealt mainly with broad trends or averages for periods of years. Now, in conclusion, we have to consider significant variations that occur from year to year and within a season, and the factors influencing these variations.

YEAR-TO-YEAR VARIATIONS

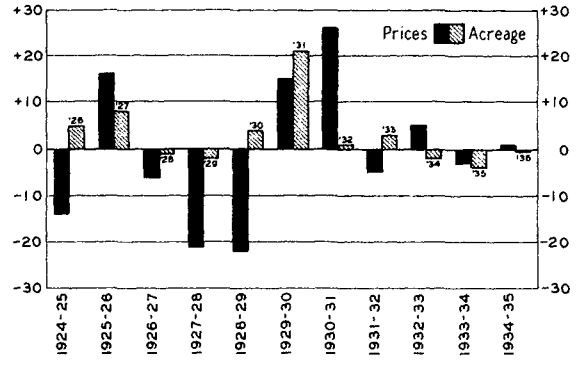
Production.—Weather conditions have only a slight effect on changes in acreage from year to year. Adverse weather seldom prevents fulfilment of sowing intentions to any appreciable extent. Since cold-resisting varieties are grown in regions with a more severe climate, winterkilling is small. The area of winter wheat that is plowed under because of winterkilling, etc., seldom exceeds 1 per cent of the area sown, and is often considerably less; 6.6 per cent in 1924 and 5.9 per cent in 1934 were exceptionally high. Moreover, part of the lost winter wheat is replanted to spring wheat. Effects of this appear in the expansion of the spring-wheat area in 1924 and 1934.[1]

Year-to-year changes in acreage sown to winter wheat are generally small. In the past eleven years the change from the preceding year once exceeded 20 per cent (crop of 1931), when it was caused by an extremely favorable price situation for a shift from rye to wheat that was reinforced by extensive propaganda for such a shift. Only in one other year (crop of 1927) did the change exceed 5 per cent; in eight of the eleven years the change was 4 per cent or less (Chart 12). One of the reasons for this stability in wheat acreage is that rotation requirements are fairly exacting. The variations in spring-wheat acreage are much larger in percentage terms (Chart 13). This is partly because spring wheat is a minor crop, in which a given shift of acreage results in a larger percentage change. Moreover, the spring-wheat acreage is sensibly affected by the amount of winter-wheat abandonment. In six years out of the past twelve, however, the spring-wheat acreage changed by less than 10 per cent from that of the preceding year.

[1] See Table VIII, and Table 2, p. 95.

German producers are sensitive, and have become increasingly sensitive, to price changes,

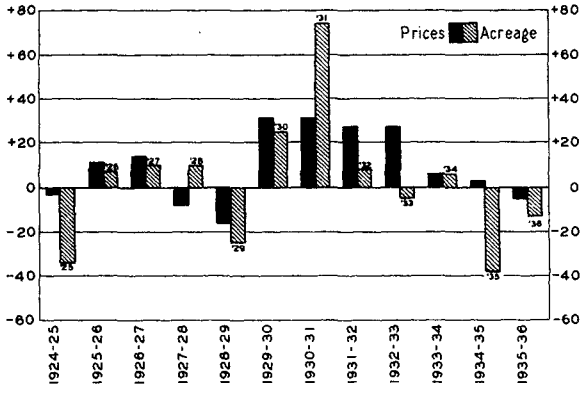
CHART 12.—PRICE RELATIONS BETWEEN WHEAT AND RYE, 1924–25 TO 1934–35, AND CHANGES IN WINTER WHEAT AREA, 1926 TO 1936*



*The bars for prices show the percentages by which the indexes of wheat prices (average 1909–10 to 1913–14 = 100) were higher or lower than the corresponding indexes of rye prices. The bars for acreage show the percentages by which the sown acreage was changed from the preceding year. On the method of computing sown acreage, see footnote to Table 2, p. 95.

particularly of certain kinds. Wheat-rye price relationships account for a considerable part of the changes in winter-wheat acreage. If wheat prices during some period of time are

CHART 13.—PRICE RELATIONS BETWEEN WHEAT AND OATS, 1924–25 TO 1935–36, AND CHANGES IN SPRING WHEAT AREA, 1925 TO 1936*



* The bars for prices show the percentages by which the indexes of wheat prices (average 1909–10 to 1913–14 = 100) were higher or lower than the indexes of oats prices. The bars for acreage show the percentages by which the acreage was changed from the preceding year.

relatively lower than rye prices, the acreage sown tends to be reduced if it had been high,

or kept low if it had been low. If wheat prices are high relative to rye prices, winter-wheat sowings tend to be increased or, if they were high, to be kept high. Similarly, wheat-oats price relationships tend to influence the acreage sown to spring wheat.

Chart 12 shows more or less concurrence between wheat-rye price relationships in a certain year and changes in winter-wheat sowings in the ensuing fall. A closer concurrence between wheat-oats price relationships in a given year and changes in spring-wheat sowing in that year is shown in Chart 13. It should be recalled, moreover, that the prices fixed for 1934–35 and 1935–36 did not correctly reflect the tight feed situation of these years, which favored the growing of feed crops rather than of wheat. When the last two pairs of bars in Chart 12 and the last four in Chart 13 are disregarded, price relationships concur with the changes in acreage in five out of nine years for winter wheat and in eight out of ten years for spring wheat.

The influence of price relationships on wheat acreage is frequently not manifest if one considers only crop-year average price relations, as in Charts 12 and 13. The relationship in the months preceding sowing is more influential than that of the crop year as a whole. In 1924–25, for example, wheat prices averaged low as compared with rye prices; but in the first half of 1925 wheat prices rose while rye prices declined sharply, and the price relation was favorable to wheat in the months preceding the sowing of winter wheat for the 1926 harvest. The sown area was consequently increased. Wheat was cheap relative to rye in 1928–29, but the strength of wheat prices in July–August 1929 presumably led to the expansion of winter-wheat acreage for harvest in 1930.

Furthermore, in Charts 12 and 13 price relationships are related to *changes* in acreage. It was stated, however, that the acreage tends to increase or, if it was high, *to be kept high,* when the price relationship is favorable, and vice versa. The 1933 acreage in spring wheat, although slightly smaller than that of 1932, was still very high for German conditions. Exactly the same was true for the winter wheat area of 1934.

A further analysis would eliminate more of the few remaining discrepancies between price relationships and wheat acreage. On the other hand, some of the cases in which price relationships and changes in acreage concur would show discrepancies if the effect of some other factors, for example, of the amount of winterkilling on the size of spring sowings, were eliminated. Space limitations prevent adequate analysis of the subject here.

Year-to-year variations in yields per acre are relatively small, for climatic reasons already noted (p. 70). Variations in the effective outturn per acre, it is true, are somewhat greater than indicated by the yield figures. For poor yields are frequently caused by heavy precipitation during the harvest period, and this condition also reduces the rate of flour extraction.

Under normal conditions, variations in German wheat production would be nearly as moderate as the variations in yields. The violent changes in price relationships in post-inflation years, between wheat on the one hand, and rye and oats on the other, must be regarded as abnormal. Hence the marked variations in wheat area and production in these years were also abnormal.

Carryover.—The high moisture content of the domestic crop makes the keeping of grain in store much more costly in Germany than it is in this country. Damp grain loses weight in storage and must be ventilated at frequent intervals. Hence, the usual form of storing grain in warehouses in Germany is not in bins, but in rather small heaps on floors in buildings with several stories. In 1935, elevators constituted only 13 per cent of the grain storage capacity of warehouses and 52 per cent of that of mills. Storing in small heaps insures that the pressure on the grain is small and permits the grain to be brought in contact with the air at frequent intervals. This method of storing is of course more expensive than storing in bins. Part of the grain gets spoiled nevertheless.

Carrying grain into the next crop year is particularly expensive, because it involves storage through the hot months. In general, it is unprofitable except under very extreme conditions, even when the grain is of good

keeping quality. Difficulties experienced in storing grain have been an additional incentive for producers to develop the habit of selling out their old-crop grain before the new crop becomes available. Data on stocks on farms, collected only from 1927 (see Table V), show that in the two years with the largest stocks in percentages of the preceding crop (1928 and 1933) the winter wheat on farms on June 15 constituted only 8.6 and 7.7 per cent of the preceding crops respectively. For spring wheat the highest percentages on June 15 were 14.1 and 9.7, in the same two years. Even in these years not much wheat was left on farms by the middle or end of August, when new wheat was ready for the market. Hence, before the era of fixed prices, changes in year-end farm stocks could affect year-to-year supplies only slightly (see Table III). Now, with prices fixed according to schedules providing for price increases from month to month during the season with a return each year to a relatively low price as the new season begins, carrying over stocks into the next crop year would entail a heavy loss year by year, and no stocks are carried over on farms.

Nor has it been customary for grain merchants and millers to carry substantial stocks into the next crop year. In the period from 1924–25 to 1931–32, there were three years for which material changes in the carryover in second hands were indicated (Tables III and V). Comprehensive data on stocks of grain in mills and warehouses are available only from February 1932.[1] Thus they include carryover stocks in but two years in which prices were not fixed (1932 and 1933). At the end of July 1932, before new domestic wheat became available, the enumerated stocks of wheat and wheat flour in mills and warehouses were equivalent to only 10 million bushels, inclusive of imported wheat. The corresponding figure in July 1933, nearly 19 million bushels, was certainly above a level previously considered normal. Now, with prices fixed, grain stocks in second hands at the end of the crop year are those which mills are compelled to hold or those belonging to the government. Variations in these stocks are determined by defense considerations and the supply of foreign exchange, rather than by the supply situation in the domestic and world wheat markets.[2]

Utilization.—Variations in the size of the wheat crop have seldom had substantial effects on year-to-year variations in food consumption of wheat. Since the crops of wheat and rye frequently turned out similarly, food consumption of wheat may even have tended to increase in years of poor crops, for the use of wheat flour in the preparation of mixed bread probably tended to be greater in years of short rye crops. These increases, if any, could not have been large, and in years of high prices they may have been counterbalanced by reductions in the consumption of wheat bread, mixed bread, or both.[3] Since (except in 1934–35 and 1935–36) the feeding of wheat without subsidies was restricted to tail- and damaged wheat, and since the quality of the wheat is usually poor in years of small crops, year-to-year variations in feed use of wheat probably also tended to vary inversely with the size of the wheat crop. According to Fensch, 11.8 and 14.0 million bushels were used for feed on farms of more than 12.35 acres in 1924–25 and 1927–28 respectively—both years of poor crops;[4] in 1925–26, a year of good crop, 8.1 million bushels were so used; but the corresponding figure for 1926–27, another year of poor crop, was only 6.6 million.

[1] See Tables VI and VII and Appendix Note A (4).

[2] For prewar years Holbrook Working ("The Changing World Wheat Situation," WHEAT STUDIES, September 1930, VI, 448–50) showed that data on apparent domestic utilization in 1883–1914 strongly indicated appreciable changes in year-end stocks inverse to crop-year prices. Probably these variations were chiefly in stocks of imported wheat.

[3] In his correlation analysis covering prewar years, V. P. Timoshenko (*World Production and the World Wheat Market*, Cornell University Memoir No. 118, 1930, pp. 51–52) found no relation between the German rye crop and wheat imports. This would indicate that wheat consumption did not tend to increase in years of short rye crops, provided the carryover did not tend to be reduced in years of short crops. Consumption data would have to be much more exact than they are, in order to prove or disprove the possibility of prices having some effect on bread consumption. Changing the *weight* of the loaf or roll rather than its *price* is widely practiced in Germany, and results in small consumption changes unnoticed by consumers.

[4] *Op. cit.* The computations in Table III give a different estimate for 1924–25, but Fensch may be more nearly correct. Food consumption in that year may have been less, or the proper correction of the official crop estimate larger, than we have assumed in our calculations.

Balance between production and utilization.—Total utilization of wheat may thus have been somewhat larger in years of poor wheat crops. Even if all or part of the additional requirements had been offset by contraction in stocks, the necessity of compensating for variations in crops still remained. So long as Germany was on an import basis, this problem was easily solved. Net imports increased or declined about in relation to the size of the crop, as in 1924–25 and 1925–26 (Table III). But in 1932 and 1933 Germany produced more wheat than was needed for current requirements. The excess of supplies in 1932–33 was in part eliminated by directing some quantities into feed use in eosinized form. Compulsory storage by mills was the chief measure applied to the surpluses of the year 1933, but arrangements were also made to have exports slightly exceed imports.

For the time being, reduction in acreage and increase in food consumption have eliminated the wheat surplus. If a surplus should reappear while feed shortage persists, the excess wheat would find its way into feed use without any subsidies. After that shortage is overcome, adjusting year-to-year variations in outturn to the demand may again present a problem, the more serious because of a wheat price level far above the world market, the poor keeping quality of German grain, etc.

Thoroughgoing regulation of the market materially facilitates certain kinds of solutions. Though storing of German wheat is expensive, increasing the carryover in surplus years may be the major measure,[1] provided the foreign trade situation permits imports of feedstuffs (as it now does not), and that the available storage capacity is not fully used for working and permanent stocks (see p. 83).[2] In the event of particularly large surpluses, part may be directed into feed use with the help of subsidies, or exported in exchange for feed grain, or both. The most economic use of the opportunities provided by the control system is not to let the acreage exceed a size which, in years of good yields, would merely cover total utilization; and to rely upon net imports to provide the balance in all other years. Such a policy may be chosen even in case per capita food consumption advances only slightly, although in this event it would be relatively easy to increase domestic production to such an extent that no imports would be necessary even in years when crops were average or below.

Prices.—As long as Germany was heavily on an import basis, year-to-year price variations were largely determined by price variations on the world market, except as changes in tariff rates were a factor.[3] The drawback system virtually insured that German prices should equal world prices plus the import duty, with such discounts as resulted from the poorer quality of German wheat or the position of some regions as surplus producers.[4] The termination of the drawback system in 1930 did not change this situation materially, so long as Germany remained in need of large net imports. Then came the surplus years 1932–33 and 1933–34. Since in the meantime Germany had become an isolated market, the effect of these surpluses on year-to-year price changes would have been very marked had it not been for the employment of intensive price-supporting measures.

The establishment of the system of fixed prices put an end to year-to-year variations of prices originating abroad or in variations of the size of the domestic crop. Independence from price variations in the world market is

[1] In years of good crops the condition of the grain is generally much better than in years of poor crops. This tends somewhat to facilitate carrying over portions of large crops, but the grain left at the end of the year is not necessarily that of the best keeping quality.

[2] A census of grain-storage capacity as of July 20, 1935, indicated a total of about 7.7 million short tons —2.3 million in mills, and 5.4 million in warehouses; and a substantial increase in warehouse storage capacity since 1927, when the last such census was taken. See *Wirtschaft und Statistik*, 1936, No. 14. The data on mill storage appear not fairly comparable.

Starting with 1935, subsidies have been paid to mills for building grain elevators. This may make it possible to keep permanent stocks of grain which could be further increased temporarily in years of good crops.

[3] On tariff duties in effect, see Appendix Note C. Timoshenko (*op. cit.*, p. 83) has shown that for the period 1891 to 1913 Berlin wheat prices were more closely associated with world wheat production than with German production.

[4] Variations in the size of the domestic crop affected German prices mainly in regions which were surplus producers in good crop years and needed imports in poor crop years.

considered an advantage. Although independence of domestic prices from the size of the domestic crop is by no means new for Germany, producers would prefer that prices be made to vary inversely with year-to-year variations in the size of the crop. Such a policy, however, would greatly increase the difficulties of price regulating, for changes in fixed prices for grain would make necessary corresponding changes in fixed prices of almost all other farm products.

Seasonal Variations

Marketings by farmers. — The intensive method of cultivation, the limited use of harvesting machinery, and often poor harvest weather cause the distribution of marketings of grain by German producers to deviate considerably from that which is usual in the United States. Prior to the war, the common procedure in harvesting grain in Germany was to haul the bound sheaves into the barn, to be threshed there when time permitted. Since the cutting of grain was immediately followed by the harvest of roots and tubers, which in most parts of the country required all available labor and power, only such quantities of grain were threshed in the fall as were needed for the current requirements of the producers themselves and to meet their urgent needs for cash. The winter was considered the principal threshing time. In years with abundant rains in the fall, the marketings in the early months of the crop year sometimes did not even cover the current market requirements. On the other hand, the high moisture content of German grain usually made it hazardous to keep it in store in the spring. The producers were so anxious not to take any chances that, in some years, the markets were glutted in the first warm spring days. The combination of these two circumstances made the marketing of small grains in Germany more nearly resemble the marketing of corn in the United States. The bulk of deliveries occurred in the seven months from September to March inclusive, in a more or less even stream. In recent times, large producers have tended to shift to threshing in the field, which is done as soon as the sheaves have dried. A rush of marketings after harvest, of the extremity experienced in areas of specialized wheat production in the United States or in Western Canada,[1] is unknown in Germany.

The picture given above applies most particularly to rye, but with some qualifications it is true for wheat also. The seasonal distribution of marketings of wheat in Germany can be illustrated by the following computations made by Fensch[2] from data of accounting farms, in percentages of total marketings in accounting years July–June.

Month	1926–27	1927–28	Month	1926–27	1927–28
July	2.0	1.5	Jan.	11.0	10.0
Aug.	6.0	5.5	Feb.	7.5	9.0
Sept.	14.5	12.0	Mar.	8.0	10.5
Oct.	11.5	9.0	Apr.	5.0	8.0
Nov.	11.5	11.0	May	6.0	5.5
Dec.	13.0	11.5	June	4.0	6.5

Additional evidence on the distribution of marketings by producers can be gained from the monthly statistics of crop balances available on farms.

Stocks on farms.—Chart 14 (p. 122) shows a notably slow and even reduction of stocks on farms.[3] The dashed lines on the chart, showing what farm stocks would have been if the crop (less seed) had been disposed of at a uniform rate throughout the whole year beginning August 15, are inserted merely to facilitate comparisons of one year with another. Through the fall, the winter, and early spring, the reduction of stocks goes on in nearly equal monthly instalments. The somewhat sharper decline of the curves in September–October is accounted for by the use of some 7 to 9 per cent of the crop for seed in addition to feed use, if any, and marketings.[4] If the quantities used for seed could be excluded from the totals, the decline of the curves in the early fall would in several years

[1] See Holbrook Working, "The Timing of Wheat Marketing in Western Canada," Wheat Studies, October 1936, XIII, No. 2.

[2] H. L. Fensch, *Die Verwertung der Deutschen Getreideernte* (Berlin, 1930).

[3] See Table V and Appendix Note A (4) for relevant details.

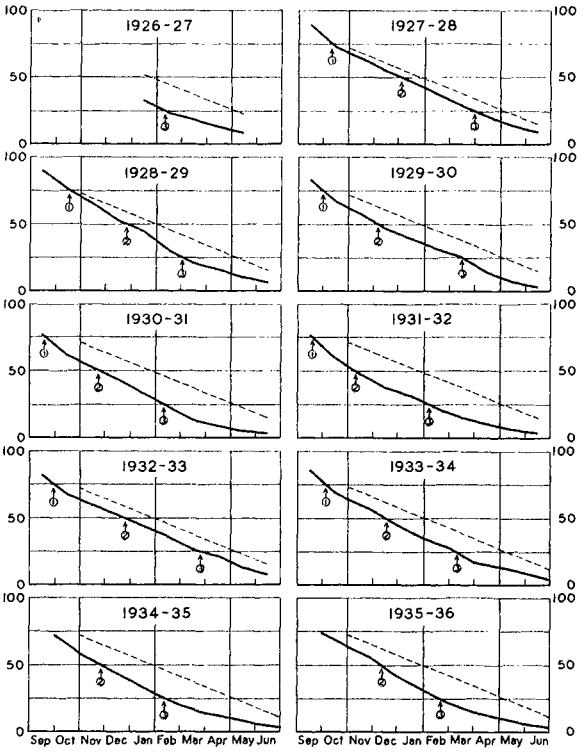
[4] Since seeding is mostly done between September 15 and October 15, the effect of seeding on the shape of the curves is more clearly seen in the years 1927–28 to 1933–34, in which stocks were reported for mid-month dates, than in later years.

be even smaller than in the later months, indicating that marketings were less in the fall than in the winter.

On December 15 of the years 1927–32 producers still held, on the average, nearly half

CHART 14.—STOCKS OF WINTER WHEAT ON FARMS, MONTHLY, 1926–27 TO 1935–36*

(Percentages of preceding crop)



* Data in Table V. The dashed lines show what stocks would have been if the crop ex-seed had been disposed of at a uniform rate through the year beginning Aug. 15. The arrows indicate roughly when ¼, ½, and ¾ of the crop had been disposed of by sale or use on the farm.

of their winter-wheat crop. Since the quantities used before that date included the grain seeded in the fall, the quantities to be marketed after December 15 were materially larger than those marketed prior to that date. On the average, 72 per cent of the spring-wheat crop was still available on farms on December 15. On the other hand, in none of the years shown did producers hold as much as 15 per cent of the winter-wheat crop on May 15, and frequently they were virtually sold out before April 15.

Foreign trade.—In countries where imports merely supplement the domestic crop, they frequently show a characteristic seasonal curve: imports are small in the fall and reach their maximum immediately before the new crop comes in. Where imports cover the bulk or all of the requirements, they tend to be distributed more or less evenly through the crop year; and their seasonal course, if any, tends to reflect seasonal variations in the exports of countries from which most of the grain is bought.

In years when Germany was a heavy importer, the seasonal variations of imports represented a combination of the two patterns. Marketings of domestic grain did not fail to affect the seasonal variations in imports of wheat for mills that ground primarily domestic wheat. Many individual mills, however, used imported wheat almost exclusively (see p. 101). Hence the effect of seasonal variations in exports from surplus countries could be easily traced in the German imports. Taking averages for the five years just before the war, 27.0 per cent of the annual imports of wheat came in August–October, when market supplies of domestic wheat were not abundant and ample supplies were available for export in surplus countries. In the second quarter, 25.8 per cent of the yearly total was imported. In the third quarter, supplies of domestic wheat were still ample, and supplies of wheat for export in surplus countries were small (owing to bad roads and freezing of harbors in Russia and Rumania); and imports fell to 19.3 per cent of the yearly total. In the last quarter, when supplies of domestic wheat were nearly exhausted and supplies of wheat for export in surplus countries were moderate, imports rose sharply but only to 28 per cent of the yearly total. Fourth-quarter imports would have had to be much larger except for the fact that mills which relied on domestic wheat for their grist used to shut down in this part of the season.[1]

In post-inflation pre-depression years, seasonal variations in imports were disturbed by

[1] The figures become still more significant if September–August rather than August–July is used for the crop year; see Appendix Note A (2). September–November imports equaled 27.5 per cent of the yearly total, while the percentages for the three other quarters were 21.8, 22.6, and 28.1 respectively.

frequent changes in import duties. Larger supplies of domestic wheat in the fall, and ample supplies for export in surplus countries in the early spring, tended to shift the bulk of imports from the first to the second half of the crop year.

German exports, if any, do not start before September. In former times they usually increased in the ensuing months, reaching their peak in December or January. In the spring and summer, price relationships between German and other wheats used to be unfavorable for exports, and commonly exports virtually ceased in the spring until the next harvest.

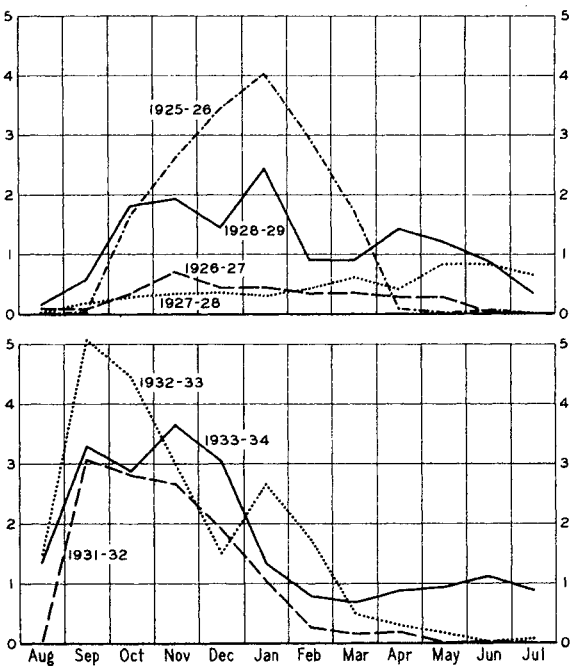
The typical seasonal course is well illustrated by the data for 1925–26 in Chart 15. There were only three other post-inflation crop years in which exports of German wheat were functioning normally, in the sense that the flow of grain into export was not interfered with by changing regulations. In 1926–27 and 1927–28, however, harvests were bad, exports were small, and their seasonal distribution was irrelevant. The large exports of 1928–29 showed substantial deviations from the normal pattern, owing to the unusually low prices of that year. After the abolition of the drawback system, exports were nearly finished before mid-winter. Their seasonal distribution clearly reflected operations under the "wheat exchange plan" (lower portion of Chart 15). The September peak of these exports, however, may reflect the shift toward earlier marketings.

As in other countries, German exports of flour are usually distributed over the year much more evenly than wheat grain exports are.

Mill and warehouse stocks.—Millers and grain dealers in Germany have been accustomed to carry only small stocks of wheat. Deterring factors were the poor keeping quality of German wheat and the limited possibilities of hedging domestic grain.[1] Positive incentives for holding large stocks, on the other hand, were largely absent. Domestic wheat came to market slowly, consumers were not insistent on uniformity of flour, and, when wheat could be readily imported throughout the year, millers could count upon a smooth flow of satisfactory material without large stocks in the mills or in other commercial channels in Germany. Under these conditions, the seasonal curve of second-hand stocks could not even remotely attain as large a steepness as is usual, for instance, in the United States or Canada. Apart from the moderate seasonal curve, there was a natural tendency to increase stocks when prices appeared low and to reduce them when prices were regarded as high.

For the period of large imports, statistics on stocks in second hands are not available. The earliest data, as of February 29, 1932,[2] showed a supply of wheat in mills equivalent to one month's grist, and total stocks of wheat and flour in mills and warehouses representing slightly more than the grist of two

CHART 15.—MONTHLY EXPORTS OF WHEAT GRAIN, 1925–26 TO 1928–29 AND 1931–32 TO 1933–34*



* Official data (not including flour) for years beginning Aug 1.

[1] Transactions for future delivery on the Berlin and other exchanges were purposely limited in scope, by prohibiting the participation of all persons not directly concerned with grain, and by other measures.

[2] In 1931–32, net imports were only about one-fourth as large as in the years 1926–27 to 1928–29.

months. In February, stocks in second hands are at or near their peak for the year. Since the data cited probably included nearly 90 per cent of all supplies in warehouses and mills,[1] the stocks held at the end of February 1932 must be classed as moderate.

As Germany succeeded in freeing herself from the necessity of large imports, the balancing element provided by the fairly even flow of world wheat exports was lost. Variations in domestic wheat marketings therefore came to assume much larger significance, the more because these variations were tending to increase. Neither the millers nor the other intermediaries, however, were prepared to assume the responsibility of carrying large stocks. For the time being, the problem of adjusting variations in marketing supplies to requirements evenly distributed throughout the crop year has been solved, more or less satisfactorily, primarily by regulating the rate of marketing by farmers, in part by compelling mills to keep stated quantities in store, and, for the rest, through surplus purchases by a government agency which sells as need arises. Compulsory mill storage could be made a much more powerful device for leveling off intraseasonal variations in marketings by farmers; but the measure has been used primarily to serve defense purposes, and the desire was to leave the stocks requirement unchanged regardless of the size of the crop and of marketings by farmers.[2] Because of these regulations, and to some extent also because of the large wheat crops of recent years, stocks in mills and warehouses have been far larger in the past four crop years than they formerly were.[3]

Prices.—The typical seasonal course of domestic wheat prices before the war, corresponding to the flow of grain from farm to market, was fairly steady from September to some time in March (with occasional temporary increases in the early fall, in years of insufficient marketings due to poor weather conditions), followed by strong advances from April on. The actual course of prices in the last five prewar years was in surprising conformity with this broad tendency. In each year, prices were nearly stable up to and inclusive of February. In three years there was even a slight decline in prices during the later winter months. In four years an upturn of prices occurred in March or April.[4]

In post-inflation years, fall marketings became larger, owing partly to changes in threshing practices and even more to high interest rates and the farmers' need of cash. In consequence, the curves of monthly prices in the years before price fixing show pronounced troughs in the autumn (Chart 16), in spite of the fact that wheat prices on world markets tended to show troughs in the early spring when Argentine arrivals reached their peak.

When arrangements were made for fixing grain prices (beginning with 1934–35), the government had to consider the problem of establishing satisfactory premiums for deferred deliveries within the crop year. It desired, of course, to insure a flow of grain to market which would cover in full the requirements of the city population, without causing an overflow in the fall. No experience was available to show what monthly differentials would bring this about. In establishing these it was necessary to take into account the poor keeping quality of the German grain, particularly in the spring. Presumably consideration also had to be given to the fact that, under fixed prices, producers are deprived of any hope of a substantial price advance in the spring; such hopes had undoubtedly been a factor inducing many to postpone marketing until the last moment, even at the risk of being compelled to accept still lower prices. Thus the necessity of fairly large premiums for different deliveries was indicated. But the government also desired to have bread prices stable throughout the year; and this called for

[1] See Appendix Note A (4).

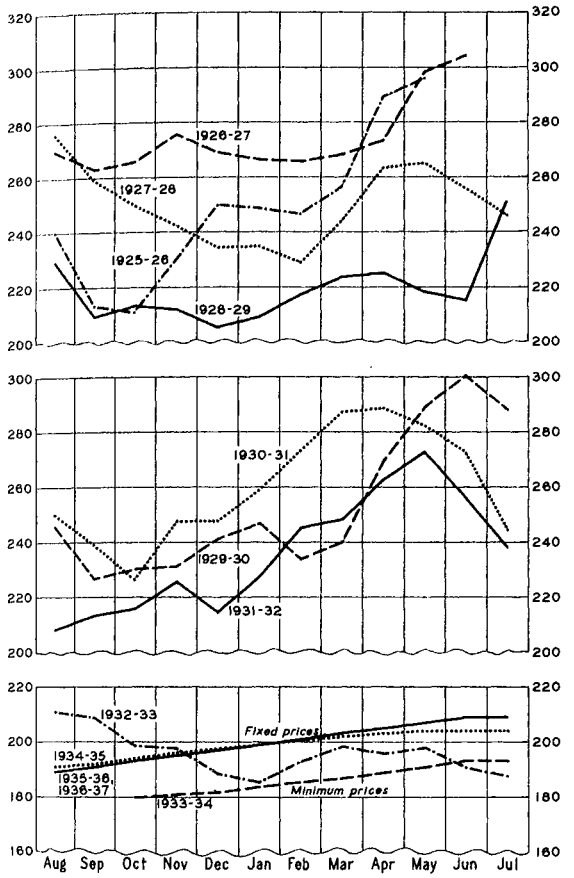
[2] The device would have to be materially perfected and, still more difficult, the storage capacity of mills greatly increased, before compulsory mill storing can serve three purposes: (1) to provide a large permanent stock as a defense insurance; (2) to level off interseasonal variations in crops, in line with Secretary Wallace's ideas of an "ever-normal granary"; and (3) to level off intraseasonal variations in marketings by producers.

[3] See Table VI, and Chart 6 in WHEAT STUDIES, December 1935, XII, 116.

[4] See "Die Märkte der Wichtigsten Landwirtschaftlichen Produkte," *Handbuch der Landwirtschaft*, I (Berlin, 1930), 844.

CHART 16.—MONTHLY PRICES OF GERMAN WHEAT, FROM 1925–26*

(Marks per metric ton)



* Prices in the province of Brandenburg through 1932–33, comparable minimum prices for 1933–34, and fixed prices for later years. The fixed prices shown for August in 1935 and 1936 applied only in the second half of the month; in the first half, the prices of the preceding July were in force. Prices for the first half of August 1937 have not yet been announced.

no premiums for deferred deliveries, or only the smallest ones. On balance, a premium of 6.8 per cent for a delivery deferred by 8.5 months or more was established for 1934–35, with intermediate months pro rata. These premiums proved too low, and they were increased by 50 per cent at the beginning of 1935–36, to the equivalent of 10.6 per cent of the price for a delivery deferred by 9.5 months or more (see Chart 16 and Table 1, p. 85). Even after the increase in premiums, the curve of fixed prices must be considered stable in comparison with the violent fluctuations of prices before 1933–34.

In 1935–36, producers' deliveries were behind the schedules prescribed. Although no exports were made, current requirements were not satisfied, and the government was compelled to supply mills with part of their quota grist. At least in the case of rye, however, and apparently of wheat also, the small deliveries were due to the unwillingness of producers to accept the fixed prices, rather than to their desire to get the premiums for later delivery. Hence judgment on whether the established margins between monthly prices are satisfactory must be postponed until more experience is available. This will show not only whether the total premium for deferring deliveries from fall to spring is correctly chosen, but whether equal price differentials for all months are appropriate under German conditions. It may be that higher premiums are warranted for the spring and summer months than for those in the fall and winter.

This study is the work of Naum Jasny of Washington, D.C., an experienced student of German agriculture and trade, formerly foreign correspondent of the Food Research Institute in Germany. The manuscript was prepared for the press with the aid of Joseph S. Davis, P. Stanley King (map and charts), and Rosamond H. Peirce of the Institute staff

APPENDIX NOTES

NOTE A. ON GERMAN WHEAT STATISTICS

1. Production Data

Crop information is collected by the central statistical authorities[1] in two different ways: on acreage, through official channels; on all other matters, through an army of private crop reporters. Official estimates are based upon such information, which ranges from sample data to fairly comprehensive enumerations.

The *acreage* is in general ascertained once a year, between the middle of May and the beginning of June, and this acreage is officially accepted as the area harvested. In the past, comprehensive censuses of land utilization (see Table I) were taken about once in a decade (1883, 1893, 1900, 1913, 1927, 1935, and 1936), with annual surveys on a somewhat smaller basis in the intervening years. In the future, such censuses will probably be taken annually. In 1935 and 1936, more than 80 per cent of the agricultural area was covered by reports from individual farmers, checked by officials.

For many years, the crop reporters have reported in the spring (formerly April, now May) on *winter grain plowed under* owing to winterkilling, etc. These data are published as percentages of the area sown in the fall. These percentages have never been used officially for computing the area sown to winter grain; hence our computations of the sown area in Table 2, p. 95, have no official authority.

In 1928, for the first time, the crop reporters were asked to report in December on changes from the preceding year in the *area sown to winter grain.* Beginning with the fall of 1933, special surveys for ascertaining the area sown to winter grain were substituted. The information thus collected does not as yet seem to be highly reliable. Of the three crop years for which estimates of the sown area were made, data for only the first agree well with the acreage data ascertained in the spring and adjusted for winter losses. For the crops of 1935 and 1936, the December estimates of the area sown to winter wheat were lower than the adjusted data of the spring surveys by about 3.5 and 3.0 per cent respectively. In view of the moderate variations in acreage in these years, such disparities appear considerable. The decline in the sown area in 1934–35 as compared with 1933–34 amounted to 6.4 per cent according to the fall survey, and to only 3.9 per cent according to spring survey data adjusted for winter losses. Such discrepancies may, however, be due more to inaccuracies in the data on the area plowed under, which are used for correcting the spring data, than to erroneous results of the fall surveys.

Condition of winter crops at the beginning of November, December, and April to July, and of spring crops at the beginning of June and July, is reported by the crop reporters, and published by the Statistisches Reichsamt, on a scale of numerals with one decimal: 1 meaning very good, 2 good, 3 average, 4 poor, and 5 very poor. The whole technique of condition appraisal, however, seems rather undeveloped. Even the July condition figures afford only a very vague idea of the probable outturn. This is partly because yields are greatly influenced by the weather during harvest; but other factors also impair the reliability of the condition figures. For 1928 the July condition figure for winter wheat was one of the three poorest of the decade 1926–35, yet the yield proved to be the second largest (trend considered) in the ten years. The average of July condition figures in the same decade was not 3, but 2.64. In only one year did the July condition figure exceed 2.8, amounting to 3.2. The best figure was 2.4; and the difference between the best and the poorest was not 40 decimals, as indicated by the scale, but only 8 decimals (4 decimals for nine out of the ten crop years).

Provisional *estimates of yields* are published in July, August, and September, based upon the condition of the crop at the beginning of each month. Final estimates of yields are published sometime between November and February. No revisions of the final figures have ever been attempted except for the period 1893 to 1898. Both the provisional and the final estimates of yields are based on estimates of crop reporters, expressed in 100 kilograms per hectare.

Some comments on the data on acreage and yields in different periods are pertinent.

1894–1913. Data on *acreage* derived by the censuses are believed to have been more reliable than those got by the annual crop surveys. The difference between the two sources, however, probably did not exceed 1 or 2 per cent. No attempt is made, therefore, to adjust the yearly survey data for the possible errors.

Estimates of *yields* for the last two prewar decades are commonly considered to be too high.

[1] The organization of crop statistics (and many others) has been decentralized in Germany. Information on crops has been collected and worked up by the Preussisches Statistisches Landesamt and corresponding agencies in other states. Germany's central statistical office, the Statistisches Reichsamt, formerly only summarized the state results, although it had also some influence on the methods of collecting and working up the data. Since the inauguration of the Nazi regime, there has been a tendency toward concentration. The Prussian Landesamt, at least, has been merged with the Statistisches Reichsamt since October 1934.

Convincing evidence of the lack of comparability between the data on yields in the late prewar years and in the years from about 1928 to the present time appears when one compares the figures on yields in the two periods and the conditions of wheat growing, particularly the amount of artificial fertilizers used. By and large, the depletion of the soil of nutrients during the war and inflation period was probably replenished by 1929. The amount of artificial fertilizers used in that year was considerably greater than in the late prewar years. Practices of cultivation and seed selection had also been improved in the meantime. Consequently, yields must have reached the prewar level, or perhaps exceeded it, sometime around that year. According to official data, however, yields averaged 32.7 bushels per acre in 1909–13 and 32.0 bushels in 1929–33.

If official data on prewar yields overstate the truth, doubt remains as to the amount by which the prewar data must be reduced in order to make them comparable with the data for recent years. Quante, a staff member of the Prussian Statistical Office and an undoubted expert in crop statistics, assumed that a 5 per cent adjustment should be made.[1] The Statistisches Reichsamt recently conceded, albeit rather reluctantly, that the prewar yields "may have been overestimated to some extent, possibly by about 5 per cent."[2] Bennett, on the basis of German evidence, considered more appropriate a reduction of the prewar wheat yields by 10 per cent.[3] To the present writer also this figure seems more nearly correct.

[1] P. Quante, "Die Zuverlässigkeit der Deutschen Anbau- und Erntestatistik unter Besonderer Berücktsichtigung der Preussischen Verhältnisse," *Zeitschrift des Preussischen Statistischen Landesamts*, 1924, Vols. III and IV, pp. 1–70.

[2] "Die Entwicklung der Deutschen Ernteereträge," *Wirtschaft und Statistik*, 1935, pp. 662–65.

[3] M. K. Bennett, "Per Capita Wheat Consumption in Western Europe," *Wheat Studies*, March 1935, XI, 274–75.

[4] A comparison of the prewar yields with postwar ones for rye, the principal German crop, gives results similar to those for wheat; and data for oats seem to call for nearly as large a reduction of prewar yields. This seems to support the correctness of the downward adjustment of prewar wheat yields by 10 per cent; for under conditions like those in Germany, conclusions as to the accuracy of crop statistics can hardly be based on data for one crop alone. But the conclusions as to the rye and oats yields are based on the same foundation as for wheat, namely, considerations as to the condition of the soil, and records of a small number of estates. Analysis of such evidence, after more than twenty years, can hardly be so precise as to permit one to be certain whether 5 or 10 per cent is the nearer to the true adjustment factor.

[5] According to Quante, the data for 1925 may be too low by 1 to 1.5 per cent.

[6] *Wirtschaft und Statistik* (published semi-monthly by the Statistisches Reichsamt), 1935, No. 21.

There is, however, some doubt as to the number of prewar years to which the correction figure is applicable. Bennett applied his correction figure to the yields of the two prewar decades. The statement of the Statistisches Reichsamt also is made in a general form. But the inferences in all cases are drawn from a comparison of the postwar yields with the yields of the last few prewar years only. It is not impossible, however, that the shift to exaggerated estimates occurred sometime during the two prewar decades. The official data show such a pronounced increase in grain yields in the last fifteen prewar years (averaging more than 1.5 per cent per annum) that the increase would remain large even if the yield figures for the late prewar years were reduced by a greater percentage than those for the earlier years. In spite of these doubts, Bennett's adjustment has been applied to the official figures for the whole period 1894–1913 in Table VIII.[4]

1915–23. It is generally accepted that official data understated both *acreage* and *yields* in the years of war and inflation, owing to the great inducements for producers to conceal their production. There are not available, however, any private estimates of area and yields in those years which can be considered reasonably safe to use. The present writer thinks it preferable not to base any conclusions on the production statistics of this period, and they are omitted from Table VIII.

1924. There are strong indications that crop *acreage* for 1924 was officially underestimated. Since it is difficult to segregate wheat from other crops and the underestimate was not very great, the official figure has been used. Official data on *yields* also are underestimates. They are raised by 10 per cent in our tables, according to the advice of P. Quante to the present writer.

1925–36. It was asserted that, beginning with 1925, the procedure employed in yearly acreage surveys was considerably improved; several of these surveys were even designated as small censuses. Hence it was assumed that from 1925 the survey and census data correctly reflected the year-to-year changes, and could be used without hesitation for comparisons with prewar census data.[5] In taking the 1935 census on land utilization, however, it was found possible to introduce further technical improvements. When the results of the census showed rather substantial deviations from the data of the preceding years, it was realized that these differences were predominantly due to changes in the statistical technique and only to a very small extent to factual changes in land utilization.[6] Moreover, it became doubtful whether changes in land utilization in the preceding years were correctly reflected by the official data.

The Institut für Konjunkturforschung, which is closely connected with the Statistisches Reichsamt, estimated that the official statistics of the winter wheat area in the years preceding 1935

were too high by about 3 per cent.[1] The Institute did not state how many preceding years it had in mind. However, in its discussion of the results of the census of 1935 cited above, the Statistisches Reichsamt made the statement that the decline of the acreage in oats may have been understated by the official data from 1930 to 1934. But if the possibility is admitted that the official statistics may have gone wrong sometime within this period, the official data for the years prior to 1930 may have been correct. Moreover, compulsory delivery always tends to impair statistics. It may later be found that the data prior to 1935 are correct while those for 1935 are underestimates. Since the proposed correction for winter wheat area is small, it seems preferable to retain the standing official figures on acreage for the time being, but to be cautious in drawing inferences from computed changes between years prior to 1935 and those of 1935 and 1936.

As to *yields*, it must be assumed that the official data for the early years of the period from 1925 to 1936 are still somewhat too low for comparison with those for more recent years. In "Die Deutsche Getreidebilanz" Hanau and the present writer[2] raised the official data for the first three of these years by 5 per cent, and there is no new evidence to justify changes in those adjustments. Official data on yields from 1928 on are accepted as fairly correct.

2. The Crop Year

The period July–June is used in German agriculture as the accounting year, and the accounting year has been commonly used as the crop year in computing total supplies, crop-year prices, etc. In some instances, a shift has been made to the period August–July. Though a decided improvement, this is by no means satisfactory. In most parts of Germany, little new-crop wheat reaches the market before the second half of August, or in some years before the end of August or early September.[3] So far as foreign trade is concerned, a lag between imports and exports and their registration by the customs by perhaps one week can easily be proved. Thus, almost all the imports and exports registered in foreign trade statistics in August, and in some years part of the imports and exports registered in September, properly belong in the preceding crop year. Nevertheless, it would hardly be advisable to change the German wheat crop year from August–July to September–August, since the crop year August–July is used by most countries of the Northern Hemisphere. If mistakes are to be avoided, however, the inexactness of the statistical crop year must be kept in mind.

3. Rate of Extraction of Flour

High extraction is profitable in Germany for two important reasons. First, the margin between the prices of low-grade flour and bran, the factor determining the profitable rate of extraction, was for decades kept wide by high import duties on wheat flour, while bran could generally be imported duty free. Second, the large consumption of mixed bread has provided a good outlet for low-grade flour, and the regulations concerning exports of flour permitted products usable only as feed to be exported as flour with the benefit of the drawback system.[4] The high moisture content of German wheat is, of course, an obstacle to high extraction; but it is compensated for, at least in part, by the high moisture content of German flour and by the small amount of dockage and foreign matter in German wheat.

The wheat flour, graham flour, and semolinas shown by the milling census of 1927–28, when related to the wheat milled, indicated an average extraction of 71.8 per cent. But there was also an unaccounted loss of 2.2 per cent. It seems probable that the millers reported the amount of wheat paid for, rather than the amount actually milled; hence part of the loss probably occurred before the wheat reached the mill. Moreover, the quality of the 1927–28 German wheat crop was exceptionally poor. The *Allgemeine Deutsche Mühlenzeitung* has used 75 per cent as the conversion coefficient in its annual computations of flour consumption. The Institut für Konjunkturforschung has used a coefficient of 72.[5] The actual figure undoubtedly varies appreciably from year to year. A coefficient of 72.5 per cent has been used in the present study for expressing stocks of flour in mills and warehouses in terms of wheat. The true average coefficient may be slightly higher than this.

Owing to certain peculiar conditions, different *conversion coefficients for flour imported and exported* by Germany must be used. This procedure is followed by the Statistisches Reichsamt, but the coefficients it uses seem unacceptable.[6] For converting *imported flour* into wheat the coefficient employed in converting domestic flour can be used. The average grain equivalent of the *flour exported* is certainly materially lower, but a reliable computation would involve a great deal

[1] *Wochenbericht des Instituts für Konjunkturforschung*, Nov. 20, 1935. Corresponding figures for other grains were: oats, 12 per cent; barley, 2 per cent; winter rye, 0.

[2] *Blätter für Landwirtschaftliche Marktforschung*, October 1931, September and December 1932.

[3] This is clearly reflected in the statistics on stocks in mills and warehouses, given in Tables VI and VII.

[4] In several postwar years, indeed, the flour exports consisted almost exclusively of such products.

[5] H. von d. Decken, *Deutschlands Versorgung mit Landwirtschaftlichen Erzeugnissen* (Sonderheft der Berichte über Landwirtschaft, Berlin, 1935), p. 29.

[6] In converting short patents, 100 units of flour are considered equivalent to 150 units of wheat, while for second clears the relation is 100 to 100.

of work, including analysis of the data country by country and year by year. Products which are sold abroad for feed use but which enjoy the export privileges granted to flour are naturally entered as flour in the German foreign trade statistics. Some of these products should be eliminated from the flour figures; another portion should be considered as partly flour, partly feed.[1] Since the present writer has found it impossible to undertake such a complicated computation, both imports and exports of flour have been converted to wheat by assuming an extraction of 75 per cent, except that a rate of 72.5 per cent has been used for the crop years 1924–25 and 1925–26, when there were large net imports of flour. The inexactness of the results is in general unimportant, owing to the small amounts of flour imported and exported; but the total supplies available for domestic consumption are somewhat understated by the use of too low conversion coefficients for exported "flour."

4. Statistics of Stocks

Data on *stocks* of winter and spring wheat, winter rye, winter and spring barley, oats, and potatoes *on farms* are collected monthly (months immediately prior to the harvest are usually omitted) by the Preisberichtstelle bei der Hauptabteilung II des Reichsnährstandes, the successor of the Preisberichtstelle beim Deutschen Landwirtschaftsrat. They are based on information from the correspondents of the Preisberichtstelle. Although the number of correspondents is not large, the data have proved fairly reliable, on the whole.[2] Data are available from January 1927. Through October 1933 they pertain to the middle of the month; a shift was then made to the end of the month, in order to have all stocks statistics for the same date. The data are made available around the 20th of the ensuing month. Though published only as percentages of the preceding crop (see wheat stocks figures in Table V), they are usually converted into absolute figures by the users of the statistics.

So long as the market remained free, the Preisberichtstelle also published data on the supplies on farms available for sale, expressed as a percentage of the total crop. These data were of course less reliable than the data on total stocks on farms, but they gave a fair picture of the intentions of the owners of the stocks at the time the reports were made.

Statistics of *stocks in mills and warehouses* ("in second hands") of wheat, rye, barley, oats, wheat flour, and rye flour are compiled monthly by the Statistisches Reichsamt for the end of each month, beginning with February 1932.[3] These are published about seventeen days after the date to which they pertain, with sub-totals as shown for wheat in Table VII. Regional sub-totals are not currently published, but may be derived for certain months from percentages sometimes made available much later.[4] Through March 1933 the figures originally published covered only stocks in mills with a capacity of more than 10 metric tons in twenty-four hours and in warehouses with a storage capacity of more than 500 metric tons. These data were later adjusted to conform to those on a broader basis, namely, for mills with a capacity of more than 5 metric tons in twenty-four hours and for warehouses with a storage capacity of more than 150 metric tons. Stocks in factories producing mixed feeds, malt, coffee substitutes, etc., as well as stocks in transit and in bakeries, are not included. Until recently, it was officially assumed that the data as published covered about 95 per cent of the total stocks in mills and warehouses. When the results of the 1935 census of grain storage capacity became available, considerable omissions were disclosed. Beginning April 1936, data on a new basis are published. A comparison of the data for April–June 1936 on the old basis and the new showed that the former were equivalent to about 93 per cent of the data on the new basis for wheat and to about 95 per cent for wheat flour. These percentages are applied officially for adjusting the data for 1935. The official pronouncement on the revision of the statistics on stocks in mills and warehouses does not mention that the minimum capacity of mills and warehouses covered by the statistics has been lowered. Hence it seems probable that up to and including March 1936, total stocks of wheat and wheat flour in mills and warehouses were higher than those shown officially by about 13 and 10 per cent respectively. Since April 1936 they are probably higher by about 5 per cent. In this study (Table III) these correction factors are used for adjusting all available data, although it is by no means certain that the proportion of stocks in the warehouses and mills previously omitted was always the same.

5. Estimates of Wheat Utilization

Official estimates of wheat supplies and their disposition in Germany, with special reference to food and feed consumption, are not published. A. Hanau and the present writer prepared such

[1] An idea of the quality of the exported products can be derived from the data on export prices.

[2] The data are supposed to represent stocks from the latest harvest only. To distinguish between stocks from different harvests is rather difficult, and the introduction of this distinction would impair the reliability of the data unless the farm stocks were usually exhausted before the new crop came in.

[3] For these data on wheat and wheat flour, see Tables VI and VII. Earlier, monthly statistics of stocks were available only for Berlin.

[4] Such percentages for February, July, and September 1933 are given in *Industrielle Produktion, 1933* (Sonderheft zu *Wirtschaft und Statistik*, 1934), p. 155.

estimates for years beginning with 1924–25, and published them in "Die Deutsche Getreidebilanz."[1] These included spelt along with wheat, and applied to present-day Germany exclusive of the Saar. The Berlin office of the United States Department of Agriculture has brought these estimates down to date. For the present study the estimates have been reworked, and spelt eliminated. Although most of the changes were small, they involved nearly all of the figures.

As given in Table III, the figures represent conversions from mostly rounded figures in metric tons, and the appearance of exactness is an unfortunate consequence. The figures are necessarily subject to a certain margin of error, as is true of such computations for any country. Explanations of the methods used are given in the note accompanying that table.

[1] *Blätter für Landwirtschaftliche Marktforschung* (Berlin), October 1931 and September and December 1932.

NOTE B. REGULATIONS UNDER THE FIXED-PRICE SYSTEM, 1936–37

1. Wheat Prices and Differentials

a) The fixed price applies to sound and dry wheat of average condition of the crop year. Significant is the average condition of the crop in the region to which the producer has to bear the cost of transportation. (These rules are not mentioned specifically in the ordinance for 1936–37, but they were included in the regulation for 1935–36 and probably remained in force in 1936–37.)

b) The basic test weight is 75–77 kilos per hectoliter (58.2 to 59.8 pounds per Winchester bushel). Premiums per metric ton are 1.5 marks for each of the first two kilos of test weight per hectoliter above 77, and 1 mark for the third. Discounts are 2 marks for each of the first three kilos below 75, and 3 marks for the fourth. (See item *e*, below.)

c) Three per cent of sprouted wheat, dockage and foreign matter, broken kernels, undeveloped kernels, and rust-damaged kernels is permitted.

d) Discounts can be made for bad odor, high moisture content, and similar defects, according to local custom.

e) Premiums for protein wheat are 20 marks per metric ton ($0.22 per bushel). On protein wheat, premiums for test weight are not allowed for weights above 78 kilos per hectoliter, and other premiums and discounts are half as large as for ordinary wheat.

f) A rather complicated method of distinguishing protein wheat has been devised. Three factors—the quantity of wet gluten, the "swelling coefficient," and the "test figure"[1]—have to be used for this purpose. The two latter factors were recently developed in Germany as tests of gluten quality (the test figure is dependent also on the amount of gluten). The swelling coefficient is recommended by Berliner and Koopman and discussed by them in *Zeitschrift für das Gesamte Getreide-, Mühlen- und Bäckereiwesen*, 1935, No. 11. The test figure is recommended by Pelshenke and described by him in the same journal, 1935, No. 3. To be recognized as protein wheat, a wheat must show not less than 20 per cent of wet gluten in the flour, a swelling coefficient not less than 15, and a test figure not less than 25.

[1] Not to be confused with test weight.

2. Types of Wheat and Rye Flour

The fixed prices of flour are established for basic types: type 790 for wheat flour and type 997 for rye flour. For all other types, premiums or discounts are prescribed. The types of flour are based on their ash content, dry-matter basis, as shown in the tabulation below.

Type	Product	Ash, dry-matter basis			Premium (+) or discount (−) (marks per 100 kilos)
		Standard	Minimum	Maximum	
790	Wheat flour	.790	.760	.890	Basis
630	Wheat flour	.630	.610	.720	+1.00
563	Wheat flour	.563	.550	.600	+2.00
502	Wheat flour	.502	.470	.540	+3.00
405	Wheat flour	.405	.380	.460	+5.00
405	Fine semolina of soft wheat	.405	.380	.460	+5.50
405	Cream of (soft) wheat	.405	.380	.460	+6.00
1100	Wheat flour	1.100	.900	1.290	−1.50
1600	Wheat flour	1.600	1.300	1.890	−5.00
2000	Wheat flour	2.000	1.900	2.350	−7.00
1700	Whole wheat flour	1.700	1.440	1.900	−3.00
997	Rye flour	.997	.910	1.100	Basis
815	Rye flour[a]	.815	.760	.900	+ .50
700	Rye flour[a]	.700	.660	.750	+1.25
610	Rye flour[a]	.610	.630	.590	+2.00
1150	Komissmehl for the military	1.150	1.040	1.320	− .50
1370	Komissmehl	1.370	1.200	1.500	−1.00
1800	Whole rye flour	1.800	1.530	2.000	−4.00

[a] Only types not better than 997 are permitted until otherwise ordered.

Except for type 970 (wheat flour) and types 1150, 997, and 815 (rye flour), premiums can be increased and discounts reduced up to 1.00 mark per 100 kilos for better quality. Premiums of 1.50 and 3.00 marks per 100 kilos are permitted for flour produced of wheat with an admixture of 10 and 20 per cent, respectively, of foreign protein wheat. A premium of 1.25 marks per 100 kilos is permitted for flour made of wheat with an admixture of 20 per cent of German recognized protein wheat.

NOTE C. GERMAN IMPORT DUTIES ON GRAINS SINCE 1880

The data tabulated below are chiefly from N. Jasny, *Die Zukunft des Roggens* (Sonderheft 20 des Instituts für Konjunkturforschung, Berlin, 1930); brought up to date by Miss M. A. Malamphy in the Foreign Agricultural Service, United States Department of Agriculture. A dash (—) indicates no change of duty. Conversions into United States currency are made at the old par (1 mark or reichsmark = 23.82 cents) through 1931, and thereafter at current exchange as of May 1935 (1 reichsmark = 40.25 cents).

Date effective	Marks per 100 kilos						U.S. cents per bushel					
	Wheat	Rye	Feeding barley	Other barley	Oats	Corn	Wheat	Rye	Feeding barley	Other barley	Oats	Corn
1880 Jan. 1	1.00	1.00	0.50	0.50	1.00	0.50	6.48	6.05	2.59	2.59	3.46	3.025
1885 Feb. 20	3.00	3.00	1.50	1.50	1.50	1.00	19.44	18.15	7.78	7.78	5.19	6.05
1887 Mar. 20	5.00	5.00	2.25	2.25	4.00	2.00	32.40	30.25	11.67	11.67	13.84	12.10
1891:												
General rate	5.00	5.00	2.25	2.25	4.00	2.00	32.40	30.25	11.67	11.67	13.84	12.10
Conventional rate[a]	3.50	3.50	2.00	2.00	2.80	1.60	22.68	21.18	10.38	10.38	9.69	9.68
1906 Mar. 1	5.50	5.00	1.30[b]	4.00[c]	5.00	3.00	35.64	30.25	6.74[b]	20.74[c]	17.30	18.15
1914 Aug. 1	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free
1925 Sept. 1	3.50	3.00	1.00[d]	3.00	3.00	2.20[e]	22.68	18.15	5.19[d]	15.57	10.38	13.31[e]
1926 Aug. 1	5.00	5.00	2.00[d]	5.00	5.00	3.20	32.40	30.25	10.38[d]	25.95	17.30	19.36
1927 Dec. 20	—	—	—	—	—	2.50[f]	—	—	—	—	—	15.125[f]
1928 Mar. 1	—	—	—	—	—	5.00[g]	—	—	—	—	—	30.25[g]
1929 July 10	6.50	6.00	—	—	6.00	—	42.12	36.30	—	—	20.76	—
Dec. 31	—	—	5.00[d]	—	—	—	—	—	25.95[d]	—	—	—
1930 Feb. 11[h]	9.50[i]	9.00[i]	—	9.00	8.00	—	61.56[i]	54.45[i]	—	46.71	27.68	—
Mar. 27	12.00	—	10.00[d]	10.00	12.00	2.50[j]	77.76	—	51.90[d]	51.90	41.52	15.125[j]
Apr. 25	15.00	—	10.00[d]	15.00	—	—	97.20	—	51.90[d]	77.85	—	—
May 26	—	15.00	12.00[d]	—	—	—	—	90.75	62.28[d]	—	—	—
Sept. 28	18.50	—	—	—	—	—	119.88	—	—	—	—	—
Oct. 26	25.00	—	—	20.00	—	—	162.00	—	—	103.80	—	—
Dec. 4	—	—	18.00[d]	—	—	—	—	—	93.42[d]	—	—	—
1931 Mar. 6	—	20.00	—	—	—	—	—	121.00	—	—	—	—
May 3	—	—	—	—	16.00	—	—	—	—	—	55.36	—
1934 Oct. 22	35.00	—	—	—	—	—	383.40	—	—	—	—	—

[a] For countries having most-favored-nation agreements with Germany. These rates were put into force for different countries at different dates in 1891 and 1892. On Russian grain the conventional duties did not go into effect until Mar. 8, 1894; up to that date duties on Russian grain were at times even higher than the general duty.

[b] Other than malting barley.

[c] Malting barley.

[d] Under customs control.

[e] Effective Oct. 1, 1925.

[f] Feeding corn under customs control.

[g] Corn for industrial purposes.

[h] On grain from countries not having most-favored-nation agreements, the rates were effective somewhat earlier.

[i] The duty was to be set by the government from time to time, taking as a guide the prevailing market prices, and aiming at average prices of 260 and 230 reichsmarks per metric ton of wheat and rye respectively at the German markets designated by the law.

[j] The corn monopoly, effective Apr. 1, 1930, had exclusive control of the distribution of imported and domestic corn at prices determined by the Reichsmaisstelle. Prices might vary according to purpose for which used and origin. Corn prices have been kept nearer to prices of wheat than to those of rye and feed grains. In June 1936 they were about 70 per cent higher than in the late prewar years.

The import duties shown for the year from 1930 on were mostly nominal. Actual imports were made on permits offered from time to time, and sometimes for importing definite quantities of certain products (with or without payment of a duty). Most frequently the permits were for imports of wheat and barley. They were granted on condition that proof be given of exports of corresponding amounts of grain or flour, of buying certain quantities of domestic rye made unfit for human food, or of potato starch, etc. Space limitations prevent presenting all these complicated, short-lived regulations. The latest pattern is to grant to some importer an import license from a country with which Germany has a clearing agreement, with the prices at which the wheat is bought approved by the Grain Bureau and the price at which it has to be sold fixed by the same agency. The difference between the purchase and selling price is handed over to the Grain Bureau except for a small compensation for the importer. In July 1936 the selling price was about 275 marks per metric ton ($3.00 per bushel), or about 25 per cent above the fixed prices paid to producers of domestic wheat. (See *Commercial Intelligence Journal*, Aug. 15, 1936.)

In some recent years lower rates of duty have been in force on wheat imported for specified purposes, as follows:

Date effective	On durum wheat for semolina manufacture		Date effective	For starch manufacture under customs control	
	Marks per 100 kilos	U.S. cents per bushel[a]		Marks per 100 kilos	U.S. cents per bushel[a]
1930 Nov. 5[b]	11.25	72.93	1931 Jan. 15[b]	11.25	72.93
1931 Nov. 16[c]	11.25	72.93	1933 Aug. 1[f]	11.25	72.93
1932 Aug. 1[d]	16.00	103.72	1934 May 15[f]	3.50	37.60
1933 Aug. 1[e]	25.00	222.56			

[a] Reichsmarks converted at the following rates in cents: 23.82 in 1930–32; 32.71 in August 1933; 30.47 in May 1934; 40.25 in 1935.

[b] Prior to this date the duty was the same as that on other wheat.

[c] Restricted to imports by semolina mills in operation in Germany previous to Oct. 1, 1931.

[d] Wheat imported for the manufacture of semolina under customs control, by the mills up to a quota of 45 per cent of the quantity of foreign hard wheat which each used in 1931 for the same purpose.

[e] General rate on wheat restored.

[f] Rate applicable only to imports made in compliance with contingent restrictions.

APPENDIX TABLES

TABLE I.—UTILIZATION OF AGRICULTURAL LAND, 1913, 1927, 1933, AND 1935*

Crop	Thousand acres				Percentage of total plowland				Percentage of total agricultural land			
	1913	1927	1933	1935	1913	1927	1933	1935	1913	1927	1933	1935
Rye	13,170	11,666	11,179	11,218	24.8	22.7	22.1	23.5	17.9	16.0	15.5	15.9
Wheat, including spelt	4,809	4,633	6,007	5,384	9.1	9.1	11.9	11.3	6.6	6.4	8.3	7.6
Barley	3,538	3,679	3,917	3,966	6.7	7.2	7.7	8.3	4.8	5.1	5.4	5.6
Oats	9,709	8,614	7,863	6,892	18.3	16.8	15.5	14.4	13.2	11.8	10.8	9.7
Mixed grain	736	949	919	1,288	1.4	1.9	1.8	2.7	1.0	1.3	1.3	1.8
Corn	104	57	101	177	.2	.1	.2	.4	.1	.1	.1	.3
Buckwheat	94	52	27	23	.2	.1	.1	–	.1	.1	–	–
Total grain	*32,160*	*29,650*	*30,013*	*28,948*	*60.7*	*57.9*	*59.3*	*60.6*	*43.7*	*40.8*	*41.4*	*40.9*
Peas	242	237	193	120	.5	.5	.4	.3	.3	.3	.3	.2
Beans[a]	240	215	181	120	.5	.4	.3	.2	.3	.3	.2	.2
Vetch	373	358	334	299	.7	.7	.7	.6	.5	.5	.5	.4
Lupines	326	408	346	309	.6	.8	.7	.7	.4	.6	.5	.4
Mixed dry legumes	54	203	136	107	.1	.4	.3	.2	.1	.3	.2	.2
Total dry legumes[b]	*1,236*	*1,421*	*1,189*	*977*	*2.4*	*2.8*	*2.4*	*2.0*	*1.6*	*2.0*	*1.7*	*1.4*
Mixed grain and dry legumes[b]	499	489	591	360	.9	1.0	1.2	.8	.7	.7	.8	.5
Potatoes	7,023	6,953	7,139	6,796	13.2	13.6	14.1	14.2	9.6	9.6	9.8	9.6
Sugar beets	1,181	1,119	768	960	2.2	2.2	1.5	2.0	1.6	1.5	1.1	1.4
Other roots	1,989	2,513	2,839	2,793	3.7	4.9	5.6	5.9	2.7	3.4	3.9	3.9
Total tubers and roots	*10,193*	*10,586*	*10,746*	*10,549*	*19.1*	*20.7*	*21.2*	*22.1*	*13.9*	*14.5*	*14.8*	*14.9*
Vegetables (including flowers)	287	339	388	331	.5	.7	.8	.7	.4	.5	.5	.5
Rape	74	69	12	116	.1	.1	–	.2	.1	.1	–	.2
Flax	37	37	12	55	.1	.1	–	.1	.1	.1	–	.1
Other industrial plants	133	114	96	84	.2	.2	.2	.2	.2	.2	.1	.1
Total industrial plants	*244*	*220*	*120*	*255*	*.4*	*.4*	*.2*	*.5*	*.4*	*.4*	*.1*	*.4*
Clover	...	4,482	4,302	3,844	...	8.8	8.5	8.1	...	6.2	5.9	5.4
Alfalfa	...	699	778	898	...	1.4	1.5	1.9	...	1.0	1.1	1.3
Other sown grasses	...	754	581	445	...	1.5	1.2	.9	...	1.0	.8	.6
Total sown grasses	*5,619*	*5,935*	*5,661*	*5,187*	*10.6*	*11.7*	*11.2*	*10.9*	*7.6*	*8.2*	*7.8*	*7.3*
Uncropped plowland	2,849	2,481	1,893	1,159	5.4	4.8	3.7	2.4	3.9	3.4	2.6	1.6
Total plowland	53,092	51,120	50,601	47,768	100.0	100.0	100.0	100.0	72.2	70.5	69.7	67.5
Natural meadows	13,188	13,623	13,581	13,895	...	...	...	...	18.0	18.6	18.7	19.6
Natural pastures	5,664	6,205	6,558	7,186	...	...	...	...	7.7	8.5	9.1	10.2
Orchards	121	119	138	252	...	...	...	...	.2	.2	.2	.4
Vineyards	222	198	205	200	...	...	...	...	.3	.3	.3	.3
Garden lands	1,176	1,406	1,478	1,440	...	...	...	...	1.6	1.9	2.0	2.0
Total agricultural land	73,463	72,670	72,560	70,763	...	...	...	...	100.0	100.0	100.0	100.0

* Official data for postwar boundaries not including the Saar. Some minor crops not specifically mentioned are included in the italicized totals. Data for 1935 are not quite comparable with those for preceding years; see Appendix Note A (1). A dash (—) indicates less than 500 hectares or .1 per cent.

[a] Mostly feed beans. Data for beans specified as food beans, separately available for the last three of the years covered here, were 20, 15, and 12 thousand acres respectively.

[b] A considerable part of vetch, lupines, and mixed legumes are not harvested for grain, but are harvested for hay, plowed under, etc.

TABLE II.—WHEAT ACREAGE OF IMPORTANT

Year	Germany	East Prussia	West Prussia	Posen	Brandenburg	Pomerania	Silesia	Saxony (Province)	Schleswig-Holstein	Hanover	Westphalia
	ACREAGE (*Thousand acres*)										
1883.....	4,761	253	186	254	129	139	443	328	109	206	189
1893.....	5,053	258	200	263	142	156	532	410	114	232	197
1900.....	5,069	256	205	235	156	166	541	445	125	244	198
1913[a].....	4,966	213	191	205	159	153	538	500	136	235	193
1913[b].....	4,230	206	67[c]		159	153	517	500	109	235	193
1927.....	4,360	215	16		194	168	517	504	99	216	173
1933.....	5,727	313	25		303	276	650	676	190	278	185
1936.....	5,112	225	14		242	210	562	569	139	240	165
	PERCENTAGE OF CROPPED PLOWLAND										
1883.....	8.6	7.1	6.6	6.7	3.3	4.3	8.4	9.3	6.8	7.4	10.2
1893.....	8.9	6.7	6.8	6.6	3.5	4.6	10.0	11.4	7.1	8.1	10.4
1900.....	8.7	6.3	6.6	5.6	3.8	4.7	10.1	12.4	7.5	8.3	10.3
1913[a].....	8.3	4.8	5.8	4.6	3.8	4.0	10.0	13.7	7.7	7.8	9.7
1913[b].....	8.4	5.0	5.3[c]		3.8	4.0	10.6	13.7	7.8	7.8	9.7
1927.....	9.0	5.0	1.9		4.9	4.5	10.9	14.0	7.4	7.2	9.2
1933.....	11.8	7.3	2.9		7.6	7.4	13.8	18.7	13.6	9.6	9.9
1936.....	...	...	...		...	...	...	...	...	...	...
	PERCENTAGE OF GRAIN AREA[d]										
1883.....	13.8	11.3	11.5	11.7	5.4	7.0	13.6	15.4	9.8	11.1	15.3
1893.....	14.3	11.0	11.9	11.5	5.7	7.6	16.0	19.0	10.0	12.2	15.5
1900.....	14.1	10.4	11.6	9.7	6.3	7.9	16.4	20.3	10.7	12.5	15.4
1913[a].....	13.1	7.8	9.6	7.2	6.0	6.5	15.8	21.9	10.8	11.2	14.4
1913[b].....	13.2	8.2	7.5[c]		6.0	6.5	16.5	21.9	10.8	11.2	14.4
1927.....	14.8	8.5	3.1		7.8	7.3	17.4	22.9	10.6	10.8	14.0
1933.....	19.2	12.6	4.8		12.0	12.0	21.8	29.5	19.4	13.4	14.9
1936.....	18.0	9.6	2.8		10.0	9.4	20.1	26.7	15.1	12.3	14.1

* Data for 1933 are from the crop survey designated as a minor census. Figures for 1936 are provisional, and data on cropped plowland are not yet available.

[a] Prewar boundaries.

[b] Postwar boundaries.

[c] Grenzmark Posen–West Prussia.

[d] Grain area does not include the negligible area in corn and buckwheat.

TABLE III.—ESTIMATED UTILIZATION OF WHEAT, ANNUALLY FROM 1924–25*

(*Million bushels*)

Item	1924–25	1925–26	1926–27	1927–28	1928–29	1929–30	1930–31	1931–32	1932–33	1933–34	1934–35	1935–36
Production												
Official estimates....	89.2	118.2	95.4	120.5	141.6	123.1	139.2	155.5	183.8	205.9	166.5	171.5
Adjustments	+8.9	+5.9	+4.8	+6.0	....	....	....	....	....	....	....	....
Adjusted estimates..	98.1	124.1	100.2	126.5	141.6	123.1	139.2	155.5	183.8	205.9	166.5	171.5
Foreign trade												
Imports	85.7	77.3	97.1	95.9	95.1	54.4	31.8	35.5[a]	30.9	28.7	11.8	3.7
Exports	5.6	20.1	5.5	7.4	17.4	6.5	.7	12.3	25.9	33.3	1.7	3.9
Net imports	80.1	57.2	91.6	88.5	77.7	47.9	31.1	23.2[a]	5.0	(4.6)[b]	10.1	(.2)[b]
Apparent utilization	178.2	181.3	191.8	215.0	219.3	171.0	170.3	178.7	188.8	201.3	176.6	171.3
Changes in stocks[c]												
On farms	....	−1.8	....	+5.5	....	−7.4	−5.5	....	+1.8	− 1.8	−2 2	+ .1
In second hands.....	....	....	....	....	+11.0	−11.0		....	+9.8	+33.4	−3.4	−25.7
Domestic utilization												
Total	178.2	183.1	191.8	209.5	208.3	189.4	175.8	178.7	177.2	169.7	182.2	196.9
Loss	2.8	3.3	3.0	3.5	3.8	3.0	3.1	3.4	4.0	4.4	3.4	3.4
Seed use	9.8	10.4	11.2	11.2	10.7	11.3	14.2	14.6	14.8	14.7	13.3	13.0
Food consumption...	159.8	164.4	171.8	183.7	185.5	168.1	153.4	147.0	144.2	145.1	149.7	158.0
Feed consumption...	5.8	5.0	5.8	11.1	8.3	7.0	5.1	13.7[a]	14.2[d]	5.5	15.8	22.5

* See Appendix Note A (5) and Note to Table III on page opposite.

[a] Including 6,889,000 bushels imported duty-free for feed use.

[b] Net exports.

[c] Reduction indicated by *minus*, increase by *plus*.

[d] Too low; see last part of Note to Table III on page opposite.

PROVINCES AND STATES, CENSUS YEARS 1883–1936*

Year	Hesse-Nassau	Rhine Province	Total Prussia[e]	Bavaria	Saxony (Free State)	Wurttemberg	Baden	Thuringia	Hesse	Mecklenburg-Schwerin	Alsace-Lorraine
	ACREAGE (*Thousand acres*)										
1883.....	165	312	2,718	797	119	86	102	...	92	108	450
1893.....	170	291	2,968	800	129	79	101	...	89	109	430
1900.....	173	247	2,994	776	156	78	96	...	74	129	386
1913[a].....	164	254	2,948	732	167	118	113	...	81	96	336
1913[b].....	164	245	2,555	728	167	118	113	...	81	96	...
1927.....	159	267	2,540	709	212	210	138	172	78	111	...
1933.....	188	320	3,415	925	263	234	156	210	96	179	...
1936.....	175	298	2,851	950	224	288	157	205	89	167	...
	PERCENTAGE OF CROPPED PLOWLAND										
1883.....	11.4	11.3	7.4	12.4	6.1	4.4	7.6	...	10.0	7.8	29.5
1893.....	11.6	10.0	7.8	12.2	6.5	3.9	7.6	...	9.8	7.4	28.8
1900.....	11.7	8.8	7.7	11.7	7.9	3.8	5.4	...	8.1	8.6	25.9
1913[a].....	11.1	9.0	7.3	10.7	8.5	5.9	8.6	...	9.1	5.2	22.4
1913[b].....	11.1	9.4	7.9	10.7	8.5	5.9	8.6	...	9.1	5.2	...
1927.....	11.0	10.7	8.1	10.7	11.2	11.9	10.8	13.4	9.1	7.0	...
1933.....	12.3	13.1	10.8	13.8	14.1	13.2	12.4	18.0	11.2	11.3	...
1936.....	...	...	...	...	...	...	...	...	...	...	...
	PERCENTAGE OF GRAIN AREA[d]										
1883.....	17.8	19.0	12.0	18.2	9.8	6.9	13.5	...	17.8	12.1	47.0
1893.....	18.1	17.6	12.7	18.2	10.5	6.4	13.8	...	17.2	12.0	45.7
1900.....	18.1	14.8	12.5	17.5	12.8	6.2	13.3	...	14.3	14.1	41.6
1913[a].....	16.9	15.0	11.5	16.3	13.6	9.8	16.0	...	16.0	9.6	37.2
1913[b].....	16.9	15.5	12.2	16.3	13.6	9.8	16.0	...	16.0	9.6	...
1927.....	17.2	18.1	12.9	18.6	18.8	21.5	22.2	23.4	16.9	11.3	...
1933.....	19.5	22.4	17.2	23.7	23.4	23.8	25.3	27.2	20.9	17.6	...
1936.....	20.1	22.7	15.2	23.8	22.4	24.2	27.3	26.9	21.0	14.2	...

[a] Prewar boundaries.
[b] Postwar boundaries.
[d] Grain area does not include the negligible area in corn and buckwheat.
[e] Including all provinces listed to the left of this column.

NOTE TO TABLE III

The estimates are for an August–July *crop year*, as explained in Appendix Note A (2). The *adjustments* in the crops of 1924 to 1927 are made as explained in Appendix Note A (1). The *conversion coefficients* used for expressing flour in wheat equivalents are explained in Appendix Note A (3). *Changes in stocks* are based, wholly or primarily, on official data such as given in Tables V and VI, so far as these are available. *Loss* is put at 2 per cent of the domestic crop and 1 per cent of the imports of wheat and flour in terms of wheat. *Seed use* is based on official data.

For *food consumption*, official data on flour production are used for 1927–28, 1932–33, and later years. For other years the figures given are the result of a more or less arbitrary division, between food and feed uses, of the wheat calculated as available for consumption. Industrial consumption of wheat (mainly for starch) is negligible, and is here included with food consumption.

The *feed consumption* figures are residuals, and therefore of only moderate value, in years when fairly definite statistics for food consumption were available. For other years the feed figures are estimates based mainly on Fensch's data from accounting farms (*Die Verwertung des Deutschen Getreideernte*, Berlin, 1930); but his figures run somewhat higher than ours. For 1932–33 the residual figure for feed barely exceeded the 13.23 million bushels marketed in eosinized form; it must be too low, since the amounts otherwise fed (e.g., directly on farms where grown) were by no means negligible. Either the crop was underestimated, the flour production was underestimated, or some other figure is in error.

TABLE IV.—PER CAPITA FOOD CONSUMPTION OF BREAD GRAINS ACCORDING TO VARIOUS ESTIMATES, 1912–13 AND ANNUALLY FROM 1924–25

(*Pounds*)

Crop year	Wheat		Wheat flour		Rye		Rye flour	
	I.f.K.[a]	H.-J.[b]	I.f.K.[a]	A.D.M.[c]	I.f.K.[a]	H.-J.[b]	I.f.K.[a]	A.D.M.[c]
1912-13..	...	...	...	124	...	...	...	144
1924-25..	156	154	112	112	177	177	124	128
1925-26..	158	158	114	108	180	180	126	134
1926-27..	166	163	119	116	175	175	122	121
1927-28..	174	174	125	120	167	169	117	109
1928-29..	176	175	127	124	162	161	114	116
1929-30..	162	157	116	114	165	165	116	114
1930-31..	144	143	103	99	174	171	113	110
1931-32..	138	136	99	92	167	167	117	106
1932-33..	137	133	99	88	166	163	116	106
1933-34..	138	133	99	88	169	165	118	100
1934-35..	141	137	101	93	158	158	118	99
1935-36..	...	143	...	...	...	165	...	...

[a] Estimates of Institut für Konjunkturforschung, from H. von d. Decken, *Deutschlands Vorsorgung mit Landwirtschaftlichen Erzeugnissen* (Berlin, 1935). Estimates for wheat and wheat flour include spelt.
[b] Estimates of Hanau and Jasny: for wheat, see Table III; for rye, from N. Jasny, *Germany's Agricultural Self-sufficiency*.
[c] Estimates from *Allgemeine Deutsche Mühlenzeitung*, 1935.

TABLE V.—WHEAT STOCKS ON FARMS, 1926–27 TO 1935–36*

(Percentages of preceding crop)

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
	WINTER WHEAT										
1926–27	....	....	....	....	32.6	23.6	18.2	12.6	8.2	...	...
1927–28	88.9	72.6	63.8	55.2	46.6	38.1	28.9	20.6	13.7	8.6	...
1928–29	89.3	76.4	65.1	53.4	45.0	31.1	21.2	15.6	10.0	6.7	...
1929–30	82.9	66.9	57.3	46.9	39.5	32.2	25.6	14.2	7.3	3.3	...
1930–31	76.8	62.1	52.4	43.7	33.5	23.4	13.2	8.7	4.7	2.8	...
1931–32	76.4	60.2	47.4	37.5	31.4	22.6	15.5	10.4	5.9	3.6	...
1932–33	81.8	67.2	59.2	52.5	43.7	35.8	26.9	21.3	12.7	7.7	...
1933–34	85.5	64.0[a]	55.4	45.1	34.9	28.0	17.0	13.0	9.0	4.0	2.0
1934–35	72.0	59.0	49.0	38.0	28.0	20.0	14.0	10.0	6.0	3.0	1.0
1935–36	74.0	64.0	55.0	42.0	31.0	22.0	15.0	10.0	6.0	3.0	...
	SPRING WHEAT										
1926–27	....	....	....	....	51.2	40.2	28.1	17.0	10.1	...	...
1927–28	95.0	90.1	84.2	79.4	71.1	62.2	49.7	31.5	21.3	14.1	...
1928–29	95.0	90.0	84.6	74.3	66.1	52.1	39.6	28.0	15.7	9.1	...
1929–30	93.1	86.1	80.9	73.4	65.7	52.9	32.4	15.6	7.2	3.0	...
1930–31	89.1	81.0	74.9	68.5	61.1	50.5	30.3	13.9	6.9	3.5	...
1931–32	89.5	80.9	74.0	66.8	58.4	48.5	36.6	19.8	9.4	5.1	...
1932–33	90.7	82.4	77.3	72.7	66.0	57.5	44.8	30.5	16.5	9.7	...
1933–34	....	84.0	77.7	69.9	61.6	50.0	29.0	21.0	13.0	4.0	1.0
1934–35	82.0	73.0	66.0	58.0	48.0	38.0	24.0	13.0	7.0	2.0	1.0
1935–36	87.0	80.0	75.0	65.0	52.0	41.0	23.0	12.0	5.0	2.0	...

* Data of the Preisberichtstelle beim Deutschen Landwirtschaftsrat and later of the Preisberichtstelle bei der Hauptabteilung II des Reichsnährstandes. Mid-month data through October 1933; thereafter for the end of each month. See Appendix Note A (4).

[a] For Oct. 31. The figure for Oct. 15 was 68.9.

TABLE VI.—WHEAT AND FLOUR STOCKS IN MILLS AND WAREHOUSES AT THE END OF EACH MONTH FROM FEBRUARY 1932*

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
	WHEAT AND FLOUR[a] (*Thousand bushels*)											
1931–32	.....	.....	.....	.....	.....	.....	27,510	25,276	22,356	20,833	15,748	10,375
1932–33	18,445	30,867	31,339	30,206	32,921	32,394	31,726	32,509	30,202	27,242	23,149	19,032
1933–34	27,933	39,184	43,336	46,539	49,880	54,274	55,867	56,603	55,776	53,462	50,867	48,645
1934–35	57,862	64,948	65,767	67,175	70,290	75,896	75,868	73,545	68,994	62,802	54,187	45,615
1935–36	53,381	57,687	55,878	52,459	54,329	57,151	57,103	55,214	48,895	41,940	36,700[b]	24,407[b]
	WHEAT GRAIN (*Thousand bushels*)											
1931–32	.....	.....	.....	.....	.....	.....	19,985	18,680	15,976	14,840	9,891	5,743
1932–33	14,318	25,356	24,878	23,997	25,879	25,279	24,810	25,408	23,898	21,403	17,053	12,981
1933–34	22,377	33,047	36,420	39,569	42,409	46,308	47,829	49,250	49,089	47,722	44,870	42,963
1934–35	52,568	58,613	59,355	60,137	62,815	67,412	67,582	65,417	61,677	55,611	47,113	38,992
1935–36	46,028	51,852	50,048	45,480	45,849	47,770	48,236	47,216	42,100	36,096	30,964[b]	20,208[b]
	WHEAT FLOUR (*Thousand barrels*)											
1931–32	.....	.....	.....	.....	.....	.....	1,670	1,464	1,416	1,330	1,300	1,028
1932–33	916	1,223	1,434	1,378	1,563	1,579	1,535	1,576	1,399	1,296	1,353	1,343
1933–34	1,233	1,362	1,535	1,547	1,658	1,768	1,784	1,632	1,484	1,274	1,331	1,261
1934–35	1,175	1,406	1,423	1,562	1,659	1,883	1,839	1,804	1,624	1,596	1,570	1,470
1935–36	1,632	1,295	1,294	1,549	1,882	2,082	1,968	1,775	1,508	1,297	1,273[b]	932[b]

* Converted from data collected and published by the Statistisches Reichsamt. See Appendix Note A (4).

[a] Flour converted to wheat at 72.5 per cent extraction.

[b] Somewhat too high to be comparable with figures for earlier months; see footnote to Table VII.

TABLE VII.—WHEAT GRAIN STOCKS IN MILLS AND WAREHOUSES, MONTHLY FROM FEBRUARY 29, 1932*

(Thousand bushels)

End of month	Domestic and imported duty-paid			Imported in bond		
	Mills	Warehouses	Total	Mills	Warehouses	Total
1931-32						
Feb. ..	12,812	6,008	18,820	889	276	1,165
Mar. ..	11,346	5,240	16,586	1,716	378	2,094
Apr. ..	9,204	3,854	13,058	2,352	566	2,918
May ..	8,752	2,928	11,680	2,363	797	3,160
June ..	5,743	1,929	7,672	1,635	584	2,219
July ..	3,259	739	3,998	1,323	422	1,745
1932-33						
Aug. ..	8,120	4,780	12,900	999	419	1,418
Sept...	14,315	10,064	24,379	661	316	977
Oct. ..	14,407	9,281	23,688	753	437	1,190
Nov. ..	14,223	9,083	23,306	452	239	691
Dec. ..	14,554	10,259	24,813	827	239	1,066
Jan. ..	14,036	10,332	24,368	595	316	911
Feb. ..	13,768	10,281	24,049	614	147	761
Mar. ..	14.231	10,549	24,780	503	125	628
Apr. ..	12,864	10,549	23,413	327	158	485
May ..	12,489	7,918	20,407	867	129	996
June ..	9,612	6,515	16,127	794	132	926
July ..	7,768	4,824	12.592	309	81	389
1933-34						
Aug. ..	10,762	10,983	21,745	474	158	632
Sept...	16,009	16,237	32,246	592	209	801
Oct. ..	18,397	17,189	35,586	614	220	834
Nov. ..	19,992	18,614	38,606	713	250	963
Dec. ..	20,650	20,999	41,649	459	301	760
Jan. ..	22,031	23,527	45.558	566	184	750
Feb. ..	21,914	25,191	47,105	452	272	724
Mar. ..	23,946	24,555	48,501	547	202	749
Apr. ..	25,305	23,053	48,358	500	231	731
May ..	25,459	21,576	47,035	489	198	687
June ..	24,585	19,444	44,029	661	180	841
July ..	23,203	18,868	42,071	705	187	892
1934-35						
Aug. ..	25,070	26,734	51,804	606	158	764
Sept...	26,529	31,599	58,128	415	70	485
Oct. ..	25,904	32,547	58,451	195	709	904
Nov. ..	25,592	33,484	59,076	264	797	1,061
Dec. ..	27,752	33,980	61,732	220	863	1,083
Jan. ..	28,660	37,845	66,505	213	694	907
Feb. ..	29.240	37,548	66,788	265	529	794
Mar. ..	28,347	36,332	64,679	213	525	738
Apr. ..	26,823	34,153	60,976	176	525	701
May ..	23,968	30,989	54,957	195	459	654
June ..	20,220	26,393	46,613	143	356	500
July ..	16,402	22,156	38,558	169	264	434
1935-36						
Aug. ..	19,128	26,643	45,771	48	209	257
Sept...	23,284	28,296	51,580	96	176	272
Oct. ..	24,324	25,544	49,868	84	96	180
Nov. ..	23,328	21,950	45,278	158	44	202
Dec. ..	24,078	21,620	45,698	129	22	151
Jan. ..	25.570	22.017	47,587	154	29	183
Feb. ..	26,793	21,307	48,100	121	15	136
Mar. ..	25,996	21,069	47,065	147	4	151
Apr. ..	24,078	17,857	41,935	161	4	165
May ..	21,098	14,620	35,718	261	117	378
	NEW BASIS					
1935-36						
Apr. ..	24,078	20,955	45,033	162	84	246
May ..	21.098	17,707	38,805	257	279	536
June ..	16,935	13,562	30,497	250	217	467
July ..	10,075	9,575	19,650	88	470	558

* Converted from data collected by the Statistisches Reichsamt. See Appendix Note A (4). In April–June 1936, the months for which data are available on both old and new basis, the totals on the old basis run about 7 per cent lower for wheat (and about 5 per cent lower for flour) than those on the new basis.

TABLE VIII.—WHEAT PRODUCTION AND FOREIGN TRADE, PREWAR YEARS FROM 1894–95 AND POSTWAR YEARS FROM 1924–25*

(Thousand acres; bushels per acre; million bushels)

August-July	Area		Yield		Production			Imports		Exports		Total net imports
	Winter	Spring	Winter	Spring	Winter	Spring	Total	Wheat	Flour[a]	Wheat	Flour[a]	
1894-95	4,475	418	22.8	20.3	101.8	8.5	110.3	49.7	1.8[b]	3.1	2.6[b]	45.8
1895-96	4,323	449	22.3	18.4	96.6	8.3	104.9	55.5	1.9[b]	2.3	2.4[b]	52.7
1896-97	4,375	386	24.1	20.0	105.4	7.7	113.1	51.1	2.3[b]	3.7	1.3[b]	48.4
1897-98	4,363	383	23.0	19.5	100.4	7.5	107.9	47.2	1.3	7.3	2.3	38.9
1898-99	4,514	352	24.7	21.4	111.8	7.5	119.3	56.8	2.0	5.3	1.6	51.9
1899-1900	4,650	333	25.8	21.7	120.0	7.2	127.2	47.8	1.8	9.8	1.6	38.2
1900-01	4,712	351	25.3	22.2	119.2	7.8	127.0	57.6	1.6	8.1	1.7	49.4
1901-02	3,137	770	20.3	24.5	63.7	18.9	82.6	81.9	1.7	.8	1.1	81.7
1902-03	4,362	364	27.5	24.1	120.2	8.8	129.0	71.6	1.6	5.8	1.0	66.4
1903-04	3,837	629	25.8	29.1	99.3	18.3	117.6	74.8	1.4	5.5	1.7	69.0
1904-05	4,348	390	26.8	24.5	116.3	9.5	125.8	73.5	.9	7.4	4.3	62.7
1905-06	4,411	351	25.8	24.0	113.9	8.4	122.3	87.3	1.3	5.6	2.8	80.2
1906-07	4,334	450	27.3	27.0	118.1	12.2	130.3	81.2	.9	6.3	4.3	71.5
1907-08	3,453	864	25.0	33.2	86.4	28.6	115.0	83.1	.9	3.7	5.5	74.8
1908-09	4,147	509	26.8	27.2	110.8	13.8	124.6	78.1	.7	10.4	8.0	60.4
1909-10	3,944	581	26.8	31.7	105.8	18.4	124.2	90.7	.6	7.2	8.2	75.9
1910-11	4,287	514	26.5	27.8	113.4	14.3	127.7	92.8	.8	13.4	9.6	70.6
1911-12	4,327	551	27.8	25.6	120.4	14.1	134.5	79.8	.8	14.1	7.7	58.8
1912-13	4,275	483	30.2	30.9	129.2	15.0	144.2	92.3	.9	14.2	9.7	69.3
1913-14	4,317	561	31.4	31.9	136.0	18.0	154.0	97.0	.9	22.3	8.5	67.1
Average[c]												
1894-99	4,410	398	23.4	19.9	103.2	7.9	111.1	52.0	1.9	4.4	2.0	47.5
1899-1904	4,140	489	24.9	24.3	104.5	12.2	116.7	66.7	1.6	6.0	1.4	60.9
1904-09	4,139	513	26.3	27.2	109.1	14.5	123.6	80.7	.9	6.7	5.0	69.9
1909-14	4,230	538	28.5	29.6	120.9	16.0	136.9	90.5	.8	14.2	8.7	68.4
1909-14[d]	4,029		29.3		.....	....	118.1	....	...	....	...	....
1924-25	3,143	481	26.8	28.3	84.5	13.6	98.1	56.9	28.8[e]	1.1	4.5[e]	80.1
1925-26	3,501	334	32.8	27.8	114.8	9.3	124.1	67.5	9.8[e]	16.6	3.5[e]	57.2
1926-27	3,596	361	25.3	25.8	90.9	9.3	100.2	92.9	4.2	3.4	2.1	91.6
1927-28	3,925	395	29.2	29.4	114.9	11.6	126.5	93.8	2.1	5.3	2.1	88.5
1928-29	3,836	433	33.2	33.3	127.2	14.4	141.6	93.6	1.5	14.1	3.3	77.7
1929-30	3,631	323	31.1	32.1	112.7	10.4	123.1	52.8	1.6	3.8	2.7	47.9
1930-31	3,997	405	31.7	31.1	126.6	12.6	139.2	31.3	.5	.4	.3	31.1
1931-32	4,653	702	29.0	29.6	134.8	20.7	155.5	35.0	.5	12.2	.1	23.2
1932-33	4,882	752	32.7	31.7	160.0	23.8	183.8	30.7	.2	20.9	5.0	5.0
1933-34	5,011	716	36.1	34.8	181.0	24.9	205.9	28.6	.1	20.9	12.4	(4.6)[f]
1934-35	4,668	762	31.1	28.3	145.0	21.5	166.5	11.6	.2	.2	1.5	10.1
1935-36[g]	4,735	470	33.2	30.3	157.2	14.3	171.5	3.6	.1	2.2	1.7	(.2)[f]
1936-37	4,739	392	33.2[i]	31.4[i]	156.8[i]	12.7[i]	169.5[i]	....	...	...	...	...
1936-37[h]	4,758	393	33.2[i]	31.4[i]	157.4[i]	12.7[i]	170.1[i]	....	...	...	...	...

* Data for prewar years are for prewar boundaries; and for postwar years for postwar boundaries, excluding the Saar. Official data on acreage (as ascertained in the spring), yields, and production are adjusted for some years as discussed in Appendix Note A (1). On extraction of flour see Appendix Note A (3).

[a] Converted to wheat on the assumption of 75 per cent extraction.

[b] Statistics for these years showed only total flour imports and exports. It is officially assumed that 95 per cent of imports and 30 per cent of exports were wheat flour.

[c] For five years ending 1898–99, 1903–04, etc.

[d] Postwar boundaries excluding the Saar. In the absence of official estimates, these figures are based on those of Michael (L. Michael, *Agricultural Survey of Europe: Germany*, U.S. Department of Agriculture, Bulletin 1399, 1926, p. 34), with yield and production reduced by 10 per cent in accordance with the reasoning in Appendix Note A (1).

[e] Converted to wheat on the assumption of 72.5 per cent extraction.

[f] Net exports.

[g] Trade data include the Saar from Feb. 17, 1935.

[h] Including the Saar.

[i] Provisional; for production based on provisional acreage data.

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