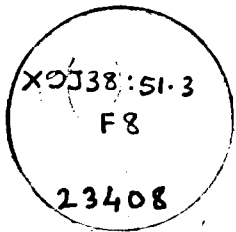


Report on the marketing of Wheat,  
Barley and Oats in England and Wales



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MINISTRY OF AGRICULTURE AND FISHERIES.

Report on the  
Marketing of  
Wheat, Barley and Oats  
in England and Wales.

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FIG. 1.—Flour mills at Liverpool.

*[Frontispiece.]*



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## THE MARKETING OF WHEAT, BARLEY AND OATS IN ENGLAND AND WALES.

### INTRODUCTION.

The following Report gives the results of a detailed investigation into the marketing of wheat, barley and oats, and covers practically all phases of what is admitted to be an immensely difficult subject.

Among the more important facts to which attention is drawn, is the tendency for the manufacture of cereal products of all kinds, in this country, to become concentrated into larger units. There is no corresponding reduction in the number of farmers selling to merchants or of merchants selling to manufacturers. In the result, the balance of bargaining power has gone against the seller. This, of itself, suggests the need for some form of organisation among producers to reduce the number of independent sellers on the market. Further, organisation of producers seems to be necessary in order to ensure orderly marketing and avoid the seasonal depression in prices which usually occurs in the early months of each cereal year.

Then, again, in order to meet the needs of modern industrial conditions, manufacturers require grain—whether wheat, barley or oats—to be delivered in large quantities of uniform quality. To this extent, home-produced grain is at a disadvantage compared with the standardised products arriving from abroad, and, if the demand for it is to be sustained and increased, there is a pressing need for some form of standardisation. It is evident from this Report, however, that a standardisation policy for home-produced grain cannot be applied by transplanting in its entirety any one system now operated overseas, but that such a policy must be spelt out, letter by letter, to suit the conditions obtaining here. Lines of possible development are set out in the Report.

Apart from these wider organisational aspects, the Report shows clearly that much can be done in other ways to extend the market for home-produced grain. Indeed, no effort should be spared in this direction in order that cereal growers, in the present state of their industry, may realise the best possible returns for their crops subject to the limitations imposed by world conditions. In this task, there is room for co-operation between farmers, merchants, manufacturers and consumers.

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## PART I.—A PRELIMINARY SURVEY.

### CHAPTER I.—WHEAT.

#### (i) World Position.

(a) *Acreage*.—The acreage devoted to wheat growing in England and Wales represents approximately one-half of one per cent. of the world's total recorded wheat acreage of about 280 million acres.

Europe, as a whole, (including the Russian Union of Socialist Soviet Republics in Europe and Asia\*) accounts for about 45 per cent. of the world's wheat acreage, and North America for 28 per cent. Asia, so far as records go, appears to be responsible for about 12 per cent. of the total acreage, and South America for 7 per cent. Africa, chiefly in the north, and Oceania, mainly Australia, account in equal proportions for the remaining 8 per cent.† About 90 per cent. of the total acreage lies in the Northern Hemisphere.

(b) *Yield per Acre*.—The average yield per acre varies considerably from year to year in every country. It also varies from one country to another: Australia and Argentine, for instance, during the 5 years 1923-27, grew, on an average, about  $6\frac{3}{4}$  cwt. per acre, while Canada grew  $9\frac{1}{2}$  cwt. and the United States  $7\frac{3}{4}$  cwt. per acre; in Europe, during the same period, France produced about 11 cwt., Germany  $14\frac{3}{4}$  cwt. and Holland 21 cwt., as compared with an average of  $17\frac{1}{2}$  cwt. per acre in Great Britain and Northern Ireland.

(c) *Production*.—Prior to the War, Europe (including the territories now embraced in the U.S.S.R.) accounted for more than 55 per cent., and North America for nearly 25 per cent., of the total world's output of wheat. Of the remaining 20 per cent., Asia accounted for roughly one-half, South America for one-fourth and Africa and Oceania for one-eighth each.

In the earlier post-War years, the world's production showed a shrinkage as compared with the pre-War figures, but in 1927, the output, roughly 114 million tons, was about 12 per cent. above the pre-War average. In Europe, however, the pre-War position has not yet been regained, and, in 1927, the output was still 5 per cent. below the pre-War average. Production in Asia and Africa was about the same as before the War. Substantial increases were, however, recorded in the production of North and South America and Oceania, while a feature of special importance was the rapidly rising output of the British Empire regarded as a unit. Empire production, indeed, increased by about 35 per cent. in the interval.

\* Hereafter referred to as the U.S.S.R.

† These proportions, and also subsequent figures regarding production and world trade, are based on the statistics of the International Institute of Agriculture at Rome. Although most countries of the world are included in the Institute's summary, there are exceptions, e.g., China.

(d) *International Trade*.—From the standpoint of international trade, the relative importance of the various sources of world supplies does not, however, depend on acreage or production, but on the exportable surplus. North and South America and Oceania were together responsible for just under 50 per cent. of the world's export trade in wheat during 1909-13, but, on the average of the years 1923-27, accounted for 88 per cent. of the total exports of about 17 million tons. Asiatic exports exceeded imports during the former period, but, since the War, the position has been reversed and the demand from the Far East, although liable to very great fluctuations, has become an important factor in the trade. Europe, in spite of its large acreage of wheat, has always taken the bulk of the exports from other areas; but, owing largely to the fall in exports from Russian territories, the annual excess of imports over exports was much greater during the period 1923-27 than in the 5 years 1909-13.

It is worthy of note that exports of wheat and wheat flour from Empire countries, on the average of 1923-27, were about 55 per cent. in excess of the import requirements of the Empire, whereas, in the pre-War years 1909-13, there was a deficiency of about 15 per cent.

### (ii) The Home Crop.

Wheat is adapted to a wide variety of soils and is grown in all the arable districts; but, since it prefers dry to wet climatic conditions, most of the wheat acreage is to be found in the east and south-east rather than in the west and north-west of England. The five eastern counties, Suffolk, Essex, Norfolk, Cambridge and Lincoln, contain more than one-third of the total wheat acreage of the country, and, with Yorkshire, account for almost a half. This localisation of production has, to a great extent, come about during the past 50 years. In 1875, Devon had more land under wheat than can be found to-day in any of the eastern counties named, except Lincoln. The same may be said of Kent. Now, Suffolk alone produces 4 times as much wheat as Devon and  $2\frac{1}{2}$  times as much as Kent.

(a) *Trend of Sowings*.—Although the acreage devoted to wheat in England and Wales is less than half that of 50 years ago, the trend has not been steadily downward. For 20 years after 1875, the acreage decreased rapidly; then followed a slight recovery and a further decrease, the acreage in 1904 (1,337,548 acres) being the lowest on record. For the next 15 years, the trend was, on the whole, upward, especially during the War, when a rapid expansion occurred. After the War, the wheat acreage contracted sharply and, although in 1926 and 1927 a distinct recovery was made, the acreage under wheat in England and Wales in 1928 was only 1,396,000 acres out of a total of 1,461,000 acres in Great Britain and Northern Ireland.\*

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\* See Table I, page 178, and Diagram A, opposite, for trend of wheat acreage in England and Wales since 1875.



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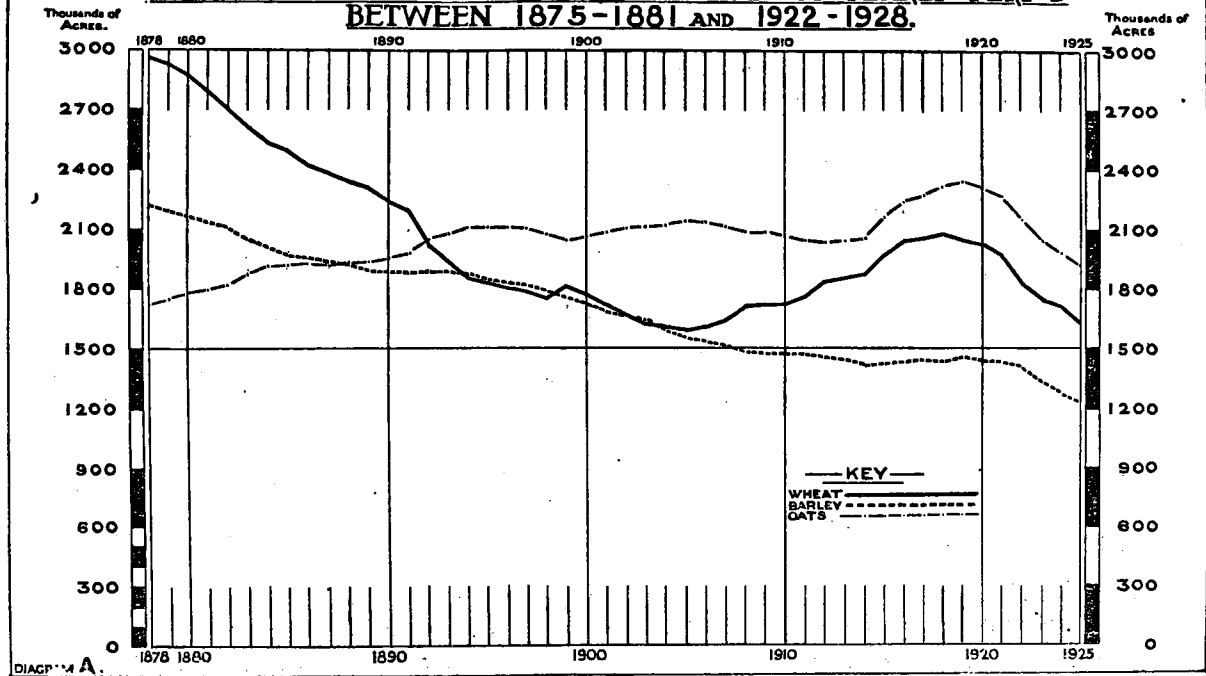
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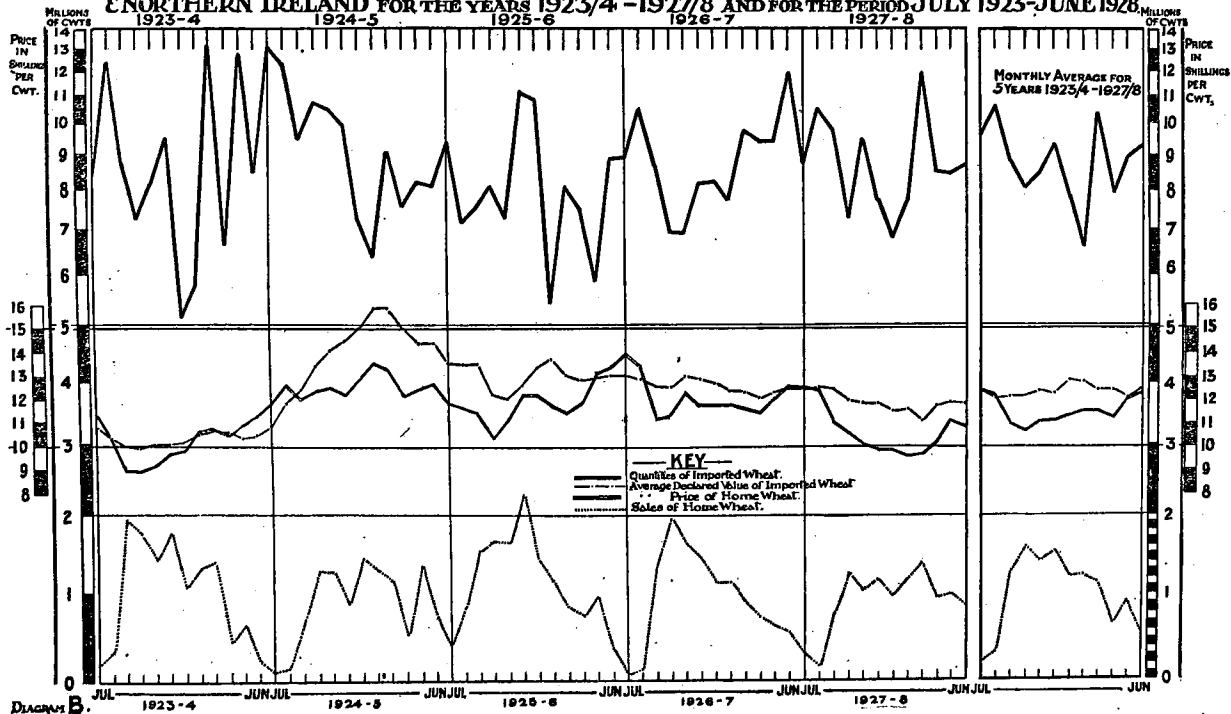
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**ANNUAL AVERAGE ACREAGE UNDER WHEAT BARLEY & OATS  
IN ENGLAND & WALES FOR EACH SEVEN YEARLY PERIOD  
BETWEEN 1875-1881 AND 1922-1928.**



**MONTHLY QUANTITIES AND AVERAGE PRICES PER CWT OF BRITISH WHEAT RETURNED AS SOLD IN ENGLAND AND WALES, AND DECLARED VALUES PER CWT OF IMPORTS INTO GREAT BRITAIN (NORTHERN IRELAND FOR THE YEARS 1923/4 - 1927/8 AND FOR THE PERIOD JULY 1923-JUNE 1928,**



(b) *Yield and Output.*—In the period 1918-27, the average annual yield of wheat in the Isle of Ely and in the Holland Division of Lincolnshire was over a ton per acre, but in the western counties, as compared with the eastern, the yield was generally lower, and in certain parts of Wales it reached barely 13 cwt. per acre. For the whole of England and Wales, the 10-year average was 17·4 cwt. per acre. From year to year, great differences in yields may occur; in 1920, for example, the average for the country was 15·6 cwt. per acre, whereas in 1921 it was returned as 19·8 cwt. per acre.\*

Owing to the fluctuations in yield and acreage, output varies considerably. The estimated wheat output of England and Wales was 1,498,000 tons in 1916, 2,339,000 tons in 1918 and only 1,423,000 in 1927. In spite of an increase of over 90,000 acres between 1925 and 1926, the output in the latter year, owing to a decreased yield, was 56,000 tons less than in 1925. The average annual wheat output of England and Wales during the post-War period 1923-27 was 1,394,000 tons, out of a total for Great Britain and Northern Ireland of 1,457,000 tons.

(c) *Season of Marketing.*—Harvesting usually begins in July and lasts until October. From 40 to 45 days are, as a rule, occupied in reaping and gathering cereals throughout the country. Large supplies are rushed on the market during harvest and shortly afterwards. According to the Corn Returns of the Ministry of Agriculture and Fisheries, between 45 and 50 per cent. of the recorded sales take place, as a rule, in the 4 months from September to December and over 75 per cent. in the 7 months from September to March.†

To some extent, this pressure of supplies on to the market can be accounted for by the farmers' need of ready cash for paying wages, buying cattle for winter feeding, etc.; to some extent, also, it is due to the need of straw for covering potato pits, bedding cattle, and so on, while a number of farmers thresh and sell early in the season with a view to eliminating or reducing the costs and losses connected with storage (see Chapter VIII. (i) (a)).

### (iii) Imports.

(a) *Quantities and Sources.*—The year 1875 may be regarded as a turning point in the history of wheat supplies in this country. From that time, wheat from abroad became definitely and permanently of greater importance on the market than the home-grown product.

#### *Wheat.*

In 1875, the United States supplied 1,176,000 tons, or 45 per cent., of the total imports of 2,594,000 tons. Russia, with 500,000 tons, provided nearly 20 per cent., and Germany 11 per cent. Canada, with Australia and India—the latter being a very variable factor—supplied less than 12 per cent.

Twenty years later, in 1895, the Argentine Republic, which had hitherto been of little account, supplied about 570,000 tons, or 14

\* See Table II, page 179.

† See Diagram B, opposite, and Table III, page 180.

per cent., of the total imports of 4,087,000 tons, while imports from Germany had fallen to barely 1 per cent. Russia, by providing 28 per cent. of the imports, more than maintained her position. From the British Dominions, imports had increased, but although the actual quantity showed a slight increase, the proportion arriving from the United States had fallen to about 33 per cent.

In 1913, out of a total of, approximately, 5,300,000 tons imported, the British Empire was responsible for about 2,540,000 tons, or little short of 50 per cent., of which more than two-fifths came from Canada. Of other countries, the United States sent just over 30 per cent., Argentina 14 per cent. and Russia nearly 5 per cent.

In the post-War period, it is notable that, out of a total of 4,843,000 tons of wheat imported in 1925, Empire countries sent 2,675,000 tons, or 55 per cent., of which Canada, according to British import statistics, supplied more than one-half. The United States and Argentina provided 27 per cent. and 12 per cent., respectively, but the quantity from the U.S.S.R. was almost negligible.

While imports from the United States increased in 1926 and 1927, supplies from Canada were also larger and the Empire's share of the trade which, in the latter year, reached 5,522,000 tons, remained high at 49 per cent. and 47 per cent., respectively.\*

#### *Wheat Products.*

Imports of wheat-meal and flour have shown a remarkable fluctuation in the past 50 years. In 1875, imports of wheat-flour amounted to 305,000 tons. By 1895, imports had increased three-fold, but a reduction has since taken place and, in 1925, imports of flour only amounted to about half of those of 1895. A slight rise occurred in 1926 and again in 1927, when imports amounted to 548,000 tons.

Imports of other wheat products, such as shredded wheat, macaroni, semolina, etc., have shown a steady and considerable increase in recent years and, in 1925, totalled about 11,000 tons. There was, however, a sharp drop to less than 8,000 tons in 1926, followed by a slight recovery to 8,600 tons in 1927.

(b) *Periodicity.*—Wheat imports, taken as a whole, are subject to varying monthly fluctuations. Different years show different months of maximum importation, although, in general, imports are lowest during the winter. The average for the years 1923-4—1927-8, inclusive, indicates that imports are greatest during July and August. March is also an important month and there is a subsidiary peak in November.†

Imports from the various supplying countries, however, show very distinct seasonal movements. There is a definite rise in the amount shipped from each exporting country in the months immediately succeeding its harvest. August 1st is regarded as the beginning of the world's cereal year. Starting in June, the United States' winter wheat crop is largely gathered in July. In August, the

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\* See Table IV, page 182.

† See Table V, page 183, and Diagram B, page 12.

harvest of spring wheat begins, and exports between August and October are exceptionally heavy, amounting on the average to nearly 50 per cent. of the whole year's exports. Canadian exports show a steep rise during October and reach a maximum during November and December. During the next four months, Canadian exports are low, as the ports are icebound, but in May and June they again rise. Exports from the Southern Hemisphere, where the harvest takes place chiefly in December and January, arrive during the interval. Exports from Australia and the Argentine are, therefore, high during the first three months of the calendar year, being at their peak in February. Indian exports are at a maximum in June and July, and exports from Morocco and other North African countries in July and August. Shipments from the U.S.S.R. and the countries round the Danube begin in August, and, together with those from other European countries, reach a maximum in September and October, at a time when the English crop is reaching the market in greatest volume.\*

There is no very marked seasonal movement in the imports of wheat products, although they tend to be lowest in August and September.

#### (iv) Total Supplies.

(a) *Quantity.*—The total supplies of wheat, home-grown and imported, available in the United Kingdom in recent years have ranged around 6 or 7 million tons; in the last three years, 1925-27, the figures have been 6,260,000 tons, 6,179,000 tons and 7,016,000 tons, respectively. On the average of the five years 1923-1927, 78 per cent. of total supplies were imported, Empire supplies representing about one-half of the imports, or 39 per cent. of total supplies.

Exports and re-exports of wheat are comparatively very small, but flour exports, which increased rapidly up to 1925, amounted in that year to 240,000 tons, exclusive of 130,000 tons sent to the Irish Free State. The figures for 1926 and 1927 were, however, less than 100,000 tons, exclusive of the Irish Free State quota, which has remained constant. There is also a small export trade in biscuits and cakes, which consist largely of wheat-flour, especially of home-grown wheat-flour.

The average nett available quantity of home and imported supplies of wheat and wheat products was 7,387,000 tons per annum in the period 1909-13, and about 6,992,000 tons in the 1923-27 period.† Since 1st April, 1923, the Irish Free State has been excluded from the statistical area and the figures should be interpreted accordingly. There is, however, an apparent decrease in consumption having regard to the growth of population, but it is possible that the reduction may be more apparent than real, owing to the fact that, in recent years, the wheat imported has been, on the average, cleaner and has contained less impurities than in the pre-War period. Moreover, the average

\* See Table III, page 180, and Diagram B, page 12.

† See Table VI, page 184.

percentage of flour extracted from wheat in the process of milling increased from 68 per cent. in 1907 to 70 per cent. in 1924.\*

(b) *Value*.—In the period 1925-7, the estimated total value of the wheat crop in Great Britain and Northern Ireland averaged, roughly, £17 million per annum. The average annual declared value of imported supplies during the same period amounted to £66½ million.

#### (v) Quality Factors.

Quality governs the relative prices of different classes of wheat, both home and imported, and very largely determines the nature and extent of the market demand for any particular type or sample. Quality is a complex of many factors. In discussing the quality of any particular sample, regard must be paid not only to the country of origin and, in some cases, even to the port of shipment, but also to the physical and chemical properties both of the grain and of the resulting flour, with special reference to the quality and amount of bread produced. It should be noted that the time of sowing has an important influence on quality. Spring-sown wheats, which are subject to a short, sunny, growing season, as, for example, in the prairie provinces of Canada and in the United States, India, Hungary and the U.S.S.R., are generally harder (see later) and rank higher as bread-making wheats than winter-sown wheats, subject to a long growing season, such as the winter wheats grown in this country, the eastern provinces of Canada and parts of the United States.

(a) *Variety*.—Although certain sub-species of wheat, such as the Macaroni, the Polish and even the Emmers and the Spelts, which are more particularly forage types, comprise varieties capable of use in milling, most of the varieties which are used for human consumption belong to a sub-species, *Triticum Vulgare*, which is the most widely grown throughout the world. In England, varieties such as "Squareheads," "Yeoman," "Browick" and others commonly grown belong to this sub-species, but "Rivett" wheats, belonging to the sub-species *T. Turgidum*, are also not uncommon.†

"Yeoman" and "Yeoman II" are red wheats and are regarded as the best bread-making varieties produced in this country. They are largely grown in the eastern counties, where they average 30 per cent. of the crop; the Holland division of Lincolnshire has the highest proportion, namely, 60 per cent., and Norfolk the lowest with 15 per cent. Red wheat of the "Squarehead's Master" or "Standard" type forms the largest part of the crop as a whole, and, being more or less of a general-purpose character, is grown in all districts. White wheats, such as "Victor" and "Wilhelmina," being regarded as specially suitable for biscuit flour and poultry foods, are favoured in Norfolk, parts of Lincolnshire and in the west, south-west and north generally. A relatively good milling wheat, like "Little Joss," is grown largely in the Isle of Ely, Cambridge-

\* See footnote to page 18.

† See Appendix A for geographical distribution of varieties in England and Wales.

shire and Lincolnshire, while the old-fashioned, soft and branny "Cone Rivett" wheat has almost disappeared except in the region of towns, where, as it resists sparrow attack, it is considered a good wheat to grow.

In Canada, No. 1 Manitoba wheat is specified to contain 90 per cent. of the "Marquis" variety. Some years ago, the grading was based on "Red Fife." The recent introduction of "Garnet" wheat, although not so successful as at first hoped, may, in time, affect the type and grades of Canadian wheat, while the recent introduction, on a large scale, of "Marquis" and "Kancred" seed wheat into Argentina may eventually alter the character of the types of "Rosa Fè," "Bar Russo," etc., at present shipped from that country, which consist mostly of Barletta wheat. Russian wheats are described according to variety, as "Saxonska," "Azima," "Ghirka," etc., and are always capable of almost endless classification under the names of ports.

(b) *Colour of the Grain.*—This varies according to the type of wheat. English wheats, as already remarked, are mainly red. In Canada and the United States, red wheats are also predominant, but good quality, white wheats are abundant in the United States as well as a yellow type of wheat (Durum). Argentina grows some yellow wheat but the bulk of the crop is red; Australia, on the other hand, has specialised almost entirely in white wheats. Russian wheats are chiefly red, and Indian mostly white or mixed.

(c) *Bushel Weight.*—This is a good indication of condition. No. 1 Manitoba and American No. 1 Hard spring wheats may weigh from 60 to 65 lb. per bushel, but, in practice, seldom fall below 63 lb. Lower grades of spring wheat range from 56 to 60 lb. North American white wheats and winter wheats run from 60 to 63 lb. Choice Argentina "Rosa Fè" wheat weighs from 62 to 64 lb., and "Bar Russo" from 60 to 65 lb. per bushel, while the lowest samples weigh from 56 to 58 lb. Australian wheats run high, at from 61 to 64 lb.; the best Indian wheats are also high, at from 62 to 64 lb. per bushel. English wheats are quoted and sold on the basis of 63 lb. per standard bushel, but the average natural weight for the 10 years 1918-27 was 61.8 lb. A good deal, however, depends on the nature of the particular growing and harvesting season in each country and there may be big differences in the average bushel weight from one year to another.

(d) *Moisture Content.*—Countries with a dry, sunny climate naturally produce wheats with a low moisture content. Indian wheats, for instance, contain about 9 or 10 per cent. of moisture, but this varies considerably according to the state of the monsoon at the time of shipment. In Canada and the United States, the moisture content ranges, as a rule, from 10 to 15 per cent., although "tough" wheat, of which a good deal has arrived from Canada in recent years, runs higher than this. English wheats, on the other hand, have an average of from 16 to 20 per cent. of moisture.

(e) *Nature and Structure of the Grain.*—These are factors of much importance to a miller. Hard wheats are generally more



satisfactory to mill and give a brighter and more crystalline flour than soft wheats. Yellow wheats, such as Durum, are hard, horny or flinty and require long steeping prior to milling. Red spring wheats, when broken across, have a glassy, vitreous fracture, while red winter wheats are soft, starchy and mild. White wheats from Australia are dry and those from India brittle. White wheats, both home and imported, are, in the main, inclined to be softer and weaker than the red wheats.

(f) *Impurities and Damaged Grain.*—The presence of impurities and damaged grain in a sample of wheat may affect the quality considerably. The lowest Canadian grades may contain frosted grain and other impurities up to 6 per cent. In the lowest grades in the United States, impurities and damaged grain may be present up to 8 per cent. The highest standard grades in each case, however, contain only from 1 to 3 per cent. of impurities. Wheats from India and the U.S.S.R. may contain very considerable quantities of earth and rubbish and, in the main, buyers of these wheats insist on doing business on a "clean wheat" basis. English wheat contains, as a rule, not more than about 1 or 2 per cent. of impurities.

(g) *Flour Yield.*—The flour yield of the grain varies with each of the aforementioned factors. In general, wheats with a high bushel weight give a larger yield of flour than those with a low bushel weight. No. 1 Manitoba may be expected to yield from 70 to 73 per cent. of flour and No. 3 Manitoba only from 68 to 70 per cent. The soft, red winter wheats of Canada and the United States yield from 70 to 72 per cent. of flour. The best types of red Russian and Hungarian wheats will give from 68 to 72 per cent. of flour, English standard reds from 67 to 70 per cent. and "Yeoman," as a rule, a little more. White wheats generally yield a higher proportion of flour than red; Australian wheats, for example, yield from 70 to 74 per cent., choice Indian from 70 to 73 per cent. and English whites from 68 to 71 per cent. Yellow wheats, on the other hand, generally give a low yield of flour which ranges from 67 to 70 per cent. when the wheat is properly milled.\*

(h) *Colour and Flavour of the Flour.*—These are factors to be taken into consideration in determining the quality of wheat. White, with a creamy bloom, is the colour most desired in flour. Yellow wheats give a flour of a poor colour, while the best results are obtained from white wheats, such as Australian, and from English red or white and the soft, red winter wheats of the United States and Canada. Argentine reds are generally considered very good, although there is no fault to find with the red spring wheats of North America. In flavour, nothing excels the home-grown article. Yellow wheats, in this respect, again rank lowest together with excessively dry wheats, such as Indian. Australian wheats are fairly good but, for sweetness, they rank below the soft, red winter

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\* According to the Census of Production in Great Britain, flour and meal constituted 70 per cent. of the wheat products obtained in milling in 1924, the corresponding figure in 1907 being 68 per cent. The figures for Northern Ireland were 71.8 per cent. in 1924 and 69.4 per cent. in 1912. The figures in each case include the unaccounted loss in milling. (See "Board of Trade Journal," March 10, 1927, and February 2, 1928.)

wheats of Canada and the United States. Owing to the pre-eminent position which home-grown wheat holds for colour and flavour, it is a pity that these factors are of such little account in the trade.

(i) *Strength*.—This term is sometimes applied indiscriminately to either wheat or flour. When applied to wheat, it means one which yields a "strong" flour. When applied to flour, it means the capacity of the flour (i) to absorb and retain moisture and thereby yield a large number of loaves to every sack of flour, and (ii) to produce loaves of a large size and of good shape and texture. It should be possible to rely on a "strong" wheat flour to give these results consistently in spite of fairly wide differences in baking practice. In the main, imported wheats give stronger flours than home-grown.

In this country, it is customary to regard the baking test as the only reliable index of strength, but some reference should be made to the gluten, protein or nitrogen content of wheat flours in relation to this particular quality factor. Gluten belongs to the group of organic substances called "proteins," which contain nitrogen in their constitution. The percentage of nitrogen present in a wheat flour is, therefore, an indication of the amount of gluten or protein present and, as between one sample and another of the same type of wheat, affords a useful index of their relative strength. In general, soft wheats have a smaller relative proportion of gluten than hard wheats. There is, however, no direct relation between gluten content and strength, for the gluten of wheat is not one substance but a mixture of several. Further, gluten is a colloid and, as such, is profoundly influenced by its surroundings. Flours containing similar amounts and similar types of gluten may, therefore, behave quite differently in the process of baking, owing to variations in the relative concentrations of acids and salts surrounding, and intimately associated with, the gluten. Largely for this reason, chemical substances ("improvers") are frequently added to flour in order to modify the environment of the gluten and so influence its behaviour in baking.

The power of absorbing water may vary considerably as between a strong and a weak flour. Some idea of the extent of the variation can be obtained by comparing a patent flour made from hard Canadian "Red Fife," having a gluten content of 10·8 per cent. and absorbing 82 quarts of water to every sack, with a flour made from a good, English, white wheat, having a gluten content of 9·8 per cent. which only absorbed 62 quarts of water to a sack of flour.\* Although, in this case, the English flour originally contained only 1 per cent. more water (viz. 14 per cent. as against 13 per cent. in the Canadian), there was an enormous difference—equal to about 50 lb. per sack—in the amount of water which the "strong" flour absorbed as compared with the "weak." This difference is worth money. Although flours absorb a large and varying quantity of water, the deciding factor is, of course, the amount finally retained in the bread. It has been cynically remarked that a baker's function in life is to make water stand upright. Jago gives the moisture content

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\* Jago. "Technology of Breadmaking," p. 296.

of the best white bread as 38.35 per cent., shop bread, baked from "London Household" flour, as 40 per cent. and wholemeal bread as 44.56 per cent. Wiley gives analyses of bread in the United States as follows:—Vienna bread, 38.71 per cent., home-made bread 33.02 per cent., of water.\* He states that moisture content may exceed 40 per cent. in bread made from "strong" flours and fall below 30 per cent. when baked from flours having a low gluten content. Where, as in Scotland, bread is baked from a flour mixture containing a very high proportion of strong Manitoba and North American wheat flours, its water content may run from about 40 to 42 per cent.; but, if the flour mixture contained 50 per cent. of home-grown wheat, the moisture content might not exceed 35 per cent. (See Chapter XV (i) (d) and Chapter XVII (iii) (b).)

A well-known miller states that, in the course of 35 years' experience, he has found that bakers seldom question or complain regarding the colour or chemical composition of his flour, or criticise the texture or flavour of the bread it produces: practically the only question they ever ask is:—"How many loaves can I get to the sack?" Bread-yield is, in fact, the baker's touchstone; to him, low yield and low quality are synonymous terms. Yields of over 100 4-lb. loaves per sack of 280 lb. are not uncommon. Brown bread, baked from wholemeal flour, gives a higher yield, but the ordinary white bakers' flour made from a mixture of wheats is expected to produce about 96 loaves per sack. A sack of flour made from average English wheat will only produce 88 to 90 loaves. On the basis of a 10*d.* loaf, a flour producing 95 loaves is worth 4*s.* 2*d.* per sack more to the baker than an English wheat flour producing 90 loaves; this difference in value is reflected back through the miller to the grower.

The size, shape and texture of the loaf vary with the strength of the flour. To please the consumer's eye, the volume of the 2-lb. loaf should be about 3,000 c.c.† Among English varieties, "Little Joss," in some tests, gave a loaf of 2,800 c.c. and "Yeoman" 2,825 c.c.‡ "Yeoman II," the best bread-making variety yet produced in this country, showed, in 1923, a large variation of from 2,750 c.c. to 3,200 c.c. in loaf volume. In a series of tests made on the 1925 crop, "Yeoman II" flour averaged 2,844 c.c. as against an average of 3,262 c.c. for a loaf made from 50 per cent. No. 1 Northern Manitoba flour and 50 per cent. average English wheat flour.§

#### (vi) Demand.

(a) *Qualitative*.—Imported wheat being, in the main, strong, is chiefly in demand for milling into bread-making flours; some kinds of imported wheat are, however, occasionally used for biscuit flours,

\* Wiley. "Foods and Their Adulteration."

† Biffen and Engledow. "Wheat Breeding Investigations," Ministry of Agriculture Research Monograph No. 4, 1926.

‡ Linlithgow Committee, Interim Report on Cereals, Flour and Bread. (Cmd. 1971/1923.)

§ Report on the quality for breadmaking purposes of various forms of wheat harvested in 1925 at the Trial Station of the National Institute of Botany.—Nat. Assoc. B. & I. Millers, 1926.

as, for example, wheat from Northern France and Germany, as well as some American red winter and Pacific white wheats.

Certain quality aspects of the demand for home-grown wheat may be briefly noted. A relatively large quantity of home-grown wheat is used for poultry food, and any kind of large-berried wheat is suitable for the purpose, but there is a strong preference for white varieties, especially in the North and West. For biscuit and confectionery flour, a soft, white wheat is preferred, but any of the ordinary red varieties of the "Squarehead" or "Standard" type are also suitable. The new "Yeoman" varieties are certainly not wanted for this purpose, and some biscuit manufacturers specify in their flour contracts that "Yeoman" must not be used in the grist. The ordinary run of English wheat is very suitable for blending flours and for scaling flours for household use, although the quality of the flours can sometimes be improved by adding "Yeoman" to the mixture. For use in bread-making flours, "Yeoman" is the most suitable type of English wheat, but large port millers often prefer a general mixture of all varieties, since any one variety may not always, and in all districts, be obtainable. Only the small miller who can give his personal attention to the business seems consistently to look for "Yeoman" wheat, but, as will be shown later, even he only requires "Yeoman" for a part of his output.

Thus, for biscuit-flour and stock feeding, which account for about one-half of the home-grown supplies on the market, "Yeoman" varieties are not in demand except at a discount, but the other half is put to uses in which "Yeoman" is to be preferred and ought to command a premium. The discount on the one side, however, frequently offsets the premium on the other. While in some districts, and on some markets, a good, white wheat will make from 1s. to 1s. 6d. per qr. more than other wheats, in other districts "Yeoman" wheat will command a similar premium.

In so far as average market prices can be accepted as a standard of measurement, they suggest (see Chapter IV) that the market does not recognise any outstanding difference in the general quality of the wheat as between that grown in the North and South or East and West. Millers and provender merchants do, of course, make some distinction in regard to the quality of wheat grown in different districts; millers of bread-making flours, for instance, regard wheats grown in the Fens as most suitable for their purpose, and poultry-food merchants in Lancashire and the Midlands show a partiality for white wheats out of Lincolnshire or Cheshire, but such distinctions, where they exist, either balance one another or are not sufficiently great to cause marked differences in the average price levels as between one part of the country and another.

(b) *Quantitative*.—Of the supplies of home-grown wheat actually marketed, it may be estimated that roughly 30 per cent. is used for bread-making flours, while the remainder is allocated in fairly equal proportions between (1) blending and scaling flours, (2) biscuit flour and special manufactures and (3) stock feeding (chiefly poultry

food). The total requirements for these purposes, apart from stock feeding, may be said to constitute the processing demand.

### *Processing.*

Apart from the comparatively small quantities of wheat which are used for special processes such as malting and distilling, or in the production of articles of diet such as patent foods, shredded wheat, meat pastes, etc., all the process-demand comes from the flour-milling industry.

The total output of flour from British mills is roughly 33 million sacks (280 lb.) per annum.\* Imported wheat, except for a relatively small fraction, goes into the flour-milling industry. The extent to which English wheat is utilised in any particular mill depends on the location and capacity of the mill and on the type of demand for which it caters.

Although it is customary to distinguish between "port" and "inland" mills, it is not easy to draw a line between them. If the term "port" is used with reference to location on the seaboard, and all other places are regarded as "inland," then milling capacity seems to be shared between port and inland mills about equally.†

If, on the other hand, mills located on navigable water are also regarded as port mills, then two-thirds of the milling capacity is represented by port mills and one-third by inland. Thus, Hull, for example, is obviously a port of first magnitude, but York, Wakefield and Sheffield, even though located well inland, are situated on good navigable water by means of which the local mills obtain a very large part of their supplies and may properly be regarded as port mills in this wider sense. As a rule, the large port mills run both day and night, while the small inland mills work by day only. Further, a number of the smaller inland mills are solely or partially employed in producing provender meals. It seems reasonable, therefore, to estimate the requirements of the port mills at about 85 per cent. of the total wheat milled in the country.

In the large port mills, English wheat is regarded as the "pepper and salt" of the mixture; on occasion, and under favourable circumstances of supply, quality and price, up to 25 per cent. of English may be used in some mills, but there are large millers who never like to see, at any time, as much as 10 per cent. of English wheat in the grist. On an average, 10 per cent. for 6 months of the year, or 5 per cent. per annum, represents the proportion of English wheat used by the large port mills. More is, of course, used where biscuit or scaling flours are part of the output, but, as a rule, the large port mills cater specially for the baker.

The output of the inland mills appears, on the average, to be divisible into three practically equal parts, namely, (a) all-English

\* 4,135,748 tons of wheat-meal and flour were produced in Great Britain and 60,720 tons in Northern Ireland, according to the Census of Production, in 1924.

† Cf. Report of Royal Commission on Food Prices. Cmd. 2390/1925. Pp. 47-48.

wheat flour, (b) a mixture containing 55 per cent. of English and 45 per cent. of imported\* and (c) a strong mixture containing up to 25 per cent. of English. The first part is chiefly made to meet the requirements of biscuit manufacturers who, it is estimated, take nearly two-thirds of it;† the balance is sold either to flour factors or to other millers for use in blending or is employed in the production of "self-raising" and household flours. The second chiefly reaches the grocer blended or unblended for sale as a scaling flour, or is employed by the local baker to blend with strong bread flours or in the baking of cakes, etc. The third part is a baker's bread-making flour and is sold, in most cases, direct to local bakers.

Taking both port and inland mills together, it may be roughly estimated that, of the English wheat employed in milling, about two-fifths is used as the merest seasoning in the bread-making flours, produced mainly by the large port millers; of the remainder, one-half is used in the manufacture of blending and scaling flours, while the other half is used mainly for biscuit making and special manufactures.

#### *Stock Feeding.*

Poultry are by far the greatest consumers of feeding-wheat, both on and off the farm. Poultry-keepers do not, however, greatly favour imported wheat and relatively little is used for feeding. Estimates of the amount of English wheat sold for this purpose vary according to the district. In the eastern counties south of the Wash, in an ordinary season, about 85 per cent. of the wheat offered for sale is used for milling, the remainder being sold for poultry food. Since the wheats grown are largely red varieties and buyers south and east of Birmingham are apparently indifferent to the colour of the wheat, it seems probable that more red than white wheat is sold for poultry purposes in this district. From south Lincolnshire northward and westward, the poultry-food demand is chiefly for a large, white wheat. It is estimated that over 40 per cent. of the wheat from Lincolnshire is used for poultry-feeding and goes chiefly to south Lancashire. About 50 per cent. of the wheat grown in Yorkshire is used in this way; in Northumberland, the proportion is estimated at 80 or 90 per cent. In the north-west, in Lancashire and Cheshire, in spite of the proximity of a large milling centre, at least half of the wheat grown locally goes to poultry. In some parts of the Midlands, the proportion is as high as 60 per cent., or more, while in other parts, as, for example, in the south-east Midlands, it is estimated to be as low as 15 to 25 per cent. In Gloucester, Somerset and the south-west, the proportion falls to from 10 to 15 per cent. In South Wales, practically the whole of the wheat produced is sold for poultry feeding, although many large mills exist in the area.

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\* The country miller wants maximum strength in minimum bulk; hence the imported wheat he uses is mostly good Manitoba.

† According to the Census of Production (1924), 2,612,000 cwt. of biscuits were manufactured in Great Britain. Exports of biscuits, in 1924, represented 6.5 per cent. of the output.

While, to some extent, these sales represent grain not suitable for milling purposes, they also include a large proportion of first-quality grain. Taking the country as a whole, it seems reasonable to estimate that a little under a quarter of the home-grown wheat put on the market is bought for feeding purposes.

(c) *Seasonal Variations.*—There are significant seasonal fluctuations in trade requirements. Flour requirements are least in July and August and increase as the winter advances, until by February-March they are about 14 or 15 per cent. above the July-August level.\* Poultry-food requirements are lowest in mid-winter; rising rapidly in spring, they reach their highest point about July or August, when the market requirement is estimated as being four or five times that of mid-winter. In spite, therefore, of the falling demand for flour, the potential market demand for home-grown wheat increases as the season advances.

Apart from these seasonal tendencies, various special factors may cause irregular variations in the demand for home wheat in the course of any one season. If, for instance, the soft, winter types of imported wheat are in short supply, port millers will increase their demand for English wheats; on the other hand, if they are plentiful, cheap and good, they may displace some English wheat not only in bread-making flours but also in biscuit-making. Variations in the price of maize may also influence the demand for English wheat for poultry feeding.

A partial failure of the crop in the prairie provinces of Canada has an adverse effect on the demand for home-grown wheat. If, owing to a shortage of Canadian wheat, the inland mills, which customarily use a high percentage of English wheat, have to turn to, say, Plate wheat, the amount of English wheat in the mixture must be reduced if the level of strength is to be maintained. A large crop of Canadian spring wheat, on the other hand, by enabling a high proportion of English wheat to be utilised in the grist, is a definite factor in increasing the demand for English wheat. It seems fortunate that Empire wheats should, in this way, be complementary rather than competitive.

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## CHAPTER II.—BARLEY.

### (i) World Position.

(a) *Acreege.*—The acreage under barley in England and Wales represents about 2 per cent. of the world's total acreage of approximately 80 million acres.

Of this total acreage, about 55 per cent. is to be found in Europe (including the U.S.S.R.), while North America and Asia each account for roughly 15 per cent. Africa represents about 10 per cent., leaving South America and Oceania responsible for the small remainder.

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\* See, also, Report on Food Requirements of Man; Food (War) Committee, Royal Society. Harrison and Sons (1919).

It is interesting to note that the countries of the Southern Hemisphere account for little over 2 per cent. of the world's barley acreage.

(b) *Yield per Acre.*—Wide variations occur from one country to another in the yield of the barley crop. In the Argentine, for instance, during the five years 1923-27, the yield averaged under 9 cwt. per acre. Canada and France, in the same period grew an average of about  $11\frac{1}{2}$  cwt., Germany about 14 cwt. and Holland approximately 22 cwt. per acre, as compared with the average yield in Great Britain and Northern Ireland of over  $15\frac{1}{2}$  cwt. per acre.

(c) *Production.*—In the pre-War period, 1909-1913, about 64 per cent. of the world's output of barley was produced in Europe (including the U.S.S.R.); Asia and North America followed in order of importance with 15 per cent. and nearly 14 per cent., respectively. Africa accounted for about 6 per cent., production in South America and Oceania, especially the latter, being almost negligible.

The post-War years show a reduction in the world's output of barley compared with the pre-War period, but there has recently been a closer approximation to the pre-War position, the output in 1927 being 35 million tons, representing a decrease of only  $6\frac{1}{2}$  per cent. In the latter year, Europe accounted for 55 per cent. of the total, while the contribution from North America advanced to  $22\frac{1}{4}$  per cent. The percentage from other sources remained about the same as before, except that production in South America and Oceania, although only responsible for 2 per cent. and  $\frac{1}{2}$  per cent. respectively, showed a considerable relative increase. It may be said that, but for the heavy deficiency still showing on production from the U.S.S.R., the world's barley output would now be in excess of pre-War production.

Empire production has increased, although not to any great extent, the percentage of world output being 17 per cent. for the last two years as compared with 15 per cent. in the pre-War period.

(d) *International Trade.*—Before the War, Europe was responsible for the bulk of the international trade in barley, viz., 84 per cent. of exports and 99 per cent. of imports. The average annual imports into Europe, in the period 1909-13, amounted to nearly 5 million tons, while exports, mainly from the territory now comprising the U.S.S.R., were about  $4\frac{1}{4}$  million tons, leaving an excess of imports to be made up from other sources of  $\frac{3}{4}$  million tons. Australia, during the same period, was almost entirely an importing unit, while America, Asia and Africa showed a surplus of exports ranging from about 300,000 tons downwards.

The international trade in barley declined during the period 1923-27 to about 2·8 million tons, of which Europe accounted for only 39 per cent. as exports, but was responsible for 98 per cent. of the total imports. The failure of the U.S.S.R. to produce a large exportable surplus accounts for the European situation. North America showed a relatively large increase in its trade and accounted for 37 per cent. of total exports, while exports from South America increased considerably. The rise of Australia as a source of barley



supplies is indicated by the fact that, from being an importer before the War, the Australian export surplus averaged about 34,000 tons during the years 1923-27. Asiatic exports have fluctuated widely during recent years, while the import trade has shown a relatively considerable increase. Exports from Africa declined and imports increased during the period 1923-27.

### (ii) The Home Crop.

Although the barley acreage is fairly well scattered over all the arable districts, it is even more concentrated in the eastern counties than wheat. The five counties of Norfolk, Suffolk, Essex, Cambridge and Lincoln contain about one-half of the total area under barley in England and Wales. From this region, the chief zones of concentration stretch along the oolitic and chalk formations northward through Yorkshire and south-westward into Dorset. In general, a light soil and a light rainfall are most suitable for the crop.

(a) *Trend of Sowings.*—The acreage under barley in England and Wales has, in the main, shown a comparatively steady fall since 1875.\* During the period 1915-20, this general trend was reversed and there was a consistent annual increase culminating, in the latter year, in a total of 1,637,222 acres, the highest figure since 1904. Since 1920, there has been a rapid decline; in 1925, the area devoted to barley (1,317,810 acres) was less by more than 40 per cent. than the acreage in 1875, and, in 1926 and 1927, the area diminished still further. In 1928, some recovery was made, the total acreage under barley in Great Britain and Northern Ireland being 1,301,000 acres, of which 1,185,000 acres were in England and Wales.

(b) *Yield and Output.*—The yield of barley varies from year to year† and from one district to another. The Isle of Ely and Lincolnshire (Holland), which have the highest average yield of wheat, show also the highest ten-year average (1918-27) for barley, namely 19·7 and 18·9 cwt. per acre respectively. The yield in the western counties is low, and in Wales, the ten-year average varied from 11·2 cwt. in Brecon to 14·1 cwt. per acre in Pembroke. The average for the whole of England and Wales was 15·0 cwt. per acre.

The total output in England and Wales during the same ten-year period varied from a maximum of 1,205,000 tons in 1920, to 862,000 tons in 1927. Owing to the annual variations in yield per acre, the production between 1920 and 1927 did not fall with such consistent regularity as did the acreage, but the output in 1927 was the lowest recorded in the post-War period. The average annual output for the five years 1923-27 amounted to 953,000 tons in England and Wales, out of a total for Great Britain and Northern Ireland of 1,077,000 tons.

(c) *Season of Marketing.*—The rush to market barley during and immediately after harvest is more pronounced than in the case of the other cereals. According to the Corn Returns of the Ministry of

\* See Table I, page 178, and Diagram A, page 11.

† See Table II, page 179.

Agriculture and Fisheries, about 60 per cent. of the barley sales are effected during the three months October to December, and over 80 per cent. during the five months, September to January\* In this case, the seasonal rush of supplies reflects the seasonal variation in the manufacturing demand (*see* page 35).

### (iii) Imports.

(a) *Quantities and Sources.*—Notable changes have taken place in the imports of barley and barley products during the last 50 years, although the extent of the changes has not been so great as in the case of wheat.

#### *Barley.*

In 1875, imports of barley were about 550,000 tons, of which Russia supplied about 23 per cent. and other European countries (chiefly Roumania) 44 per cent. Supplies from Asiatic Turkey practically equalled those from Russia. Imports from the United States were insignificant, as also were those from the British Empire. By 1895, imports exceeded 1,180,000 tons. The main sources of supply were the same but imports from the United States had increased. The British Empire remained a negligible factor in the trade. In 1905, out of a total of 1,071,000 tons imported, Russia accounted for 46 per cent., other European countries and Asiatic Turkey 15 per cent. each, the United States 12 per cent., and the British Empire (mainly Canada) 5½ per cent. The remainder was divided almost equally between North Africa and Chile.

By 1913, when total imports amounted to 1,122,000 tons, the Empire's share was 28 per cent., due very largely to exceptionally heavy supplies from British India. Russia contributed 27 per cent., other European countries 11½ per cent., Asiatic Turkey 10 per cent. and the United States 20 per cent.

In 1925, the total imports had fallen to under 800,000 tons. Of this amount, however, 26 per cent. came from within the Empire—19 per cent. from Canada—and over 35 per cent. from the United States, while Russia, which had for a time dropped out as a source of supplies, again assumed an important position by supplying 23 per cent. of the barley imports. North Africa and Chile each sent 5 per cent.

In 1926, barley imports declined sharply but rose again to over 800,000 tons in 1927, in which year Russian imports were negligible and supplies from Canada were low, the Empire as a whole being responsible for only 16 per cent. The exceptionally large quantities from "Other Foreign Countries" were mainly drawn from Iraq, which had been included in Asiatic Turkey in pre-War years.

The Argentine has never been an important source of barley supplies, but Chile has, in some years, made a substantial contribution. The collapse of Russia in the barley trade after the War is a matter of common knowledge, and the recovery which took place in 1925 and 1926 was followed by a heavy decline in 1927. As in the

\* See Table III, page 180, and Diagram C, page 37.

case of wheat, the rise of the British Empire to a prominent position is noteworthy, although the 1925 percentage was not maintained in 1926 and 1927, chiefly owing to smaller supplies from Canada. India and Australia are both very variable factors.\*

#### *Barley Products.*

Imports of barley meal and flour do not, as a rule, exceed 2,000 tons annually, and the imports of malt are about the same figure. The quantity of pearled barley imported is slightly larger and remains fairly steady at about 2,500 tons, although in 1927 the amount rose to 4,000 tons. Imports of malt extract have become important and are believed to have increased considerably in recent years; no figures are available but the large increase in exports from the United States is significant. In 1921, these amounted to 12,579 gallons, but by 1927 they had increased to 476,035 gallons, valued at \$399,658.

(b) *Periodicity.*—Barley imports show a definite seasonality. The largest monthly imports take place during September, October and November, the maximum being in October.†

The quantities exported from the various producing countries follow a certain sequence. In August, exports from the United States and North Africa are rising and, in the latter case, reach their highest point in September, while those of the United States increase, as a rule, until October. In October, exports from Danubian and other European countries are at their highest. Exports from Canada are greatest about November, and Australia loads most heavily in December and January. Exports from the Argentine and India are greatest in February and March, while Indian supplies reach a peak again towards June or July. Unfortunately, the period of maximum imports into this country from all sources only slightly precedes, in point of time, the date at which the home crop reaches the market in greatest volume.

#### (iv) Total Supplies.

(a) *Quantity.*—The total supplies of barley, home-grown and imported, available in the United Kingdom during recent years have been considerably lower than formerly. In 1925, 1926 and 1927, the figures were 1,944,000, 1,605,000 and 1,778,000 tons, respectively. The diminution in supplies has been common to both home-grown and imported grain and appears, therefore, to be directly due to a reduction in the amount of barley which the market will absorb. On the average of the five years 1923-27, 44 per cent. of total supplies were imported, Empire supplies representing 28 per cent. of the imports and about 12 per cent. of the total supplies.

Exports and re-exports of barley from this country are, in some years, fairly high and amounted to nearly 29,000 tons in 1925,

\* See Table VII, page 185, showing Imports of Barley into the United Kingdom in 1925, 1926 and 1927, compared with the 1909-13 average.

† See Table VIII, page 186, and Diagram C, page 37.

although that figure was not sustained in the two following years. There is also a fairly steady and substantial export trade in malt. As against the imports of malt extract, there is a corresponding export trade from this country to meet, in particular, the requirements of certain Empire countries having a warm climate, but the precise extent of this trade cannot be ascertained. Exports of other barley products are of little significance.

The nett available quantity of home and imported supplies of barley and barley products was 2,533,000 tons per annum over the period 1909-13, as compared with 1,880,000 tons for the period 1923-27.\* These figures cannot be considered as strictly comparable owing to the omission of Irish Free State figures in the later period. It is obvious, however, that there has been a considerable reduction in the consumption of barley. Reference to the statement of quantities used in the brewing and distilling industries† indicates that the explanation is to be found very largely in the reduction of the quantities used for those purposes.

(b) *Value*.—The average annual value of the barley crop in Great Britain and Northern Ireland in the period 1925-27 was approximately £12 million. Imports in the same period averaged £7½ million.

#### (v) Quality Factors.

It is difficult to classify barleys according to quality. The quality analyses of a brewing chemist indicate that buyers consistently undervalue samples of home-grown grain which have been produced in unfashionable districts; similarly, although some maltsters or brewers commend the barley of this or that country, others profess to find it objectionable or unworkable. Some are critical of the good-looking barleys received from Australia; others dislike Californian "Mariout," while Chilean is considered, in some quarters, to give malt with an earthy smell. Quality in barley and malt is so much a matter of personal taste that it is difficult to make a rigid standard. There are, however, certain commercial factors which must be taken into consideration. Whether the barley is intended for provender or malt, the physical character of the grain is the first consideration. If the grain is to be malted, factors governing the quantity and quality of the malt produced become significant with special reference to the nature of the final manufactured product whether that be malt extract, beer or spirits.

(a) *Variety and Type*.—Although a rough distinction is generally made between feeding and malting types of barley, these are to a considerable extent interchanged. The many varieties of barley grown in England may be classified into two main commercial types, namely, the thin, fine-skinned "Chevallier" type, and the plump, thicker-skinned "Goldthorpes." The "Chevallier"

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\* See Table IX, page 187.

† See Table X, page 188.

type is found in those districts noted for the finest barleys—the Norfolk coast and the Wolds of Lincolnshire. In the Midlands and in the West and North, or wherever a good malting sample cannot be relied on, heavy-yielding, “fat” types of barley are grown. In general, however, the bulk of the barley is of a hybrid type, from which a farmer hopes in a good, dry year to have a first-quality, malting sample for sale, but, should the weather prove unpropitious, he hopes to derive some consolation from a fairly good yield of feeding barley.

The best quality barley is generally found in Norfolk, Lincolnshire, Suffolk and Essex—the first-named, especially on the coast-land by Wells, being the most “fashionable” district. In the southern counties, parts of Dorset, Wiltshire and Hampshire grow a good sample. Much depends on the season. Thus, Yorkshire barleys are, on the whole, of fair quality; on the Wolds, near Malton, they are good; in some years, however, the general level is poor and it is only in an occasional dry season that Yorkshire barleys, as a whole, attain first rank. Other parts, such as the Fens, seldom produce first-grade barleys.

Imported malting barleys, such as those arriving from countries bordering the Pacific, are generally classified by the trade into two types, “Chevallier” and “Brewing.” In the process of malting, the Chevallier varieties, as grown in California, Chile and Australia from British seed, work in a manner similar to home-grown grain. Brewing types are generally mixed and contain a considerable proportion of six-rowed barley. In California, there is, however, a tendency to produce a uniform article by concentrating on the growth of one variety, namely, “Mariout,” grown originally from Egyptian seed. Countries in the Mediterranean region, particularly Hungary, and Czecho-Slovakia, send malting barleys of excellent quality. Asia Minor and North Africa, however, generally export a light, husky barley of a type which has special characteristics desired by some brewers. In the main, Great Britain receives more feeding than malting barley from Canada and the Baltic. Although Canada does, in fact, grow a fairly large quantity of a good malting type, this has, up to now, been used entirely at home and no special export trade in malting barley has been developed.

(b) *Bushel Weight and Moisture Content.*—These are the important factors in feeding and milling types of barley. The drier nature of imported barleys makes them more desirable for provender milling than home-grown grain. Whereas the latter contains from 16 to 17 per cent. of moisture, the imported kinds contain, as a rule, only from 11 to 12 per cent. Home-grown barley, however, has generally a higher bushel weight than imported barley. It is bought and sold, as a rule, on the basis of 56 lb. to the bushel, but on the average of the 10 years 1918-27, its natural bushel weight was estimated at 53.8 lb. This might be compared with, say, No. 1 Canada Western, the bushel weight of which is 48 lb., and No. 3, which has a bushel weight of only 46 lb.

(c) *Percentage Germination*.—Pale-ale malts require a germination of at least 98 per cent., but for running-ales and stout, a lower percentage germination will suffice. For coloured malts, 85 per cent. or 90 per cent. germination may give satisfactory results. The percentage germination of imported barleys which have matured in a sunnier, drier climate is stated to be higher and more reliable than that of home-grown barleys. Of Californian, Australian and good barleys from Hungary and Czecho-Slovakia, it is said that they germinate "to a corn." It is impossible to give a reliable indication of the average germinative capacity of home-grown grain, especially as the process of kiln-drying (see later) has a profound effect on the product and may increase the proportion of grains which germinate by as much as 10 per cent.

(d) *Thickness of Husk, etc.*—For malting purposes, thin-skinned barleys are, in the main, preferred, but, in order to keep the mash open and allow the "worts" to drain off, it is necessary to have a certain amount of husk in the mash tun. For this purpose, oat husks may be added or a proportion of thicker-skinned barley which will not break down when the malt is milled. Husky barleys from Smyrna and North Africa are frequently employed for this purpose, although these have been largely displaced in recent years by barleys from the west coast of North America—California, Oregon and British Columbia. The average imported barleys are thicker in the husk than, and not so fine as, home-grown barleys. It has been said, however, that a good winter-sown barley from Dorset will supply as much husk as is required, and that it is better than Californian because it is not so loose in the husk and is, therefore, less liable to mould attack. The increasing output of winter-sown barley may, therefore, eventually reduce the demand for imported barley which arises from this special cause.

Other quality points in a barley for malting purposes are that it must be free from impurities and broken grains, even in size, well-matured, rich in starch, free from proteins and of a good colour.

(e) *Malt Yield*.—The quantity of malt which can be produced from a given measure of barley is an important factor in estimating the quality of the grain. In the process of malting, the barley, after being steeped and allowed to germinate, is cured and dried until it contains only about 1 per cent. of moisture. A large part of the loss in weight which occurs in the course of malting is due to this drying-out; barley with the highest initial moisture content will naturally show the greatest loss. Since home-grown barley generally contains a higher percentage of moisture than imported kinds, it follows that, weight for weight, less malt can be produced from home-grown than from foreign barley. A quarter (448 lb.) of barley is expected, according to the Excise standard, to yield a quarter (336 lb.) of malt. In practice, however, 10 cwt. of barley yield, on an average, 8 cwt. of malt.

(f) *Quantity of Extract*.—Extract is the soluble matter derived from the infusion of crushed malt and differs according to the type of barley used. This factor depends generally on the size and plump-

ness of the grain; thickness of the husk, etc. The Excise standard Sp. Gr. for beer (of 1055°) is fixed on the presumption that 1 quarter of malt (336 lb.) will yield a minimum of 79·2 brewers' lb. of extract,\* but, in actual practice, much higher yields are obtained, the general run being from 80 to over 100 lb. In this respect, home-grown barley is better than imported. While the former will yield, on an average, from 90 to 100 lb. of extract, the latter, as a rule, only gives from 80 to 96 lb. per quarter of malt.

(g) *Diastatic Capacity*.—The diastatic capacity, or the power of converting starch into sugars, varies with the malt. Usually, malt may be expected to convert 4 or 5 times its equivalent of unmalted grain: this factor is vastly more important in distilling than in brewing, since distilleries employ large quantities of unmalted grain, such as maize, as the basis of a cheap starch supply. It is also an important factor in the case of malt extracts used in bread making. Home-grown barleys are not deficient in diastatic capacity but they are excelled in this respect by the Canadian barley and by barleys imported from Danubian countries. In general, immature barleys have more diastatic power than fully matured or slightly weathered barley. So far as this particular factor is concerned, barley meets with competition from rye, which ranks high in diastatic capacity.

#### (vi) Demand.

(a) *Qualitative*.—Barley supplies are fairly evenly apportioned between (a) stock feeding, milling and the provender trade, and (b) malting, with the allied industries of brewing and distilling. Lower qualities of imported barley go for stock feeding and are largely made into meals, though some of the better imported feeding barleys, such as Canada Western, are also used in the preparation of pot and pearled barley for human consumption. Practically all imported Chevallier types and many imported brewing types are used in malting and allied industries.

In considering the quality requirements of the milling industry and of the provender trade, it should be observed that, in making preparations of pot, pearled and rolled barleys, the barley must first be "shelled." For this process, the barley should be dry. If not naturally so, it must be dried in a kiln before milling. As this may cost about 1s. a quarter or more, the drier imported barleys have an advantage in this respect. In the finished product, however, the home article is finer and more palatable and nutritious than any preparation imported or made from imported barleys. A large pot barley is customarily used for soup in Scotland and the north of England, and, if made from home-grown grain, sets to an excellent jelly when cool.

The type and quality of grain required in the malting industry vary with the time of year and with the nature of the output. For example, at the beginning and end of the malting season, more reliable results are obtained by malting imported barley than by malting home-grown grain, as the latter is said to behave more

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\* To convert brewers' lb. to lb. solid extract, multiply by 2·597.

erratically than imported barley in the warmer weather. There is the further consideration that barleys from California, Smyrna, etc., are used because of the character of their husk. In order to meet the requirements of the malting and brewing industries, therefore, the use of some imported grain appears necessary, but, in the main, barley grown in this country, if well harvested and threshed, appears in every way suited to the needs of these industries.

The distilling and brewing industries are quite distinct in their quality requirements. In the distilling industry, between 35 and 40 per cent. of the output of spirits is made in distilleries which are devoted to the production of yeast for baking. Over 25 per cent. of the spirits made in 1923-4 were employed in industry, arts and manufactures or as medicines, etc., and an almost equal quantity was sent to markets abroad. Only 40 per cent. of the total output is apparently consumed in this country as potable spirits. Distilling requirements are, therefore, largely for a cheap food for the yeast plant—what a farmer would term a cheap manure—and cheapness is also essential in the production, on a competitive basis, of alcohol for industrial purposes or for export. In pot stills, almost all the material used is malted barley, but, in patent stills, malt is only used in the proportion of about 1 to 4 of other material. To convert such a large bulk of starchy material into sugars, the malt must have a high diastatic capacity. With obvious qualifications, therefore, distilleries require a cheap barley with a good diastatic power. To provide a cheap yeast food, other grains such as maize and rice are largely used and, partly for this purpose and also on account of its diastatic power, rye is often employed instead of barley. For the same reasons, foreign barley is favoured in patent stills, while distillers with pot stills generally prefer to use the home-grown product.

The finished product of the brewing industry is consumed as beer in this country with the exception of about 1 per cent. which is exported and a small fraction converted into vinegar. Even although by the use of certain materials such as caramels, sugars, etc., or by employing certain processes such as chilling and carbonisation, a brewer is able to attain the requisite colour, clearness and sparkle, he still expects his beer, if brewed from barley malt alone, to have these characteristics without artificial aid. He requires, therefore, a first-quality barley. Only a relatively small proportion of the English crop is considered by brewers to be suitable, on the average, for making the very finest pale ales, but 80 to 90 per cent. of it would, in most years, be good enough for making malt for use in the preparation of mild running ales and stouts.

In striking contrast to the conditions prevailing in the case of wheat, barley users make very great distinctions in regard to the suitability for their purpose of barley grown in different districts throughout the country. In general, suitability for malting purposes decreases from east to west and from south to north, although some brewers claim that they can make better beer from Yorkshire or Scottish barleys than was ever made from barley out of the south-eastern counties. The price differences at various country markets



provide some indication of the emphasis which the market lays on this variation in quality between one part of the country and another (see Chapter IV). This localisation of quality in the barley crop has an enormous bearing on its distribution. They say in the trade that barley "goes wide." Maltsters and brewers frequently go far afield for supplies, provided that they can find barley with the character and quality which suits their fancy.

(b) *Quantitative.*—The total supplies of barley available in this country are between  $1\frac{1}{2}$  and 2 million tons, of which about one-half is used for stock feeding, and the other half mostly in the brewing, distilling and malting industries, only a little being used in the milling of household preparations. About 65 per cent. of the barley grown in this country seems to be sold off the farms, and of this, probably over two-thirds is bought to meet the requirements of maltsters, brewers and distillers.

#### *Processing.*

Malt is chiefly employed in brewing and distilling, but a certain amount is absorbed in the manufacture of malt extract for use in bakeries or for sale as a food, either mixed or unmixed with other nutritive materials such as cod-liver oil. The amount of barley malted and utilised for this purpose is only capable of vague estimate but probably does not exceed 10,000 tons per annum.

It has been explained that the quality requirements of the distillers demand a cheap food for the yeast plant and a barley with good diastatic power. In 1924-25, the distillers of Great Britain and Northern Ireland used about 152,000 tons of malt, over 100,000 tons of unmalted grain (maize, etc.), and 62,100 tons of other materials. During the year ended September, 1926, however, a very serious decrease took place in the amount of distilling, and in that year, well under 100,000 tons of malt were used.\* In 1927, the quantity of malt used for distilling declined still further.

To-day, all beer must be "coloury," clear and sparkling. This doubtless tends to increase the use of sugar, glucose, etc., but, even so, the largest part of the materials used in the brewing industry consists of malt. In 1924-25, for example, 572,700 tons of malt were used and nearly 140,000 tons of other materials, exclusive of hops which equalled 18,100 tons.\* The 1926 and 1927 returns show a decline in the amount of malt used in brewing, but the reduction in this case was proportionately less than in the case of distilling and only amounted to a little over 25,000 and 38,000 tons, respectively. From an examination of the various amounts used in some representative malting centres, it would seem that not much more than half of the malt is made from home-grown grain.

In the milling of household preparations, unmalted barley is used for the manufacture of certain farinaceous foods such as pot and pearled barley, and of rolled and partially cooked barley passing under several trade names. Here again it is only possible to make

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\* See Table X, page 188.

a general estimate that the requirements under this head appear to be about 25,000 tons of barley.

#### *Stock Feeding.*

In part, the stock feeding requirements are also manufacturing requirements. The milling industry, for example, uses about 375,000 tons of barley annually in the manufacture of barley meal and flour.\* Manufacturers of animal and poultry foods use a certain amount—estimated at about 50,000 tons—of crushed barley in their products. Even when all the market requirements are met, there still remains a large percentage of the crop to be utilised on the farms as seed and stock food. According to the Agricultural Census of Production taken in 1925†, the amount of barley thus retained by farmers amounts to 35 per cent. of the total production. When his barley is of a kind fit only for stock feed, the farmer should find it more profitable to feed it on the farm; but, for this purpose, it is better crushed before use. If no grist mill exists on the farm, the barley is frequently sent to a local grist mill and after being ground is taken back home. Apparently, about 100,000 tons per annum are treated by millers in this way for farmers.

(c) *Seasonal Variations.*—The market demand for barley varies throughout the year. The malting season lasts, as a rule, from September to April. Most maltsters and maltster-brewers, however, habitually buy 60 or 70 per cent. of their total requirements before Christmas. This is kiln-dried and stored for use during the season. Relatively little is bought, therefore, once the New Year is reached. If the crop is good and prices low, buyers not infrequently re-enter the market in the spring and buy up a quantity to carry forward to commence the following season. For malting purposes, therefore, buying begins in September, rises rapidly to a height in November, and falls rapidly again to a low level in January, while, in the summer months from May onwards, the demand is practically negligible. For household purposes, and stock feeding also, the demand would appear to be greater in winter than in summer. In general, therefore, the demand for barley of all kinds may be regarded as being highest in October, November and December.

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### CHAPTER III.—OATS.

#### (i) World Position.

(a) *Acreage.*—The area devoted to the cultivation of oats throughout the world is only half that of wheat—i.e. about 140 million acres. The acreage in England and Wales represents approximately 1½ per cent. of the world total. Europe, including the U.S.S.R. territories, accounts for 56 per cent. of the acreage and North

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\* According to the Census of Production, the output of barley meal and flour in Great Britain was, in 1907, 303,150 tons, and in 1924, 303,965 tons.

† The Agricultural Output of England and Wales, 1925. Cmd. 2815/1927.

America for about 40 per cent. Of the small balance, South America holds a much larger share than any other region, the Southern Hemisphere, as a whole, being responsible for 3 per cent. of the total acreage.

(b) *Yield per Acre.*—As in the case of wheat and barley, the yields of oats vary considerably from one country to another. In the U.S.S.R., for instance, during the five years 1923-27, the average yield per acre was  $6\frac{1}{2}$  cwt. The average for both North and South America was about 9 cwt. per acre. Germany, however, grew 14 cwt. and Holland  $16\frac{1}{2}$  cwt. as against an average of 15 cwt. per acre in Great Britain and Northern Ireland during the same period.

(c) *Production.*—About 97 per cent. of the world's output of oats is produced in Europe (including U.S.S.R.) and North America. In the pre-War period, these two areas shared production in the proportions of 63 per cent. and 34 per cent., respectively. Oceania was responsible for barely 1 per cent., South America for about  $1\frac{1}{4}$  per cent. and Africa for just over  $\frac{1}{2}$  per cent., while the Asiatic output was negligible.

In the earlier post-War years, the European output diminished, mainly owing to the deficiency from U.S.S.R., but, in later years, the pre-War position has been practically regained. Production in America has increased as compared with the pre-War period, resulting in a small increase in the world's total output which, in 1927, was roughly 65 million tons. Of this total, Europe, including the U.S.S.R., was responsible for 61 per cent., North America for 37 per cent., South America about 1 per cent., and Oceania and Africa for  $\frac{1}{2}$  per cent. each.

The British Empire contribution has not shown any material increase in the later as compared with the earlier period. Production has increased in Canada, but has decreased in Oceania, principally New Zealand. The Empire, as a whole, is responsible for about 16 per cent. of the world's production.

(d) *International Trade.*—The total world trade, exports and imports, showed a decrease of 38 per cent. for the period 1923-27 as compared with 1909-13. Europe is the principal factor in the trade and, in the earlier period, was responsible for 96 per cent. of total imports and nearly 55 per cent. of total exports, with an excess of imports over exports amounting to an average of nearly 840,000 tons per annum. South America accounted for 28 per cent. of the world's export trade, North America for 10 per cent. and Africa for  $4\frac{1}{2}$  per cent.

In the 1923-27 period, out of the average annual international trade of just under  $1\frac{1}{2}$  million tons, Europe was responsible for 93 per cent. of imports but for only 19 per cent. of exports, the resulting excess of imports over exports being more than a million tons. The U.S.S.R. has been, of course, the main cause of this falling off in European exports, but heavy decreases in both the import and export trade of Germany and the Netherlands have contributed very materially to the decline. North America recorded an increase in exports in the later period and accounted for nearly 37 per cent.

**MONTHLY QUANTITIES AND AVERAGE PRICES PER CWT OF BRITISH BARLEY RETURNED AS SOLD IN ENGLAND AND WALES, AND DECLARED VALUES PER CWT OF IMPORTS INTO GREAT BRITAIN & NORTHERN IRELAND FOR THE YEARS 1923/4 - 1927/8 AND FOR THE PERIOD JULY 1923 - JUNE 1928**

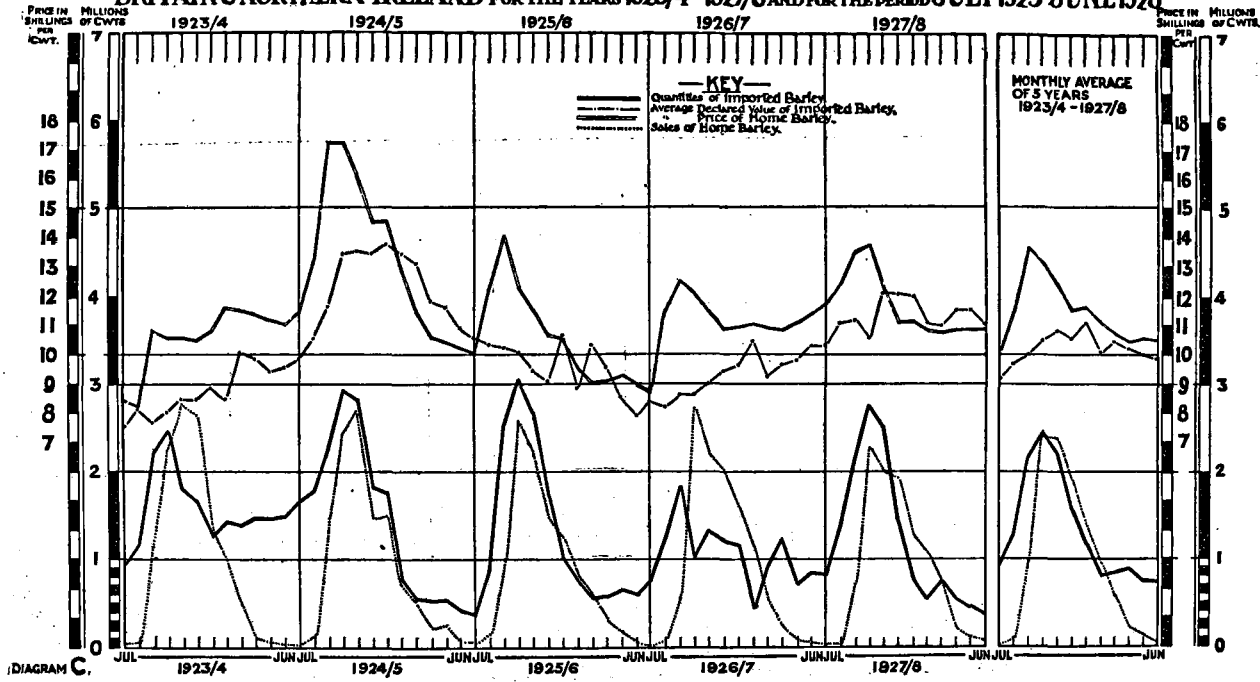
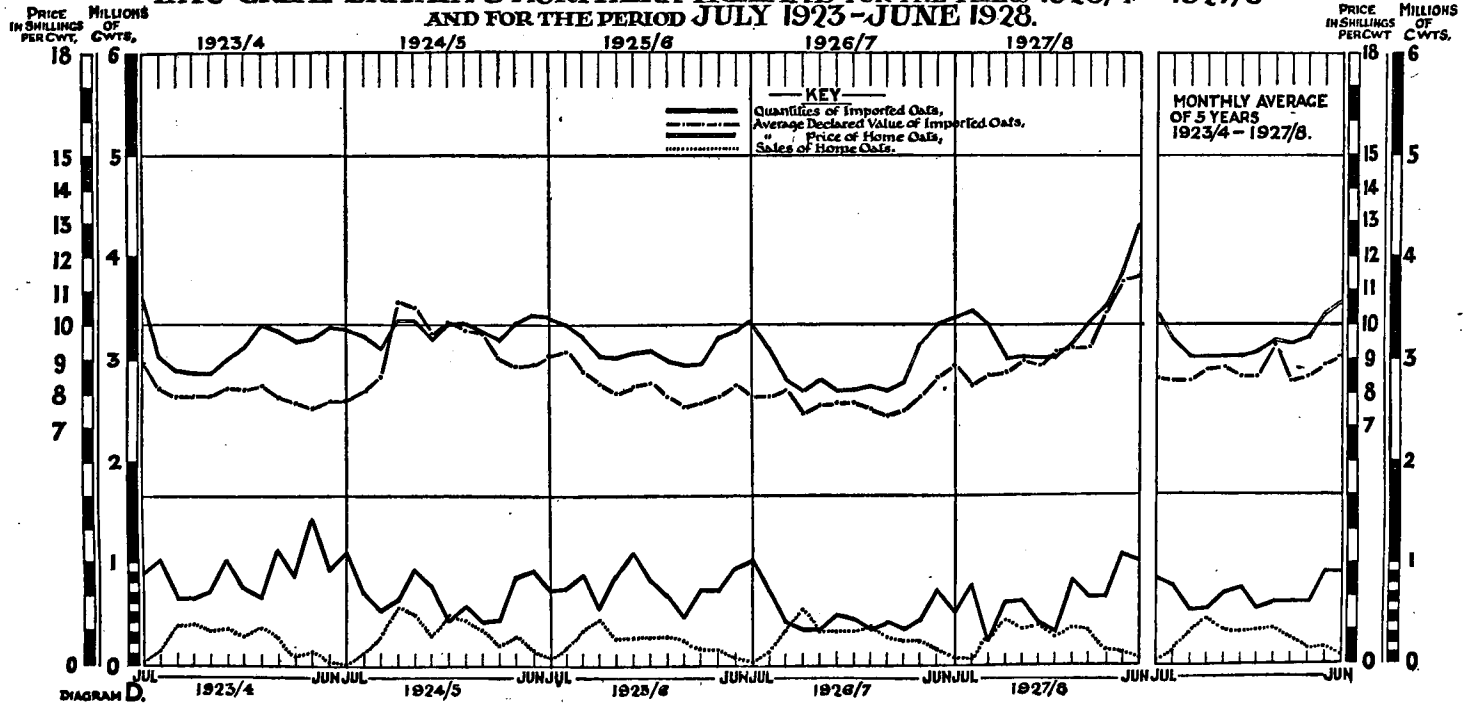


DIAGRAM C.

**MONTHLY QUANTITIES AND AVERAGE PRICES PER CWT OF BRITISH OATS RETURNED  
AS SOLD IN ENGLAND AND WALES, AND DECLARED VALUES PER CWT OF IMPORTS  
INTO GREAT BRITAIN & NORTHERN IRELAND FOR THE YEARS 1923/4 - 1927/8  
AND FOR THE PERIOD JULY 1923 - JUNE 1928.**



of the world's export trade, showing, despite increasing imports, a surplus of exports over imports of over 450,000 tons. South America registered a decline in quantity but an increase in percentage of exports, and accounted for 42 per cent. of the world total. Imports into Africa have grown considerably since the pre-War period, while exports have shown a marked decline. Similarly, Oceania, from having a small export surplus, was, on balance, mainly an importing country in the period 1923-27.

### (ii) The Home Crop.

The oat acreage is very generally distributed throughout England and Wales, although the five eastern counties cited in the case of wheat and barley have 18 per cent. of the total. Oats are suited to a wider range of altitude and to a higher rainfall than either wheat or barley and are, therefore, more extensively grown in the west and north than are the other two cereals. The widespread use of oats as a feeding-stuff for all classes of stock is a further factor in inducing a fairly uniform distribution of the crop throughout the country.

(a) *Trend of Sowings.*—The acreage under oats in England and Wales, as in the case of other cereals, showed a rapid increase and decrease during and after the War respectively, but the general trend of production of oats has been markedly different from that of the other cereals.\*

From 1875 to 1895, the acreage under oats showed a large increase, the latter being the peak year with 2,287,675 acres. Although that figure was not again reached, except during the War years, the acreage remained fairly constant at just over two million acres until 1925, when it dropped to 1,868,176 acres. Even at this figure, the acreage under oats was  $12\frac{1}{2}$  per cent. greater than it was fifty years earlier. In 1928, the acreage under oats in England and Wales was approximately 1,762,000 acres out of a total for Great Britain and Northern Ireland of 2,951,000 acres.

(b) *Yield and Output.*—As in the case of wheat and barley, the Holland Division of Lincolnshire, with a ten-year (1918-27) average of 21·4 cwt. per acre, and the Isle of Ely, with 21·5 cwt., lead all the other parts of England. Welsh counties, with averages ranging down to 8·8 cwt. per acre, rank lowest. The yield per acre in England and Wales, as a whole, varied from 11·6 cwt. per acre in 1922 to as much as 16·0 cwt. in 1926, the average for the ten-year period being 13·9 cwt.†

During the same period, production in England and Wales fluctuated considerably, being as high as 2,010,000 tons in 1918 and dropping to 1,252,000 tons in 1922. The average annual output of oats in England and Wales during the post-War period, 1923-27, was 1,413,000 tons out of a total for Great Britain and Northern Ireland of 2,382,000 tons.

(c) *Season of Marketing.*—According to the Corn Returns of the Ministry of Agriculture and Fisheries, marketing in large quantities

\* See Table I, page 178, and Diagram A, page 11.

† See Table II, page 179.

begins in September, following harvest. October is the peak month but good supplies are sent to market throughout the winter and into the spring. Over 80 per cent. of the oats sent to market are sold during the seven months, September to March.\* This seasonal variation in supplies corresponds fairly closely with that of home-grown wheat, and can be explained in much the same way (see page 13).

### (iii) Imports.

(a) *Quantities and Sources. Oats.*—Europe was responsible for nearly all of the 622,000 tons imported into this country in 1875. Russia sent over 50 per cent., Sweden 25 per cent. and Germany 11 per cent. The British Empire was represented by Canada, which dispatched about 20,000 tons, approximately 3 per cent. of the total. The United States and the Argentine Republic did not figure in the list.

In 1905, out of a total import of 855,000 tons, the quota of the United States amounted to 125,000 tons and that of the Argentine to over 14,000 tons. Russia provided by far the largest part (over 65 per cent.) of the supplies, and, of the 100,000 tons which came from other European countries, Germany was responsible for 68,000 tons. Chile had also entered the market as a source of supplies. Canada, with 38,000 tons, and New Zealand, with about 10,000 tons, helped to make up the 49,400 tons, equivalent to nearly 6 per cent. of the total imports, which arrived from British Dominions.

By 1913, supplies from Argentina, Germany and Canada showed heavy increases, while Russia had dropped out of the market to a considerable extent. Of the total imports of 908,000 tons, these four countries supplied 35 per cent., 19 per cent., 13 per cent. and 15 per cent., respectively. Imports from Chile had grown to over 40,000 tons, representing  $4\frac{1}{2}$  per cent. of imports. Small supplies from "Other British Possessions," added to Canada's figures, brought the Empire contribution to  $13\frac{1}{2}$  per cent. of total imports.

The War gave a great impetus to the import trade, especially with the Argentine and the United States, but, in 1925, Canada sent more than any other country. In that year, the total imports of 418,000 tons were mainly contributed by Canada with 150,000 tons, or nearly 36 per cent., the United States with 109,000 tons, or 26 per cent., and the Argentine with 65,000 tons, or  $15\frac{1}{2}$  per cent. Supplies from Russia and Germany were negligible. Of the remainder, 43,200 tons may be noted as arriving from the Irish Free State; in the earlier years, these would have ranked as home-produced.

In 1926 and 1927, supplies from the United States and Canada materially decreased, while those from the Argentine and Chile were higher than in 1925. The total imports, however, showed successive decreases to 382,000 tons and 295,000 tons, respectively. Omitting the Irish Free State, the Empire contribution was almost entirely confined to supplies from Canada, which, as already stated, declined

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\* See Table III, page 181, and Diagram D, page 33.

in 1926 and 1927 and amounted to 25 per cent. and 9 per cent., respectively, of total imports. Including the Irish Free State, the Empire countries accounted for about one-third of total imports in these last two years.

Two outstanding features are noticeable in connection with oat imports during recent years; firstly, the assumption of principal place by American countries at the expense of European sources of supply, and secondly, the heavy decrease after the War in the amount of total imports.\*

#### *Oat Products.*

Imports of oatmeal, groats and rolled oats, like imports of wheat flour, showed a large increase in the 'eighties and 'nineties, but, in contrast to wheat flour, the imports of oat products have since remained at a fairly high level.

In 1895, imports amounted to 24,000 tons, rising to the high figure of 49,000 tons in 1898, but falling to 32,000 tons by 1905. In the immediate pre-War years, the imports stood at over 40,000 tons; during the post-War period, they have been of a similar order. A heavy decrease to 26,000 tons was, however, recorded in 1927.

(b) *Periodicity.*—Imports of oats follow a definitely seasonal course. The average for the years 1923-4 to 1927-8 indicates that imports are at a maximum over the period May to July, when market supplies of the home crop are lowest. There is also a secondary rise about December.†

The months of maximum exports from Canada coincide with the period of heaviest imports into this country, while, in November and December, immediately after the Canadian harvest, exports are also large. Supplies from the United States are exported in largest quantities during August and September, while European countries tend to export most in October, which marks the completion of the harvest in this country. Exports from the Argentine and Chile are greatest in the January-March period.

#### (iv) Total Supplies.

(a) *Quantity.*—The total supplies of oats, home-grown and imported, available in the United Kingdom have shown a regular decline in recent years and now amount to roughly two-thirds of pre-War totals. The percentage decrease of imported supplies is much heavier than that of home-grown grain. In 1925, 1926 and 1927, the total supplies were 2,787,000 tons, 2,915,000 tons and 2,535,000 tons respectively. On the average of the five years, 1923-27, 15 per cent. of total supplies were imported, Empire supplies representing nearly two-fifths of the imports, or 6 per cent. of total supplies.

Compared with the total supplies, exports and re-exports of oats and oat products form a very small quantity. For each of the years 1925 and 1926, the figures were just over 25,000 tons, of which two-

\* See Table XI, page 189.

† See Table XII, page 190, and Diagram D, page 38.



thirds went to the Irish Free State, but there was an increase in 1927 to about 35,000 tons.

The net available quantity of home and imported supplies of oats and oat products was 3,911,000 tons per annum, during the five years 1909-13 and only 2,831,000 tons during the period 1923-27.\* This heavy fall may be attributed very largely to the decrease in the number of horses during recent years. A contributory factor is also to be found in the lessened demand, more particularly in Scotland, for oatmeal for human consumption. It is, however, important to note that the two periods are not strictly comparable owing to the exclusion of the Irish Free State from the statistical area since April 1st, 1923.

(b) *Value*.—As only about 25 per cent. of the oats grown in Great Britain and Northern Ireland are sold off the farm, any estimate of the value of the total home production must be largely conjectural; a rough estimate of £20 million may, however, be taken to represent the average annual value of the oat crop during the years 1925-27. The average annual value of imported supplies during the same period was about £3 million.

#### (v) Quality Factors.

(a) *Variety*.—There is little to be gained by discussing the varietal characteristics of imported oats. As regards home produce, heavy-yielding, thick-skinned oats like "Abundance" are favoured in the south-eastern counties, while thin-skinned oats, like the "Potato," are found, though not very extensively, in the north. Yellow oats, such as "Golden Rain," are plentifully grown, chiefly in Wales and in the north-west. Black oats, such as "Tartarian," are more common in the west and south-west and in hilly regions.

The cultivation of winter oats is spreading in many districts, notably in the south-east, owing to the fact that spring-sown oats are liable to serious attacks by eelworm and fritfly. Some white oats are autumn-sown but, in general, the winter varieties are chiefly black or grey.

(b) *Bushel Weight*.—This is an important indication of quality since a low bushel weight in the case of oats is often associated with husky, badly-filled grain. The standard bushel weight for Canada Western No. 1, for instance, is 36 lb., and for No. 3, 34 lb. per bushel. Home-grown oats are generally reckoned on a basis of 42 lb. per bushel, although the average natural weight per bushel for the whole country during the 10 years 1918-27 was estimated at only 39.4 lb. Many shipments of oats from North America arrive and are sold as "clipped." Even so, they do not, in many cases, reach more than 38 lb. per bushel, while a bushel of clipped home oats weighs at least 10 lb. more than this.

(c) *Moisture Content*.—This, as in the case of other cereals, varies according to climatic conditions in the country of origin. In general, home-grown oats contain 5 or 6 per cent. more water than imported kinds.

\* See Table XIII, page 191.

## (vi) Demand.

(a) *Qualitative*.—Trade requirements can best be judged on the basis of either milling or feeding characteristics.

Millers regard a tough, plump, thin-skinned oat, rich in protein and not over-starchy, as being the most suitable, since it yields the best type of oatmeal for human consumption and behaves satisfactorily in the process of milling. It cuts better into meal, does not break down into flour too readily and gives a richer and better-flavoured product than other types. Home-grown oats from the north and west have these characteristics in a high degree. In the mill, however, it is nearly always necessary to kiln-dry home-grown oats in order to facilitate shelling and milling. As kiln-drying is an expensive process and since home-grown oats are almost unobtainable at certain times of the year, many oatmeal millers consider that imported oats answer their requirements better than the home-grown article. For a time, New Zealand oats, as having a close resemblance to home-grown oats, were favoured, but, more recently, Canada Western have been chiefly employed. Some millers regard Argentine and Chilean oats as suitable for this purpose. Many provender millers, who manufacture products such as "Sussex Ground" oats, where the whole grain is crushed, also show a preference for the drier type of imported grain—Canada Western for choice.

Regarded as a feeding-stuff for use in their natural state, imported oats compare unfavourably with home-grown in palatability and feeding value. No oats in the world meet the requirements for general stock-feeding better than those grown at home.

Among home-grown types of oats, the market makes certain broad distinctions of quality on the basis of colour, some of which are justifiable and some not. White oats are preferred by millers and, of these, the thin-skinned varieties are better suited to milling than the thick-skinned. Yellow or golden varieties are not favoured by poultry-food merchants as they are suspected of being discoloured whites. Owners of collieries and, more recently, owners of hunting stables have begun to appreciate the good quality to be found in a coloured sample, although grey oats are, as a rule, less popular for horse-feeding than an all-black sample. It is not always necessary or desirable, therefore, for farmers to follow the practice observed in some districts of selling their white oats and retaining black oats for consumption on the farm.

While the varied character of the supplies produced and of those available in each district has a distinct bearing on the distribution of the crop, the effect is, on the whole, local. Prices from different districts do not give any great indication of quality differences between one part of the country and another (see Chapter IV).

(b) *Quantitative*.—Apart from supplies retained on farms, the total market requirement may be estimated roughly as:—for horse-feed 850,000 tons, for oatmeal 200,000 and for poultry 125,000 tons, a total of approximately 1,175,000 tons. A few farmers buy cheap imported oats and sell their own, but the practice is not general, so

that, apparently, even after imported oats are disposed of, there is a potential market demand for approximately one-third of the home crop of Great Britain and Northern Ireland.

#### *Processing.*

The production and consumption of oatmeal are greatest in the north of England and Scotland, but there are only a few mills of importance on this side of the border. The total amount of oatmeal, groats and rolled oats manufactured in Great Britain and Northern Ireland in 1924\* may be estimated at 136,000 tons, which represents, on the basis of a 70 per cent. extract, roughly 200,000 tons of oats. The quantity of crushed and "Sussex Ground" oats, milled for poultry and animal foods, appears to be increasing owing to the greater numbers of poultry which are kept, and may be estimated, on a conservative basis, as about 125,000 tons per annum.

#### *Stock Feeding.*

Oats are in greatest market demand as feed for horses. Railway companies and haulage contractors employ a large number of draught animals, so that busy centres, such as London, the West Riding of Yorkshire and south Lancashire, still offer an important outlet. Large numbers of ponies are still used in the coal mines in South Wales, Durham and the West Riding and, particularly, in the Midland counties of Derby, Stafford and Nottingham. The hunting counties, notably Leicester, Gloucester, Northampton, Warwick and Devon, and counties such as Yorkshire, with large racing stables, still show a strong demand for home-grown oats. The total market requirements for oats as horse-feed are estimated to be between 800,000 and 900,000 tons per annum apart from supplies retained on farms. It is not likely that market requirements will show any great variation from one year to another, although the tendency is doubtless for the demand to fall off with the decline in the horse population. On the other hand, there has, of late, been a very marked increase in poultry population and it is reasonable to assume that the total market requirements for oats for feeding purposes have not declined to anything like the extent suggested by the reduction in the number of horses in the country. It should be noted that there is a growing tendency to employ oats for the feeding of all kinds of farm stock and, therefore, for relatively smaller quantities of oats to be placed on the market.

(c) *Seasonal Variations.*—The seasonal demand for oats is not capable of any precise measurement but, since many horses are put to grass during summer, the demand is probably greatest during the winter. Prior to Christmas, however, there is a marked disinclination in many quarters to use new oats as horse-feed. The demand from oatmeal millers is maintained throughout the year.

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\* Based on Preliminary Reports of Census of Production, 1924, in "Board of Trade Journal" for March 10th, 1927, and February 2nd, 1928.

## CHAPTER IV.—PRICES.

### (i) General.

For the last 50 years, the prices of wheat, barley and oats have been determined, on the one hand, by conditions of world production based on the acreage sown and yields per acre, and, on the other hand, by the demand of those countries, situated mainly in Europe, whose output is insufficient to meet their own requirements. Of these countries, by far the most important is the United Kingdom. World supplies exercise the predominant influence, since the demand for grain, especially wheat, is held to be relatively inelastic. Nevertheless, the possibility of substitution must be taken into account, and the world price of wheat cannot be considered independently of the prices of other cereals commonly used for human food, such as rye and rice. Similarly, the prices of barley and oats cannot be considered separately from the price of maize, which is often regarded as the dominant factor of the feeding-stuff market. The production of potatoes for human and stock food and for industrial purposes has also important reactions on the prices of wheat, barley and oats. It is, therefore, practically impossible, even in retrospect, to correlate world supplies and prices.

Correlation of the future position of world supplies and prices involves the further difficulty that estimates of future production based on acreage sown are liable to a very large margin of error. In the United States, for example, the average area of winter wheat which failed during the ten years ended 1925-26 was 12·8 per cent. of the area sown, the range being from 1·9 per cent. in 1918-19 to 28·9 per cent. in 1916-17. Estimates made about harvest time may also show large errors. The Canadian wheat crop, for instance, was officially estimated, in July 1925, at 9,800,000 tons, but the total for the year was finally put at 1,200,000 tons higher. The Argentine wheat crop of 1925-26 was first officially estimated at 6,200,000 tons; in December, this was reduced to 5,750,000 tons and the final official estimate amounted to 5,100,000 tons. It is not difficult to understand, therefore, how fortunes come to be lost in the grain trade by the "intelligent anticipation" of market prices on the basis of advance information regarding supplies.

In spite of this fact, a very large amount of trading is done in "futures" as well as "cash" grain in the chief North American markets and at Liverpool in this country; futures trading is carried on in wheat, barley and oats, but chiefly wheat, in America and almost exclusively in wheat at Liverpool. There is no futures trading in English grain. "Cash" prices refer, of course, to transactions in which immediate, or approximately immediate, delivery is contemplated; futures prices are those to be paid for grain to be delivered at some future date, under a contract made in accordance with the rules of an organised exchange. Such contracts are generally made for certain delivery months such as September, December, May, but actual delivery is only made in a small proportion of cases, the bulk of the contracts being offset or cancelled.

“Futures” prices, being forecasts, are essentially speculative in character, although their primary function is to cover, so far as possible, the risks arising from fluctuations in cash prices by providing facilities for “hedging.” (See Chapter VI (iii) (b).)

There is naturally a high degree of correlation between cash and futures prices, the spreads between them being indicative of the opinion of traders in futures as regards prospective prices; these spreads tend to diminish with the approach of the delivery month, when cash prices are frequently above those of futures. Owing to the impossibility of isolating the factors involved, it is difficult to say how far futures prices are accurate forecasts and whether they have a stabilising effect on cash prices. There is no doubt that the efficacy of hedging as a cover for price fluctuations is impaired by the existence of an element of uninformed speculation on the futures market and by the tendency of the futures prices, in the earlier months of trading, to be lower than the cash price subsequently obtained. On the other hand, the existence of two correlated sets of prices for grain tends to render the market more sensitive and to facilitate the adjustment of prices to present conditions and future prospects of world supplies and demand.

#### (ii) Trend.

The prices of British wheat, barley and oats before 1875 fluctuated mainly in accordance with the European harvests and especially those in this country and, in general, showed little consistent trend. From 1875 to 1895, a decline set in which was followed by a period of generally rising prices up to 1914. During the War, prices of these grains rose to an extraordinary level, being, in 1920, between 180 and 200 per cent. more than in 1900. Between 1916 and 1921, supplies and prices of grain were controlled by the Government and a bread subsidy was in operation. Decontrol was followed by a violent fall in prices which was checked about 1923, since when a slight tendency to decline is discernible.

There is no doubt that changes in the purchasing power of money have been the principal cause of these secular movements in grain prices.\* Nevertheless, variations in the supply of these cereals have resulted in important deviations from the price movements of all agricultural commodities. The depression in agriculture between 1875 and 1895 was, for instance, intensified by the influx of vast supplies of wheat from the New World which caused prices of this grain to fall more rapidly and to a greater extent than the general price index of agricultural commodities. Similarly, the low level of grain prices in the years immediately following 1921 was largely the consequence of world over-production which, coupled with the impoverishment of Europe and its currency troubles, enabled consumers in the United Kingdom to obtain wheat supplies at much lower prices, relatively, than before the War.†

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\* See Report of the Committee on the Stabilisation of Agricultural Prices, Economic Series No. 2.

† See Report of Royal Commission on Food Prices. Cmd. 2390/1925.

## (iii) Prices of Supplies from Different Sources.

(a) *Wheat*.—Prior to 1875, home-grown wheat commanded higher prices than imported supplies, but the position has since been reversed. In 1925, 1926 and 1927, the Gazette average prices per cwt. of British wheat were 1s. 10d., 8d. and 10d., respectively, below the average annual declared values per cwt. of imported supplies taken as a whole. When account is taken of the supplies of home-produced wheat sold at different prices during the year and a weighted average price arrived at on this basis, the margins between the prices of home-grown and imported wheat were 1s. 9d., 1s. 0d. and 1s. 1d. in 1925, 1926 and 1927, respectively.

The reason for the reversal in values after 1875 is largely to be found in improved milling technique and in the development of roller milling. These encouraged the use of hard, dry wheat from abroad and made the evolution of a factory system possible. To facilitate the handling of imported grain, many millers emigrated to the ports and established large roller-mills which rapidly grew in milling capacity. Owing to their size and factory methods, these mills were better able to handle large quantities of uniform types of grain than small lots of native wheat requiring personal supervision and sorting out. At the same time as the revolution was taking place in the milling industry at home, the cultivation of hard, strong wheats was extending in Canada and the United States, and bakers began to recognise that more bread could be obtained from a sack of strong flour made from imported wheat than from home-grown wheat flour.

In comparing the prices obtained for supplies imported from different countries, it should be remembered that the quality of the crops varies greatly from year to year. In the case of Canadian and American wheats, this can be seen in the variations in the proportions of total supplies falling into the various grades. In 1923-24, No. 1 Northern formed 38·3 per cent. of the total wheat inspected in the Western Division of Canada in the six months September-March, and, in 1925-26, 23·2 per cent.; in the corresponding months of 1926-27 and 1927-28, the percentages fell to 10·3 and 1·0 respectively.\* A very wide disparity exists between the prices of the highest and lowest grades, the latter sometimes showing a discount of 50 per cent. under the price of No. 1 Northern wheat. While, therefore, No. 1 Manitoba commands the highest prices,† the bulk of the Canadian wheat imported into this country is of lower grades, thus causing the average declared values per cwt. of Canadian wheat to be frequently below those of other large supplying countries. Similarly, the average declared values of wheat from the United States do not represent the prices commanded by the higher grades of grain.

Wheat from the Argentine, Australia and India is sold on an f.a.q. basis and, to this extent, quoted prices represent the bulk of the supplies received, but the quantities of wheat exported from these sources are subject to an even more marked seasonality than supplies

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\* See Canadian Grain Statistics.

† See Table XIV, page 192.

from Canada and the United States; average declared values per cwt. are, therefore, a better guide to the relative position of these countries on the British market than actual prices. Variations in the average annual declared values of grain from these sources would seem to be as great as those of wheat from Canada and the United States; the value per cwt. of the Argentine crop exported to this country, for instance, was, in 1925, greater than that of North American supplies, but the inferior quality of Argentine supplies in 1926 and 1927 reversed the position. In general, there would seem to be little indication of a permanent difference in the average values per cwt. of the wheat imports from the principal supplying countries.\*

(b) *Barley*.—Prices of home-grown barley, unlike those of wheat, are usually above the average declared values per cwt. of imported supplies taken as a whole, the margins between them being 11*d.* in 1925, 1*s.* 4*d.* in 1926, and 11*d.* in 1927. If, instead of the Gazette average, a weighted average price of British barley is taken, the position is even more favourable to the home-grown product, the margins in this case being 1*s.* 6*d.*, 2*s.* 1*d.* and 1*s.* 3*d.* in 1925, 1926 and 1927, respectively.

In regard to the prices obtained for supplies from individual countries, the following statement shows that the prices of Californian (Malting) and Chilian barleys approximate fairly closely to home-grown malting barley, while Canadian Western No. 4 usually exceeds British feeding barley in price. It is, however, important to note that the prices of imported barley given in the following statement are for certain grades only; average declared values per cwt.† are probably a better indication of the average value of total supplies from any country.

*Average Annual Prices per cwt. of Barley in England,  
1923-1927.*

	1923	1924	1925	1926	1927
	<i>s.</i> <i>d.</i>	<i>s.</i> <i>d.</i>	<i>s.</i> <i>d.</i>	<i>s.</i> <i>d.</i>	<i>s.</i> <i>d.</i>
British (Malting) .. ..	10 1	14 0	12 2	10 11	12 5
„ (Feeding) .. ..	8 1	11 3	9 11	8 7	10 0
Californian (Malting) ..	10 6	14 0	13 5	10 5	12 1
Chilian .. ..	10 10	—	13 8‡	10 6‡	11 5‡
Canadian No. 4 Western ..	8 5	10 10	10 4	8 10	10 10§

The prices of Australian barley are also high but supplies are very fluctuating. Supplies from other countries are mainly of feeding quality and usually fetch lower prices than the above-named types.

\* See Table IV, page 182.

† See Table VII, page 185.

‡ Average annual declared value.

§ No. 3 Western.

(c) *Oats*.—The Gazette average price of British oats was consistently above the average declared value per cwt. of imported supplies, taken as a whole, during the years 1925, 1926 and 1927, to the extent of 11*d.*, 1*s.* 1*d.* and 9*d.* respectively. Taking a weighted average price for these years, the margins in favour of home-grown oats were 11*d.*, 10*d.* and 8*d.*

White oats, on the average, fetch higher prices than black and grey. As regards imports, the relative positions of the three chief supplying countries, Canada, United States and the Argentine are by no means stable; as in the case of wheat, the variable quality of the crops from year to year is largely accountable for the fluctuations in relative values. The prices given in the following statement are for certain grades of oats only and do not necessarily represent the average prices obtained for the total supplies received from these sources, for which purpose, as with wheat and barley, average declared values per cwt. are probably a better guide.\*

*Average Annual Prices per cwt. of Oats in England,  
1923-1927.*

—	1923	1924	1925	1926	1927
	<i>s.</i> <i>d.</i>	<i>s.</i> <i>d.</i>	<i>s.</i> <i>d.</i>	<i>s.</i> <i>d.</i>	<i>s.</i> <i>d.</i>
English (White) .. ..	10 2	10 1	10 3	9 4	9 6
„ (Black and Grey)..	9 3	9 6	9 8	8 11	9 1
Canadian :					
No. 2 Western .. ..	10 4	10 7	11 8	10 4	—
No. 3 Western .. ..	9 10	10 0	10 7	9 9	—
Feed .. ..	9 6	9 6	9 5	9 0	—
American .. ..	8 9	8 5	—	8 3	8 4
Argentine .. ..	8 8	9 0	9 11	8 6	9 5
Chilian .. ..	—	—	9 9	8 5	8 9

#### (iv) Seasonal Variations.

As might be expected, the prices for wheat, barley and oats are subject to fairly regular seasonal variations, but the factors governing the seasonal movements of barley prices are sharply distinguished from those determining the course followed by the prices of wheat and oats.

(a) *Wheat*.—In the case of wheat, the demand for which is fairly steady throughout the year, the seasonal variations in prices are connected with the costs of storing and holding the grain until it is required. Thus, the average price of wheat in Chicago in the period 1871 to 1921 rose from 104 cents per bushel in the months immediately following harvest to 115 cents per bushel in May, with a total seasonal spread of 11 cents. In regard to this, it is stated that “cash wheat selling in September at 100 cents would normally

\* See Table XI, page 189.



indicate a selling future of about 112 cents—figuring the carrying charge at  $1\frac{1}{2}$  cents a month for 8 months.”\* Calculations for home-grown wheat for the period 1923/4 to 1927/8 show a rise from October as the season advances of about 13 per cent., as compared with 10 per cent. during the period 1909/10 to 1913-14. From a minimum, about September or October, prices tend, on the whole, to rise until June or July, after which a sharp and accelerated fall occurs to the autumn minimum. This movement is the reverse of the seasonal variation in the quantities of home-grown supplies marketed.† The values per cwt. of imported wheat do not, as a rule, show so marked a seasonality.‡ In the period 1923/24 to 1927-8, taken as a whole, the average monthly declared values per cwt. of imported wheat tended to rise slightly in January and February and declined to their lowest point in July and August. The correlation between prices and supplies is not so close as in the case of home-grown wheat but, irregularities apart, prices in general move in the reverse direction to supplies.

Since wheat crops are being harvested in some part of the world in practically every month of the year, it is obvious that, for any single country, the advantage to be expected from holding grain off the market depends, to a large extent, on the quantity and quality of the newly harvested supplies from other areas. In the case of home-grown wheat, the heavy supplies marketed in September, October and November would appear, generally, to depress prices unduly in those months as compared with the value of imported supplies and with the value of English wheat later in the season. It is, therefore, probable that more orderly marketing, involving the holding of a proportion of the supplies off the market for a few months would secure better returns to farmers. There is, however, the risk that, in any single year, prices in the late winter and early spring may be actually lower than in the autumn months. (See also Chapter XVII (iii) (a).)

(b) *Barley*.—British barley prices show a very marked seasonality, August to November being the period of highest prices, with September as the peak; this corresponds directly with the seasonal marketing of supplies.§ In regard to this, it has been observed that maltsters and brewers take in from 60 to 70 per cent. of their requirements immediately after harvest, so that demand is greatest at that time; it is, therefore, probable that most of the best home-grown barley is sold at the season of highest prices. Though the prices of Californian barley approximate fairly closely to those of home-produced supplies at this season, the declared values per cwt. of all imports taken together approach British barley prices only in the period from January to July, when very small quantities of home-grown barley arrive on the market.¶

\* Chicago Wheat Prices for 81 Years. J. E. Boyle, Cornell University, 1922.

† See Diagram B, page 12, and also Tables III and XV, pages 180 and 193.

‡ See Table XVI, page 195.

§ See Diagram C, page 37, and also Tables III and XV, pages 180 and 193.

¶ See Tables XV and XVI, pages 193 and 195.

(c) *Oats*.—The prices of British oats follow a generally similar course to those of home-grown wheat and also move in an inverse ratio to supplies.\* Prices, which are lowest immediately after harvest (September and October) when supplies are at a maximum, show only a slight tendency to increase until April, after which a sharp rise takes place to a maximum in July. To some extent, the rise may be associated with the fact that oats improve with keeping. The seasonal variations in the values of imported oats bear a certain resemblance to the price movements of home-grown supplies, although the inverse ratio of prices to supplies is not so consistent. Owing to this fact, the opportunities for profitable holding over the months of heavy marketing do not seem so great as in the case of British wheat. (See also Chapter XVII (iii).)

#### (v) Market Variations.

It has been stated that prices of wheat and, to a less extent, barley and oats, are governed by the world conditions of production and demand as reflected on large-scale, highly organised markets. In theory then, prices of comparable qualities tend to be equal in all parts of the world, allowing for time, transport charges and exchange rates among other factors. This generalisation is, however, in practice only broadly true, as the following random examples show. On May 1st, 1925, the Argentine Barletta wheat quotations at Buenos Aires were 54s. 9d. per 480 lb., the freight charge—La Plata (Down River) to this country—was 15s. 3d. per ton, or 3s. 5d. per quarter. The cost of wheat in the Argentine plus freight to this country was, therefore, 58s. 2d. per 480 lb. The price of Plate wheat on May 1st in Liverpool and London was 58s. per quarter. At the same date, the quotation for No. 2 Winter wheat at New York was 58s. 2d. and freight to Liverpool 1s. 6d., making 59s. 8d.; the price of No. 2 Winter in London and Liverpool was 58s. 4d. per quarter. Indian wheat at Karachi was quoted at 57s. 3d. and freight at 4s. 6d. per quarter, or together, 61s. 9d., but the price of C.W. Karachi on London and Liverpool markets was only 60s. per quarter. Allowing for the time factor, however, the price of wheat a month later, when actual delivery could be made in this country, was 62s. On these examples, it would seem that the spreads between the prices in importing and exporting markets scarcely cover freight alone.

Interesting confirmation of this is found by a comparison of weekly prices at Winnipeg and Liverpool. In regard to this, it is stated that, "although the price spreads vary from season to season and from year to year in rough correspondence with shipment costs, the spreads do in fact vary not a little above and below the calculable costs. It is only with such qualifications that the data can be regarded as supporting the orthodox theory of international price relationship."† According to the authors of this study, "During

\* See Diagram D, page 38, and also Tables III and XV, pages 180 and 193.

† Wheat Studies, Food Research Institute, Stanford University, Vol. II, No. 5.

the past three years (i.e. 1923/4 to 1925/6) wheat exporters could not have 'broken even' on their operations unless they bought at lower or sold at higher prices than the average of the quotations, or obtained especially favourable lake or ocean freight rates."

It will be obvious, from an examination of the highest and lowest daily, weekly and monthly quotations for c.i.f. wheat, "option" wheat, rates of exchange and freights, that there is every opportunity for a skilled operator in intimate touch with the various markets to make good profits or, conversely, amid the ups and downs of the daily, hourly, and weekly quotations, there is ample scope to incur considerable losses. With so many variable factors to consider, it seems likely that in the ordinary daily routine of the trade, many, if not most, of the gains on the swings are lost on the roundabouts.

Local variations in the prices of home-produced grain, especially wheat and oats, are also, of course, largely attributable to the costs of moving supplies from areas of surplus production to centres of demand.\* The prices of wheat and oats on markets in a typical surplus-producing area such as Lincolnshire, for instance, are consistently below those in the outer ring of consuming markets including Leeds, Birmingham, Banbury, Reading, London and Chelmsford. In the period 1909-13, the average price of wheat on these Lincolnshire markets was 7s. 6d. per cwt., compared with 7s. 11d. per cwt. in the latter group. In 1927, the average prices on these two groups of markets were 11s. 2d. and 11s. 8d., respectively.

More particularly in the case of barley, however, local variations in prices are also an index of differences in quality between one part of the country and another. The supplies marketed in East Anglia, particularly Suffolk, would appear generally to command higher prices than those of other producing areas; this preference would seem to be more marked in the post-War than in pre-War years.

Differences may also exist in the prices obtained in small and large markets in the same district. Comparing, for instance, the prices of barley at Fakenham with those in the neighbouring larger market of Norwich between September, 1925, and March, 1926, the prices obtained in the smaller market were below those of the larger market three weeks out of every four. The quality factor can hardly be regarded as entering into the question, since Fakenham is, if anything, nearer to the centre of the district which produces a high quality of barley. A similar comparison may be made in the case of wheat prices at Saffron Walden and Colchester. Here, the smaller country market is more consistently below the larger, although, as might be expected, the margin per cwt. is less than commonly occurs in the case of barley. If these differences did not exist, it is difficult to see what inducement there would be for any wholesaler to go out to the small country markets and buy from farmers there. These price differences are, in fact, a measure of the cost, or part of the cost, of distribution.

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\* See Table XVII, pages 196 and 197.

## (vi) Price Ranges on a Single Market.

Owing to variations in the quality of the grain offered for sale, the prices for different samples of wheat, barley and oats on any market may vary considerably above or below the average for that market. On the Norwich Market, for instance, in the period September-December, 1927, the average prices and the averages of the highest and lowest weekly quotations for wheat, barley and oats per cwt. were as follows:—

		Wheat.	Barley.	Oats.
		<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Average	... ..	10 6	13 0	9 5
Average of highest prices	... ..	11 2	16 8	10 4
„ lowest	„ ..	8 10	8 9	8 4

It is noticeable that the price range due to quality variations was much greater in the case of barley than for wheat and oats. It will also be seen that the average price of wheat was only 8*d.* below the average of the highest prices but was 1*s.* 8*d.* above the lowest average prices. Examination of the Returns for this market shows that, actually, over 75 per cent. of the supplies of wheat were sold at prices within a range of 6*d.* above and below the averages.

## (vii) Note on Market Intelligence.

Much information is collected and published, both officially and unofficially, regarding supplies, prices, stocks and movement of grain. Most of the large firms engaged in the grain trade have, in various countries throughout the world, their own correspondents and agents with whom they are in constant touch. News collected in a similar way is available to the trade in papers, such as Broomhall's "Corn Trade News," published in London and Liverpool, "The London Corn Circular," "The London Grain, Seed and Oil Reporter," and news services such as H. N. Bathgate and Company's Review. The Customs Bills of Lading A. and B., published for various ports, also provide merchants with speedy information, particularly regarding imports into this country. The Governments of the chief producing countries collect and publish, periodically, estimates of acreage and production of the various crops. All these official estimates are collected and published monthly in the International Crop Report and Agricultural Statistics issued by the International Institute of Agriculture in Rome.

The Ministry of Agriculture and Fisheries, in its Agricultural Market Report, published weekly, gives the latest official information regarding world supplies as well as the average prices of home-grown grain for the week, the amount of grain passing through the markets, etc. The Ministry also publishes, at suitable periods, information regarding acreage sown, probable yields, and total production for the year. All this information is published as soon as it becomes available and also annually in the Agricultural Statistics.

It may be observed that the critical periods in the grain market and, therefore, the times at which precise information is anxiously

desired, are from September to October, when the harvest in the Northern Hemisphere is at its height, and from December to January, when the Southern Hemisphere is harvesting. May to June is also a critical period in regard to the position of world stocks and early prospects of the North American harvest. It cannot, however, be said that there is any month in which the market is not capable of developing a critical position owing to unfavourable prospects of sowing, growing or harvesting in the large exporting countries.

**(viii) Note on the Corn Sales Act, 1921.**

This Act provides for uniformity in the weights and measures used in the sale of corn and other crops. According to the Act every contract, bargain, sale or dealing relating to corn shall, unless it is made or had by weight only, and in terms of and by reference to the hundredweight of one hundred and twelve imperial standard pounds, be null and void.

The Act admits of certain exceptions to this rule as for example dealings in (a) quantities of less than one cwt., (b) imported grain in store at the place of importation, (c) imported grain in original bags, (d) corn for export and (e) growing or unthreshed corn.

The Act defines an imperial bushel as sixty imperial pounds of wheat, fifty imperial pounds of barley, or thirty-nine imperial pounds of oats and provides that where any measure other than the imperial bushel is concerned the Minister of Agriculture and Fisheries shall be empowered to certify what number of imperial pounds ought to be substituted therefor.

The Act came into operation on 1st January, 1923, but old customs die hard and many farmers and merchants still retain the use of the terms quarter, coomb or other local measures when doing business, although subsequently these measures are converted by the merchant into terms of the hundredweight when preparing his statement of account and making corn returns.

• It seems desirable that farmers and merchants alike should recognise the valuable assistance which this Act lends to the trade by substituting for the plethora of local corn measures a standard unit of weight for the conduct of sales. Market quotations are only comparable on the basis of weight and it seems in the best interests of all concerned that the Act should be adhered to as closely as possible and all transactions in grain conducted in terms of weight only.

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## PART II.—PREPARATION FOR MARKET.

### CHAPTER V.—THRESHING, DRESSING, AND SAMPLING.

#### (i) The Practice at Home.

(a) *Threshing*.—Threshing is the first step towards preparing grain for market, and unless it is done with care and efficiency, the value of the grain will be adversely affected. In the case of malting barley, for instance, the quality of the malt and of the beer made therefrom may be seriously affected by the growth of moulds on the exposed surfaces of barley kernels which have been broken or chipped in the threshing process.

When the weather permits, grain is not infrequently threshed in the field direct from the stook. There is something to be said for this practice, since early supplies often meet with a good demand and may make a better price than supplies marketed later when the bulk of the crop is being threshed. Most of the crop, however, is stacked first and threshed later at suitable intervals. Although the advent of the agricultural tractor has probably led to an increase in the number of farmer-owned machines, threshing is still done, in the main, by travelling sets. (Fig. 2.) These generally belong to heavy-haulage contractors who can nearly always find other employment for the men and engine when the weather is unsuitable for threshing. A number of sets are owned by large farmers who hire them out to others; some again are jointly owned by three or four farmers, and others by agricultural co-operative societies, while, in some districts, they are owned by corn merchants. These travelling machines cover up to 50 square miles of country, some working within a radius of 5 miles, others on a strip 15 miles long. In an 8-hour day, they thresh from 80 sacks of wheat and up to 120 sacks of oats. The actual output depends, of course, not only on certain technical points, such as the type of machine, speed of the drum, method of "feeding" the sheaves, and so on, but also on the heaviness of the crop and on its condition. For instance, if the wheat is very raw and tender in the skin, 50 sacks may be a fair day's threshing in the circumstances.

Charges for threshing vary considerably from one district to another and from one firm to another. The threshing-machine owners have a national association which compiles a list of charges for each district. These charges are supposed to be agreed on by the various local associations, but, as there are many owners outside the association, the charges do not appear to be much recognised in practice. Recent charges in the Colchester district of Essex were 1s. 4d. per qr. and, in the Braintree district, 1s. 8d. for wheat or barley and 1s. 6d. for oats, with a deduction of 2d. per qr. for cash payments. In Huntingdonshire, the charge for engine, machine and two men

was £3 per day, and, in Derbyshire, £2 10s. The farmer is also expected to feed the men and supply water and coal for the engine. Terms and conditions vary considerably, but 1s. 6d. per qr. may perhaps be regarded as the approximate total cost of hiring the machine. This cost depends, of course, on the amount of threshing being done at one time. For instance, where the charge for a whole day is £3, the charge for half a day's threshing is commonly £2. On a small-holding, the process of threshing may, therefore, be half as expensive again as on a large farm.

Farmers naturally cannot be sure of obtaining the use of a machine just when the market and farm conditions are suitable. Anything from two days to a week's notice is necessary as a rule. There is no ground, however, for believing that there is any shortage of threshing capacity in the country. Where there is a difficulty about getting a machine at once, it is usually due to the fact that the machine happens, at the time, to be at the other end of the district which it serves. A special difficulty appears to exist in south Lancashire, where many threshing sets are owned by corn merchants. Here, a farmer may get a good offer for his corn from a merchant whose tackle is already fully employed, but he may find considerable difficulty in arranging elsewhere for his threshing; as often as not, if he wants the grain threshed quickly, he has to let the better offer slip and accept a lower price for his grain from a buyer who has tackle available. The average size of farms in south Lancashire is small, which is perhaps one reason for the special conditions existing in that area.

During the harvest of 1928, the Institute of Agricultural Engineering at Oxford made extensive trials of a combined harvester-thresher machine. Originally designed for Australian conditions, the use of this type of machine spread first to the Argentine, then to the United States (see page 61), and, more recently, to Canada, Russia and Mediterranean countries. That the machine has made rapid headway in recent years is due largely to the fact that there has been added a separate power unit for driving the cutter at a rate dependent on the weight of the crop and independent of the pace of the machine. It is, in fact, this improvement which makes it possible to contemplate the introduction of the machine into countries, like England, which grow heavy crops with long straw.

The type of machine used in the experiment had an 8-foot platform (see Fig. 3) and was, therefore, smaller than that customarily employed abroad; even so, it cut and threshed at the rate of 2 acres per hour, two operators only being required. The total cost of the whole outfit, apart from the tractor, was approximately £400. Contrary to expectations, it left quite a short stubble and did the threshing properly and well. In the field, the machine was not at all cumbersome; it was, indeed, handier at turning and made a better job at the corners of the field than a binder usually does. The prospects for the machine in this country can thus be regarded as fairly promising, but further experiments and adjustments will be necessary before it will be possible to claim that the machine is entirely suited to farming conditions here. Moreover, even if it



FIG. 2.—A travelling threshing outfit.

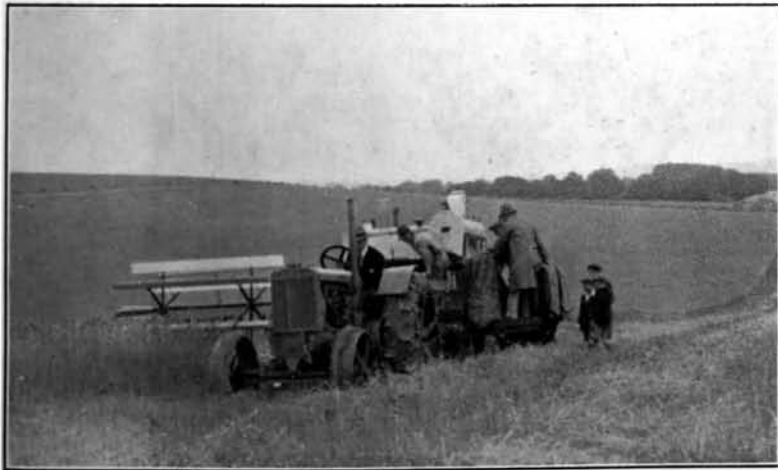


FIG. 3.—Combined harvester-thresher at work in Wiltshire





FIG. 4.--No. 2 Granary, Manchester.

should prove successful in reducing the labour, time, weather risks and cost of producing grain on the farm, it is possible that farmers may not be able to adopt the improvement rapidly or extensively in the present state of marketing organisation. As has been the experience in other countries, the general adoption of the machine here would probably accentuate the rush of supplies on to the market at harvest time, unless use were made of storage accommodation and drying facilities for bulk grain.

(b) *Dressing*.—A small hand-winnowing machine is often found amongst the farm implements. This, however, is only used for dressing seed lots and is not always necessary even for this purpose. If the grain being threshed is intended for seed, it is a simple matter to set the threshing machine so as to take out a larger proportion than usual of the seconds or tail corn—say 1 sack of seconds for 5 sacks of first quality grain. For ordinary market purposes, the practice is to take out 1 sack of tailings for every 10 sacks intended for sale. The percentage extracted is under the control of the operator and can be varied according to instructions.

Most weed seeds are removed by the ordinary type of threshing machine, though certain kinds of seed, such as garlic, if present in the crop, are apt to pass through with the grain. The presence of garlic is highly objectionable and makes the product unsuitable for flour milling, as it fouls the mill rolls and imparts an objectionable flavour to the whole grist.

Well-threshed wheat should not contain even 1 per cent. of impurities. Unfortunately, from threshing one type of grain the travelling sets often turn on to threshing another without being thoroughly cleaned out; they are seldom cleaned between threshings of the same type. The result is that the first sack of grain threshed may be very mixed and may contain a considerable quantity of other grain at the bottom. The last sack also contains a lot of dust and dirt owing to the machine being allowed to run on and empty itself. Further, at the top of the sack, there is apt to be damp grain and grain harvested from around hedgerows, etc., and, at the bottom, grain that has been broken and damaged by vermin; thus the first and last grain threshed is often of inferior quality. There appears ample ground for suggesting that, in addition to the tail corn, farmers should set aside, for farm use, the first and last sack of each threshing, or else mix it with the tail corn for sale as poultry grain. These sacks represent about 2 per cent. of the day's threshing and, as often as not, are sold with the rest and give occasion for dispute on the part of the buyer. There is nothing to be said, of course, in favour of including, as many do, the result of threshed rakings along with the rest of the grain.

(c) *Sampling*.—Drawing a sample is often the first step in marketing the crop and may precede threshing. The farmer draws a few heads out of the stack, rubs them out in the hand and does business with the merchant on the basis of this rubbed-out sample. This cannot, of course, provide a satisfactory basis because the sample holds no impurities and it is difficult to avoid hand-picking the sample to some extent. Nor can a small sample drawn off the

top of the sacks after threshing be regarded as truly representative. The best method commonly used is to draw small quantities from the spout at intervals while the threshing machine is running and to place these in some convenient receptacle, such as a bushel measure, from which, after shaking up, a quantity is drawn at random to provide a representative sample of the whole.

To make the bulk and the sample coincide, it has been recommended to farmers, especially in the case of barley, that all the grain as threshed should be emptied on the barn floor and there mixed before drawing the sample. Many of the large farms are equipped with conveyor belts which dump the grain in bulk on the granary floor at the time of threshing, and, in such cases, the problem presents no difficulty; but, in general, the grain is threshed straight into the sacks, and smaller farmers aver that, owing to lack of barn space and to extra handling of sacks involved, the foregoing recommendation must to them remain a counsel of perfection incapable of practical application. To stimulate the adoption of the procedure recommended, however, it has been suggested that a series of sample bags bearing a trade mark should be issued to farmers who will undertake to bulk and mix their grain before drawing the sample. (Figs. 5 and 6.) The object is, of course, to guarantee greater regularity of quality and a closer correspondence between the sample and the bulk. The Norfolk and Suffolk County Branches of the National Farmers' Union worked schemes on these lines for the 1928 crop. In Norfolk, the scheme was applied to malting barley only, and, apart from the seller's declaration, printed on the bag, that "this sample is drawn from mixed bulk," no precise method of drawing the sample was defined. Under the Suffolk scheme, however, the farmer was instructed to shoot the grain evenly on the floor, to turn it over at least once, to draw grain from four points in the heap and to fill a bushel measure from which, after mixing, the sample must be drawn. In the event of dispute, the onus of proving that the above method was employed was laid on the farmer. For the season 1928-9, the Farmers' Union in Norfolk issued 1,000 bags to 200 members participating in the scheme and, in Suffolk, over 400 bags were issued to 24 members. It is too early as yet to say what effect either of these schemes has had on the trade.

In addition to the small pocket sample of about 2 to 4 oz. which the farmer takes to market and on which the purchase terms are based, merchants frequently ask for a bulk sample to be sent to them, especially in the case of barley, before confirming the bargain or accepting delivery. This should be drawn from all the sacks and be as representative as possible, because, eventually, in case of dispute, it will be compared with the arbitration sample and, if not strictly comparable, the farmer will have to face the consequences of the dispute. This arbitration sample is, on request, drawn from each sack in the consignment by an independent party, often a railway official, at the receiving end. If the arbitration sample and the bulk sample as supplied by the farmer do not agree, it seems obvious that the farmer has failed to take reasonable precautions in

drawing the sample—unless, of course, the discrepancy is due to damage in transit.

Another precaution, which it seems desirable that the farmer should adopt, is to have a freshly drawn sample on each occasion when the grain is offered for sale. A pocket sample may dry out


<i>Season</i> 1928-29.		<i>Date of Sale</i> .....
<i>Seller's</i> <i>Registration</i> No.....		<i>Quantity</i> .....cwts.
<b>NORFOLK MALTING BARLEY</b>		
<hr/> The Seller gives a <b>GUARANTEE</b> that this Sample is drawn from Mixed Bulk.		
<hr/> <b>ISSUED BY THE NORFOLK COUNTY BRANCH</b> <b>of the NATIONAL FARMERS' UNION.</b>		

FIG. 5.

and change colour to a very appreciable extent in the course of a week and it is for this reason that merchants who have failed to dispose of grain within a week frequently call on the farmer for a fresh sample.

Sampling is a simple process but, as it is the present basis of the home corn trade, it is important that, whether the grain be good or bad, the sample should be representative. Unfortunately, in too many cases, buyers have good reason to complain that the sample is not truly representative of the bulk. They have, however, a remedy in their hands which they do not fail to use. Knowing, as they do, that a certain number of farmers will fail to deliver grain of a quality equal to sample, they insure themselves against this risk by cutting prices all round. In this way, they obviate the necessity of making constant complaints, but the system implies that farmers who deliver grain up to sample subsidise those who deliver below sample. In fairness, therefore, to the farmer who puts his grain on the market properly, the existing state of affairs calls for improvement.

<i>Date of Sale</i> .....	<i>Seller's Reg. No.</i>
<i>Quantity</i> .....	<i>Cwts.</i> .....



**1928-29  
SEASON**

**Issued and Controlled by the  
Suffolk Branch of the N.F.U.**

FIG. 6.

## (ii) The Practice Abroad.

Throughout the world, there are wide variations in the methods of harvesting and preparing grain for market. In India, for example, the crop is mostly cut by hand. It is commonly threshed by means of the flail or trodden out by oxen on the floor of the barn. The grain is generally winnowed by wind, and if the crop is held on the farm before sale it is stored in the form of grain, usually in an earthen pit. However suitable they may be in relation to native agricultural and economic conditions, the methods in vogue in India are primitive and backward in the extreme as compared with those in this country, but the methods here, however suitable they may be to our conditions, can be considered as primitive compared with the system prevailing in the large wheat-growing areas of North America, for example. There, especially in the drier regions of the West, the process of stacking is to a great extent eliminated and the harvesting and threshing of the crop, instead of being two distinct operations, as in this country, are combined in one. Even this combined operation has recently been cheapened and simplified, with the result that the crop is placed more easily and quickly on the market than before.

The United States Labour Monthly Review\* has given a summary of the progress made in this direction in the United States where harvesting and threshing used to be the biggest problem connected with wheat growing. At one time, so much labour and, in addition, such expensive equipment were required, that no ordinary farmer could afford to own a set and man it. The labour and equipment were therefore hired from a travelling thresherman or hired and owned by several farmers in partnership. The typical set of equipment consisted of three headers, nine wagons, one engine and thresher, etc., along with 30 or 35 men and 60 or 70 horses. With this, it was possible to do from 75 to 90 acres per day. The next step was the 18-foot combined harvester and thresher drawn by a tractor or 33 horses manned by 5 men, and doing perhaps 30 acres per day. The latest development is a 12-foot combined harvester and thresher run by a tractor, with 2 or 3 men, doing 15 acres per day, and so inexpensive to buy that every farmer can possess one. It is pointed out that, in this way, 2 men can hope to harvest unaided as much wheat as they can possibly seed. After threshing, a farm wagon conveys the grain in bulk to the local elevator, where the operator samples each load and the grain is there allotted its market grade as will be subsequently described.

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**CHAPTER VI.—ASSEMBLING.**
**(i) The Practice at Home.**

(a) *By Merchants.*—Apart from the direct purchase and assembling of grain by manufacturers which is referred to later (page 126), the assembling of grain in this country is very largely done by inter-

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\* Vol. XXIII, No. 6.

mediaries who may be roughly classified as follows:—the corn agent, the corn merchant, the corn and agricultural merchant, the produce merchant and the seed merchant.

The corn agent is found chiefly in the area of intensive grain growing which lies round the Wash. In some parts of this district, it is estimated that he handles 50 per cent. of the grain put on the market. His methods of business are simple. Farmers send or hand to him samples of the grain which they wish to sell and the agent disposes of this grain to a larger merchant or dealer, either on the local market or at some other market within about 25 or 30 miles, and charges the farmer a flat rate commission of 3*d.* per qr. on all grain sold. Except in the case of wheat which he may sell to a local miller, if there is one, most of the corn agent's sales are to merchants and not direct to manufacturers.

The corn merchant is established where grain is grown most intensively and particularly in the Eastern Counties round the Fens. As well as buying grain from farmers, he may also be engaged in selling them seed grain, but, in the Fen district, he does not, as a rule, undertake the sale of feeding-stuffs, partly because the cattle population is low in that area, partly owing to the presence of small provender millers who trade direct with farmers, and partly because the local flour millers, as a matter of custom, dispose of their offals through the country baker.

The corn and agricultural merchant forms the largest and most important group of intermediaries dealing in farmers' grain. He is found throughout the whole country, especially where corn growing and stock farming are mixed. He buys any kind of grain from the farmer and, in return, sells feeding-stuffs, manures and all kinds of agricultural requisites including seed.

The produce merchant who handles potatoes, market-garden produce, hay, fodder, etc., is a feature of the grain trade in south Lancashire.

The seed merchant is not infrequently a specialist, and consideration of his function in the corn trade is therefore reserved to Chapter XVI., which deals with the sale of seed grain.

Business methods do not vary greatly. A merchant sometimes handles a farmer's grain on commission like the corn agent. He takes the sample, disposes of the grain to a buyer and charges the farmer 6*d.* or 1*s.* per quarter on the transaction, according to the type of grain and the price realised. In such cases, however, the farmer often specifies a minimum price when leaving the grain with the merchant to sell. In the main, however, the farmer shows his sample to the merchant who buys the grain outright free on rail at the farmer's station. In some cases, the merchant gives the farmer a purchase note recording the terms of sale, but, usually, he simply marks the approximate quantity and price on the sample and places it in his bag. The closing of his bag on the collected samples signifies the completion of the day's operations. While some corn merchants in their dealings with farmers will confine their activities to a county or part of a county, like Norfolk or Suffolk,

others may attend all the country markets between the Fens and the Humber or cover the area between the Humber and the Tweed for buying purposes. In order to dispose of their purchases, merchants naturally go to markets far outside their normal assembling area—to markets such as Manchester, Leeds, Bristol, Lincoln, Birmingham or Mark Lane. (See Chapters XII and XIII.)

By collecting the samples in his bag at a country market, a merchant may be regarded figuratively as assembling the grain. In so far as control over the disposal of scattered parcels of grain has become centralised, the operation is certainly one of assembly, and, for a large part of the trade in home-grown grain, no further form of assembly is required. Physical assembly is, of course, commonly undertaken in the special case of the seed merchant, who assembles grain at a central point for redressing and testing prior to distribution. The barley buyer also frequently assembles small quantities at a local depot where the grain may be inspected, mixed and made up into large consignments of a uniform type. This, again, is to meet a special demand, since the maltsters prefer to buy enough of one lot (say 50-100 qr.) to make one "wetting," on the ground that a uniform lot off the same farm will germinate evenly on the floor. The buyer of malting barley is, as a rule, commissioned either by a large maltster or brewer-maltster to buy barley of certain types, in which case he may be provided with samples or, knowing the requirements of certain firms, he may simply buy what he knows to be the special type required. He is, therefore, always buying with a view to matching samples.

Again, quantities of all kinds of grain are frequently collected and bulked by merchants in localities where grain is available in small quantities, as, for instance, in the neighbourhood of small farms. Similarly, where a form of processing—e.g., clipping oats, is performed on the merchant's premises, the grain must of course be assembled. The actual physical assembly of small quantities in this way, while it is fairly general throughout the country, probably does not in the aggregate represent a substantial proportion of the trade. Apart from the extra handling involved, it is a well-known fact that if a quantity of grain is "shot" on to a floor a certain amount of wastage is inevitable in re-sacking. Hence, unless circumstances enable the merchant to secure some special concession in price from one side or another, such operations are not a commercial proposition.

In certain districts, however, merchants assemble a large part of the crop before distributing it to manufacturers. Alongside the rivers in Norfolk and Suffolk, old warehouses can still be seen where grain was formerly collected for shipment to other parts. Owing chiefly, perhaps, to the great reduction in acreage of grain, these warehouses are now derelict or put to other use. Until 1903, the railway companies employed about 100 barges on the waterways of the Fens in collecting grain and bringing it to Peterborough where it was warehoused and subsequently distributed throughout the country. The waterways are still used for transport, but the grain



traffic has ceased and the Peterborough warehouses also are derelict. In this case, however, the traffic has only changed direction. From Boston, in the course of a year, anything from 1,000 to 10,000 quarters of grain are shipped to the Humber, Tyne and Forth particularly. A similar traffic passes outwards from some of the other ports in the area—e.g., from Fosdyke, Sutton Bridge, Wisbech, Wells and King's Lynn. A similar movement occurs also in Somerset; from Bridgwater, up to 15,000 qrs. of wheat may be shipped in the course of a year to Cardiff, Swansea, Gloucester, and other ports. Several cargoes of Yorkshire grain are assembled and shipped every year from York, chiefly bound for London. The amount of grain assembled in this way by merchants for "export" varies, of course, from one year to another according to the production in the district. If the harvest is plentiful, grain is frequently assembled at and shipped from several other points round the coast.

The cost of this assembling operation cannot be regarded as prohibitive when associated with water transport. In the autumn of 1925, for instance, a merchant in the Wash area was buying wheat from local farmers at 51s. per quarter and selling it in Leith at 54s. 5d. delivered. The freight from Boston to Leith at that time was 8s. per ton and in-and-out charges at the docks 3s. 6d., making a total of 2s. 6d. per qr., which left the merchant about 1s. per qr. to cover cost of assembling and profit. When the railway companies were engaged in assembling grain at Peterborough prior to 1903, the barging and handling charge was 3s. per ton, equivalent to 9d. per qr. of wheat. For the sake of comparison, it may be added that, at the present time, local millers in most parts of the country offer 1s. per qr. more for wheat delivered-in than for wheat which they have to collect from the farm.

Merchants, therefore, find the physical assembling of grain in this country cheap enough to be a commercial proposition, especially where sufficient supplies exist to admit of large quantities being handled and where water transport is available.

(b) *By Producers' Co-operative Organisations.*—So far as is known, the Sherston Co-operative Milling Society is the only agricultural co-operative society in this country which has been formed with the special object of marketing the grain of its farmer members. Many societies formed for the purpose of buying farm requisites undertake, however, the marketing of home-grown grain as a subsidiary function. Some of them are provender millers as well as merchants; others are specialists in some particular sphere. The eastern counties are well-known as a source of seed supplies; it is not surprising, therefore, that the Eastern Counties Farmers' Co-operative Association should have developed an important seeds department of its business. Since Yorkshire oats are plentiful and good, the Yorkshire Farmers, Ltd. naturally do a large trade in clipped oats with the rest of the country. South Lancashire is a great poultry run and Preston Farmers, Ltd. are, therefore, large buyers and sellers of good poultry grain. This adaptability of farmers' co-operative associations to their local environment need not always be related to agricultural conditions, nor need the particular form of

speciality be a raw agricultural product. South Hereford Farmers, Ltd. for instance, are country flour millers and make flour for local bakers and for biscuit factories further afield.

These associations are local in character and are not primarily concerned with the marketing of grain on a large scale for their members.\* Their business methods do not differ fundamentally from those of the corn and agricultural merchant. Representatives of the societies attend country markets in their respective assembling areas where they buy on sample or handle on commission, as suits the occasion. They do not confine their operations to members in every case, nor are members bound in any way to the Society either for purchases or sales. If members can get better terms from the society than from the local merchant, they use the society, but not otherwise. It speaks well, therefore, for these societies that they are mostly flourishing.

Societies, like merchants, also undertake the physical assembly of grain at suitable places and in certain circumstances. Yorkshire Farmers, for example, assemble and ship grain from York, while the Eastern Counties Farmers may export from Ipswich or from their various branches at East Coast ports; other societies have depôts in the country districts at which grain may be assembled prior to distribution.

#### (ii) The Practice Abroad.

(a) *Europe*.—Country merchants in France, Belgium and Holland generally operate in much the same manner as merchants in this country. In recent years, the amount of business done in the small country markets has shown a tendency to decline, largely, it seems, because the country merchant does much visiting of farms by car and collects a good deal of grain and produce direct from the farm by motor lorry. Throughout Europe generally, farmers' co-operative societies undertake the sale of grain to a varying extent, and, as in this country, they are also mostly engaged in the purchase of seed, feeding-stuffs and other farm requisites for their members. In Germany, Czecho-Slovakia and Sweden, there are a number of farmers' co-operative societies that operate warehouses and elevators for the purpose of assembling their members' grain. In Germany, however, although the small co-operative elevators have, in general, been successful, there have been numerous failures associated with large and expensively equipped co-operative elevator warehouses for rye and wheat. In the Baltic Republics and most other new States which have arisen since the War, the State Authorities have availed themselves of existing co-operative organisations, or have promoted new ones, in order to assist the work of reconstruction and have, in many cases, through the agency of the co-operative organisations, succeeded in developing export markets.

One or two special points regarding the position in Europe may be briefly noted:—

In Germany, at the port of Königsberg, facilities are provided for

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\* For further particulars of co-operative marketing and purchasing societies in England and Wales, see Economic Series Nos. 1 and 5.

the clearing and sorting of grain according to grade. These facilities attracted a very large traffic in Russian grain prior to the War. A certain amount of grain is sold by farmers direct to grain merchants in provincial towns round about; these merchants, in turn, sell to the exporters in Königsberg. Most of the business, however, is done by landlords and farmers who send samples of grain to commission-agents, who are members of the Börse or Corn Exchange, for sale to the export merchants. At the Börse, the grain is graded according to quality by experts. In October, 1926, the town of Königsberg received from a bank consortium, under the leadership of the Reichskredit-gesellschaft, a loan of four million marks for the financing of the trade.

In 1926, also, a large central grain organisation, the Deutsche Getreide-Handelsgesellschaft, was founded, under the superintendence of the German Government, with a capital of 15 million marks, provided, as to 9 million, by the German farmers' buying association (Reichslandbund), as to 3.6 million by the Nitrogen Syndicate and as to 2.4 million by the Potash Syndicate. The Chambers of Agriculture, indirectly, and agricultural co-operative trading societies, directly, are represented on the board of directors. The consumers' co-operative movement is also represented. The organisation has at its disposal a Government credit of 30 million marks given without security, carrying interest at  $1\frac{1}{2}$  per cent. per annum and repayable in April, 1934. The Company was formed with the object of protecting the market, so far as possible, from artificial price movements arising from speculative operations. It seeks to achieve its object partly by advancing credit on easy terms to German farmers to enable them to hold grain at harvest time, and partly also by buying and selling grain on the open market, either indirectly through the agricultural trading societies or directly through the usual brokers.

In Norway, the War-time State monopoly of grain has been modified, but provision has been made for the erection, by the State, of assembly warehouses for Norwegian grain. The State also continues to assist and exercises a certain amount of control of the trade by means of a system of equalised freights. In Russia, the State continues to exercise a close control over the purchase and export of grain. On the other hand, by referendum in 1926, the Swiss State monopoly established during the War for the purchase and storage of wheat was abolished.

(b) *United States.*—In the United States, country corn markets, as understood in this country, are unknown. In the eastern states, where there is little or no exportable surplus, local flour mills play an important part in marketing wheat. In the central and north-western surplus-producing areas, on the other hand, the characteristic marketing agency is the local elevator. Local elevators are of three kinds, namely, (1) the line elevator, which is one of a number owned by a large corporation and operated from some terminal point, (2) the independent elevator, and (3) the farmer-owned elevator. These all work in much the same way, assembling wagon-

loads from farms and dispatching in truck loads to commission houses operating on the terminal markets. Unless the elevator belongs to a pool, the manager ordinarily buys the farmers' grain for cash after weighing and grading it. Where grown in appreciable quantities, barley and oats are also marketed through local elevators. The handling of farm requisites and livestock is an additional activity of farmer-owned elevators in many parts of the United States.

In the United States, there are, at present (1928), 4,000 local farmers' elevators handling 500 million bushels of grain and large quantities of goods and livestock. The dependence of these local units on commission firms in the terminal markets for disposing of the grain and for intermediate finance prevents them, however, from exercising any organised influence on the market. In Canada, on the other hand, the special feature of the producers' co-operative movement has been the line-elevator system under central control, combined with, in recent years, a system of pooling (see later). "The farmers of Canada went into terminal markets even before they established elevators at the country railroad stations, whereas in the United States, farmers' elevators were first established locally."\* Canadian methods are being closely studied in the United States and attempts have been made to organise co-operative line elevator companies, and to federate local elevators, but comparatively little success has been achieved. Attempts have also been made to form co-operative sales agencies in terminal markets and several such agencies have succeeded in making good. In 1920, a wheat pool was organised in the State of Washington. This was followed by pools in other north-western States and by similar organisations in the Middle West and South-West.† Several of these pools existed only for short periods but eight were in operation in October, 1927. Most of these organisations are very small compared with the Canadian pools, and the aggregate volume of grain handled annually is about 20 million bushels.‡

(c) *Canada*.—As in the United States, there are no country corn markets in Canada such as exist in this country. Apart from producers' organisations (see below), the business of assembling Canadian grain is chiefly in the hands of line elevator companies who control a number of country elevators in conjunction with large terminal elevators. "In general terms, the primary function of the elevator operators from the Canadian point of view is to make available, at the head of the Lakes, round lots of wheat of standard grades assembled from hundreds of interior shipping points."§ An increasing quantity of grain is also assembled at other centres for movement

\* Co-operative Grain Marketing—A Comparative Study of Methods in the United States and Canada. U.S.D.A. Bulletin 937.

† See p. 70, Economic Series No. 4 (Large-Scale Co-operative Marketing in the United States.) for account of North-West Wheat Growers Associated.

‡ Co-operative Marketing of Grain in Western Canada. U.S.D.A. Technical Bulletin No. 63; See also Proceedings of First International Wheat Pool Conference, Saskatchewan, 1928.

§ U.S.A. Department of Commerce—Trade Information Bulletin No. 251—"Marketing of Canadian Wheat."

westwards from the prairie provinces to Pacific ports, but more than five times this quantity moves over the eastward route to the head of the Lakes.

A farmer may take his grain to one of the country elevators, of which there are 4,700, including farmer-owned, in the Dominion. He may agree with the elevator manager in regard to the grade or, failing agreement, he may sell "subject to inspector's grade and dockage" as subsequently determined. Grain thus acquired on delivery to the elevator is called "street" grain. A farmer selling more than a truck-load may place his grain direct on rail at one of the "loading platforms" provided for this purpose and so save handling charges at a local elevator, although he assumes a certain amount of risk; this grain is known in the trade as "platform" grain. Once on rail, the farmer may sell the grain as "track" grain, or forward the bill of lading and selling instructions to a commission agent on Winnipeg Grain Exchange; the farmer may, of course, postpone selling and have the grain stored in a terminal elevator if he thinks such a course is wise. In the same way, a farmer may deposit his grain in a country elevator and have it kept separate from the other grain as "special binned" grain, or stored as "stored to grade" or "graded storage" with the rest of the grain of a similar grade. The farmer thereupon gets a warehouse receipt, and, later, he may either request the elevator operator to load his grain to rail and dispose of it as before, or he may sell his grain in the elevator to the company and accept a cash ticket in lieu of the warehouse receipt. He can at any time sell his grain through the elevator company on commission. The main policy of the elevator companies is, of course, to buy grain outright from the farmers at the country elevator, the basis of local prices being the day's price at Winnipeg less the costs of freight and handling.

The elevator companies transact business at both country and terminal points. As the elevator capacity does not equal the volume of the crop and as the ports are later closed by ice, the companies, at the beginning of the season, endeavour to pass on as much grain as possible to shippers and exporters. From December onwards, however, their policy is mainly to buy and store till navigation opens in April.

Turning now to co-operative marketing, the movement in Canada, as stated above, was directed first towards establishing central control of marketing at the terminal, and, with this end in view, legislative safeguards and facilities were sought for the marketing of grain at the terminal by individual farmers. The Manitoba Grain Act of 1900 was the foundation of the Canada Grain Act, which was passed in 1912 and revised in 1925. After the passing of the first Act, a number of farmers' associations were formed out of which there arose, in 1906, a co-operative marketing organisation known as the Grain Growers' Grain Co., established primarily for the sale of grain on commission on the Winnipeg Grain Exchange.

Dissatisfaction with conditions at country points then led to a demand for farmer-owned elevators. A number of single-unit elevators owned by farmers existed, but they had found it difficult to com-

pete with companies operating a chain of elevators. The solution of the problem appeared to be the establishment of co-operative line-elevator companies. In 1909, in response to a demand for State ownership of elevator facilities, the Manitoba Government acquired and operated 174 elevators, but, the scheme proving a financial failure, the Government retired from the business after two years and leased the elevators to the Grain Growers' Grain Co. In this way, the farmers' company acquired a line of elevators which it would probably have been unable to acquire on its own initiative and from its own resources. The intervention of the Manitoba Government may, therefore, have had an important bearing on later developments.

In 1911, a co-operative line-elevator company was established by statute in Saskatchewan. The Saskatchewan Co-operative Elevator Co., as it was called, began business with 46 country elevators and received a Government loan equal to its uncalled capital (85 per cent. of the amount subscribed), the loan to be repaid in 20 years. In 1914, similar developments, aided financially by the Provincial Government, took place in Alberta, and the Alberta Farmers' Co-operative Elevator Co., was formed which built, or bought, 52 elevators in the first year and 26 more in the second.

In 1917, the Manitoba and Alberta organisations amalgamated under the name of United Grain Growers, Ltd., the sales agency in Winnipeg of the Manitoba Company becoming the sales department of the new organisation, which favoured the handling of livestock and farm requisites as well as grain. The Saskatchewan Company continued as a separate organisation; it had already established its own sales agency in Winnipeg and viewed with disfavour any proposal to embark on activities unconnected with the grain business. In 1926, these were the two great grain marketing co-operatives in existence in Canada outside the wheat-pool organisation. In that year, the elevators of the Saskatchewan Company—numbering 450—were taken over by the Saskatchewan Provincial Pool. In 1927, the Manitoba Provincial Pool was in progress of negotiating for the purchase of the elevators—nearly 400—operated by the United Grain Growers, Ltd.

It should be emphasised that the co-operative line-elevator movement adopted the system of marketing followed by the trade in general, including the purchase of "street" grain, the provision of storage facilities for farmers' lots pending dispatch, and including also sales on the Grain Exchange. It may be regarded, however, as a stage in the development of the pooling system which now dominates the marketing of grain in Canada, if for no other reason because it created confidence among farmers in their ability to organise and operate large-scale organisations. The adoption of the pooling principle was, however, evidence of a conviction on the part of the farmers that the existing system of marketing, which the co-operative line-elevator movement supported, was not the best that could be devised.\*

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\* Co-operative Marketing of Grain in Western Canada. U.S. Dept. of Agriculture, Technical Bulletin No. 63.

*The Wheat Pool.*

During the War, Canadian farmers acquired a taste for more autocratic methods of centralised selling and more democratic methods of distributing the proceeds of sales. The wheat crops of 1917 and 1918 were marketed through a Governmental agency known as the Board of Grain Supervisors, which established a compulsory system of centralised marketing. Farmers could only market their grain through the Board and all were paid alike on the basis of grade. The Board made an initial payment on the grain when delivered and, as sales progressed, paid the balance to growers in instalments until the whole of the crop was disposed of. After the War, farmers wanted to have this compulsory system put on a permanent basis, and there is no doubt, too, that interest in pooling as a principle was sustained by the progress of the then existing pools in Australia. In response to pressure, the Canadian Government set up a Wheat Board to handle the 1919 crop, but, after the cessation of the Board's activities in August, 1920, and following the refusal of the Dominion Government to legislate for a compulsory pool, it became clear that farmers could only have a pooling system if they organised one afresh on a voluntary basis.

Support for the pooling method rapidly increased and rested largely on the assumption that existing methods, which resulted in 70 per cent. of the Canadian crop being marketed within a period of 3 or 4 months, depressed prices unduly. Obviously, however, if sales were to be more evenly distributed throughout the year, control over supplies was essential and this could only be secured by means of long-term contracts signed by growers of a large proportion of the total crop. It was on these lines that development proceeded, the form of contract eventually used providing, *inter alia*, for (1) the grower to deliver to his organisation all the wheat, except seed wheat, grown by him in certain specified years, the transfer of title from the farmer to the organisation to take effect on delivery of the grain, (2) an advanced payment on delivery, the balance to be paid in one or more instalments subsequently, and (3) all grain of like grade to be pooled and the producers thereof to receive the same basic price.

In 1923, the representative farmers' organisation of Alberta passed a resolution favouring the immediate establishment of a voluntary contract wheat pool and urged other provinces to follow suit "with the ultimate idea of a world-wide systematised plan of wheat marketing." The Alberta pool, under the name of Alberta Co-operative Wheat Producers, Ltd., was organised in time for the 1923 crop and was the first to get going. It commenced operations with about 46 per cent. of the wheat acreage in the province under a five-year contract, and marketed during the year over 34 million bushels. In the following year, the Saskatchewan pool (Saskatchewan Co-operative Wheat Producers, Ltd.) got under way on the basis of 50 per cent. of the provincial wheat acreage, and the pool in Manitoba (Manitoba Co-operative Wheat Producers, Ltd.) also commenced operations, although it had only contracted for a little over 25 per cent. of the provincial wheat acreage. A central selling

agency for the three provincial pools was then formed, known as Canadian Co-operative Wheat Producers, Ltd., which is a selling organisation only, placing in the world's markets the wheat of the three provincial bodies. Together, the four organisations constitute "the wheat pool," but each provincial pool maintains its independence and has equal representation on the Board of the central selling agency.

Remarkable progress has been made. In 1927, the Alberta wheat pool had about 43,000 members, contracting in all for approximately 4 million acres, or 60 per cent. of the total acreage of the province, and representing an average of a little under 100 acres per member. During the season 1926-7, the pool handled over 43 million bushels of wheat. It had leased the terminal elevators of the Dominion Government at Prince Rupert and Vancouver and, by the close of 1927, controlled 160 country elevators. The establishment of a pool for coarse grains (barleys, oats, rye and flax) was under consideration.

The Saskatchewan Co-operative Wheat Producers, Ltd. is the largest of the three provincial pools. In 1927, it had about 80,000 members and 10,500,000 acres under contract, or about 80 per cent. of the wheat acreage of the province, and an average of 130 acres per member. During 1925-6, through its subsidiary company, the Saskatchewan Pool Elevators, Ltd.—created to own and operate elevators—the pool controlled 90 country elevators, handling, on an average, 174,000 bushels each per annum. During the year, it added 32 and, in 1926, after taking over the elevators of the Saskatchewan Co-operative Elevators Co., Ltd., controlled nearly 600 elevators with a storage capacity of 18,000,000 bushels. In 1927, the number of elevators controlled by the Saskatchewan pool reached 720. During 1926-7, the pool handled about 117 million bushels of wheat and about 8 million bushels of coarse grains.

Manitoba Co-operative Wheat Producers, Ltd., in 1927, had about 19,000 members and nearly 30,000 contracts, of which well over one-half were for wheat and the remainder for coarse grains. The contracted wheat acreage was 1,300,000 acres, an average of nearly 70 acres per member. In 1926-7, the Manitoba pool disposed of approximately 16 million bushels of wheat and 12½ million bushels of coarse grains. Through its subsidiary company, the Manitoba Pool Elevators, Ltd., it had acquired about 40 elevators and was leasing or building others, resulting in a total of 57 elevators by the close of 1927. As previously stated, it was also negotiating for the purchase of the elevator system operated by the United Grain Growers, Ltd. The Manitoba pool does not operate terminal elevators, pool grain from Manitoba being handled by the elevators of the central selling agency (see below).

At the close of 1927, the three pools had a total membership of about 142,000 farmers and were operating 937 country elevators with a capacity of 30,510,000 bushels. Several hundred new elevators are in course of construction. In addition, the pools own 11 terminal elevators, with a capacity of 42,475,000 bushels; 3 of these elevators are under the control of the Alberta pool, 5 of the



Saskatchewan pool and 3 of the central selling agency. As the pools only control a relatively small proportion of the required elevator capacity, much of the grain is, of course, handled through the country elevators of other companies with whom the pools have arranged fixed operating charges.

The pools, through the central selling agency, dealt with 209,500,000 bushels of wheat and 21,000,000 bushels of coarse grains in 1926-27. In 1927-28, the figures were 222,000,000 bushels of wheat and 18,300,000 bushels of coarse grains. While the pools endeavour, as a rule, to clear all stocks within the cereal year, the "carry over" of pool wheat in September is reported to have been about 7 million bushels in each of the years 1927 and 1928. The central selling agency is the sole seller of "pool" wheat, its policy being to sell as much grain as possible direct to domestic and foreign millers. It has its own branch offices in London and Paris.

Steps were taken in 1927 to establish a pool for wheat and coarse grains in Ontario—a mixed farming province growing soft winter wheat. This pool handled about 5 million bushels of the 1927 crop. It is affiliated with the western pools and uses the central selling agency.

(d) *Australia*.—The methods and agencies utilised for assembling grain in Australia differ, to a considerable extent, from those in the United States and Canada. As a rule, the grain is placed in 3-bushel sacks by the farmers and dispatched from the field to the railway station, where the sacked grain is piled in open sheds or in large stacks, to the regulation height of 20 sacks, which are afterwards covered with metal or canvas roofs. From the country station the grain is moved as quickly as possible to the ports and stored, pending shipment, in ordinary floor warehouses. The tare weight of the sack is apparently paid for as grain but, even so, it is held that, taking into consideration the cost of the sack and the extra freight and loading charges, the use of sacks is a considerable expense to Australian farmers.

On the other hand, it is maintained that as an elevator, in order to be profitable, needs to turn over its capacity at least 12 or 13 times a season, elevator handling would not, as a rule, be economical in Australia where wheat production is widely scattered over all the States of the Commonwealth. In New South Wales, however, there has been, in recent years, a decided tendency towards elevator handling; one-third of the crop is now handled in bulk in this way. The State Government operates 66 country elevators, having a capacity of 200,000 to 300,000 bushels each, and, in addition, a terminal elevator, with a capacity of over 6,000,000 bushels, at Sydney, through which 50 per cent. of the wheat exported from New South Wales is passed.

Assembling is, for the most part, done by merchants, while direct purchase of grain from farmers by millers and millers' agents is also common. From 30 to 40 per cent. of the Australian wheat crop, however, is marketed through voluntary co-operative pools which exist in New South Wales, Victoria, South Australia and Western Australia. These pools mainly function in the assembly of

wheat for the export trade. In Queensland, there is a compulsory State pool, but the crop is not generally large enough to provide a surplus for export.

The merchants in the export trade are confined to a few large firms operating on an international scale. These firms, it is stated, "buy on daily cabled quotations from the world's markets, and generally sell by cable on the very day on which they buy. They do not willingly risk as much as 24 hours' rise or fall."\* It is contended by the pools, however, that this method of business does nothing to check the disorderly marketing of Australian wheat which occurs during the months of January, February and March.

Wheat pools covering the four States of New South Wales, Victoria, South Australia and Western Australia were conducted on a compulsory basis by the Commonwealth Government for the six seasons 1915-6 to 1920-1. The scheme was based on the general principle that, in the abnormal conditions prevailing, some co-ordinated organisation was necessary to see that all growers should participate equitably in the marketing of the crops and that the limited freights available should be allotted between the States in accordance with the exportable surplus of each. The responsibility for realising the crop and arranging for distribution of freights was vested in the Australian Wheat Board, which acted with the assistance of an Advisory Board of wheat shippers and arranged overseas sales through its London Wheat Committee. In certain States, the crop was bought by the State Government, and, in others, the wheat was received from the growers for sale on their behalf. Certain wheat, particularly seed wheat, was in all States excluded from the scheme. The Board fixed all selling prices, except for poultry food which was left to the States individually to regulate. Each State had a local Board or Commission to control the local operations of the scheme and effect local sales, including sales to millers.

The Commonwealth scheme terminated in 1921 after handling 133 million bushels of the 1920-21 crop. New machinery was required to dispose of the 1921-22 crop. A State compulsory pool was continued for one year in Western Australia, but, in the other States, voluntary pools were set up mainly on the initiative of existing farmers' co-operative societies. These societies trade in practically everything the farmer has to sell and they also supply his requirements for fertilizers, machinery, etc. The handling of wheat is only a part of their activities. The Western Australian pool, like the others, is now on a voluntary basis. While each State pool operates independently and there is no agreed selling policy between them, New South Wales, South Australia and Western Australia have a joint marketing agency in London—the Overseas Farmers' Federation, Limited—which runs a grain department and has a seat on the Baltic Exchange.

The percentage of growers marketing through the voluntary pools was, at first, high. Later, there was a falling off, but it would

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\* See Supplement to "Economic Record," Australia, February, 1928 Vol. IV, page 48.

appear that the pools are now tending to recover their position. In 1925-26 and 1926-27, the quantities of wheat delivered to the pools were as follows:—

	1925-6.		1926-7.	
	Millions of Bushels.	Per cent. of Market-able Crop.	Millions of Bushels.	Per cent. of Market-able Crop.
New South Wales .. ..	0.74	2.4	8.85	25
Victoria .. ..	3.62	13	20	50
South Australia .. ..	5.4	21	8.95	30
Western Australia .. ..	6	33	17.93	65

In all, the pools handled just over one-third of the total marketable quantity of wheat during the 1926-27 season. In addition to marketing wheat for their members, the pools have, in some cases, undertaken the warehousing of grain for the farmers.

The fact that the Australian wheat pools have not, up to the present, made such striking progress as those in Canada is attributable partly to the differences in marketing conditions and partly to the absence of the binding contract as an integral part of the pooling system. It is understood that the State pools are now concentrating on securing the introduction of the binding contract so far as possible, and are conducting vigorous campaigns among farmers for this purpose. Attempts, also, have been made to obviate inter-State competition on the world market by the establishment of a voluntary Commonwealth pool, but, so far, this has not materialised.

(e) *India.*\*—In India, the peasant usually sells his wheat to the village grain dealer who sends it to the local market where the larger merchants and representatives of exporting firms purchase village deliveries of grain to incorporate into larger parcels for storage or rail-shipment. The owners of large estates in the Punjab, however, are usually in direct touch with exporting firms and, in recent years, the small growers have become less dependent upon the village dealer and more inclined to deal direct with the exporters' agents. It must be remembered, however, that the bulk of the wheat crop is retained in the wheat-growing regions themselves and only a relatively small proportion passes out of the producing provinces.

Wheat being an important cash-crop and the cultivators lacking, as a rule, any storage facilities, the tendency is for the grain to be pushed on to the market immediately after harvest at a consequently low price level. Exporters then find their most favourable opportunity of making large purchases which, to avoid loss by storage under Indian conditions, are again passed on for export as quickly as possible. The bulk of the wheat exported from the surplus-producing provinces goes to the three seaports of Calcutta, Bombay

\* See also Report of Royal Commission on Agriculture in India. (Cmd. 3132/1928.)

and Karachi, the latter being the main centre of the overseas export trade.

From the local market, the grain for export is handled in sacks throughout. There is no elevator system in India and the ordinary "go-downs" or warehouses at the port are used for storage pending shipment. Apart from these port warehouses, and the silos of the Army Supply Department which are for military use only, the facilities for storing grain in India are unsatisfactory. The ordinary cultivator generally makes use of a small pit or an earthen bin of sun-dried clay. For large crops, the growers use pits (khattis) lined with straw and chaff and covered with straw, earth and a thatch. Only the larger warehousemen have buildings of stone or brick, which also are often defective and liable to cause deterioration of the grain.

Much consideration has been given to the question of handling grain in bulk. So far back as 1890, proposals were made for the establishment of a system of country elevators, and later, in 1913, an elevator with a capacity of 140,000 bushels was erected, as an experiment, at Lyallpur in the Punjab. Little use, however, has been made of this elevator, which remains the only building of its kind in India. Meanwhile, no change in the old-established practice of handling grain in sacks appears likely in the near future, although efforts are being made to improve marketing efficiency.

(f) *Argentina*.—The grain trade from the Argentine Republic is largely in the hands of 4 or 5 large grain-shipping firms of international repute. These have their agents located up-country in the grain-growing districts. Farmers cart their grain to the railway station where it is purchased by one or other of the agents. The grain is sacked and railed and handled in sacks throughout. There are no country elevators and only one or two port elevators for the purpose of facilitating the handling and loading of cargoes. A substantial proportion of the grain exported is now shipped in bulk.

(g) *New Zealand*.—To a certain extent, conditions in New Zealand may be regarded as bearing some resemblance to those in this country since, in recent years, wheat imports have exceeded exports. As recently as March, 1928, however, the farmers of New Zealand resolved to form a pool on the Canadian model. Changes in their present methods of assembling grain may, therefore, be looked for and should be of interest to farmers in Great Britain.

### (iii) The Finance of Assembling.

(a) *In this Country*.—The terms of payment for grain depend to a great extent on the financial relations which already exist between the merchant and the producer, and to some extent, also, on the financial straits of the farmer.

The corn agent and corn merchant pay cash within 7 days or on the next market day after delivery of the grain. Where the farmer is in need of money, he often gets something on account from the merchant before actual delivery.

Producers' co-operative societies may also buy on a cash basis or, like the corn and agricultural merchant, they may sell supplies to

farmers on long credit and run contra accounts. A leading merchant in the eastern counties, who deals in feeding-stuffs, etc., classifies his farmer customers as follows:—20 per cent. pay cash within a month, 30 per cent. take from 4 to 6 months' credit and the remaining 50 per cent. take from 9 to 12 months' credit. The majority, in fact almost all, of the farmers in the last group send in corn to the merchant between the end of harvest and the beginning of January, but receive payment only when the value of the grain exceeds the amount of the contra account. This is the general practice amongst merchants, although occasionally a merchant will pay a clear cheque to the full value of grain delivered without deducting the farmer's contra account. Where a farmer sells his grain past the merchant to whom he is owing money, the practice is to serve him with the full amount of his account and notice to pay within 7 days. Should the farmer ignore this notice, there is no alternative but to obtain a writ. There is, however, very seldom any occasion for this kind of thing. Many farmers simply send in their grain to the depôts of the agricultural merchant and leave the question of price and payment to him. Merchants say that they do not like this way of doing business and that they prefer a farmer to come to market with his sample and offer it to them there. If the farmer rejects the merchant's offer, business is not necessarily terminated, for the merchant may allow the farmer to offer his grain to other buyers on the market, in which case the merchant, in order to get the grain, may have to pay a shilling or two more than he considers it is worth rather than run the risk of not getting payment of his account. Although the contra account system may work to the disadvantage of the farmer by tying him to his creditors, in consequence of which he loses freedom of marketing, it may also work to the disadvantage of the merchant in so far as it compels him to go on buying the farmers' grain in spite of his better judgment even when he knows that prices are falling and the market is going against him. The agricultural merchant, during October and November, takes in winter supplies of feeding-stuffs, cakes, etc., for which he has to pay cash within seven days. He cannot meet his obligations unless he gets grain to sell.

The financial pressure on the farmer at harvest time is well-known. Michaelmas rents, formerly by custom not payable till January, are now being collected more up to time. The farmer must frequently draw on the bank for money to meet the harvest wages; store cattle have to be bought for winter feeding and this involves further credit. Banks are not unresponsive and lend money for these purposes even well beyond the limit of what is commonly required in the way of security. Nevertheless, bank credit has not hitherto borne any definite relation to the amount or value of the crop held on the farm, and neither the farmer nor the agricultural merchant has been in a position to finance the crop for more than a limited period. Hence, the tendency to rush the operation of assembling and marketing grain immediately after harvest. The powers which a farmer possesses under the Agricultural Credits Act, 1928, to give a valid charge to the bank on grain in stack or in store,

will improve his status as a borrower. The use of these powers may, in time, counteract the tendency to overload the market in the autumn.

*(b) In North America and Australia.*

The Merchant System in North America.

In North America, grain is, itself, a first-class security on which owners can readily obtain, directly or indirectly from the banks, whatever credit may be required to buy, move or hold it. The ease with which this credit can be arranged is due to the fact that (1) the quantity of the grain is controlled through the system of public elevators and warehouse receipts, and (2) the quality is controlled through the official grading system. Given a warehouse receipt for "X" bushels of Grade "Y" wheat at "Z" elevator, the bank can always collect from the elevator that amount of grain of the specified quality and, consequently, there is very little risk involved in making cash advances to the trade amounting approximately to the value of the grain which has been bought at any particular moment, the advances being made either directly to the elevators or, in the case of country elevators, more usually through the medium of grain commission firms on terminal markets. The only uncertainty is the future value of the wheat. The financial policy of the trade turns, therefore, on this point and is directed to insuring against any drop in value of the grain. This is done by "hedging" on the "futures" market (see also Chapter IV).

At 11 centres in the United States, there are contract markets where trading in futures is carried on; of these, Chicago is considered to be the leading market. In Canada, Winnipeg Grain Exchange is the great centre of futures trading. Trading in futures is mostly confined to certain specified delivery months—namely, May, July, September and December; delivery, if called for, must be made by the last day of the month at a specified point, which, in the case of Winnipeg, is the terminal elevator at Fort William—Port Arthur. Distance in space or time from this point causes the country ("street") price to differ from the cash price of Canadian grain and this, again, to differ from the price of futures, but all the prices tend to move in harmony. It is possible, therefore, for a terminal elevator, instead of holding, say, 1,000,000 bushels of wheat for 3 or 4 months with no certainty of sale at a price which will cover interest, insurance, operating costs and show a profit, to cover itself by selling its cash wheat for future delivery, in other words, by hedging it. If, as sometimes happens, the spread between current cash and future prices is insufficient to cover the "carrying charge," the elevator companies do not buy to hold, and the resulting lack of demand for grain tends to restore the margin between spot and future prices.

Similarly, it is possible for the dealer, when he buys wheat at his country elevator, to safeguard himself against loss by hedging his holdings; this he does by making an immediate sale on the central exchange, for future delivery, of an amount of grain equal to the quantity of cash grain bought. Whenever he makes the

actual delivery of his country grain, he buys in the future market a contract for a like amount of grain and offsets it against the sale of the future previously made. If he loses money on his cash grain, he will gain correspondingly on the future market, and vice versa. He waives the opportunity of a speculative profit by protecting himself against a speculative loss. In the result, the cost of marketing is reduced. There is comparatively little futures trading in barley and oats and these cereals are consequently handled on a wider margin than wheat in order to allow for market risks. Practically all the wheat, however, that finds its way to terminal markets is kept hedged at every step from the time it leaves the farmer.

On the various Exchanges, business methods differ slightly, but in no case is it necessary to put up money to the value of the futures bought—except, of course, when taking delivery of grain under a futures contract. In the main, these transactions are done on “margins.” Cash or equivalent securities are deposited with a bank or clearing-house amounting to 10 per cent. of the value of the grain at any time; as quotations rise, the amount of the cash margin therefore rises also. With marginal deposits and a system of day-to-day settlement of differences, there seems hardly ever any occasion for a genuine holder of wheat to get into serious financial difficulties. When the grain is hedged and the documents relating to the grain are lodged with the bank, a merchant has no difficulty in obtaining ample credit to carry the grain, the market risks having been shifted on to the shoulders of the speculators or the manufacturers buying against future delivery. Safe security for the bank admits of easy credit to the trade, and funds once in the hands of the merchant pass rapidly to the farmer. An ample supply of credit by the banks is, in fact, the special feature of grain assembly in North America. The credit given to the trade rests, however, on (1) public storage, with its attendant system of warehouse receipts, (2) grades subject to official inspection, and (3) grain exchanges where contract facilities are provided for trading in futures.

#### Pool Finance in Canada and Australia.

In Canada, pool members delivering wheat to an elevator receive the initial payment decided on for that crop season for the grade of wheat delivered; this payment is on the basis of Fort William prices—i.e. less freightage and commission or handling charges. The operator at the country elevator records the name of the farmer and the quantity and grade of grain delivered and makes out a “grower’s certificate” in quadruplicate, one copy of which is sent to the provincial pool, two are given to the farmer who sends one to the provincial pool and one is retained by the elevator. When the grain arrives at the designated terminal, it is taken over by the provincial pool concerned, and the country elevator company—if a pool elevator has not been used—is reimbursed for the initial payment, plus freightage, plus agreed commission or handling charges. The provincial pool delivers its warehouse receipts to the central selling agency which, in turn, settles with the provincial pool on the basis

of the advances agreed upon. When an interim payment is declared, this is calculated by the central agency for each province and paid in a lump sum to the provincial pools. They, in turn, pay out to individual farmers in accordance with the grade and quantities shown on the grower's certificate. The provincial pools make their own deductions for elevator reserves (see later), etc. before paying the final instalment on the year's pool. The coarse-grain pools for barley, oats, rye and flax are worked in much the same way as wheat pools. A relatively large initial payment is made in each case, followed by one or more instalment payments until the crop is cleared.

The Canadian pools, both provincial and central, are capital-stock organisations, but the share capital is small compared with the total capital employed. The contracts between farmers and the provincial pools provide for the establishment of an elevator reserve fund and a commercial reserve, the former being used for the acquisition of elevators and the latter, in relief of bank credit, for the general business operations of the pool. The elevator reserve and the commercial reserve are created by deductions not exceeding 2 per cent. and 1 per cent. respectively from the returns for the wheat. The directors of the central selling agency arrange, each year, with a Committee of Canadian bankers for the credit necessary for the movement of pool grain. Canadian banks have been anxious to secure pool business and there has been no difficulty in obtaining the credit required. As the provincial pools increase their reserves, so the need for bank credit will, to some extent, be lessened. Briefly stated, therefore, the Canadian pools finance their fixed assets by mortgages and by deductions from growers' returns and their advance payments and operating expenses by a floating bank credit, by commercial reserves and by returns from the sale of grain.\* The system of ironclad contracts whereby members are bound to send their grain in successive years to the pools is, of itself, an important security in respect of bank advances and greatly facilitates credit accommodation. The three basic elements in pool finance are, in fact, (1) public elevator storage, (2) official grades and (3) growers' contracts.

It is important to note that under the pooling system, the producer-members, as a whole, assume the risk of future price fluctuations, the margin between the initial advance and the likely value of the crop being a measure of the risk. For this reason, the Canadian pools have no need to "hedge." Moreover, the central selling agency operates on a minimum of marketing costs, since it does not buy grain but acts as a selling agent, making an initial advance on delivery and having no purchase price to cover or selling price to guarantee; hedging costs are eliminated and borrowing costs are reduced.

The voluntary wheat pools in Australia differ from the Canadian in that, in the case of Australia, (1) public storage has not, as yet,

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\* See "Co-operative Marketing of Grain in Western Canada." U.S.D.A. Bulletin, No. 63.



been systematised and hardly exists in the country districts, (2) instead of a series of official grades there is only one—viz. the unofficial f.a.q. standard with graduated dockages, and (3) apart from South Australia, where a contract pool was organised in 1928, there is no binding contract between grower and pool. Success, in spite of the first handicap, is made possible by Australia's exceptional climate. The second factor has no great significance from a business standpoint, since the Australian pools operate only in the export trade and Australian wheat is clean and of uniform quality. The third factor—absence of contracts—is probably responsible for many of the difficulties which have emerged. Failing the security afforded by "hedging" or by growers' contracts, the credit of the State has been invoked to guarantee the banks any disbursements made, through the pools, to the growers. The requisite financial accommodation in New South Wales and Victoria was furnished by the Commonwealth and Associated Banks supported by guarantees by the State Governments. Since the season 1924-25, the Bank of the English Co-operative Wholesale Society at Manchester has financed the West Australian pool; the South Australian pool was financed by this Bank in 1925-26 and 1926-27. On the basis of f.a.q. wheat at the railway siding, the pools made an initial payment to growers of 3s. 6d. per bushel (3s. 8d. in the case of Victoria) and subsequent instalments as sales proceeded. As already stated, the Australian voluntary pools work independently and do not have a central selling agency, but they all work through the same sole agents abroad so as to avoid competition and waste. In Queensland, where there is a compulsory pool, the Commonwealth and Associated Banks provide the financial assistance necessary to make advances on wheat delivered, the State Government guaranteeing the Wheat Board's accounts with the banks.

#### (iv) Note on Large-scale Organisation of Home Producers..

The suggestion has frequently been made that the Canadian pool system should be reproduced in all its completeness here, in order to ensure the orderly marketing of the home-grown crop. This suggestion apparently overlooks the natural advantages possessed by Western Canada in producing one dominant type of hard spring wheat to which a grading system can be easily applied and in its system of public storage which can be economically worked owing to the fact that the bulk of the crop passes through "bottle-necks" on its way to export markets. There is, as yet, no grading system in operation for home-grown grain, nor is there any public storage in the producing areas. There are, in fact, serious difficulties in the way of organising collective action in this country on Canadian lines, even if it were a simple task to bring home to the individual farmer that he needs the help of his neighbours in what seems, on the face of it, one of the simplest operations in the world—selling his grain. It is clear that co-operative grain marketing on national lines in England and Wales would need to be organised on some special plan to meet the conditions which exist in this country.

It is important to keep clearly in mind that orderly marketing, as practised by wheat pools, does not mean uniform distribution of sales throughout the year. It means the accommodation of marketing policy to the international market situation. The "orderliness" of pool marketing lies not in any more measured movement of wheat from farm to consuming market, but in unified selling on the basis of the available knowledge of world supply and demand conditions.\* The pools cannot fix market prices, but, given prudent and efficient management, they give their members a competitive world price less the actual cost of handling, transportation and selling on the most economical basis. Since, however, the function of feeding the consuming market is a service which is already performed in this country on narrow trading margins, it may be that, for the present, all that is needed in the conditions obtaining in England and Wales is (1) credit for the producer in order to modify the seasonal concentration of selling in the case of wheat and oats, (2) some method of obviating the rush of grain to market which takes place owing to the farmers' need of straw for covering pits and for bedding cattle, etc., and (3) some form of area selling organisations which, without pooling supplies or interfering with the right of individual members to determine when to sell, will reduce the number of sellers offering home-grown grain at points of first sale and so ensure prices which demand and supply conditions justify. On the first of these points, improved facilities are now available under the Agricultural Credits Act, 1928. Further reference to the second and third points is made in Chapter XVII (ii) and (iii) (a), but it should be made clear that such elementary organisations as those contemplated under (3), even if sufficiently representative, would not be able to co-ordinate their selling activities one with another, still less with those of overseas pools and other export agencies in so far as the adoption of common selling policies may be found to be practicable in the international trade of the future.

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## CHAPTER VII.—GRADING AND STANDARDISATION.

### (i) General.

Grading means dividing products of varying quality and size into lots conforming to defined standards; products thus graded are said to be standardised. The standards adopted by an individual may be his own or they may be national standards which have become the currency of the trade either by usage or by regulation laid down by authority.

There are certain advantages which may be directly attributed to a system of standard grading. In the grain trade, the advantages of such a system are briefly as follows:—

1. It places market quotations on a comparable basis and enhances the accuracy and value of market intelligence

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\* H. S. Patton. "Grain Growers' Co-operation in Western Canada." 1928.

generally. It removes many causes of dissatisfaction and dispute, and assists the course of business, since sales can be made at short notice on description only, and the differentiation of grades enables the producer to be remunerated according to the quality and condition of his grain.

2. It makes possible the bulking of grain of similar type, and this, again, cheapens and facilitates storage and handling and makes it possible to offer large supplies of grain of uniform quality to buyers who require large quantities.
3. Storage by standard grades makes possible and reliable a system of contract buying for future delivery. This, in turn, minimises risk and makes it possible to arrange a system of credit whereby, through the external agency of the banks, farmers can be paid cash for their crop immediately after harvest and buyers be assured of future supplies without either (a) the farmers having to accept a large discount for quick sale or (b) buyers being called upon to sink an excessive amount of capital in their business.

#### (ii) The Canadian System.

Canada affords, perhaps, the best illustration of systematic grading to national standards. The Canada Grain Act, 1925, incorporating the Act of 1912 with subsequent amendments, regulates, through the Board of Grain Commissioners, the marketing, handling, grading and weighing of Canadian grain. For this purpose, Canada is divided into Eastern and Western Inspection Divisions, the former comprising the territory east of Port Arthur (Ont.) and the latter the territory west thereof to the Pacific coast. In the Eastern Division, the Board issues annual licences to operators of public elevators dealing with western grain. In the Western Division, licences are issued by the Board to all track buyers, owners and operators of elevators, warehouses and mills, all grain commission merchants and primary grain dealers.

Winnipeg is the point of inspection for grain passing eastward to Fort William, and Calgary or Edmonton for grain going westward to Vancouver. At these inspection points, the grain is graded and an official inspection certificate is issued. In times of pressure only, the inspection may take place at a port terminal. In any case, grain is subject to re-inspection at the large terminal elevators where it is held in storage awaiting export. In the public elevators at the terminals, all the grain of uniform grade is run and kept together.

Owners of country elevators are bound to accept the grain brought in by any farmer, to look after it properly and to keep a record showing the weight, grade and dockage for dirt or other cause, of each load received into store. They must also, if requested, clean the grain before it is weighed and the net weight of the clean grain must then be specified on the certificate. The person delivering the grain must be given, for each load, either a cash purchase ticket, warehouse storage receipt, storage receipt for special

binned grain, or a receipt or ticket "subject to inspector's grade and dockage," according to the method of sale or handling (see Chapter VI., page 68). Although, for the purpose of settling with producers, a substantial part of the grain is graded, by agreement, at local elevators where it is mixed with other grain of similar grade, the grading is not finally determined until the grain enters the terminal elevators or passes through the terminal stations.

The Canada Grain Act specifies the grades and their characteristics. Spring wheat has three general grades and one "rejected." For winter wheat, which more resembles English grain, there are two grades (No. 1 and No. 2) of white, red, and mixed (white and red) respectively, and one No. 3 grade of grain not clean or plump enough to be graded No. 2. Barley is graded into five categories, while for oats, there are four grades of white, four of black, four of mixed and four of white, clipped oats.

In the case of wheat, the general grade is determined by the degree of cleanness, soundness and bushel weight; in the case of barley, these factors are also taken into account together with plumpness, brightness and purity; in the case of oats, the determining factors are cleanness, soundness, purity and weight. The Grain Standards Board, which operates under the ægis of the Board of Grain Commissioners, is assisted in defining the commercial grades by a Government grain research laboratory which investigates the milling and baking qualities of the wheat and examines any special problems arising from seasonal conditions.

Apart from the general grades, special grades are defined by the Act for the Western Inspection Division. These, in the case of wheat, take into account the structure of the kernel and the variety in addition to the factors specified in the general grades.

Spring wheats are graded as follows:—No. 1 Manitoba Hard Wheat includes all varieties of hard, red, spring wheat equal in value to "Marquis" wheat; the wheat must be sound and well cleaned, weigh not less than 62 lb. to the bushel and contain 75 per cent. of hard, red, vitreous kernels. Nos. 1, 2 and 3 grades Manitoba Northern are specified to be of the "Marquis" type, and, inter alia, to contain 60 per cent. vitreous kernels in the case of No. 1 and 45 per cent. in No. 2. Amber or Red Durum may be present up to 1 per cent. in No. 2 and 3 per cent. in No. 3. While the first two must weigh not less than 60 lb. to the bushel, No. 3 need only weigh 57 lb. Wheat rejected for smut and scoured has 3 grades and there is also a provision that grain rejected as "No grade" for moisture and dried may be graded as "Dried" of the grade to which it belongs or as straight grade. No. 3 Northern dried, or any lower grade, may not, however, be graded higher than No. 3 Northern.

For winter wheats, there are No. 1 Alberta red, consisting of hard, pure, sound and clean wheat weighing not less than 62 lb. to the bushel; No. 2 and No. 3 Alberta red weighing not less than 60 lb. and 57 lb. to the bushel respectively; three grades of Alberta white, weighing not less than 60 lb., 58 lb. and 56 lb.; and two grades of Alberta mixed, weighing not less than 61 lb. and 59 lb., the former containing not less than 50 per cent. red winter wheat.

In addition, there are 6 grades of Western Amber Durum wheat, 3 grades of Western Red Durum wheat and 3 of Western Kota wheat.

The western barley grades vary little from the general grades. No. 1 Canada Western must be plump, bright, sound, clean, free from other grain and weigh not less than 48 lb. to the bushel. No. 2 must be reasonably clean and sound and, inter alia, weigh not less than 48 lb., while No. 3 Extra is similar to No. 2 except in colour and must weigh not less than 46 lb. No. 3 includes weather-stained and slightly shrunken but sound barley of 45 lb., and No. 4 includes all damaged barley of the same weight as No. 3.

There are fewer western oat grades than general oat grades. No. 1 Canada Western must be white, sound, clean and free from other grain and contain 95 per cent. of white oats and weigh not less than 36 lb. to the bushel. No. 2 must be sound, reasonably clean and pure and contain 90 per cent. of white oats, while No. 3 must be sound but not clean and pure enough for No. 2. The bushel weight of Nos. 2 and 3 is 34 lb. For black or mixed oats, there are 2 grades at 36 lb. and 34 lb. per bushel. For feed oats, there is Extra No. 1 grade, weighing not less than 38 lb. and containing not more than 4 per cent. of other grains; No. 1 grade, comprising oats excluded from the preceding grade on account of damage other than heating, weighing not less than 34 lb. per bushel and containing not more than 8 per cent. of other grains; and No. 2 grade, including oats weighing less than 34 lb. to the bushel or otherwise unfit for No. 1 Feed.

The Act also provides that if a considerable portion of the crop of wheat, or any other grain, for any one year, in any division, has any "marked characteristics which exclude it, *to the prejudice of the producer*, from the grade to which it otherwise belongs," special grades, known as "commercial grades," shall be established therefor. The words italicised are a significant indication of the principle underlying the Canadian system of grain grading which seems designed primarily to safeguard the interests of the producer.

It is important to note that the existence of a grading system does not always abolish sale by sample in the grain trade. A considerable quantity of Canadian wheat finds its way to Minneapolis in the United States, which is one of the largest grain markets and milling centres in the world; here, millers prefer to buy on sample notwithstanding the grading system of both the United States and Canada. They also like to buy on a protein basis, so that wheats with high gluten content command a premium. This premium in the United States has amounted, in recent years, to about one cent per bushel for each one-fourth of one per cent. variation in protein content. It follows that variations in protein content result in a general lack of correspondence between grades and value. Indeed, the grading systems of both the United States and Canada—based, as they are, on productive factors\* such as variety, bushel weight, cleanness, con-

\* In the United States, the Federal grades for wheat are determined by the following factors:—bushel weight, moisture content, damaged kernels, heat damage, foreign matter other than dockage ("unseparable foreign material"), wheats of other classes, smell and taste.

dition, etc.—are being undermined by a factor based on the requirements of the miller and baker. This factor has reference to gluten content which very largely governs the strength and water-absorbing capacity of the flour. The United States Department of Agriculture has recently remarked on this point as follows:—"Requests have been made to the department for the incorporation of protein as a factor in federal wheat grades, but the department does not believe this should be done. Country buyers could not determine the amount of protein in wheat offered by individual farmers for sale, and consequently could not reflect terminal market prices to farmers on a protein basis." This pronouncement, however, does not solve the problem. In Canada, as recently as November, 1928, the Government of Saskatchewan appointed a Royal Commission "to investigate grain marketing." The terms of reference included the consideration of the methods now employed in grading wheat, and whether advantage would result to growers if the present system were replaced by some other which would more accurately indicate its value for milling purposes.

### (iii) The Australian Practice.

On the subject of the grading of wheat, Australian opinion has been, so far, conservative. The crop is generally harvested in an absolutely dry condition and the quality is fine. The grain is threshed, cleaned, bagged on the field and railed direct to the ports whence it is shipped still in the bags in which it left the farm. Sampling is carried out and faulty bags are rejected, but, as strict inspection and grading are almost impossible in the absence of bulk storage, Australian wheat is ordinarily shipped as f.a.q., that is to say, virtually without guarantee of grade as understood in North America. In the result, Australian f.a.q. wheat is said to be at a disadvantage compared with graded Canadian wheat on the international market, which lends support to the suggestion that the adoption of fixed grades in Australia is only a question of time.\* Though bulking does take place in New South Wales at the Sydney elevator, the certificate issued by the elevator simply refers to quality (f.a.q.) and does not specify a grade. The New South Wales Wheat Act, 1927, makes provision for the appointment of a Wheat Standards Board to fix standard grades for bulk wheat but, apparently, no steps had been taken in this direction up to the end of August, 1928.

### (iv) Standards for Imported Grain in this Country.

(a) *London*.—The London Corn Trade Association has been in existence since 1878. It acts as an arbiter and supervisor and draws up standard forms of contract for the purchase and sale of grain. A very large part of the grain trade in Europe and throughout the world is worked on London Corn Trade Association contracts.

Apart from the special case of the "Liverpool contract grade," referred to later, the buying and selling of imported grain as it

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\* See "International Review of Agriculture" No. 3—March, 1928—(International Institute of Agriculture).

arrives in this country is mainly conducted on the basis of 4 distinct standards of quality, viz. :—

1. *Certificate Final.* Where Government grades exist in the country of origin and the grain is inspected prior to shipment, the production of the proper certificate, as to grade, must be accepted as final on the question of quality.

2. *Sealed Sample.* A sample drawn from the bulk is used as the basis of the sale. The sealed sample is deposited with the London C.T.A. for production when called for.

3. *Fair Average.* This is arrived at in the country of origin on the basis of representative samples from all districts. The name of the authority determining the standard and the place where the current standard sample may be seen are duly notified to the trade.

4. *Fair Average Quality.* This is determined by the London C.T.A. from samples representing the deliveries, at time of discharge, in all ports of the United Kingdom and Continent, of grain of any one type or description. The method of determining this "fair average quality" is briefly as follows:—Samples are drawn in the course of discharge by the buyers' and sellers' agents. These samples are sealed and forwarded to the Association along with particulars regarding vessel, quantity, description of grain and period of shipment. A Committee meets once a month and, after inspection of the samples, makes up the standard proportionately to the quantities represented by the samples. The Committee is then in a position, if called upon, to arbitrate in regard to any particular load which departs from the f.a.q. standard so determined. It is on this f.a.q. basis that the bulk of the trade is now conducted, and about 100,000 arbitration samples are received by the Association in the course of a year.

For East Indian grain, the standard adopted is that known as "clean terms," under which allowance is made by the seller for impurities, according to the percentage of admixture ascertained to be present in samples examined by the Association's analyst. The process leading up to analysis is called "reducing."

In addition to these quality standards, grain is sold on the basis of natural weight—or test weight, as it is sometimes called. This is ascertained by the Association by means of a Schopper Scale.

The Association has between 60 and 70 different forms of contract governing the sale of grain. The terms of these contracts are constantly being revised to meet new conditions.

(b) *Liverpool.*—The Liverpool Corn Trade Association dates from 1853 and its membership extends far and wide. It, too, has standard forms of contract for the sale, between members, of grain, flour, etc. In general, the terms of these contracts and the special standards of quality do not differ materially from those of the London Corn Trade Association. It has, however, an additional special grade of wheat—"Liverpool contract grade"—for tender on a future delivery contract. It is true that not much wheat is actually

tendered in this way, but the point of interest is the existence of the grade and the system of grading.

The buying and selling of grain and flour "futures," or "options," is carried on in the News Room of the Liverpool Corn Exchange. The custom nowadays is to make up these contracts for 5 separate months, viz. :—March—when Australian and Plate wheat is well forward, May—when the St. Lawrence is re-opened, July—when Indian wheat is arriving freely, October—when American winter wheat is on the market, and December—the end of the calendar year. Transactions in wheat are made on the basis of lots or loads of 4,800 centals, and quotations are per cental (= 100 lb.). Each contract is registered in the Clearing House. Anyone having sold wheat for forward delivery, say in May, has the option, when the time arrives, of either taking up the contract by buying in a similar amount or of tendering the actual wheat against the contract, in which case, he must tender wheat of Liverpool contract grade and a certificate of the Grading Committee must accompany the tender.

Wheat, Liverpool contract grade, is understood to be milling wheat "in fair merchantable condition (a slight dry warmth not to be objected to)." The grade admits 3 general classes of wheat, namely American red wheat grown east of the Rockies, Argentine wheat and Australian wheat. Three types of American wheat are specified, viz. :—

(a) American spring wheat, such as Manitoba, Northern (U.S.A.) or any other spring wheat on a basis of 60 lb. per bushel;

(b) American soft winter wheat, free from garlic, on a weight basis of 61 lb.; and

(c) American hard winter wheat weighing 60½ lb.

Two types of Argentine wheat are specified, viz. :—

(a) Northern type, on a weight basis of 59½ lb.; and

(b) Southern type, with a weight basis of 60½ lb.

For Australian wheat, the basis of weight is 60½ lb. per bushel.

No wheat weighing more than 1 lb. per bushel under the basis weight can be accepted in the grade. Spring wheats must be reasonably hard of their respective types and all descriptions must be reasonably clean, though some heated, sprouted, frosted and/or smutted grain may be allowed provided that, according to the valuation of the Grading Committee, the wheat is not more than 1*d.* per cental inferior in value to basis quality. If the deficiency is more than this, the wheat is rejected. Should the wheat proffered be superior to basis grade, the Committee may allow a premium not exceeding 3*d.* per cental. Allowances in gradations of ½*d.* per cental may be made on wheat within the grade, varying thus from 1*d.* below, to 3*d.* per cental above, contract price. The Association's Standing Grading Committee, acting through a Sub-Committee of 5, is responsible for the inspection of samples and the issue of grading certificates. It should be noted in regard to Liverpool contract



wheat, that it must be tendered to the buyer ex-store at Liverpool; this regulation is essential, as the Secretary of the Association is responsible for the proper drawing of samples from each lot of wheat to be graded.

**(v) Possibilities in Regard to Home-grown Grain.**

In considering the question of systematic grading and its possible application in this country, recent experience in Canada and the United States must be regarded as significant (see page 84). That the utility of the wheat grading system in the United States is diminishing and the system of sale by sample increasing in importance may, perhaps, be accounted for by the falling off in export trade; on the other hand, as previously noted, it seems equally probable that it is mostly, if not entirely, due to the emphasis now being laid by buyers on one factor, namely, "strength" as indicated by protein content. It is possible, indeed probable, if American experience is any guide, that if grading, as commonly practised abroad, were applied indiscriminately to all kinds of home-produced grain, the best lots would still be bought on a sample basis. This would be specially true of malting barley. Indeed, wherever manufacturing (milling, malting, etc.) is carried on in proximity to the source of supplies, the manufacturer generally prefers to select, from samples, those individual lots best suited to his purpose. That is not to say, however, that a grading system is unsuited to or unnecessary in the trade; rather does it suggest that the customary method of grading grain lays insufficient emphasis on those points to which buyers attach most importance and that some adjustment is desirable in order that the grades may more usefully reflect trade requirements.

Clearly, if, at any time, the physical assembling and bulking of large quantities of home-produced grain should become generally feasible, then in order to facilitate storage arrangements, to admit of individual farmers being paid on the basis of quality, and to market the grain in lots of uniform type and quality, it would be necessary to institute a series of fixed standards for the home product. There should be little difficulty in defining workable standards for home-grown wheat, oats and feeding barley, but, in the case of malting barley, the task would present considerable practical difficulty. As a basis for future discussion, suggested grades for English grain are set out in Appendix B.

Although a grading system is a commercial necessity when supplies are assembled and bulked, it may, nevertheless, be a commercial advantage to have fixed and well-recognised grades even when grain customarily moves into distributive channels direct from the farms; in such circumstances, the grade of any particular lot could be determined by the authoritative examination of samples drawn and sealed in the presence of representatives of both buyer and seller. The home grain trade is not yet ready, however, for the institution of a system of standards which can be defined on paper, partly because the physical assembly of supplies only takes place to a limited extent and partly because, as business is done at

present, except in the case of local sales, buyers and sellers are never present together with the grain at any point where joint sampling of the bulk could take place between the farm and, say, the mill. In order to systematise the quality appraisal of home-produced grain, the right line of development, in the present circumstances, would seem to be to compose, in terms of grain rather than words, the average standard of quality of various kinds and types of home-grown grain in any one season and to regard these seasonal averages as objective standards for the purpose of business.

Obviously, if a "fair average quality" sample existed for home-produced grain of any one kind and type in any one season, a standard would be available which would enable the producer of that type of grain to form some idea of the relative quality of his own supplies. The existence of f.a.q. standards would also facilitate the purchase of that proportion of English grain which is "exported" from producing to consuming areas. It would tend to reduce the possibility of disputes between sellers and buyers or, in the event of dispute, would enable a rapid settlement to be made, since any particular lot of grain would be either above or below the standard. As things are at present, barley sales give rise to most disputes and the trouble is much worse in some seasons than in others. It is difficult to convince the farmer, in every case, that a consignment has been turned down on justifiable grounds. As a rule, the producer accepts any terms the buyer may offer rather than go to arbitration, but he often feels that he is being "done," especially if prices have fallen in the interval between sale and delivery. Disputes also arise with wheat and oats, but the margin of price in dispute is never so great as in barley.

It is often asserted that the value of each separate lot of home-grown grain is not determined solely by its relative quality, but depends largely on the individual tastes and requirements of the different types of users, and that, on this account, the grain in any particular price group would not show any consistent relation to an average sample. This is, to some extent, true, particularly in the case of malting barley; nevertheless, it would probably be of assistance to the producer if, as a preliminary to the establishment of "fair average quality" standards for English grain, a series of representative samples *classified according to price*—say 4 or 5 groups of barley and 3 of wheat and oats respectively—were collected and exposed in various corn markets throughout the country. The collection of such samples should present no very serious difficulty. In every statutory corn market, for instance, there is already a box in which the corn returns, showing the price and quantity of the purchases made by the merchants, are deposited for collection by the Inspector of Corn Returns. When a merchant buys a farmer's lot, he marks on the envelope containing the sample the amount bought and the price. He frequently marks a similar envelope for the farmer. Farmers might in every case have a sample so marked and placed in a box for collection as in the case of the corn returns. Samples falling in the same price groups could be

mixed each week and a representative average sample drawn for each group for subsequent display in neighbouring markets, or in the same market, together with particulars showing the bushel weight, moisture content, germinative capacity, etc., of each sample. At present, only the average price of the previous week for each grain is posted up on a board. This average price doubtless may be taken to correspond with the fair average quality of the district, but it is of very little significance in view of the wide price differences which may exist.

It is possible that, if such a system were introduced, the trade might eventually recognise the standards in making purchases and specify the fair average quality of a group as the minimum standard for delivery to be referred to in any case of dispute. To test the utility of such a suggestion, it might perhaps be tried in connection with a few markets in the eastern counties. It is desirable, however, to emphasise the temporary nature of such an experiment, which should be regarded only as a step towards the making up and definition of some f.a.q. or other standards by agreement between representatives of the farmers and the manufacturing interests concerned. Standards of "good milling wheat," for example, might be made up at the beginning of each season on the basis of samples collected from different parts of the country. (See Chapter XVII (iii) (b)). Subsequently, a similar attempt might be made by the farmers' representatives to reach agreement with the malting and brewing interests in regard to the minimum standard requirements for barleys corresponding to the different classes of malt, and, in conjunction with the milling and provender interests, to adopt accepted f.a.q. standards for milling and feeding barley and for oats. The immediate purpose of having such seasonal standards would be to minimise disputes and provide a definite basis for arbitration when necessary, the ultimate aim being to provide farmers with clearer objectives, to give the trade greater facilities in distribution and manufacturers a more uniform and reliable product as required by modern industrial conditions.

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## PART III.—CONSERVATION.

### CHAPTER VIII.—STORAGE.

#### (i) The Practice at Home.

##### (a) *Home-grown Grain.*

##### Farm Storage.

The harvested crop, if not immediately threshed, is stacked either in the field or in the stack-yard. The stacks vary in size, but the more general custom is to build large oblong stacks holding the produce of about 10 acres which is sufficient to provide a complete day's threshing. In some parts, particularly in the north and west, small round stacks holding about 2 or 3 tons, or even less in the case of oats, are more common. In many cases, also, the crop is stacked in a "Dutch" barn.

It is difficult to say precisely what happens to the grain while in the stack. Every season, a considerable amount is damaged in quality owing to the heating of damp, immature or badly gathered grain but, apart from this, the general effect of stack storage on well harvested grain is probably to improve its quality. Where circumstances of locality and climate compel farmers to cut the crop before it is quite ripe, the ripening process is completed in the stack. Where the grain is already ripe at the time of stacking, a post-ripening process of maturation appears to take place. The details of this process are, at present, obscure. The process is, however, accompanied by "sweating" of the grain, and although it is impossible, by a biological or chemical examination, to determine at what stage it can be regarded as complete, there is ample evidence that, in the case of barley, particularly, any interruption of the process in its early stages is harmful to the quality of the grain. Maltsters, for instance, prefer to buy barley either direct from the field or, if once it has been stacked, not until the grain has had time to sweat properly—say 6 or 8 weeks after being stored. This preference exists even where the maltster is in the habit of kiln-drying the barley which also induces the maturation of the grain. Checking the ripening or interrupting the maturation of wheat does not seem to affect quality in the same way since different factors are involved. The question of germination does not arise in the case of wheat, and, if anything, delayed maturation may perhaps improve baking strength by maintaining the relative proportion of nitrogenous elements to the starch; some millers, for example, have observed that English wheat is often stronger in a damp season than in a good season favourable to maturation.

It might be expected that with ripening, sweating and maturation of grain proceeding in the stack, there would be a steady fall in

its moisture content, but, from investigations which have been made into the loss in weight of crops during farm storage, it appears that the moisture content of cereals in the stack at first increases and then decreases. A typical instance showed the moisture content of wheat in the first week of November to be 16.36 per cent. This same wheat by February contained 17.73 per cent. moisture, which decreased to 14.56 per cent. by the middle of May. The maximum amount of dry matter was found in the early part of the season. With all kinds of grain, there appears to be a steady decrease in bushel-weight as the storage period advances. The moisture content of grain throughout a stack seems to vary considerably. In one case, grain at the top contained 17.03 per cent. and, near the bottom, 15.85 per cent., while, at the outside of the stack, it was 15.85 per cent. and, in the centre, 15.16 per cent.\*

Apart from normal variations in the moisture content, grain may be damaged by excessive wet either at the top of the stack or through the bottom when stacked on the ground in a badly drained position. Birds, rats and other vermin also cause damage, which, in individual cases, appears to be considerable. The Ministry's investigation into this subject is not yet complete, but, according to the opinions of farmers, the total extent of losses from all causes may be estimated at from 10 per cent. to 11 per cent. in the case of wheat and barley kept in stack until April, and at 15 per cent. or over in the case of oats.

#### Storage off the Farm.

The practice in regard to the storage of home-grown grain off the farm varies. Wheat is bought in quantity by millers, particularly country millers, at harvest-time when prices and quality are favourable; there is no difficulty in keeping until after Christmas sound grain bought in October. Some find that it keeps in good condition in sacks; others say that, as sacks are apt to get damp at the bottom, they prefer to keep the grain spread out on the warehouse floor, which should be of wood; some use an ordinary concrete silo. Most good warehousemen assert that English wheat can be held indefinitely in any of these ways without injury to its quality or without acquiring any granary smell provided that the grain is turned over periodically—say once a fortnight, or once a month to begin with.† In the case of silo storage, this is a simple operation and consists merely in giving the grain a run over the conveyor bands and back into the silo.

The amount of wheat held by millers varies considerably throughout the season and from one season to another. At the beginning and end of the season, country millers often have on hand supplies sufficient for 6 or 8 weeks' grinding, but much depends on the probable course of prices and supplies. In the main, millers do not seem to carry, on an average, more than about 3 weeks' supply of English

\* Journal of the South-Eastern Agricultural College, Wye, 1927.

† N.B.—Most wheats need turning over at some time or other, especially about the month of May, when the wheat appears to get some kind of "spring feeling."

grain. English wheat is not infrequently mixed, especially at the larger mills, with a dry wheat such as Indian; the drier wheat absorbs any moisture exuded by the damp grain and the risk of damage is thus reduced.

Maltsters and brewer-maltsters take in from 60 to 70 per cent. of their barley requirements before Christmas, and, in most cases, this is kiln-dried before being stored in the maltster's warehouse. To some extent, oatmeal millers buy and store oats for later use, and this also is generally kiln-dried before being placed in store. Kiln drying costs from 1s. to 1s. 6d. a qr.

Merchants sometimes hold grain either in their own or in railway warehouses where space is hired for the purpose. Such storage is very limited both in quantity and in time. The warehouse, in fact, is merely used either as a collecting depôt or, especially in the larger towns and particularly in the case of oats and poultry grain, as a distributing depôt. The grain remains in the sack and is only stored temporarily while buyers are being found. In the case of railway warehouses, the companies accept no responsibility for any deterioration in quality during storage. If there are any signs of dampness or heating, they commonly advise the owner, and only on receipt of his instructions, and at his expense, do they undertake the shooting, turning over and dressing of the grain.

Information regarding stocks of home-grown grain held in store by manufacturers and merchants in this country is not available, but the Ministry of Agriculture and Fisheries obtains and publishes estimates from its Crop Reporters of stocks remaining on farms as at 1st January and 1st April each year.

(b) *Imported Grain.*—The warehousing of imported grain in this country is not subject to Government supervision. The large port warehouses and elevators belong to private milling interests or to port authorities such as the Port of London Authority, the Mersey Docks and Harbour Board and the Manchester Ship Canal Company (Fig. 4), or to the railway companies, or to private companies such as the Liverpool Grain Storage and Transit Company and the Severn Ports Warehousing Company. They are employed chiefly to facilitate the handling of grain and are not, as a rule, used to hold parcels of grain for any considerable period. Owing to the large number of different types of grain which arrive from all parts of the world and are dealt with under varying climatic conditions throughout the year, the equipment and management of grain elevators in this country is, in general, in advance of that in other countries. The identity of each lot of grain is maintained throughout the period of storage, and great care is exercised, by means of regular inspection and treatment, to guard against loss in weight or loss in condition owing to heating or damage by weevils and other pests.

The port grain warehouses and elevators generally have a turnover equal to from 3 to 5 times their capacity in the course of a year. Although stocks vary considerably, the elevators are not normally more than about one-third full and, as a rule, parcels of grain are

not retained in store for more than 2 months. Although the elevator accommodation at all the chief ports provides for the storage of bulk grain in silos, there are also floor warehouses where the grain may be stored either in bulk or in sacks. The largest granary in London belonging to the Port of London Authority, namely, that at Millwall Docks, has a capacity of nearly 1 million bushels and stores the grain in bulk on floors throughout the warehouse, the bulk grain being handled by a system of conveyor bands and an arrangement of spouts and elevating machinery between floors. (Figs. 7 and 8.) The storage accommodation of the Mersey Docks and Harbour Board, also, consists of floor warehouses where the grain may be handled either in bulk or in sacks as required.

The railway companies own large warehouses at inland centres, such as Lincoln, Sheffield and Birmingham, and at rail-heads in the large port towns, such as London, Manchester and Newcastle. These warehouses and elevators fulfil a more important function in handling than in storage, and further reference to them is made in Chapter IX. Many of them, however, now remain empty, or practically empty, and others are rapidly being adapted for the use of large firms trading in products other than grain. Similarly, the tendency appears to be for less stocks to be carried in port stores. There is, therefore, throughout the country, a considerable amount of surplus grain-warehousing accommodation available in normal times.

The charge for storage at port warehouses and elevators varies, but the standard charge may be regarded as 4*d.* per ton per week, although as low a rate as 3½*d.* may be obtained. The charge for storage for the first 7 days is usually included in the receiving and delivery charge. When a merchant hires a definite amount of space for a year, an arrangement is sometimes made whereby the charge works out at about 2*d.* per ton per week, plus a share of the local rates levied on the warehouse.

In-and-out elevator charges for receiving, weighing, delivering to rail, boat or lorry, plus a week's storage, vary from 2*s.* to 3*s.* per ton. The commercial rate for sampling is 2*s.* 6*d.*, and for estimating bushel weight and moisture content, usually 5*s.* per consignment. Drying, etc. charges run about 9*d.* per ton per 1 per cent. moisture extracted. The combined operations of turning grain, running it over the conveyor bands and back into the silo costs about 4*d.* per ton.

#### (ii) The Practice in North America.

Reference has been made in Chapter VI to storage methods in various countries, from the primitive pits of India to the modern terminal elevators of North America. (Fig. 9.) In the North American elevator system, the storage points are located directly in the line of the natural flow of the grain. The farmer brings his grain to rail, and there he finds the country elevator. From the country elevator, the grain may pass to an interior terminal elevator located at a traffic marshalling point and at a place which is also, in many cases, a large milling centre. From the interior terminal, grain for export passes to the port elevator or warehouse.

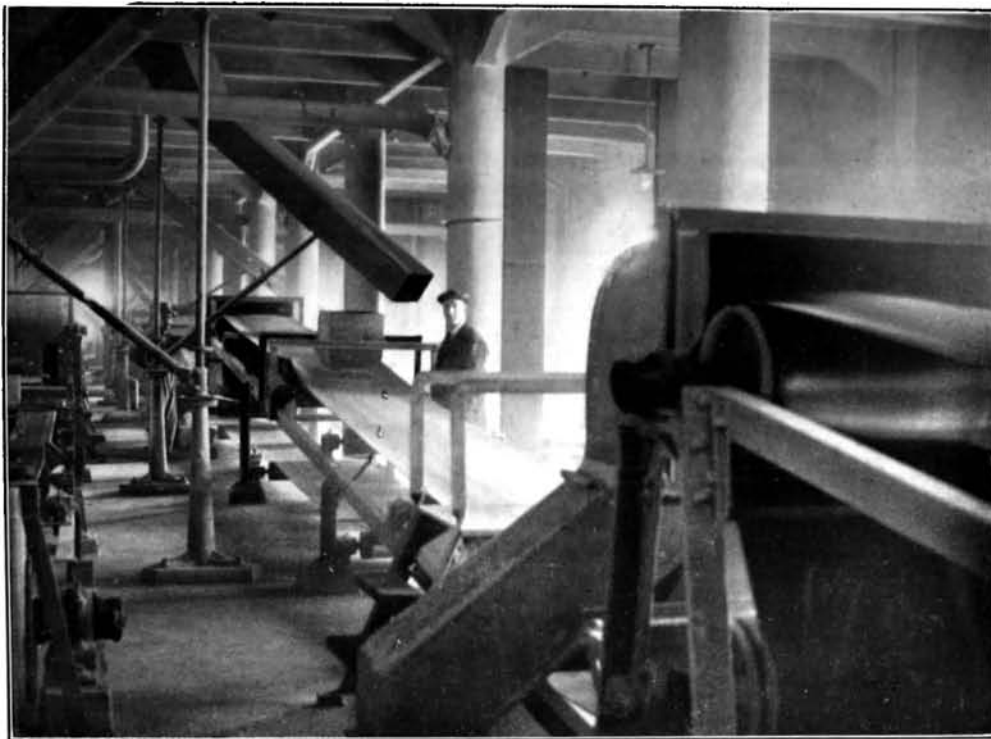


FIG. 7.—Interior of elevator showing system of conveyor bands for grain.





FIG. 8.—Interior of elevator showing grain flowing into silo.

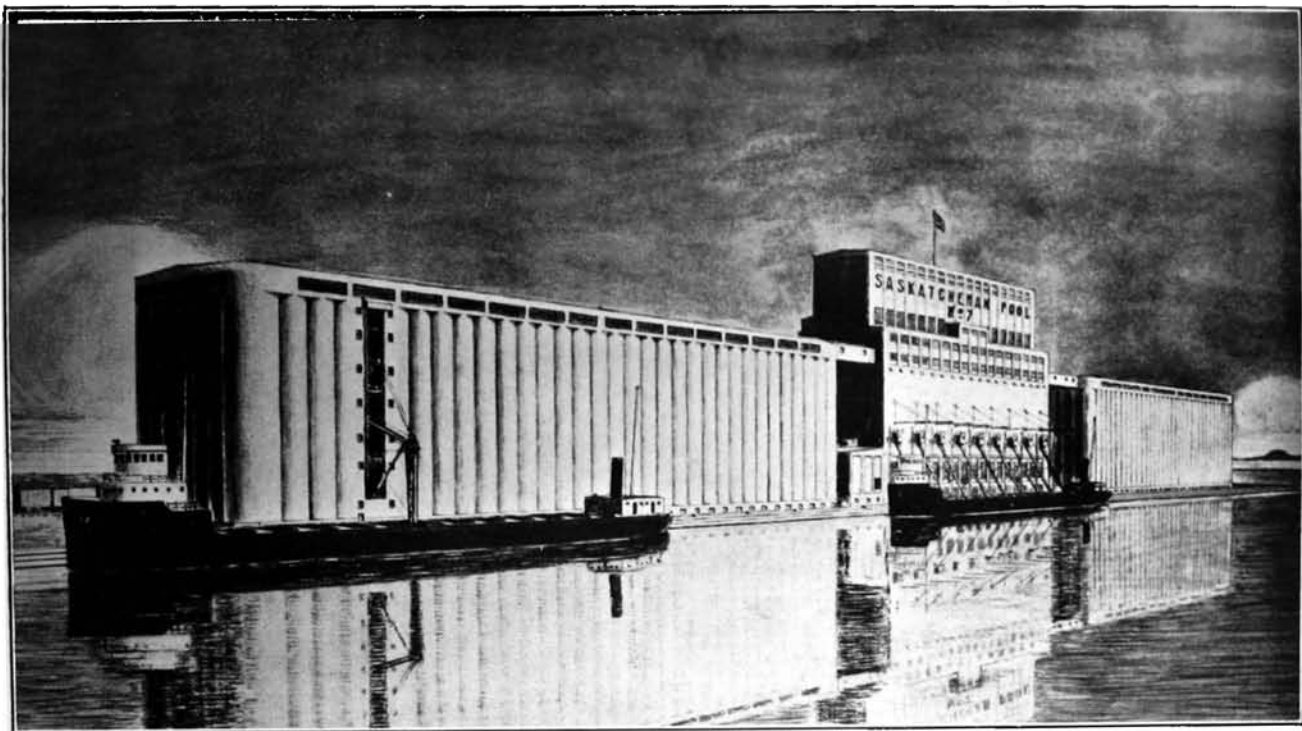


FIG. 9.—A Canadian terminal elevator.

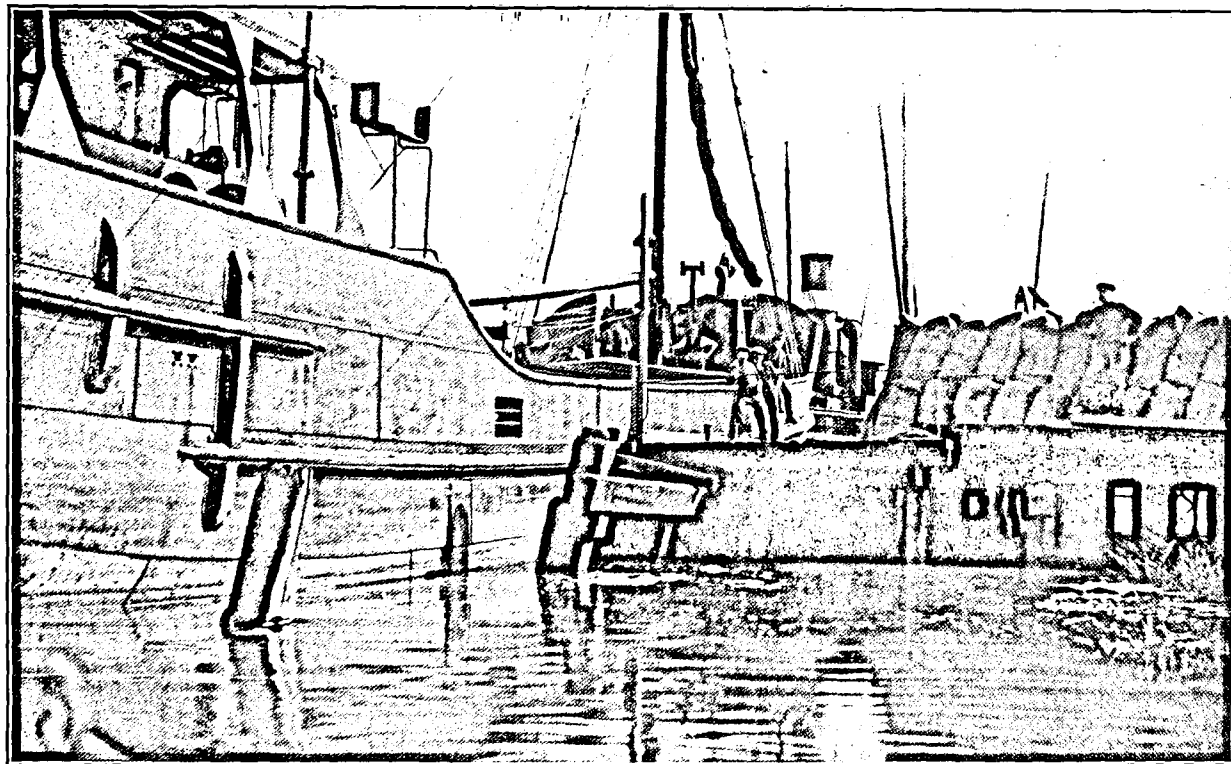


FIG. 10.—Sacked grain assembled in Wash area for transport by coastal vessel.

In the main, therefore, the system must be regarded mainly as part of the machinery for moving the crop, and, to a large extent, the elevators and warehouses act as valves by means of which the flow of grain can be regulated. The extent to which they function in a purely storage capacity, for conserving supplies, varies with the type and location.

(a) *Storage Methods.*—Storage methods differ according to the district and to the type of warehouse or elevator in use. A warehouse is usually a low building, occupying considerable floor space, as compared with an elevator, whose greatest dimension is usually height. Warehouses are not, as a rule, equipped with elevating machinery or with separate bins, except those warehouses which handle grain in bulk rather than in sacks. Elevators, on the other hand, are specially designed for elevating, storing and loading grain in bulk, the grain being conveyed to the top of the building, whence it is spouted into the bin allocated for its storage.

In the United States—in the Pacific North-west—sack handling is common, and, consequently, floor warehouses are employed for storing the grain in contrast to conditions further east, where bulk handling is the rule accompanied by storage in silos or elevator bins. When grain is stored in Pacific warehouses, the company either issues a storage ticket for the grain, not specifying any grade but keeping the grain stacked separately, or, with the concurrence of the farmer, specifies the grade and stores the sacks with others of like quality. These two methods roughly correspond with special bin and ordinary storage in the case of elevator handling.

The quantity of grain stored by a farmer depends mainly upon his financial position and on market conditions. As a rule, the farmer retains on his own premises only grain reserved for seed; if he can afford to store the bulk of his crop to await higher prices, the elevator or warehouse is usually employed for the purpose. The Commission on the Grain Trade\* reported that, "As a rule, the Pacific coast warehouse is much more a warehousing facility for the farmers than is the elevator in the more easterly section, which is, on the whole, chiefly a merchandising organisation." Country elevator operators, in fact, frequently prefer to store little or no grain, and, in some cases, definitely refuse to store, alleging insufficiency of space. Conditions vary, however, according to local circumstances, such as the proximity of competing elevators.

When accepted for storage at a country elevator, the grain is graded, weighed and docked for impurities, etc. and the farmer receives a storage ticket prepared accordingly. The ticket also shows the conditions of storage and rate of storage charged. When signed by the elevator agent, the ticket is negotiable and can be used as collateral for loans. When the farmer sells his grain, he endorses the storage ticket and hands it to the buyer who may then, or at any time, claim the grain from the elevator on payment of the accumulated storage charges.

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\* Report of the U.S.A. Federal Trade Commission on the Grain Trade, 1920.

At the terminal elevators, the practice in the past has been for the elevator operator to own and control the grain. Any advantage in price, therefore, which might accrue from holding the grain in store and keeping it off the market, has gone to recompense the company operating the terminal elevator and has acted as an additional, if not, indeed, the only, inducement to undertake the service of storage. The Commission on the United States Grain Trade, in its Report\*, discussed the practicability of independent grain dealers at interior terminal points storing grain in public elevators in competition with the large operating merchants owning the elevators, and remarked that, "To accomplish this would require a reduction in storage charges. But the indications are that, even at present storage rates, a purely storage and transfer elevator cannot be profitably operated."

Conditions in Canada differ in certain respects from those in the United States. Bulk handling is universal and the elevator system prevails throughout the whole country. Moreover, under the Canada Grain Act, country elevators are compelled to supply storage space at established charges, so long as there is room in the bins. Country elevators are not, however, used for prolonged storage of grain, for, as a rule, the sellers desire to push on their crop to the Lake terminals before December, in time for shipment before navigation closes for the winter. The main storage centres are, therefore, to be found at the interior and port terminals. Before the close of navigation, grain is moved through the terminal elevators as rapidly as possible, very little being held longer than the free storage period of 15 days. After the close of navigation, however, the position is altered, and storage capacity is of more importance than handling capacity. Stocks are thus accumulated at the terminal elevators during the winter in readiness for the renewal of traffic in the spring.

(b) *Warehouse and Elevator Capacity.*—The capacity and turnover of warehouses and elevators are subject to wide variations and, incidentally, supply interesting evidence of the extent to which they are used for storage proper.

Country warehouses and elevators in the United States are capable of holding, on an average, from 20,000 to 40,000 bushels, the warehouses being fewer but having the greater average capacity. In Canada, country elevators vary from 30,000 to 60,000 bushels capacity, while some large port and interior terminal elevators are capable of holding between 2 and 3 million bushels. The country elevators are obviously not designed to hold all the crop of the district. Those in the United States handling wheat alone turn over a quantity of grain during the year equal to more than four times their capacity, and the crop is rapidly passed on to market. In this connection, the Commission on the United States Grain Trade reported that, "During the first six months of the crop year (i.e., July-December) about three-fourths of the wheat crop in 14 principal grain producing States is marketed, and a somewhat

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\* *op. cit.*

higher proportion of both the rye and barley crops." This rate of flow is not dissimilar to the speed of marketing in this country, where no country elevators exist (see Diagram B). The same Report gives the turnover as from 9 to 16 times the capacity in small transfer interior elevators and a very variable turnover for port elevators, as, for instance, at New Orleans, where the rate per annum varied in consecutive years from 10 to 4 times the capacity.

An analysis of the turnover of 28 storage elevators at the interior terminal of Minneapolis—an important milling centre—showed, however, an average capacity turnover of 1.99 in the course of the year; in the words of the Report referred to, "this figure indicates very clearly that the elevators at Minneapolis have been used largely for storage for subsequent consumption or in anticipation of shipping demand."

Reference has been made in Chapter VI to the country elevators of Canada, now numbering 4,700, and to the large public and terminal elevators. In 1926, the total capacity of the country elevators was over 140 million bushels and the total capacity of all Canadian elevators over 280 million bushels\*. The quantity of grain inspected in Canada, on the average of three recent years, was over 450 million bushels, and, on the assumption that the whole of this grain passed through the country elevators, the average turnover per elevator was from three to four times its capacity. The total stock of wheat in Canada on 31st March averaged over 160 million bushels, of which 33 per cent. was in farmers' hands, 57 per cent. in elevators and 10 per cent. in flour mills or in transit, while on 31st July in those same years, the amount of grain stocks of all kinds in terminal elevators equalled about four times the stocks held in country elevators.

While an elevator system, as a whole, can and does act, to some extent, as a reservoir of supplies, the storage function, as distinct from the elevating or handling function, is mainly performed by terminal elevators.

(c) *Cleaning and Drying*.—Where a country elevator is equipped with cleaning machinery, the operator is bound to clean the grain at the farmer's request. Returns from country elevators in the United States showed that 50 per cent. were so equipped. In Canada, however, cleaning is not generally undertaken at country elevators but rather at the larger terminal elevators, which are equipped with special machinery for this work. Drying facilities are only found, as a rule, in terminal elevators.

It is sometimes urged as an insuperable objection to the introduction of an elevator system for bulk handling and storage of grain in this country, that English grain is much too damp. It should be observed, however, that a large part of the Canadian crop frequently suffers from the same disability. In the season 1925-26, for example, it is estimated that at least 30 per cent. of the Canadian crop graded damp or tough and that at least 10 per cent. of this required drying before being placed in store.

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\* The Canada Year Book, 1926.

(d) *Storage and Other Charges.*—Storage charges in elevators in the United States show considerable variation. Many concerns, for competitive and other reasons, store free of charge, and it appears customary for most elevators to allow free storage for periods varying from 15 to 30 days. After the period of free storage, the charges range from about  $\frac{1}{2}$  a cent to 1 cent per bushel per month.

In Canada, charges are regulated by the provisions of the Canada Grain Act (1912) and subsequent amendments. At the present time, storage in the Canadian Government terminal elevators for the first 15 days is included in the initial charge of  $1\frac{1}{2}$  cents per bushel made for receiving, elevating, storing and insurance. After this period, storage, including fire insurance, is charged for at the rate of one-sixtieth of 1 cent per bushel per day, equivalent to a little over 2d. per ton per week. The inclusive rates chargeable by country elevators for receiving, elevating, insurance, storage for 15 days and putting on rail, are limited to  $1\frac{3}{4}$  cents per bushel of wheat if stored by grade, or, if specially binned,  $2\frac{1}{2}$  cents. After 15 days, storage charges must not exceed one-thirtieth of 1 cent per bushel per day, equivalent to a little over  $4\frac{1}{4}$ d. per ton per week. The customary deductions made from the gross weight of each car\* to cover invisible loss and shrinkage in handling are 30 lb. for wheat and 50 lb. for barley and oats; there is a statutory provision that no elevator may take more than one-half of 1 per cent. for shrinkage and waste in handling and storing, nor more than 1 per cent. on tough, damp or wet grain.†

Tough, damp or wet grain taken into store by country elevators is held at the owner's risk, and the operator has the right to ship it immediately to a terminal elevator chosen by the owner for treatment. The charge for drying at terminals amounts, in practice, to 3 cents per bushel on tough grain and 5 cents on damp or wet grain. Charges made for other services at terminal elevators vary with the circumstances of the case. The cleaning charge, for instance, varies with the proportion of dockage. When this contains no other grain of commercial value, the charge varies from nothing, if the dockage does not exceed 3 per cent., to  $1\frac{1}{2}$  cents per bushel, if the dockage exceeds 10 per cent. The holder of a warehouse receipt covering dockage can claim the return of screenings of average quality. The storage charges are calculated on the net weight and other charges on the gross.

(e) *Ownership of Warehouses and Elevators.*—The ownership of warehouses and elevators and the method of financing them vary with type and location and from one country to another. Both in Canada and the United States, the railroad companies were responsible for constructing large numbers of elevators, both country and terminal, as the grain-growing areas developed. In the United States, the railroads continue to own a large proportion of the elevator capacity. At interior points their elevators are mostly leased

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\* Average capacity of railway cars in Canada—for wheat 1,329 bushels, barley 1,448 bushels, oats 2,072 bushels.

† Tough grain contains from 14 to 17 per cent. of moisture, and damp grain over 17 per cent.

to private dealers, subject to the operating control of the lessees, but, at the seaboard points, where they are reported to own 69 per cent. of the rated storage capacity, the railroads, in most instances, retain direct operating control. A few municipal elevators were constructed between the years 1915-20, financed by publicly authorized bond issues, but there seems to have been no recent development in this direction. The bulk of the elevator capacity in the United States is owned or controlled by the private dealers, generally designated as elevator companies or grain companies, who operate elevators for the purpose of storing, conditioning and shipping grain on their own account—i.e. not as public warehousemen. In addition, however, the private dealers appear to have control of a large proportion of the terminal elevators licensed as public warehouses by the various States. As stated in the Federal Commission's Report, "Over 30 per cent. of the total elevator capacity in the United States is operated under State licence but in practice is used primarily for private account."

The situation in Canada is markedly different and has already been outlined in Chapter VI. Apart from the railway companies and commercial elevator companies, there are the farmers' co-operative companies, the pools, the port authorities and the Dominion Government all undertaking the control of elevators.

(f) *Government Control*.—Government control of grain warehouses and elevators is common in North America in one form or another. In the United States, under the Warehouse Act, 1916, and the amending Acts of 1919 and 1923, the Secretary of Agriculture, acting through the Chief of the Bureau of Markets, controls the handling and storage both as regards weight and grade of all agricultural products stored in public warehouses (which include elevators, etc.). The warehouses are licensed and bonded. The operator provides sureties, up to 10 cents for every bushel of grain storage capacity, for the good conduct of his business.

An inspector and weigher nominated by the warehouseman are also licensed to grade and weigh the product. While the official grain standards of the United States are adopted for the purpose of the Warehouse Act, a certificate given by an inspector at a warehouse is not valid under the United States Grain Standards Act and is not, therefore, negotiable in inter-State and foreign commerce. The inspector's certificate, however, covers receipts and deliveries from the warehouse, and the warehouseman is bound to deliver the quantity and grade of grain shown on the original warehouse receipt. Where any question arises as to the true grade of the grain, an interested party may appeal to the Office of the Federal Grain Supervision in the district. The appeal must be accompanied by samples (2-quart size) taken in accordance with the regulations and by a fee of 1 cent per sack or 25 cents per wagon of bulk grain. A grade certificate issued from the Grain Supervisor's Office supercedes the inspector's certificate.

Negotiable or non-negotiable warehouse receipts with inspection and weight certificates, in a form approved by the Bureau of Markets, are issued for the grain stored in a licensed warehouse.



The warehouse and books are subject to inspection at any time and the licences to withdrawal in case of misdemeanour. The holder of a warehouse receipt, or the depositor of the grain, must demand delivery of the grain within a year. The licensed warehouseman, on the return of the receipt, must hand over to its owner the quantity and grade of grain specified on payment of storage and other charges, which must be at a reasonable rate and must be printed on the receipt. Where the inspector, at the request of the depositor, has set a dockage for cleaning, the warehouseman must clean the grain received for storage. If grain is received in a condition likely to affect adversely the quality of the other grain in store, it must, if taken in, be kept separate from the rest. If grain appears to be going out of condition in store, the warehouseman notifies the inspector, who may authorise him, if it will prevent deterioration, to re-elevate, screen, blow, cool or dry the grain after due notice has been sent to its owners. The structure and equipment of places where grain is stored must be approved by the Chief of the Bureau of Markets.

In Canada, the Board of Grain Commissioners, appointed under the Canada Grain Act, exercises control over the charges and handling of the grain whilst in store in all public elevators. The Commissioners register the receipts of those elevators, both in regard to weight and grade; mixing of grades is not allowed except in "hospital" elevators, where the grain is treated prior to storage and is allowed then only if all the grain is owned by the operator. In private terminal elevators, and in country elevators belonging to line elevator companies, grades can be and are mixed; the Government only registers the weight of grain and not the grade in those elevators. Hence, the warehouse receipt of the public elevator should rank as much better security than the warehouse receipt of a private elevator, but the Winnipeg Grain Exchange undertakes the registration of grades in the latter case on condition that the elevator company provides an adequate bond to meet the requirements of the exchange as to inspection by their representatives, etc. Such registered warehouse receipts, though unofficial, seem to pass in the trade as equally good tender for delivery on future contracts.

### (iii) Possibilities of Elevator Storage in this Country.

It appears to be the general view that farm storage is more suitable for English grain than any system of elevator or warehouse storage, and for two reasons; it is said that English grain is too damp to be stored with safety, and that if it were dried its quality would be adversely affected.

On the first point, it is the experience of millers and others in this country that the bulk of English wheat in most seasons can be safely stored in warehouses or elevators until required, and that, *provided the grain is regularly turned*, it may be kept indefinitely. Barley is, in many cases, held without treatment, but, if kiln-dried before storing, it will keep indefinitely, and, in practice, it is sometimes held over to the following malting season. Oats, too, are frequently kiln-dried before storing. On the second point, Canadian

experience certainly shows that millers do not object to properly dried grain. Moreover, the technique of the drying process is now so well understood in England that there is little risk of forced drying being attempted with consequent injury to the milling quality of the grain.

Reference has already been made to the charges for drying grain before and during storage in this country, from which it would seem that, provided the operation is conducted on a reasonably large scale, the cost of drying and keeping in condition all the home-grown wheat likely to be stored in elevators would not be prohibitive. There are instances of farmers operating on a small scale who dry and store their grain with financial success, particularly in years when grain is harvested under unfavourable conditions.

Nevertheless, the commercial value of any *general* system of elevator storage in this country can be questioned on the ground of incidental costs. English grain, it is said, goes direct from the farm to the final buyer, and the intervention of an elevator would, therefore, involve additional expense. Much depends on the meaning attached to the word "direct." Consignments of English grain put on rail, for example, often change hands as many as three times, or more (see page 104), even although the supplies are, in the main, transported direct from the farmer's station to that of the ultimate buyer without any form of intermediate handling or storing. Each time that the grain changes hands, the merchants' charges on the transaction can hardly be less, on the average, than 6d. per quarter. If, therefore, to some extent, a system of storage off the farm obviated intermediate transfers, then economies would be secured as an offset to the charges incidental to elevator storage.

Assuming the feasibility of some system of elevator storage for home-grown grain; the further question that arises is whether country elevators serving local needs would be more efficient for that purpose than terminal elevators serving a wide area.

Advocates of country elevators hold that these would act as centres where grain, especially wheat, could be graded and bulked, thus providing not only reliable types for milling but convenient and cheap handling at the milling end. Many mills using English wheat are not, however, equipped for handling bulk grain received by rail, and most millers consider that the small quantities of English wheat which they require are better and more easily handled in sacks, since the man who unloads the sacks can also, at the same time, put aside any which are likely to spoil the grist. Further, the problem of obtaining enough grain in country centres to warrant the erection or pay for the running of country elevators is one of serious practical importance. It has been shown that the capacity of Canadian country elevators varies from 30,000 to 60,000 bushels and that their annual turnover is about four times the capacity. There are very few large grain loading-stations in English country centres. At two of the largest, which are situated in the Wash area, the total quantities of grain of all kinds loaded in a recent year amounted to about 6,000 tons in one case and 5,000

tons in the other; of these supplies, only 2,500 tons and 1,000 tons respectively represented wheat. The total loadings of wheat at these stations were, therefore, approximately 100,000 and 40,000 bushels, respectively, compared with the 120,000 to 240,000 bushels handled by a Canadian country elevator in the course of a year. If, then, wheat alone is considered, the amount loaded, even at the largest country stations in England, would seem to be insufficient to warrant the erection or the running of country elevators with a reasonable prospect of commercial success.

The possibilities of establishing and running terminal elevators for home-grown grain have not hitherto been fully explored. In common with the elevator system as a whole, the functions of large terminal elevators are to facilitate the handling of grain, but, more especially, they are employed for treating damp or damaged grain and for storing and controlling the supply. They are usually situated at natural assembly points or at milling centres. Natural assembly points for grain exist in Somerset, Yorkshire and the Wash area, but only in the last-named would supplies be sufficiently large and regular to warrant the operation of a terminal elevator; in the other cases, the contiguity of the producing and manufacturing areas is a factor in the situation. The four chief milling areas are round the Mersey, the Humber, the Severn and the Thames, to all of which home-produced grain flows in considerable quantity.

All things considered, the most suitable points for the operation of terminal elevators for home-produced grain would seem to be within the triangles marked out by the following towns:—(i) King's Lynn—Peterborough—Boston, (ii) Ipswich—Cambridge—London, (iii) Bridgwater—Salisbury—Gloucester, (iv) Preston—Manchester—Chester, and (v) Hull—York—Doncaster. In all these areas, except the first, there are already large well-equipped elevators or warehouses having ample room to spare, but they do not handle home-grown grain to any appreciable extent. It has been pointed out that, owing partly perhaps to decreased production, but chiefly to the rise of port milling—which has caused the traffic to change direction and leave the area by boat instead of by rail—the centralised assembling and warehousing of home-grown grain in the Wash area, which was previously carried out by the railway companies, has been discontinued. The warehouses formerly used for grain have consequently become derelict or have been put to other uses, but there still appears to be much accommodation which could readily be adapted for use as a terminal elevator, although difficulty might be experienced in finding a building of the size required.

The commercial advantages of terminal elevators in the home trade may be dealt with in relation to their three principal functions, namely, the handling, treatment and storage of grain.

As regards handling, it seems clear that, compared with the direct transport from farmer's station to manufacturer, an elevator system would, as a rule, tend to increase costs. In assembling at the elevator, the extra transport cost involved may be estimated at from 4s. to 5s. per ton on the average. To this must be added the in-and-out charges for receiving, weighing, delivery to rail or lorry,

a week's storage, etc., at commercial rates,\* which average for grain, in general, from 2s. to 3s. per ton, making a total of from 6s. to 8s. per ton as the extra handling costs for grain passing through an elevator.

Further, if grain is to be bulked, the interests of producers must be safeguarded by a system of sampling and grading. Apart from administrative charges incidental to grading, the ordinary commercial charge for sampling is 2s. 6d., and for ascertaining the natural weight and moisture content of each parcel the charge is 5s. The normal consignment of home-grown wheat being about 5 to 10 tons, sampling and grading might, therefore, involve an additional charge of 1s. to 2s. per ton. The cost of drying damp grain, if spread over all the grain handled, could hardly, in practice, be less than 1s. to 2s. per ton. The additional cost of employing terminal elevators in the home trade may, therefore, be estimated roughly at from 8s. to 12s. per ton, which must be offset by gains resulting from the superior efficiency of an organised system of elevator or warehouse storage off the farm if such a system is to be of advantage to the industry.

The estimated losses in stack storage of wheat amount to about 10 per cent. by weight, but since some of this is merely loss of moisture, and allowing for waste under elevator storage, it is probable that only one-half of the total estimated loss could be saved. The average annual value of home-produced wheat in the last five years has been over £11 per ton; a saving of 5 per cent. by the use of elevator storage would, therefore, represent 10s. or 11s. per ton. Further, if negotiable warehouse receipts were issued for grain in store, many transfers of wheat from one buyer to another might be eliminated. At present, the desire for a ready market and prompt payment, on the one hand, and for guaranteed quality and regularity of supplies, on the other, leads farmers and manufacturers to seek the intervention of the merchant, whose margin varies from 3d. to 1s. per qr., according to circumstances. A grading system, together with the extended use of warehouse receipts and systematic credit, should do much to encourage direct sales from farmer to manufacturer. While the merchant would continue to play a useful part in assembling grain, the elimination of unnecessary transactions might well result in a saving of from 1s. 6d. to 4s. 6d. per ton.

It is clear, however, that, in general, the direct cash advantages of a system of elevator storage over farm storage are not sufficient to ensure its full use by farmers acting independently. Any proposals involving the utilisation of elevator facilities for home-grown grain would, therefore, need to be linked up with an orderly marketing programme for the whole industry. (See Chapter XVII (iii) (a)).

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\* See also page 94 for elevator charges in this country.

## PART IV.—TRANSPORTATION.

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Grain put on rail by a farmer to the order of a merchant is not always consigned away at once, but, while lying at the loading station, may be transferred to the order of another merchant by instructions sent to the local goods agent. At what is possibly the largest grain-loading station in England, situated in the Wash area, where about 2,500 tons each of wheat and oats, and about half that amount of barley, were put on rail during a recent year, over 25 per cent. of the wheat consignments put on rail by farmers to the order of the original buyer were transferred to a second buyer, another 15 per cent. were transferred twice to a third buyer and another 5 per cent. transferred three times to a fourth buyer, all before the dispatch of the grain. The figures for the largest barley-loading station in the same area, where between 3,000 and 4,000 tons were loaded, showed that 55 per cent. of the barley consignments put on rail were transferred by the first buyer to a second buyer, another 10 per cent. were transferred twice to a third buyer and another 5 per cent. transferred to a fourth buyer. Oats, at the first station referred to, showed only 10 per cent. transferred once and 5 per cent. twice, while records at a small loading station in Northamptonshire, apparently near an oat-consuming centre, showed that 50 per cent. put on rail was transferred once, 30 per cent. transferred twice, and 15 per cent. three times, making, in this last case, four buyers in all. Small loading stations showed a proportionately greater number of transfers; at a station in Dorset, for instance, where less than 800 tons each of wheat and barley and 400 tons of oats were loaded, 33 per cent. of the wheat was transferred once, 50 per cent. twice and 10 per cent. three times; 80 per cent. of the barley was transferred once and 20 per cent. twice, while 55 per cent. of the oats were transferred once, 11 per cent. twice and another 11 per cent. transferred a third time. A large part of the grain put on rail is transferred at the receiving station, as well as at the forwarding end, so that the number of times grain is transferred may be actually higher in practice than the above figures represent.

Although the merchants interested in such consignments are commonly said to be "handling" the grain, they may, in fact, handle nothing but samples and never see the consignments. What follows in Chapters IX and X refers, however, to the physical handling and transportation of the grain from consignor to consignee.

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## CHAPTER IX.—HANDLING.

### (i) Loading, Discharging, Etc.

#### (a) *Home-grown Grain.*

##### In Bulk.

In contrast to imported grain, home-grown grain is rarely handled in bulk; bulk handling, when it occurs, is usually associated with water transport. In such cases, the sacks may be taken to the quay by the farmers' carts and there emptied into the ship's hold, or, as usually happens, the grain may be dispatched to a rail or canal siding and thereafter conveyed by truck or barge to the main collecting point, where the sacked grain is warehoused until the whole cargo is assembled. On the ship's arrival, the sacks are emptied into the hold. The vessels employed are usually small coasting craft of from 200 to 400 tons, many of which are owned by milling interests; in most cases, they carry the bulk grain direct to the waterside mills so that there is no intermediate handling. The grain is worked out of the ship by pneumatic conveyors or bucket elevators and passes straight into the mill silo.

##### In Sacks.

Sacking is done on the farm, and, as a rule, the grain remains in the same sacks until reaching the miller or maltster. Even when conveyed by coastal vessels, the grain is not always bulked but may often be loaded in sacks. (See Fig. 10.)

Grain in sacks is usually man-handled throughout by trolley or gantry. It seems more difficult to apply mechanical power to handling sacked grain than to loose or bulk grain, although shoots for sliding bags from a higher to a lower level are common and the use of an elevator conveyor is not unknown. (See Fig. 11.) Where machinery is employed, sack handling seems to involve much waste of power, as, for instance, where a 7-ton crane may be observed, day after day, lifting four or five sacks of grain at a time to and from rail.

In the trade in home-grown grain, returnable sacks are almost invariably employed. In the midlands and in the north and eastern parts of the country, a great part of the corn trade is worked in sacks belonging to railway companies. In the western and southern counties, sacks are more commonly hired from firms that specialise in the sack-hiring business. Some maltsters, millers and merchants use sacks of their own for part of their business. The farmer obtains his supply of sacks from the hirers before threshing his corn. The grain is usually sacked at the time of threshing and remains on the farm until it is sold and orders are received from the merchants regarding dispatch.

The term "sack" and "bag" are employed indiscriminately. There is no definite line of demarcation. A good, strong jute "sack," costing from 2s. 6d. to 3s. when new, is the type used for corn. The smaller, thin, hessian "bags" are used chiefly in the offal trade. In neither case is there a recognised standard weight

of contents, as this varies according to the grain and the district. Four bushels per sack is the customary capacity, but this is not invariable. The usual weights are, for oats, 12 stones (168 lb.), for barley, 16 stones (224 lb.), and for wheat, 18 stones (252 lb.). It is the practice of farmers to put in a few lb. extra per sack to allow for shrinkage or loss of weight before the grain reaches its destination.

#### Costs.

After being sacked on the farm and placed on barge, rail or lorry, the only handling necessary for home-grown grain is the unloading of the consignment by the miller or maltster. Many millers regard the cost of this handling as an almost negligible factor and do not consider any appreciable saving could be effected by bulk handling so long as conditions persist which necessitate home-grown grain being used sparingly and in small quantities. The scale of charges for loading and unloading grain conveyed by rail varies from 5*d.* to 8*d.* per ton for each service when performed by the railway company. As a rule, handling charges are included in transport charges for grain carried by road. (See Chapter X.)

The charge for the hire of sacks varies slightly. In some cases, it is rated at 1*d.* per quarter of grain per week, and in others the charge is  $\frac{1}{2}$ *d.* per sack for each ten days out on hire. It will be obvious that, after ordering his sacks, the farmer may have to pay extra hiring charges if the threshing machine is not immediately available, or the weather is unsuitable for threshing, or the merchant delays forwarding orders. The sacks go with the grain, and each time the sacks change hands the hirer is, or should be, notified of the transfer in order that he may apportion the hiring charge. As a rule, merchants will not pay any of the sack hire incurred before they take delivery, but others have an arrangement with the sack hirer to charge to their account the hire for any grain handled by them; indeed, some merchants make all arrangements for the farmer, whose grain they have purchased, to be supplied with sacks free of charge. If, on arriving at its destination, the grain is not "shot" within a week, the sacks are transferred to the account of the miller or maltster.

#### (b) *Imported Grain in this Country.*

##### In Bulk.

Grain may be shipped to this country in bulk even although the previous handling in the exporting country has been in sacks, as in the case of part of the Argentine supplies; on the other hand, where bulk handling is the rule, a certain percentage of sacked grain is shipped with the cargoes for safety reasons. Of the grain arriving at ports in this country, it is estimated that about 85 per cent. comes in bulk, comprising, in the main, the shipments of Canadian, United States, Argentine, Russian and Danubian grain. Indian grain, entirely, and Australian, Californian and Chilean, largely, arrive in sacks.

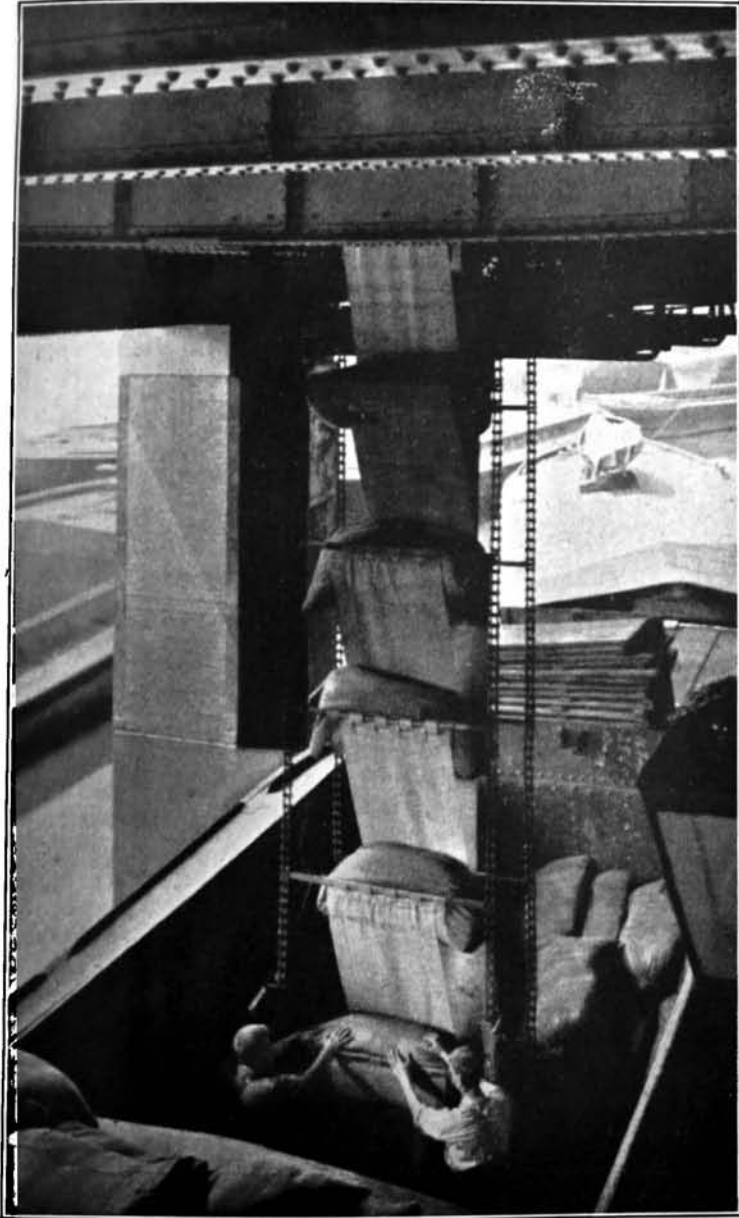


FIG. 11.—Conveyor for sacked grain in operation at Brentford.



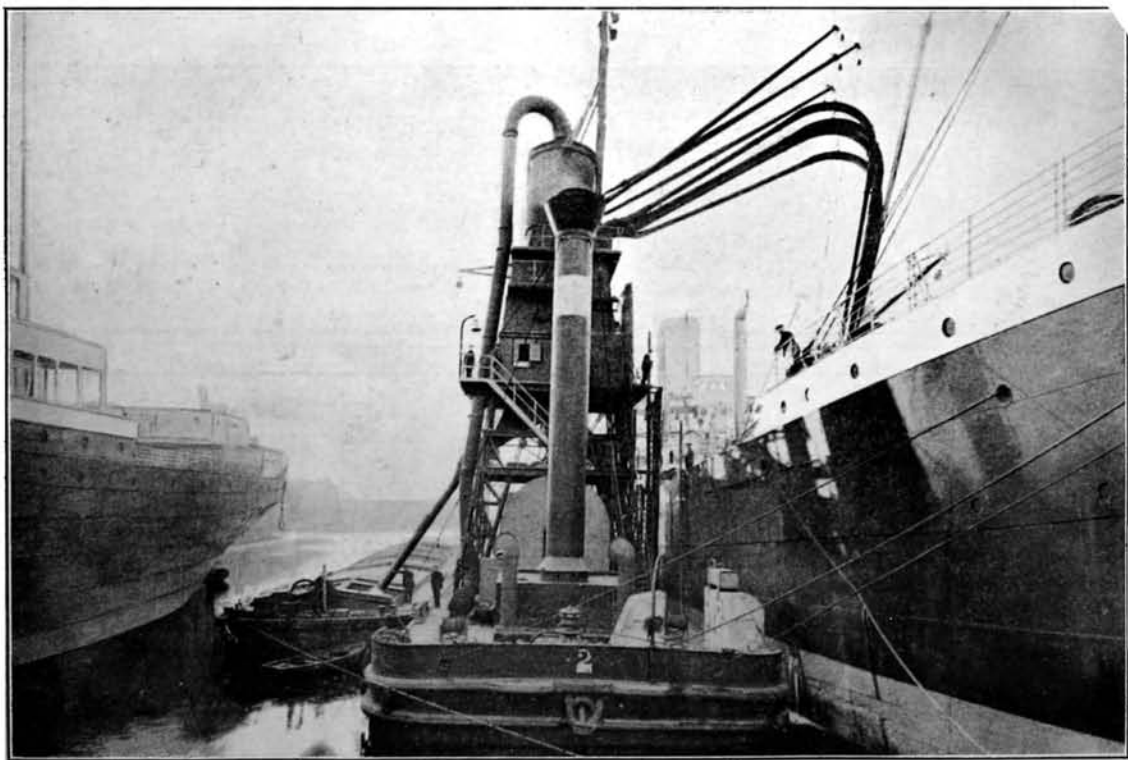


FIG. 12.—Discharging bulk grain by pneumatic conveyer at Liverpool.

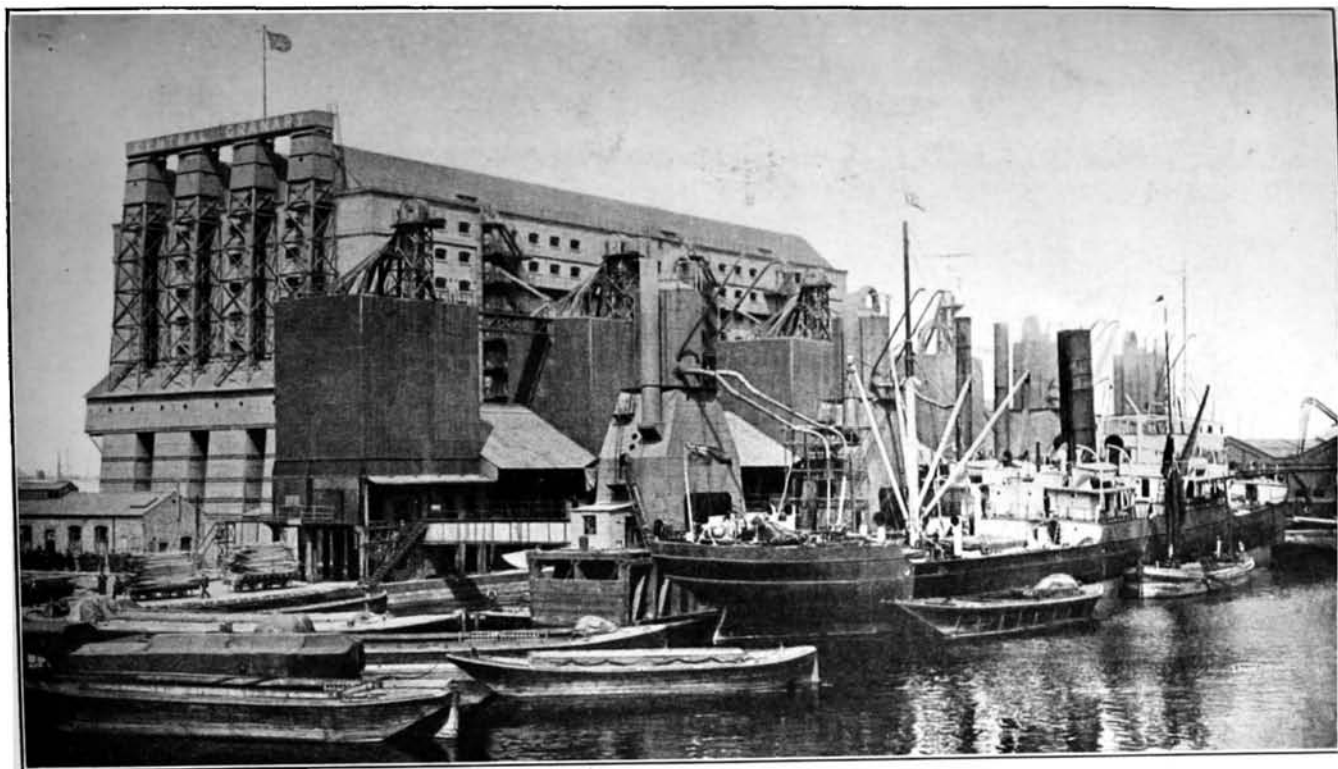


FIG. 13.—Unloading bulk grain to warehouse, to barge and to rail in sacks at Millwall Docks, London.

*Facing page 107.*<sup>1</sup>



FIG. 14.—Barge being loaded with bulk grain ex elevator, Manchester.

At the ports, the method of handling varies according to circumstances. The three main factors determining the mode of procedure are (1) the method of stowing the cargo, (2) the equipment and labour available at the port and (3) the ultimate destination of the grain. Cargoes are stowed in various ways. For example, the grain may be in bulk and topped fore and aft with sacks to steady the cargo, or there may be an arrangement whereby feeders are passed through the general cargo to the lower hold filled with bulk grain, with sacked wheat on top of other holds. The different lots and parcels of bulk grain in the hold are divided by a system of screens or separation cloths. The rules of the Board of Trade and the regulations made by various bodies of underwriters regarding grain cargoes vary, but, in general, where bulk grain is carried, 2 or 3 per cent. of the grain must be in feeders or, in the absence of feeders, the grain must be topped with from three to five layers of sacks. Of the grain carried on or between deck, a portion must be in sacks. A system of shifting boards is necessary in all cases.

Where the grain is topped with sacks, the latter may be worked out by hand and the grain landed either in sacks or "skipped"—i.e., emptied, overside. In the larger ports, the sacks are more commonly "started to bulk"—i.e., opened and emptied in the ship's hold and worked out with the rest of the grain. When the ship has been opened up, bucket elevators or pneumatic conveyors (so called "marine towers" when mounted on pontoons)—see Figure 12—are employed to work the grain out of the holds and overside. These conveyors are capable of handling from 50 to 250 tons per hour, so that once the plant has been set to work at each hatch, a cargo of 6,000 or 7,000 tons can be discharged in a matter of a few hours provided that there is not too much waste of time with separations, moving of barges, etc. Where separation cloths are inserted between the parcels, the grain on top of the screen is drawn towards the centre by means of large wooden scoops, which are man-handled but worked by ropes from the ship's derrick. Where the ship can get alongside the elevator, the conveying plant takes the grain right into the building, and, as at the Port of London Authority granary at Millwall, various operations may be going on at one time, viz., unloading to warehouse, to barge and to rail in sacks. (Fig. 13.)

When elevated into the conveyor, the grain is weighed and then passed by a spout to a barge alongside (Fig. 14.) for subsequent transit to mill or elevator. Alternatively, as happens especially in London, the grain may be weighed in a series of small 4-bushel weighing machines and passed through a number of outlet pipes in bulk to barge, or sacked as it comes out of the pipes before putting into the barge (Fig. 15). Sacking in this way, however, cannot be worked in connection with the largest machines, and even when a less powerful elevator is employed, it reduces its working capacity by about 20 per cent. The machines shown, for instance, will deliver loose about 600 tons in an eight-hour day, but only 500 tons if the grain is sacked.

A variation of this method of handling bulk grain is to be found,

especially at Glasgow and Cardiff, where liner parcels, particularly, are worked through the dock transit sheds. Figures 16 and 17 show grain passing by conveyor bands direct into the transit sheds at Glasgow and a grain piler at work in a shed at Cardiff. This grain must, as a rule, be cleared by the buyer within three days. It is gathered from the floor in a bucket elevator, automatically weighed and then sacked or shot into a hopper and elevated in bulk into a motor or horse wagon equipped for carrying bulk grain (Fig. 18). All the grain does not leave the sheds in bulk, much of it being sacked on the floor by gangs of workers.

Apart from mechanical elevation of bulk grain, cargoes are also frequently worked by labour gangs. This system appears most common in Bristol (Old Docks), although it is also a common practice at London and other ports. At many ports, even although mechanical equipment is available and, perhaps, standing idle, a certain proportion of the grain must be man-handled according to existing arrangements between the Trade Unions and the Harbour Authorities. This attempt at decasualisation of dock labour, however desirable, adds to the ship's expenses in port and makes almost impossible a quick turn-round. It must not be overlooked, however, that at ports whence grain is largely distributed to inland ports, merchants need time to dispose of the cargo. At present, orders are accepted up to 72 hours after the ship's arrival, and if there is no system of handling through transit sheds, there seems, from the merchant's point of view, no object in rushing unloading operations until all the orders have been received. The present leisurely arrangements, therefore, have more than one reason for their existence. To give the ship a speedy dispatch, while allowing the trade time to pass on the grain, there should be sufficient mechanical equipment and skilled staff available at all times to handle the peak load of grain, and also a system of transit sheds where the grain can lie for 72 hours, if need be, without incurring a warehousing charge.

The man-handling of grain arriving in bulk consists of bushelling and sacking the grain in the hold, the sacks being brought to the ship's rail by derrick. There the grain is weighed and emptied through a spout into a barge or on to the conveyor bands of the warehouse. The men work in gangs consisting of three bushellers and one weigher. There are usually two gangs to a hatch, and, according to local arrangements, the day's work of the gang stops when 700 sacks have been filled. Wheat and barley are sacked, as a rule, in 250-lb. and 200-lb. lots respectively, but a sack of oats may be 168 lb., if loading to rail, or 190 lb. if going to warehouse. The work of a gang of four men, therefore, may be regarded as about 70 tons per day, or the equivalent of the amount unloaded by one of the smallest elevators in an hour.

#### In Sacks.

As in the trade in home-grown grain, the use of the terms "sack" and "bag" are not very clearly defined. Australian and Indian wheats, for instance, arrive in "sacks" which contain 180 and 224 lb., or thereabouts, respectively, and wheat from the

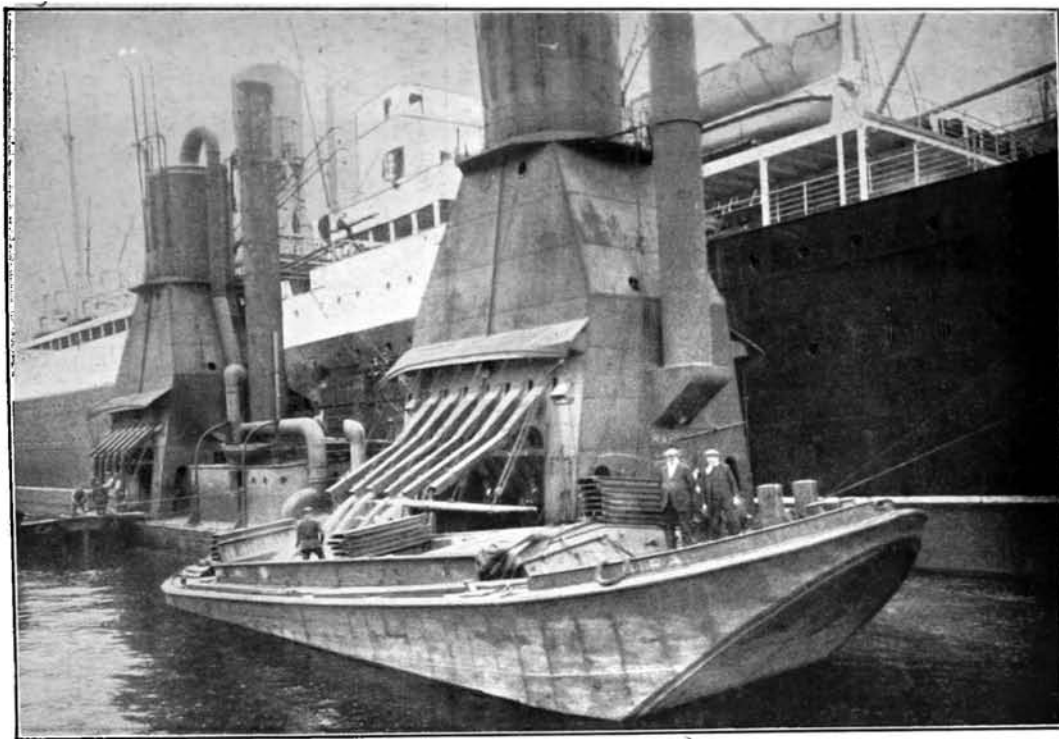


FIG. 15.—Discharging bulk grain at London to barge in bulk and in sacks.

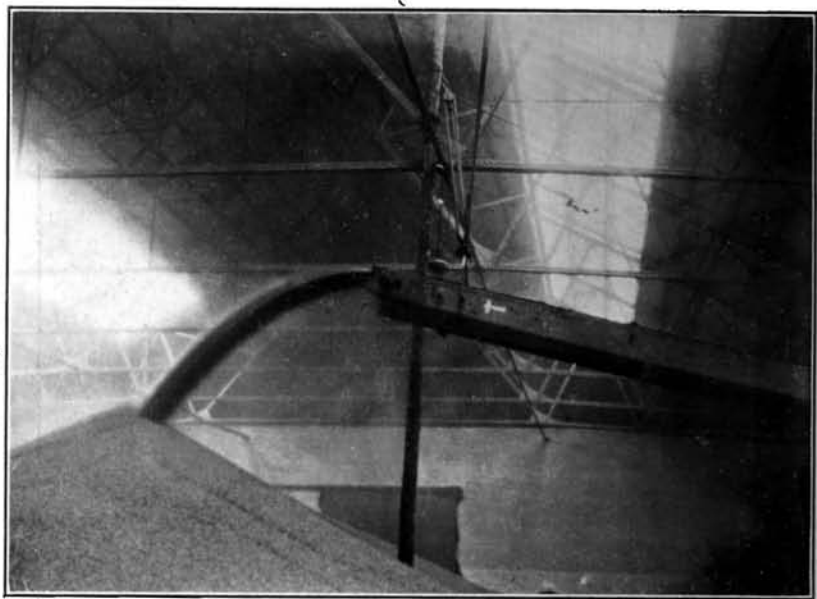


FIG. 16.—Grain passing by conveyer band direct to transit shed from liner.

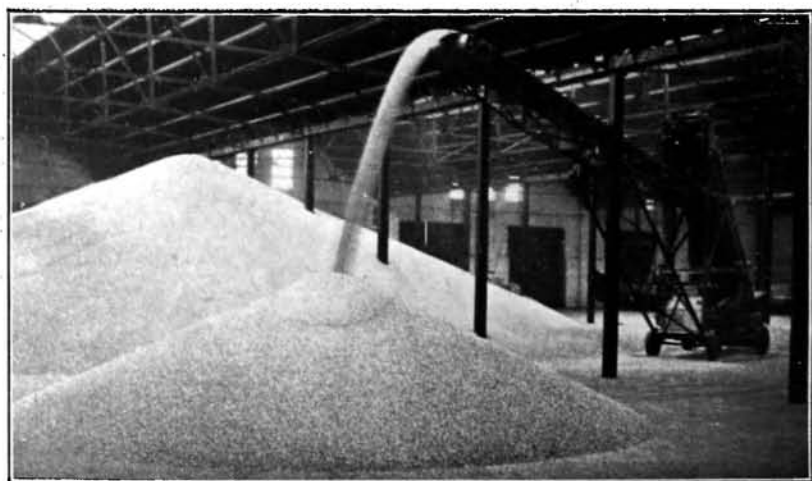


FIG. 17.—Grain piler at work in transit sheds, Cardiff Docks.



FIG. 18.—Bulk grain being weighed and loaded to horse wagon in dock transit shed, Glasgow.



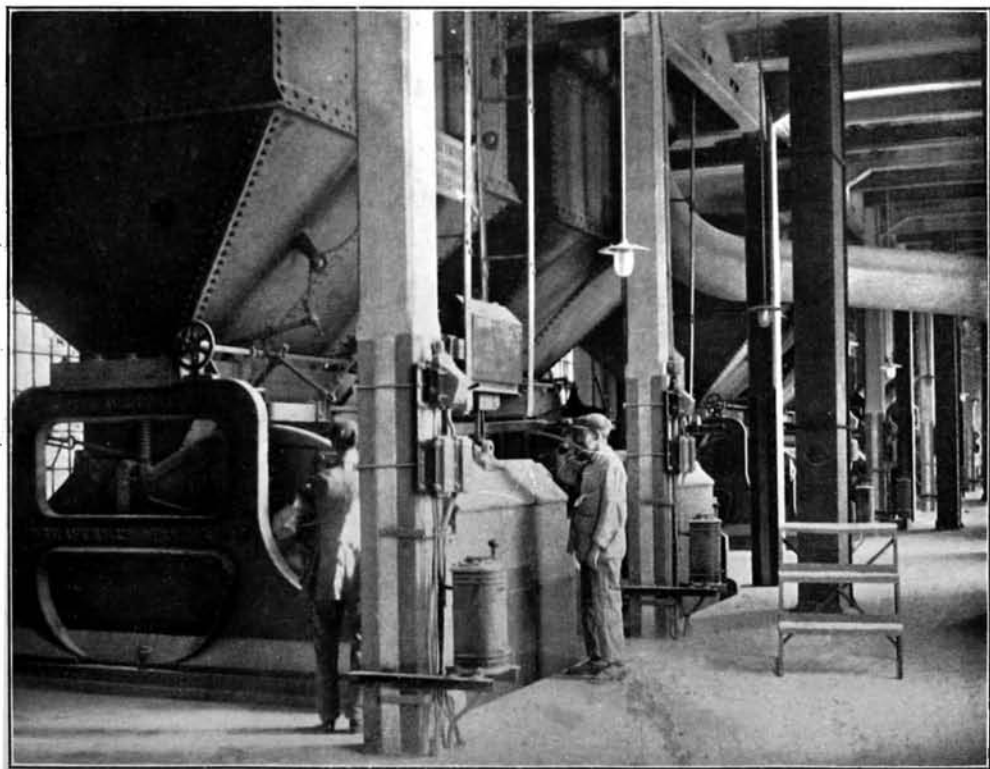


FIG. 19.—Weighing grain in elevator by large automatic machines.

Plate is in "bags" of about 140 lb.; but the weights vary in each case. Sacked grain may here be taken to mean any that is contained in bag or sack.

As already observed, sacked grain arriving with bulk cargoes is frequently "started to bulk" and worked along with the remainder. Californian and Argentine grain arriving in sacks is, as a rule, bulked before unloading, since the sacks are usually the property of the ship or the shipper. Indian and Australian grain, on the other hand, is generally landed in original sacks. At some ports, Australian and even Indian grain is bulked and handled through elevators.

The methods employed in discharging vessels, however, depend in a large measure on what is afterwards to happen to the grain and on the peculiarities of the port. In Liverpool, for instance, bagged grain is, as a rule, "skipped" on deck or on the quay before being stored or put into barge alongside. In London, vessels with bagged grain mostly discharge at the buoys in the river, and much of the grain goes overside in sacks to barge or is skipped into the barges in bulk. Some barges take the sacked grain to one of the privately owned wharves for subsequent transport in sacks by rail or water; others go to mills, where the sacks are "started to bulk" and the grain elevated into the mill silos. From an actual analysis of the traffic, it has been estimated that 40 per cent. of all the grain arriving in London is handled in sacks.

Where the grain arrives in ships' bags and is going to rail or barge in sacks, the bags are "skipped" in the hold and the grain bushelled into the merchant's sacks or into sacks which he has hired.

#### Costs.

The handling charges on imported grain arriving at the ports vary by a few pence per ton from one port to another and between light and heavy grain.

Discharging wheat in bulk costs from 1s. 4d. to 1s. 9d. per ton, with extras according to the number of separations or of small lots in different holds. Barley and oats cost about 2s. to 2s. 2d. per ton to discharge, the higher figure being charged on sacked grain. These costs are, however, paid by the shipper and are included with the freight. Insurance, as a rule, covers the grain while being barged to quay.

Importers' charges, which begin at the ship's rail, also vary considerably. The charge on wheat, for example, received in bulk, ex-ship direct to warehouse, varies from 1s. 6d. to 2s. 6d. per ton; this covers receiving, weighing, storage for seven days, and delivery to rail, barge or lorry. Sacked wheat and other grain are subject to higher charges; the warehousing charge for oats in sacks may be 4s. 6d. per ton, with an additional delivery charge of 2s. or more per ton. At the larger ports, transfer by barge from ship to quay or warehouse is necessary for a great deal of the grain, and increases the landing charges by a further 3s. 6d. or 4s. 6d. per ton. A representative charge falling on c.i.f. grain for receiving, barging, storing, weighing and delivery might be taken as 5s. per ton for

wheat, 6s. for barley and 7s. for oats. Some of the grain landed will have to bear higher charges, but, on the other hand, this may be counterbalanced by the fact that some merchants and millers undertake the barging at their own expense and accept delivery at the ship's side in bulk, the cost of this simple operation, including weighing, amounting only to about 6*d.* per ton. Further, when grain is discharged direct to mill, the shipowner allows the miller the ordinary stevedoring rate for the port. Even omitting the cost of sack hire on railed and barged grain, the landed price of imported grain on account of handling charges cannot be regarded, on the whole, as less than from 5s. to 7s. per ton above c.i.f. price.

In this connection, it may not be out of place to quote the Trade Director of the Port of Montreal, who, in 1924, investigated the methods of receiving and handling grain cargoes at European ports. He says in his Report,\* "In a few ports in Great Britain, modern grain elevator plants equipped for economical operation were found. The general average, however, is represented by methods inefficient and costly, and by equipment of the most primitive and obsolete type. The net result is that, in the Port of London, for example, the cost of handling grain from vessel to storage ranges up to 4½ cents to 5 cents per bushel as against a cost at Montreal for the corresponding service of four-tenths cents per bushel." He considered as urgent "the realization of the opportunity open to South British ports for sharing in the overseas transshipping trade to Continental Europe, developed on so large a scale by such ports as Hamburg, Copenhagen, Rotterdam and Antwerp."†

## (ii) Weighing.

(a) *Home-grown Grain.*—Home-grown grain is, in the first instance, weighed on the farm. When conveyed by rail, the railway company weighs the grain by the wagon load, while the miller or maltster at the receiving end again weighs each sack as a check.

(b) *Imported Grain.*—Weighing is a necessary incident in the handling and transportation of imported grain whether in bulk or sack. Bulk grain, ex ship, is usually weighed, in the marine tower or elevator, on large automatic and self-recording weighing machines capable of holding about 3,000 lb. of wheat and 2,240 lb. each of barley and oats (Fig. 19). Pneumatic conveyors naturally remove a great deal of dust and chaff from the grain, but this is collected and returned to the grain stream by means of an airtight valve, so that no weight is lost on the way.

Weighing, like sampling, is usually superintended on behalf of the shipper, the ship-owner and the importer. On an average, the weight of grain landed is reckoned to be not more than ½ per cent. short of the amount shown on the ship's manifest. The out-turn from boats loaded at Canadian ports is usually good, but the out-turn of grain from some ports, and from some ships, is, not infrequently, a good deal below the declared weight of the cargo.

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\* Harbour of Montreal Annual Report, 1924.

† See also "Times," November 26th, 1928.

Appropriations amounting to 1 per cent. of the total are made from each parcel, and after the buyers have been supplied with their allotment of the cargo the balance of the appropriations is divided out amongst them on a "pro rata" basis. In this way, all the buyers share in any weight discrepancy.

When taking the grain into an elevator, a further "draftage" allowance of 1 lb. per 1,000 lb. is taken by the elevator company to allow for the turn of the scale on small lots leaving the elevator. Where grain goes out in bulk, no deduction for draftage is necessary, but some compensatory allowance must be made when grain goes out in sacks, as about 20 turns of the small scales are required for every turn made by the large scale at the time of intake. As in the case of appropriations, surplus draftage accumulating in the elevator is divided amongst the customers pro rata on their intake weights. The estimation of this surplus takes place about once a quarter, and some of the larger elevators estimate the amount thus disbursed to be approximately one-fourth of the draftage. In addition, there are the small quantities of sweepings and the dust and chaff, accumulated by the dust-collecting machinery, which are sometimes regarded as the property of the elevator company and sold for various purposes; in other cases, customers are notified and given the opportunity of collecting their share.

Weighing of grain in sacks ex-ship direct to rail is performed by hand on deck (Fig. 20). Sacked grain leaving the elevator is frequently weighed by automatic self-recording scales, but even where such facilities exist, weighing by hand is often resorted to.

### (iii) Other Incidental Operations.

(a) *Home-grown Grain.*—In inland warehouses, particularly railway warehouses at provincial centres, one of the floors is usually set apart for the incidental handling of sacked grain. To avoid demurrage on sacks where it is intended to store the grain for some time, and also to provide for the use of non-returnable empties, a good deal of shooting from company's sacks to private sacks is done in these warehouses. Some of them are equipped with screening plant but it is not used to any great extent. Turning and, also, mixing on behalf of the merchant are commonly done in the course of shooting and sacking. The charges for these operations are the standard charges agreed upon between the various railway companies, and amount to 2*d.* per quarter in each case, except as regards sacking, for which the charge is 4*d.* per qr. Shooting, mixing and sacking conducted as one operation are undertaken for 6*d.* per quarter inclusive. All the work is done by hand labour.

(b) *Imported Grain.*—Bulk imported grain in elevators is sometimes cleaned by screening and the use of a separator, at a cost of about 8*d.* per ton; as already mentioned,\* drying, blowing and cooling cost about 8*d.* or 9*d.* per ton; turning and mixing cost about 4*d.* per ton, and weighing over and re-stowing about 10*d.* to 1*s.* 2*d.* per ton, according to the type of grain.

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\* Page 94.

## CHAPTER X.—METHODS AND COSTS OF TRANSPORT.

### (i) Water.

The bulk of the imported grain still arrives in cargo steamers of from 5,000 to 7,000 tons register, which, in many cases, are able to berth alongside the port mills in this country and discharge grain direct to the mill silos. In recent years, however, particularly since the decline in supplies from Europe and the rise of the Canadian trade to pre-eminence, the tendency has been for grain to arrive in larger vessels. This has compelled some ports in this country to make extensive arrangements for dealing with the big cargo and passenger liners which now take a considerable share of the grain traffic. The development of the docks at Avonmouth and Tilbury and the proposed extensions at Southampton indicate the adjustments necessary to meet the new conditions. These changes, in some cases, mean that the main discharging points are no longer close to the mills; this may increase the intermediate handling required and so diminish some of the advantages at present possessed by port mills over inland mills in this respect.

Fig. 21 shows a liner discharging at Avonmouth Docks, barges and a sailing vessel being loaded and sacked grain going to rail.

Fig. 22 shows a steam coaster and a large river barge being loaded with bulk grain ex the elevator of the Liverpool Grain Storage and Transit Company, and also a smaller barge, used on the inland canals, being loaded with sacked grain. The river barges do not go out past the bar, the coastal trade and the Irish traffic being worked in small coasting vessels. The coastal traffic in grain, either in sacks or in bulk, radiates from the chief importing centres. Some of the grain is carried by the regular coastal shipping lines, but the larger milling firms frequently own and employ vessels for this purpose.

The inland waterways in this country afford no counterpart to the systems on the Continent, where large river barges holding 1,000 tons or more are used for carrying grain inland from the ports, such as Rotterdam and Antwerp; the usual capacity of the river barges in this country is only about 75 tons, although larger barges, even up to 200 tons capacity, are sometimes employed in this traffic. On the inland canals, the small 25 to 35-ton barge is the customary unit.

On the Severn system, Avonmouth will accommodate large liners, boats of from 7,000 to 8,000 tons reach Sharpness, and Gloucester can take vessels up to 1,000 tons. From Gloucester, it is possible to take grain to Worcester in barges of 200 tons and to Stourport in lots of from 100 to 110 tons, but, at this latter point, grain must be transhipped to barges of 25 to 35 tons for conveyance on the Birmingham canal system.

Similarly, imported grain dispatched from Liverpool to Birmingham by canal may go in bulk by the large Mersey flats of from 75 to 200 tons as far as Ellesmere Port, where it is elevated to warehouse and transferred in sacks to small 25-ton canal barges for the rest of the journey. Elevating and sacking at Ellesmere are



FIG. 20.—Weighing grain in sacks ex ship direct to rail.



FIG. 21.—Liner discharging grain at Avonmouth, barges and a sailing vessel being loaded and sacked grain going to rail.

(“Bristol Times and Mirror” photo.)

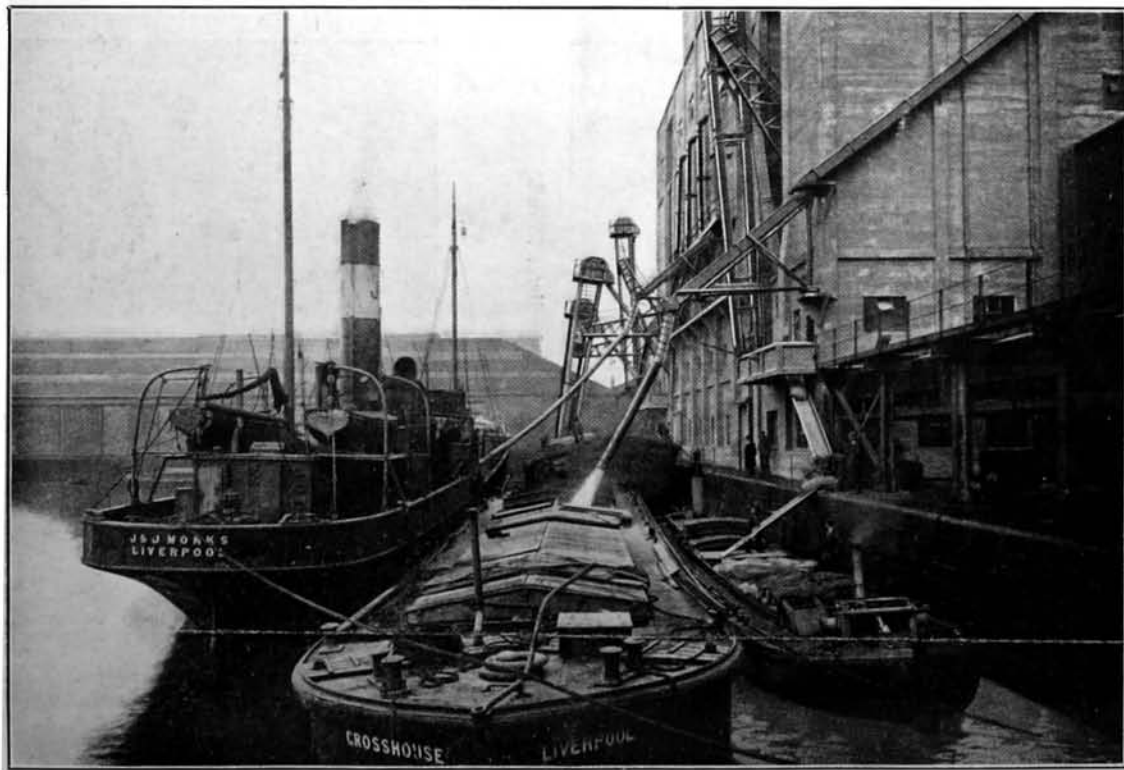


FIG. 22.—Loading a steam coaster and large river barge with bulk grain ex elevator at Liverpool.



FIG. 23.—Grain being assembled by barge in the Fens.

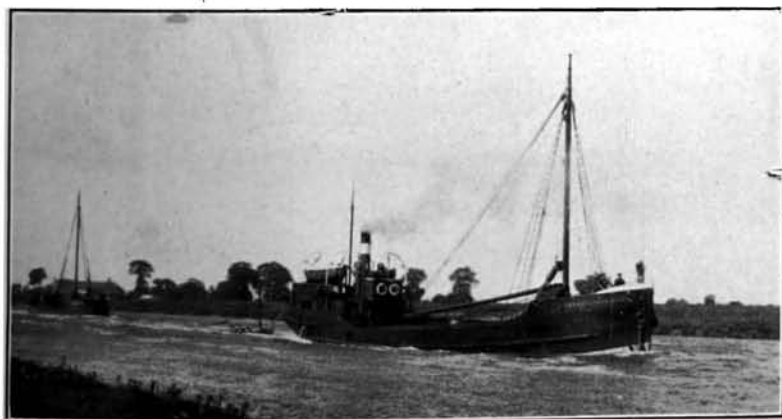


FIG. 24.—Grain leaving the Wash area by coastal vessel.



*Facing page 113.]*

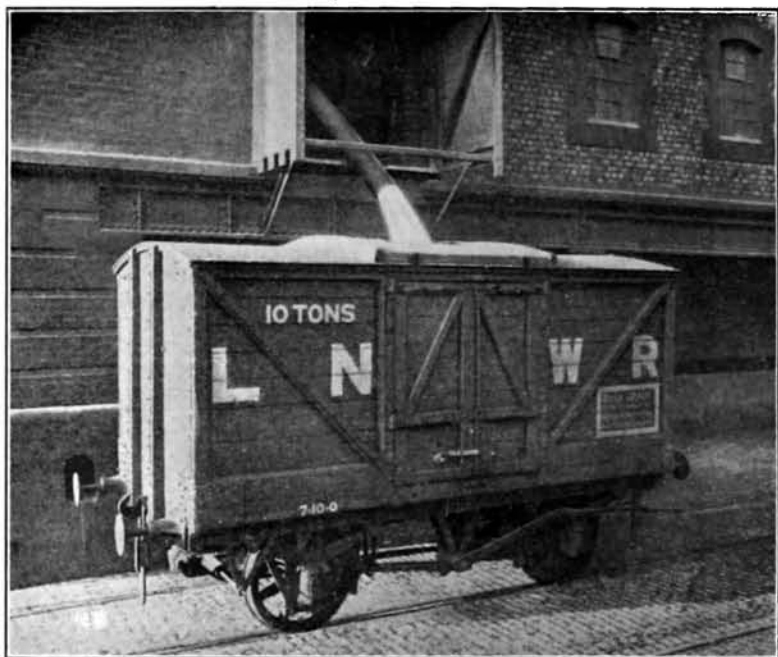


FIG. 25.—Loading grain into a 10-ton bulk railway wagon.



FIG. 26.—Discharging grain from railway wagon to hopper.

necessary because the canal barges are not considered clean enough for bulk grain and because the mills at the receiving end are not, as a rule, suitably placed or equipped for handling bulk grain. The charge for intermediate handling is included in the through freight.

On the canal system of the Trent, barges of from 100 to 120 tons pass from Hull to Newark, but imported grain for Nottingham and other places further inland must be transhipped into 25 to 35-ton barges. In this case, also, lack of equipment at the mills is an additional reason for handling in sacks, although advantageous freight rates are quoted for bulk grain.

To some extent, home-produced grain is carried on the inland waterways, where they exist, but the total quantity so carried is relatively small. Only on the rivers and canals in the Humber area, in the region of the Wash, with the rivers and canals of the Fens and Norfolk, and in the Bristol Channel region, with its associated canals and the rivers Severn and Avon, is there any appreciable amount of traffic in home-grown grain by inland waterway (Figs. 23 and 24). Odd lots of English grain are, however, conveyed in bulk by barges from other inland points to the ports when canal transport is convenient.

While the actual costs of inland water transport are, generally, less than the comparable rail rates, transport by barge on inland waterways as a method of carrying grain suffers from several disadvantages. It is slow, even under the most favourable circumstances, and is also subject to delays, perhaps for a week at a time, owing to floods on the rivers or ice on the canals. Some canal and river navigation companies continue to improve the waterways by deepening and dredging, but many of the canals are owned or controlled by the railway companies, who seem to prefer that, where possible, grain should travel by rail rather than by canal. Apart from railway-owned canals, however, the superiority of the service rendered by the railways has, in many cases, caused canals to fall into disuse and disrepair. There is the further disadvantage that the barges, after transporting coal, bricks, clay, etc., are not in a sufficiently clean state to carry grain in bulk. It seems, therefore, that even if, as is sometimes suggested, the inland waterways were deepened and cleaned, the locks widened and the traffic speeded up by the use of 50-ton power-driven barges, no great advantage would be conferred directly on the home-grown grain trade. Indirectly, perhaps, such improvements, by their effect on inland milling and freights, might, in the long run, benefit the home producer.

In general, the actual costs of carrying grain by water would seem to be lower than the rail rates for the same journey. From York to London, for instance, the rail rate for grain is 26*s.* 1*d.* per ton (4-ton lots), while the coastal rate is 12*s.* 6*d.* per ton. The competitive effect of inland waterway transport on rail rates can be seen in comparing the canal and rail rates for the conveyance of grain from Bristol to Birmingham with those for the shorter journey from Liverpool to Birmingham. Owing to the intermediate handling at Ellesmere Port, the canal rate from Liverpool to Birmingham is 16*s.* 6*d.*, while that from Bristol is 12*s.* 1*d.* If rail rates corresponded

to the length of haul, the rate from Liverpool would be rather less than that from Bristol, but, owing to canal competition, the position is reversed and it is possible to send grain by rail from Bristol to Birmingham for 13s. 8d. per ton as against 17s. 5d. per ton from Liverpool. Similarly, in the Humber area, it is necessary for railway companies to quote keen rates to a large number of points in order to compete with the extensive system of water transport.

It is, however, important to note that water and rail charges are not always for comparable services. From London to Birmingham, for instance, the canal and rail rates are 19s. and 23s. 5d. per ton, respectively; in this case, the rail charge is for 5-ton lots and includes handling from barge at the point of origin, while the canal rate is for 25 to 30-ton lots, and transport is much slower, occupying four days, at least, on the canal.

### (ii) Rail.

In 1925, the railways of Great Britain carried approximately one million tons each of wheat and barley and about one-half that quantity of oats; later years, however, show considerable reductions in the quantities carried.\* Specially compiled figures giving the average distances over which grain moved by rail in October, 1923, show that the average haul for wheat was over 50 miles and that for oats slightly less; barley hauls, however, averaged about 60 miles.

The average consignment of home-grown grain apparently varies in quantity according to the size of the farms in the district. In the eastern counties, records of the consignments from a group of stations during a single season showed that the average consignment of wheat was 12 tons, of barley, 16 tons, and of oats, 9 tons; throughout the country, generally, consignments of grain averaged only about 6 tons.

Consignments of imported grain from the ports are commonly of 20, 50, 100 and 150 tons, but from 35 to 40 tons appears to be the average for wheat and barley consignments and rather less for oats.

There is little variation in the methods of carrying grain by rail in this country. Although covered vans are occasionally employed, grain is normally conveyed, in bags or sacks, in the ordinary open railway truck in lots of from 4 to 6 tons. Very few bulk wagons are used. About 60 special bulk wagons are owned by railway companies for the conveyance of grain (Figs. 25 and 26); in addition, some privately owned wagons are also in use. While the railway companies encourage the extension of this system, manufacturers do not at present possess equipment for handling railed grain in bulk, and the majority appear to be averse to making the necessary alterations to their premises. The lack of siding accommodation is, also, in many cases, a deterrent factor. On the other hand, elevator companies have for some years offered specially favourable terms to buyers who will accept delivery of grain in bulk; in Liverpool, for example, a rebate of from 4½d. to 5½d. per ton on the usual handling charges is allowed on grain delivered in bulk. In spite

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\* See Railway Returns published by the Ministry of Transport.

of these inducements, however, the transport of bulk grain by rail has shown only a slight tendency to increase in recent years.

The following are examples of the standard rates and charges, including certain terminal charges, for the carriage of grain by merchandise train in this country, operating on and from January 1st, 1928:—

Dis- tance (Miles)	Rate per ton.			Dis- tance (Miles).	Rate per ton.		
	4 tons and over.	2 tons and under 4 tons.	Under 2 tons.		4 tons and over.	2 tons and under 4 tons.	Under 2 tons.
	<i>s.</i> <i>d.</i>	<i>s.</i> <i>d.</i>	<i>s.</i> <i>d.</i>		<i>s.</i> <i>d.</i>	<i>s.</i> <i>d.</i>	<i>s.</i> <i>d.</i>
10	5 3	6 4	9 9	60	13 10	16 7	21 4
20	7 11	9 3	12 10	70	15 1	18 1	23 2
30	9 6	11 2	15 1	80	16 3	19 8	25 0
40	11 1	13 1	17 3	90	17 6	21 2	26 10
50	12 8	15 0	19 6	100	18 8	22 9	28 8

Except for consignments of under 2 tons, charges for loading and unloading are not included in the standard rates; in the case of the larger consignments, the authorised charge for such service when performed by the railway companies is 5*d.* per ton. In all cases, additional charges are made for collection and delivery. Freight is charged on the gross weight, including the sacks, which weigh, as a rule, about 3½ or 4 lb. each.

The above rates are for merchandise conveyed at company's risk. The bulk of the traffic, however, is carried at owner's risk at special rates, which, under certain classifications, represent reductions of from 7½ to 10 per cent., according to the size of the load. In addition, there are special point-to-point freight charges at exceptional rates, which show a considerable reduction upon the standard charges. These exceptional rates are applied whenever the circumstances appear to the railway companies to justify them; the chief determining factors would seem to be (1) the volume and regularity of the traffic between two points and (2) the competition of alternative routes or means of transport. Between London and Chelmsford, the exceptional rate for 4-ton lots of wheat is 8*s.* 7*d.* per ton and for 20-ton lots 7*s.* 11*d.* per ton. From Bristol to Gloucester, a distance of 42 miles, the 4-ton rate for grain is 6*s.* 2*d.* per ton, but conveyance from Bristol to Ross, another 18 miles, costs 11*s.* 11*d.* per ton for 4-ton lots. By way of comparison, a local agricultural co-operative society is able to run its own road transport service from Bristol to Gloucester at less than 7*s.* 6*d.* per ton delivered into its premises. As already noted, and owing, presumably, to the competitive influence of canal transport, grain can be carried by rail from Bristol to Birmingham for 13*s.* 8*d.* per ton as against 17*s.* 5*d.* per ton for the shorter haul from Liverpool. Again, Banbury is farther from Cardiff than from London, but the exceptional rates are the same; the rates from London, Hull, and Bristol to Leicester are also about equal.

While it is evident that exceptional rates are not built up on any uniform basis, it is certain that, owing to the greater volume and regularity of the traffic, grain is frequently carried from the chief ports to the principal consuming centres at more favourable rates than home-produced grain normally enjoys when carried from the producing areas to those centres. Moreover, importers of grain, inland buyers of imported grain, and flour millers at the ports, who operate on a large scale, are strong enough, individually, to organise alternative means of transport. They are, therefore, in a position to negotiate advantageous terms with the railway companies. Neither an individual farmer nor a country agricultural merchant can reasonably expect similar concessions for home-produced grain from the railway companies, nor is the inland miller, with his relatively small output, able to obtain a corresponding reduction in freight on flour made wholly or largely from home-grown wheat. Producers, however, might be able to reduce transport costs by assembling grain in large quantities for dispatch, particularly at points where there is competition between rail and water transport, or, alternatively, by co-operating with agricultural merchants and local millers or maltsters in organising a local road transport service.

### (iii) Road.

Farmers within a 5 or 10-mile radius formerly carted much of their grain into mills and breweries by horse wagon, but this practice declined in the neighbourhood of provincial towns when roads became difficult for horses. With the development of motor transport, road haulage of grain has once more increased.

Inland millers and maltsters often arrange to collect grain from the farm by motor, but since the quotation for grain delivered-in is commonly 1s. per quarter more than for grain lifted from the farm, and since bran and feeding-stuffs collected ex-mill or ex-store are also cheaper, it frequently pays the farmer to hire motor transport to take in his grain and bring back feeding-stuffs. In most country towns and villages, haulage contractors are engaged in this traffic. Millers, in the main, prefer to use these independent motors for collecting grain from the farms rather than employ their own transport, which is engaged primarily and more regularly in delivering flour, etc. In some districts, there are signs of co-operation among farmers to make a more efficient use of local road transport; the possibilities in this direction should be worth exploring.

The traffic in imported grain has given greater scope to road transport and has shown greater development in this direction than home-produced grain. From the ports, much of the grain is now distributed by road within a 30 or 40-mile radius.

Apart from road traffic within limited areas near the ports, a more or less regular system of organised transport has grown up between distant points suitably situated in regard to return loads. In recent years, for instance, it has been possible to have grain regularly delivered by road from London, ex quay, direct into the mill at places as far out as Leicester for the same rate as rail-borne grain. In addition to this organised traffic, in certain areas and

along definite routes the tramp ships of the road convey considerable quantities of grain. A recent instance noted was that of a large road transport vehicle whose driver had called at Manchester Docks Granary to pick up a chance load of grain for Preston. He had left the granary five weeks before with a load of grain bound for Shrewsbury. From there he had traversed the west of England to Cornwall, back to London, into Essex and through the Midlands, picking up loads each day, and had called again at the granary for a load home to Preston. Such free-lance cargo carriers are fairly numerous and are kept busy. Their freight rates are frequently a matter of adjustment, and it is difficult to judge of their precise significance in the grain transport traffic.

Road-borne home-grown grain is invariably carried in sacks, while imported grain is mostly carried in bulk. Fig. 29 shows bulk grain being loaded into a wagon specially fitted for the purpose, and Fig. 30, the same wagon being tipped up and the grain shot into a receiving pit. Fig. 18 shows a movable box structure fitted to a horse lorry, into which bulk grain is loaded; a similar fitting is used on motor lorries. These boxes are well strutted and fitted with hooks at each top corner so that they can be lifted by crane. When the lorry is required for other purposes, the box is laid aside.

Reference has already been made to the difference of 1s. per quarter which exists between the price of grain delivered at the mill and that collected from the farm. This, therefore, may be said to represent the average cost of road transport and delivery within a short radius. About 9s. or 10s. a ton is perhaps a normal charge for wider delivery within a 50-mile radius, which is probably the economic limit of road transport of grain except where there is a regular traffic in return loads. There are, however, no standard road rates and, in the present unorganised state of road transport, most carriers are willing to adjust their charges to make them comparable with prevailing rail rates. It should be borne in mind that road rates include, as a rule, the services of loading and unloading.

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## CHAPTER XI.—PRODUCE MOVEMENT.

### (i) Home Produce from Country Districts.

The movement of home-grown grain may perhaps be best described by selecting five representative country areas and regarding, as a whole, the movement outwards from each area. Suitable districts for the purpose might be taken as being within a radius of 30 miles of (1) Cottenham, in the Fens, (2) Newark, (3) Easingwold, in Yorkshire, (4) Burghclere, in Hampshire and (5) Hereford. Fig. 27 shows the location of mills, and Fig. 28 the location of breweries and distilleries, in England and Wales; these also show the main direction of movement of home-grown wheat and barley in relation to the areas referred to.

*Area* (1).—Norfolk and Suffolk—particularly Norfolk—are pre-eminent for barley exports, Cambridge and Essex for wheat, while

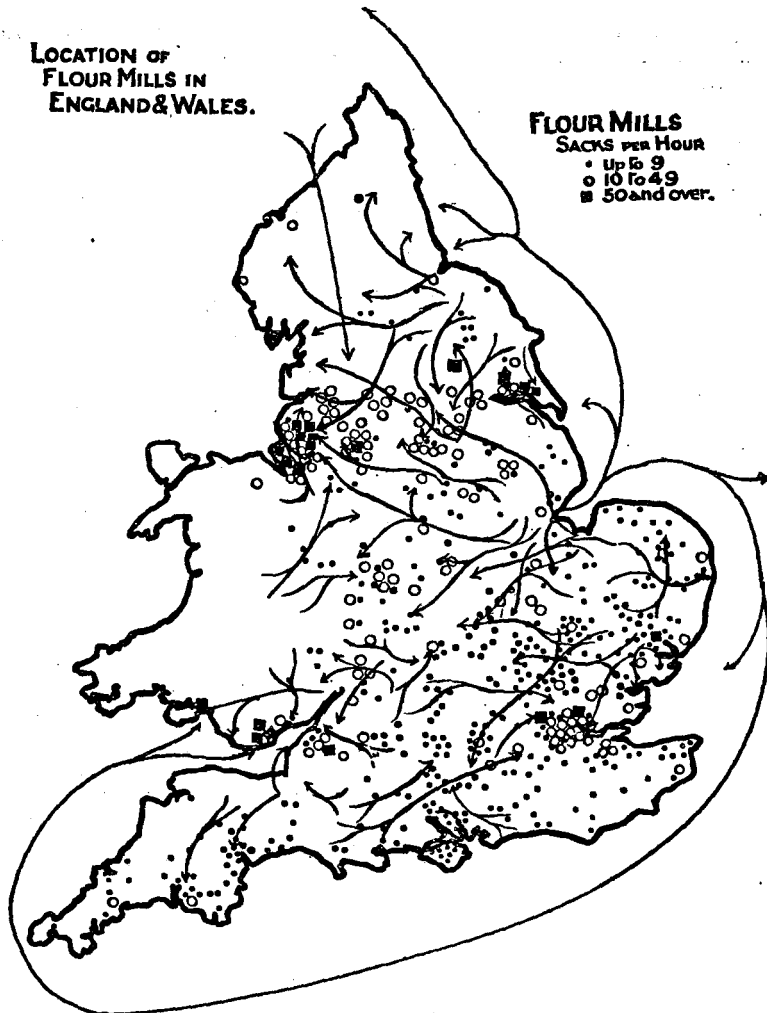


FIG. 27.—Map showing location of flour mills and movement of home-grown wheat.

the Fens are the only part from which oats are exported in notable quantities.

Within this area, and immediately outside it, there are numerous mills which draw on the area for supplies. Apart from coastal exports, the wheat does not travel much further as a rule than London, Reading, Wellingborough and Leicester, although some from the Fens reaches as far as the towns of the West Riding of Yorkshire. In addition to the traffic to maltings lying immediately outside the circle, barley from the district goes by rail to London and Reading, Birmingham and Burton, Leicester and Lincolnshire

**LOCATION OF DISTILLERIES  
AND BREWERIES IN  
ENGLAND & WALES**

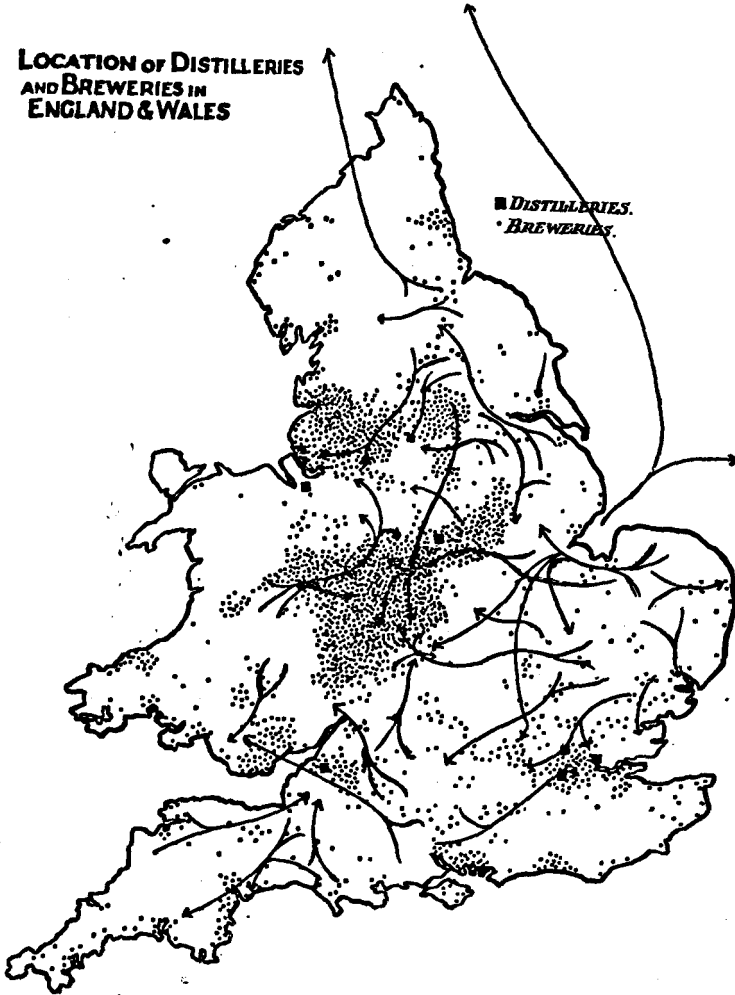


FIG. 28.—Map showing location of distilleries and breweries and movement of home-grown barley.

and, occasionally, to Yorkshire. Oats from the Fens go to the Leicester and Nottingham coalfields, particularly, but the distribution fluctuates considerably.

By coast from Wells, King's Lynn, Sutton Bridge and other ports, wheat, amounting to as much as 10,000 to 15,000 tons in a season, is consigned northwards to the Tyne and the Forth, and some also to Hull and York; southwards, it goes to London, and, westwards, via the south coast as far as South Wales mills. Consignments of barley occasionally go north to Scotland, and, of both



Barley and wheat, a certain amount of foreign shipments—chiefly of seed—are also made from this area.

The distribution of cereal products is even more widespread than that of grain. The mills in this area are large producers of English wheat flour which, for biscuit making or for scaling and blending purposes, is regularly, and in fair quantities, dispatched to Scotland and the north of England, Lancashire, South Wales, London and the Midlands; some even goes as far as Dublin.

Malt made in the district and on the east coast has also a wide distribution. Much goes to London and the Midlands, but some also as far as Kent, Hampshire, South Wales, Lancashire and, on occasion, into Yorkshire.

*Area (2).*—From this area, some wheat goes to mills in Cambridgeshire and Bedfordshire. The counties of the Midlands—Northampton, Warwick, Leicester, Stafford and Derby—also draw on this area. Mills in Yorkshire, particularly in the West Riding, and Lancashire take a large quantity. This latter movement takes place particularly from about February-March onwards, after the arrivals of Cheshire wheat in Lancashire have begun to fall off. At this season, the demand appears to be chiefly for poultry wheats, and it is not confined to backyarders and smallholders in the industrial part of Lancashire but comes also from farmers in the neighbourhood of Preston and further north.

Barley from the district occasionally goes as far as London but is mainly dispatched to the Midlands. A little goes northwards to Lancashire and Yorkshire and south to Area (1).

Oats find their readiest market outside the area, in Warwickshire, Leicestershire and West Riding towns.

Grain leaves the district by boat for distribution up and down the coast, and flour and offals arrive in the same way. The movement of flour from and to this area is not, however, very great, although certain types of wholemeal flour milled here are widely distributed throughout the Midlands and further west. There is, of course, considerable interchange of flour, especially by road, with the milling centres lying on the outer edge of the district. Malt goes largely by rail to Burton and other towns in the Midlands; some, but not much, goes to London, while south Lancashire and the West Riding take a fair share.

*Area (3).*—From this area, locally grown wheat goes mostly to the West Riding and to Hull. Cumberland, Durham and Northumberland together take about 12 or 15 per cent. of the traffic. A very little goes, on occasion, as far as the Midlands or Scotland.

Yorkshire barleys are more widely distributed in some seasons than others. Lancashire, on an average of 3 years, takes about 12 per cent. of the railed barley traffic, Scotland and the Midlands about 8 per cent. each, and the south of England about 2 per cent., while the balance is consumed in Hull and other Yorkshire towns; Northumberland, Durham and Cumberland are negligible factors in this trade. On the other hand, the coalfields in these last 3 counties absorb about 60 per cent. of the oats put on rail, Yorkshire towns, chiefly in the West Riding, taking the balance.

Malt made in the district, or in maltings just on its edge, goes largely by road towards Lancashire and Birmingham, while some goes by rail down through Nottingham as far as London at times.

*Area (4).*—This area lies naturally between the large consuming centres of London on the one side and of Bristol on the other. Outgoing traffic, therefore, chiefly goes east and west respectively; water transport within the area has largely fallen into disuse, and road transport is largely employed in moving the grain from the east and west sides of the area. Analysing the railed traffic loaded at stations near the centre of the area destined for points outside it, one finds that 90 per cent. of the wheat goes in the direction of London and only 10 per cent. to Bristol and South Wales. Barley consignments, on the other hand, are almost equally divided between these two consuming centres. About 40 per cent. of the oats go to the Midlands via Banbury, another 40 per cent. to Bristol and South Wales, and between 15 and 20 per cent. to London. The area is well supplied with mills, but the balance of flour traffic, especially by road, appears to be inwards. One finds all-English wheat flour arriving in the area from Suffolk mills, and flour milled from local wheat leaving the north-east side of the district for Bristol, Cardiff and South Wales. There is also a little traffic inwards of malt.

*Area (5).*—Although there has been a considerable reduction in the amount of country milling since the War, this area still mills a large part of its own wheat and also malts much of its own barley.

Some of the wheat goes into South Wales, particularly for poultry, and, from the Shropshire side, some goes to Lancashire for the same purpose. There is also a movement eastwards to the mills in the Midlands and southwards on occasion as far as Bristol.

Barley goes out of the area to Birmingham and Birkenhead and to maltings in South Wales. Oats also go out to the Midlands, up to Lancashire and down into the South Wales coalfields, although the large imports of Scotch and Irish oats through Mersey and Severn ports are apt to limit the radius of distribution.

Flour, milled from locally grown wheat, is chiefly sold in the direction of Bristol and Cardiff. The area provides a convenient field of competition for the large milling centres to the north and south of it and, consequently, baker's flour from the small country mills in the district does not go very far afield. As small brewers are still fairly numerous in this area, local malt can find a market inside the area. Rolled oats and milled provender also find a good local demand, although some consignments go to the Midlands and South Wales.

Other country areas have their own special features. Kent, for instance, grows good barley in the Thanet district, but any of malting quality can generally be used locally, although occasionally, in a good season, it may go as far as Yeovil or Burton. Much of the malt made in this district is sold to London. There is very little delivery of wheat to London and flour milled locally is distributed

mostly in Kent and Sussex. Sussex barleys are not, on the whole, much used for malting. Wheat is brought into the district for milling but locally grown grain is, on occasion, shipped coastwise from Chichester round to Cardiff mills.

Devon barleys, not malted in the county, usually go to Bristol. There is also, at times, a little cross-Channel export trade in barley and malt. Local millers do not find enough wheat in the district and have to draw on Somerset to supplement their supplies.

Wales does not produce much wheat and local produce is consumed mostly on the farm or by poultry; wheat grown in the vale of Glamorgan, for instance, although quite close to a large milling centre, is largely used for feeding. The large consuming centres in South Wales and in the Midlands and south Lancashire do, however, draw on Wales for oats, but the traffic is apt to fluctuate owing to the competition of imported oats arriving at the Severn and Mersey. Cheshire, on the other hand, is a good wheat and oat producing county and provides south Lancashire in the early part of the season with most of its home-grown grain requirements for poultry feeding.

Cumberland, Westmorland and north Lancashire are importers of wheat both from the east and north. Although some oats are exported from these counties to Northumberland and Durham coalfields, there is a certain amount of return traffic in home-produced oats from the east to Cumberland coalfields. Oats are also imported from Scotland for the numerous oatmeal and provender mills in the district, which, in turn, export oat products to the Midlands, South Wales and even further.

In the Northumberland-Durham area, the wheat grown is mostly used for pigeon and poultry food, the requirements for flour being met by coastal imports from the Wash area. Flour milled in the district is consumed locally, except for special types of wholemeal flour which have a more extensive distribution.

An examination of the traffic passing between England and Scotland shows that Scotland imports a certain amount of English wheat from east coast ports for milling, while, on the other hand, white wheat from Scotland is dispatched to Lancashire for feeding. In Scotland, the flour from native wheat is not used for bread-making to any appreciable extent but almost entirely for biscuits, cakes and scaling purposes; one may observe the movement of this Scotch flour down into the north of England, while a somewhat similar traffic in all-English flour is entering Scotland from East Anglian mills. For distilling and brewing in Scotland, Scottish barley is mostly employed, but there is, on occasion, an import of barley from East Anglia and, not infrequently, a counterbalancing export of barley from north-east Scotland into England. Scottish oats and oatmeal have a wide distribution and pass regularly by rail into Yorkshire and Lancashire and by boat to London.

From Ireland to this country, the movement of grain consists chiefly of oats, more particularly to Lancashire and South Wales ports. With the recent decline in the Irish distilling industry, more barley may be expected to arrive from this source in future.

There is a regular export trade in flour from Lancashire and South Wales ports to Ireland.

(ii) Imported Produce from Port Areas.

A study of Table XVIII\* shows that the Mersey area, comprising the ports of Liverpool and Manchester, is by far the heaviest importer of wheat in the United Kingdom and that the London area ranks second in importance. The area covered by the Severn ports—Cardiff, Bristol and Gloucester—comes next in volume of imports with Hull practically equal to it. The Tyne and the Clyde areas are of much less importance and are about equal to each other, with Leith next and Belfast a good way behind. Other outlying ports, such as Southampton, Swansea, Ipswich and Plymouth, take a significant share, and the first-mentioned an increasing share, in the import of wheat. Bristol holds a pre-eminent position in the import of barley, and London in the import of oats.

About 70 per cent. of the population in England and Wales is located within a radius of 40 miles from the 4 chief importing centres on the Mersey, the Thames, the Severn and the Humber. The chief points of concentration outside these four port areas are the Midlands, where, within a 40-mile radius of Coventry, may be found about 7 per cent. of the total population, and the Northumberland and Durham coalfields.

Since imported supplies of wheat form about 80 per cent. of the total requirements, and roughly 70 per cent. of the population is to be found in port areas, it is not surprising that a similar preponderance of the country's milling capacity is to be found at the ports. (See Fig. 27.) In brewing and malting, however, the home product provides a greater proportion of the total amount of grain used than it does in the milling industry, and large manufacturing maltsters and brewers are found concentrated in the Midland area. (See Fig. 28.)

In discussing, generally, the normal distribution of produce from the 4 chief port areas, it is permissible to regard them as more or less self-contained so far as imported grain is concerned and not to attach too great importance to any apparently special movements between the areas, as, for instance, coastwise shipments in appreciable quantities between places as far apart as Liverpool and Newcastle.

*Mersey Area.*—At the Mersey ports, about two-thirds of the grain is either delivered direct to the waterside mills or is loaded to barges for transit to the mills.

The balance of imported grain is landed to elevators, warehouses and sheds. Some of this passes direct by conveyor from elevators to adjacent mills but nearly two-thirds is re-barged ex elevators, leaving only one-third (or from 10 to 12 per cent. of the total imports) to be distributed, in approximately equal proportions, by rail and road. Of the consignments sent by road, 50 per cent. go in bulk, but only 5 per cent. of the rail-borne grain travels in this way.

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\* Page 198.

Of the grain barged ex elevators, some, particularly from Manchester, passes to the Midland area and some to towns in the West Riding, but the larger part, say about two-thirds, is distributed in south Lancashire. About one-half of the railed grain goes beyond south Lancashire into the West Riding, and into the Midlands towards Derby. Birkenhead sends supplies more particularly into North Wales and Shropshire. Road traffic is general throughout on a 30 to 40-mile radius. Regular coastal steamers run from Liverpool to Ireland and also distribute grain northwards to Preston and as far as Silloth and Scottish ports on the Solway. Southwards, there is also regular coastal traffic to mills on the west coast of Wales, and even further.

*London Area.*—Most consignments of wheat, barley and oats arriving in London are barged or go direct to mills etc. on the river and estuary. There is barge traffic into Kent and regular coastal traffic to Ipswich, Yarmouth, King's Lynn and north to Newcastle, as well as a certain amount to Hull and Leith. Coastal steamers take grain round the south coast as far as Truro.

It appears that less than 10 per cent. of the wheat and barley arriving in the port is loaded to rail for distribution inland, but of oats, a much higher percentage—approximately 40 per cent.—is treated in this way. Most of the wheat put on rail is destined for the belt of counties lying just outside the 40-mile radius, and goes chiefly to the counties of Hampshire, Northampton and Oxford, although Bedfordshire, Berkshire, Huntingdon and Cambridge receive a fair share and some goes as far as Leicester. Some oats go further afield and penetrate into the Staffordshire coalfields area. There is a certain amount of grain distributed from London by road, but it forms only a small proportion of the total quantity landed.

*Severn Area.*—At ports on the Severn, a larger proportion is loaded direct to trucks than in the preceding port areas. An analysis of traffic at Bristol and Cardiff indicates that about 25 per cent. is handled in this way. Here, also, a large part of the total—about 60 per cent.—either goes direct alongside mills or is put over-side to barge for mills, etc. One fourth of this, however, is destined for mills further north than Gloucester and not for those situated in the immediate vicinity of the Bristol Channel. Coasting vessels from the Severn ports not only serve other places in the Bristol Channel but also sail regularly with grain round to south-western ports, such as Falmouth and Plymouth, and up the Welsh coast to Portmadoc and other points. There is also a regular trade with Ireland and the Channel Isles.

On the Cardiff side, about 75 per cent. of the railed grain goes to places in South Wales and only 10 or 12 per cent. outside it. From Bristol, on the other hand, about 45 per cent. of the grain put on rail goes to the Midland counties, particularly Warwick, Worcester and Stafford; a similar quantity goes south-west as far as Plymouth and Launceston, while the counties of Oxford and Buckingham take most of the balance. Gloucester distributes fair quantities outside this area into Shropshire, as well as to the Midlands.

A feature of this district is the relatively small amount of road traffic in grain. This may be due partly to advantageous rail facilities, partly to road difficulties and partly to the fact that, on the Bristol and Gloucester side, there is no densely populated hinterland, so that the grain moves out beyond the normal road-transport radius.

*Humber Area.*—From the Humber area, excellent navigable rivers and canals run in all directions. By Newark to Nottingham, by Doncaster to Sheffield, by Wakefield to Leeds and up-river to York, grain passes, mostly in bulk, to the numerous mills and maltings in this populous area. A relatively small proportion is railed further afield to Derby, Leicester, the North Riding of Yorkshire and to Durham.

Considerable quantities of grain pass from Hull coastwise, to the Tyne and the Forth particularly, and also down the coast to ports on the east even as far as London and beyond.

Other ports, outside the 4 main areas, have special features which are worth noting. Tyne ports, for instance, receive a large influx of grain by coastal traffic, the reason for which is to be found in the fact that the quantity of direct imports is not sufficient to meet the requirements of this populous area. Supplies have consequently to be supplemented from other ports. An analysis of this traffic for a year showed that, in the case of wheat, 60 per cent. was drawn from Hull, 17½ per cent. from London, 12½ per cent. from ports in the Fen area and 5 per cent. each from Scottish ports and ports on the west, particularly Liverpool and Bristol; 15 per cent. of the oat traffic came from Liverpool and the remainder from Scottish ports, while 90 per cent. of the barley came from Yarmouth and other east-coast ports and 10 per cent. from Scotland. Milling is mainly confined to the port mills, and the distribution of grain and flour is limited almost entirely to the Northumberland and Durham area.

The Clyde area roughly equals that of the Tyne as regards the amount of imports, and here, also, additional supplies are required which are mainly brought by coast from Liverpool. It is interesting to note that at Glasgow, where 75 per cent. of the grain is landed at liner berths and handled through transit sheds, the distribution afterwards is performed in bulk and, to the extent of at least 90 per cent., by road transport, since the mills are not, in the main, suitably located for receiving bulk grain by water.

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## PART V.—DISTRIBUTION.

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### CHAPTER XII.—WHOLESALE DISTRIBUTION OF GRAIN.

#### (i) Home Produce.

(a) *By Farmers.*—Farmers sell much of their grain direct to millers, maltsters and brewers, a certain amount to provender retailers, and a little, on occasion, to other farmers. Many of these sales are, of course, transacted at country corn markets. Although the amount of direct trading is considerable, especially in some localities, it is perhaps, taking the country as a whole, not so great as is generally supposed. It varies in extent with each cereal as well as from one district to another.

Most of the wheat requirements of the small inland miller are met by direct marketing from farmers within a 25 to 30-mile radius, and, if within a 5-mile radius, the farmer usually delivers straight into the mill by farm wagons. Payment is customarily made on the market day following delivery.

Apart from the exporting area in the neighbourhood of the Fens, wheat grown in East Anglia largely passes direct from the farms to local mills; this direct trading probably represents between 60 and 70 per cent. of the total sales of wheat in the area, although the percentage is even higher in some parts of the district. In the Midlands, particularly the south and east Midlands, there is a similar proportion of direct marketing, although, in this district, provender merchants take a larger share of the grain.

From the Fens, northward through Lincolnshire into Yorkshire, the proportion of wheat marketed direct falls off considerably, and probably not more than 30 or 40 per cent. of the business is done in this way. In Northumberland and Durham, home-grown wheat is of little account and provender merchants take the bulk of supplies.

In the north-west of England, sales of wheat direct to millers are very small, and even in south Lancashire, where many mills are located, very little direct trading is done between individual farmers and millers. The large millers in this part area do not obtain supplies from the small farmers, country corn markets are little patronised and the wheat goes mostly to provender retailers. In Cheshire and north-east Wales, much of the wheat leaves the district for Lancashire and there is therefore little direct business done, but, to the south, round Hereford and Worcester, local milling again becomes prominent and probably up to 60 per cent. passes direct from farmer to miller or to retail provender merchants in the towns. In the southern counties, direct sales may be estimated at between 40 and 50 per cent. of the marketed supplies. Taking the country

as a whole, probably less than half of the sales of home-grown wheat are made from farmer direct to manufacturer or retailer.

Barley is often sold direct by farmers to maltsters or brewer-maltsters on the country markets or through the maltster's offices in country districts. The country brewer-maltster, when buying from local farmers, usually stipulates for the grain to be delivered at the brewery. At times, farmers simply send in a load of barley to the brewery without making any previous arrangement regarding price and delivery, but this practice is dying out and only holds now for long-standing customers. Payment is made by the brewer on the market day following delivery. If the market day is on a Saturday, for instance, he will pay for everything delivered during the week up to Friday.

When the grain is bought from further afield, the terms are usually f.o.r. sender's station. Provided the barley is of high quality and of a type which suits the brewer's requirements, the question of railway carriage is of comparatively little moment; on barleys which are not quite in the first rank and have to compete in quality with imported barleys, railway carriage from country stations becomes, however, a more serious consideration. Were it not for this factor, northern barleys and those from the southern counties might, on occasion, go much further afield; a limitation lies, however, in the fact that brewers and maltsters are inclined to pay less for barleys grown in certain unfashionable districts.

In the eastern counties, barley is not now so easily transferred from grower to manufacturer since the number of working malt-houses in the district has been considerably reduced. On the other hand, some of the large brewer-maltsters have been taking steps to increase the amount of direct buying from farmers and some have full-time buyers engaged on this work. These direct transactions of the brewer-maltsters, however, are very often confined to the trade in the better class pale-ale barleys. Allowing for some mild-ale and running-ale barleys being sold direct to maltsters and local brewers, and also for some purchases of feeding barleys by the local provender millers, probably less than one-third of the barley sold in this district is marketed direct by farmers to manufacturers. This proportion decreases in the Wash area, increases on the Lincolnshire Wolds, decreases to the north and increases again in the East Riding of Yorkshire. In Northumberland, while the proportion of direct purchases from farmers by brewers and distillers decreases, the direct purchases by millers of pot and pearled barley increases. Down the west, from Cumberland through Lancashire to Derbyshire, farmers are able to sell barley direct to the numerous local provender millers. Direct sales by farmers to maltsters and brewers increase in the west Midlands and the south-west of England, although Midland brewer-maltsters appear to prefer to buy from merchants rather than farmers. In Kent and the southern counties, wherever the crop is of good malting quality, a large proportion is sold direct from farmers to maltsters.

Taking the country as a whole, however, and bearing in mind the fact that many large manufacturers do not attend country markets,



the amount of direct marketing by farmers cannot be more than from 20 to 25 per cent. of the sales of home-grown barley.

Direct marketing of oats for horse feed is not general, and the large wholesale buyers, such as cartage contractors, colliery companies, hunting and racing establishments are not, as a rule, represented on country markets. Farmers in the vicinity of Newmarket, Doncaster and the colliery districts and towns of the North, Midlands and South Wales are, however, able to effect direct sales.

In the north-western counties of England, oats for making oatmeal and Sussex Ground oats, etc. often pass direct from farmer to miller; these direct sales to millers in some parts represent from 60 to 70 per cent. of the oats sold locally. With a crop so widely diffused, there is naturally a good deal of trade, in the towns and villages throughout the country, between farmers, cartage contractors and retailers of poultry foods. No reliable estimate can be given of the extent of this local trade but the direct sales of home-grown oats may perhaps be put at about 30 per cent. of the total quantity placed on the market.

(b) *By Merchants.*—The distribution of grain by the wholesale merchant begins as soon as the latter has "assembled" the grain at the country market. There he may find a maltster, miller, or other buyer prepared to accept a certain type of grain, in which case he disposes of the grain forthwith. As a rule, however, he displays his samples at one of the corn exchanges which are recognised as 'factors', rather than farmers', markets. Of these, the chief are Leeds, Lincoln and Mark Lane (London) on the east, and Bristol, Birmingham and Manchester on the west. On these markets, particularly those in the east, the smaller country dealer sells to the larger wholesale merchant or corn factor who, having procured fairly large supplies, is then in a position to offer to the manufacturer a run of some particular class of grain. Prices are agreed and sales are completed after examination of the merchant's bag of samples.

Apart from the business transacted at the country and factors' markets, the wholesaler does much, probably most, of his distributing direct from his office. His day's work is often continued in the evening after returning from the country market or markets, if, as is frequently the case, he attends several markets a week. He then sorts out the samples collected during the day, re-packs them, and sends them off by train to prospective buyers with a covering letter making a firm quotation for the buyer's acceptance in the course of the following day, or sometimes the following week. Much business is also done over the telephone. Some merchants have a working understanding with millers for whom they buy during the day on the basis of approximate quantities and prices specified beforehand. The consignments, as bought, are forwarded to the miller who, in turn, pays the purchase price plus a commission of 3*d.* or 6*d.* per quarter.

Similar arrangements are frequently made for merchants to buy special types of barley for brewers and maltsters. In some cases, the latter confine their buying entirely to merchants or maltster-

merchants who must attend at the brewery head-office or send samples, with prices marked thereon, for the brewer's acceptance. These samples may be tested for germination, etc. at the brewery, but more often they are judged and bought on appearance. Having made the sale to the manufacturer, the wholesaler then proceeds to arrange for the physical distribution of the grain. He may send to the farmer an order on the railway company for the required number of sacks, which are filled and put on rail by the farmer. The merchant, if he has sold on an f.o.r. basis, then notifies the station agent at the loading station to transfer the consignment to the order of the buyer, who thereafter becomes responsible. When selling on a delivered basis, the merchant sends forwarding instructions to the agent at the loading station and a transfer order to the unloading station.

(c) *Agricultural Co-operative Societies.*\*—The methods of farmers' co-operative societies engaged in the grain trade do not differ appreciably from those of the wholesale merchant, the same channels of distribution being employed. Representatives of the societies attend the large markets in distributing centres such as London, Manchester, Birmingham, Leeds and Lincoln and dispose of farmers' grain. Between 50 and 60 of these societies, however, are themselves manufacturers, mostly engaged in grinding pig foods and other provender which they retail for consumption on local farms. One or two societies also mill flour and even engage in the retail bakery trade.

Agricultural co-operative societies transact a large proportion of their sales with the Co-operative Wholesale Society. This trading is reciprocal, there being an interchange of commodities, particularly wheat and offals. No definite arrangement, however, appears to be in force between the groups, and sales only take place between them when the price, quality and point of delivery are regarded as suitable. Inter-trading between farmers' societies in exporting areas and those in importing areas has also attained fair proportions, although there is still a great deal of room for development in this direction.

## (ii) Imports.

The distribution of imported grain, from the port of shipment in the producing country to the manufacturer or retailer in this country, is undertaken, in sequence, mainly by the shipper, the importer, the broker, the jobber and the country wholesale merchant. While each has a separate function in the distributive trade, several functions may, on occasion, be performed by one person or firm.

In general, shippers and importers deal in cargo lots while jobbers and wholesalers buy in "loads." Brokers are intermediate and variable, and, in addition to dealing in cash grain, some perform a special function in regard to dealings in futures or options. It is,

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\* See also Economic Series No. 1 (Co-operative Marketing of Agricultural Produce), Chapter XI, and Economic Series No. 5 (Co-operative Purchase of Agricultural Requisites).

however, impossible here to give more than a very generalised statement of the function which each class of merchant performs in the trade.

The shipper, as a rule, has offices in both the exporting and importing country and it is generally his function to arrange for the composition and loading of the cargo. The documents relating to the cargo are drawn on the shipper; one set of documents is made out for each complete "load" of 1,000 qrs. and one for the balance of the cargo. If possible, the shipper disposes of the cargo to an importer by selling on a f.o.b. basis. Grain loaded at New York or North Atlantic ports and sold f.o.b. is payable in New York by 7 days' sight draft against documents, at Vancouver by 30 days, in Australia by 60 days. For Plate grain, the terms vary considerably. The shipper frequently also sells to importers, or through brokers, grain delivered at the port in this country. C.i.f. grain, according to the usual grain contract, is payable in London in 14 days. The shipper must usually be prepared to finance the cargo for about 50 or 60 days. In Canada, banks require shippers to hedge, and the hedge is held as the property of the bank. In spite of the risks attached to financing grain over this long period, some shippers, however, decline to hedge; but, to do business on these lines, they must be prepared, should occasion arise, to store 25,000 or 30,000 qrs. of grain. The chartering of vessels is mostly undertaken in London and a large part of the shippers' business is done by cable.

The importer also has offices in both exporting and importing countries. He buys from overseas jobbers or shippers either f.o.b., afloat, or c.i.f. He buys either whole cargoes or parcels and sells c.i.f. parcels in loads of 1,000 qrs. He tries, so far as possible, to dispose of the grain immediately after purchase, no matter where the shipment may be at the moment. When he cannot dispose of it quickly, he may hedge his purchase or, if the market is getting firmer, he may wait until the boat arrives before selling. At exceptional times, he may even risk landing some of the grain before sale.

The broker ordinarily sells to large manufacturers, or to jobbers and wholesale merchants. He commonly works on the instruction of exporting shippers who cable quantities and quotations and allow the broker 1 per cent. commission on his sales. He may, for instance, receive a cable such as "Offer firm this month 3 loads Manitoba Ones 67s. 3d." and on that basis he makes his sales. When an importer in this country sells through a broker, he usually gives him a firm quotation for a certain quantity to hold good for an hour, during which time the broker tries to dispose of the grain with as much profit as possible. As, however, the importer is also offering the grain to various buyers, the broker's profit is usually very limited and, as a rule, is but a small fraction of one per cent.

The opportunities of the importer and broker are every year becoming more circumscribed, owing to the increasing activities in the sphere of distribution of the organised producer, on the one hand, and of the manufacturer, on the other, who is tending, more and more, to buy direct from overseas shippers. With the increase

in number of large capacity mills and the elimination of small mills, the buying of wheat is becoming as easy for millers as for brokers. This tendency is illustrated by the fact that, at one of the large ports in the kingdom, documents covering 60 per cent. of the grain arriving in 1926 were taken up by millers direct, whereas nearly all the trade in pre-War years was done by merchants and brokers. Further, some importers and brokers in the wheat trade used to have a large jobbing business amounting, in some cases, to about 90 per cent. of their trade, but the extent of these operations is now almost negligible. In fact, distributors in the wheat market have now to undertake business in other imported cereals and pulses, and in flour, offals and feeding-stuffs, in order to maintain their turnover.

Different conditions operate in the case of barley sales. Brewers and maltsters prefer to see the grain before purchase; they seldom buy on the strength of the grade description alone. On the arrival of a shipment of barley, most buyers automatically make application for arbitration; the application is withdrawn if the bulk grain approximates to the original f.a.q. sample for the season. Imported barleys, therefore, pass in the main through the hands of the importers, brokers and jobbers.

The jobber operates in the grain trade by breaking up large parcels bought from importers or brokers into small lots to suit the needs of country wholesale merchants or small manufacturers. While shippers, importers and brokers conduct their business for the most part over the telephone or at the port grain exchanges, such as the Atlantic in Liverpool and the Baltic in London, the jobber who buys in those exchanges is found at provincial markets such as Birmingham and Berwick, Norwich and Lincoln, where he disposes of small lots to country manufacturers and wholesale corn merchants. The latter, however, are frequently able to buy direct from grain importers and brokers at the port produce exchanges, such as Liverpool Corn Exchange, Manchester Exchange and Mark Lane in London. There is a tendency, however, for importers and brokers to concentrate on the port grain exchanges, such as the Baltic and the Atlantic, and to abandon trading on the produce exchanges.

Most of the business between the various kinds of intermediaries engaged in the distribution of imported grain is conducted by private treaty, but the precise methods of business vary from one firm to another and from one contract to another. The duties of each party to a contract, as well as the form of the different contracts, the terms of delivery, the minimum brokerages on c.i.f. and future delivery contracts, deficiencies, tenders, points of delivery, passing and taking up documents, terms of payment, arbitration in case of disputes and many other details, are governed by the by-laws of the various Corn Trades' Associations in this country and by the regulations of the trade clearing-houses at London and Liverpool. Although much of the trading is done on the floor of grain exchanges during fixed hours, the market in imported grain is, in fact, always open, and cargoes still on the open seas have been known to change hands 3 or 4 times during a night. All the large buyers and sellers, and the exchanges in this country, are in close

touch with one another and business overlaps. One may find, for instance, an importing house in Bristol doing most of its buying on the Baltic in London, merchants buying in Liverpool and selling in London or vice versa, and so on. The large merchants on the grain exchanges in this country are also in close and constant touch with price movements on exchanges abroad, and they buy or sell here or abroad as seems profitable at the moment. In the cash market for imported grain in this country, market prices are not collected and published officially in the way adopted for home-grown grain, nor do the market authorities concerned make any attempt to collect or publish current prices except in the case of graded wheat in Liverpool (see page 139), but records of buying or selling prices for certain cargoes and for landed grain are collected by reporters and published from day to day in the press or circulated by private intelligence services.

*Note on the Distribution of Pool Grain.*

Reference has already been made in Chapter VI to the arrangements adopted by the Australian and Canadian pools for the marketing of their grain in this country. The Australian pools employ a marketing agency—the Overseas Farmers' Federation, Ltd.—while the Canadian pool now has its own branch office in London. In both cases, however, distribution is effected through the ordinary trade channels and brokers deal with the bulk of the business. Millers in this country, unlike millers on the Continent, are apparently disinclined to buy direct from the pools and prefer to leave the importing in the hands of the merchants. It may be expected, however, that, with the opening of the London Office of the Canadian pool, there will be some development in the direction of more direct distribution from the pool to the miller.

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## CHAPTER XIII.—WHOLESALE MARKETS.

### (i) Country Markets.

In the home grain trade, the country corn market is primarily the venue for sales by farmers to merchants and manufacturers. Farmers attend from within a radius of 10 to 15 miles as a rule, millers, maltsters and merchants from a radius of from 25 to 40 miles.

The growing use of the post, telegraph and telephone tends to lessen the farmers' dependence upon local markets, while the advent of the motor-car and motor-bus has made it practicable for farmers to attend markets further afield in preference to the smaller ones near at hand. Fakenham corn exchange, for instance, was abandoned by the proprietors and taken over by a local shopkeeper a few years ago and, although there is still a fair amount of business passing in the barley season, farmers are tending to drift more and more towards Norwich Market, on the one side, or that at King's Lynn on

the other. Another illustration of this tendency is to be seen at Sudbury, in Suffolk, where nowadays there may be in the market-hall an attendance of as many as 80 merchants and only about 20 farmers. Some merchants are, therefore, transferring their activities from Sudbury to bigger neighbouring markets such as Bury St. Edmunds, where from 250 to 300 farmers may be found on a market day and where there are already over 180 merchants' stands and more are being applied for every year.

This tendency towards concentration of business is most noticeable in the chief grain-growing counties. In other areas, especially in those devoted to dairying and stock feeding, the marketing of grain has been decentralised and now takes place mostly in the vicinity of cattle markets. In Derby, for instance, this movement has led to the corn exchange being converted, in recent years, into a cinema, while at Nottingham, although there is a corn exchange, merchants wishing to buy grain must, as a rule, seek the farmer in the cattle market.

At a number of places, such as Ipswich and Bedford, the municipal authorities have supplied accommodation for an exchange, but the facilities are not always used. At Oxford, for example, the exchange is little used by farmers; similarly, at Basingstoke, the room provided by the municipality is not used, but a small wooden building has been placed at the disposal of merchants in the cattle market close to the station, although the dues are still paid to the local authority.

Many of the corn exchange buildings such as, for instance, those at Berwick, Norwich and Peterborough\* have been erected or are controlled by corn exchange companies whose shareholders are chiefly local corn merchants and town shopkeepers. The revenue is derived from stand rents and traders' tickets, which cost, as a rule, between 2 and 5 guineas a year. In some cases, there is also a charge of 5s. per annum for farmers' tickets or a toll of 2d. for each visit. Wherever there is any tendency for the toll charge to encourage trading outside the market, it is frequently omitted.

Apart from rooms provided by municipal authorities and corn exchange companies, accommodation is often provided by hotels, as at Selby, Colchester and Newark. In the latter case, although an exchange is provided, it is little used except as a place where merchants leave their samples.

The country market is not infrequently held on the street, in the vicinity of stations or hotels, or in a corner of the cattle market. Even when there is a market place provided, a farmer will, at times, waylay a particular merchant en route from the station and dispose of his grain in passing. In the grazing districts, there is a noticeable absence of corn exchanges. There is none between Carlisle and Preston; nor is there any provision of this nature in places where town and country are intermixed. In south Lancashire, the so-called country markets for farmers are in the vicinity of such places as the

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\* See Fig. 3, Economic Series No. 14.

“ King’s Arms ” at Ormskirk, the “ Railway Hotel ” at Southport, and the “ Crofter’s Arms ” at Wigan.

It may be observed that many country markets, especially in the smaller places, are not equipped with or conveniently situated for the telephone.

In country corn markets, apart from a more or less recognised time for opening and closing, there is no form of marketing organisation. In the street or cattle market, a buyer may stand at some recognised point—perhaps a window-sill or corner of a building—but, as a rule, he moves about among the farmers, looking at samples which he pockets after purchase. In a corn exchange (Figs. 31 and 32), millers, maltsters and merchants have stands with a desk on which is displayed the name of the firm and on which, in the case of provender merchants, samples are also displayed. Buyers and sellers move about looking for an opportunity to transact business. All trading is done by private treaty and there is no recognised market price for the day or the hour. People simply ascertain from one another how the market is going at the moment. In the case of wheat and oats, there is not often any great variation in the course of a day at the country market—the real market often lasts about 2 or 3 hours—nor is there any great variation in price from one buyer to another. The same does not hold for barley, for which there may be considerable variation in the market price. By gathering round 3 or 4 of the chief barley buyers in the market, farmers may both see and hear what price merchants are paying and what type each one is buying. Farmers may also form their idea of market values by comparing samples and prices with their neighbours.

The average market price of each cereal for the previous week is customarily posted up in a corn exchange. In every statutory corn market there is a box provided for the collection of returns of corn prices made by merchants. The inspector of corn returns subsequently submits these records to the Ministry of Agriculture and Fisheries, and, on the basis of returns collected during the week throughout the country, the Gazette average price is arrived at and published. The inspectors usually receive by Tuesday the returns of markets held in the preceding week, and the average Gazette price is issued on the Saturday. It thus refers to prices ruling in the preceding week, and, in the interval, market conditions may have changed considerably. These corn returns form a valuable record of grain prices over a long period of years.

### (ii) Factors’ Markets.

It is difficult to decide at what point a country market shades off into a factors’ market and at what point the factors’ market becomes a produce exchange (see later).

The corn exchanges at Norwich and Lincoln, for instance, are attended each week by hundreds of farmers, yet much of the business is done between merchant and merchant, or merchant and manufacturer; hence, these places may almost be regarded as factors’ markets rather than country markets for primary sale by farmers. There



FIG. 29.—Loading grain to bulk road wagon.



FIG. 30.—Unloading bulk grain from road wagon.



Facing page 135.]



FIG. 31.—Typical corn exchange showing arrangement of stands.

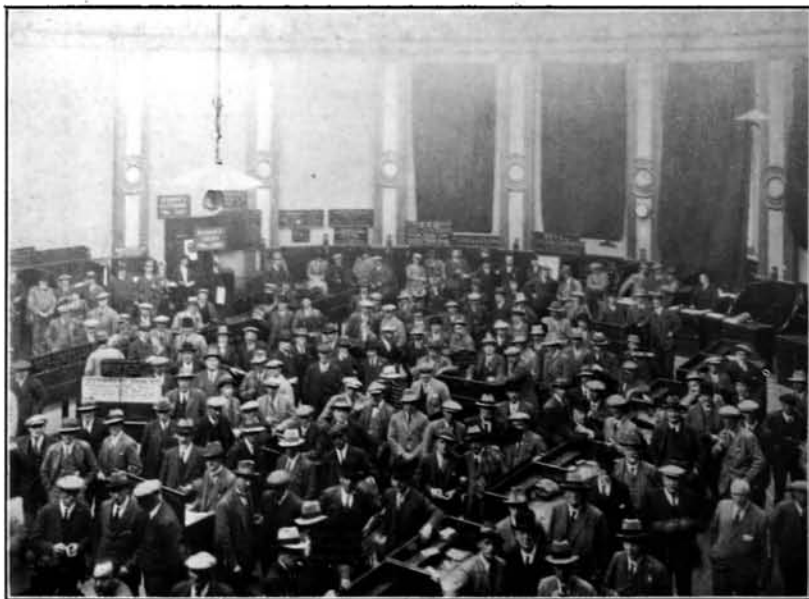


FIG. 32.—The same exchange on market day.

are, however, some places which are quite distinctly factors' markets, as, for instance, Leeds and Birmingham corn exchanges.

Leeds Corn Exchange,\* erected by the Corporation, was at one time divided into a factors' market and a farmers' market, both under the same roof and on the same floor but with separate entrances. According to the bye-laws, only farmers were allowed to bring samples for sale into the farmers' market, and only factors or their assistants were allowed to exhibit samples and transact business in the factors' market. Farmers selling their own corn in the farmers' market paid a fee of 5s. per annum and merchants hired stands or half-stands in the factors' market for which they paid 8 guineas or 5 guineas per annum respectively. This arrangement was found to be unsatisfactory and the position could, at times, become absurd. A farmer might come into the farmers' market and see, on the other side of the floor, the merchant to whom he wished to offer his grain, yet be unable to cross the floor and sell it without having a stand ticket. The farmers' market therefore drifted outside on to the steps of the Exchange, on to the street and into a neighbouring hostelry, and the whole exchange became a factors' market. Although farmers can and do enter the market, those who, in recent years, have inadvertently or otherwise taken round samples and displayed them for sale to merchants have been requested to leave the market.

In Leeds market to-day, there are nearly 180 stand-holders, apart from holders of walking tickets—e.g. railway agents, sack, manure and coal dealers, etc. Stand-holders come from places as far apart as Liverpool and London, Manchester and Ipswich, Hull, Berwick and Peterborough. The market is held once a week, on Tuesdays from 10 a.m. to 3 p.m.; here, as in the country markets, business is by private treaty and there is no current quotation of market prices during the day. Leeds is, however, a statutory corn market and the corn returns are collected and published in the usual way. The market hall is well supplied with telephone boxes and there is much buying and selling by factors and their agents according to telephoned instructions.

Birmingham Corn Exchange is also a factors' market. It is run by a committee of stall-holders, who hire the hall and arrange the letting of stands to merchants. Although there appears to be no regulation against the entry of farmers, very few do, in fact, attend, since the market is in the centre of an industrial area. There are between 100 and 150 stand-holders, who come from as far away as Liverpool, Bristol and London. Country corn merchants within a 50-mile radius attend to sell grain and buy feeding-stuffs, and millers and others from a 25-mile radius come to buy. Most of the grain sold on the market is imported. On a market such as Birmingham, the true functions of the country merchant can be clearly seen; while the country merchant uses this market for the distribution of home-grown grain he also uses it as a point for purchasing supplies of imported cereals for subsequent distribution in the

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\* See Fig. 45, Economic Series No. 19.

country areas. Manchester and Bristol bid against one another on Birmingham market for the trade of the Midlands. Although the markets in these two places are held on the same day as Birmingham market, representatives of merchants in both port areas attend at the Midland centre. Buyers from both the north-west and south-west also attend and buy there, so as to play off the merchants of one port against those of the other. In the course of market day, there is naturally a great deal of business done over the telephone, the market being well-equipped for that purpose.

### (iii) Port Grain Exchanges.

It is desirable to draw a distinction between the Corn Market and the Pacific at Hull, the Corn Exchange and the Commercial Rooms at Bristol, the Corn Market and the Atlantic Newsroom at Liverpool and Mark Lane and the Baltic in London. In each case, the latter is an organised grain exchange, the former being primarily a produce exchange (see later).

Port-grain exchanges deal with shipping business, as well as with imported grain, and are the importer's primary markets; no trade is done in English grain unless intended for export. They are standing markets and are open for business every day except Sundays and holidays. They have been organised by associations of merchants, and are usually held on or near the site of some long-standing informal meeting-place where merchants congregated to discuss their affairs. The governing bodies seek to facilitate business in every possible way whilst at the same time exercising some control over the trade practices of members.

The Baltic Grain and Shipping Exchange in London is the official headquarters of the London Corn Trades' Association. The principal business conducted on the Exchange is the chartering of vessels and the sale of cereals and oilseeds in cargo or parcel lots. The Association has a clearing-house to facilitate the passing of documents, the settlement of contracts, and the clearing or adjusting of price differences between the successive buyers and sellers concerned in a series of transactions in the same lot of grain.

All grain contracts are not passed through the clearing-house, but any contract may be, provided a registration clause is added giving either party the right to register it at any time during its currency. The clearing-house accepts no responsibility for the fulfilment of the contract, and the rights of the different parties are not affected in any appreciable way by registration. The whole arrangement is intended to facilitate direct settlement between first sellers and last buyers, and works as follows. Particulars of a contract having been supplied to the clearing-house, a numbered certificate of registration is issued to the buyer and seller, and the deal is recorded on a "string sheet," on which subsequent transactions relating to the goods can be listed from time to time. When the buyer sells, or the seller covers, by buying-in against his contract to sell, the buyer, quoting the contract numbers, instructs the clearing-house to connect his contracts, so forming the "string" which is continued by other buyers. When the first seller has earmarked an actual lot

of grain for delivery against the contract, he gives "notice of appropriation" to the clearing-house, which, in turn, assigns it to the last buyer, who may be the first seller on another "string" against which the appropriation may be passed through the clearing-house as before. All the intermediaries concerned receive notice of appropriation and, later, provisional invoices, which are practically difference accounts showing how much to receive or pay. When the last buyer applies for the documents, a clearing is called. The first seller passes the documents to the clearing-house, which, on receipt of the differences from intermediaries and of the last seller's draft, hands over the documents to the latter. Within 28 days of final discharge, a final invoice is rendered and the transaction completed.

The foregoing is given as an example only of one method of disposing of grain on the Baltic. For most of the business, however, documents pass direct. There is no calling-over the prices and the business is chiefly done by private treaty in the shipment and delivery of grain of all types; no general trading in grain "futures" takes place. There was, at one time, a grain futures market in London, but, owing to the restricted number of traders making use of its facilities, the market was found to be unsatisfactory and London merchants now make use of the Liverpool options market for such transactions. In the closing months of 1928, however, proposals were again being considered by the London Corn Trades' Association for the re-establishment of a "futures" market in London.

The Atlantic\* in Liverpool is the headquarters of the Liverpool Corn Trades' Association. The Newsroom and offices of members of the association in the immediate vicinity may be regarded as constituting the standing market for imported grain. The Association has a clearing-house for contracts relating to shipment and delivery, c.i.f., and future delivery grain. The wheat futures market is situated around an enclosure in the Newsroom and only members and subscribers are entitled to use the room. Membership is restricted to merchants or firms with a high standard of commercial integrity. New members on admission must deposit £1,000 in cash or supply equivalent security to the Association during the first three years of their membership.

All declarations and tenders in the Newsroom are made for "loads"—i.e. quantities of 4,800 centals, and quotations are made "per cental." Contracts are made for wheat deliverable more particularly in the months of March, May, July, October and December. At any time during the hours of trading, a member may call a price over the ring and, as soon as any transaction occurs at the price called, the attendant records it on a blackboard. Each subsequent price is marked up and remains there to show the course of the day's trading. All futures contracts must be registered at the clearing-house and, for a contract to be included in the day's business, registration must be effected by 10.30 a.m. on the next business day (10 a.m. on Saturdays). Any party to a contract has the right to call an original margin—i.e. to call on the other party to deposit a

\* See also Economic Series No. 19, pages 106/107.

sum not exceeding £50 on each 4,800 centals as a safeguard against price fluctuations, provided such call is made before 11 a.m. on the next business day after sale. By 12.30 p.m., daily, the Committee fix the settlement price for the previous day and the posting in the clearing-house of the quotations of the Committee is deemed a valid call for margins or for the payment of price differences. After the posting of the Committee's quotations, the buyer or seller, as the case may be, has to pay the difference (being a loss) between the contract price and the Committee's figure. When no original margin has been called, the payment has to be not only the difference between the contract price and the Committee's quotations, but also one penny per cental more in order to provide for subsequent dealings on the contract.

Future delivery contracts on the Liverpool market may, by consent of the clearing-house, be arranged in a "string," the intention being that, subject to the release of intermediate parties from their liabilities, the first seller and the last buyer for the time being shall be regarded as the only contracting parties. In the case of contracts for shipment and delivery only, the secretary of the clearing-house has power to vary the arrangement of the contracts on a "string" whenever a number of them are capable of being formed into a "ring," in which case he may pass a formal tender in fulfilment of the contracts forming the "ring." In the event of any default by either party upon a duly registered contract, the secretary is empowered, without further authority, to close the contract and arrange for the purchase or disposal of the consignment concerned.

When making out a contract, it is not necessary for a member acting as agent or broker to disclose the name of the principal for whom he acts. In such case, however, the principal has no redress against other parties to the contract in case of default, but can settle only with his agent. The principal must in every case pay any differences or margin to the agent at least 15 minutes before the time specified for the broker to settle with the clearing-house. All payments are made in cash or by London drafts, although members may make a deposit and have a current account with the clearing-house. This account is thereafter debited or credited with any day-to-day differences.

Although brokers can and do buy and sell wheat futures for persons other than members or parties directly interested in the grain trade, there is, in fact, very little outside business done. There is no encouragement for small buyers in the trade or speculators outside to enter the market. The unit of sale is too large and the margin of £50 is easily lost by the quotation dropping two or three pence in the course of one day, although it might rise to a higher level on the following day. There is no jobbing in Liverpool futures, so that it is not possible for small speculators in this country to dabble in the wheat market as easily as is possible in the United States.

Grain sales, other than futures, are here, as elsewhere, the subject of private treaty between the parties concerned, and most of the business is done by telephone and cable. Information regarding

shipment of grain is posted up in the Newsroom but members are forbidden by the bye-laws to pass on any such intelligence to outsiders for publication. The prices of grain futures and also the number of loads sold are, however, made available and published in the daily Press throughout the country.

#### (iv) Produce Exchanges.

At the country markets, merchants and manufacturers buy grain and sell offals, feeding-meals, etc., and on the large factors' markets there is also much trade in feeding-stuffs, flour and malt, as well as grain. The corn markets in the large ports, however, where the dealings in miscellaneous produce are probably greater than the trade in grain, are primarily produce markets, where the wholesale market price of the manufactured product is established by personal contact. As outstanding examples of this type of market, one may take the two leading produce exchanges in the country, namely, those at Manchester and London.

In the Manchester Corn and Produce Exchange\*, a corn market is held every Thursday and a grocery and produce market every Tuesday. The premises are provided by the Manchester Corn, Grocery and Produce Exchange, Ltd. The hall is spacious and amply equipped with stands for the display of samples. For the corn market, there are about 220 stands with between 400 and 500 sellers attached to them. In the grocery market, there are 450 stand-holders and a number of members without stands. Buyers and merchants mostly come from within a 30 or 40-mile radius, but some may be found in the market from places as far apart as Glasgow, London, Bristol and Birmingham. As many as 6,000 people may, on occasion, attend the market in one day. Buyers are admitted to the market free of charge and the business is all done by private treaty.

There is a close connection between the Manchester and Liverpool corn exchanges. Importers and brokers dealing with grain arrivals at the Mersey ports have stands in both markets; but, owing perhaps to the fact that the wheat importer is ceasing to do much jobbing business, there seems a slight tendency for those merchants previously centred on Manchester to transfer their main business activity to the Port Exchange at Liverpool.

Similarly, in London, there is a close connection between Mark Lane, which is now primarily a produce market, and the Baltic Grain and Shipping Exchange. Mark Lane occupies the site of the old London Corn Exchange, and houses, in the same building, the old exchange known as the Corn Exchange, London, and a small so-called new exchange owned by a separate company and known as the London Corn Exchange.† The latter was intended for the sale of small parcels of grain but is now recognised chiefly as the market for home-grown grain and, particularly, malting barley and agricultural seeds. The bulk of the stand-holders are country corn merchants drawn from a very wide area.

\* See also Economic Series No. 19, pages 118/119.

† A Bill is to be promoted to enable the Corn Exchange Company, Mark Lane, to take over the adjacent London Corn Exchange.

In the old exchange, which is much larger, the majority of the stand-holders come from the London area, but merchants from Bristol, Liverpool and Scotland are also represented. A large number of stand-holders are engaged in the sale of cattle-cakes, offals, maize, rice, lentils, peas and agricultural requirements such as artificial manures. Amongst them, there are at least 40 millers engaged in selling flour and offals to factors and country merchants as well as in buying grain. The stands are well equipped for the display of samples and here, also, business is transacted by private treaty.

In these produce exchanges, there is no official record of market transactions. The price of home-grown grain and the quantities sold are, however, collected officially in the usual way from the returns made by merchants and by farmers' co-operative societies, etc., who have stands in these markets. The current prices of other produce are collected by reporters and published in the press throughout the country. The London Corn Circular, for instance, a trade paper published on Monday and Friday market days, confines its produce quotations almost entirely to wholesale prices on Mark Lane. There is a natural difficulty in arriving at the actual current market prices in the absence of any official record of transactions. In the case of flour, the London Flour Millers' Association publishes an "official" market price which is apparently unconnected with the market. For example, on January 4th, 1926, the London Corn Circular, under the heading of "Flour," states, "The Corn Exchange was closed on Friday, and yet the millers met and took off the 1s. they had put on last Tuesday." After quoting the "official" figures, the Circular remarks that "*actual taking prices* are now level with official quotations, but reselling by factors and bakers who may elect to take profits is a matter apart." Reselling by buyers who made flour purchases at an earlier date, and quotations by original sellers for prompt and for future delivery, all tend to confuse the question of what is precisely the market price of flour at any particular moment.

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#### CHAPTER XIV.—RETAIL DISTRIBUTION OF GRAIN.

Prior to the retail stage, grain does not make a physical appearance, in bulk, on the market. All the intermediate operations are done on sample or description, in contrast to the methods at present largely employed in marketing home-produced fruit, vegetables, livestock, eggs, poultry and so on, where the produce is transported, in bulk, to the market place and there made the subject of bargaining.

Grain is sometimes retailed by farmers themselves but more usually by provender merchants and corn chandlers.

**(i) By Farmers.**

In the neighbourhood of colliery villages, particularly in the north, farmers do quite a large trade in retailing bag-lots of grain to poultry and pigeon feeders, small cartage contractors, etc. Wherever town and country are in close contact, a certain amount of this kind of retailing by farmers is done. The total volume of such trade is not, however, great.

**(ii) By Provender Merchants.**

In the sale of poultry foods, horse corn, etc., the methods of distribution of the provender merchants vary considerably. In industrial areas, he frequently uses the railway warehouse as his base in which to store grain bought by the wagon-load and from which to distribute in cwt. or  $\frac{1}{2}$ -cwt. lots. This form of retail forage trade has fallen off in industrial centres and is probably 30 per cent. below pre-War level; but whereas, at one time, the poultry demand only represented 20 per cent. of the trade, it has now-a-days increased to about 50 per cent. Some merchants, located in agricultural districts, work a retail trade in cwt. or  $\frac{1}{2}$ -cwt. lots of poultry and pheasant mixtures and sell to buyers over a very wide area. These mixtures are usually branded and advertised by catalogue or in the press. Wheat is largely used in the mixtures and more is now consumed in this way, and also unmixed, than in pre-War years. It is seldom of high-grade milling quality and usually suffers from some defect which renders it undesirable from a miller's point of view but does not seriously affect the appearance or eating quality of the sample.

**(iii) By Corn Chandlers.**

Many retail grocers and co-operative stores now undertake the retailing of grain, but, in general, most of the business is still done by the corn chandler who sells the grain in small lots to pig and poultry keepers. The largest part of this retail trade in grain consists, however, of wheat for poultry food. As appearance has a good deal to do with the sale of the article, chandlers, especially in the Midlands, west and north-west, prefer to handle white rather than red wheats. For the same reason, they prefer white to yellow oats and apparently hardly use black oats at all. For choice, they handle clipped oats rather than natural oats and are inclined to prefer a "clipped" American oat to the natural home article, although the bushel weight of the former, even when clipped, is lower than the natural bushel weight of the latter. The prejudice against black oats seems unfortunate in face of the increasing home production of winter oats—which are mostly black or grey.

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## CHAPTER XV.—NOTES ON PROCESSING AND DISTRIBUTION OF CEREAL PRODUCTS.

In a report on the marketing of cereals, it is only necessary to refer to the aspects of processes, such as flour milling, malting and provender milling, which may have some bearing on the demand for home-grown grain.

### (i) Flour.

(a) *Milling*.—Large millers manufacture and advertise their own special brands of breadmaking flour and naturally seek to maintain the quality of each brand at a uniform level. So far as possible, the basic wheats in the grist mixture are, therefore, kept the same, although adjustments have to be made, from time to time, according to the wheats available and their relative prices. Uniformity in baking quality is secured by having the flour specially tested each day, either on the mill premises or, by arrangement, in an adjoining bakery. Millers in this country generally regard the baking test as the only one of real value and do not rely on the percentage of protein present as an indication of the strength or baking quality of the flour. The miller usually tests not only his own flours but also those of his trade rivals. Where a firm owns several mills throughout the country, the flours from each mill are sent daily to one centre where they are baked and tested against one another. It will be seen that, no matter what mixtures are used or where the mills are situated, the chief concern of the miller is to attain uniformity in the quality of his product. The lack of uniformity in the quality of English wheat as at present delivered is, therefore, regarded by the large millers as an obstacle to its more extended use. Its quality varies according to variety and district and even within the limits of any one consignment. It might be possible to avoid such variations by some organised system of assembling, grading and storing (see Chapter VIII), but, apart from this, greater uniformity than at present could, to some extent, be attained by standardising production types as far as practicable, while business would be further facilitated and buying on description made possible if wheat, when offered for sale, were classified by variety and district on the basis of some agreed standard probably related to a fair average quality sample (see page 90 and pages 169 to 172).

Turning to the other side of the miller's problem, it is unfortunate that millers who use a fairly high proportion of native wheat in the production of bread flours find it necessary to hide the fact, so far as possible, in case it spoils their trade with the baker, who, if he knew that the flour contained much English wheat, would be instinctively disposed to blame it for any faults arising in the course of baking. In point of fact, however, there are many flours on the market containing a high proportion of English wheat which not only yield loaves of the highest quality but also the customary number of loaves to the sack. In practice, English wheat is usually submitted to a process of conditioning or drying before milling, just as, on the other hand, dry, hard, imported wheats are usually tempered with water. Some of the larger inland millers, when using

what is, for bread-baking purposes, a relatively high proportion of English wheat, so adjust the mixture as to produce a dry type of flour containing only about 13 per cent. of water. This reduces the flour output of the miller but the baker is able to add as much water and get as many loaves out of a sack of this flour as he can get out of a sack of stronger flour containing 15 or 16 per cent. of water, which is the usual moisture content of commercial flours.

The manufacturing problems of the small country miller also require consideration. He specialises, to a large extent, in the production of biscuit flour and of flour for confectionery and household use. He, therefore, uses a large amount of English wheat. Biscuit manufacturers, especially, demand all-English flour, although some definitely exclude the use of Yeoman wheats. The manufacture of biscuits goes on all the year round and the confectionery and household demand is also fairly steady, but the supply of English wheat almost disappears late in the season. In consequence, the country miller has practically to shut down for a period of the year. He cannot, therefore, run his business on an economic basis or hope to compete with the port miller, who is in the position to secure regular supplies. The more efficient small mills generally try to keep running by resorting to soft red winters and white Pacific wheats, while French wheat—from the northern provinces—or German wheat can be and are used at times in lieu of English. It seems desirable, therefore, that the farmers should consider ways and means of keeping one of their best customers—the small country miller—in business. This suggests the need for a system of more orderly marketing in order to stem the present rush of supplies at harvest time and avoid the subsequent shortage (see Chapters I and XVII (iii) (a)). Further, some action seems to be desirable in the direction of stimulating the demand for the products of country mills, particularly all-English flour for confectionery and household use. There is, in fact, scope for the definition of standards of quality and for distinguishing the goods which conform to the standards by means of some mark easily recognisable by buyers. A scheme might possibly be devised under which all-English flour of recognised grades could bear the National Mark under the Agricultural Produce (Grading and Marking) Act, 1928.

There seems a further possibility, which has not yet been fully explored, that all-English flour has points to commend it to the baker for special lines of bread provided it is of a reasonably high standard of quality. Bakers are not, however, likely to demand or knowingly accept all-English flour, or even flour containing a high proportion of English wheat, unless they can rely on the quality. For this reason, there is much to be said for defining quality standards for types of flour consisting of all, or a high proportion of, flour from native wheat and, if possible, linking these standard flours to corresponding standards of quality for home-grown wheat in order that some common distinguishing name or mark might be applied to both.

It is, of course, as well to recognise the fact that millers, as a whole, in the general process of manufacture, are apt to meet with

a little extra trouble when using English wheat. Its softness and, to some extent also, its greater moisture content make it more difficult to work than the harder, drier types of imported wheat. Differences in the results obtained when milling home and imported wheats may, perhaps, be best illustrated by taking the particular case of a small mill situated on a river near the east coast. This mill has a normal capacity of from 9 to 10 sacks per hour. The best type of foreign wheat may be milled at the rate of  $12\frac{1}{2}$  sacks per hour and yields from 70 to 72 per cent. of straight run flour; an undried, natural, English wheat, on the same dressing, will only yield, on an average, from  $67\frac{1}{2}$  to 68 per cent. of flour and run not more than 9 or 10 sacks to the hour under good conditions. The output of all-English flour in this mill averages from 7 to 8 sacks per hour one day with another. By giving a quicker release, from 8 to 10 sacks are obtainable, but the grade is apt to suffer in consequence. Too much emphasis need not, however, be put on these facts, since similar results would occur if imported types of soft wheat were used, as compared with hard wheat. Further, every individual miller's case is a particular instance and much depends on external factors, such as river fogs, as well as on the type and efficiency of the milling plant and on the drying or conditioning methods in use.

Finally, some reference should be made to the bleaching of flour. This is incidental to the process of milling and has only a slight bearing on the use of English wheat. The practice is very general and few firms make any secret of the fact that they employ it. As things are at present, bleaching appears to be almost a business necessity.\* There is, however, a growing tendency, as yet but slight, for buyers to specify that flour shall be unbleached and untreated. This has been a practice with biscuit factories for a long time and seems also to be becoming the practice of large bread-baking factories. Many millers welcome this tendency amongst bakers and look forward to the day when the intrinsic qualities of flour, apart from extreme whiteness and maximum strength, will be the determining factors in the baker's choice. Any increased demand for unbleached flour of a good colour should react advantageously on the demand for home-grown grain.

(b) *Distribution.*

Wholesale.

The distribution of imported flour is naturally in the hands of merchants, but home-milled flour, particularly that ground at the large port mills, is chiefly distributed direct in wholesale quantities from the miller to the baker, confectioner or other user. Sales are, as a rule, made by private treaty through the agency of the travellers employed by the millers. The miller may know the baker's requirements and supply the necessary blend of flour, or, as in Scotland, the baker, with his knowledge of the miller's brands, may order a proportion of each, say,  $\frac{2}{3}$  "Spring" and  $\frac{1}{3}$  "Winter" flour, and do his

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\* Report of the Ministry of Health Departmental Committee on the Treatment of Flour with Chemical Substances (1927).

own blending. Terms are usually quoted on a delivered basis. In many cases, the large port millers have adapted railway warehouses or have purchased disused inland mills for use as central distributing depots from which to supply the surrounding towns and villages.

The method of distribution adopted by the small country miller depends largely upon the class of flour milled. He usually makes 3 or 4 classes of flour. The class containing a high proportion of foreign wheat-flour is delivered direct to local bakers within a 20 or 25-mile radius. Of the all-English flour, or that containing a very high proportion of English, about one-half is, as a rule, sold direct to biscuit factories and large mills for blending purposes, and the other half to flour factors for subsequent distribution to mills or to the provision trade. Some country millers make their own special brands of self-raising flour which they advertise by name and sell direct to grocers within a 40 or 50-mile radius, or even further.

Biscuit factories obtain most of their flour direct from country millers and, at times, draw supplies from considerable distances. The biscuit manufacturer makes his offer on the basis of a flour sample submitted by the miller; he also tests consignments and may reject any not in accordance with the sample. Contracts between the miller and the biscuit manufacturer run for a period during which delivery is required in regular specified quantities. Since many of these contracts are made at the beginning of the season when the prices of English wheat are generally low, millers quote flour for forward delivery at low rates on the basis of prices prevailing at the time. They are constantly thereafter trying to buy wheat at prices low enough to meet their contracts, with the result that, in the absence of effective competition for English grain from port millers, there is a tendency to prolong the seasonal depression in the price of English wheat (see Chapters IV and XVII (iii) (a)). It should be remembered, in this connection, that there are very few buyers of biscuit and blending flour, and many sellers; consequently, millers have to cut quotations very closely in order to secure the trade and keep their mills running.

Business between the flour factor and the country miller is mostly done by post or telephone, although the miller may attend Mark Lane or other produce exchange, and the factor, or his travelling representative, may call on the miller or meet him at some of the larger country markets.

#### Retail.

The grocer and provision merchant, corn chandler and retail establishments of the general-store type all take part in the retail distribution of flour along with the baker. In the north of England—say, from Chesterfield northwards—a large part of the bread, from 60 to 70 per cent. in some counties, is baked at home and, therefore, the grocer and general-store play a greater part in the retail distribution of flour than the baker. In the agricultural counties of the east, perhaps 15 or 20 per cent. of the bread is still baked at home. In Wales and the west, the retail store formerly sold a large amount of

flour for making home bread, but the baker's bread has now superseded this trade. In the Midlands and south of England, and in Scotland also, the baker, through the medium of bread, is now supreme as a retailer of wheat-flour. In all parts of the country, the grocer and general-store do most of the trade in scaling flours for puddings and pies, and self-raising flours for household use, although the baker also shares in this trade.

Flour intended for household use is either bought from the miller or flour factor in sack lots or more and made up by the retailer in quantities as required by customers, or, as is becoming the more general practice—especially in the case of specialities like self-raising flours, the flour is first packed by the miller in bags of 1, 2, 3½, 7 lb., and so on, before dispatch. This method is more economical, as the flour is packed and weighed by machinery at the mill. As a rule, the bags are branded and the miller advertises his brand under some attractive name throughout the district in which he normally distributes his produce. The intention in such cases is to induce the housewife to ask for a particular brand which she knows suits her purpose, but, in practice, she is still disposed to ask the retailer only for "plain" or "self-raising" flour. Since the various brands of plain or self-raising flour vary considerably in composition and behaviour, it is not astonishing if very variable results are obtained in the process of home baking. This, again, seems to point to the desirability of having a uniform mark which could be easily recognised by the housewife as covering any or all reliable brands of all-English flour of a certain standard of quality. The possibility of attaining or defining this standard is, at any rate, worth exploring (see page 143).

(c) *Distribution of Milling Offals.*—The disposal of milling offals follows a different course from that of flour. Offals are frequently sold ex-mill to the farmer, who, after delivering grain to the mill, takes away a return load. In the main, however, the country miller disposes of his bran to the merchant and, in this way, is assured of a more regular outlet. In Norfolk and other parts of the eastern counties, country bakers are frequently styled "bakers and offal merchants." To keep his account open with this class of baker, the miller must often be prepared to supply 1 ton of offals with every ton of flour; hence, the country miller is occasionally forced into the position of having to buy imported offals to meet his customers' requirements.

(d) *Baking.*—The industrial revolution in milling came late in the 19th century, while in baking, the revolution really only commenced at the beginning of the present century and is still proceeding. Before the War, small bakers were going out of business in the face of competition from large factory bakeries. This process was arrested during the War and has since been in abeyance, mainly through the action of local associations of bakers and confectioners. These associations have been largely instrumental in preventing cut-throat competition, with the result that there is still

in existence a large number of small one-man bakeries using little or no machinery. At the moment, the large factory bakers appear to be applying their resources in the direction of installing larger travelling ovens, buying improved equipment, such as high-speed mechanical mixers, and extending their premises with a view, in every case, to dealing with an output well beyond their present capacity.

The technique of baking is highly developed and the large factory bakeries usually employ a specialist who is well acquainted with the chemistry of the subject and competent to test and mix the various brands of flour before use. The amount of water and other ingredients to be added in order to secure the best results is determined with accuracy and the product can, as a rule, be turned out according to specification.

In the usual process of baking, to each 280-lb. sack of flour there is generally added 140 lb. of water,  $2\frac{1}{4}$  lb. yeast,  $3\frac{1}{2}$  lb. salt and probably 1 lb. malt extract or its equivalent of malt flour, with, it may be, some other form of improver. The number of loaves obtained from a sack of flour has already been dealt with in Chapter I, when discussing the quality of wheat. The nature and amount of the ingredients used vary according to the process employed, and this differs from one district to another. It may be remarked, however, that the practice of using sugar, lard, milk, cornflour and other ingredients, as commonly observed in America, is not extensive in this country. A more extensive use of milk has, however, been suggested as a means of increasing the commercial possibilities of all-English flour for bread-making purposes. Such tests as have already been made in regard to all-English milk-bread are encouraging and the matter seems worthy of further attention.

The older, long-process method of baking, involving the preparation of a sponge and a dough, still persists in some parts, especially in the North, but the short-process of making a straight off-hand dough has, in recent years, largely superseded this system throughout England. In the long-process, it is necessary to use very strong wheat-flours in the sponge if the best results are to be obtained. On the other hand, the short-process apparently does not allow sufficient time for the strongest flours to ripen to their optimum point. Hence, a greater proportion of softer flours can be used with advantage in the dough. To some extent, therefore, conditions in the baking industry are now more favourable than formerly for the more extended use of home-grown wheat-flour.

In recent years, changes have also occurred in the type of loaf produced by bakers. Before the War, the cottage loaf was commonly favoured, but the pan or tinned loaf has since become established as the one most in demand. Some bakers, 90 per cent. of whose trade before the War was in cottage loaves, report that now over 90 per cent. of their output consists of tinned bread. Since the cottage loaf must stand upright of its own accord, it must be made of a tighter—i.e. drier, dough and generally requires a stronger flour than the pan loaf. Tinned bread, on the other hand, has the lateral support of the tin while in the oven, and good,

shapely loaves can consequently be obtained from weaker flours than those used in the manufacture of cottage loaves. Here again, conditions appear to be such as would favour a more extended use of English wheat-flour.

The practice of wrapping the bread before sale has not, as yet, extended very far. As wrapping tends to preserve the flavour and to retard the staling of the loaf, the general adoption of this practice might also react favourably on the demand for English wheat-flour.

Unfortunately, the yield of loaves per sack of flour is still the paramount factor in commercial baking. Any shortcomings in this respect tend to neutralise all other influences which favour the use of English wheat-flour in bread-making. It is obvious, of course, that if a sack of one flour yields more than a sack of another, the difference is merely due to the extra water retained. While the presence of water is natural in certain foods up to a point, it seems a question worth considering whether, in the case of bread, the amount of water normally present has not become excessive owing to the force of competition, the use of "improvers" and the application of science in the baking industry. It seems to be generally true that the best white bread contains a lower percentage of water than that commonly sold. It has been suggested, therefore, that a statutory limitation of the percentage of water in white bread to, say, 35 per cent. and in brown bread to, say, 40 per cent. would materially improve the quality, palatability and nutritive value of the bread sold throughout the country. There are precedents for a regulation of this kind in Australia and the United States of America, although there may be difficulties in the way of applying it here. Incidentally, any move in this direction would have a beneficial reaction on the use of English wheat-flour for bread-making, since the present extent of its use for this purpose tends to be limited by the fact that English wheat-flour is not the best medium for absorbing and carrying water.

(e) *Distribution of Bread.*—Millers in this country sometimes take part in the baking and distribution of bread but the practice is perhaps more common in the Irish Free State. Some hold the view that it may eventually prove to be good policy for millers to follow the brewers' example and link up with retail establishments so as to provide a regular outlet for the products of their mills. Among the larger provincial millers, there are instances of steps being taken in this direction and a few relatively small country millers dispose of all or nearly all their flour through directly owned or associated bakeries with very successful results. A somewhat similar connection between miller and baker may be observed in the relations between the Co-operative Wholesale Society and certain of the retail industrial co-operative societies whose bakery managers, on the instruction of the Committees, may take all or a certain proportion of their flour requirements from the mills of the wholesale organisation.

The large factory baker who turns out thousands of loaves per

hour generally sells his bread in wholesale quantities to retailers within easy reach of his bakery, but many of these large firms own or control confectionery shops, cafés and similar retail establishments for the sale of bread, cakes and confectionery. The wholesale distribution of cakes and confectionery is already conducted over a very wide radius and some firms now operate and distribute on almost a national scale.

Owing, perhaps, to the continued existence of small retail bakeries, the distribution of bread has hitherto been conducted very largely on a local basis. There is every indication, however, that the wholesale distribution of bread will eventually follow the lines of, and be on a similar scale to, the wholesale distribution of cakes and confectionery.

#### (ii) Malt, etc.

(a) *Manufacture.*—The country maltster may either produce a range of 4 or 5 different classes of malt, from best pale ale to a coloured malt, or he may confine his attention to one type only. In the latter case, he obtains the bulk of his barley supplies from the merchant who can offer a large number of samples of uniform type. In the former case, the maltster usually purchases, direct from farmers, the particular classes of barley which yield the types of malt required by his brewer customers.

Owing to the increasing use of malt flour and malt extract in baking both white and brown bread and in the preparation of malted food products, some country maltsters have extended their processing to the manufacture of malt products of various kinds. There has always been an outlet, other than brewing, for some of the maltsters' products, as, for instance, for a good extract which is not clear enough for beer or for a malt just a little over-fired but suitable for brown bread. In recent years, this special market demand has, however, been curtailed by the swiftly mounting exports of the United States, to which previous reference has been made.

The country maltster, operating in districts where the barley is grown, generally prefers to handle home-grown grain, and it requires an appreciable financial inducement for him to make a change-over. The country malthouse usually consists of a kiln and a malting floor, and kiln-drying of the grain, for the purpose of obtaining a more even and higher degree of germination, is regarded as a natural concomitant of the malting process. In recent years, however, there has been a tendency for brewers to do their own malting—a tendency which has probably been accelerated by the introduction of the pneumatic malting cylinder. They generally prefer, so far as possible, to eliminate the process of kiln-drying and, on that account, are more likely to buy dry, imported barleys which have already a high percentage germination for use in the mechanical maltings.

For technical reasons, maltsters and brewers appear to use at least 25 per cent. of foreign barley, even although, in order to maintain this proportion, a relatively higher price must be paid for the imported article. In the process of malting, it is



claimed that certain kinds of imported barley give more reliable results in the warmer weather experienced at the beginning and end of the malting season, so that natural circumstances favour the use of imported grain to a certain extent. Further, in the process of brewing special kinds of pale ales, it is claimed that certain types of imported barley are to be preferred to home barley, since their use gives more stability to the beer and makes it clearer and more sparkling. Certainly, the modern taste for clear beers has given an impetus to the use of imported barleys, but, to some extent, this has been counteracted by changes in processing, as for example, by the introduction of chilling, whereby matter in suspension is rapidly precipitated, and by the introduction of carbonisation, which adds sparkle to the beer. In regard to distilling, it may be noted, in passing, that recent changes in the method of producing yeast, whereby this may be accomplished without making any very appreciable quantity of spirit, may tend to reduce the amount of barley, both home and imported, required by the distilling industry.

There is quite evidently a growing tendency to favour the use of imported grain in the malting and allied industries, and, in practice, there would seem to be a greater quantity of imported grain used than is required by natural circumstances. In the face of the falling output of beer and spirits, and the consequent reduction in the demand for barley as a whole, it seems desirable to examine possible ways and means of increasing the proportion of home-grown barley used.

Recently, there has been a vogue in dark-coloured speciality beers primed with malt extract. To some extent, this may tend to favour the more extended use of English malt, but it seems a matter for consideration whether something further could not be done in the way of promoting the sale and consumption of all-English beers. In the autumn of 1928, the Norfolk County Branch of the National Farmers' Union, arising out of a well-directed propaganda campaign, was successful in getting a brand of all-English beer put on the market locally. It seems a question whether the brewing industry could not be induced to take similar steps on a national scale. It would, however, be necessary to have some assurance that malt made from English barley was, in fact, used in the process and that the article, as sold to the public, corresponded to certain standards in regard to specific gravity and other factors. It seems desirable that any such standards for beer, and incidentally of malt or malt products, should be correlated with corresponding standards for home-grown barley.

In this connection, it is necessary that the barley grower should recognise the trend of affairs in the associated industries concerned with his product. In recent years, particularly, there has been a tendency towards the amalgamation of small firms and the concentration of processing in fewer and larger units. This is resulting in an increased demand for larger quantities of a uniform quality of barley. Conditions in this respect are beginning to resemble those already existing in the case of wheat, where the uniformity of

quality obtainable by the purchase of imported grain in large quantities enables the actual routine of processing to be carried on with the minimum of supervision. This movement in the brewing industry has not proceeded so far as the similar movement in flour milling, but progress appears to be accelerating. Since there is, as yet, no corresponding movement on the part of home producers to meet this increasing demand for larger quantities of uniform quality, there is a danger that the proportion of home-grown grain in the mash tun will go on decreasing as processing becomes concentrated into larger units. For this reason, it is desirable that farmers should give serious attention to the possibility of standardising production types by concentrating on growing certain dominant varieties, as has been done, to some extent, in Denmark, Ireland, Canada, California and elsewhere. This would appear to be a necessary preliminary to the definition of standard quality grades within each variety with the object of facilitating business in the home product (see Chapter VII).

(b) *Distribution*.—The produce of the maltster is, in the main, distributed to the brewers. The large brewers appear to obtain only about 20 per cent. of their requirements from independent maltsters and to malt the other 80 per cent. on their own premises; these proportions are, of course, liable to variation with the season. The small brewer obtains his requirements through the maltster or large brewer-maltster, but the number of small brewers is decreasing each year.\* The lessened demand from both large and small brewers during recent years has resulted in the closing down of numbers of country malthouses; a certain reaction appears, however, to have set in and some brewers now seem to find it more advantageous to make large use of the efficient services which the country maltster is often able to render.

The maltsters engaged in producing malt flour and malt extract for use in baking, etc., mostly sell direct to individual bakers. There is some slight indication of combination amongst those engaged in the production of patent foods, but, in general, the other manufacturers maintain a strict individuality, working very much apart and almost in secret. It seems worthy of consideration whether the various isolated units engaged in the business ought not to get into closer touch with one another, standardise their products so far as practicable—possibly with a view to the application of a common mark to indicate all-English produce of defined quality—and, by a combined advertising and sales organisation, develop the market all round. The home product, by virtue of its superior quality, ought to increase its hold on the market in spite of increasing foreign competition.

### (iii) Meals and Provender.

(a) *Milling*.—In the manufacture of oatmeal and preparations such as pot and pearly barley for human consumption, the outer

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\* In 1913, there were in England 3,643 commercial brewers; in 1927, there were only 1,550. In Scotland, the corresponding figures were 75 and 49.

skin or husk of the grain is removed, but, in provender milling for cattle food, the whole grain is milled.

Before home-grown supplies can be properly husked, it is generally necessary to kiln-dry the grain. The miller, therefore, suffers a loss in weight owing to the evaporation of water. The fresh meal made in this way is full-flavoured and contains all the essential oils of the grain, but it tends to deteriorate rapidly and must therefore be distributed quickly.

The manufacture of groats and rolled, partially-cooked oats, in this country is extending. The oats, after being husked, are passed over a hot roller which drives out more of the oils and removes more of the moisture. The resulting product, however, can be kept longer and commends itself also to consumers by reason of the fact that it takes less time to cook and prepare for the table. As the shrinkage of weight involved in this process is considerable, millers are inclined to favour the use of the drier, imported oats. The produce of home-grown grain is, however, considered to be superior in flavour and palatability to that made from imported grain.

In provender milling, imported grain is generally preferred on account of its dryness. Since kiln-drying is considered too expensive to be applied to the manufacture of cattle food, an admixture of foreign grain is frequently used when milling home grain for this purpose. Oat "shudes"—i.e. the husks obtained in the process of manufacturing oatmeal, are also used in these mixtures in order to make the whole grist sufficiently dry for manufacturing, and these are usually worth about £2 per ton to millers of barley meal and compound feeding-stuffs. The addition of husks was, however, frequently carried to excess, and the passing of the Fertilisers and Feeding Stuffs Act, 1926,\* under which their presence must be declared, has given oatmeal millers some concern regarding their disposal.

Finally, mention should be made of the fact that, in the large meal factories abroad, valuable by-products are manufactured from the husks. By treating one ton of oat husks with sulphuric acid and steam, 300 lb. of furfural can be obtained, which finds a ready market at 6d. per lb., for the manufacture of synthetic resins which, like celluloid, are worked up into various articles for everyday household use. There would seem to be room for oatmeal millers in this country, either jointly or individually, to consider the better processing of the by-products of their industry.

(b) *Distribution*.—The method of distribution of meals and provender depends largely on the type of the product, the size of the business and the location of the mill. Meals and feeding-stuffs manufactured by the large provender millers in the port areas are chiefly sold to corn and agricultural merchants on the port produce exchanges or at the larger corn markets throughout the country. Many of these large firms, however, employ their own travellers in selling direct to farmers and other buyers.

The small provender miller located in a country district is often

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\* 16 & 17 Geo. V., Ch. 45.

disinclined to deal direct with farmers and generally prefers to sell his product to agricultural merchants, by which means he is assured of a better and more regular outlet. A similar type of miller located in an industrial area, such as in parts of Lancashire, will usually, however, go much further than the larger firms in dealing with producers direct, and will sell in small 1-cwt. or  $\frac{1}{2}$ -cwt. lots to cottagers, poultry and pig feeders and may even own a retail shop where still smaller lots are sold.

Millers of pot and pearled barley for human consumption find the best outlet for their products in the north of England. They generally sell to grocers and large consumers direct within a radius of 25 or 30 miles; produce going further afield is usually sold to the wholesale provision merchant. Where the miller's output consists of some special type of prepared or partially cooked barley, the goods are generally packed in cartons at the mill. The brand used on the carton is extensively advertised by the makers, but the method of distribution remains the same.

Manufacturers of oatmeal also find their best market in the North. While some fresh oatmeal is distributed by northern millers to London, South Wales, etc., the product mostly consumed in southern areas consists of partially cooked oats. Most of the fresh meal is distributed direct by millers to grocers and institutions within a 25 or 30-mile radius and, although the wholesale provision merchant does the long-distance trade, there is rather more direct trading between the manufacturer and the distant retailer in this case than in the case of barley. With oatmeal, also, a greater use is made of brands and cartons, especially for partially cooked, rolled oats. In this case, the cartons are not always packed at the mill, but the required number of cartons may be sent along with each sack of meal and the packing left to the retailer. Since a sack of meal, after leaving the mill, gains in weight about 5 per cent. in a week owing to the absorption of atmospheric moisture, the retailer runs little or no risk of losing by the turn of the scale.

An oatmeal millers' association some time ago proposed to introduce a common brand to indicate home produce, but some of the members could not guarantee to use home-grown grain only and the proposal fell through. It would still seem to be desirable to move along the lines of a uniform, recognisable mark for home produce, notwithstanding the recent Order-in-Council under the Merchandise Marks Act, 1926, which requires the marking with an indication of origin of imported oat products on importation and on sale, both wholesale and retail. The oat products covered by the Order-in-Council include oatmeal, rolled oats, oat-flour and groats, but not bruised or crushed oats. The position to be explored is whether standard quality grades can be established for any or all of these products manufactured from home-grown grain, and schemes drawn up for using, possibly, the National Mark under the Agricultural Produce (Grading and Marking) Act, 1928. This applies also to preparations such as pot and pearled barley for human consumption. The fact that these products are extensively packeted increases the opportunity of appealing to the consumer.

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## PART VI.—THE SEED TRADE.

### CHAPTER XVI.—DISTRIBUTION AND CONTROL OF SEED.

#### (i) Supplies.

(a) *Quantity.*—The amount of seed sown varies from one district to another, being higher as a rule in the north than in the south; it varies with the time of sowing, more being used for late than early sowing; it varies also with the method of sowing, more being used for broadcasting than for drilling. In general, the rate of sowing wheat varies from  $1\frac{1}{2}$  to  $3\frac{1}{4}$  bushels, barley from  $2\frac{1}{2}$  to 4 bushels, and oats from 3 to 5 bushels per acre. The normal seeding may be regarded as  $2\frac{1}{2}$ , 3 and 4 bushels per acre of wheat, barley and oats respectively. On this basis, the seed sown in England and Wales in 1927 would amount, in the case of wheat, to about 100,000 tons, of barley to about 70,000 tons, and of oats to over 120,000 tons. Only part of this enters the market. It is estimated that 75 per cent. of the wheat seed sown by farmers is grown on their own farms, the percentage of barley being 80 per cent. and of oats 85 per cent. This leaves, therefore, about 25,000 tons of wheat, 14,000 tons of barley, and 18,000 tons of oats as the total market requirement for seed purposes of the farmers in England and Wales in 1927. These are merely rough estimates, but they serve to give perspective.

An enquiry made by the Ministry of Agriculture and Fisheries in the autumn of 1925 regarding the sources of seed wheat in the eastern counties\*, showed that practically one-third of the seed purchased by farmers was obtained from their neighbours and two-thirds from seed merchants, and that only a small proportion of selected, high quality, somewhat expensive seed was sown. Independent enquiries made in other parts of the country, also in regard to the other cereals, showed similar results, but much, of course, depends on the relative price of seed and other grain, and on the season.†

Taking these proportions as normal and applying them to the estimates given above, it may be said that roughly 17,000 tons of cereal seed pass directly from farmer to farmer, 34,000 tons are handled by the local corn, seed and agricultural merchants, and about 6,000 tons are put on the market by the large specialist seed firms and, to an increasing extent, the plant-breeding stations.

(b) *Source.*—As already indicated, the source of seed supplies is mainly local. In the south-eastern counties, the large acreage of Yeoman and Little Joss wheat is grown from seed originally pro-

\* Journal of the Ministry of Agriculture, April, 1926.

† Compare with corresponding figures for wheat in 1927; Journal of Ministry of Agriculture, July, 1928.

duced at the National Institute of Agricultural Botany, Cambridge. From this centre, these varieties have gradually spread outward over the whole area and into other parts of the country. Cambridge, Norfolk, Suffolk and Essex are the chief exporting counties for wheat seed, which, from these counties and particularly from Essex, is regularly sent as far afield as Somerset, Yorkshire, Scotland and the north of France.

The south-eastern counties are also noted for high quality malting barley, which, to some extent, implies a reputation as a source of seed barley. Of recent years, however, considerable trouble has been taken in Ireland to improve the standard and character of seed barley, and, in consequence, Suffolk and Norfolk have, in turn, drawn on Irish sources for supplies. The introduction and increasing cultivation of Spratt Archer, for instance, can be traced to this source. The export of barley seed to other parts of this country and to the Continent is greatest from Norfolk, but does not appear to be so widespread or extensive as the corresponding distribution of wheat seed.

For oats, it is difficult to define any special source, although Cheshire appears to have some reputation for seed oats. There is, however, a distinct movement of seed from Scotland southward, particularly into the north-western counties of England, and from Cumberland and Westmorland into Anglesey and North Wales. Hereford and Monmouth maintain a seed trade with Wales on the one side and with the Midlands on the other. Wiltshire seed, grown on the chalk, is considered good and is sold northward as far as Scotland, where the practice, so far as there is any regular feature, is to look to the east and south-east for seed, or to change from highland to lowland and to draw occasional small lots from Sweden. Oat seed from Scotland has been grown in the south-eastern counties with a view to providing good meal-milling oats for local manufacturers, but the change in environment has, as a rule, so modified the product that its characteristics have been lost. It is possible, however, that the time of cutting the crop may be partly responsible for this alteration since, in Scotland, oats are frequently cut before they are quite ripe.

In the case of wheat and oats, most farmers believe in changing their seed every 2 or 3 years by buying enough fresh seed to supply themselves with their own saved seed in the following year. In the case of barley, the practice is not so general. "Change wheat ever, barley never," is a saying which seems to reflect the mind of many farmers, who believe that a good line of barley is better kept unchanged. Apart from the tendency to change seed from one district to another, farmers are also inclined to change within the district from hill to vale and back again, or from heavy to light soils and vice versa.

In general, one may remark a movement of seed wheat from the south-east of the country to the west and north; of seed barley, from the south-east northward; and of oats from the north to the south and south-west, and a slight return movement northward from the south and south-east. In supplies of seed, Great Britain

and Ireland are self-supporting, although small quantities of wheat for spring sowing from Canada and France, of barley from Denmark, and of oats from Sweden, are occasionally used. In the main, however, although there is no actual record of quantities, this country appears to export considerably more seed wheat, barley and oats than it imports. It seems worth considering whether this export trade could not, in some way, be developed.

### (ii) Merchants and Methods.

Merchants engaged in the general grain trade also share in the distribution of seed. There are also specialist types of seed merchant and seed farmer-merchant.

As a rule, the country corn and agricultural merchant assembles and distributes seed within his own local area. He buys from farmers in the district and sells to others in the same district. He simply selects some well-dressed sample offered to him in the ordinary course of business and decides that it is good enough for seed. He has a sample tested for germination, etc. and sells to farmers on that basis. He may, however, sell the grain to another merchant as seed, in which case it is not necessary for him to have it tested provided the buyer undertakes to do so.\* Of the seed bought and sold by these local merchants, apparently not more than about one-third is physically assembled at a depot or warehouse, the remainder simply passing direct from loading to unloading station in the usual way. Not more than from 5 to 10 per cent. appears to be dressed-over or treated in any way before being issued as seed and, at the most, this is run through the hand-winnowing machine to remove the dirt and light grain. The process is fairly satisfactory so far as it tends to clean and sort out the grain with the highest specific gravity, which appears to be the most suitable type for seed purposes; but as it is difficult to ensure a regular current of air, an even sample is not generally obtained.

The specialist seed merchant frequently supplies farmers with seed to be grown under special contract conditions. In such cases, the merchant undertakes to buy all the crop produced from the seed at a price specified beforehand; some provision is usually made regarding the cultivation of the crop and also for "roguing," especially in the case of black oats. The specialist firms often employ trained botanical staffs and make a point of selling selected lines of seed, which are extensively advertised by catalogue throughout the country. As a rule, the price asked for these special lines is considerably above the ordinary day-to-day market price of grain and is higher than the ordinary farmer can afford to pay for all the seed he sows. The specialist merchant may also, on occasion, buy seed in the ordinary way from farmers or country merchants. As a rule, he takes such lots to his central warehouse and there screens, winnows, brushes and sometimes hand-picks the seed before dispatch to buyers.

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\*See later section for Regulations as regards seed testing.

The seed farmer-merchant is not a common type. He is, however, to be found especially in areas where small seeds for root crops, flowers and vegetables are also grown. He grows cereals for seed and may contract with his neighbours in much the same way as the large specialist seed firms. He conducts his sales by catalogue and post as the large merchant does.

*Farmers' agricultural co-operative societies* engage in the seed trade also, but here, as in other phases of their business, their methods do not differ materially from those of the merchant. Quite a number of these societies throughout the country have their own premises and plant for dressing the seed. They do not, however, engage in inter-trading to any great extent, for each society, when dealing outside its area, appears to transact business mostly with the agricultural merchant. It has been suggested that there is room for the establishment of a form of clearing-house which farmers' co-operative societies might use for the mutual exchange of seed and other products. Several of the societies are favourably placed in regard to seed supplies and, were a system of exchange adopted, they should be in a good position to supply seed of first-class quality at a moderate price.

### (iii) Plant Breeding Institutes.\*

Although crossing occasionally occurs naturally, particularly in the case of oats, cereals are self-fertilised so that grain normally resembles the parent seed in every material respect. A plant may be considerably modified by its environment, and a grain of seed sown in a sheltered part of a field, and in specially favourable circumstances as regards manure or some other factor, may produce an exceptional plant; but if the grain of this plant is selected and held over to another year and sown in ordinary field conditions, the resulting product is almost invariably the same as the original crop. This does not mean that progress is never made by the selection of isolated plants, for this was the only method employed for improving cereals until late in the last century. Owing to the occasional occurrence of natural crosses, the method has, on occasion, met with some success, but, at best, it is a haphazard business and the chances of improvement by this method seem remote.

The re-discovery of Mendel's principles of breeding, however, has made it possible for the modern plant breeder to produce new varieties of cereals scientifically, and more or less at will, by crossing those varieties which contain the qualities it is desired to reproduce.

During the last half of the 19th century, considerable progress was made by plant breeders in Canada and Australia. Commercial firms in this country also practised hybridisation, but their efforts did not achieve the success desired. Since the beginning of this century, however, Professor Biffen, at the plant-breeding station at Cambridge, has met with notable success in producing new varieties

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\* See also the following publications issued by the Ministry of Agriculture — "Research and the Land" (price 2s. 6d.) and "Wheat Breeding Investigations at the Plant Breeding Institute, Cambridge" (price 2s. 6d.).



of wheat with improved cropping capacity, as, for instance, Little Joss, and with better milling quality, as in the case of Yeoman, than the general standard type of wheat grown in the country.

Since the War, plant-breeding stations have been established also in Scotland, Wales and Northern Ireland. At Corstorphine, near Edinburgh, and at Aberystwyth and Belfast, research work is being carried forward by highly skilled staffs. In Scotland and Ireland, the aim of the plant breeder is to produce an early-ripening, large-yielding, white, spring oat. At Cambridge and Aberystwyth, on the other hand, so far as oats are concerned, the chief problem is to produce a white winter oat to overcome the drought and frit fly. In Wales, the plant breeders are studying the possibility of improving the native "Hen Cymro" variety of wheat. At Cambridge, in conjunction with the National Association of British and Irish Millers, work is concentrated on improving the strength of English wheat without impairing its cropping capacity. Promising work is also being done on barley.

The work of a plant-breeding station consists of crossing, testing, sorting out likely new hybrids, and propagating these until sufficient seed is obtained to distribute to the trade on a commercial scale. To reach this point takes about 10 years, and even then the work in connection with the new variety is not finished. In recent years, it has been found necessary to tackle also the problem of so-called "reversion," if the ground gained by years of hard work in the laboratory is not to be quickly lost in the commercial field.

Although the experience of plant breeders at Aberystwyth seems to indicate that the crossing of wheat takes place naturally more often than one might suppose to be possible, there is no doubt that by far the largest part of the variations which occur in the character of pure samples of wheat varieties under field conditions are due to the introduction of seed from other commonly grown varieties while the grain is in the barn or in the process of being threshed. It has, therefore, been found necessary to practise mass selection periodically in order to maintain the purity of new types. Samples of the pure line are recalled to the station and sown in such a way that the crop can be easily "rogued"; the re-selected seed is thereafter sent out to the country. It seems a matter for consideration whether farmers should not themselves form pure-line growers' associations to undertake the mass selection and marketing of pure seed, but it may first be necessary to convince farmers that there is a considerable commercial advantage to be gained by sowing pure-line seed instead of mixed stocks.

#### (iv) Quality Considerations.

To judge from the samples submitted to the official seed testing station at Cambridge (see later), there is room for much improvement in the type of seed put on the market. The samples received there for examination are, however, so often sent in on account of their doubtful character that they cannot be regarded as truly representative.

A field survey made by the Ministry of Agriculture and Fisheries in the autumn of 1927\* showed that out of 248 samples of wheat taken on farms in the eastern counties at the time of sowing, 155 contained weed seeds of some kind; 38 samples, or 15 per cent. of the total, were below the minimum percentage germination prescribed by the seeds regulations and, of these, 8 showed less than 65 per cent. germination and one as low as 28 per cent. In many cases, a proportion of small and partly shrivelled grains was also present which germinated in the course of the laboratory tests but would not probably have survived under ordinary field conditions. Further, although in the case of 148 samples the infection was negligible, most of the remainder were heavily infected with bunt.

As such a large part of the seed used does not pass through ordinary marketing channels, one must look to farmers themselves, rather than to the trade, for any considerable improvement to be effected in the general level of seed sown. Although there has been some improvement in recent years and farmers are now beginning to realise the advisability of having their seeds tested, many do not as yet realise the importance of using seed of high quality. So far from appreciating the commercial advantage of sowing pure, instead of mixed, seed, some farmers mix varieties at the time of sowing, hoping in that way to get a higher yield. The farmer, therefore, requires to be shown that there is a definite commercial advantage to be gained by the use of pure-line seed. In this connection, it seems desirable that, in measuring commercial advantage, plant breeders and growers should cease to measure it entirely in terms of yield of grain per acre, but should use, as the basis for comparing varieties, the yield per acre of (1) flour in the case of wheat, (2) malt extract in the case of barley and (3) meal in the case of oats.

#### (v) Seed Testing and Official Regulations.

Official regulation of the sale of seed was not known in Europe in the early years of last century, and, in the last quarter of the century, the practice rapidly extended in Europe, the United States and the British Dominions. The first seed-testing station in the United Kingdom was established in Ireland in 1900, and, by the Weeds and Agricultural Seeds Act of 1909, the Irish Department of Agriculture was given a measure of control over the sale of seed in that country. In 1914, the Board of Agriculture for Scotland established a seed-testing station on a voluntary basis, but no control of the seed trade was attempted.

During the War, the Testing of Seeds Order (1917), under the Defence of the Realm Regulations, sought to prevent the sale of seed with low vitality and containing injurious weed seeds. This brought the United Kingdom into line with other countries.

The Seeds Act, 1920, made permanent the reforms in the seed trade effected by the Testing of Seeds Order of 1917. In general, the Act and its Regulations make provision for the testing of seed at an official seed-testing station which, for England and Wales, is

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\* See Journal of the Ministry of Agriculture, July, 1928.

located at Cambridge. There are, however, a certain number of private seed-testing stations licensed by the Ministry for the purpose of testing the licensee's own purchases and sales.

Between harvest and April 30th, when making a sale of seed wheat, barley or oats, a statement in writing must be delivered to the purchaser within one month of the sale setting forth (1) the name and address of the seller, (2) that the seed has been tested in accordance with the Seeds Act, 1920, (3) the kind of seed, (4) the distinctive name of the variety and (5) the percentage of germination, provided that if such is at or above the minimum percentage specified in the regulations a statement to that effect is sufficient. The minimum percentages of germination authorised by the Seeds Regulations of 1922 are, for wheat and barley 90 per cent., and for oats 85 per cent.

Provision is made for the sale of seed with a lower percentage of germination provided the actual percentage is stated to the purchaser. There is also a limit to the time which may elapse between the making of a test and the sale of the seed.

The Seeds Act does not apply to seeds (1) when sold to a person "purporting to purchase them with a view to cleaning them before they are sold or exposed for sale"; (2) when the purchaser at the time of sale gives the seller "an undertaking in writing that he will, before selling or exposing the seeds for sale, test or cause them to be tested, or that he will not re-sell the seeds to a seed merchant except on a similar undertaking by the purchaser," thus enabling seed to be passed from merchant to merchant without the necessity of a statement containing the prescribed particulars being delivered in each case; (3) when sold for delivery outside the United Kingdom; or (4) when sold for some purpose other than planting or sowing.

It is important to observe that the requirements of the Seeds Act, 1920, affect the sale of seeds from farmer to farmer as well as from seedsman to farmer. A farmer in England and Wales who wishes to sell cereals as seed should send a sample of at least 4 oz. to The Chief Officer, Official Seed Testing Station, Huntingdon Road, Cambridge, together with a remittance of 2s. per sample. If, in the case of a wheat sample, it is desired to have a further microscopic examination made for the presence of bunt spores, an additional fee of 2s. must be sent to cover the extra service. Should a farmer, however, desire only a report for his own use on seed he proposes to sow on his own farm and which is not intended for sale, the test will be made for a fee of 6d. A declaration must be sent along with such sample stating that the test is not required in connection with the sale of seed.

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## PART VIII.—CONCLUSION.

### CHAPTER XVII.—SUMMARY.

#### (i) General.

The quality of the cereals grown in this country ranks high. Our wheat is good. Compared with the average product from abroad it is cleaner, sweeter and more palatable. It is free from insect pests, such as weevils, and yields a high percentage of flour of first-class colour and flavour. Nevertheless, as shown in Chapter IV (iii), the average price of imported wheat is higher than that of the home product. The best barley from our farms makes the finest malt in the world and, on the basis of malt extract, can be relied on to yield more nutriment than the average of imported kinds. Similarly, home-produced oats weigh more to the bushel, are thinner in the skin, cut better for meal and are a better food for both man and beast than any imported from abroad. Home-grown barley and oats, as a rule, command a better average price than the imported grain.

Of the total available supplies in this country, the farmers of Great Britain and Northern Ireland provide little more than 20 per cent. of the wheat, between 50 and 60 per cent. of the barley, and about 85 per cent. of the oats. Of the supplies grown in Great Britain and Northern Ireland, England and Wales alone produce over 95 per cent. of the wheat, from 85 to 90 per cent. of the barley and from 50 to 60 per cent. of the oats, the annual output of England and Wales being roughly  $1\frac{1}{2}$  million tons in the case of wheat and oats and under 1 million tons of barley. About 60 per cent. of the wheat grown in England and Wales is produced in the eastern counties between the Trent and the Thames, and 5 of those counties alone grow more than 50 per cent. of the barley and about 20 per cent. of the oats.

Of imported cereals, the Empire supplies about 50 per cent. of the wheat, 30 per cent. of the barley, and 40 per cent. of the oats. So far as wheat is concerned and in contrast to the position in pre-War years, the exports of the Empire now exceed the import requirements of the Empire, in terms of both wheat and wheat-flour, by about 70 per cent. and, in spite of the large market in the United Kingdom, the Empire, regarded as a unit, has to seek an outlet for its surplus in the other countries of the world. A point worth noting in this connection is that the greater the quantity of high-grade Canadian wheat on offer in this country, the greater is the demand for home-grown wheat (see Chapter I (vi) (c)); to this extent, therefore, Empire wheats are complementary rather than competitive, and any action taken to promote the consumption of all-Empire wheat-flour or all-Empire bread might well have a stimulating effect on the demand for home-grown wheat.

In general, the tendency has been for this country to depend to an increasing extent on imported supplies, and, in the 20 years between 1907 and 1927, although the intervening War period saw a great expansion of acreage, the area devoted to the cultivation of wheat, barley and oats in England and Wales declined by over 800,000 acres. The trend has not been uniform for these cereals, but the reduction is nevertheless significant. Such a notable decline in output suggests the need for a careful study of the various factors and operations involved in the marketing of home-produced grain in order to discover how far the farmer's net returns can be improved within the limitations of his present economic environment. This has been the purpose of the present Report, which, it is hoped, will facilitate the examination which the National Farmers' Union is already making of the subject in all its bearings.

Each cereal presents, of course, different problems and is considered separately in this summary, but reference should first be made to the common defect of inter-farmer competition at points of first sale.

#### (ii) The Need for Unified Selling.

The merchandising of wheat, barley and oats is done on very much the same lines in each case. There is some evidence that avoidable transfers from one merchant to another occur at times in the trade in home-produced grain. There are also signs that farmers selling in small country markets sometimes make unduly low prices compared with those prevailing in neighbouring larger markets. In the main, however, enquiries bear out the fact already admitted that, largely owing to the system of sale by sample, grain is, in general, merchanted in a simpler manner and more efficiently than most other agricultural products, and marketing costs are comparatively low. It is significant that agricultural co-operative societies (Chapter VI (i) (b)), in so far as they undertake the marketing of farmers' grain, operate in a manner similar to the ordinary merchant; they also require a similar margin to meet their costs. In so far as they represent farmers in larger markets which it is not convenient for the individual to attend, eliminate some unnecessary transfers and raise the plane of competition, there is something to be gained by extending the scope of existing co-operative effort, particularly in regard to agency sale (see below). To some extent, and in some districts, the activities of agricultural co-operative societies must certainly be credited with having reduced the merchants' margin, but, apart from transport (see Chapter X), there is not very much room for effecting further operative economies in the general marketing field.

Although the existing merchant system is economical in its method of working, it does not follow, however, that there is no opportunity for farmers to improve their position as sellers on the market. At present, the seller, whether he be a farmer or a merchant, is placed at a disadvantage in every case—probably not so much with oats as with barley and milling wheat—owing to the fact

that sellers are many and buyers are few. The final buyers are very few indeed, and although there is a free market in the sense that each side is free to "take it or leave it," there is, in fact, no equality of opportunity or bargaining power between buyer and seller. Collective bargaining by farmers on national lines is out of the question as regards cereals in present circumstances, but it is worth considering whether, as a first step in organisation, it is not possible to build up a number of area selling agencies, under farmer-control, which, acting on behalf of members but without pooling supplies or interfering with the right of members to determine when to sell, would be the sole vendors of grain to merchants and other buyers at country markets in their respective areas (see Chapter VI (iv)).

### (iii) The Special Problems of Wheat.

World conditions govern the price of home-produced wheat but, even within the limits set by world prices, there are certain directions in which improvement seems possible. Two aspects, in particular, seem worthy of attention, namely, (a) the seasonal fluctuation in the price of home-produced wheat and (b) the price difference between home-produced and imported wheat.

(a) *Seasonal Price Fluctuation*.—In the autumn, immediately after harvest, the price of home-grown wheat is unduly depressed compared with the price which it makes later in the season and compared also with the average value of imported wheats. (Chapter IV (iv)). In September and October, prices are at their worst; for the 5 years from 1922-1923 to 1926-1927, the average of the monthly prices from January to July was 1s. per cwt. above the average of the September to October prices. It is true that the price does not rise every year and, on occasion, owing to the position regarding world supplies, may actually decline as the season advances, but, taking one year with another, native wheat sold from January onwards may be expected to make £1 per ton (equivalent to 4s. 6d. per quarter) more than the same wheat sold just after harvest.

In the autumn, farmers in need of cash for wages, etc., must thresh as soon as possible after harvest. Others do the same owing to the need of straw for covering potato pits, winter feeding of cattle, etc., and others thresh at that time in the belief that the costs and losses associated with storage exceed any subsequent gain in price. Farmers press the grain for sale on the merchants. At that time of year, the merchant, as a rule, is as much in need of ready money as the farmer. The grain is, therefore, passed on immediately to the millers. The miller, in his turn, especially the small inland miller who specialises in the manufacturing of all-English flour and is one of the farmers' best customers, has neither the capital nor other facilities for holding the wheat. He mills the grain at once and presses his flour for sale on future contracts based on the low price of native wheat prevailing at the time. This factor, in turn, reacts adversely on the price of wheat then and later, and tends to prolong the depression. (Chapter XV (i) (a)).

As a rule, in the period from September to December, when prices are depressed, between 45 and 50 per cent. of the recorded sales of

home-grown wheat take place each year (see Chapter I (ii) (c)), but it would be hazardous to suggest holding over this wheat for better prices without first examining the probable course of the market demand as the season advances. Of the home-produced wheat actually marketed, about 30 per cent. is used for bread-making flours, and the balance is allocated in fairly equal proportions to (a) blending and scaling flours for household use, (b) biscuit flour and (c) stock feeding, chiefly poultry. The consumption of bread and flour is fairly steady throughout the year and, although milling shows a certain diminution during the summer months, the millers' demand for wheat remains more or less constant. For the manufacture of bread flours, the demand for home-produced wheat should apparently be greater in the early part of the season to mix with the strong Canadian and American wheats which are then available, rather than later when a softer type of wheat, such as Argentine, is in plentiful supply. This does not always follow, however, since the market for native wheat may be considerably restricted in the autumn by supplies of soft American winter wheats or of similar types of wheat on offer from near-European countries, particularly from Germany. For the manufacture of bread-making flour, therefore, the demand for home-grown wheat may, in general, be regarded as showing, at most, a very slight tendency to fall as the season advances.

The manufacture and consumption of biscuit and household flours, etc., also remain comparatively steady throughout the year, and since native wheat is pre-eminently suitable and largely used for such flours, the demand for it is also maintained at a fairly constant level. If, however, supplies of English wheat are not available late in the season, other soft types of wheat have to be bought and milled for this special purpose. The demand for poultry food appears to be 4 or 5 times greater in the spring and early summer than in the period, say, before Christmas. Here again, although native wheat is much to be preferred for the purpose, wheats having a somewhat similar appearance are sometimes substituted in order to cope with the demand when home-produced wheat is scarce. Taking everything into consideration, therefore, the potential demand for home-grown wheat increases rather than decreases as the season advances (Chapter I (vi) (c)), whereas the curve of supplies marketed by farmers moves in exactly the opposite direction. Prima-facie, if more home-grown wheat were made available later in the season, the market would readily absorb it.

#### The Remedy—Orderly Marketing.

Orderly marketing is a farmers' problem and no other section of the trade is in a position to change the existing state of affairs. Orderly marketing involves holding back excessive supplies from the market, and this, in turn, involves the questions of credit and storage. In regard to credit, the powers which a farmer possesses under the Agricultural Credits Act, 1928, to give a valid charge to the bank on grain in stack or in store, will improve his credit status.

(Chapter VI (iii) (a).) Storage may be done either in the stack or in elevators or warehouses located at suitable centres.

Stack storage has advantages in so far as it is the method at present customarily employed; it requires no fresh capital outlay on the part of farmers; the system is good in itself, since each grain is carefully packed in straw. Allied to the credit facilities made possible by the Agricultural Credits Act, 1928, it seems admirably adapted for holding off the market those supplies which are at present pressed for sale owing to the farmers' need for ready money. It suffers from the disadvantage that appreciable losses in weight are liable to occur if the grain is not in good condition at the time of stacking, or if the stacks are not well built and made proof against vermin and the weather. (Chapter VIII (i) (a).)

When, as in some parts of the country, notably in the Fen area, it comes to a question of holding off the market grain which would be pressed for sale owing to the farmers' need for straw, the question of warehouse or elevator storage becomes prominent. Elevator storage for home-produced grain is technically quite a feasible proposition, although a certain amount of the grain might have to be dried before storing. Drying, if done properly, is open to no objection from buyers provided it is not employed to disguise the original nature of objectionable grain. It may be noted, in this connection, that between 30 and 40 per cent. of Canadian grain has been graded as tough or damp and much of it has had to be dried in recent years before storing. (Chapter VIII (ii) (c).) Country elevators for home-produced grain do not appear to be an economic proposition owing to the fact that the grain loadings at any one station in this country are relatively small. Terminal or semi-terminal elevators might conceivably be economically possible and, for this purpose, elevators and warehouses suitably located and having ample space available are already in existence. Capital expenditure might be necessary, however, in connection with a terminal elevator in the assembling area of the eastern counties—in, say, the area round the Wash. (Chapter VIII (iii).)

The advantages associated with systematic elevator storage are fully discussed in Chapter VIII. In regard to its possible application to this country, it should be noted that it would lead, through grading, to the establishment of uniformity in the quality of grain delivered to buyers and enable a better control of supplies to be maintained. The important point, however, is that any scheme of orderly marketing based on stack or elevator storage, or both, is not likely to meet with much success if operated on a local basis only. The results of any local scheme of this kind might quite well be neutralised by the normal rush of supplies in other areas. If, on the other hand, a local scheme were effective, or partially effective, in avoiding gluts and sustaining the price level, all farmers outside the scheme would benefit although they had taken no share in its financial responsibilities.

For this reason, any organised effort by producers to ensure the more orderly marketing of the crop would need to be of national scope. There would, in practice, be very little hope of making a



system of orderly marketing truly effective until control of the whole, or a very large part of, the crop in the country were vested in some central body. Since loyalty would be the very essence of such a movement and, in order to ensure adequate finance for those aspects of the scheme which involve storage off the farm, growers would need to be prepared to sign contracts, not only to sell all their grain through area-selling agencies, such as those referred to above, but to go further and leave the agencies free to control the flow of supplies to market under the direction of a central selling agency.

(b) *Difference in Price between Home and Imported Wheats.*—Home-produced wheat, weight for weight, is commonly cheaper than the general run of imported wheats. The average annual price of No. 1 Manitoba wheat for the period 1923-27 was 13s. 7d. per cwt. and the annual Gazette average for English wheat was 11s. 6d. For the same period, the average declared value of all imported wheat was approximately 12s. 3d. and the true average of English wheat only 11s. 3d. per cwt.

This difference in price is very largely due to the very limited demand for native wheat from the large port millers. This lack of demand has been ascribed to two factors in particular—namely, the lack of “strength” in native wheat flour and the lack of uniformity in the wheat as delivered (Chapter IV (iii) and Chapter XV (i) (a)).

#### *Lack of “Strength.”*

“Strength” is closely connected with the power of absorbing and retaining water in bread and with the size and yield of loaves, and is not a factor which can be altered by any system of marketing. As a problem in production, the Home-grown Wheat Committee have been searching for a solution for more than 25 years. “Yeoman II” wheat is the culminating point of their efforts so far. Baking tests show the loaf volume of bread made from “Yeoman II” flour as 2,844 c.c., on the average, as compared with an average volume of 3,262 c.c. for the 2-lb. loaf made from 50 per cent. No. 1 Northern Manitoba and 50 per cent. average English wheat flour (Chapter I (v) (i)). A marked improvement has certainly been effected, but there is evidently a long way to go before English wheat will make a flour which is anything like as strong and reliable as one containing, say, 50 per cent. of Manitoba. From the point of view of the ordinary baker, this question of strength becomes almost entirely one of the yield of loaves per sack of flour. While it is not uncommon to get 100 loaves—i.e. 400 lb. of bread from a 280-lb. sack of flour, the ordinary run of white flours as sold will yield about 95 or 96 loaves—or, say, 380 lb.—of bread. If 280 lb. of flour produces 380 lb. of bread, it is obvious that the difference is merely due to the extra water retained—since the yeast and salt are but very small items. English wheat flour, even although it reach the baker’s hands in as dry condition as other and stronger flours, will not absorb and retain nearly as much water. This fact has considerable bearing on the market value of English wheat.

## Possible Remedies.

In view of the complaints which are made, from time to time, regarding the quality of bread, it seems somewhat surprising that no limit should be set to the water content of such a valuable and universal food. The farmer's position in regard to milk is well-known. Further, the Butter and Margarine Act of 1907 prescribes 16 per cent. as the maximum limit of water in butter turned out by a factory. The moisture content of other products sold to the public, such as tobacco, is defined and limited by regulations. All these products might cost less, but would be correspondingly inferior in quality, if the sellers were allowed to add water indefinitely. Since there is no statutory control over the water content of bread, there is at present a direct commercial incentive to resort to every kind of device to make it carry as much water as possible. On that account, there is some justification for the belief that the ordinary white commercial bread is, in the main, poorer in quality than it might or should be.

The quantity of water present in bread of standard quality may not exceed 31 per cent. in the District of Columbia, U.S.A. In practice, this regulation appears, however, to be more honoured in the breach than in the observance. The Federal standard limit, as defined by the United States Food and Drugs Acts, of 38 per cent. moisture content in white bread seems, however, to be complied with. There may be difficulties in the way of introducing a regulation in this country, but it has been claimed that a measure of this kind would be in the interests of the public. It would also seem to be in the interests of the farmers, since it would tend indirectly to increase the demand for home-produced wheat for bread making. (Chapter I (v) (i) and Chapter XV (i) (d)). It would also seem to be in the interests of those bakers who believe in making and selling a good quality article, but, owing to the standard weight of the loaf and the, more or less, uniform price of bread, are, at present, bound to conform to the general level of quality set by the trade as a whole.

The demand for English wheat for bread-making purposes would also be increased by promoting the manufacture and consumption of all-English bread. It is well to recognise, however, so far as plain bread is concerned, that the best commercial results are probably obtained from home-grown wheat when it is used in conjunction with other wheats and that it would be difficult to increase the sale of all-English plain bread in competition with the ordinary plain bread of commerce. It would probably have to be manufactured and sold as "fancy" bread having some special or exceptional characteristics. Steps already taken in this direction to promote the manufacture and sale of all-English milk bread encourage the belief that it may be commercially possible to supply the public with an attractive milk loaf of high quality made solely from native wheat. Bakers who have given this a trial, however, have occasionally found their baking practice upset by the unreliable quality of some all-English flours put on the market.

Provided millers obtain wheat of a uniform standard of quality, they should be able to sell an all-English flour which will also conform to a standard. In order to safeguard the interests of all concerned, and to ensure that the public is supplied with a reliable article which it can buy freely and with confidence, it is worth considering whether some attempt could be made to correlate standards for all-English wheat, flour and bread, and, if possible, apply to all-English wheat and wheat-flour a voluntary scheme for the use of the National Mark under the Agricultural Produce (Grading and Marking) Act, 1928. (Chapter XV (i) (a)).

#### *Lack of Uniformity in Quality.*

The second factor which affects adversely the price of English wheat as compared with imported is that of the quality of the grain, particularly the lack of uniformity and reliability in the grain as delivered to buyers. Variations in quality are due to many causes. In the first place, the number of varieties grown is large. White wheats are more or less similar in their characteristics but they differ as a whole from red wheats. Among the red varieties, those of the "Squareheads Master" type may be regarded as forming the common standard from which, on the one hand, "Yeoman" wheats differ by being thinner in the bran and yielding somewhat "stronger" flour more suitable for bread making and, on the other hand, wheats like "Swedish Iron" and "Rivetts" differ in having a thicker bran and yielding a weaker flour more suitable for biscuits and confectionery. All the varieties grown are, in practice, more or less mixed, and the same variety varies in its general characteristics when grown on different soils and in different parts of the country. In this connection, it is of interest to note that the National Institute of Agricultural Botany, out of the numerous varieties grown by farmers and offered for sale by seedsmen, recommends half-a-dozen at most and claims that the bulk of the others have little or no justification for their continued production.\* This would suggest that there is scope for farmers, through the agency of, say, pure-line seed growers' associations, to concentrate on the propagation of a few predominant types. (Chapter XVI (iii)).

Then again, the condition of the wheat, particularly as indicated by moisture content, varies from season to season, from farm to farm, from one district to another and from time to time according to weather conditions. The amount and character of impurities vary from one consignment to another; within the same consignment, the condition of the grain in the sacks varies according to whether the grain, as threshed, came from the top, middle or bottom of the stack. All these differences give rise to vexatious adjustments in the process of handling and milling the wheat and account for the fact that English wheat is regarded as objectionable by large millers working on factory principles.

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\* Journal of the Ministry of Agriculture and Fisheries, October, 1928.

### Standardisation.

The National Farmers' Union has, all along, endeavoured to assist the merchants by recommending its members to bulk all grain before drawing samples in order to eliminate quality variations within consignments. This is a primary step in any system of improved marketing. Further progress in this direction has recently been made, particularly in regard to barley, by the Norfolk and Suffolk County Branches of the National Farmers' Union. These Branches introduced schemes in 1928 to improve the system of sampling and issued "guaranteed sample bags" for the use only of those growers who undertook to bulk and mix all grain before sampling and delivering. (Chapter V (i) (c)). There has been no attempt, however, to define any standard for home-grown wheat which can compare, in any way, with the standards laid down in the case of imported wheats.

Imported wheats are, in many cases, classified in the country of origin according to type and grade (Chapter VII). In North America, for example, the wheats are classified into Spring, Winter, Durum, etc., and each class is sub-divided into a series of, it may be, half a dozen different grades on the basis of bushel weight, purity and so on. A system of Government inspection and certification is employed whereby the grain is inspected and the grade allotted at some terminal or quasi-terminal point conveniently situated in the line of grain flow. Occasionally, however, without inspecting the whole consignment, the grade may be determined on the basis of a fairly large sample drawn and sealed in the presence of the buyer and seller and forwarded to a central grain inspection office.

In the absence of a grading system, the export trade of some countries is worked on the basis of a *fair average quality* standard. To cite the Australian practice, for example, Chambers of Commerce prepare, at the beginning of each season, fair average quality samples to be sent abroad as the standard for the trade. The London Corn Trade Association also makes up a separate f.a.q. standard for practically each exporting country. The samples sent to the Association for use in making up the f.a.q. standard are drawn from shipments at the time of unloading and are sealed in the presence of representatives of both buyer and seller.

The standards of quality which govern the trade in imported grain are a great boon to buyers; the fact that there are no such standards in the trade in home-produced grain reacts to its disadvantage. Standards promote confidence and tend to eliminate disputes. The buyer knows what to expect and can arrange his milling practice accordingly. Buying and selling for future delivery become possible and afford some insurance against severe price fluctuations; this, in turn, makes it possible to finance the crop by means of systematic bank credit (Chapter VI (iii) (b)). With operative standards, market intelligence is much improved, since quotations for various types and qualities of wheat can be differentiated and compared instead of all being placed in one category, as is the case with home-produced grain at the present time.

The disability from which the marketing of home-produced wheat suffers through the absence of defined standards is obvious, but the method of applying a remedy is not. Conditions in this country, as a whole, are not comparable with those existing in the large exporting countries. There, the grain for export must be assembled before it is distributed to buyers; here, the actual assembly of wheat takes place to a limited extent in a few districts only, of which the country in the neighbourhood of the Wash is probably the most outstanding instance. (Chapter VI (i) (a).)

It is necessary to recognise the fact that, in all existing systems of grain standardisation, one or other of two conditions is satisfied; either (a) *all the grain* which is to be allotted a grade or passed as of a certain standard *is available at the point of inspection*, or (b) *a sample* from the whole consignment *is drawn and sealed in the presence of representatives of both buyer and seller* for the purpose of having the standard of quality determined and certified by some central authority. Neither of these conditions, of course, precludes the possibility of buyer and seller mutually agreeing at any point, for their own satisfaction, that any particular lot of wheat is of a certain defined standard or grade. In the trade in home-produced grain, the conditions usually associated with systematic grading and standardisation do not exist; the grain does not pass through "bottle necks" which might be used as points of inspection; and, except in the case of direct delivery to local mills, the buyer and seller are normally never both represented at any one point along with the grain.

Any method of determining standards for native wheat would, therefore, need to be on a different basis from the methods commonly employed. When it comes to choosing the type of standard, the possibility of, or necessity for, a wide range of grades can be ruled out at once. From a milling point of view, all *good* English wheat is much on a level as regards quality. The large price range between the highest and lowest grades which exists in Canada, for instance, has no parallel in this country. The great bulk of English wheat in a country market usually sells within 6*d.* per cwt. above or below the average for the day. (Chapter IV (vi).) One f.a.q. standard for red and another for white wheats, or, at most, two grades of each and one mixed (see suggestions in Appendix B), in order to admit of some special distinction being made in regard to "Yeoman" wheats, would probably be sufficient to cover all the wheat of good milling quality.

The position in regard to the standardisation of home-produced wheat may be looked at in this way. About three-fourths of the wheat sold is either the subject of direct buying between the smaller country or provincial millers and farmers or is destined for poultry feeding, and no one at present seems to feel any compelling need of standardisation in regard to these supplies. If, at some future date, standards were applied to all-English flour, which is chiefly manufactured in the smaller inland mills, then, as shown above, it would be desirable to link up these standards with suitable standards

for the wheat. The more immediate problem, however, concerns that proportion—about one-quarter of the wheat sold—which leaves the country districts for the large milling centres; some form of quality standardisation appears to be essential if this proportion is ever to be increased. It is in the interests of home wheat growers, generally, that a regular and larger market should be secured in this direction. If workable standards for this purpose could be devised, it should not be impracticable to arrange for some form of check supervision at the receiving and distributing end, since the large mills which would use standard grain are located in the six main consuming centres, and those areas of concentration are individually relatively small.

The method of laying down a standard requires to be explored. Preferably, perhaps, a standard should be made up in respect of each season, and the proper parties to make up the standard would seem to be the organisations representing the farmers, merchants and millers respectively. The following method of procedure is suggested. Early in the season, the National Farmers' Union, through its County Branches, might take steps to obtain fair average quality samples of different types of wheat, say, white wheat, Yeoman and other red wheats, and from these make up f.a.q. samples for the country. These f.a.q. samples, having been analysed in respect of bushel weight, moisture content, purity, etc., the farmers' representatives might meet with the millers' and agree as to what wheat should be accepted as f.a.q. within certain limits (Chapter VII (v)), and also agree on a scale of price deductions and premiums for wheat, within the f.a.q. range, which, at the time of delivery, falls either below or above the standard in respect of any particular factor. (See, in this connection, the system adopted for assessing wheat on the basis of the Liverpool contract grade—Chapter VII (iv) (b).) Deductions from, or additions to, the f.a.q. price could, for example, be laid down for each  $\frac{1}{2}$  lb. difference in bushel weight above or below the f.a.q. standard and for each 1 per cent. of moisture content or  $\frac{1}{2}$  per cent. of impurities, and so on. A standard of this kind implies, of course, that the wheat is otherwise clean, sweet, sound and of good milling quality. With known standards in operation, buyers and sellers could, with confidence, do business by letter or telegram for immediate or future delivery without having to inspect samples before striking a bargain.

The method of determining the grade or assessing the relation which any particular lot of grain bears to the standard might be as follows:—

- (a) In the case of grain assembled and bulked, grain could be graded by licensed warehousemen (see page 99) subject to appeal, if need be, to a central grain inspection authority.
- (b) In the case of grain sold and "exported" on the basis of a defined standard, consignments could, in case of complaint, be subjected to an independent inspection and sampling in the consuming centres.

- (c) In the case of local sales from farmer to country manufacturer, the grade could be determined from samples taken jointly by the buyer and seller, or their representatives, and forwarded to a central grain inspection office.

This procedure could also apply in the case of barley and oats when recognised standards for these cereals are in operation.

#### (iv) The Special Problems of Barley.

The special problems of barley bear no relation to those of wheat. The seasonal rush of supplies and the fluctuation of prices are each greater for barley than for wheat (Chapter II (ii) (c) and Chapter IV (iv)). It is unfortunate in some ways that imports reach their maximum immediately ahead of home supplies but, nevertheless, the highest price for barley rules at the beginning of the season, immediately after harvest, when the rush of supplies is greatest. This is largely due to the fact that the demand from maltsters and brewers is greatest at the beginning of the season and that they are equipped, financially and otherwise, to buy, dry and store the grain for subsequent use as required. In this respect, the barley grower appears to be in a more fortunate position than the wheat grower. The question of orderly marketing really only arises in the case of barley intended for feeding purposes. Farmers with low-grade barley to sell, if they cannot feed it on the farm, should, so far as possible, avoid offering it during the very early part of the season when the malting demand is on.

The difference between the price of home and imported grain is, as a rule, in favour of the former (Chapter IV (iii)), which reflects the superior quality of the home-grown product (Chapter II (v)). The disquieting feature of the barley situation is, however, the downward trend of the demand, which, in the first instance, is directly due to the decreasing production and consumption of beer and spirits. The demand for home-produced barley is further limited by the amount of imported grain now being used in the malting, brewing and distilling industries (Chapter XV (ii) (a)). For technical reasons, these industries require a certain amount of imported grain of special types, but there seems scope for increasing the proportion of native grain used. It is of interest to observe, in this connection, that in the autumn of 1928, the Norfolk Branch of the National Farmers' Union, by means of propaganda, was instrumental in getting an all-English beer put on the market as an experiment and that the local brewers concerned are said to have found it a commercial proposition. An extension of this movement would obviously improve the demand for home-grown barley (Chapter XV (ii) (a)).

Possibilities of this kind certainly seem to be worth exploring, but, taking a broad view of the market as a whole, it is important that present tendencies in the malting, brewing and distilling industries should be appreciated. In recent years, country maltings and small breweries have been rapidly decreasing in number and the tendency is for malting, brewing

and distilling to become concentrated in larger units. Apart from any disadvantage arising out of the reduction in the number of final buyers, it seems abundantly clear that the conditions of the market are becoming seriously altered to the disadvantage of small sellers, by the elimination of the small manufacturer accustomed to buy and handle small quantities and the emergence in his place of the large industrial combines dealing in large quantities. Under factory conditions, the quality of each lot of grain must be uniform. Apart from the question of unified selling referred to above (page 162), it is incumbent on barley growers to take what steps they can to attain the desired measure of uniformity in their product.

Reference has been made above (page 169) to the efforts of the National Farmers' Union to improve the method of sampling (Chapter V (i) (c)). This is in the right direction in so far as it leads to uniformity within consignments, but it does not tackle the major problems of securing the general uniformity of supplies as a whole. At present, the barley buyers for maltsters and brewers are faced with the necessity of making their selection from a very large number of varieties and mixture of varieties, all of which differ in their basic characteristics. The marketing of barley would be simplified, and the use of home-grown grain by large industrial concerns very much facilitated, if the number of varieties could be reduced and the efforts of farmers mainly concentrated on growing one dominating variety of good quality which could be kept pure and true to type.

In Ireland, a good deal has been done in this direction. Barley from Denmark is getting a good reputation for the same reason; in California and in Canada, also, efforts are being made to concentrate on one variety suitable for particular regions. Following similar lines, there appears to be some necessity in this country for co-operation, on the one hand, between the malting and allied industries and the National Institute of Agricultural Botany in selecting and advising on the most suitable variety, and, on the other hand, between the National Institute of Agricultural Botany and farmers in the organisation of, say, pure-line seed growers' associations or otherwise for propagating and extending the cultivation of one dominant pure strain of barley (Chapter XVI, (iii)). A policy of this kind may, of course, involve the discarding of some strains having admirable characteristics. It might mean, in other words, that, as well as levelling up, there might also be some levelling down in quality, but the chances are that the results as a whole would be worth it.

Once this stage were reached, it should then be possible to define grades for malting barley based chiefly on factors such as the starch content and percentage of extract. The definition of such grades could be so drawn as to cover variations within the variety arising from soil and climatic conditions. Since certain large firms already buy their barley on the basis of percentage extract, it is not inconceivable that, if farmers devoted their attention to the cultivation of one dominating variety, home-grown barley for malting purposes could be sold on grades at prices directly related to intrinsic



manufacturing value. The definition of standard grades for feeding and milling barley should offer relatively little difficulty when circumstances arise to warrant steps being taken in that direction. Suggested grades for feeding barley are set out in Appendix B.

The desirability of standardising malt products, with a view to the use of some common distinguishing quality mark, has been briefly referred to in Chapter XV; eventually, it would be worth considering whether standards for home-produced barley corresponding to the various types of malt, from the finest pale-ale malts to the lower ranges of coloured malts, could not be linked up with any standards that may be laid down for malt products.

#### (v) The Special Problems of Oats.

In a modified degree, the oat market has certain resemblances to that of wheat. The seasonal movement of supplies and prices follows the same course (Chapter III (ii) (c) and Chapter IV (iv)), but the rise in price as the season advances is not so pronounced. Such seasonal movements would not, of themselves, perhaps justify the adoption of any elaborate scheme of orderly marketing for this crop alone, but, in so far as the conditions of this market are somewhat similar to those of the wheat market, any scheme of orderly marketing adopted for wheat (see page 164) could, at the same time, usefully and economically include oats. The same machinery and a similar programme of marketing could be employed—compare, for instance, the action of the Canadian wheat pools in regard to the sale of coarse grains. (See Chapter VI (ii) (c)).

Under present conditions, millers of home-grown oats find great difficulty in securing supplies of raw material late in the season. Further, the demand for oats as poultry food increases as the season advances. In the result, as indicated by the seasonal rise in imports, the market must have increased supplies from abroad to meet the deficiency. A system of orderly marketing which would make home-produced grain available throughout the year should, therefore, extend the market for it. In connection with any scheme of this kind which involved the storage of oats in bulk off the farm, it would not be a difficult matter to draw up a range of grades which would ensure that growers were paid on the basis of the quality of their grain before it lost its identity. Suggestions as a basis for grades are set out in Appendix B.

In view of the high quality of the home-grown article, something might be done to improve the demand for native grain by expanding the market for the manufactured product in the form of meal. At one time, an association of oatmeal millers contemplated the introduction of a mark to be used on meal grown and ground at home (Chapter XV (iii) (b)). In view of the recent Order-in-Council under the Merchandise Marks Act, 1926, relating to oat products, it is desirable that the trade should continue to explore the possibility of introducing some mark or brand to indicate that the product is both grown and made at home. In connection with such a mark, it would be necessary to define minimum standards of quality for any product so marked, both as regards the grain used and the manufac-

tured article. Apart from various other factors which might be included in any definition of quality as applied to meal, the question of limiting moisture content seems worth considering.

The market for oats is, at present, undergoing a change owing to the decreasing number of horses in the country, but the diminished consumption on this account is being largely made good by the increase in the number of poultry. On the supply side, the market is also being influenced by certain factors of production. The extensive damage done by eelworm and frit fly to spring-sown oats has recently caused a rapid increase in the cultivation of winter-sown oats, and these, although in some cases white, are very largely black or coloured. (See Appendix A.) While the quality of the coloured oats is good, they are not favoured by poultry-food merchants and millers. There is, therefore, room for further research into the question of developing suitable white varieties for winter sowing.

With oats, as with other cereals, improved production must accompany improved marketing. A supply of high-quality seed should be made extensively available at reasonable prices through the agency of pure-line growers' associations, or otherwise, and the advantages of using pure lines should be demonstrated to growers in regard to both yield and quality. (Chapter XVI (iv)).

There also appears to be room for a standing Synonyms Committee (See Appendix A) to record the names and characteristics of existing varieties of wheat, barley and oats, and to register new varieties only when they are proved to be distinctive.

Markets and Co-operation Branch,  
Economics Division,  
Ministry of Agriculture and Fisheries.  
*December, 1928.*

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TABLE I.—*Acreage under Wheat, Barley and Oats in England and Wales in the Years 1875 to 1928.*

Year.	Wheat.	Barley.	Oats.
	Acres.	Acres.	Acres.
1875	3,240,344	2,244,867	1,659,121
1876	2,917,765	2,262,912	1,776,666
1877	3,087,355	2,147,743	1,729,297
1878	3,143,054	2,210,614	1,665,362
1879	2,813,631	2,388,592	1,652,093
1880	2,835,462	2,203,321	1,759,651
1881	2,731,071	2,171,817	1,870,548
1882	2,924,878	1,993,035	1,784,485
1883	2,544,990	2,046,443	1,929,432
1884	2,608,322	1,938,266	1,869,468
1885	2,423,163	2,019,874	1,894,205
1886	2,229,779	2,023,436	2,022,720
1887	2,266,987	1,878,556	2,023,557
1888	2,495,502	1,860,204	1,866,857
1889	2,389,968	1,898,062	1,872,989
1890	2,324,363	1,895,386	1,889,352
1891	2,253,983	1,889,533	1,906,890
1892	2,158,247	1,824,107	1,998,862
1893	1,853,431	1,863,453	2,155,238
1894	1,883,096	1,877,714	2,229,178
1895	1,383,842	1,949,736	2,287,675
1896	1,656,228	1,886,481	2,087,372
1897	1,839,372	1,802,694	2,067,582
1898	2,046,345	1,665,682	1,961,827
1899	1,953,725	1,741,612	2,001,882
1900	1,796,210	1,750,070	2,076,960
1901	1,664,740	1,737,333	2,040,513
1902	1,679,215	1,680,303	2,102,870
1903	1,540,451	1,644,434	2,167,132
1904	1,337,548	1,639,920	2,272,223
1905	1,748,354	1,501,530	2,088,404
1906	1,705,615	1,532,542	2,086,141
1907	1,577,138	1,501,785	2,171,590
1908	1,583,305	1,470,019	2,160,405
1909	1,773,819	1,464,405	2,038,440
1910	1,756,057	1,537,061	2,062,824
1911	1,842,532	1,424,313	2,047,173
1912	1,863,364	1,456,528	2,072,479
1913	1,701,588	1,588,856	1,974,700
1914	1,807,498	1,504,771	1,929,626
1915	2,170,170	1,231,722	2,088,047
1916	1,912,208	1,332,076	2,084,674
1917	1,918,485	1,459,796	2,258,909
1918	2,556,661	1,500,809	2,780,063
1919	2,221,195	1,509,716	2,564,326
1920	1,874,652	1,637,222	2,271,703
1921	1,976,004	1,435,620	2,148,943
1922	1,966,917	1,364,048	2,163,965
1923	1,740,257	1,326,947	1,977,633
1924	1,544,804	1,314,072	2,037,948
1925	1,499,628	1,317,810	1,868,176
1926	1,592,212	1,147,662	1,863,908
1927	1,635,980	1,048,926	1,751,146
1928*	1,395,541	1,184,958	1,762,364

\* Preliminary figures only.

TABLE II.—Yield per Acre, Price per Cwt. and Hypothetical Value per Acre of Wheat, Barley and Oats in England and Wales, for the Cereal Years 1885/6 to 1927/8.

Year.	Wheat.			Barley.			Oats.		
	Yield per Acre.	Price per Cwt.	Hypo- thetical Value per Acre.	Yield per Acre.	Price per Cwt.	Hypo- thetical Value per Acre.	Yield per Acre.	Price per Cwt.	Hypo- thetical Value per Acre.
	Cwt.	s. d.	£ s. d.	Cwt.	s. d.	£ s. d.	Cwt.	s. d.	£ s. d.
1885-6	17-27	7 2	6 3 9	16-86	7 9	6 10 8	13-89	7 0	4 17 3
1886-7	14-77	7 8	5 13 3	15-29	6 11	5 5 9	13-69	6 1	3 3 3
1887-8	17-68	7 3	6 8 2	14-87	7 10	5 16 6	12-55	5 10	3 13 2
1888-9	15-47	7 2	5 10 10	15-69	7 1	5 11 2	13-61	6 4	4 6 2
1889-90	16-43	7 3	5 19 1	15-05	8 1	6 1 8	14-29	6 8	4 15 3
1890-1	16-93	8 3	6 19 8	16-66	7 10	6 10 6	14-91	6 10	5 1 11
1891-2	17-21	7 9	6 13 5	16-33	7 8	6 5 2	14-27	7 5	5 5 10
1892-3	14-46	6 3	4 10 4	16-52	6 11	5 14 3	14-27	6 9	4 16 4
1893-4	14-21	5 11	4 4 1	13-34	7 5	4 18 11	12-15	6 7	4 0 0
1894-5	16-89	5 0	4 4 5	16-48	6 0	4 18 11	15-33	5 3	4 0 6
1895-6	14-41	5 10	4 4 1	15-02	6 3	4 13 10	13-25	5 1	3 7 4
1896-7	18-57	6 8	6 3 10	15-93	6 6	5 3 7	12-88	6 0	3 17 3
1897-8	15-95	8 5	6 14 3	15-05	7 6	5 12 10	13-82	6 7	4 11 0
1898-9	19-09	6 1	5 16 2	16-91	7 4	6 4 0	14-97	6 2	4 12 4
1899-1900	18-04	6 2	5 11 3	16-38	7 1	5 16 0	14-28	6 3	4 9 3
1900-1	15-66	6 4	4 19 2	14-88	7 0	5 4 2	13-67	6 6	4 8 10
1901-2	16-96	6 7	5 11 8	14-51	7 3	5 5 2	12-80	7 4	4 13 10
1902-3	18-07	6 2	5 11 5	16-65	6 6	5 8 3	15-82	6 4	5 0 2
1903-4	16-57	6 4	5 4 11	15-15	6 1	4 12 2	14-49	5 10	4 4 6
1904-5	14-65	7 2	5 5 0	14-62	6 10	4 19 11	14-14	6 1	4 6 0
1905-6	17-98	6 8	5 19 10	16-00	6 9	5 8 0	13-65	6 7	4 9 10
1906-7	18-80	6 7	6 3 9	16-79	6 10	5 14 9	15-60	6 7	5 2 8
1907-8	18-59	7 8	7 2 6	16-81	7 2	6 0 6	16-29	6 6	5 5 11
1908-9	17-68	8 6	7 10 3	15-45	7 6	5 15 10	14-25	6 9	4 16 2
1909-10	18-24	7 7	6 18 4	17-27	6 8	5 15 2	14-69	6 4	4 13 0
1910-1	16-49	7 3	5 19 7	15-45	6 11	5 6 10	14-74	6 4	4 13 4
1911-2	18-45	8 2	7 10 8	15-50	8 9	6 15 7	13-94	7 9	5 8 0
1912-3	15-36	7 6	5 15 2	14-18	7 10	5 11 1	11-61	7 0	4 1 3
1913-4	17-37	7 6	6 10 3	15-76	7 6	5 18 2	13-37	6 10	4 11 4
1914-5	18-08	11 7	10 9 5	15-73	9 1	7 2 11	13-89	10 3	7 2 4
1915-6	17-32	12 4	10 13 7	14-06	13 8	9 12 2	13-91	11 1	7 14 2
1916-7	15-67	17 4	13 11 7	14-85	18 1	13 8 6	13-93	17 0	11 16 10
1917-8	16-33	16 10	13 14 11	14-40	16 4	11 15 2	13-02	17 0	11 1 4
1918-9	18-30	17 0	15 11 1	15-56	17 10	13 17 6	14-46	18 0	13 0 3
1919-20	15-88	17 8	14 0 7	13-94	26 5	18 8 3	12-22	21 2	12 18 8
1920-1	15-56	19 9	15 7 4	14-73	17 5	12 16 7	12-99	15 0	9 14 10
1921-2	19-80	11 10	11 14 4	14-33	12 7	9 0 4	13-33	10 7	7 1 1
1922-3	17-02	9 11	8 8 9	14-02	9 4	6 10 10	11-60	9 9	5 13 1
1923-4	17-49	10 6	9 3 8	14-55	11 4	8 4 11	13-69	9 5	6 8 11
1924-5	17-60	12 6	11 0 0	15-40	13 1	10 1 6	14-70	9 11	7 5 9
1925-6	18-10	12 3	11 0 9	15-30	10 4	7 18 1	14-80	9 4	6 18 2
1926-7	16-40	11 11	9 15 5	16-00	11 6	9 4 0	16-00	8 9	7 0 0
1927-8	17-40	10 3	8 18 4	16-40	11 6	9 8 7	15-40	10 6	8 1 9

TABLE III.—Quantities of British Wheat, Barley and Oats, returned as Sold in England and Wales in each Month of the Cereal Years 1923/4 to 1927/8 and the Monthly Average for the Period 1923/4 to 1927/8.

## WHEAT.

Month.	1923-4.	1924-5.	1925-6.	1926-7.	1927-8.	Average 1923/4 to 1927/8.
	Thousands of Cwt.					
September ..	1,922	650	1,540	1,341	759	1,242
October .. ..	1,753	1,281	1,677	1,992	1,245	1,590
November .. .	1,412	1,272	1,651	1,640	1,031	1,402
December .. .	1,770	886	2,358	1,449	1,169	1,526
January .. . .	1,073	1,433	1,440	1,155	976	1,215
February .. . .	1,311	1,297	1,165	1,142	1,179	1,219
March .. . . .	1,400	1,151	841	905	1,384	1,136
April .. . . . .	440	522	741	733	953	678
May .. . . . . .	618	1,359	968	638	994	915
June .. . . . . .	241	767	375	579	873	567
July .. . . . . .	103	400	85	307	334	246
August .. . . . .	149	832	126	182	287	315
Total .. . . . .	12,192	11,850	12,967	12,063	11,184	12,050
Monthly Average	1,016	987	1,081	1,005	932	1,004

## BARLEY.

Month.	1923-4.	1924-5.	1925-6.	1926-7.	1927-8.	Average 1923/4 to 1927/8.
	Thousands of Cwt.					
September .. .	1,139	1,488	985	600	716	986
October .. . . .	2,224	2,440	2,572	2,705	2,285	2,445
November .. . .	2,770	2,667	2,274	2,207	2,005	2,385
December .. . .	2,630	1,463	1,527	2,019	1,934	1,915
January .. . . .	1,318	1,498	1,245	1,616	1,290	1,393
February .. . . .	996	750	829	1,164	1,083	964
March .. . . . .	507	549	585	554	720	583
April .. . . . . .	120	210	325	239	217	222
May .. . . . . . .	58	246	190	98	104	119
June .. . . . . . .	15	81	63	49	70	56
July .. . . . . . .	8	44	25	26	18	24
August .. . . . . .	136	155	72	28	147	108
Total .. . . . .	11,921	11,591	10,692	11,305	10,589	11,220
Monthly Average	993	966	891	942	882	935

## OATS.

Month.	1923-4.	1924-5.	1925-6.	1926-7.	1927-8.	Average 1923/4 to 1927/8.
	Thousands of Cwt.					
September ..	374	263	313	320	242	302
October .. ..	394	550	422	519	427	463
November .. .	303	485	258	331	345	344
December .. .	342	289	264	326	391	322
January .. . .	272	499	265	328	286	330
February .. . .	353	417	285	371	366	358
March .. .. .	264	325	224	271	338	284
April .. .. . .	85	178	156	240	139	160
May .. .. . . .	102	271	149	233	103	172
June .. .. . . .	37	137	74	153	67	94
July .. .. . . .	20	60	39	85	15	44
August .. .. . .	100	163	104	67	79	103
<b>Total .. . . .</b>	<b>2,646</b>	<b>3,637</b>	<b>2,553</b>	<b>3,244</b>	<b>2,798</b>	<b>2,976</b>
<b>Monthly Average</b>	<b>220</b>	<b>303</b>	<b>213</b>	<b>270</b>	<b>233</b>	<b>240</b>



TABLE IV.—Imports of Wheat into the United Kingdom\* in the Years 1925, 1926 and 1927, Compared with the Average for the Years 1909-13.

Country.	Average 1909-13.			1925.			1926.			1927.		
	Quantity.	Value.	Av. Value per Cwt.	Quantity.	Value.	Av. Value per Cwt.	Quantity.	Value.	Av. Value per Cwt.	Quantity.	Value.	Av. Value per Cwt.
	Cwt.	£	s. d.	Cwt.	£	s. d.	Cwt.	£	s. d.	Cwt.	£	s. d.
Russia ..	15,781,728	6,631,560	8 5	1,265,369	801,756	12 8	2,267,729	1,493,728	13 2	2,459,380	1,523,267	12 5
Germany ..	255,460	100,440	7 10	2,057,341	1,195,695	11 8	2,243,029	1,428,952	12 9	285,167	169,921	11 11
United States ..	18,686,833	7,848,955	8 5	26,509,086	18,774,918	14 2	31,182,926	20,435,707	13 1	35,619,001	21,944,763	12 4
Argentina ..	16,691,620	7,019,776	8 5	11,960,128	8,582,526	14 4	11,899,216	7,344,119	12 4	19,452,492	11,752,641	12 1
Chile ..	767,460	332,178	8 8	896,722	632,600	14 1	246,203	164,681	13 4	—	—	—
Other Foreign Countries ..	1,375,240	567,695	8 3	760,490	484,310	12 9	850,889	561,951	13 2	560,125	347,873	12 5
Total from Foreign Countries	53,558,341	22,500,604	8 5	43,449,136	30,471,805	14 0	48,689,992	31,429,138	12 11	58,376,165	35,738,465	12 3
Canada ..	18,155,529	7,630,630	8 5	29,677,199	20,429,524	13 9	35,669,532	23,327,785	13 1	32,181,355	19,655,849	12 3
Australia ..	11,752,697	5,158,062	8 9	16,305,957	11,667,051	14 4	9,186,417	6,287,438	13 8	14,837,906	9,464,181	12 9
British India	19,371,391	8,238,161	8 6	7,324,150	5,268,819	14 5	2,694,687	1,781,066	13 3	5,014,239	3,184,274	12 8
Other British Countries ..	480,940	199,990	*8 4	97,736	64,165	13 2	15,402	9,975	12 11	26,150	17,015	13 0
Total from British Countries	49,760,757	21,226,843	8 6	53,405,042	37,429,559	14 0	47,566,038	31,406,264	13 2	52,059,650	32,321,319	12 5
Total ..	103,319,098	43,727,447	8 6	96,854,178	67,901,364	14 0	96,256,030	62,835,402	13 1	110,435,815	68,059,784	12 4

\* Since April 1st, 1923, United Kingdom means Great Britain and Northern Ireland.

TABLE V.—*Monthly Imports of Wheat into the United Kingdom from July, 1923, to June, 1928, and the Average Monthly Imports for the Period 1923/4 to 1927/8.*

Month.	1923-4.	1924-5.	1925-6.	1926-7.	1927-8.	Average 1923/4-1927/8.
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
July .. ..	8,353,700	13,053,608	9,406,360	8,950,740	8,811,803	9,715,242
August .. ..	12,400,030	12,365,782	7,244,227	10,519,825	10,505,807	10,607,134
September .. ..	8,749,400	9,505,040	7,541,054	8,710,186	9,843,479	8,869,832
October .. ..	7,261,610	10,694,380	8,134,704	6,978,407	7,356,059	8,085,032
November .. ..	8,141,324	10,524,274	7,364,204	6,923,280	9,490,934	8,488,803
December .. ..	9,538,675	9,997,703	11,246,775	8,211,679	7,746,154	9,348,197
January .. ..	5,167,651	7,278,232	10,883,955	8,314,362	6,819,634	7,692,767
February .. ..	5,785,290	6,426,694	5,458,086	7,724,727	7,715,020	6,621,963
March .. ..	13,176,204	9,015,835	8,070,923	9,777,099	11,930,770	10,394,166
April .. ..	6,692,813	7,606,067	7,552,132	9,481,763	8,561,999	7,978,955
May .. ..	12,812,241	8,304,556	5,858,042	9,426,849	8,472,144	8,974,766
June .. ..	8,500,527	8,164,637	8,822,250	11,956,779	8,758,615	9,240,562

TABLE VI.—*Total Supplies of Wheat, Wheat Meal and Flour Available for Consumption in the United Kingdom\* in the Years 1909-13 and 1921-27.*

Year.	Wheat.				Wheat Meal and Flour (Expressed as Grain Equivalent).†			Estimated Corrections for Stocks.	Total Supplies. (Expressed as Grain.)
	Home Production.	Imports.	Exports.	Total Supplies.	Imports.	Exports.	Excess of Imports over Exports.		
	000 Cwt.	000 Cwt.	000 Cwt.	000 Cwt.	000 Cwt.	000 Cwt.	000 Cwt.	000 Cwt.	000 Cwt.
1909	34,404	97,854	472	131,786	15,351	1,978	13,373	+ 767	145,926
1910	30,955	105,223	883	135,295	13,778	1,943	11,835	- 5,194	141,936
1911	36,412	98,068	916	133,564	13,979	2,120	11,859	+ 2,704	148,127
1912	30,766	109,573	1,069	139,270	14,152	2,482	11,670	+ 531	151,471
1913	31,511	105,878	639	136,750	16,636	2,607	14,029	+ 505	151,284
1921	41,309	80,479	1,171	120,617	22,002	4,803	17,199	+ 13,243	151,059
1922	35,599	96,380	349	131,630	18,715	3,235	15,480	+ 1,586	148,696
1923	31,835	100,467	876	131,426	16,276	5,557	10,719	- 1,194	140,951
1924	28,327	117,421	795	144,953	15,342	9,449	5,893	- 4,041	146,805
1925	28,357	96,854	1,353	123,858	12,656	10,379	2,277	+ 5,106	131,241
1926	27,315	96,256	652	122,919	14,807	5,757	9,050	+ 643	132,612
1927	29,874	110,436	539	139,771	15,224	5,958	9,266	- 1,488	147,549

\* From April 1st, 1923, United Kingdom means Great Britain and Northern Ireland.

† 72 lb. of flour has been taken to equal 100 lb. of wheat.

TABLE VII.—Imports of Barley into the United Kingdom\* in the Years 1925, 1926 and 1927, Compared with the Average for the Years 1909-13.

Country.	1909-13.			1925.			1926.			1927.		
	Quantity.	Value.	Av. Value per Cwt.	Quantity.	Value.	Av. Value per Cwt.	Quantity.	Value.	Av. Value per Cwt.	Quantity.	Value.	Av. Value per Cwt.
Russia .. ..	Cwt. 7,088,120	£ 2,098,669	s. d. 5 11	Cwt. 3,611,516	£ 1,490,463	s. d. 8 3	Cwt. 3,228,968	£ 1,259,023	s. d. 7 10	Cwt. 498,704	£ 224,431	s. d. 9 0
Roumania .. ..	2,430,140	777,587	6 5	140,803	70,174	9 11	276,680	108,394	7 10	879,635	423,013	9 7
Other European Countries	1,184,181	519,964	8 9	631,447	331,810	10 6	326,012	260,353	15 11	1,553,849	1,142,446	14 8
North Africa .. ..	1,367,239	477,324	7 0	825,024	593,880	9 6	363,487	139,418	7 8	640,265	329,477	10 3
Turkey (Asiatic) .. ..	2,443,800	931,091	7 8	103,993	69,224	13 4	393,592	228,866	11 8	365,272	216,984	11 11
Persia .. ..	193,300	61,742	6 5	54,974	29,736	10 10	247,461	98,355	7 11	1,531,197	684,912	8 11
United States .. ..	2,690,484	1,061,273	7 11	5,582,386	3,223,383	11 7	3,765,327	1,736,448	9 3	5,355,383	3,047,712	11 5
Argentina .. ..	102,740	34,958	6 10	22,151	10,129	9 2	89,111	37,445	8 5	236,309	112,537	9 6
Chile .. ..	392,540	153,843	7 10	756,218	516,170	13 8	1,026,610	540,093	10 6	663,847	380,044	11 5
Other Foreign Countries	104,282	41,583	8 0	7,888	6,466	16 5	37,400	24,341	13 0	1,975,632	923,813	9 4
Total from Foreign Countries .. ..	17,996,826	6,158,034	6 10	11,736,400	6,341,435	10 10	9,754,648	4,432,736	9 1	13,700,093	7,485,369	10 11
Canada .. ..	718,660	234,698	6 6	3,067,701	1,546,344	10 1	1,448,039	591,913	8 2	1,364,475	675,022	9 11
Australia .. ..	26,340	9,874	7 6	344,820	287,856	16 8	80,183	46,774	11 8	404,023	256,361	12 8
British India .. ..	2,566,260	917,959	7 2	478,180	279,112	11 8	1,050	537	10 3	624,206	343,630	11 0
Other British Countries	81,700	30,460	7 5	152,061	78,138	10 3	286,423	116,839	8 2	328,713	158,210	9 8
Total from British Countries	3,392,960	1,192,991	7 0	4,042,762	2,191,450	10 10	1,815,695	756,063	8 4	2,718,417	1,453,223	10 8
Total .. ..	21,389,786	7,351,025	6 11	15,779,162	8,532,885	10 10	11,570,343	5,188,799	9 0	16,418,510	8,938,592	10 11

\* Since April 1st, 1923, United Kingdom means Great Britain and Northern Ireland.

TABLE VIII.—*Monthly Imports of Barley into the United Kingdom from July, 1923, to June, 1928, and the Average Monthly Imports for the Period 1923/4 to 1927/8.*

Month.	1923-4.	1924-5.	1925-6.	1926-7.	1927-8.	Average. 1923/4-1927/8.
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
July .. ..	953,200	1,673,083	397,687	753,478	816,861	918,862
August .. ..	1,157,960	1,781,695	898,695	1,283,074	1,390,422	1,302,369
September .. ..	2,229,200	2,256,872	2,513,552	1,804,849	2,183,815	2,197,658
October .. ..	2,459,430	2,958,971	3,055,157	1,031,253	2,773,414	2,455,645
November .. ..	1,811,285	2,834,976	2,663,369	1,329,588	2,511,076	2,230,059
December .. ..	1,698,718	1,821,621	1,741,897	1,204,787	1,457,989	1,585,002
January .. ..	1,250,853	1,759,730	1,009,799	1,177,482	782,026	1,195,978
February .. ..	1,403,795	769,109	762,724	491,328	597,277	804,847
March .. ..	1,371,522	571,059	565,410	924,004	744,385	835,276
April .. ..	1,459,758	530,362	574,701	1,230,000	589,134	876,791
May .. ..	1,451,567	547,055	628,509	709,134	482,160	763,685
June .. ..	1,480,438	426,023	602,445	837,185	398,201	748,858

TABLE IX.—*Total Supplies of Barley, Barley Meal and Flour, Pearled Barley, and Malt Available for Consumption in the United Kingdom\* in the Years 1909-13 and 1921-27.*

Year.	Barley.				Barley Meal and Flour. §	Pearled † Barley.	Malt. **	Correction for Stocks.	Total Supplies. (Expressed as Grain.)
	Home Production.	Imports.	Exports.	Total Supplies.	Excess of Imports over Exports.	Excess of Imports over Exports.	Excess of Exports over Imports.		
	000 Cwt.	000 Cwt.	000 Cwt.	000 Cwt.	000 Cwt.	000 Cwt.	000 Cwt.	000 Cwt.	000 Cwt.
1909	32,411	21,556	60	53,907	7	72	256	— 528	53,202
1910	29,708	18,282	41	47,949	1	50	315	+ 1,371	49,056
1911	28,218	24,545	328	52,435	1	77	360	— 457	51,696
1912	27,016	20,126	499	46,643	1	80	353	— 96	46,275
1913	31,593	22,439	32	54,000	1	96	267	— 800	53,030
1921	25,971	15,813	423	41,361	— 2 †	34	42	— 1,429	39,922
1922	24,993	12,703	76	37,620	18	62	102	+ 1,179	38,777
1923	22,017	18,129	97	40,049	26	61	157	— 500	39,479
1924	22,897	21,656	68	44,485	29	71	347	— 1,000	43,238
1925	23,099	15,779	574	38,304	36	46	407	+ 304	38,283
1926	20,537	11,570	238	31,869	11	56	383	+ 1,018	32,571
1927	19,149	16,419	260	35,308	19	114	219	— 821	34,401

\* From April 1st, 1923, United Kingdom means Great Britain and Northern Ireland.

† This figure represents an excess of exports over imports.

§ Barley meal and flour has been taken to equal its weight in grain.

‡ 60 lb. of pearled barley has been taken to equal 100 lb. grain.

\*\* 75 lb. malt has been taken to equal 100 lb. of grain.

TABLE X.—Quantities\* of Materials used in Brewing and Distilling in the United Kingdom\*\* in the Years 1909-13 and 1923-27.

Year ending 30th Sept.	Brewing.					Distilling.				
	Malt.	Unmalted Corn.	Rice, Rice Grits, Flaked Rice, Maize Grits, Flaked Maize, etc.	Sugar, etc.	Hops.	Malt.	Unmalted Grain.	Rice.	Molasses.	Glucose, Sugar and other Materials.
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
1909 ..	18,594,024	31,040	1,257,245	2,890,759	548,445	3,362,838	3,436,065	23,249	1,093,533	21,082
1910 ..	19,374,384	24,477	1,293,738	2,910,010	551,248	2,560,767	2,914,746	34,763	988,498	18,137
1911 ..	19,376,384	26,477	1,336,687	3,011,201	574,251	2,613,336	3,013,671	39,048	1,028,081	18,475
1912 ..	19,337,800	25,548	1,419,171	3,067,465	549,507	2,790,951	3,391,083	7,104	1,127,054	30,629
1913 ..	19,607,864	34,151	1,611,357	3,279,814	561,709	3,160,824	3,596,190	3,780	1,204,223	20,713
1923 ..	10,742,593	26,287	803,920	1,599,053	328,688	3,242,502	1,948,776	15,428	719,045	1,500
1924 ..	11,274,964	23,223	846,210	1,699,769	350,428	3,105,525	1,940,703	10,574	732,631	27,244
1925 ..	11,453,591	23,735	908,125	1,863,960	362,554	3,045,543	2,100,279	3,560	1,223,271	15,025
1926 ..	10,948,168	23,113	827,398	1,832,914	355,375	1,984,338	1,573,071	12,498	1,315,197	—
1927 ..	10,682,484	21,932	823,000	1,816,773	337,721	1,491,948	1,744,333	350	1,371,216	2,271

\* Malt and Unmalted Corn and Grain have, in each case, been converted from qrs. to cwt., in the years 1909-13, on the basis adopted since 1922 by H.M. Commissioners of Customs and Excise, viz., 1 qr. = 336 lb.

\*\* Since April 1st, 1923, United Kingdom means Great Britain and Northern Ireland.

TABLE XI.—Imports of Oats into the United Kingdom\* in the Years 1925, 1926 and 1927, Compared with the Average for the Years 1909-13.

Country.	1909-13.			1925.			1926.			1927.		
	Quantity.	Value.	Av. Value per Cwt.	Quantity.	Value.	Av. Value per Cwt.	Quantity.	Value.	Av. Value per Cwt.	Quantity.	Value.	Av. Value per Cwt.
	Cwt.	£	s. d.	Cwt.	£	s. d.	Cwt.	£	s. d.	Cwt.	£	s. d.
Russia .. ..	5,746,120	1,728,814	6 0	15,880	5,873	7 5	28,022	12,265	8 9	274,218	120,054	8 9
Germany .. ..	2,410,660	795,298	6 7	175,165	78,292	8 11	316,505	139,341	8 9	151,294	66,905	8 10
United States .. ..	754,373	251,324	6 8	2,178,285	948,841	8 9	1,001,090	409,379	8 2	339,757	127,951	7 6
Argentina .. ..	5,634,680	1,647,037	5 10	1,297,385	585,556	9 0	2,601,701	954,949	7 4	2,207,456	885,810	8 10
Chile .. ..	592,760	188,895	6 4	570,678	274,403	9 7	1,016,796	419,487	8 3	807,798	358,140	8 10
Other Foreign Countries	908,671	267,453	5 10	154,313	68,229	8 10	204,232	90,628	8 11	189,768	84,574	8 11
Total from Foreign Countries .. ..	16,047,264	4,878,821	6 1	4,391,706	1,961,194	8 11	5,168,346	2,026,049	7 10	3,970,291	1,643,434	8 3
Canada .. ..	1,430,680	463,700	6 6	2,990,626	1,331,592	8 11	1,902,156	786,130	8 3	528,804	213,256	8 1
Irish Free State .. ..	—	—	—	864,872	362,690	8 4	559,280	213,705	7 8	1,390,161	588,712	8 6
Other British Countries	535,478	190,100	7 1	118,496	53,429	9 0	10,005	3,854	7 8	17,779	9,430	10 7
Total from British Countries .. ..	1,966,158	653,800	6 8	3,973,994	1,747,711	8 9	2,471,441	1,003,689	8 1	1,936,744	811,398	8 5
Total .. ..	18,013,422	5,532,621	6 2	8,365,700	3,708,905	8 10	7,639,787	3,029,738	7 11	5,907,035	2,454,832	8 4

\* Since April 1st, 1923, United Kingdom means Great Britain and Northern Ireland.



TABLE XII.—*Monthly Imports of Oats into the United Kingdom from July, 1923, to June, 1928, and the Average Monthly Imports for the Period 1923/4 to 1927/8.*

Month.	1923-4.	1924-5.	1925-6.	1926-7.	1927-8.	Average 1923/4-1927/8.
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
July .. ..	892,450	1,123,409	730,214	1,037,488	507,553	858,223
August .. ..	1,010,020	701,249	734,840	734,106	793,705	794,784
September .. ..	653,850	530,378	890,696	405,682	220,498	540,221
October .. ..	646,720	625,768	569,701	334,451	609,402	557,208
November .. ..	711,240	930,334	897,016	341,984	637,934	703,702
December .. ..	1,037,586	777,269	1,112,115	482,213	405,399	762,916
January .. ..	760,683	411,455	820,510	454,294	318,034	552,995
February .. ..	659,269	558,329	692,044	350,681	838,419	619,748
March .. ..	1,142,324	413,182	448,752	409,043	670,414	616,743
April .. ..	884,449	424,908	714,023	352,624	682,805	611,762
May .. ..	1,415,977	858,504	725,857	449,089	1,101,601	910,206
June .. ..	940,234	901,494	951,638	718,813	1,018,049	906,046

TABLE XIII.—*Total Supplies of Oats, Oatmeal, Groats and Rolled Oats Available for Consumption in the United Kingdom\* in the Years 1909-13 and 1921-27.*

Year.	Oats.				Oatmeal.†	Groats and Rolled Oats.†	Correction for Stocks.	Total Supplies. (Expressed as Grain.)
	Home Production.	Imports.	Exports.	Total Supplies.	Excess of Imports over Exports.	Excess of Imports over Exports.		
	000 Cwt.	000 Cwt.	000 Cwt.	000 Cwt.	000 Cwt.	000 Cwt.	000 Cwt.	000 Cwt.
1909	62,678	17,836	199	80,315	256	446	— 605	80,412
1910	62,084	17,495	398	79,181	400	577	+ 507	80,665
1911	58,369	18,273	576	76,066	480	586	— 318	76,814
1912	56,365	18,300	218	74,437	522	540	+ 263	75,768
1913	58,607	18,163	496	76,274	480	556	+ 155	77,465
1921	58,905	8,357	382	66,880	433	711	— 29	67,995
1922	56,241	9,357	288	65,310	344	769	— 200	66,223
1923	46,009	9,759	143	55,625	353	659	— 257	56,380
1924	49,354	10,316	409	59,261	289	630	+ 343	60,523
1925	47,375	8,366	338	55,403	272	580	+ 229	56,484
1926	50,663	7,640	390	57,913	247	672	+ 143	58,975
1927	44,795	5,907	602	50,100	68	546	+ 43	50,757

\* Since April 1st, 1923, United Kingdom means Great Britain and Northern Ireland.

† 70 lb. of oatmeal and of groats and rolled oats have been taken to equal 100 lb. of grain.

TABLE XIV.—Average Monthly Prices\* per Cwt. of certain kinds of Imported Wheat, together with the Average Declared Values of all Imported Supplies into the United Kingdom, and the Gazette Average Prices of British Wheat in England and Wales, from July, 1923, to June, 1928.

Month.	No. 1,† Manitoba	Austra- lian.	Argen- tine.	Karachi.	Average Declared Value of Imports.	British.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1923.						
July ..	11 3	11 7	11 0	10 9	10 9	11 3
August ..	11 1	11 5	10 6	10 1	10 4	10 4
September	11 7	10 9	10 4	9 11	10 0	8 11
October ..	11 5	10 10	10 4	10 0	9 11	8 11
November	11 0	10 11	10 6	10 2	10 1	9 2
December	10 11	11 2	10 6	10 5	10 1	9 9
1924.						
January	11 5	11 0	10 8	10 6	10 2	9 10
February	12 1	11 6	11 4	—	10 6	10 8.
March ..	11 7	11 3	10 10	—	10 8	10 10
April ..	11 1	11 2	10 7	—	10 7	10 6
May ..	11 2	11 5	10 9	—	10 4	10 11
June ..	11 7	11 8	10 11	—	10 6	11 3
July ..	13 0	12 5	12 0	11 11	10 11	11 11
August ..	14 4	13 6	13 0	12 9	11 11	12 9
September	14 4	13 8	13 3	13 2	12 6	12 1
October	16 2	14 10	14 6	14 7	13 6	12 6
November	15 11	—	14 9	14 8	14 2	12 7
December	16 0	—	15 2	14 6	14 6	12 3
1925.						
January..	17 3	—	16 0	15 3	15 1	12 11
February	18 3	16 11	16 9	16 1	15 11	13 7
March ..	17 1	15 7	15 11	15 11	15 11	13 3
April ..	14 8	14 1	14 2	14 0	15 1	12 3
May ..	15 10	14 3	14 7	14 6	14 5	12 7
June ..	15 7	14 1	14 5	14 7	14 5	12 10
July ..	14 6	13 3	13 5	13 4	13 8	11 11
August ..	15 2	13 11	14 2	14 2	13 7	11 9
September	15 2	13 9	14 0	13 7	13 7	11 6
October ..	12 9	12 9	12 3	12 9	12 4	10 5
November	13 1	13 3	12 10	12 11	12 1	11 2
December	15 0	15 1	—	—	12 8	12 3
1926.						
January..	14 11	—	14 3	—	13 5	12 3
February	14 7	14 0	13 8	—	13 9	11 10
March ..	13 11	13 1	12 4	—	13 2	11 6
April ..	14 7	13 10	12 7	—	12 11	11 11
May ..	15 0	14 4	13 1	—	13 0	13 3
June ..	14 4	14 2	13 0	—	13 1	13 6
July ..	14 5	14 1	13 5	13 7	13 1	14 0
August ..	14 3	13 10	13 2	13 3	12 11	13 6
September	13 9	13 4	12 9	12 11	12 8	11 3
October ..	14 4	13 6	—	13 3	12 7	11 4
November	14 11	—	—	13 10	13 1	12 5
December	—	—	—	—	12 11	11 10

TABLE XIV—*contd.*

Month.	No. 1† Manitoba.	Austra- lian.	Argen- tine.	Karachi.	Average Declared Value of Imports.	British.
1927.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
January..	—	—	—	—	12 9	11 10
February	13 10	—	—	—	12 5	11 10
March ..	13 8	13 1	12 4	—	12 4	11 8
April ..	—	12 11	12 2	—	12 2	11 6
May ..	—	13 4	12 9	—	12 4	12 1
June ..	14 5	13 7	13 0	—	12 6	12 8
July ..	14 4	13 1	12 9	12 8	12 7	12 7
August ..	14 5	13 0	12 9	12 9	12 7	12 6
September	13 9	12 7	12 4	12 6	12 6	11 1
October..	13 9	12 3	12 1	12 1	12 1	10 6
November	13 8	12 2	11 11	12 0	11 9	10 1
December	—	—	12 0	12 0	11 10	9 10
1928.						
January..	13 2	12 1	11 10	12 0	11 6	9 10
February	13 0	11 8	11 8	—	11 7	9 7
March ..	13 4	12 7	11 8	—	11 2	9 8
April ..	13 8	12 8	12 1	12 5	11 9	10 2
May ..	13 10	12 11	12 5	13 5	11 11	11 1
June ..	12 10	12 4	12 0	12 2	11 10	10 11

\* Average of prices in Bristol, Hull, Liverpool and London markets.  
† In 1928, No. 2 Manitoba.

TABLE XV.—*Monthly Average Prices per Cwt. of British Wheat, Barley and Oats in England and Wales in the Cereal years 1923-4 to 1927-8 and in the Period 1923-4 to 1927-8 as ascertained under the Corn Returns Act.*

## WHEAT.

Month.	1923-4.	1924-5.	1925-6.	1926-7.	1927-8.	Average 1923/4 to 1927/8.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
September	8 11	12 1	11 6	11 3	11 1	11 0
October ..	8 11	12 6	10 5	11 4	10 6	10 9
November	9 2	12 7	11 2	12 5	10 1	11 1
December	9 9	12 3	12 3	11 10	9 10	11 2
January	9 10	12 11	12 3	11 10	9 10	11 4
February	10 8	13 7	11 10	11 10	9 7	11 6
March ..	10 10	13 3	11 6	11 8	9 8	11 5
April ..	10 6	12 3	11 11	11 6	10 2	11 3
May ..	10 11	12 7	13 3	12 1	11 1	12 0
June ..	11 3	12 10	13 6	12 8	10 11	12 3
July ..	11 11	11 11	14 0	12 7	10 10	12 3
August ..	12 9	11 9	13 6	12 6	10 5	12 2
Cereal Year Average	10 6	12 6	12 3	11 11	10 3	11 6

TABLE XV—*contd.*

## BARLEY.

Month.	1923-4.	1924-5.	1925-6.	1926-7.	1927-8.	Average 1923/4 to 1927/8.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
September	10 10	17 3	14 1	12 6	13 6	13 8
October ..	10 7	17 3	12 3	12 1	13 9	13 2
November	10 7	16 1	11 6	11 6	12 4	12 5
December	10 6	14 6	10 8	10 10	11 2	11 6
January	10 9	14 6	10 6	10 11	11 2	11 7
February	11 7	12 10	9 7	11 1	10 10	11 2
March ..	11 6	11 6	9 0	10 11	10 9	10 9
April ..	11 4	10 7	9 1	10 10	10 10	10 6
May ..	11 2	10 5	9 4	11 2	10 10	10 7
June ..	11 0	10 3	9 0	11 5	10 10	10 6
July ..	11 5	10 1	8 9	11 9	10 3	10 5
August ..	13 3	12 3	11 6	12 5	12 0	12 3
Cereal Year Average	11 4	13 1	10 4	11 6	11 6	11 7

## OATS.

Month.	1923-4.	1924-5.	1925-6.	1926-7.	1927-8.	Average 1923/4 to 1927/8.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
September	8 9	9 4	9 8	8 5	9 1	9 1
October ..	8 8	10 2	9 2	8 1	9 2	9 1
November	8 8	10 2	9 1	8 5	9 1	9 1
December	9 1	9 7	9 3	8 2	9 2	9 1
January	9 5	10 0	9 3	8 2	9 6	9 3
February	10 0	10 1	9 0	8 3	10 1	9 6
March ..	9 10	9 9	8 10	8 1	10 7	9 5
April ..	9 7	9 6	8 11	8 4	11 7	9 7
May ..	9 8	10 1	9 8	9 5	12 11	10 4
June ..	9 11	10 4	9 10	10 0	12 8	10 7
July ..	9 10	10 3	10 2	10 2	12 1	10 6
August ..	9 8	10 0	9 4	10 0	10 5	9 11
Cereal Year Average	9 5	9 11	9 4	8 9	10 6	9 7

TABLE XVI.—Average Monthly Declared Values per Cwt. of Imports of Wheat, Barley and Oats into the United Kingdom from July, 1923, to June, 1928, and for the period 1923/4 to 1927/8.

Month.	Wheat.						Barley.						Oats.					
	1923-4	1924-5	1925-6	1926-7	1927-8	Aver. 1923/4 to 1927/8	1923-4	1924-5	1925-6	1926-7	1927-8	Aver. 1923/4 to 1927/8	1923-4	1924-5	1925-6	1926-7	1927-8	Aver. 1923/4 to 1927/8
July ..	10 9	10 11	13 8	13 1	12 6	12 4	7 7	9 10	10 7	8 5	10 4	9 3	8 11	7 10	9 1	7 11	8 10	8 5
August ..	10 4	11 11	13 7	12 11	12 7	12 1	8 2	10 7	10 4	8 3	11 1	9 9	8 2	8 1	9 3	7 11	8 4	8 4
September ..	10 0	12 6	13 7	12 8	12 6	12 2	7 8	11 8	10 3	8 8	11 3	10 0	7 11	8 6	8 8	8 1	8 7	8 4
October .	9 11	13 6	12 4	12 7	12 0	12 2	8 0	13 5	10 1	8 8	10 8	10 6	7 11	10 5	8 4	7 5	8 8	8 8
November	10 1	14 2	12 1	13 1	11 10	12 4	8 5	13 6	9 5	9 0	12 2	10 10	7 11	10 5	8 0	7 8	9 0	8 9
December	10 1	14 6	12 8	12 11	11 10	12 3	8 5	13 5	9 1	9 5	12 1	10 7	8 2	9 9	8 3	7 9	8 10	8 6
January	10 2	15 1	13 5	12 9	11 6	12 10	8 10	13 9	10 7	9 8	12 0	11 1	8 1	10 0	8 4	7 9	9 3	8 6
February	10 6	15 11	13 9	12 5	11 7	12 9	8 5	13 5	8 10	10 6	11 2	10 1	8 3	9 10	7 11	7 7	9 5	9 6
March ..	10 8	15 11	13 2	12 4	11 2	12 5	10 1	13 2	10 4	9 3	11 0	10 6	7 10	9 9	7 8	7 4	9 5	8 4
April ..	10 7	15 1	12 11	12 2	11 9	12 5	9 10	11 10	9 7	9 8	11 7	10 3	7 9	9 1	7 9	7 6	10 5	8 6
May ..	10 4	14 5	13 0	12 4	11 11	12 2	9 5	11 8	8 7	9 10	11 7	10 0	7 7	8 10	7 11	7 11	11 4	8 10
June ..	10 6	14 5	13 1	12 6	11 10	12 6	9 7	10 11	7 11	10 4	11 0	9 10	7 10	8 11	8 3	8 6	11 5	9 1

TABLE XVII.—Average Prices of British Corn per Cwt. on Certain Markets for the Years 1924, 1925, 1926 and 1927, Compared with the Average for the Years 1909-13.\*

Market.	Wheat.					Barley.					Oats.				
	1909-1913	1924	1925	1926	1927	1909-1913	1924	1925	1926	1927	1909-1913	1924	1925	1926	1927
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Reading ..	7 11	11 9	12 0	12 6	11 9	7 8	12 8	11 1	9 8	11 5	6 11	10 0	9 9	8 11	9 5
Cambridge ..	7 10	11 5	12 1	12 3	11 4	7 8	13 7	11 9	10 1	11 7	6 8	9 9	9 10	9 1	9 0
Exeter ..	7 9	11 8	12 3	12 5	11 8	8 1	14 10	12 8	11 5	12 5	6 8	10 4	10 0	9 3	9 4
Dorchester ..	7 7	11 6	11 11	12 2	11 6	7 8	12 8	10 8	9 10	11 4	6 8	9 7	9 6	8 7	9 1
Darlington ..	7 5	11 6	12 5	12 4	11 5	7 6	12 10	10 3	9 7	10 10	6 11	9 9	10 0	9 0	9 0
Braintree ..	7 10	11 7	12 1	12 3	11 7	7 9	14 2	12 2	10 0	11 6	6 8	10 3	9 8	8 11	9 3
Chelmsford ..	7 11	11 10	12 3	12 7	11 9	7 10	14 5	12 2	10 5	11 7	6 9	10 0	9 11	9 2	9 5
Colchester ..	7 11	11 5	12 0	12 2	11 6	7 8	14 2	12 6	10 4	11 8	6 10	9 8	9 8	9 0	9 4
Gloucester ..	7 10	11 7	12 5	12	11 9	7 5	12 11	11 9	9 11	11 7	6 10	9 11	9 11	8 11	9 1
Andover ..	7 8	11 7	12 1	12 1	11 6	7 5	13 6	10 11	9 8	11 1	6 9	9 9	9 6	8 10	9 2
Hereford ..	7 9	11 7	12 5	12 3	11 8	7 9	12 7	11 0	9 11	11 4	7 0	10 10	10 1	9 1	9 3
Bishops Stortford	7 8	11 6	12 0	12 3	11 4	7 11	14 1	12 0	10 1	11 9	6 7	9 10	9 8	9 1	9 1
Hitchin ..	7 9	11 3	12 1	12 1	11 4	7 8	13 6	11 2	9 7	11 1	6 10	9 6	9 10	9 1	8 11
Manchester ..	7 9	11 8	12 5	12 3	11 6	7 1	13 1	10 8	9 6	12 3	6 11	10 1	9 11	9 1	9 1
Canterbury ..	8 0	11 11	12 7	12 5	11 10	8 6	14 2	12 5	10 6	12 0	7 0	10 7	10 8	9 11	9 10
Boston ..	7 7	11 3	12 2	12 1	11 2	7 5	12 9	10 11	9 3	10 11	6 6	9 4	9 3	8 7	8 7
Brigg ..	7 6	11 2	12 2	12 0	11 2	7 9	12 7	11 0	9 7	11 2	6 8	9 4	9 4	8 3	8 7
Lincoln ..	7 8	11 5	12 3	12 3	11 4	7 9	12 5	11 1	9 7	11 5	6 11	9 6	9 5	8 9	8 10
Spalding ..	7 6	11 3	12 1	12 0	11 0	7 4	12 8	11 3	9 1	10 11	6 6	9 5	9 5	8 8	8 8
Grantham ..	7 6	11 1	12 1	11 11	11 2	7 9	13 2	11 5	10 1	11 8	6 11	9 5	9 4	8 6	8 7
London ..	8 0	11 10	12 4	12 8	11 8	7 7	13 11	12 4	10 9	12 1	7 2	10 4	10 7	9 10	9 9
Fakenham ..	7 9	11 2	11 9	11 10	11 3	7 3	14 5	12 5	10 7	11 5	6 8	9 11	9 9	9 0	9 4

TABLE XVII—contd.

Market.	Wheat.					Barley.					Oats.				
	1909-1913	1924	1925	1926	1927	1909-1913	1924	1925	1926	1927	1909-1913	1924	1925	1926	1927
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
King's Lynn ..	7 6	11 4	11 10	11 11	11 2	7 4	14 3	12 0	10 6	11 7	6 7	9 10	9 10	9 0	9 2
Norwich ..	7 10	11 4	11 10	12 3	11 5	7 6	13 9	12 1	10 8	11 10	6 9	9 11	9 10	9 4	9 3
Peterboro' ..	7 7	11 3	12 1	12 0	11 1	7 6	12 10	11 2	9 7	11 2	6 7	9 7	9 6	8 9	8 8
Berwick ..	7 4	11 1	12 0	11 11	11 3	7 6	12 9	10 8	9 1	10 10	6 11	10 1	10 2	8 10	9 0
Newark ..	7 7	11 4	12 3	12 1	11 4	7 11	12 10	11 4	9 10	11 7	6 10	9 6	9 6	8 9	8 9
Banbury ..	7 9	11 9	12 4	12 5	11 6	7 6	12 6	10 9	8 11	10 4	7 0	9 10	9 7	8 8	9 0
Shrewsbury ..	7 7	11 7	12 3	12 3	11 10	8 3	14 3	12 0	11 4	12 5	7 2	10 2	10 0	9 3	9 2
Bristol ..	7 9	11 7	12 2	12 6	11 8	7 11	13 8	12 2	10 10	12 6	6 11	9 9	9 8	9 0	9 3
Wolverhampton ..	7 7	11 9	12 6	12 6	11 9	8 3	13 6	11 11	10 5	12 9	6 10	10 3	9 10	9 1	9 4
Burton ..	7 7	11 3	12 3	12 4	11 8	8 3	14 2	13 6	11 11	12 8	7 5	10 1	10 2	9 6	9 9
Bury St. Edmunds ..	7 10	11 5	12 0	12 2	11 4	7 9	14 3	12 10	10 8	11 10	6 11	10 0	9 10	9 3	9 4
Ipswich ..	7 10	11 6	12 0	12 3	11 6	7 11	14 4	12 9	11 6	12 1	6 11	9 11	9 11	9 5	9 3
Sudbury ..	7 10	11 3	12 0	12 1	11 6	7 9	13 9	12 4	10 9	11 9	6 8	9 8	9 6	8 9	9 2
Chichester ..	7 9	11 9	12 0	12 2	11 9	7 8	13 0	11 10	9 9	11 1	6 11	10 2	10 2	9 2	9 7
Birmingham ..	8 0	12 1	12 9	12 9	11 11	8 3	14 2	11 8	9 8	11 4	6 11	10 7	10 6	9 10	10 1
Salisbury ..	7 9	11 10	12 2	12 6	11 7	7 7	13 3	11 4	9 11	11 9	6 11	10 0	9 8	9 1	9 6
Worcester ..	7 10	11 7	12 7	12 8	11 10	7 11	13 5	11 5	9 9	11 3	7 2	10 4	10 0	9 4	9 6
Driffield ..	—	11 4	12 3	12 1	11 4	—	12 4	10 6	9 4	10 10	—	9 3	9 5	8 4	8 5
Hull ..	7 7	11 3	12 2	12 3	11 5	7 5	12 5	10 4	8 10	10 6	6 8	9 3	9 5	8 7	8 8
Doncaster ..	7 7	11 3	12 2	12 4	11 4	7 8	12 1	10 10	9 8	11 1	6 11	9 4	9 6	8 8	8 6
Leeds ..	8 0	11 6	12 5	12 4	11 7	7 10	13 1	11 6	9 11	11 9	7 2	9 8	9 9	8 11	8 10
Cardiff ..	7 3	11 8	12 6	12 5	11 10	7 9	14 2	12 2	11 2	13 2	7 4†	10 6	10 6	9 5	9 8

\* Prices per Imperial quarter have been converted on the basis of  
 1 quarter of wheat = 480 lbs.  
 1 quarter of barley = 400 lb.  
 1 quarter of oats = 312 lb.

† Annual Average 1909/12.



TABLE XVIII.—Imports of Wheat, Barley and Oats into Certain Ports of the United Kingdom in the Years 1925, 1926 and 1927.

Port.	Wheat.			Barley.			Oats.		
	1925.	1926.	1927.	1925.	1926.	1927.	1925.	1926.	1927.
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
Barrow-in-Furness	164,218	147,105	97,240	—	—	—	—	—	—
Boston .. ..	—	—	—	11,658	31,959	132,577	—	—	—
Bristol .. ..	7,394,641	7,992,785	9,199,597	4,195,113	3,082,235	3,830,759	468,907	480,096	380,483
Cardiff .. ..	4,525,368	4,999,779	5,569,430	303,919	297,492	315,999	453,045	300,512	255,828
Carlisle .. ..	29,537	15,584	10,320	—	—	—	—	—	—
Cowes .. ..	9,527	10,000	—	—	—	—	—	—	—
Falmouth .. ..	—	—	—	140,320	104,360	92,245	7,711	1,799	6,880
Gloucester .. ..	883,290	364,440	976,938	117,388	76,920	—	20,523	2,432	12,351
Grimsby .. ..	51,500	38,106	—	364,425	132,814	145,879	—	—	—
Harwich .. ..	—	—	—	76,679	46,156	8,708	—	—	—
Hull .. ..	15,369,843	16,796,990	18,680,145	2,476,269	2,223,217	3,662,934	295,967	327,732	186,269
Ipswich .. ..	429,353	448,473	727,229	250,584	134,468	132,077	—	—	—
King's Lynn .. ..	—	—	—	8,292	—	3,890	—	—	—
Liverpool .. ..	20,882,211	20,848,256	23,074,440	622,722	481,933	458,453	628,328	703,308	526,942
London .. ..	26,183,864	24,512,338	28,255,963	3,108,259	2,583,994	3,725,470	4,392,529	4,297,985	3,347,572
Manchester .. ..	9,167,275	8,015,927	10,124,359	178,356	147,665	250,120	262,224	169,744	57,387
Newcastle .. ..	2,496,853	3,073,344	3,758,923	—	—	—	279,843	187,483	101,641
Penzance .. ..	—	—	—	—	—	—	29,969	18,956	18,749
Plymouth .. ..	163,541	12,000	47,836	381,051	422,921	327,981	153,956	96,274	110,974
Southampton .. ..	309,836	284,211	232,727	272,800	124,132	324,185	151,725	137,610	176,867
Stockton .. ..	12,000	73,887	30,360	—	—	—	—	—	—
Sunderland .. ..	431,224	390,776	290,557	—	—	—	—	—	—
Swansea .. ..	949,816	986,148	901,849	229,761	179,559	113,844	74,123	65,948	68,924
Truro .. ..	—	—	—	—	—	—	10,636	18,396	22,072
Yarmouth .. ..	10,019	25,800	—	9,896	—	32,400	—	—	—
Campbeltown .. ..	—	—	—	13,260	10,324	—	—	—	—
Glasgow .. ..	3,194,347	3,211,359	3,512,418	863,253	409,771	716,169	463,467	293,575	158,915
Inverness .. ..	—	—	—	176,361	21,156	288,988	—	—	—
Leith .. ..	2,485,016	2,543,201	2,793,086	1,689,244	984,413	1,585,009	209,803	177,223	86,952
Belfast .. ..	1,639,099	1,412,989	2,111,663	203,375	54,763	69,508	—	—	—
Londonderry .. ..	8,577	—	—	—	—	—	—	—	—

## APPENDIX A.

## GEOGRAPHICAL DISTRIBUTION OF VARIETIES.\*

In the following notes, the numerous varieties of wheat, barley and oats are grouped roughly into commercial classes, and varietal localisation] is discussed from a broad, economic standpoint.

## (i) Wheat.

(a) *Yeoman Varieties*.—These are customarily regarded as commercially distinctive from other English wheats, either red or white. Yeoman is found in greatest abundance in south Lincolnshire, where, within the last 4 or 5 years, it has almost completely ousted other red wheats such as Squarehead's Master, and now constitutes over 60 per cent. of the total crop. It is also extensively grown in the tract of country stretching south-eastwards from this part through the Fens, Isle of Ely, and eastern Cambridgeshire into Essex. On this strip, Yeoman probably constitutes from 30 to 40 per cent. of the crop, but, according to some observers, this proportion is decreasing and likely to decrease further. Although the decrease is sometimes ascribed to productive factors, it is, in the main, associated with economic conditions. Local millers, for instance, may admit the superior strength of Yeoman for bread-flours, but protest that there is too much grown for their purpose since white wheats and Swedish Iron are to be preferred for biscuit flours.

In Essex, where many growers and merchants find an outlet for their grain in the seed trade, the decrease is partially accounted for by the lack of demand for this kind of seed from other parts of the United Kingdom, and also from France, where buyers are interested in other types of English seed wheat but have no use for Yeoman. Eastward, Yeoman is found in decreasing quantities and, in Norfolk, accounts for not more than 15 per cent. of the wheat acreage. Bedfordshire has from 20 to 25 per cent. of Yeoman, but the proportion is also said to be decreasing, partly for economic and partly for productive reasons. In Huntingdonshire, with from 20 to 25 per cent. Yeoman, the tendency is to increase the acreage at the expense of white wheats. From Hertfordshire, through to Oxfordshire and up to Leicestershire, Yeoman constitutes perhaps 15 to 20 per cent. of the crop on an average. It ranges from as low as 10 per cent. in some parts up to 30 per cent. in others; reports as to its popularity are conflicting, although it is apparently having a considerable vogue in the neighbourhood of Leicester.

Further west, in the counties of Warwick, Worcester and Stafford, Yeoman represents not more than 5 or 10 per cent. of the crop, while in Hereford and Monmouth the proportion is even less, and, in Wales, the variety is only met with on trial plots. West-country critics allege that they cannot get more for Yeoman than for other wheats, that Yeoman does not bushel well or that it yields insufficient straw, or that it reverts to the Squareheads type, and that all wheat grown from Yeoman seed does not show Yeoman characteristics. Yeoman I having once been tried by a farmer and found unsuitable, it is possible that Yeoman II, or any other type bearing the name "Yeoman," however different, may be condemned without trial.

In the southern counties, Kent shows the largest percentage of Yeoman varieties, between 30 and 40 per cent. of the crop consisting of this type. East Sussex is not a great wheat-growing county and the percentage of

\* A variety is capable of spreading very rapidly. A description of its geographical distribution can therefore only be temporarily true. This survey is made on the basis of information collected during 1925-6.

Yeoman falls off somewhat. In West Sussex, perhaps 40 per cent. of the crop is Yeoman and the proportion appears to be increasing; around Chichester, the proportion is much higher.

Hampshire and Wiltshire appear to grow only from 5 to 10 per cent. of Yeoman, but in Gloucestershire and Somersetshire, the proportion increases to about 15 per cent. or more in some parts. In Devonshire and Cornwall, the amount of Yeoman grown is infinitesimal; Devon farmers who tried it have given it up owing, it is said, to poor yield.

Of the north-eastern counties, Nottingham has not more than 10 per cent. of Yeoman. In north Lincolnshire, where apparently it is not successful on the chalk, Yeoman amounts only to about 15 per cent. In south Yorkshire, the percentage is low but, in the East Riding, it rises to about 20 per cent. In the North Riding, again, the proportion does not perhaps exceed 10 per cent., but, in Durham and Northumberland, it is grown rather more plentifully; further north, in the Lothians and south-east of Scotland, Yeoman forms about 25 per cent. of the crop.

Cumberland, Westmorland and north Lancashire grow little wheat, apart from some sown to provide thatching straw. In south Lancashire, some Yeoman is found in the Fylde, but, in the rest of the county and also in Cheshire, although wheat is plentiful, the amount of Yeoman grown is practically negligible.

(b) *Other Red Varieties*.—Taking the country as a whole, Squarehead's Master, or wheat with somewhat similar varietal characteristics, may be regarded as the standard type of red wheat and the one mostly widely grown.

In Scotland, probably 50 per cent., in Northumberland and Durham 75 per cent., and in Yorkshire probably 80 per cent., of the total crop is of this type. Swedish Iron is fairly prominent and might account for 10 per cent. of the wheat acreage in these parts, although Little Joss and Brick are preferred for sowing on the Wolds.

In Lancashire, where only 25 per cent. of the wheat is red, and in Cheshire, where the proportion of red wheats is about 50 per cent., Squarehead's Master is the general type, and Little Joss the only other variety worth specifying. In this district, there appears, however, to be a marked disregard of varietal names, and provided the sample looks right, it is judged good enough for seed without any question of variety—a habit which, however, is not confined to this area.

Some 30 or 40 per cent. of the wheats in Wales are red, and these mostly of the standard type. In the counties of Gloucester, Worcester, Hereford and Monmouth, from 80 to 90 per cent. of the wheat is red and, apart from Harvester, which is a little longer in the berry than Squarehead, consists mostly of the standard type. Where late sowing in the spring is necessary, French Marvel or, sometimes, Manitoba wheat is used.

In Somersetshire and Devonshire, where the proportion of red wheat is about 30 or 40 per cent., the bulk is again of standard type with small quantities of Swedish Iron and Little Joss.

In the southern counties, from 50 to 60 per cent. of the wheats grown are red, chiefly of the Squarehead type, although Little Joss is preferred in some parts of Hampshire and Swedish Iron or Harvester in some parts of Sussex.

In the counties of the Thames Valley, wheat of the Squarehead's Master type constitutes more than 50 per cent. of the crop, while Little Joss is popular and constitutes perhaps 15 per cent., except on the strip between Reading and Oxford, where it forms a much higher proportion. Swedish Iron and a little Rivett Wheat are occasionally met with on the lighter lands to the north.

Rivetts are also met with in Bedfordshire, on the light lands which are not good enough for market gardening. From here up to Nottinghamshire and over the Midland counties, red wheats constitute from 75 to 80 per cent. of the crop, and Squarehead's Master type forms rather more than half of this. In some parts of the area, Little Joss and Swedish Iron are said to be

increasing; in others, Swedish Iron has been falling off during the last 3 or 4 years and the tendency has been to grow white wheats instead.

In the eastern counties, Squarehead's Master is losing its supremacy in face of white wheats and Yeoman varieties. In south Lincolnshire, it has practically disappeared in the last few years; in the east of Essex, also, Squarehead's Master is now little grown. Between these two last districts, down through the Isle of Ely, Little Joss is, after Yeoman, the most important variety and, representing over 30 per cent. of the crop, practically equals Yeoman in extent. In Norfolk and Suffolk, however, Squarehead's Master remains the most popular variety and in east Norfolk it probably constitutes from 50 to 75 per cent. of the crop; Swedish Iron is relatively plentiful and there is a good proportion of Dutch wheats and of varieties such as Setter, Bacton Champion, etc., with some Little Joss on light land or for late sowing.

(c) *White Wheats*.—Although Stand Up White, Benefactor, Victor and other white varieties have distinctive varietal characteristics of importance, from a productive standpoint there is little difference between any of these varieties when they come on the market.

In Norfolk and Suffolk, white wheats probably do not exceed 10 per cent. of the crop, although, in parts of Suffolk, some observers report a tendency for this proportion to increase. In Cambridgeshire, also, the percentage is low, and in Huntingdonshire, where they were once held in favour, they are now rarely grown. In Rutland and Bedfordshire, however, white wheats increase to about 30 per cent. of the crop. In Leicestershire, probably from 15 to 20 per cent. of the wheat is white, but this is mostly found in the Vale of Belvoir; in the rest of the Midlands, the proportion varies from 5 to 20 per cent. and, although it is high on the red land to the west of Nuneaton, it probably averages only 10 per cent. of the crop.

Worcestershire and Herefordshire grow about 20 per cent. white wheats, but they practically disappear in Gloucestershire except on the Cotswolds. In Monmouthshire also, the proportion drops, but further west, in Wales, it rises until probably 65 per cent. of the crop consists of white varieties. In Somersetshire, the proportion increases and round Taunton probably 50 per cent. of the crop is white. In Devonshire, red wheat is mostly confined to the hills, and white wheats constitute from 65 to 75 per cent. of the crop. Allowing for these varying proportions, white wheats may be regarded as forming a little more than 30 per cent. of the wheat grown in the south-west.

In the south-eastern counties, from Berkshire and Hampshire to Kent, white wheats do not make up more than 10 or 15 per cent. of the crop, while in Oxfordshire and Buckinghamshire the proportion is even less.

In South Lincolnshire, white wheats still represent perhaps 30 per cent. of the crop, but, in Yorkshire, the percentage is estimated at not more than 10 per cent. of the total. Northumberland does not grow more than 5 per cent., but in the south-east of Scotland, white wheats increase to about 25 per cent. In Lancashire, 75 per cent. and, in Cheshire, 50 per cent., of the crop is estimated to consist of white varieties.

## (ii) Barley.

Barley does not lend itself so easily to classification in economic groups according to variety. There is a great difference between a malting and a feeding barley and also between a pale ale malting barley and one intended for use in, say, the manufacture of stout or lager beer. The distinction cannot, however, be made on a varietal basis, because factors of soil, climate, season and time of sowing cause big variations in the crop. Most barley is spring-sown, but, in recent years, the amount of winter-sown barley has greatly increased throughout the south-east of England. In Essex and West Suffolk, the proportion of winter barley is now estimated at from 40 to 50 per cent. of the crop. The varieties which are being employed for this purpose are commonly the same as those used for spring sowing.

(a) *Six-rowed Barley*.—This may be broadly distinguished from the bulk of the crop which is of the two-rowed type. A form of this six-rowed barley, which may either be autumn or spring-sown, is harvested in Orkney and the north of Scotland under the name of "bere" or "bigg" and is, at times, employed for malting. Six-rowed barley is also found in the highlands of Wales and in the west and is plentifully grown on the Downs of Hampshire and Sussex, where it is sown in the autumn and, instead of being harvested, is fed-off by sheep in the spring.

(b) *Two-rowed Barley*.—Two-rowed barleys may be roughly classified into two groups, "older varieties" and "newer varieties," and these again subdivided into "wide-eared" and "narrow-eared" types.

*Older varieties* of the wide-eared type are represented by Goldthorpe, Fan or Spratt, Archer, Standwell and Plumage, while English and Scotch Common, Old Irish and Cornish, and Chevallier—an early-selected type of English barley—may be regarded as typical of the old narrow-eared varieties.

Spratt is common in the Fen district. On King's Lynn market, it is possible to buy a run of Old Goldthorpe types out of the Fens and west Norfolk. Goldthorpes are also to be found across through Nottinghamshire into Derbyshire and up into Yorkshire and Northumberland, while some are met with in south Buckinghamshire and in Oxfordshire.

Standwell is grown to an appreciable extent in Yorkshire and Northumberland, in Somersetshire and the south-west of Gloucestershire, and on the lowlands of Lincolnshire, where Plumage is also favoured to some extent.

Archers are later in ripening than the Spratt and Chevallier types and are not so suitable, therefore, for the northern parts of the country, but, in Leicestershire, Archer is not uncommon. From here, it extends down into Hampshire and Wiltshire and is found scattered to the east and south-east of this line.

Chevallier is found chiefly on the Norfolk coast and in Suffolk, east Essex, Rutland and the highlands of Cambridgeshire, and constitutes perhaps 10 per cent. of the crop in those parts. It is also grown, to some extent, in Kent and on the wolds of Lincolnshire, Yorkshire and in Wiltshire. It is very difficult, however, to know whether the terms "Chevallier" and "Goldthorpe" are, in every case, used to describe the botanical varieties or are merely used to distinguish between the ordinary commercial types of brewing barley.

The names of Old Irish, Old Cornish and Scotch Common are probably sufficient indication of the locality in each case. In Scotland, brewers express a preference for the old-fashioned Common barley, but its cultivation has greatly decreased in recent years, largely owing to the fact that where it will yield 5 quarters to the acre the newer types of barley will yield 6.

*Newer Varieties*.—In the main, these fall botanically into the wide-eared group of barleys and are mostly hybrids of the old Spratt, Goldthorpe and Archer families. Although some buyers lump them all together and describe them as "fat" barleys, the newer varieties are so profoundly modified by their environment that they may fall into either the commercially so-called "Goldthorpe" class or the "Chevallier" class, according to the nature of the season, soil and district.

Throughout the Midlands and the west and north-west of England, where barley is sparsely grown and seldom intended for malting, the old types such as the Goldthorpes remain dominant. Where barley is widely grown and intended for malting, from Scotland down the east coast to the south-eastern counties of England and across from Norfolk to Devon, the newer varieties are predominant; in 1925, the most widely grown of any was Plumage Archer. This variety was estimated to form from 70 to 80 per cent. of the barley crop in the Lothians and south-east Scotland, and not less than 60 per cent. in Norfolk, Suffolk and Essex. The proportion remains

high—about 75 per cent.—westward through Hertfordshire, Buckinghamshire, Gloucestershire and Somersetshire to Devonshire.

In Essex, Suffolk and east Norfolk, Spratt Archer is, however, beginning to displace Plumage Archer. It has also been making progress in Huntingdonshire and Rutland and in Devonshire.

Beavans Archer is widely grown in Somersetshire and part of Gloucestershire and constitutes perhaps 25 per cent. of the crop in the south-west. It is also favoured in some parts of Suffolk.

It is not possible to follow all the varieties in detail. Some selected Irish Archers of the old type and Old Danish have been introduced and continue to be grown in east Norfolk. In this and other parts, there have been introduced still more recent varieties, or old varieties passing under new names, and, as always happens, these new varieties show signs of spreading rapidly for a year or two.

### (iii) Oats.

Oats may be grouped into two commercial classes—white and coloured—which have, in the main, quite different markets and uses. The coloured oats, in turn, may be sub-divided into black, grey and yellow. The nature of the market influences the type of oat grown in a district, and factors of soil and elevation have also to be taken into account; the most important factor, however, is the time of sowing. Oats, if sown too early in the spring, may be checked at about the 3-leaf stage and become a prey to wireworm, or, if sown late, are liable to be destroyed by frit fly. To avoid the ravages of these pests, which are apparently worst in the south and south-east, oats, to an increasing extent, are being sown in the autumn where the season and system of farming admit of this being done. As yellow oats and the great majority of white oat varieties do not appear capable of standing a hard winter, the introduction of autumn sowing practically means, for most districts, the extended cultivation of black and grey winter varieties.

There are many varieties of black oats but Black Tartarian is perhaps the one most commonly met with in most parts of the country, except Cornwall where an indigenous variety is grown. Of yellow oats, Goldfinder and Golden Rain are the chief varieties outside Wales; Abundance and Victory are the most plentiful and foremost among white spring oats, and White Marvellous perhaps the most common white variety used for winter sowing.

In some parts of Norfolk, more black than white oats are grown, but, over the whole county, not more than 15 per cent. of the oats are winter-sown, and these are practically all black with a very little grey; the bulk of the crop there consists of white spring Abundance, some Victory and a variety called Giant Eliza on the light land. The winter oats are, in the main, consumed on the farm. In Suffolk, winter oats are extensively cultivated and the acreage is increasing, while further south, in Essex, from 30 to 50 per cent. of the crop is winter-sown. Some White Abundance and Marvellous oats are sown in the autumn in the latter district and also an appreciable quantity of grey winters, but, in the main, the winter oats are again black. Of the white spring oats, Victory appears to be the leading variety.

In Hertfordshire, Buckinghamshire and Oxfordshire, the majority of the oats, certainly not less than 60 per cent., are winter-sown. Of these, there is a little white and a little black, but grey winters, suitable for the London and southern markets, predominate.

In the midland counties of Bedford, Huntingdon and Rutland, the bulk of the oats are white, spring Abundance; black, grey and white winters are also favoured, respectively, in these counties. In Nottinghamshire, over 50 per cent. of the oats are black winters, while in Leicestershire, although from 30 to 40 per cent. of the oats are winter-sown, white winters are growing in favour and now represent probably over 60 per cent. of those winter-sown. Towards Warwickshire, on the other hand, only a few white winters are grown

and practically no grey at all, as Birmingham and the Midland markets prefer the all-black oats which, in 1925-6, were at a premium as compared even with white samples; hence, over 60 per cent. of the winter oats and over 30 per cent. of the spring oats are black, although the extent of spring and autumn sowing is, as a rule, fairly even.

In Gloucestershire, in the Vale of Berkeley, from 60 to 70 per cent. of the oats are winter-sown, and, of these, 75 per cent. are black and the remainder grey. On the Cotswolds, however, with oats following roots fed to sheep, at least 70 per cent. of the crop is spring-sown, but 50 per cent. of this is black and probably 25 per cent. grey, since white oats are not considered successful on the hills. Somerset has also a high proportion, probably 75 per cent., of winter-sown oats, but Devonshire, as a whole, does not appear to sow more than 15 or 20 per cent. in the autumn, and, of this, more is grown in east and south Devon than in the north and west. Here, yellow oats of the Golden Rain variety are common, but the white varieties, Victory and Abundance, are the most general; Tartarian and Superb are the chief black varieties. In Cornwall, Old Cornish black oats are common but there is much sowing of mixed "dredge corn."

The area comprising Herefordshire and Monmouthshire is regarded as a good one for seed, but not more than 20 per cent. of the crop is winter-sown. White Abundance constitutes most of the crop and relatively few black oats are grown. In South Wales, although the Vale of Glamorgan grows mostly white oats, over 60 per cent. of the crop to the west of this is black; spring sowing is the rule both here and generally throughout Wales. The native, yellow Welsh oat is long, coarse, tough, does not clip well, and does not stand the winter if autumn-sown. At the Welsh plant-breeding station, hybrids are being produced from the Radnorshire Sprig oat and from the Welsh Strigosa, which promise to be of a better type of grain and as hardy as Grey Winter for autumn sowing. One may, therefore, look for some change in sowing practice in Wales in the near future.

In Anglesey, although white oats constitute the bulk of the crop, the yellow Golden Rain or Goldfinder oats are also popular. In Cheshire, which produces oats of outstanding quality, not more than 20 per cent. of the crop is autumn-sown, but this proportion is said to be increasing. White varieties are preferred for winter sowing, so that very few black oats are grown and, with the exception of a few yellow oats, the crop is mainly white.

In south Lancashire, there is very little winter sowing and, although perhaps 10 per cent. of the crop is black, this is mostly spring-sown. Abundance and Victory account for more than 50 per cent. of the crop, and the proportion of yellow Golden Rain and Goldfinder may be as high as 40 per cent. In the north of Derbyshire, there are very few black and no yellow oats, but in south Derbyshire, where frit fly is bad and the influence of the Midland market is felt, probably as much as 50 per cent. of the oats are black, winter-sown. In north Lancashire, Westmorland and Cumberland, black oats practically disappear, the practice of winter sowing is exceptional and, although some yellow oats are grown, the bulk of the crop appears to be Victory. Abundance is also met with and also appreciable quantities of the Potato oat, the cultivation of which is said to be again increasing.

In Lincolnshire, oats are not extensively cultivated on the heath, as they are apt to grow thin. Throughout the county, the proportion of winter sowing varies from a little over 30 per cent. in some parts, to 75 per cent. in others. White oats for winter sowing are tried in places, but, in the main, the crop consists of 50 per cent. black—chiefly Tartarian for sale in the Midlands—and 50 per cent. white, Abundance being the leading variety.

In Yorkshire, winter oats do not do well on the wolds and not more than 15 per cent. of the oats are winter-sown; these are chiefly black with a very few white. In Northumberland and Durham, 85 per cent. of the crop is white, spring-sown and there is little or no market for black oats.

In Scotland, black oats are found chiefly in Forfarshire, Ayrshire and the

Border counties, while the Lothians and Berwick grow hardly any at all. Winter sowing of oats is exceptional. Probably 30 per cent. of the crop consists of thin-skinned varieties, such as the Potato oat on high ground generally throughout the country, the Sandy oat in the north and the Tam Findlay oat in the west, but at least 60 per cent. of the crop now consists of thick-skinned types such as Victory and Abundance.

(iv) Note on Varieties and Synonyms.

¶ Among all the cereals there is a plethora of varietal names. One variety may have many pseudonyms and the number of reputed varieties is generally increased each year by alleged new stocks which are apparently quite indistinguishable—except perhaps in regard to purity—from the old stock varieties. For a time, these may have a vogue, in many cases of a local character, before becoming merged again into the general type. While the sudden spread of these new varieties may be an index of the farmers' readiness to adopt improvements, it seems as if farmers ought to be protected against paying a higher price for seed which does not differ from the types in common use. There seems room for the appointment of a representative Synonyms Committee for cereals—similar to that already existing for potatoes—which will record the name and characteristics of existing varieties and their synonyms, and register any new varieties put on the market, provided that they are, in fact, distinctive.

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APPENDIX B.

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NOTE ON METHOD OF DEFINING STANDARD GRADES FOR HOME-GROWN CEREALS.

The precise nature of the factors employed to define standard grades of quality for home-grown grain would require to be jointly considered and agreed on by the various interests concerned in relation to the conditions under which any such system of grading would be expected to operate. As a basis for future discussion, it is suggested that standard grades for home-grown cereals might be drawn up on the following lines:—

Wheat.

- No. 1 *Red* shall be pure red wheat, sound, plump and clean, weighing not less than 62 lb. to the bushel.
- No. 2 *Red* shall be pure red wheat, sound, plump and clean, weighing not less than 60 lb. to the bushel.
- No. 1 *White* shall be pure white, winter wheat, sound, plump and clean, weighing not less than 62 lb. to the bushel.
- No. 2 *White* shall be pure white, winter wheat, sound, plump and clean, weighing not less than 60 lb. to the bushel.
- No. 3 *Wheat* shall include all wheat—red, white or mixed—not suitable for grading either as No. 1 or No. 2, and weighing not less than 58 lb. to the bushel.

Feeding Barley.

- No. 1 shall be sound, clean barley weighing not less than 52 lb. to the bushel.
- No. 2 shall be sound, clean barley weighing not less than 48 lb. to the bushel.



## Oats.

*No. 1 White* shall be pure white oats, sound and clean, weighing not less than 40 lb. to the bushel.

*No. 2 White* shall be pure white oats, sound and clean, weighing not less than 38 lb. to the bushel.

*No. 3 White* shall be sound and clean oats, weighing not less than 36 lb. to the bushel.

*Black Oats* shall contain 95 per cent. of black oats; grades 1, 2 and 3 (Black) shall otherwise be made to correspond with grades 1, 2 and 3 (White).

*Mixed Oats*.—The grades Nos. 1, 2 and 3 Mixed oats shall correspond in all respects with Nos. 1, 2 and 3 White oats except that they may be coloured or white and black mixed.

The foregoing are merely tentative suggestions and are admittedly open to objection in each case. The barley grades, for instance, have not a great deal to commend them. For each grade, there should be specified tolerances and dockages. It would be a matter for consideration whether the basis test weights should not be altered according to the season; also whether the percentage moisture content should not be assessed on every consignment and a dockage set for each 1 per cent. above 15 per cent. moisture. Further, it might be worth considering whether, in order to discourage the growth of branny wheats, either the percentage flour extract should be estimated by some agreed standard method and a series of dockages assessed in relation thereto, or variety type made an element in the grade definition.

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