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BULK HANDLING IN AUSTRALIA

Joseph S. Davis

Country and terminal grain elevators had been long discussed but never introduced in Australia before New South Wales, in 1916, provided for a state system. Commonwealth financial aid shortened delays in starting construction, but led to some unfortunate modifications in the plans affecting the Sydney terminal and the first country "silos." Opened for partial use in 1920–21, this system was slow to find favor with farmers, merchants, and millers; and for ten years other states were content to observe the operating and financial experience in the pioneer state.

In 1930–31, ocean freight differentials in favor of bulk wheat were established, and bulk shipment oversea soon became the rule. With this change, bulk handling within Australia has expanded materially. The New South Wales plant has been extended, is more widely used, and yields operating surpluses, but has been cursed by recurring congestion. Victoria is building a similar state network, a portion of which is being first used this season. In Western Australia, progressive farmers' co-operatives have developed a cheaper, more flexible, unorthodox system which has worked well. Since early in 1936, when this received delayed official sanction, it has expanded rapidly despite poor terminal facilities and grudging co-operation from the state railways.

Bag handling and storage, however, still have a large place in Australian practice, and may long persist in some degree. This year, as in 1916, Australia faces the task of dealing with a bumper crop under conditions that severely restrict exports. Accumulated experience can be drawn upon to facilitate solution of resulting problems in ways more satisfactory than during the last war.

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In Australia, signal progress in handling grain in bulk has been made only since 1930. Previously, even bulk shipment oversea was relatively unimportant; in the past decade it has come to predominate. Bulk handling developed first at a few of the larger flour mills, in the fifteen years before the World War; and as the milling industry subsequently expanded, mill elevators became the rule at all modern or modernized plants. Otherwise private capital was not attracted to elevator construction. New South Wales decided in 1916 to build and operate a state system of terminal and country elevators. First used in 1920–21, this has been gradually enlarged. Beginning with 1931–32 it has come to handle typically more than half—at its peak, 72.5 per cent in 1937–38—of the part of the crop that moves by rail; and from 1932–33 it has been financially successful. In Western Australia a far less expensive, unorthodox system of country bulk handling has been cooperatively developed from experimental beginnings in 1931–32. In 1938–39 it handled as much grain as the New South Wales system and 84 per cent of the marketed crop of the state. Victoria decided in 1934 to build and operate a fairly comprehensive state system, broadly similar to that of its northern neighbor; and the first completed portions are being used in the current season.

When the present war broke out, therefore, Australia was in process of transition from the pioneer method of handling wheat in bags, though it was doubtful whether South Australia, the fourth surplus-producing state, would ever install interior bulk-handling facilities. Well over half of the marketed crop of the Commonwealth continued to move in bags from farms to mills and ports, but most of the exported wheat was shipped in bulk.

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During the last World War, because of acute shortage of shipping, large stocks of surplus wheat were backed up in Australia, from 1916 on; and considerable quantities were lost because of inadequate protection from weather damage and depredations of mice and weevils. The country now faces the grave possibility of a similar backing up of stocks from the bumper crop of 1939 and subsequent harvests. Despite the lapse of years, Australia entered the present war with an effective elevator capacity (ex-mills) of only about 60 million bushels—less than the increase in average crop between 1914 and 1939.

This situation lends a certain timeliness to the present historico-economic study of the origins, rise, and development of bulk handling in Australia. A historical sketch of the rise of Australia as a wheat producer and exporter, and a brief review of bulk handling in other exporting countries, constitute the introductory section. The second deals with the evolution of export shipment in bulk, with special reference to Australia. The third reviews the development of Australian ideas and plans with regard to bulk handling, up to 1920. Sections IV and V are devoted to the active experience with grain elevators in New South Wales and with cruder bulk facilities in Western Australia. The next two sections deal more briefly with the diverse postwar developments in Victoria and South Australia. Section VIII deals with the failure of grading to develop in connection with bulk handling. The final section contains retrospective and prospective observations, including reference to the problem that Australia will face if huge supplies of wheat should remain there for lack of markets or shipping to take it to them.

The more permanent justification of the study, as of many scientific investigations, lies

in the broader significance of its results. It throws light on Australian economic history, so little understood in other continents; on certain contrasts among the four wheat-exporting states of Australia, particularly between New South Wales and Western Australia; on the blundering processes by which ideas evolve and essentially economic policies are determined, not in Australia alone; on the interactions between technological, economic, and political conditions and developments; and on special difficulties associated with such direct governmental participation in commerce and industry as prevails in Australia.

Note on Sources

No exhaustive historical study has yet been made of the evolution of bulk-handling ideas and systems in Australia. Inadequate files of the relevant documents, and lack of time to examine all the accessible materials, put this beyond our powers. But the search was carried far enough to yield, together with generous responses of Australians to requests and inquiries, corroborative and complementary evidence ample for an account that is broadly trustworthy if somewhat incomplete and sometimes inaccurate in detail.

The titles of documents most heavily drawn upon are cited in brief, as follows:

N.S.W. Sel. Com., *Min. Ev.:* New South Wales Legislative Council, 1916, *Report from the Select Committee on Grain Elevator Bill, together with the Proceedings of the Committee and Minutes of Evidence* (Parliamentary Papers)

W.A. Roy. Com., *Report:* Western Australia, *The Bulk Handling of Wheat, Royal Commission, Report* (Perth, 1935)

Com. Aus. Roy. Com., *Second Report:* Commonwealth of Australia, Royal Commission on the Wheat, Flour and Bread Industries, *Second Report* (Perth, 1935)

Com. Aus., *Year Book: Official Year Book of the Commonwealth of Australia* (Melbourne or Canberra)

N.S.W., *Year Book: Official Year Book of New South Wales* (Sydney)

N.S.W. Dept. Agr., *Report:* New South Wales Legislative Assembly, *Report of the Department of Agriculture for the Year Ended 30th June . . . .*

Agr. Gaz. N.S.W.: New South Wales Department of Agriculture, *Agricultural Gazette of New South Wales* (Sydney)

S.A. *Parl. Deb.:* South Australia, *Parliamentary Debates*

Reports of Chambers of Commerce are also cited in brief, e.g., Adelaide C. of C., *Report.*

Two farm weeklies have been used extensively for the more recent years: *The Land* (Sydney), the organ of the Farmers and Settlers' Association of New South Wales; and the *Primary Producer* (Perth), the organ of the Primary Producers' Association of Western Australia. For these two organizations we have frequently used the convenient abbreviations FSA and PPA; and a similar practice has been employed in a few other instances.

For valuable materials and answers to questions, the author is especially indebted to A. H. E. McDonald, Director of Agriculture, New South Wales; T. H. Bath and H. E. Braine of the Western Australian co-operative groups; K. L. Elphick, Secretary, S.A. Co-operative Wheat Pools, Ltd. (Adelaide); R. C. Tilt, Manager, Victorian Wheatgrowers Corporation, Ltd.; the late C. Judd, Chairman, Grain Elevators Board, Victoria; W. D. Brunton, Australian Flour Mills; and E. S. Saw, Secretary, Perth Chamber of Commerce.

I. BACKGROUND FACTS

Historical Résumé

In the second half of the nineteenth century Australian wheat began to figure, more or less regularly, on oversea markets. South Australia first became a surplus producer, soon after Ridley's "stripper" (a horse-propelled header) came into use in 1843–46.[1] For some years most of her surplus was taken by the other colonies, but in the 1880's she sent abroad a few million bushels nearly every year.[2] Victoria, after twenty years' delay in using the stripper, had her first surplus in 1870, when the record 1869 crop of 5.7 million bushels yielded exports of about 100,000. After 1877 she too was normally a net exporter, frequently and on the average outstripping South Australia,[3] where average yield per acre seriously declined in the 1890's. New South Wales had her first surplus in 1898, after two successive record crops of 8.9 and 10.6 million bush-

[1] Edward Shann, *An Economic History of Australia* (Cambridge, England, 1930), pp. 149, 219, 220–22; and *The Australian Encyclopedia,* edited by A. W. Jose and H. J. Carter (3 vols., Sydney, 1925–26), articles on Bull and Ridley.

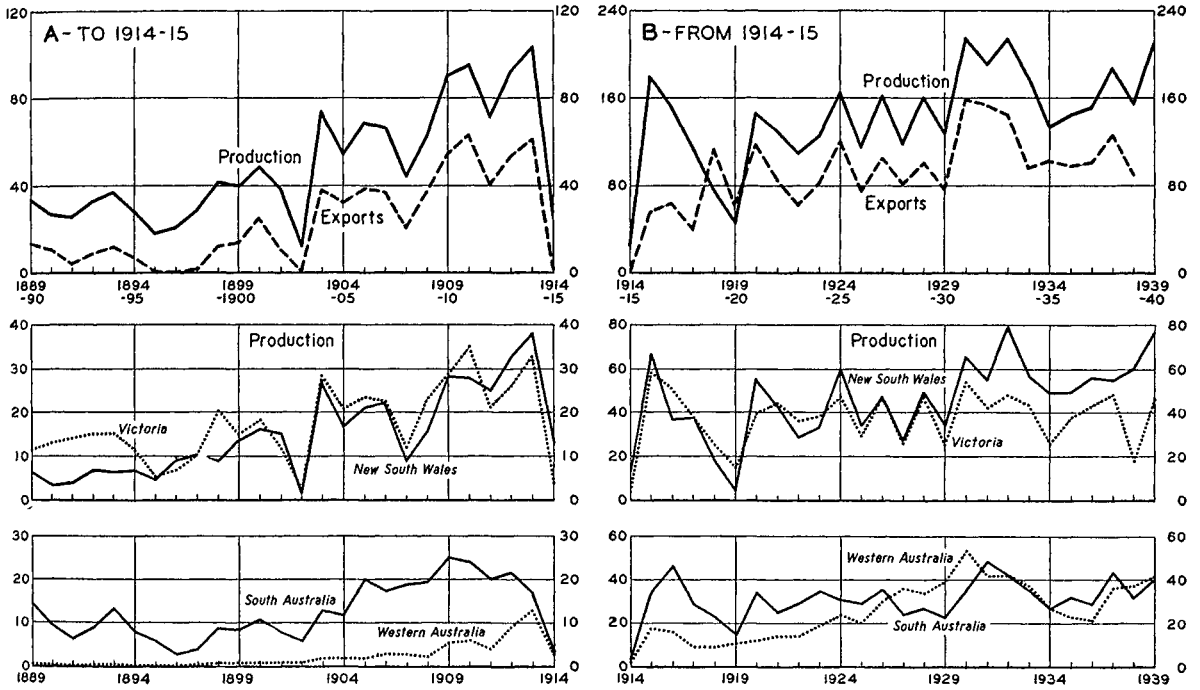
[2] *Statistical Register—South Australia,* e.g., 1885, 1895.

[3] *Statistical Register for Victoria for 1900,* Supplement: "Statistical Summary of Victoria from 1836 to 1900."

els in 1896 and 1897. In the next decade she came to rank with the other two as a source of exports. Western Australia joined the ranks of surplus producers in 1907, first exported as much as 1 million bushels in 1910, and rose to increasing prominence during and after the World War. The rest of Australia has remained, as formerly, a wheat-deficit area: Tasmania because other enterprises pay better than wheat growing; Queensland for both climatic and economic reasons, though her bumper crop of 1938 yielded a true surplus; and the sparsely settled Northern Territory primarily for climatic reasons.

CHART 1.—AUSTRALIAN WHEAT PRODUCTION, 1889–1939, AND GROSS EXPORTS OF WHEAT AND FLOUR, 1890–1939*

(Million bushels)



* Data in Table I and official sources there cited. Vertical scale for section A is twice that for section B. Export data are for calendar years, A, 1890–1915, and B, 1915–1939.

The upper sections of Chart 1 show, for two 25-year periods respectively ending and beginning with 1914–15, the course of wheat production and gross exports from Australia since 1889–90. For convenient approximate comparison, the production around the end of each calendar year is plotted on the same vertical line with exports in the following year.[1] The lower sections show, for the same two periods, the course of production in the four principal wheat-growing states. It will be noted that the vertical scale for the first period is more open than for the second, thus relatively exaggerating the quantities in the earlier stretch of years. Decennial averages for production by states, and for gross exports, are given in Appendix Table I, and corresponding data on wheat acreage for grain and yield per acre in the several states in Table II.

From 1899 Australia has been a net exporter of wheat in every year but two. In 1903 and 1915, following extreme crop failures late in the years preceding, there were net imports of 11.1 and 5.6 million bushels respectively; but only extreme demands for export wheat in 1914 prevented retention of ample supplies from the big crop of 1913. The shortest subsequent crop, that of 1919,

[1] In the past fifteen years, the Australian crop year has been officially regarded as beginning December 1. Appendix Table III gives supply and disposition data on this basis for crop years beginning with 1925–26. Unfortunately, no such complete statistics are available for the long view here needed.

was not far above domestic requirements; but abundant unexportable surpluses of preceding seasons permitted large exports in 1920. Australia's net exports of wheat and flour averaged about 15 million bushels per year during 1899–1902, about 50 million in 1909–13, about 152 million at the peak in 1931–33, and about 102 million in 1934–39. In the interval between the two world wars, Australia has been one of the four chief exporters, usually ranking fourth in the 1920's and second or third in the 1930's, but first in 1937–38 and fourth in 1938–39.

As in many other countries, the pioneer method of handling Australian grain was in bags or "cornsacks," typically of jute. A few years before the World War, under pressure from organized labor, these were standardized as to size, to hold 3 bushels (about 180 pounds) instead of 4 or more (p. 357). Used bags have long been frowned upon for second use for wheat, but widely served to contain millfeed, "chaff" or cut hay, and (after cleaning) flour. The bags were filled at the threshing machine or, as successive forms of the modern combine harvester-thresher came into use,[1] in the single harvesting process. Bagged grain was hauled to and stacked at country shipping points, typically on well-constructed platforms or in roofed "grain sheds," on "stacking sites" adjacent to railway sidings. "Lumpers" stacked it there, and loaded it on to open railway trucks. At mills or at terminals awaiting export, it was again stacked in similar or slightly better storage.

The bag-handling method was convenient in several respects. Lightweight, smutty, rusted, or otherwise inferior grain, or special types such as red (the white being typical) or very strong (such as the variety Pusa 4), could be separately stacked and kept identified; merchants and millers could thus discriminate between lots. Moreover, stacking sites could be cheaply leased from the railways; thus storage facilities were cheaply provided, and costs of storage were low. On the other hand, the cost of sacks and twine was an appreciable and variable item of expense. There was a recurrent problem of having enough and not too many to meet the unpredictable requirements of the highly variable harvests, weeks distant from the source of jute bags—India, during most of the period involved. More important, a great deal of hard labor was involved in the filling and sewing of bags on the farm, and in handling and rehandling the filled sacks at the farm, the country station, the mill or terminal, and the ship. All these laborious processes were not only expensive but time-consuming, and this seriously affected farmers, the railways, and shipowners.

As wheat production and exports in the new Commonwealth attained appreciable volume, around the turn of the century, voices began to be raised in favor of replacing the bag-handling process by a modern bulk-handling system such as had reached commercial maturity in North America.

Bulk Handling in Other Exporting Countries

In the United States, bulk handling had developed with private capital in the hard-red-winter and hard-red-spring wheat belts, as these came into prominence in the second half of the nineteenth century, and simultaneously spread through the surplus-producing sections of the soft-red-winter wheat belt. In Western Canada, as it rose to importance as a wheat producer and exporter in the twenty-five years before the World War, the network of private and co-operative elevators expanded correspondingly. In both nations, country and terminal elevator capacity has continued to increase, wholly under private and co-operative ownership except for a few terminal elevators in Canada, where the total capacity is now about 425 million bushels. The Pacific Northwest is the only surplus-producing wheat belt of North America where grain continues to be handled predominantly in bags from farm to mills or terminals; and even there, terminal elevators have become numerous and bulk shipment by sea has been the rule since shortly after the World War.

Russia, in the heyday of her grain export

[1] H. V. McKay, a young Victoria farmer, turned out in 1884 his "Sunshine" harvester, "capable of stripping and winnowing in one operation." Shann, *op. cit.*, p. 222; and *Australian Encyclopedia*, article on McKay. But combines were very little used as late as 1900, and came into extensive use only in 1915–20.

before the World War, had built great terminal elevators at such ports as Odessa, Nikolaev, and Novorosiisk. "But in pre-war Russia there was no system of interior grain elevators, either local or terminal. Some private railroad companies . . . . attempted to develop systems . . . . , but financially these experiences were not very successful." Shortly before the war the imperial government undertook to construct, through the Central State Bank, a system of interior sub-terminal elevators; but the only ones completed were in regions producing mainly for the domestic market. Since 1924 the Soviet Government has somewhat enlarged and extended its port elevators, built additional sub-terminal elevators, and through various agencies local elevators as well. By the end of the 1920's, however, the interior bulk-handling system was modest in size, and not very satisfactory financially or otherwise; and primitive flat storehouses remained typical of the domestic grain trade.[1] Of the further expansion in the past decade, even the broad facts are not clear to us; but it is significant that the third Five-Year Plan (1938–42) provides for building a network of new elevators and other storage facilities to increase the total capacity by 300 to 400 million bushels.[2] With the much more extensive use of the combine and motor truck in the USSR, bulk handling from farm to railroad has become much more common.

The grain-exporting states of the Danube basin also developed before the World War terminal elevators and floating elevators at such shipping points as Budapest, Braila, and Galatz on the Danube and Constanza on the Black Sea, but elevators there have not yet wholly displaced the flat warehouses, especially for the local market. The chief Bulgarian Black Sea ports, Varna and Bourgas, had no elevators.[3] Even with some expansion in terminal-elevator facilities since the war, bag handling as far as the terminals continues to be the rule in most of this important grain-surplus area.

In India, the institution of bulk handling was discussed as early as 1879, seriously considered in 1889 and at various later times, but never established. In 1893 the government vetoed a proposal to grant relevant privileges to a private company. In 1910 an informal committee recommended building terminal elevators at Karachi, but this was not done. Shortly before the war, in order to test the feasibility of a bulk system for Northern India, the Punjab government built and equipped an elevator of 4,000 tons capacity (say 150,000 bushels) at Lyallpur, the focal city of the Chenab Colony. Leased to a grain firm, under government guarantees, this began operations in June 1920. It proved badly located, attracted little and decreasing patronage from the merchants and none from producers, failed to yield all the anticipated advantages, and in 1926 was closed to cut the government's current losses. No further steps in the direction of bulk handling have been taken, even at the mills or ports. Grain exports from India move in bags, with one exception: since 1934 linseed destined to the United States has been desacked into ships' holds at the port.[4]

In Argentina, bulk shipment by sea came into extensive use before the World War. Gradually a few terminal elevators were brought into operation, but even yet their aggregate capacity is far below that required to handle the grain exported. Country facilities for handling bulk grain are still very limited there, and slight progress has yet been made in carrying out the ambitious scheme for a country-wide government system of country and terminal elevators for which legal provision was made in 1936.[5]

[1] V. P. Timoshenko, *Agricultural Russia and the Wheat Problem* (Food Research Institute, Grain Economics Series 1, Stanford University, Calif., 1932), pp. 340–50.

[2] *Bolshevik*, 1939, No. 2.

[3] V. P. Timoshenko, "The Danube Basin as a Producer and Exporter of Wheat," WHEAT STUDIES, March 1930, VI, 249–51.

[4] F. Noël-Paton, *Indian Wheat and Grain Elevators* (Calcutta, 1913), pp. 2–3, 23, 69–72, 104–08; C. P. Wright and J. S. Davis, "India as a Producer and Exporter of Wheat," WHEAT STUDIES, July 1927, III, 357–58, 361; India, *Agricultural Marketing in India—Report on the Marketing of Wheat in India* (Marketing Series 1, Delhi, 1937), pp. 211–13, 232.

[5] There are said to be about one hundred privately owned country elevators. Canada, Dominion Bureau of Statistics, *Monthly Review of the Wheat Situation* (Ottawa), June 23, 1939, p. 15. See also below, pp. 306, 339.

II. BULK SHIPMENT OVERSEA

The general practice of handling grain in bulk within a country makes bulk shipment for export practically inevitable. The reverse is not necessarily true. Where grain is domestically handled in bags, it may either be exported in the sack or be desacked at the port of export and carried oversea in bulk. Which will be the more economical will depend, among other things, on the relative costs of loading, the relative charges for ocean freight in sacks and in bulk, the price differential (if any) in the importing market, and even the insistent preference of certain markets for sacked wheat. Some ports of import, for example, are even yet not equipped to handle bulk grain; and in a few importing countries the necessity of transporting wheat into the interior in sacks creates a strong preference for receiving it in sacks from the country of origin.

Before the World War, bulk shipment of grain had become very common. The New South Wales Minister of Agriculture, testifying in 1916, stated that wheat was received in bulk at all the chief ports of Britain, France, Holland, Belgium, and Italy; that all wheat from the Mediterranean, Black Sea, and Canada, and all grain from the Argentine was shipped in bulk; and that even on the Pacific Coast bulk handling was in course of adoption.[1] These statements contained some degree of unintentional exaggeration, but the trend was clearly in the direction indicated.

Australia's considerable dependence on ex-European wheat markets long furnished arguments against general adoption of bulk handling there. When the New South Wales system was about to be provided for, it was urged in reply that for such shipments wheat could cheaply be bagged at the terminal elevator. Subsequent development of bulk facilities in Japanese ports and at Shanghai, the principal receiving port of China,[2] gradually weakened the force of the earlier arguments. For several years past only small fractions of Australian grain exports have moved to ports where bagged wheat is strongly preferred.

After the World War, bulk shipment for export expanded considerably even from areas where grain has continued, entirely or in large part, to move in sacks from farm to port.[3] The principal exceptions are India and California. In the Pacific Northwest of the United States, bulk shipment by sea quickly became the rule in the early 1920's, even though interior bulk handling there has expanded at only a moderate pace.[4] A further expansion of bulk shipment oversea took place in Argentina,[5] where it had made important strides before the World War, though interior movement in bulk is even yet very small. Australia's experience has been broadly similar, but there the development came much more slowly and with considerable differences among the exporting states.

[1] N.S.W. Sel. Com., *Min. Ev.*, p. 4.

[2] There, as at some European ports, lighters are used. See "The Port of Shanghai," U.S. Dept. Comm., *Commerce Reports*, Mar. 9, 1940, p. 230.

[3] Cecil Bentham, "Transporting the Grain Harvests of the World," a lecture delivered at the Institute of Transport in London, Oct. 18, 1938, by the chairman and managing director of Henry Simon, Ltd., an outstanding firm in the construction of grain storage and handling facilities; and V. D. Wickizer, "Shipping and Freight Rates in the Overseas Grain Trade," WHEAT STUDIES, October 1938, XV, 78–79.

[4] J. S. Davis, "Pacific Northwest Wheat Problems and the Export Subsidy," WHEAT STUDIES, August 1934, X, 379–81. The situation there has not materially changed since 1934.

[5] In the absence of historical data on Argentine shipments in bags and in bulk, the following notes regarding its development are pertinent.

Information obtained in England by the Agent-General for New South Wales in 1908 was to the effect that British merchants handled without objection "large and increasing quantities" of Argentine wheat brought to England in bulk. N.S.W., *Year Book, 1911*, p. 439. A letter from the Argentine Minister of Agriculture, dated May 21, 1908, appears in H. V. Jackson, *Bulk Handling of Wheat* (Farmers' Bull. 13, Sydney, 1908), p. 64. The second edition of Jackson's bulletin, published November 1912, contains (pp. 20–21) a letter from H. M. Gibson, chief traffic superintendent of the Manchester Ship Canal Co., dated Aug. 23, 1911, who said: "We believe the tendency is for most of the grain from the River Plate to be shipped in bulk," with usually 10 per cent in bags for stiffening. Cf. also W. G. McRobert, "Handling Grain in Bulk," *Journal of . . . . Agriculture, Victoria*, September 1910, VIII, 552.

"From the Argentine bulk has become the recognised method in recent years, but frequently with a proportion of sacks stowed on the top, although cargoes from some loading places in the Argentine still come with grain entirely in bags." Bentham, *op. cit.* (1938), pp. 20–21.

Until early in the twentieth century, Australian wheat moved into export mainly in sailing vessels,[1] which were and still are regarded as quite unsuited for bulk cargoes of grain.[2] In the decade before the war, however, so many newly built steamers entered the Australian trade that by 1911 or 1912 only a "very small" proportion of the export wheat, from New South Wales at least, was shipped in sailing vessels.[3] During the war, resort was again had to sailers to relieve the shortage of steamers,[4] but this was purely temporary. In the years between the two great wars a few sailing ships annually made the "race" from Australian ports to Europe with cargoes of grain, but they carried a small and diminishing fraction of the exports.[5]

From Australia, as from the Pacific Northwest after the Panama Canal route became available,[6] great uncertainty prevailed as to whether grain could be safely shipped in bulk to Europe, even by steamer. In 1901 a bulk parcel (represented in 1916 as 1,500 tons) of wheat was loaded by Dalgety and Company into an insulated chamber in the White Star liner "Persic" at Darling Harbour, Sydney. It reached Liverpool successfully and "opened up dry and in quite good order . . . . ," "in splendid condition, being cool, dry and clean, and quite equal in every respect to that carried in bags."[7] Another was shortly made in the "Suevic."[8] These experiments, however, appear not to have been repeated for more than a decade.[9]

The South Australian Royal Commission that reported on wheat marketing in 1908 and 1909[10] recommended that facilities for handling experimental shipments in bulk be installed at the Outer Harbour of Port Adelaide; but of their construction and utilization we have found no trustworthy evidence.[11]

During the war there were one or two experimental shipments. Before the Select Committee one witness testified in September 1916 that "sometime ago" a bulk parcel had been taken by an Orient Company steamer in a freezing chamber.[12] Earlier in 1916, at least one bulk cargo was shipped from Western Australia to the United Kingdom, in a big steamer bought by the state government.[13] E. F. Carter, after ten years' engineering experience exclusively with bulk handling, testified that the Argentines had no trouble with their bulk shipments.

[1] In an official estimate of marketing costs, presented in the N.S.W. *Year Book, 1905–6,* p. 349, and subsequently repeated in *ibid., 1907–8,* p. 357, it is noted that three-fourths of the wheat is exported by sailing vessels, and that freights are 4 to 5*s.* per ton more by steamer.

[2] N.S.W. Sel. Com., *Min. Ev., passim.*

[3] N.S.W., *Year Book, 1911,* p. 438. In 1908 Jackson (*op. cit.,* p. 26) included testimony "that the days of sailing vessels are numbered, and it can only be a matter of a few years before the greater portion of wheat shipments will be carried by steamers."

[4] N.S.W. Sel. Com., *Min. Ev.,* pp. 36–38.

[5] Wickizer, *op. cit.,* pp. 51, 88. In 1921 the sailing fleet numbered 36, in 1938 only 13. *Northwestern Miller,* Mar. 16, 1938, p. 36.

[6] From the Pacific Northwest the first bulk cargo, 400,000 bushels, was shipped by the Gray-Rosenbaum Grain Co. in the "Hanley," which left Portland in the latter part of October 1921, was en route nearly two months, and completed unloading at Marseilles Dec. 17. The result was entirely satisfactory. Information obtained in 1922 from H. J. Besley of the U.S. Department of Agriculture.

[7] N.S.W. Sel. Com., *Min. Ev.,* pp. 9, 12, 43, 50, 51. Another witness (Brunton) considered this not a fair trial, since the wheat was bagged at Liverpool. Additional details on this shipment are given in Jackson, *op. cit.* (1908), p. 5. There the volume is stated as 1,023 tons. It was shipped at the same freight and insurance rates as an accompanying one of 1,549 bags, and the bagged wheat realized 3*d.* per quarter more.

[8] The Victorian Commission on Handling Grain in Bulk, 1902–3, referred to both of these. Its report (not available to us) on this point is quoted in the South Australian report cited below.

[9] Others were proposed, as in Sydney in 1907: Jackson, *op. cit.* (1908), p. 9. But credible testimony in N.S.W. Sel. Com., *Min. Ev.,* pp. 9, 43, leads us to doubt the statement in the N.S.W. *Yearbook, 1911* (p. 438), that "a number of trial shipments by steamer from Sydney to Europe have arrived in England in excellent condition." Probably "a number" meant "two."

[10] Appointed Jan. 16, 1908, its progress report was submitted late in 1908 and the final one in September 1909; both in the S.A. *Parliamentary Papers.* The second is entitled: *Final Report of the Royal Commission on the Question of the Marketing of Wheat, together with Minutes of Proceedings, Evidence, and Appendices* (Adelaide, 1909). The report is summarized in the N.S.W. *Year Book, 1911,* pp. 437–38.

[11] In the same *Year Book* appears the questionable assertion: "The installation of these facilities is now proceeding, and the experiments will be watched with interest throughout the Commonwealth."

[12] N.S.W. Sel. Com., *Min. Ev.,* p. 43.

[13] *Ibid.,* pp. 9, 55. Bentham, *op. cit.,* p. 21, may have referred to this shipment when he said: "A test cargo in bulk was brought over during the war from Australia and it was found that with the exception of grain in contact with the shaft tunnel, very little damage occurred."

For some years, however, it was a moot question whether shipping could be got to handle bulk wheat and whether insurance rates would be higher.[1] Inquiries made by the New South Wales Department of Agriculture in 1910, of insurance companies represented in Sydney, yielded the information that insurance against ordinary sea risk on bulk grain shipped by steamer could readily be obtained, though the companies "generally were reluctant to cover the risk of bulk cargoes in sailing ships."[2] The Victorian Commission that reported in 1913 got reassuring opinions on both points from the Agent-General of the state in London. The corresponding agent for New South Wales (Mr. Carmichael) got confirmatory evidence in England to the effect that shipping and insurance could be had at rates no higher than for bagged wheat.[3]

The official testimony before the Select Committee of the New South Wales Legislative Council in 1916 was conflicting.[4] According to the Under Secretary of Agriculture (George Valder), lining the holds was the chief additional step necessary. This, he insisted, the shipping companies were ready to do: "if we find the bulk wheat they will take it."[5] It was anticipated that 15–20 per cent of the cargo would be shipped in bags for topping bulk wheat. The Principal Assistant Engineer of the Sydney Harbour Trust (W. E. Adams) was satisfied that the ordinary steamers coming to Sydney could carry bulk wheat with no structural alterations. Experienced practical witnesses were skeptical if they did not disagree. The General Manager of the United Insurance Company, Sydney (Bartin Haigh), admitted inexperience with bulk handling, but thought that it would be difficult to get insurance on bulk wheat and that rates would be higher. The Marine Surveyor of the Sydney Marine Underwriters' Association, an experienced sea captain (John Cuthbert), presented unfavorable views. For the near future, until ships were built specially for the purpose, the wharf manager for a leading stevedore company (Captain Jonathan Owen), thought bulk shipment impracticable. He stressed the cost and delays of fitting liners for the purpose. Two other experienced witnesses testified to similar effect.

On these points the Select Committee reported:

> . . . . That there will be no material saving in loading time, as all steamers will have to be lined in port, and the time so occupied will counterbalance the time saved in the more rapid loading of the vessel.
>
> . . . . That on the evidence your Committee is of opinion that the expense of lining steamers to carry grain in bulk will involve an increase in freight of 6*s.* a ton.
>
> . . . . That on the evidence your Committee is of opinion that, owing to the hazardous character of grain in bulk as a cargo, and the length and route of the voyage, insurance could not be effected at less than a 40 per cent increase on present rates. Your Committee considers it not improbable that even further increases may in time take place, as insurers have at present no practical experience of carrying wheat in bulk from Australia to British ports.
>
> . . . . That as the success of the scheme depends upon the ability of the shippers to effect insurance at reasonable rates, your Committee, having regard to the facts set out in the preceding paragraph, recommends that before commencing the erection of the elevators, the Government should make trial shipments of full cargoes of grain in bulk to British ports.

We find no evidence that this advice was taken.

After the war the first bulk cargo, variously stated as 4,500 or 6,000 tons or 166,000 bushels of wheat, left Sydney April 1, 1921 in the steamer "Astyanax."[6] By that time the Sydney terminal elevator at Glebe Island was near enough to completion to permit handling grain from the few operating country silos.[7] The

[1] Considerable material on this subject appears in Jackson, *op. cit.* (1908), pp. 16–24, and some additional in the revised edition (1912), pp. 30–31.

[2] N.S.W., *Year Book, 1912*, pp. 555–57.

[3] Testimony of Minister and Under Secretary for Agriculture, in N.S.W. Sel. Com., *Min. Ev.*, pp. 9–10, 14, 15.

[4] *Ibid.*, pp. 15–16, 28, 43–51.

[5] The same position was strongly taken by A. M. Oliphant of Perth, in 1913 (see below, 314 n.).

[6] *Corn Trade News* (Liverpool), June 3, 1921, p. 595; C. Louise Phillips, *Bulk-Handling of Grain, Parts I and II, Abstracts and References* (U.S. Dept. Agr., Bureau of Markets and Crop Estimates, 1918, 1921, mimeographed), pp. 44–46.

[7] S. W. B. McGregor, *Report on the Economic and Financial Situation of Australia* (Dept. Overseas Trade, London, 1922), pp. 70–71; Phillips, *op. cit.*, p. 45, citing U.S. Dept. Comm., *Commerce Reports*, June 16, 1921, p. 1557.

result was technically successful, but lining and loading costs were so high that it was followed by only one or two others within the year.[1] For several years shippers did not regard the method with favor, and the prejudice was slow to disappear completely.[2] From 1924 through 1930 bulk shipments from Sydney totaled 34.1 million bushels, only 41 per cent of total shipments from that port (Table IV).

Two technical difficulties had to be overcome. The first was to ensure that bulk grain keep in good condition, and particularly to minimize damage by "sweating," during an ocean voyage of six to ten weeks through regions varying greatly in climate. "When bags of grain are stored in a ship's hold the large amount of air acts as an insulator, and the bags themselves absorb surface moisture."[3] The early procedure with bulk cargoes was to ventilate the ship's hold as much as possible. Later experience has pointed rather to the desirability of controlling the ventilation and sometimes to cease ventilating.[4]

The second problem was to load the vessels in such a way as to prevent shifting of cargo during rough weather such as would endanger the ship. According to Bentham,[5] the solution was the following:

> Generally speaking the ships are fitted with parting boards down the centre of the holds from top to bottom and these are hung with cloth known as "dunny." Usually also this material is hung on the ship's side and acts as a partial insulation. On the lower part of the hold against the ship's side timber boarding is placed in addition to the clothing. At intervals during the loading of the grain a layer of cloth is placed across the grain; sometimes these cloths indicate the division between different parcels. They also serve an additional purpose in absorbing moisture from the grain during transit.
>
> On long sea voyages, such as from Australia, it is not usual to load a vessel beyond the first 'tween deck hatch, but a feeder trunk is built in timber from the main hatch to the 'tween deck hatch and the bulk grain is fed through this into the lower hold. The rules demand at least 2 per cent of the cargo in the feeder trunk and frequently this additional grain sinks into the hold during the voyage.
>
> In other holds a proportion of the cargo is loaded in bags, these being placed on top of the bulk grain with boards placed between the bulk and the bags. This minimises any tendency of the surface of the bulk grain to run to one side in heavy seas.
>
> From North America grain is frequently used as part cargo with other goods stowed on top. This method is also effective in checking any movement of the grain.
>
> A ship carrying bulk grain alone cannot fill the holds completely, but with a number of temporary small compartments the load is distributed so as to leave very little room in any one compartment for the cargo to move.

Undoubtedly the progress made in dealing with these problems in shipments of wheat and maize from Argentina facilitated application of the results of this experience on the longer routes from Australia, and for several years the problems have been definitely solved.

At the outset, ocean freights from Australia to Europe were considerably higher on bulk wheat than on sacked wheat. In 1921, the differential asked ran up to 7*s.* 6*d.* per long ton.[6] This was due in part to factors already suggested, and in particular to additional costs involved in adapting the available vessels to bulk shipment. Within a few years, the adverse differential was eliminated. In 1924 a Sydney grain merchant (G. W. Walker) attended a meeting of the British Chamber of Shipping, and was told that "if bulk handling were developed on uniform lines in all States so that the ships could go to any port and load bulk wheat at so many tons per hour they would agree to a reduction of 5*s.* per ton in the freight, which would mean nearly 2*d.* per bushel to the Australian grower."[7]

In the absence of such development, the adaptation of the New South Wales system to the shipowners' needs gradually improved. In 1929–30 new shipping spouts were installed at the Sydney terminal elevator to facilitate faster loading of ships.[8] In 1930–31 the Wheat Commissioner (E. Harris) privately visited Europe and got useful information on the handling of cargoes.[9] Thereupon the shipowners initiated the practice of quoting lower

[1] McGregor, *loc. cit.*

[2] Bentham, *op. cit.*, p. 21.

[3] *Ibid.*

[4] *Ibid.*, pp. 21–22.

[5] *Op. cit.*, pp. 21–23, including an illustrative diagram of a ship loaded from Argentina.

[6] McGregor, *op. cit.*, p. 70.

[7] Walker testimony, W.A. Roy. Com., *Report*, p. 424.

[8] N.S.W. Dept. Agr., *Report, 1930*, p. 14.

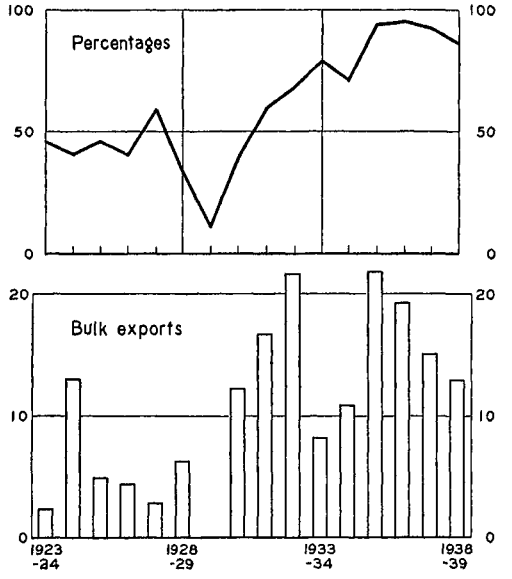
[9] *Ibid., 1931*, p. 16. He went again in 1935, this time also to North America and Argentina. *Ibid., 1935*, p. 4.

rates on bulk wheat than on bagged, in recognition of economies due to the greater speed of loading and unloading.[1]

On the UK/Continent route the standard differential has been 2*s.* 6*d.* per ton,[2] and this was embodied in the minimum rates fixed under the tramp-rate–control scheme effective March 28, 1935.[3] Since October 1936, moreover, freight rates on wheat from Australia to UK/Continent have been customarily quoted in terms of bulk wheat, rather than in terms of bagged. On shipments to the Orient the differential in favor of bulk wheat has been lower. In December 1931, for example, when rates to UK/Continent from Sydney[4] were quoted at 27*s.* 6*d.* per ton in bulk and 30*s.* in bags, those to Shanghai were as follows:[5]

Sydney—bulk	15*s.* 6*d.*
Sydney—bags	16 6
Adelaide—bags ...	18 6
Fremantle—bags ..	17 6

The rise in bulk exports from New South Wales in the 1930's is shown by the accompanying inset chart, showing in the upper section the *percentage* of wheat exports (chiefly from Sydney) represented by the bulk shipments through the terminal elevators, and in the lower section the *quantities* thus shipped in bulk, in million bushels.[6] In recent years most of the non-bulk export from Sydney has represented parcel shipments and bagged wheat used for topping bulk cargoes. Corresponding data for other states, if available, would show only low percentages shipped in bulk in the 1920's but a broadly corresponding rise in the 1930's.



In the 1920's the Westralian co-operative successfully shipped a cargo in the "Arna," chartered at a low rate. In 1929–30 another test shipment was profitable because lower freights could then be had on bulk wheat. Consequently in 1930–31 the pool shipped most of its export wheat in bulk.[7]

Bulk exports from the other states were negligible until 1932–33,[8] but increased rapidly thereafter. By 1934–35 the Commonwealth Royal Commission could state:

> In Victoria, South Australia and Western Australia, a considerable quantity of wheat handled in bags is shipped in bulk. The bags are cut and emptied at the ship's hold. "Internal" costs for bagged wheat are increased by this operation, but the cost is more than compensated by the value of the empty bags retained by the shipper, and part of the saving in ocean freight.[9] . . . .

By 1936–37 the transition to bulk export was well-nigh complete. In discussions of bulk handling in the Legislative Council of South Australia, early in August 1937, several speakers pointed to the change. H. G. Hawkins said: "The wheat carried by every steamer that left

[1] "During the year the Wheat Commissioner (Mr. E. Harris) paid a private visit to England and the Continent of Europe, and while there obtained much useful information in regard to the handling of wheat cargoes. One result of the visit has been the reduction in the rate of marine freight paid for bulk wheat, up to 2*s.* 6*d.* per ton less than similar freight for bagged cargoes." N.S.W. Dept. Agr., *Report, 1931,* p. 16. The credit for the reduction was presumably due partly to others, notably the Westralian co-operatives.

[2] Com. Aus. Com., *Second Report,* p. 166.

[3] Wickizer, *op. cit.,* p. 104.

[4] On charters for European ports Western Australia has an advantage in rates usually 2*s.* 6*d.* per ton (¾*d.* per bushel). Com. Aus. Roy. Com., *Second Report,* p. 177.

[5] Canada, Dept. Trade and Comm., *Commercial Intelligence Journal* (Ottawa), Jan. 16, 1932, p. 72.

[6] Data in Table IV.

[7] John Thomson, in W.A. Roy. Com., *Report,* p. 19.

[8] "Australian wheat comes to Great Britain chiefly in bags, but there are bulk elevators in New South Wales which ship wheat here in bulk." W. S. Thompson, in *Milling* (Liverpool), Nov. 12, 1932, p. 537.

[9] Com. Aus. Roy. Com., *Second Report,* p. 166.

our shores last season was in bulk. In fact it was impossible to sell any other cargo. The only wheat that went away in bags was that in sailing ships and parcels."[1] Much the same was presumably true in Victoria, where also no elevator system was yet available, and in Western Australia, where the growing bulk system was handling an increasing volume.

Bulk wheat exports are now made up as follows: (1) discharge from orthodox terminal elevators at Sydney and Newcastle (New South Wales), Geelong (Victoria), and Bunbury (Western Australia), and from provisional installations at Fremantle and Geraldton (Western Australia); (2) transfer from bulk trucks to ships without going through terminal elevators, as at Fremantle and Geraldton; (3) desacking into special bulk-loading equipment, as from Corio Bay, Geelong; and (4) desacking into ship's holds, at almost all ports but especially in South Australian ports, Williamstown (Victoria), and Albany (Western Australia). Exports of bagged wheat have latterly comprised chiefly parcels in liners, quantities used under shipping rules for topping bulk cargoes, and full cargoes on a few sailing vessels.

Bagged wheat usually yields surpluses of "outturn" on overseas shipments as a whole; in Western Australia, 1933–34 was the first season when high percentages of losses were experienced. Bulk wheat, on the contrary, usually shows losses on outturn overseas, and this adversely affects the relative price offered in Australia for bulk wheat. The differences are not fully understood, even by those closest to the situation, after considerable inquiry or investigation.[2] But this disadvantage of bulk shipment does not figure heavily in relation to its important advantages.

There can be no doubt that the rate differentials in favor of bulk shipments oversea exerted a decisive influence not only on bulk shipments oversea but also in promoting expansion of bulk handling within Australia. The prospect has been held out that when it becomes general throughout the Commonwealth the differential may be raised to 5*s.* per ton, at least from ports with fully modern loading facilities. Even in time of peace, the increased rapidity of loading so greatly reduces the time required for a "turnaround" that shipowners can afford to quote lower rates; and in time of war, with acute shortage of shipping, this becomes even more important.

III. AUSTRALIAN IDEAS UP TO 1920

Quite contrary to experience in North America, where storage charges were a major factor in financing elevator expansion, bulk handling did not grow up in Australia through private or co-operative enterprise. Capital was long scarce. Co-operation among farmers was weak before the World War. Grain dealers preferred bag handling, and were hostile to co-operatives. The railways, which owned the sites for stacking or elevators, were almost wholly owned and operated by the states, and were conservative. Hence the installation of bulk systems was regarded as a matter for public investigation, public action.

When the several colonies were joined into a Commonwealth of Australia in 1901,[3] the federated states retained important powers to the exclusion of the federal government. Production of and trade in agricultural products remained within the field of state powers. Except by mutual agreement, or under emergency powers in wartime, the relevant power of the federal government has been narrowly limited. At times, before and even since the New South Wales elevator system has ma-

[1] S. A. *Parl. Deb.* (28th Parl., 6th Sess., 1937), p. 2. Confirmed as to the present by letter from K. L. Elphick, secretary of the South Australian Farmers Cooperative Union, by letter of Aug. 24, 1939.

[2] W.A. Roy. Com., *Report*, p. xv, and extensive evidence therein given.

[3] The Commonwealth of Australia came into being by proclamation of Queen Victoria Jan. 1, 1901, on terms laid down by the Convention of 1891 and the Premiers' Conference of 1897, which were subsequently embodied in the Commonwealth of Australia Constitution Act of July 9, 1900 (63 and 64 Vict., chap. 12), passed by the British Parliament. For the constitution as amended, see Com. Aus., *Year Book, 1938*, pp. 1–33, and for summary information on the previous development of the constitutions of the various colonies and the movement toward federation, *ibid., 1908*, pp. 17–21; *1929*, pp. 5–17.

tured, the suggestion has occasionally been made that the Commonwealth Government take the lead in the movement for bulk handling; that it secure agreement on a general plan and uniform designs, with a view to effecting economies in construction and equipment costs; or that, as in Canada under the Canada Grain Act, a sort of federal system be provided. State-initiated efforts in the same direction have been made at times, as we shall see.

Nothing of the sort has been possible, for several strong reasons. First, there are marked differences in economic and financial conditions, temper, and political leadership in the four chief wheat-growing states, and they are jealous one of another and of their independence in a great variety of matters. Second, for geographical reasons, the wheat of each state moves into export through the ports of that state.[1] Except as surplus states supply deficiencies in those that have deficits either regularly or in particular years, interstate shipment is negligible.[2] Third, climatic conditions are so far from identical in the four states that designs appropriate for New South Wales and Victoria are by no means best suited for the other two. Accordingly, in this as in many other respects, the states have gone their several ways.

Before the World War

Already in the 1890's, men in the progressive Department of Agriculture in New South Wales had investigated bulk-handling possibilities for Australian conditions. In the middle of 1916 its Under Secretary (George Valder) testified:[3]

> As an officer of the Department of Agriculture, I have been engaged for the past twenty-five years in making inquiries with regard to the best means for handling wheat. I have not visited the United States or Canada, but other officers of the Department have, and from time to time they have furnished reports describing the methods employed in those countries, laying stress on the saving effected as a result of the handling of grain in bulk. During recent years, finding the yield of wheat increasing to such enormous proportions, we made further investigations, bringing experts from America and occasionally sending a man there, so that I think we have now very complete information on the subject. Through the *Agricultural Gazette* and special bulletins, we have furnished many reports from time to time, but we have had to vary them from year to year as improvements are being made continually.

In the first half of 1899 the New South Wales Parliament voted funds "to enable the Board of Exports to make adequate provision for handling in the most effective and economical way large quantities of grain, &c., for export . . . ."[4] The Department of Agriculture had already sent abroad as agricultural commissioner an indefatigable senior officer, the scientist Nathan A. Cobb,[5] who was already on record in favor of bulk handling for Australia. For a year and a half he devoted much of his time to extensive investigations of bulk-handling systems in use. In a brief progress report published in March 1900, Cobb said: "With regard to the introduction of elevators into Australia, there is hardly room for two opinions. The opinion which I expressed some years ago in the *Agricultural Gazette* I find to be now stronger than ever."[6] His lengthy illustrated report appeared in this departmental journal early in 1901.[7]

It may have been under the influence of this report that the first trial shipments of wheat in bulk were shortly made from Sydney, in the "Persic" and the "Suevic" (p. 307). These were among the matters covered in a major investigation by the Victorian Commission on Handling Grain in Bulk, 1902–03.[8]

[1] See special article on "Ports of Australia," Com. Aus., *Year Book, 1910*, pp. 669–77.

[2] Some wheat from the Riverina, New South Wales, moves to Victorian mills or ports because of freight-rate advantages, and a little from South Australia (durum especially) goes to Victorian mills for other reasons.

[3] N.S.W. Sel. Com., *Min. Ev.*, p. 14. This document is one of the most valuable sources of information on developments prior to September 1916, when the report was submitted.

[4] N. A. Cobb, "Grain Elevators," *Agr. Gaz. N.S.W.*, March 1900, XI, 187–94.

[5] Cobb (1859–1932) was an American who had begun agricultural experimentation in 1874, was in the service of the New South Wales department from 1891 to 1904, and from 1907 to his death was a senior technologist in the Bureau of Plant Industry, U.S. Department of Agriculture.

[6] *Op. cit.*, p. 193.

[7] "Grain Elevators," *Agr. Gaz. N.S.W.*, February 1901, XII, 255–301.

[8] Document not accessible to us but referred to in others consulted, including McRobert, *op. cit.*

Perhaps under the same influences, G. W. Walker, then a young member of the grain firm of Lindley Walker and Company, began in 1902 his agitation for bulk handling, contrary to the sentiment that strongly prevailed in the grain trade. In 1908 he studied the systems in operation in all parts of the world, and followed up these investigations with others in 1912, 1914, and 1924.[1]

Discussion of the new idea widened in the years following the great drought of 1902, as four good crops in succession were harvested in 1903–06. In 1906 legislative committees in both New South Wales and South Australia sat on the subject; but the former took evidence and reached no recommendation, while the latter reported the time not yet ripe for action.[2] In 1908 the New South Wales Department of Agriculture published a 67-page Farmers' Bulletin reviewing available evidence on the subject.[3] Generally but by no means altogether favorable, this included a letter by a man (Robert Baxter) with some 35 years' experience in Victoria, written in 1901 after a visit to America. He warned against embarking on what he predicted would be an increasingly expensive program that would "simply result in . . . . monuments of Government folly, very much like the cold storage white elephants constructed by the Government to foster the butter industry."[4] In 1909 the department published another bulletin, on *Bulk Handling of Wheat in Great Britain*.[5]

In 1908–09 a Royal Commission investigated extensively and reported voluminously but cautiously in South Australia.[6] It was impressed not only by the hostile attitude of the local grain trade but by doubts as to whether grain could be safely shipped in bulk oversea, on which it recommended special tests. This report was carefully studied in New South Wales, and gave rise to special inquiries there. One of these, in 1910, gave reassuring information regarding insurance coverage on bulk cargoes shipped in steamers. A Royal Commission on the cost of living, appointed in New South Wales in 1911, was empowered to touch on bulk-handling possibilities, but apparently did not.[7]

Neil Nielsen, New South Wales commercial representative to the United States, submitted an extensively illustrated report on the North American system of bulk handling, dated Sydney, February 27, 1913.[8] Through him the government arranged with the Burrell Engineering and Construction Company of Chicago to make an expert report on the suitability of bulk handling for New South Wales conditions. The president of this concern, G. T. Burrell, reached Sydney May 26, 1913, and submitted his report with recommendations within three months.[9] Both strongly favored the adoption of bulk handling, extolled its advantages, and minimized obstacles. The New South Wales Department of Agriculture, having published in November 1912 a revised and extended edition of the 1908 Farmers' Bulletin, in May 1914 put out a supplementary bulletin on American and Canadian methods.[10] The *Official Year Book of New South Wales* for 1911 to 1913 contained extended discussions of bulk handling and the disadvantages of the existing system, and contributed to the pressure for a new one.

The Dominions Royal Commission, appointed by the British Parliament, spent several weeks in Australia in the first half of 1913. On April 28, A. K. Trethowan of the Farmers and Settlers' Association, New South Wales, testified in favor of embarking upon bulk handling, starting with a terminal elevator at Sydney, the system to be built by the Public Works Department and operated by the State Railways Department.[11] On May 20

[1] According to his own statements in 1935, reported in W.A. Roy. Com., *Report*, p. 424.

[2] N.S.W. Sel. Com., *Min. Ev.*, p. 9. These two committee reports have not been examined.

[3] H. V. Jackson, *Bulk Handling of Wheat* (Farmers' Bull. 13, Sydney, 1908).

[4] *Ibid.*, pp. 28–30.

[5] Farmers' Bull. 21, Sydney, 1909. This was reprinted in the revised edition of Jackson's bulletin, published November 1912.

[6] *Op. cit.* [7] We have not found its reports.

[8] N.S.W., *Parliamentary Papers* (1913), I, 69–111.

[9] *Ibid.*, I, 57–68. Ordered to be printed Aug. 12, 1913.

[10] H. V. Jackson, *Bulk Handling of Wheat, No. 2: Notes on Some American and Canadian Methods* (Farmers' Bull. 85, Sydney, 1914).

[11] Dominions Royal Commission on the Natural Resources, Trade, and Legislation of Certain Portions of His Majesty's Dominions, *Minutes of Evidence*, Part II (Cd. 7172, London, 1913), pp. 25–27.

John Darling, a grain dealer with 48 years' experience, expressed adverse views in Adelaide, especially "now that they have gone in for harvesters they can bag the wheat at the same time as they are reaping it." He questioned whether the time was ripe for it in New South Wales or Victoria, and thought South Australia, with 40 outports, ill fitted for it. He doubted the possibility of getting lower freight rates on bulk wheat, but added: "Of course, if cheaper freights could be secured, that would be a decided advantage to start."[1]

In Perth, shortly after, the Dominions Royal Commission found the strongest support for the innovation, which had the backing of the state agricultural advisers, the Fremantle Harbour Trust, the Perth Chamber of Commerce, and the manager of the Western Australian Producers' Union.[2] The Harbour Trust was even then holding back on certain expansion till a decision could be reached. And in the course of 1913 an advisory board in Western Australia made "a concise and convincing report" strongly recommending prompt adoption of a bulk system there.[3]

On the basis of such evidence, in its *Second Interim Report* presented to the British Parliament in January 1914,[4] the Dominions Royal Commission unanimously concluded that "substitution of bulk handling for the present system of bagging wheat in Australia is worthy of examination." It expressed surprise that bulk handling had not been introduced in Australia, summarized evidence showing that it would save labor on the farms and at railway stations and materially lessen costs of port loading, thought the savings in cost would facilitate expansion of profitable wheat cultivation, and especially urged an early decision before badly needed additions to railway rolling stock were provided.

In 1913 a Royal Commission in Victoria made an elaborate investigation and published perhaps the best prewar report on the entire subject, on the whole impressively favorable to the project.[5] One or two members of this commission, and at least twice the Victorian Commissioner of Railways, made inquiries and investigations abroad.[6]

All these investigations had their influence on public opinion, and it appeared that definitive action might soon be taken, in three or four of the states, to supplement the developments already in progress in bulk handling at the mills (p. 319). The Premiers' Conference at Melbourne in March 1914, however, decided "that the subject of bulk handling cannot be the subject of a resolution"[7]—presumably because unanimity could not be secured.

The Associated Chambers of Commerce, at their eleventh annual meeting held at Perth late in May 1914, nevertheless resolved:

> That it is essential that the marketing of wheat should be conducted as economically as possible. That with this object in view, this Conference urges upon the various Chambers of Commerce to give careful consideration to the question of bulk handling of wheat.[8]

It is to be inferred that this resolution was due to the initiative of the Perth Chamber. Responding, it "reaffirmed its opinion in favour of bulk handling, and . . . . urged upon the Government the importance of bringing the system into operation as early as possible." The Melbourne Chamber adhered to the views expressed in a report of its Corn Trade Sectional Committee in August 1913, in which it "expressed accord with any movement likely to assist and lessen the cost of marketing of wheat or any other produce," but gave its opinion "that the establishment of elevators and shipment of wheat in bulk would not attain this object, or even if it did,

[1] *Minutes of Evidence*, Part II (Cd. 7172), pp. 71–73.

[2] *Ibid.*, Part I (Cd. 7171), p. 220; Part II (Cd. 7172), pp. 73–74, 95–99. Testimony of F. W. B. Stevens, A. M. Oliphant, and G. L. Sutton.

[3] Testimony of W. L. Brine, in W.A. Roy. Com., *Report*, p. 173. It was presumably this to which, as an "excellent report of the Western Australian government," reference was made by a speaker in the South Australian Parliament on July 28, 1915. S.A. *Parl. Deb.*, pp. 289, 336.

[4] Cd. 7210 (London, 1914), pp. 51–52, 58.

[5] Document not available to us. Frequent reference to its work was made in testimony before the Select Committee of 1916, e.g., N.S.W. Sel. Com., *Min. Ev.*, pp. 9, 10, 29, 34.

[6] *Ibid.*, p. 9. [7] Com. Aus., *Year Book, 1914*, p. 1057.

[8] Associated C. of C., *Report*, March 1915 (Melbourne, 1915), p. 162.

it would be secured at too great a cost to the general public." The Adelaide Chamber responded in greater detail to the same effect, advising "that the time is not ripe in Australia for bulk handling . . . ."[1] To quote its own report:

> Following on the resolution carried at the last Conference of the Associated Chambers . . . . [May 1914], the Corn Trade Sectional Committee met to consider the matter, and after full discussion confirmed its opinion as previously expressed, viz:
>
> "That in the opinion of this Committee bulk handling of wheat in South Australia is not viewed with favour, there being so many outports in the State from which grain is shipped that it would be quite impracticable to instal bulk handling at each port."
>
> In support of this the following objections to installation of bulk handling as regards this State were submitted, viz:
>
> 1. Not suitable to South Australian conditions owing to variable seasons and percentage for export not being sufficient.
> 2. Too many ports from which wheat is shipped to instal it at each, and only ones suitable are Outer Harbour and Port Pirie.
> 3. There would be increased cost of insurance and dearer freights.
> 4. Bulk handling would preclude export to South Africa, South America, and the East, where there are no facilities for handling in bulk.
> 5. Wheat in bulk is of less value to the English buyers than that conveyed in sacks, and thus the farmer would have to take lower price for his wheat than if it were shipped in bags.[2]

Wartime Developments

During the early months of the World War, other problems urgently demanded attention, and the harvest of 1914–15 was exceptionally short (Table I). Yet the issue of bulk handling was neglected only temporarily, and soon was taken up with renewed vigor. For two years or more, indeed, there appeared good prospect of developing a country-wide system on uniform lines.

In South Australia, even the Labor Party sponsored the idea in its successful election campaign early in the war, and the new government undertook to push the matter rather than have South Australia fall behind the other states.[3] Its predecessor, whose cabinet had been divided on the subject, had already agreed with the Victorian government to share the expense of securing experts to make preliminary investigations and general recommendations;[4] and these were sent out by the John S. Metcalf Company of Montreal, Canada. Its South Australian report, submitted in December 1915 and shortly issued as a public document, proposed a plan for handling a harvest of 30 million bushels, and called for terminal elevators near Adelaide, at Port Pirie, at Walleroo, and later at Port Lincoln.[5] The Metcalf report for Victoria was rendered in March 1916. It was a comprehensive, impressive document, and the Victorian Railway Commissioners separately published their comments on it, broadly endorsing its recommendations.[6]

Meanwhile, the Australian states had harvested bumper crops eventually estimated to total 179 million bushels (Table I). With shipping extremely scarce, this created a huge problem for which wartime control machinery was quickly provided; and the storage needs intensified interest in bulk systems. The precise sequence of the subsequent events is not clear to us, but their drift is plain.

At the Premiers' Conference held in Adelaide in May 1916, this resolution was passed: "It is desirable that the States should cooperate in the adoption of bulk handling of grain."[7] Citing this resolution, the governor of South Australia said at the opening of his Parliament in July that "all the States concerned in the wheat export trade have decided to adopt this system of handling the harvest. A Bill to bring the system into operation in South Australia will be placed before you in due course." "My ministers have entered into an agreement for the preparation of plans and specifications . . . ."[8]

Sometime in the interim, a wheat confer-

[1] *Ibid.*, p. 163.

[2] Adelaide C. of C., *Report*, April 1915, pp. 43–44.

[3] See the state governor's opening speech on July 8, 1915, and subsequent discussions of the subject, in S.A. *Parl. Deb.*, (22d Parl., 1st Sess., 1915), pp. 45, 99, 100, 136, 137, 158, 190, 248, 267, 288, 289, 336.

[4] *Ibid.*, p. 248.

[5] On this document, see also N.S.W. Sel. Com., *Min. Ev.*, pp. 12, 13, 30–31, and Phillips, *op. cit.*, p. 1. The South Australian fee was stated as £2,000.

[6] Document not consulted. Some quotations from it are given in Phillips, *op. cit.*, pp. 1, 28–29.

[7] Com. Aus., *Year Book, 1918*, p. 1193.

[8] S.A. *Parl. Deb.* (22d Parl., 2d Sess., 1916), p. 3.

ence was held in Melbourne attended by the South Australian Premier and Minister for Agriculture, the Minister for Lands and Agriculture of Western Australia, and the Attorney General and Minister for Agriculture of New South Wales. Presumably representatives of the Victorian government also participated. At this conference bulk-handling questions were seriously discussed, with the Metcalf representative in consultation. It resulted on March 2, 1916 in the adoption of a draft of a joint or common agreement between the governments of New South Wales, South Australia, and Western Australia and Metcalf and Company for drawing plans and supervising the installation of bulk-handling facilities.[1] The Victorian government more cautiously undertook first to seek Parliamentary sanction. The New South Wales government approved this agreement within six weeks, as did the government of South Australia. A political crisis in Western Australia prevented ratification there, but for a time there was prospect that the new cabinet would go ahead with the scheme.[2] Actually, Parliamentary approval was withheld in three of the four states—in South Australia, at least, under vigorous attack from the grain trade and reports of opposition among the majority of the farmers.[3]

The New South Wales agreement (and probably the abortive South Australian one also) called for paying the Metcalf Company £20,000 for detailed plans and specifications for a comprehensive state system, and 1¼ per cent on cost for supervising the construction if it should be decided to go ahead with the project, the company agreeing not to tender for construction contracts.[4] Its chief engineer (E. F. Carter), who had worked for ten years exclusively on bulk handling, was put in charge of the task.[5] To check estimates, plans, and specifications, the Minister for Agriculture appointed a Wheat Elevator Board consisting of Mr. Kendall, Engineer-in-Chief of Existing Lines (Department of Railways); W. E. Adams, Principal Assistant Engineer of the Sydney Harbour Trust; and George Valder, Under Secretary of the Department of Agriculture.[6]

The subsequent Grain Elevator Bill passed the Legislative Assembly on August 16, 1916.[7] In the Legislative Council it was referred to a Select Committee of ten, which heard witnesses from August 28 until it rendered its report on September 19. The committee submitted various observations on the scheme but "did not deem it necessary to make any amendment in the Bill." The Council thereupon passed it on September 26 and the Governor signed it on October 4.[8]

After the passage of the bill, the Council of the Sydney Chamber of Commerce "conveyed the following expression of opinion to the Minister of Agriculture relative to the erection of Grain Elevators":

> It is felt that the time is not opportune for the expenditure of a large sum of money necessarily associated with this undertaking, and it is hoped that in the exercise of your wisdom and discretion, you will not commit the State to this expenditure under the circumstances that exist.
>
> It is further felt that even in the event of your

[1] S.A. *Parl. Deb.* (22d Parl., 2d Sess., 1916), p. 1300.

[2] Testimony of Minister for Agriculture (Grahame) and others before the N.S.W. Sel. Com., *Min. Ev.*, pp. 12, 28, 55. In 1915 a bulk-handling bill had been introduced in the New South Wales Parliament, and its Public Works Committee heard George Valder on the subject in October 1915. *Ibid.*, pp. 10, 14.

[3] As to South Australia, see *ibid.*, p. 40, and S.A. *Parl. Deb.* (22d Parl., 2d Sess., 1916), pp. 221, 1275, 1300–04, 1435, 1439. A pamphlet by F. S. Alford was apparently influential. This defeat may have figured in the subsequent turning out of the Labor Government.

[4] In South Australia critics had cast suspicion on the Metcalf 1915 report because the company seemed a prospective bidder on the contract. In the debates in the Commonwealth Parliament in July 1917 (p. 223), a South Australian representative (Richard Foster) said: "Do not quote Metcalfe and Barnard, who came out here with thousands of pounds to splash about in order to get the bulk-handling system adopted by the Australian States."

[5] N.S.W. Sel. Com., *Min. Ev.*, p. 28. See his testimony in *ibid.*, pp. 28–33.

[6] *Ibid.*, p. 10. See Adams' testimony in *ibid.*, pp. 24–28, 46–47, 56–57, 59–60. The annual report of the Department for the year ended June 30, 1916, stated: "There is little doubt that a tender will in due course be accepted for the installation of the scheme, and we shall then mark an important epoch in the agricultural history of the state."

[7] *Votes and Proceedings of the Legislative Assembly*, 1916, pp. 27, 29, 38, 51, 54. It was called "A bill to sanction the construction of certain grain elevators, to amend the Public Works Act, of 1912, and for purposes consequent thereon and incident thereto."

[8] *Ibid.*, pp. 144, 163.

going forward with this project, the conditions upon which tenders have been called do not give scope for proper investigation and calculations to be made before the date on which the tenders have to be received.

Holding these views, my Council most respectfully suggests to you that under any circumstances an extension of time should be given to allow of the fullest freedom and competition in tendering, and this period it is considered should be at least six months.

Later, on February 7, 1917, "a very representative deputation waited upon the Premier on this subject and emphasized the views herein set out."[1]

Wartime conditions, and financial obstacles in particular, thus intervened to delay progress. The annual report of the Department of Agriculture for 1917–18 stated:

> Tenders were called and considered by the Cabinet, but unfortunately it was decided that the adoption of the scheme should be postponed, principally on account of shortage of funds.
>
> Subsequently, in view of the shortage of shipping space and the consequent accumulation of wheat in Australia, the Commonwealth Government decided to give financial assistance in the erection of emergency country grain silos—a special Act having been passed through the Federal Parliament to give effect to this decision.

From the bumper crop harvested late in 1915, and two succeeding crops larger than any prior to 1915, huge quantities could not be exported because of the shipping shortage. The backing up continued throughout the war. The Australian Wheat Board acquired control, through compulsory state pools, of over 400 million bushels from the crops of 1915–17.[2] At their peak, exportable stocks of wheat probably approached 200 million bushels, and total stocks after the moderate harvest of 1918 must have considerably exceeded this figure. On April 27, 1917 the Royal Commission on Wheat Supplies, the British agency acting on behalf of the Allied Wheat Executive, signed a contract of record size to buy 3 million tons (about 110 million bushels); but the bulk of this long remained in Australia. Miles of stacks of bagged wheat at the ports, and other long stretches at country points, exceeded anything of the sort seen in Australia before or since. Despite the pressure on storage facilities, most of the stacked wheat was reasonably protected against serious weather damage. By the end of 1916, however, mice became a veritable plague. What they ate was not the most serious loss. Grain leaked out through holes gnawed in the bags, and some stacks collapsed after such leakage. Moreover, this damage facilitated weevil infestation, which continued serious after the mouse plague was brought under control. Heavy costs were incurred for protection and treatment of the stored wheat, though the actual loss of grain appears to have been only a few million bushels.[3]

The gravity of the situation early in 1917 led to the appointment of a Wheat Storage Commission, composed of official and technical experts from the Commonwealth and each of three wheat states. It formally reported to the Commonwealth Premier (W. M. Hughes) on June 20, 1917. Referring to it on June 4, he told his Parliament that at two Premiers' Conferences he had called "it was agreed that joint action should be taken by the wheat-producing States and the Commonwealth in regard to the erection of silos."[4] At the opening of the next session, on July 11, the Premier promised the early submission of "a scheme for the establishment of an extensive system of silos to protect the wheat in the pool." Introduced July 12, and up for second reading on July 18, this bill had as its object "to provide for the erection of permanent silos for wheat." In the course of the ensuing debate, however, Mr. Hughes conceded much to the opponents of bulk handling. He asserted: "The Government is not committed to the bulk handling scheme, and express no opinion about it."[5] The immediate proposals had no necessary relation to bulk handling, though the silos would be so erected as to be adapted to bulk handling if that were subsequently de-

[1] Sydney C. of C., *Report, 1917*, p. 39.

[2] To July 15, 1918 the total was 403,267,000 bushels. N.S.W., *Year Book, 1917*, p. 698.

[3] Discussed with illustrations in Royal Commission on Wheat Supplies, *First Report . . . . , with Appendices* (Cmd. 1544, London, 1921), pp. 9–10, 30–32, 91–95. Bulletin 5 of the Commonwealth Institute of Science and Industry (organized in 1916) dealt with *Wheat-Storage Problems (Damaged Grain and Insect Pests)*. Com. Aus., *Year Book, 1919*, p. 1199.

[4] Com. Aus., *Parl. Deb.* (1st Sess., 1917), p. 32.

[5] *Ibid.* (2d Sess., 1917), pp. 14, 40, 153, 218 ff.

cided upon. The Wheat Storage Act, 1917, as passed on July 27, "provided for advancing to the state governments up to £2,850,000 under arrangements whereby silos and other structures would be provided to protect the wheat awaiting shipment."[1]

For bulk handling, however, New South Wales alone took advantage of this offer to get under way the construction of her elevator system.[2] The Commonwealth Premier had little idea of the time factor when he told Parliament in July 1917 that he expected the silos to be ready by January 1, 1918.[3] Little of the accumulated surplus ever got into the new structures, and its postwar disposal was practically completed before the elevators could be put to their first operating tests.

It has often been stated, or implied, that the depredations of mice and weevils during the World War gave a great impetus to the movement for bulk handling; indeed, an article in an American milling journal on the New South Wales system was entitled "Modernized by Mice."[4] This impression is largely erroneous. As we have seen, the New South Wales system was legally provided for in 1916, before losses became serious in 1917; progress on it was delayed by war conditions, and the Commonwealth loan permitted a slightly earlier beginning on construction; but even the exceptional storage requirements seem to have influenced the plans only to the extent of causing the Sydney terminal and some country elevators to be built larger than was later found necessary or economical, and of rushing the completion of the storage space proper.[5]

In Victoria and South Australia, where the wheat losses were larger, eagerness to provide for elevator construction was apparently not greatly intensified by this experience, and the moves were in any case defeated.

The Adelaide Chamber wrote to the Premier of the state requesting him to oppose "the proposal of the Federal Government to build silos in South Australia for the storage of wheat," "so as to prevent the wheat growers in South Australia from being saddled, against their will, with a liability of something like £250,000."[6] It argued that stacking of sacked wheat had been in use for fifty years, that properly roofed stacks gave no trouble, and that wheat so stacked gained more in weight through absorbed moisture than wheat in bins; that neither railways nor millers were equipped to handle bulk wheat; and that the farmers should not be asked to assume the burden of the inevitable costs. The proposal was not pressed.

At the annual meeting of the Associated Chambers, in March 1918, a Western Australian member stated in connection with a discussion of mismanagement by the Wheat Pool: "The question of storage in silos has been put forward for more than twelve months. In Western Australia the Advisory Board urged the Minister, as far back as July last, to do something, and at the present time they are only now considering an agreement with Metcalf & Company."[7] Nothing came of this.

Thus the World War ended with a complete defeat of what had seemed promising prospects for general adoption, on more or less uniform lines, of a bulk-handling system for the four Australian states.

Business and Farmer Attitudes

Millers.—Bulk-handling facilities in Australia developed first at the flour mills. Cobb[8] referred to a cubical wooden silo holding some 20,000 bushels erected by J. Crago at Bathurst about 1890, and said that about 1899 Crago

[1] See Com. Aus., *Parl. Deb.* (2d Sess., 1917), pp. 218–30, 236–59, 343–51, 380–404, 480–87, 572–84, 665; N.S.W., *Year Book, 1917*, p. 56, and *1919*, p. 575.

[2] *Ibid., 1917*, pp. 698–99.

[3] Com. Aus., *Parl. Deb.* (2d Sess., 1917), p. 403.

[4] *American Elevator and Grain Trade* (Chicago), June 15, 1923, p. 816. For an almost identical article by the same author, formerly U.S. Trade Commissioner at Melbourne, see A. W. Ferrin, "Bulk Handling of Wheat in Australia," *Northwestern Miller* (Minneapolis), July 18, 1923, pp. 243–44.

[5] We regard as misleading the italicized portions of the following statements in evidence included in the W.A. Roy Com., *Report*, pp. 417, 422. *"The original scheme was built as a storage scheme during the war,* and as a result large storage has been provided at certain places, some of which is not used to its full capacity" (Col. Holborrow). *"Originally, bins were put in purely as a storage system* and huge silos were constructed at certain places long distances apart" (A. K. Trethowan).

[6] Adelaide C. of C., *Report*, April 1918, pp. 59–60.

[7] Associated C. of C., *Report*, March 1918 (Melbourne, 1918), p. 179.

[8] *Op. cit.* (1901), pp. 291–92.

built a wooden elevator of about 70,000 bushels capacity in connection with his flour mill at Newtown, Sydney; not long after, Gillespie Brothers and Company built one of similar material and capacity at the Anchor Roller Flour Mills in Sydney. Other millers gradually adopted the practice.[1] In 1916, when the Grain Elevator Bill was under consideration before the Select Committee of the Legislative Council of New South Wales, three witnesses testified on this point. The Under Secretary of Agriculture implied that most of the mills had as yet no facilities for handling bulk wheat.[2] G. W. Walker, then an experienced grain dealer in Sydney, said that nearly all the large mills in New South Wales had bulk silos, and added: "Gillespie empties practically every bag of wheat he receives the moment it comes up to the mill . . . . , and has don so for the last five years."[3] John S. Brunton, another leading miller, who strongly favored the comprehensive introduction of bulk handling, testified: "Even for the internal consumption of New South Wales I say it is absolutely the proper and most up-to-date—indeed the only system." "A number of mills here have not the means of receiving grain in bulk, but it would suit my firm. We have up-to-date elevators . . . ."[4]

At this time, however, large mills were few and small ones numerous. Since then, the number of Australian mills has dwindled while the aggregate capacity and output have increased. The smaller country and city mills especially declined in relative importance, and bulk equipment was provided in many of the older plants as well as in the new ones. For several years past, nearly every mill in New South Wales has had in use facilities for handling wheat in bulk,[5] and a fair proportion of their grist has come through the state elevator system (p. 337). In Victoria and Western Australia similar progress was made, though not to the same extent, in advance of the introduction of country handling in bulk. In South Australia, where the milling industry has undergone less expansion, the modernization proceeded more slowly. Today, however, all the large city mills and all the larger country mills have mill elevators.[6]

Despite the progress just sketched, neither before nor since the installation of country and terminal elevators have the millers unanimously approved state-wide bulk handling. Some of their reasons for preferring to acquire their wheat in bags are elsewhere touched upon (pp. 336–37, 355).

Commercial interests.—From early in the century the Australian grain trade in general manifested a good deal of resistance or active opposition to the institution of bulk handling. The commissions which reported in Victoria in 1902–03 and in South Australia in 1908–09 took very seriously the hostile attitude of the shippers, which long persisted. In New South Wales, as late as 1916, the one dealer who testified strongly in favor of the move (G. W. Walker) admitted that he was called a "faddist" on the subject, and that shipping agents generally viewed the scheme "very adversely."[7] Their satisfaction with the existing system was coupled with fears of increased competition, of co-operative marketing, and of their own elimination; but their opposition was based in part on rough comparisons of current costs with prospective ones, which led them to the conviction that bulk handling would not pay. They forecast that the turnover in country silos would be low and that costly terminals at the numerous ports would prove uneconomical. Further evidence of their position appears elsewhere in this study.

[1] References to Crago's, Brunton's, and others appear in Jackson, *op. cit.* (1908), pp. 6–8, 61. The 1912 edition of this bulletin contains evidence on the installations made by several milling firms.

[2] N.S.W. Sel. Com., *Min. Ev.*, p. 16. [3] *Ibid.*, p. 39.

[4] *Ibid.*, pp. 42–43. In 1908 Brunton had been in favor of its adoption "in a reasonable way," but not of "the spending of a lot of money to handle all our exportable wheat." He thought it would compel farmers to grow cleaner and better wheat. Jackson, *op. cit.* (1908), pp. 7–8.

[5] *Milling*, June 19, 1937, p. 787, with a description of the new silos of J. Darling and Son at Rhodes, New South Wales.

[6] Letter from W. D. Brunton (Melbourne), July 13, 1939. No statistics on the total capacity of mill elevators have come to our attention.

[7] N.S.W. Sel. Com., *Min. Ev.*, p. 40. Another grain merchant (F. J. Wallis of James Bell & Co., Ltd.) refused to commit himself. *Ibid.*, pp. 35–37. The Minister for Agriculture, in his testimony, spoke of talks with Mr. Lasry of Louis Dreyfus & Co., and with Harold Darling of J. Darling & Sons, "who is opposed to bulk handling and is fighting it tooth and nail." *Ibid.*, p. 13.

Among Australian commercial interests generally, the idea won more support, as witnessed by the attitude in Western Australia and the action of the Associated Chambers of Commerce in May 1914 (p. 314). Meeting at Sydney in March 1920, the Associated Chambers repassed the resolution that had been adopted in 1914. The Corn Trade Sectional Committee of the Melbourne Chamber "agreed with the principle enunciated in the resolution where export is concerned, but recommended that it be not applied until sufficient surplus for export can always be depended on to ensure a fair prospect of profitable working."[1] Twelve years more elapsed, however, before the Victoria trade was finally converted. In South Australia the trade gave repeated evidence of sustained hostility. Despite the evidence of support for the idea in Western Australia, the regular grain trade there continued in opposition.[2] In the main, the same firms operated there as in the other states, and their opposition was based on the same grounds as in South Australia. Even Westralian Farmers, which grew to major status as a co-operative wheat handler during the war and was the parent of the wheat pool, did not actively press the issue for a decade after 1921. New South Wales wheat merchants gradually, but more or less reluctantly, adapted their operations to the elevator system established there, and so did those in Western Australia in the 1930's.

Farmers.—On the attitudes of Australian wheat growers, the available evidence is limited, often biased, and more or less divergent.

As early as 1908 Thomas I. Campbell, General Secretary of the Farmers and Settlers' Association, said that his constituents thought bulk handling would benefit them.[3] This sentiment grew stronger. In July 1910 an FSA deputation visited the Colonial Treasurer to urge its adoption, and a year later its annual conference voted to press the government at once to provide for bulk handling and grading.[4] In April 1913 A. K. Trethowan, then its vice-president, testified strongly on both points before the Dominions Royal Commission then visiting Australia.[5] Before the Select Committee in September 1916, Campbell testified on behalf of the FSA:

> . . . . I appear principally as the representative of the farmers in this matter. For many years past at our annual conferences the question of the bulk-handling of wheat has been brought up, and we have been very insistent that the present system is obsolete, and that the bulk-handling system is essential to place our Australian farmers on a footing with their competitors in the world's markets. I might say that the farmers are almost unanimously in favour of the bulk-handling system. We have followed very closely and keenly the various enquiries which have been held. I do not know whether the report of the Royal Commission which sat in Victoria in 1913 has been brought under the notice of the Committee. I have gone through that report and the evidence, and to my mind it is the most up-to-date report on the whole question of bulk-handling that I have come in contact with. The report, which was adopted by that Commission, demonstrated bulk-handling is absolutely necessary to place the Australian farmer on a fair and reasonable footing with his competitors. The findings of the Commission are absolutely in favour of the installation of a system for the bulk-handling of wheat. The Farmers and Settlers' Association has strongly supported the attitude at its annual conferences year in and year out, and it has been laid down that until we get a system for handling wheat in bulk, the conditions in New South Wales will not be satisfactory.[6]

Nevertheless, there is reason to doubt if this testimony accurately represented farmer sentiment in New South Wales. During the first decade of experience with bulk handling, wheat growers certainly manifested by their actions a notable lukewarmness toward the new system, to a degree that must have embarrassed the FSA sponsors. It was not until severe depression supervened, with a series of big crops, very low wheat prices, and lower freights on bulk exports, that the enlarged

[1] Melbourne C. of C., *Report, 1920–21*, p. 80.

[2] E. S. Saw, Secretary of the Perth Chamber, wrote me Aug. 28, 1939: "It is not correct to state that before and during the War, the grain trade in Western Australia was favourably disposed towards the Institution of the Bulk Handling of wheat . . . . The trade, as represented by the merchants, has never actually favoured the handling of wheat in bulk in Australia, for many reasons . . . ."

[3] Jackson, *op. cit.* (1908), p. 11.

[4] *Ibid.* (1912 revised edition), pp. 69–70.

[5] See above, p. 313. Trethowan spoke of the organization as comprising 400 branches with "close upon 20,000" members, or about 25 per cent of the farmers of the state.

[6] N.S.W. Sel. Com., *Min. Ev.*, p. 34.

system won strong patronage from and support among the farmers of the state. In recent years, they have become generally attached to the system and convinced of its benefits, while severely critical of its shortcomings and frequent breakdowns.

It seems clear that farmer opinion in Western Australia, in the pre-war and war periods, was in part responsible for the vigorous initiative in the direction of bulk handling that was taken in 1913 and 1914 by the Perth Chamber of Commerce and later by Westralian Farmers. The investigations by the co-operatives in the 1920's, which led to action in the next decade, were doubtless based partly on the active interest of this large body of progressively-minded growers. Throughout the past decade the "Westralian" farmers have given repeated evidence of their strong support of the system in operation; and the unanimous testimony of those consulted by the Royal Commission in 1935 (p. 341) undoubtedly contributed to its favorable report at a critical juncture.

We infer that in Victoria farmer support for the innovation was more or less limited in the earlier period; but to ascertain the facts now would require much further historical research to reach results of slight consequence. Subsequently, their interest has waxed and waned, but it has never been so strong and united as Campbell testified of New South Wales farmers in 1916 and as it has been in Western Australia in recent years. In the early 1930's a high degree of enthusiasm for bulk handling was worked up among Victorian farmers, but at least one important organization of the growers has mildly opposed the construction of the state system on the basis there adopted (p. 350).

Farmer demand for a bulk-handling installation in South Australia was never powerful. In the debates in the State Parliament in 1915 and 1916, and in the Commonwealth Parliament in 1917, there were uncontroverted assertions that the majority (some said 90 per cent) of the farmers of the state were opposed to the introduction of bulk handling.[1] Not until the 1930's, when at last bulk wheat could be shipped more cheaply than bagged, was some degree of interest aroused, and within a few years it almost died out.

IV. THE NEW SOUTH WALES EXPERIENCE

In the five years 1911–15 New South Wales was the leading Australian wheat state, in both acreage and production. Her notable rise to first place was the result of a marked expansion of wheat growing within two decades (Chart 1, p. 303). This called for additions to railway tracks and rolling stock, which long remained deficient, as well as to grain-storage facilities of one sort or another. An elevator system promised economies in railway equipment and operation, as well as of labor. Hence the arguments of the advocates of a state bulk-handling system, backed by the progressive temper of the people and prolonged investigations of the Department of Agriculture, culminated in the authorizing act of 1916. The war, with its shortage of materials, labor, and funds, delayed the beginning of construction until near the end of actual hostilities.

Since New South Wales alone has had twenty years of experience with bulk handling, it is pertinent to review in some detail (1) the growth of the system, (2) the operating procedure and results, (3) the financial experience, and (4) the recurrent problems and changing attitudes, in that state.

Growth of the System

The initial plans, as modified from earlier ones for reasons of economy and war-storage needs, called for constructing silos at 70 country points in the southern, southwestern, and western districts, with capacities ranging from 50,000 to 500,000 bushels and a total capacity of 15,400,000 bushels; and a terminal elevator at Sydney with a capacity of 6,509,600 bushels.[2] Construction of the Newcastle ter-

[1] S.A. *Parl. Deb.* (1915), p. 267; *ibid.* (1916), p. 1301; Com. Aus., *Parl. Deb.* (2d Sess., 1917), p. 242.

[2] N.S.W., *Year Book, 1919*, p. 575. For earlier versions of the matured plans see *ibid., 1917*, p. 698, and *1918*, p. 627. For some years the capacity was carried at 6,500,000 bushels, but it is now officially regarded as 6,750,000 through 1933–34.

minal and its tributary silos in the northern and northwestern districts was deferred.

The Sydney terminal was located on Glebe Island, a spit of land between Rozelle Bay and White Bay, some distance from Darling Harbour, where ships have long loaded bagged wheat. Originally planned for a capacity of 3 million bushels,[1] as actually completed it held 6.75 million. At a cost of about £1,150,000,[2] it was built and equipped like the best North American terminals of the time.[3]

Before construction was formally authorized, various witnesses before the Select Committee of 1916 gave divergent estimates of the time that full installation would require.[4] The Minister for Agriculture thought that it would be completed within five years, subject to expansion later with the growth of the wheat area. The Under Secretary agreed that five to seven years would probably be required, but that it would pay best to rush it to completion in a shorter time. G. W. Walker, the grain merchant, thought three to five years sufficient. The chairman of the Committee estimated ten. The chief engineer of the company hired to supervise construction called the Sydney terminal a "one-year job," and the Newcastle one about as long;[5] the country elevators, he said, could be completed very quickly or slowly depending on the policy of the government.

The more hopeful estimates proved unduly optimistic. The Director of Agriculture, in his report for the fiscal year ended June 30, 1918, stated (p. 7) that the work was well under way, "and there is little reason to doubt that the greater number will be available for handling the coming season's crop." They were not. In 1919 expectations were held out that a large part of the system would be ready for use in the next harvest.[6] Had it been, the very short crop of 1919 (Table I) would have left it idle. Actually, by September 1919 the effective progress was represented by emergency storage space for 4,850,000 bushels at 26 country stations. When first used in the season of 1920–21, for a crop second only to that of 1915, only the main portion of the Sydney elevator and 28 country silos could be used, and these were not fully equipped.[7] In that season and the next, the country elevator capacity was only 5,450,000 bushels, and it did not reach 15.4 million until 1928–29. The expansion of the system is indicated by the several curves in Chart 2.

The delay in completing the construction was partly due to the fact that the system was slow in winning the farmers' favor. This was foreseen by another Select Committee of the Legislative Council, which reported in November 1920. After making comprehensive inquiries "into the facts concerning the installation of wheat elevators and the system of bulk-handling of grain, with particular reference to the transition from the bag to the bulk method," it reached conclusions far less sanguine than those which had inspired legislative action in 1916. "It was . . . . thought that the majority of existing farmers would adhere to the bag system until, at least, the time comes for scrapping worn-out implements and buildings, and that the bagging of wheat will continue for a very long time to come in respect of a large portion of the crop. It was expected that new farmers would usually adopt the bulk method."[8]

Not until 1928 did the state wheat acreage approach the 1915 peak; growers were slow to make readjustments in equipment, and

[1] N.S.W. Sel. Com., *Min. Ev.*, pp. 10–12, 25, 28. Construction by the Sydney Harbour Trust was then in contemplation.

[2] Official testimony (4*s.* per bushel of capacity) in W.A. Roy. Com., *Report*, p. 416.

[3] It is described in various official yearbooks (e.g., *1926–27*, p. 153), and in an illustrated circular of the New South Wales Department of Agriculture, *Handling and Storing Wheat in Bulk: The New South Wales System* (Sydney, 1936), pp. 1, 6–7. See also brief article on "The Port of Sydney, Australia," *Commerce Reports* (Washington, D.C.), Mar. 2, 1940, p. 216.

[4] N.S.W. Sel. Com., *Min. Ev.*, pp. 10, 16, 28, 29, 40.

[5] As then contemplated, their respective capacities were to be 3.0 and 0.8 million bushels.

[6] *Corn Trade News* (Liverpool), June 30, 1919, and Sept. 24, 1919.

[7] Phillips, *op. cit.*, p. 44, citing a report from the American trade commissioner in Melbourne (A. W. Ferrin) in *Western Grain Journal*, Aug. 25, 1921, p. 27. According to this report, the first consignment reached the Sydney terminal in February 1921, and the total capacity to be provided was put at 51,450,000 bushels.

[8] N.S.W., *Year Book, 1920*, pp. 383, 393. Document itself not consulted. Among the uncertainties was whether the highly efficient harvester would be adapted to bulk use. *Ibid.*, p. 374.

chose in general to stick to their old practices; and the grain trade and many millers continued to prefer and promote continued use of bags. Illuminating is an official comment made late in 1925:

The marked improvement in the proportion of the harvest handled in bulk is due to the fact that farmers are recognising that substantial savings are possible for them by this means, and that the feeling against control of the silos by the Government is being dispelled. Indeed a strong demand is arising among farmers in districts where silos are not available for the provision of such facilities in order that they may share in the advantages of the system.[1]

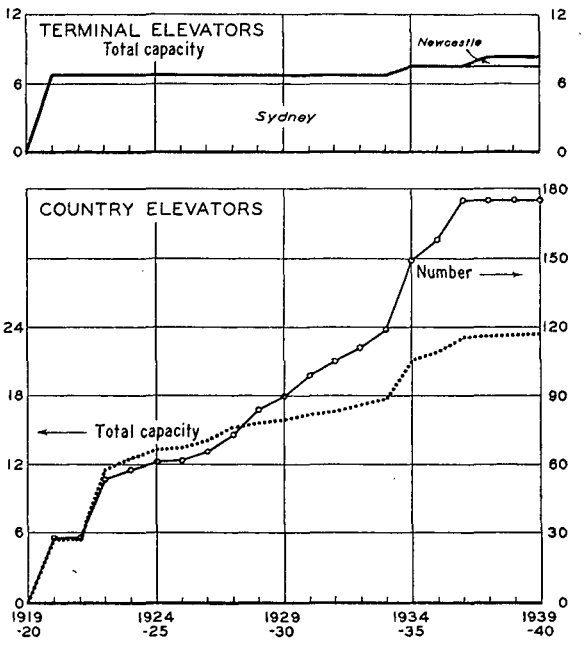
Ten years later another official commented:

For a long time the farmers in New South Wales did not hold the bulk handling system in great favour, but in later years this feeling had changed and farmers were now more and more taking advantage of the facilities offered by the Department.[2]

In another related respect, expectations were gravely disappointed. When the bulk-handling system was under consideration in 1916, the Deputy Chief Commissioner for Railways (James Fraser) based his estimates of annual net savings (£310,667) on a crop of 60 million bushels, of which 48 million would be shipped including 42 million in bulk,[3] implying bulk handling of 70 per cent of the crop and 87½ per cent of that shipped by rail. It was recognized that under New South Wales conditions the turnover could not be so rapid as in Canada, where the elevators were said to be emptied four times a year; but agricultural and railway authorities agreed that a turnover of three times a year in a normal shipping season could be counted upon.[4] These expectations have not yet been approached, even under the most favorable conditions.

CHART 2.—TERMINAL AND COUNTRY ELEVATORS, NEW SOUTH WALES, ANNUALLY FROM 1920–21*

(Capacity in million bushels)



* Country elevator data in Table IV. See also Chart 7, p. 344.

The great variability in the crop of each individual district, and the fact that in each district the harvest extends over a very short period of time, operate against the economical use of an elevator system. To provide silo capacity adequate to handle peak loads in good years is out of the question, and even to provide silos at all shipping points would be excessively costly. In practice, a silo is kept closed if the crop of the tributary district is unusually small, and the storage and handling facilities are overtaxed if the harvest is good or the movement from the farms unusually rapid. Hence the ratio of quantity handled to capacity is necessarily low.

In the first ten years of operation, the volume received into the country elevators equaled their aggregate capacity only in 1924–25, as shown by Chart 3.[5] Then a big crop

[1] N.S.W., *Year Book, 1924–25*, p. 459.

[2] Mr. Adamson, construction engineer, Grain Elevators Department, in W.A. Roy. Com., *Report*, p. 419.

[3] N.S.W. Sel. Com., *Min. Ev.*, pp. 19–21.

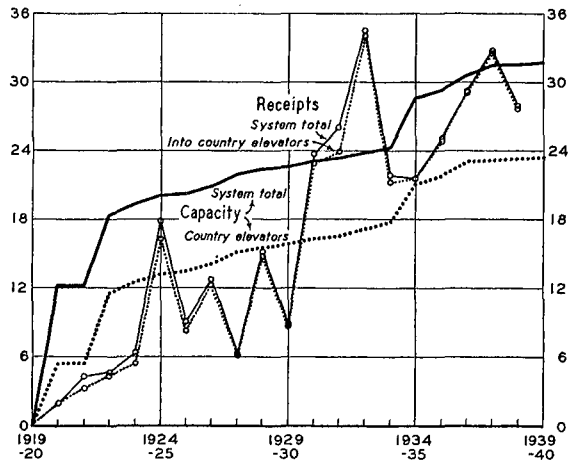
[4] Minister for Agriculture Grahame's testimony in *ibid.*, p. 10. The Under Secretary of Agriculture said (*ibid.*, p. 17): "We expect to have adequate accommodation for a third of the [marketed] crop at the one time." As late as 1935 the Wheat Commissioner told the Western Australia Royal Commission: "In basing country storage accommodation it is considered silos should be filled three times during the delivery period . . . ." See the latter's *Report*, p. 417. In Western Australia the objective in 1935 was to provide substantial accommodation, exclusive of temporary bulkheads, for three-fourths of the marketed crop.

[5] See also Tables I, IV.

and urgent export demand[1] gave the system its first significant test. In that and the five subsequent seasons, only about 35 per cent of the volume that moved by rail (not the whole of the marketed crop) went through the elevators, and in most years except 1924–25 less than half of this went into export. In

CHART 3.—ELEVATOR CAPACITY AND RECEIPTS, NEW SOUTH WALES, ANNUALLY FROM 1920–21*

(Million bushels)



* Data mainly in Table IV. See also Chart 7, p. 344.

years of poor crops, such as 1925–26, 1927–28, and 1929–30, bulk receipts were far below the country silo capacity. Even in 1930–31, after a big crop, bulk receipts at country points averaged about 1.4 times the aggregate capacity there. This ratio was slightly exceeded in 1931–32 and 1937–38, and has thus far been materially exceeded only in 1932–33, when it approached 2. In only four seasons have receipts exceeded the aggregate capacity of the system, and in only one of these (1932–33) did the turnover much exceed 1.1. Virtual elimination of the period of free storage and increase in storage charges (p. 334) would doubtless raise the turnover at country points; but they would meet with objections from farmers, necessitate material increases in railway equipment and operating costs, and sometimes exert pressure on the export markets.

Most of the 61 country silos available in 1924–25 were large ones, with capacities ranging from 150,000 to 300,000 bushels, and they averaged 217,200 (Table IV). These had bins 36 feet in diameter and 70 feet high, with a capacity of 50,000 bushels each, and the aggregate capacity at each station was therefore in multiples of 50,000 bushels.[2] In June 1925, after the system had enjoyed its first good season, the cabinet approved a construction program under which a number of additional silos were built, mostly of 150,000 or 160,000 bushels; and in 1926–27 approval was granted for building silos of 30,000 bushels capacity at stations where plants of 150,000 bushels capacity or more were not needed.[3] These small silos comprised a nest of four cylindrical bins of 6,000 bushels capacity each, with smaller rectangular ones between them holding as little as 500 bushels.[4] Since then numerous elevators with capacities of 30,000, 60,000, and 90,000 bushels have been erected,[5] and though additions to capacity were made at various points the average capacity declined steadily until 1936 (Table IV).

A three-year program of construction to begin July 1, 1929 called for silos at 18 additional stations with a capacity of 815,000 bushels.[6] Before these were completed, however, the huge harvest of 1930–31, and the necessity for rigid economy in cash expenses on the part of farmers, brought nearly 24 million bushels through the system; and much more would have been so handled if unfortunate retardation of exports had not choked the system in midseason and required refusal of additional receipts.[7] In all but two subsequent years this volume has been exceeded. Record handlings of 34.5 million bushels in 1932–33 represented 52.2 per cent of the receipts at rail from the bumper crop

[1] Cf. our "Review" of 1924–25, in WHEAT STUDIES, November 1925, II, 1–64.

[2] N.S.W. Dept. Agr., *Handling and Storing Wheat in Bulk: The New South Wales System* (Sydney, 1936), p. 4. The terms "silo" and "elevator" are used interchangeably, and "bin" refers to the individual units.

[3] N.S.W. Dept. Agr., *Report, 1927*, p. 11.

[4] E. C. Squire report, in U.S. Dept. Comm., *Foodstuffs Round the World* (Washington, D.C.), Jan. 11, 1929, with special reference to 1928.

[5] The annual reports of the Department of Agriculture often mention country elevators under construction and completed at specific points, and sometimes give partial lists by capacities.

[6] N.S.W., Dept. Agr., *Report, 1929*, p. 2.

[7] *Ibid., 1931*, p. 15.

of nearly 79 million bushels. The percentage of total rail receipts going through the elevators rose to fresh peaks in several later years, culminating at 72.5 per cent in 1937–38, when the volume handled was only 1.7 million bushels below that of 1932–33.

The exceptionally heavy, profitable operations of 1932–33 led the government, following a conference between the Minister of Agriculture and interested organizations on February 21, 1933, to approve a program for spending £500,000 in the next two years to build 38 additional silos with an aggregate capacity of 3.9 million bushels. Of these 24 were in the North and Northwest, which had previously been left out of the system,[1] and 7 additional ones each in the West and Southwest.[2] The work was carried out partly by contractors and the department's day-labor gangs.[3] In the next two years 28 more were added with an aggregate capacity of 3.0 million bushels.[4] In the expansion which increased the number of country plants by 102 between 1927 and 1936, the average capacity of the added silos was well under 75,000 bushels as compared with an average of over 217,700 bushels for the first 62 that were built (Table IV).

The 1933 program also called for enlarging the capacity of the Sydney terminal and building one at Newcastle to serve the northern and northwestern districts. In time for service in 1934–35, the Sydney terminal was enlarged from its original capacity of 6,750,000 bushels to 7,500,000.[5] Construction of the 800,000-bushel terminal elevator at Newcastle was begun in January 1934, vainly expected to be in use in 1935–36, and practically completed in 1936.[6] It was not operated in 1936–37 because, according to the official explanation, wheat of the tributary districts moved heavily to Queensland, local millers, and Sydney, owing to special conditions; these, however, included the unwillingness of merchants to route exports thence and, according to trade reports, the delay in providing equipment to handle bagged wheat for topping cargoes was the vital factor.[7] The terminal came into full use in 1937–38, when it received 1,179,208 bushels; by June 30, 1938 three vessels with 803,316 bushels had been loaded out, and in the next year four with 1,253,814.[8]

Acreage and production in the Northwest have notably increased, and the 1938 yield per acre averaged 21 bushels. In April 1939 a meeting of growers from that region unanimously decided to press for the establishment of a subterminal elevator of 5 million bushels capacity at Werris Creek. This and subsequent similar proposals the silo management and the Department of Agriculture have opposed as uneconomical.[9]

By 1937–38, the operating capacity of the entire system had risen to 31.5 million bushels, including 175 country silos with an aggregate capacity of 23.2 million. No more elevators have since been built, but additional workhouses at several stations have added some 500,000 bushels to the available country silo capacity.[10]

The expansion of the elevator plant has been, from the outset, strictly orthodox; and, according to a specialist's technical appraisal in 1938, the design of the plants added as recently as 1933 has differed little from those used in 1922.[11] Nor have effective ways been found to cope with the recurrent congestion, of which more is said below (p. 333). In the past few months, under the joint pressure of a huge crop and the war emergency, crude bulkheads like those used in Western Australia have been added at numerous country stations, some grain sheds converted for bulk

[1] The first country silo in these districts, at Quirindi, was completed in 1933. *The Land*, June 21, 1933, p. 28. The 24 silos in use in these districts in 1934–35 handled 2,054,677 bushels, but could have handled three or four times as much. *Ibid.*, Mar. 8, 1935, p. 6.

[2] N.S.W. Dept. Agr., *Report, 1933*, p. 4.

[3] *Ibid., 1934*, p. 29.

[4] The program for 1935–36 and 1936–37 included 9 of 60,000 and 16 of 90,000 bushels capacity. Outside tenders for building 24 were accepted, and 2 were to be built by the Department of Agriculture. *The Land*, June 14, 1935, p. 5; June 28, 1935, p. 5.

[5] N.S.W. Dept. Agr., *Report, 1935*, p. 29.

[6] *Ibid., 1934*, p. 29; *1935*, p. 30; *1936*, p. 32.

[7] *The Land*, Oct. 16, 1936, p. 6; *Primary Producer*, Dec. 2, 1937, p. 10.

[8] N.S.W. Dept. Agr., *Report, 1938*, p. 35; *1939*, p. 31.

[9] *The Land*, Apr. 28, 1939, p. 5; May 19, 1939, p. 4.

[10] N.S.W. Dept. Agr., *Report, 1939*, pp. 15, 31. See also below, p. 360.

[11] L. Boyd Mercer, *Bulk Handling of Wheat and the First Principles of Elevator Design* (Melbourne, 1934).

storage, and farmers have been furnished plans for inexpensive storage tanks for bulk wheat on farms.[1]

The matured system and its operating procedures are set forth for popular consumption in an illustrated circular published by the Department of Agriculture in 1936 (*Handling and Storing Wheat in Bulk: The New South Wales System*). This must be read with allowance for bias typical of such official pamphlets. Whereas its first subhead reads, "The System Makes Rapid Progress," the progress actually shown would have seemed exceedingly slow to the promoters of the system in 1916.

Operating Procedure and Experience[2]

In the first two years of operation, when a high percentage of the crop was handled through a voluntary state wheat pool, the country elevators were run by the pool committee and patronized only by pool members. Beginning with 1923–24, the system was operated by a Silo Control Board in the Department of Agriculture consisting of a Wheat Commissioner and a Silo Manager.[3] Soon these two offices were virtually merged, under E. Harris, an experienced government official who had been for some years during the war in charge of the State Wheat Office.[4] It was not until February 1928 that, under the Wheat Act, 1927, an orderly code of handling and storage regulations was issued, roughly corresponding to those long since in use in Canada.[5] In 1933 Harris was succeeded by his assistant, G. A. H. Holborrow; and he in turn, in 1939, by his assistant, L. S. Harrison.

There have been complaints against the "tsaristic" management of the silos, its lack of sympathy with the farmers, and its coldness to their requests or representations. Some have urged the reconstitution of the former Silo Board, with a farmers' representative as a member, or favored provision for consultation with the Farmers and Settlers' Association or its local branch on matters of major concern to the growers.[6] Others have urged that the Railway Department should be represented in the management, or even that the operations should be under that department.[7] Undoubtedly such criticisms and suggestions influenced the Victorian decision, in 1934, to set up a board of three (p. 349) and the South Australian Parliamentary Committee, in 1935, to favor "a Board of five, representing the Railways and the Harbours Board, the Department of Agriculture, the wheat growers and the wheat merchants."[8] Thus far, however, the "Wheat Commissioner and Manager, Government Grain Elevators" remains one person within the New South Wales Department of Agriculture, consulting with the state railway officials, farmers' representatives, and others as occasion requires.

The schedule of bulk-handling charges has been changed from time to time, as indicated in Table 1. Over the whole period, broadly speaking, the inclusive and terminal charges have been considerably lowered, and the country rate proper first raised, then lowered drastically, and finally restored to the earliest level. A drastic reduction in rates was in force in 1935–36; but revenues fell off in spite of some increase in volume handled,[9] and rates were raised in the following year. After October 1, 1936 the inclusive charge was 2*d.* per bushel, and the schedule was not further changed till this season. With the rate reduction in 1935, the period of free storage was materially shortened, and since its extension by one month in 1936 storage charges begin to run from April 1, instead of August 1 as in the decade 1924–34 and September 1 previously.

Various special concessions have been made. Since 1930 the silo management has offered

[1] *The Land,* Oct. 13, 1939, p. 3; Dec. 1, 1939, p. 12; Jan. 12, 1940, p. 4; Jan. 19, 1940, p. 8.

[2] On this general subject, see the department circular already referred to, and detailed official and other testimony in W.A. Roy. Com., *Report,* pp. 416–27.

[3] N.S.W., *Year Book, 1922,* pp. 510, 512; *1923,* pp. 487, 489. There was a third advisory member for railway matters.

[4] N.S.W. Dept. Agr., *Report, 1933,* p. 3; *The Land,* June 21, 1933, p. 28.

[5] N.S.W. Dept. Agr., *Report, 1927,* p. 11; *Canadian Milling and Grain Journal,* July 1928, p. 18.

[6] Cf. *The Land,* Aug. 16, 1935, p. 9; Feb. 9, 1940, p. 4; and testimony of the FSA general secretary in W.A. Roy. Com., *Report,* p. 426.

[7] *Ibid.,* pp. 426 (G. W. Walker), 430 (H. W. Clapp, chairman, Victorian Railway Commissioners).

[8] *Ibid.,* p. 431.

[9] See below, p. 332, and *The Land,* Oct. 9, 1936, p. 5.

farmers financial inducements to deliver their grain in bulk, in order to speed receipt at the country station. An "allowance" of ⅛*d.* per bushel was offered in 1929–30, for wheat delivered in bulk lorries.[1] The government circular published in 1936 referred to some such

TABLE 1.—BULK-HANDLING CHARGES THROUGH NEW SOUTH WALES GOVERNMENT ELEVATORS*

(*Pence per bushel*)

Season	Country receival and terminal delivery	Country receival and delivery	Terminal delivery only		Storage charges 1/8 *d.* per week from
			Received in bulk	Received in bags	
1920–21..	2.75	1.50	....	2.00	Sept. 1
1923–24..	2.00	1.50	1.00	1.25	Sept. 1
1924–25..	2.50	2.00	1.50	1.75	Aug. 1
1927–28..	2.50	2.00	1.00	1.75	Aug. 1
1929–30..	2.50	2.00	.75	1.25	Aug. 1
1935–36..	1.50	1.00	.50	1.00	Mar. 1
1936–37..	2.00	1.50	1.00	1.50	Apr. 1

* For 1920–21 from *Official Year Book of New South Wales, 1922*, p. 510; for later years as kindly furnished by the New South Wales Department of Agriculture. Figures are shown only for seasons in which some change was made. For special or supplementary arrangements, see accompanying text.

For 1939–40, under the Australian Wheat Board, the inclusive charge for bulk wheat in all the states is 2*d.* on receival plus ½*d.* on loading out. *Primary Producer*, Jan. 25, 1940, p. 1; *The Land*, Feb. 9, 1940, p. 5, and Feb. 16, 1940, p. 3.

encouragement, and stated that the Department "pays the farmer one-tenth of a penny for every bushel" delivered in a suitable hoppered bulk box to be fitted to his wagon. For the first few weeks of two seasons, to December 31 in 1932 and 1933, the inclusive handling charge on new wheat for export was reduced by ¼*d.* per bushel,[2] to encourage rapid shipment. Rather than impose penalties for keeping old wheat in elevators when the new crop was about to be harvested, the officials offered in September and October 1932 a concession of ½*d.* on storage charges on wheat shipped out in these months.[3] A similar concession of 1*d.* per bushel was made on all wheat so delivered from December 12, 1934 to January 15, 1935.[4] From April 1, 1938 a remission of ⅛*d.* per bushel of handling charges has been made on wheat shipped from the Newcastle terminal,[5] presumably to induce fuller use of that equipment.

Of the total wheat crop, part is retained on the farm—typically for seed and in many cases also for feed to poultry or other livestock.[6] Of the balance that is marketed, some is hauled direct to mills in the country districts or in accessible cities. The rest is hauled mainly to country "sidings"—still predominantly by wagon, but latterly increasingly by motor truck.[7] No data on the total volume *marketed* are regularly available, but Chart 4 (p. 328) shows some subdivisions of the crops since 1920. The unshaded portion at the top of each bar indicates the quantities retained on farms, hauled to local mills, and hauled to Victoria railways. The rest of each bar represents deliveries to New South Wales railways. The heavily shaded portion of the shaded bar represents bulk receipts into country elevators, while the middle portion represents mostly wheat shipped in bags from country stations plus a little shipped in bulk from non-silo stations to the terminal. The government statistician's estimate for 1939–40, made late in January, was as follows in million bushels:[8]

Deliveries to New South Wales railways		
To Jan. 20	58.5	
After Jan. 20	6.0	64.5
Sent to Victoria by road or Victoria railways	3.0	
Sent by road to New South Wales flour mills	3.5	
Retained on farms for seed, etc.	5.0	11.5
Total crop		76.0
Total marketed crop		71.0

When New South Wales was planning her elevator system, harvesters ("combines")

[1] N.S.W. Dept. Agr., *Report, 1929*, p. 14.

[2] Information direct from the Department of Agriculture, supplementing their annual reports.

[3] N.S.W. Dept. Agr., *Report, 1932*, p. 16.

[4] *Ibid., 1935*, p. 29.

[5] *Ibid., 1938*, p. 35; *1939*, p. 31.

[6] On feed use of wheat in New South Wales, see N.S.W., *Year Book, 1904–5*, p. 300, and *1920*, p. 388. Large quantities were fed to sheep in the unusually severe drought of 1919–20.

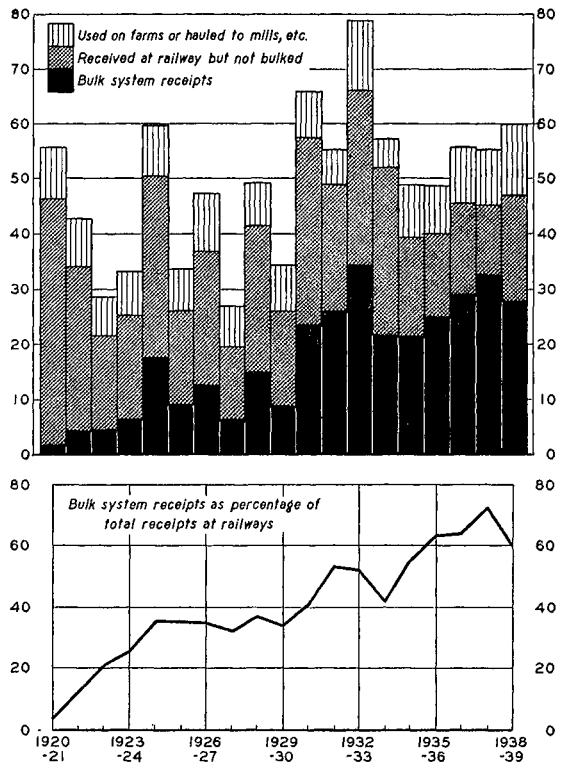
[7] Except in South Australia (p. 354), most of the Australian wheat-producing areas are not near enough to the coast to make the trip by wagon economical, and the distances are such that motor-truck haulage to the ports has not developed far. In Argentina, such truck movement has been attaining sizable proportions.

[8] *The Land*, Feb. 2, 1940, p. 3.

were already in use in the state—particularly on big farms, used in dry weather—but the reaper and binder was still in use to an extent which led officials to expect wheat de-

CHART 4.—RELATIONS BETWEEN WHEAT CROPS, RECEIPTS AT RAILWAYS, AND BULK SYSTEM RECEIPTS, NEW SOUTH WALES, ANNUALLY FROM 1920–21*

(*Million bushels*)



* Based on Tables I and IV.

livery to be spread over 4 to 6 months.[1] A technical member of the advisory Grain Elevators Board estimated that of a 60-million-bushel crop, 5 million would be retained on farms for seed, and that deliveries from the farmers would run as follows (in million bushels) after the beginning of harvest: first month, 8; second, 22; third, 15; fourth, 10.[2] Beginning with 1915–16, however, harvesters displaced the reaper and binder over most of the state.[3]

Actually, though several crops have approached or exceeded 60 million bushels, the elevator system has never yet handled as much as 35 million bushels in a single season and this total was closely approached only in 1932–33; and in 1937–38, when the *proportions* handled were at their peak to date, only 59.3 per cent of the crop and only 72.5 per cent of the receipts at rail were handled in bulk (Chart 4). Even so, the much enlarged facilities of recent years have been subjected to severe strain in consequence of factors that have tremendously accelerated the physical movement of the grain from the fields. "The increase in the size of harvesters, the more extensive use of tractors to draw them, the greater number of motor trucks and the increased carrying capacity of many of these, have put the original estimates of the rate of bulk delivery quite out of relation to present experience."[4]

For some years the silo receiving hours were typically from 7:00 A.M. to 6:00 P.M. on Mondays to Fridays, and 7:00 A.M. to 2:00 P.M. on Saturdays; and if these hours were insufficient, arrangements were made to receive wheat on all weekdays from 6:00 A.M. to 6:00 P.M., holidays excepted.[5] Latterly, however, the receiving day has commonly run only from 8:00 to 5:00 o'clock.[6]

Growers have encountered vexatious delays in delivering wheat to the silos, never worse than in the current season. When the grain is coming in rapidly, they must wait their turn at the concentrated silos, whereas the use of numerous sheds and stacking sites permits a large number to unload bags simultaneously.[7] In an effort to expedite unloading, the management has offered farmers appreciable abatements of charges on wheat delivered to the silos in bulk; but as late as 1936 it was officially asserted that "by far the greater number of growers deliver their wheat to the elevators in bags tied or secured at the mouth with one of the many types of commercial or home-made fasteners."[8]

[1] George Valder, N.S.W. Sel. Com., *Min. Ev.*, pp. 16–19.

[2] W. E. Adams, *ibid.*, pp. 24–25.

[3] N.S.W., *Year Book, 1920*, pp. 284–94, 374.

[4] T. H. Bath, in *Primary Producer*, Aug. 4, 1938, p. 10. Though he spoke primarily of Western Australia, the same conditions were in evidence in New South Wales.

[5] *The Land*, Oct. 26, 1934, p. 10.

[6] *Ibid.*, Feb. 9, 1940, p. 4; Mar. 22, 1940, p. 13.

[7] Com. Aus. Roy. Com., *Second Report*, p. 180.

[8] See official circular, *op. cit.* (1936), p. 4.

In some of the early years the New South Wales silos accepted, in addition to f.a.q. wheat, red wheat and mixed red and white wheat.[1] As late as 1930–31, some 81,286 bushels of red wheat were received.[2] Since 1932–33 only white wheat has been accepted.[3] Small amounts of wheat below the f.a.q. standard have sometimes been received for shipment at the owner's risk, but this may be refused.[4] In 1930–31, and in some later years when a second f.a.q. grade has been fixed, some such wheat has been handled.[5] Beginning in 1935–36, the silos have accepted hard white premium wheats for special stacking or binning.[6] This was designed to meet the criticism that the f.a.q. system offers no encouragement to growers to produce wheats of high milling quality, but only limited use has yet been made of it.

No provision is made for cleaning wheat as it enters the silos.[7] The cost of turning wheat stored in the silos, which is ordinarily done every two months—according to many critics, more frequently than necessary—is borne by the silo management and not charged to warrant holders. The first dust explosions in the history of the system occurred in September 1935, at Tichborne near Parkes and at Warral near Tamworth. Under the Wheat Act, 1927 (S. 15)—which the Sydney Chamber of Commerce had vainly sought to get altered in this respect—the Silo Board was not liable for the damage and the grain losses were spread pro rata over all warrant holders.[8]

The country elevators have thus far handled only wheat. The Sydney terminal, however, has in some years received small quantities of rice and maize,[9] shipped from non-wheat sections. Among the factors limiting the turnover possibilities of the system is the fact that other small grains, to the extent that they are grown in the wheat districts, are not extensively shipped or exported, and that rice and maize are grown in quite different districts.

For wheat delivered to the receiving elevator (country or terminal), the grower receives a negotiable warrant, transferable by endorsement, stating the quantity and quality (typically merely f.a.q.) and the place of delivery. This warrant in some respects corresponds to the storage receipt obtained from the merchant or miller who stores sacked wheat under a contract permitting the price to be fixed at the option of the grower; but in the latter case, the wheat is practically under the control of the merchant or miller (to their satisfaction) rather than available for sale to anyone. In either case, the title remains in the grower until he chooses to sell. Ordinarily shipment of bulk wheat is made on order of the warrant holder, typically one who has bought it; but the warrant holder is entitled to corresponding amounts of f.a.q. wheat or that of other specific quality, rather than specific lots, since ordinarily these are not separately binned. The silo management prepays the railway freight,[10] and collects this and its own charges from the ultimate warrant holder on delivery.

When bulk-handling plans were being made in 1916, the railway department proposed to build 30-ton bulk trucks of box-car type in place of the trucks of 6 or 7 tons capacity then in use for hauling bagged wheat, and it was estimated that 1,000 of these would be needed.[11] Actually, in the early years, the Railway Commissioners merely converted

[1] N.S.W., *Year Book, 1923*, p. 487, referring to 1923–24.

[2] N.S.W. Dept. Agr., *Report, 1931*, p. 15.

[3] N.S.W., *Year Book, 1932–33*, p. 71.

[4] *The Land*, Aug. 17, 1934, p. 17.

[5] N.S.W. Dept. Agr., *Reports, passim*. The largest volume, in 1930–31, was 1,057,255 bushels.

[6] *The Land*, Oct. 25, 1935, p. 5; Nov. 1, 1935, p. 4. In *ibid.*, Nov. 8, 1935, p. 4, the Minister of Agriculture was reported to have decided to allow stacking sites and grain-shed space at silo stations to be used only for hard wheat carrying a premium of 2*d.* or more per bushel, users to deposit a £250 bond to insure compliance with this condition. The amounts subsequently reported as handled through the silos are as follows: 1935–36—951,017; 1936–37—115,524; 1938–39—48,165.

[7] The Agricultural Bureau in July 1937 voted to ask the government to consider the advisability of providing for this. *The Land*, July 16, 1937, p. 6.

[8] *Ibid.*, Sept. 13, 27, 1935.

[9] In the two years ending June 30, 1929 it received 36,789 bushels of maize and 225,848 bushels of rice. N.S.W. Dept. Agr., *Report, 1928*, p. 9; *1929*, p. 14; *1938*, p. 10. No oats are handled in bulk.

[10] Since 1931–32 this has been the rule for *bulk* wheat shipped from non-silo stations. N.S.W. Dept. Agr., *Report, 1932*, p. 16.

[11] George Valder, N.S.W. Sel. Com., *Min. Ev.*, p. 16; James Fraser, *ibid.*, p. 20.

some 956 15-ton wooden "S trucks" to carry bulk grain, now called "Ws," with a wheat capacity of 14 tons each. After a few seasons, these were supplemented and in part replaced by specially built 20-ton steel "U trucks" with hoppered bottoms. Of these 1,170 were completed by 1928,[1] and by 1935 there were 2,500.[2] Distances to terminals are so short—averaging 282 miles[3] in 1932–33—that each truck can make many trips. In the peak weeks of seasons of big crops, such as 1924–25 and 1933–34, limitation of rolling stock has at times been responsible for congestion at country silos.[4] Experience of this sort in 1933–34 led to the expenditure of £20,000 (borne by the Department of Agriculture) to convert additional trucks, but this proved sheer waste because the wheat was so slow to move in 1934–35.[5] For the next season the aggregate capacity of the bulk-grain trucks, apparently exclusive of the converted ones, was 1,600,000 bushels.[6]

At the country station, a small part of the grain (especially before the rush movement has started) is loaded directly on to railway trucks, for sack or bulk shipment to mills or terminals. More is stored in the sack in grain sheds or on stacking sites provided by the railway or leased by grain merchants, other firms, or even farmers themselves, pending shipment to mills or terminals for export.[7]

[1] N.S.W., *Year Book, 1923*, p. 488 (this issue, with a preface dated July 1924, said: ". . . . a number of these are under construction."); *ibid., 1927–28*, p. 585.

[2] Testimony of railway officials in W.A. Roy. Com., *Report*, p. 420. The current cost was then put at £500 each.

[3] Com. Aus. Roy. Com., *Second Report*, p. 137. Corresponding figures for other states were: Victoria, 187; South Australia, 81; Western Australia, 151.

[4] *Corn Trade News*, Apr. 7, 1926, citing *Daily Telegraph* (Sydney), Jan. 22, 1926; and *The Land*, Aug. 7, 1934, p. 17; Jan. 25, 1935, p. 7; Feb. 22, 1935, p. 7; Nov. 1, 1935, p. 4.

[5] Minister of Agriculture (Main), *ibid.*, Aug. 16, 1935, p. 9; W.A. Roy. Com., *Report*, p. 420.

[6] *The Land*, Nov. 15, 1935, p. 5.

[7] For such storage only a nominal charge is made; but if the grower chooses to haul it back to feed stock —as happened, for example, in 1937–38 (N.S.W. Dept. Agr., *Report, 1938*, p. 35) a "freight charge" is made based on the rate for the 1–10 mile zone. This practice aroused complaints. *The Land*, Sept. 10, 1937, p. 17.

[8] *Ibid.*, Nov. 15, 1935, p. 5.

[9] *Ibid.*, Oct. 26, 1934, p. 10. [10] *Ibid.*, Feb. 22, 1935, p. 7.

[11] *Ibid.*, Aug. 17, 1934, p. 16. [12] *Ibid.*, Oct. 18, 1935, p. 5.

Where bulk-handling facilities are available, most of the wheat is typically received into the silo from sacks that are temporarily fastened in a variety of ways rather than firmly sewn. Sacks thus emptied at the silo are returned to the grower for use in the same or subsequent seasons, or bundled and consigned to someone at his order. Bulk shipment from non-silo stations is usually encouraged early in the season, before all the available railway trucks are required to move wheat from the silos, but railways withdraw the priority privilege after an announced date (such as November 30) depending on conditions.[8]

For many years the state railways, in addition to leasing stacking sites, had built and maintained grain sheds for storing sacked wheat at country points; but this practice was abandoned with the installation of the silo system. In October 1934, when organized growers were urging fresh action of this sort, to cope with congestion, the official reply was that it would cost too much to build sheds where silos were available, particularly in view of prospective further reductions in bag handling with increased silo capacity.[9]

The allotting of these facilities for country-station storage, typically to grain merchants and farmers, had come in for repeated complaint. The FSA urged that growers be given preference over buyers.[10] In some instances, damp grain had been refused at the silo and the grower had been unable to get storage space in sheds because he had not previously applied for it.[11] In 1934–35 considerable quantities of wheat were handled in bags supplied free or on a rental basis, the private receiving agent agreeing to make a deduction for the weight of the bag and ultimately to buy the grain at "silo terms." This practice disturbed the silo authorities, who saw in it a device for evading the use of the silos, and argued to the growers that it was against their interests. In 1935–36 shipping agents again offered sacks on a rental basis, deducting 2¼ pounds per sack on delivery.[12] Then, after years of sorry experience with competition of the old and new systems at country points, the government took steps to compel farmers to use the elevator system.

In October 1935 the Department of Agriculture announced that it had leased from the Railway Department all the grain sheds and stacking sites in railway yards throughout the state for the ensuing year; that those at non-silo sidings would be allotted by inspectors from the Department and the Railways as in the past, on application; and that those at silo stations would not be allotted, but would be emptied, cleaned, fumigated, and reconditioned so as to be in a position for use by November 22 if need arose.[1] This was obviously designed not merely to end so-called abuses that had been rife in the preceding season, but to force more effective use of the silo capacity even at the expense of the bagged-wheat trade.[2] Actually the use at silo stations was restricted to wheat not receivable by the elevators, or for hard wheat commanding a premium of at least 2*d.* per bushel. The management concluded that "this action resulted in far greater deliveries to the elevators, and combated unfair competition. In addition, the f.a.q. standard was undoubtedly improved."[3] The policy has since been adhered to.

Financial Experience

At the outset, when the New South Wales system was authorized, there was no practical alternative to state construction of the bulk-handling facilities. Indeed, only the financial aid of the Commonwealth Government enabled the state to embark upon it as soon as it did, during the war, on a less comprehensive scale than was first planned. Even under normal conditions of peace, however, private construction would not have been attempted, so limited was the supply of private capital and so serious the doubts of financial success in circles whose judgment weighed heavily. This skepticism was long justified by events.

The intention of the government was to make the system self-supporting, and the authorities were confident that it would be. On these points there was considerable testimony before the Select Committee in 1916.[4] Brunton, the miller, thought that if properly handled the system should certainly pay its way. The supervising engineer who drew the plans (E. F. Carter) estimated that charges of $\frac{7}{8}d.$ in the country and $\frac{7}{8}d.$ at the terminal,[5] including stowage on board ship, would make the system entirely self-supporting, including interest at 5 per cent, sinking fund at 2.1 per cent, and depreciation at 2 per cent.[6] But such expectations were doomed to disappointment.

If the government accounts, unlike those in most other countries, are so kept as to yield a satisfactory picture of the financial developments, the published reports fail to reveal it. At various points unessential details are readily available while important facts significant for a financial and economic analysis are lacking. The following discussion is necessarily based on the available published data which, as in corresponding instances in other countries, leave much to be desired. The true capital investment, the handling of depreciation and replacements, and the extent to which the system is charged its proper costs, are among the uncertainties; and even the extent of the support early received from the Commonwealth government is not made clear, though exhaustive research might show it.

Capital costs were much heavier than first anticipated. New South Wales was pioneering, and inevitable mistakes were costly. Enlargement of the capacity of the Sydney terminal and various country elevators, in deference to demands for storage space, needlessly burdened the system for ordinary conditions. In certain respects, hurried construction for

[1] *The Land*, Oct. 25, 1935, p. 5; Oct. 23, 1936, p. 6; Nov. 13, 1936, p. 7.

[2] Cf. *ibid.*, Nov. 1, 1935, p. 4.

[3] N.S.W. Dept. Agr., *Report, 1936*, p. 32.

[4] N.S.W. Sel. Com., *Min. Ev.*, pp. 15–21, 30–31, 35, 43.

[5] The Under Secretary of Agriculture more accurately forecast the scale of charges in estimating the handling cost at 2–3*d.* per bushel. The FSA representative thought the cost would be about 4*d.* per bushel. See Table 1, p. 327.

[6] The Deputy Chief Commissioner for Railways (James Fraser) made an allowance of 8 per cent for interest and depreciation, and considered that 2½ per cent was adequate for depreciation in view of the ferro-concrete construction in contemplation. Actually, because of the conditions under which the early work was done, some reconstruction was later necessary, and obsolescence figured as well as depreciation proper. See the Department of Agriculture circular published in 1936, on *Handling and Storing Wheat in Bulk: The New South Wales System.*

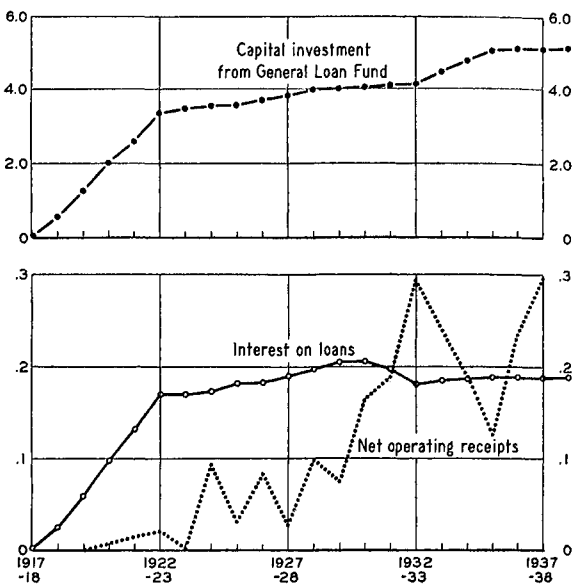
storage use necessitated improvements as time permitted. At best, the ferro-concrete type of construction was inherently expensive under Australian conditions of the time. In the late war and immediate postwar period, materials were especially dear and wages high. Altogether, the plant that was completed by the end of 1924 averaged more than 3*s*. 6*d*. per bushel of total capacity, and may have cost twice as much as a well-balanced plant of equal operating effectiveness would have cost at levels of prices and wages in the period subsequent to 1921.[1]

Later additions cost less, but were by no means cheap. This was true of the building programs adopted in 1925 and 1934. The 25 additional silos authorized in June 1934 were estimated to cost £300,000,[2] or under 3*s*. per bushel of capacity. Up to June 30, 1939, the drafts on the General Loan Fund averaged 3*s*. 3.5*d*. per bushel of total capacity. In March 1935 the Minister of Agriculture (Main) argued that when the current construction program was completed, the silo management should be able to meet its costs and pay the Treasury 4 per cent interest, with handling charges as low as in other countries.[3]

The growth of capital investment and some of the financial results are summarized in Chart 5. By June 30, 1939, £5,183,673 had been drawn from the General Loan Fund for capital expenditure, plus £30,836 from the Unemployment Relief Fund. Interest charges reached a peak of £206,687 in 1930–31. Rate reductions in subsequent years lowered these charges, which in 1938–39 were only £189,436 on an investment over 25 per cent larger. In the first twelve operating seasons, even including 1924–25, the net revenues of the system annually failed to cover current interest charges. Since apparently no account was taken of depreciation, the government was continually subsidizing the system.

CHART 5.—FINANCIAL ASPECTS OF BULK HANDLING, NEW SOUTH WALES, 1917–18 TO 1937–38*

(Million Australian pounds)



* Data in Table V.

For more than a decade after operations began, the New South Wales experience with the system was therefore viewed as financially disappointing, and in some quarters was flatly called "a disastrous failure" although the operating feasibility had been admittedly demonstrated. As late as 1931 and 1932, hostile critics and even impartial observers stressed the limited use of the facilities by farmers, and the burden on the taxpayers resulting from the fact that the revenues failed to cover operating expenses and interest charges, to say nothing of depreciation.[4] With a capital cost averaging about 3*s*. 6*d*. per bushel of aggregate capacity, a scale of charges adequate to make the system self-supporting could be shown to be prohibitive. Professor Wadham of the University of Melbourne wrote in 1931:

It is extremely doubtful if the general adoption of such a scheme [in Australia] would be a success in view of the initial cost of the silos, the wide fluctuations in the crop of many districts and the economic way in which the bagged grain can be handled by the farmer and the transporting au-

[1] G. W. Walker, the Sydney grain merchant who had been one of the earliest advocates of a bulk-handling system, told the Western Australia Royal Commission in 1935 that £2,000,000 had been wasted on the New South Wales system. See the Commission *Report*, pp. 424–25. This view, right or wrong, is frequently stated.

[2] *The Land*, June 22, 1934, p. 5.

[3] *Ibid.*, Mar. 8, 1935, p. 6.

[4] See the pamphlet, *Bulk Handling of Wheat*, reprinting articles by Gerald Robinson that had appeared in *The Argus* (Melbourne), Feb. 22–26, 1932, and by Professors S. M. Wadham and G. L. Wood, in *ibid.*, Apr. 6–9, 1932.

thorities under the existing scheme in the circumstances of the Australian climate.[1]

It is doubtless correct to attribute the rather unsatisfactory financial results, in the early years, partly to the fact that the construction of the Sydney terminal and the earlier country silos was undertaken when prices were inflated and costs very high. It is conceivable that, at cost levels and interest rates prevailing in the depths of the depression of the 1930's, and with the experience gained in New South Wales, a comparable system could have been provided at half the capital cost and perhaps at less than half the current burden for fixed charges. Such arguments unquestionably influenced Victoria's acceptance of a similar scheme in 1932–34. Yet it is fair to say that the New South Wales system was much more of an experiment than its successful advocates realized in 1913 to 1917, and that in the absence of the postwar price collapse it would probably not have promptly proved self-supporting in the full sense of the word, as its advocates so confidently expected.

The financial results of the past decade, however, have been much more satisfactory (Chart 5), though official accounting is insufficiently clear to reveal the precise status. With lowered costs of added construction, reduced interest charges, larger volumes handled, and probably greater economy in operation, net operating receipts came near to meeting interest charges in the two seasons beginning with 1930–31 and have since exceeded these charges every year except in 1935–36, when handling charges were excessively lowered (p. 326). If we may trust the official reports, the system is no longer a current burden on the state finances, and is more than paying its way.

Problems and Attitudes

One of the more urgent problems in administering the elevator system has been to keep it functioning in the flow of wheat rather than be clogged with grain. In the earlier years of limited use of the system, no particular difficulties were encountered if a considerable proportion of the receipts stayed in the elevators for several months, but since 1930 the story has been different.[2] The grain may flow freely to the mills and ports, and into export; but this is by no means the rule. Occasionally, as in 1924–25, an exceptionally large crop and rapid export selling have put so heavy a strain on the railway facilities as to cause congestion and delay.[3] More frequently retarded sale, through holding by farmers or others, is responsible. Serious congestion thus occurred in 1933–34,[4] when the crop was smaller than in any of the three years preceding, because farmers sold very reluctantly at the low prices then obtainable.

In later years, despite the expansion of the elevator capacity, delivery of wheat has repeatedly had to be refused because the silos were full. In 1934–35, as the Minister of Agriculture (Main) told the Farmers and Settlers' Association conference,[5] only two-thirds of the wheat delivered to silo stations could be accepted. He complained that, though the system was intended for bulk handling of all wheat that growers wished to bring to it, it was being used for storage by all the wheat interests of the Commonwealth (see p. 335). The extent of such holding in these two extreme years is indicated by the following figures, in thousand bushels:[6]

Season	Receipts at country silos	On hand June 30	On hand Aug. 1
1933–34	21,230	18,262	14,750
1934–35	21,509	16,288	12,500

The Minister advised growers who wished to hold wheat for a long time to build their own silos—which few have done. The new scale of charges, and particularly the shortening of

[1] S. M. Wadham, "The Wheat Industry," *The Annals of the American Academy of Political and Social Science* (Philadelphia), November 1931, CLVIII, 57.

[2] Data on stocks in country and terminal elevators on June 30 are shown in Table IV. Of 8,887,000 bushels received into the elevators in 1929–30, 7,073,000 remained on June 30, 1930 in addition to 98,000 bushels of older-crop wheat.

[3] *Corn Trade News*, Apr. 7, 1926, citing *Daily Telegraph* (Sydney), Jan. 22, 1926.

[4] Com. Aus. Roy. Com., *Second Report*, p. 180. The Australian carryover on Dec. 1, 1934 was 40 million bushels, over 20 per cent of the preceding crop plus carryover; see Table III.

[5] *The Land*, Aug. 16, 1935, p. 9.

[6] First two columns from Table IV, third column from *The Land*, Aug. 16, 1935, p. 9. In 1935–36 and 1936–37 the wheat moved much more freely, in part because of different price conditions.

the free-storage period, under the new regulations put in force October 1, 1935, were designed to meet this difficulty and have largely done so. Though the farmers' organization protested the new regulations, they were only slightly modified after a year's experience (see Table 1, p. 327). The Minister argued that to increase the silo capacity to equal that of a normal crop would cost an additional £3 or £4 million, and that if this were done farmers would have to pay for it.

Congestion has been serious in the past three seasons; in each, the harvest flow of wheat was rapid, the crop materially exceeded early expectations, and exports were seriously retarded. "By the middle of December [1938] the terminal elevators were full and most of the country silos were unable to receive any further wheat."[1] It was stated early in January 1939: "Silos are full and millions of bushels will have to be marketed this year in bags."[2] About the end of January the Minister of Agriculture (Reid) announced that the silos would not be reopened this season, "and that growers should make their own arrangements to dispose of any wheat still remaining," since any space released by shipments would be required for properly turning wheat in store. At the same time the Minister lifted restrictions on grain sheds and stacking sites on all railway lines except those south of Junee.[3] Early in March, it was announced that following an alteration in the Sydney terminal position, wheat still on farms might be railed direct to it, in bags or in bulk, for receipt up to March 31.[4] The state record of receipts at any one station was 583,418 bushels at Temora in the Riverina, in 1938–39, where the silos now hold 550,000 bushels.[5]

The problem of congestion has several aspects. It may arise (1) because too much old wheat remained in the elevators when the new harvest moved; or (2) because the grain flowed to the shipping point faster than it could be moved out, because of either (*a*) rapid movement from the farms, (*b*) insufficient rolling stock or oversea shipping, or (*c*) retarded marketing for disposition.

Some instances have been reported of wheat held in the country silos for as long as three years. The Minister of Agriculture has authority under the Wheat Act, 1927, to clear the silos after October 15 on 21 days' notice to the original warrant holders. Such notice has been frequently given in recent years, beginning in 1930–31, sometimes accompanied by a remission of 8 weeks' storage charges (p. 327). Thus early in August 1934 notice was given that any wheat remaining in the silos after October 15 (later extended to November 5 to prevent forced selling) would be sold by the management for what it would bring, in order to clear the way for the new harvest movement.[6] The bulk of the exceptionally large quantity then in the silos was said to be owned by speculators not farmers (p. 335). The authorities have been reluctant, however, to exercise the power of sale. In 1938–39, for example, a second notice was given on December 28 effective January 15, 1939, after failure of warrant holders to clear the silos had added materially to the congestion and when about 1 million bushels of old wheat remained in the Sydney terminal. The balance of 125,000 bushels remaining at the end of January was sold by the Wheat Commissioner at prices averaging about 2*s.* 4*d.* per bushel.[7]

To a foreign observer it would appear that this cause of congestion could be eliminated, except in time of war, by enforcement of appropriate regulations—perhaps including higher and/or more flexible storage charges[8] that might finance additional storage space. Yet the persistence of congestion reflects the caution with which government officials find

[1] *The Land*, Jan. 6, 1939, pp. 3. 4.

[2] *Ibid.*, Feb. 3, 1939, p. 3.

[3] *Ibid.*, Feb. 3, 1939, p. 3. At the FSA executive meeting in early February, speakers were emphatic against letting the stacking sites again come under the control of merchants and shippers. *Ibid.*, Feb. 10, 1939, p. 3. See also Peter Snodgrass, *ibid.*, Mar. 10, 1939, p. 10, urging silo authorization to receive bagged as well as bulk.

[4] *Ibid.*, Mar. 10, 1939, p. 4.

[5] *Ibid.*, Jan. 13, 1939, p. 2.

[6] *The Land*, Aug. 3, 1934, p. 1; Aug. 31, 1934, p. 5. The grain trade blamed the earlier order for precipitating a panic causing a sharp fall in wheat prices, though the drop preceded the announcement.

[7] *Ibid.*, Jan. 6, 1939, p. 3; Mar. 31, 1939, p. 4.

[8] Futures trading results in making effective storage "charges" flexible, determined by market factors.

it expedient to proceed, and the presence of intangible obstacles of various kinds.

Wider resort to bulk handling from the harvester itself, and to the use of motor trucks, has materially speeded the physical movement from field to railway in recent years, in Australia as elsewhere. This tendency has not yet reached its limit. It has intensified, and may further intensify, the need for speeding up the disposal of the carryover and early-moving new wheat.

Insufficient rolling stock, and possibly other shortcomings of the state railways, have been significant features only in occasional years, such as 1924–25 and perhaps 1932–33. On the whole, complaints of railway inadequacy have been far less than before the World War, and satisfaction with the rapidity of railway handling of the crop is fairly general. A bumper harvest may in any year overstrain the available railway facilities, but this is likely to be only a minor factor in such congestion as will recur.

Occasionally a shipping shortage may cause delays, either because of a serious strike or because an Australian crop turned out far above expectations in the weeks preceding harvest. These, however, are exceptional under peace conditions.

Retarded marketing, however, has frequently been a factor and bids fair to continue important indefinitely. Even in times of peace, when limited export markets and shipping shortage do not interfere, the disposal of the wheat depends on price. This involves agreement between sellers and buyers. If the sellers are not satisfied with the buyers' offers, the wheat does not move. The farmer may hold his warrant, or he may sell it and its buyer let the wheat stay where it is. In fact, the "viscosity" of the wheat movement typically reflects market conditions in which Australians are relatively bullish on their wheat or less bearish than oversea buyers of their wheat or flour.

There is no grain futures market in Australia. In its absence resort is had to other devices for hedging and speculation in grain. To some extent exporters hedge in Liverpool, or even in Winnipeg and Chicago; but such operations involve considerable risks because of imperfect parallelism between Australian cash prices and foreign futures prices. Merchants generally try to keep their sales and purchases well in balance. In general, Australian growers prefer to carry the risks of price change themselves. Even in Western Australia, where wheat pooling has been most successful and best patronized, it has not had consistent, general support from growers.

In the absence of bulk-handling facilities they have tended to deliver their grain rather promptly to one shipper or another, on a contract reserving the right to determine when to sell it. Since the merchants make an advance, growers may and do extensively speculate on margin by holding title to their grain for several weeks or months; but the contract is such that ordinarily the grower finds it cheapest to sell to the merchant to whom he had delivered the wheat. Where bulk facilities are in use, the grower may hold all or part of his negotiable warrants until he chooses to sell them, and then sell to anyone he freely chooses.

In New South Wales at least, the bulk warrants have provided a convenient medium for speculation and hedging. Freely transferable, one may change hands several times before the firm that wants the wheat for domestic sale, milling, or export buys it and calls for delivery of the grain.[1] Dealt in on margins of about 6*d*. a bushel, warrants are bought extensively by speculators, and also by millers, outside New South Wales as well as in that state, for hedging forward sales of flour.[2] Such use was facilitated by the practice, obtaining through 1935, of permitting free storage in elevators through July (p. 326). Demand for such warrants for hedging by millers in other states was at least partly responsible for the slow movement out of the silos in the years 1931–35, which held a high proportion of the total receipts in the elevators till July or

[1] In 1934–35, indeed, endorsements became so numerous that the space allotted for them was exhausted. A. K. Trethowan in W.A. Roy. Com., *Report*, p. 422.

[2] It is important to realize that, broadly speaking, Australian mills produce nearly as much flour for export as for domestic use (Table III); they seek to keep their plants operating steadily on three shifts per day; and they often make flour sales well in advance to insure continuous operations.

August (Table IV); and New South Wales millers were handicapped by the higher prices to which such demand drove both bagged and silo wheat accessible to them.[1]

Agitation against this unexpected use or "abuse" of the system was a factor in leading to the change in storage regulations, and since this change the proportion of stocks held through June has been considerably lower. As the bulk system has expanded in Western Australia and as it expands in Victoria, the concentration of such speculative and hedging support is in process of disappearing. With a larger volume of "silo warrants" available, however, the volume of speculation in them will presumably increase.[2]

When the Victorian Grain Elevators Board visited New South Wales early in 1935 to inspect the system there, it gained a very favorable impression. The chairman reported that growers, shippers, and millers all spoke highly of it. Especially impressive was the speed with which wheat trucks, especially of the hopper type, were able to discharge—one every 15 seconds or 850 in a 12-hour day.[3] The Western Australia Royal Commission also received generally favorable testimony during its investigating visit to New South Wales later in 1935.

In spite of their numerous and varied complaints, New South Wales farmers appear generally satisfied of the net advantages of the bulk-handling system. Indeed, if growers could be sure of being able to deliver all their wheat in bulk, the quantities and proportions moved in bags would be smaller than they are. Growers feel less under the domination of the merchants than formerly, and welcome increased competition presented by dealers, millers, and speculators as warrant buyers. Yet they have seemed to find the economies of the system in operation looming smaller, and the irritations larger, than was generally expected when the installation was projected.

Particularly since lower ocean freights have been available for bulk wheat, the grain dealers' prejudice against bulk handling has largely disappeared. They have adapted their operations to the new system, and for some years have operated "with bulk wheat as cordially as with bags."[4] One well put it thus:

> Generally the merchants have no preference either way as between bag and bulk handling, except that they would rather handle bag wheat as they like to have control of a certain amount of bagged wheat. With bagged wheat they have control over quality, whereas with silo wheat they have to take what is given to them.[5]

The millers have mixed feelings regarding the bulk system.[6] They see clearly its manifold advantages to various parties and seldom openly argue against it. The FSA secretary overstated the truth when he asserted, in 1935: " . . . . the millers are opposed to the system. Certain millers will go to the silos, and others will not."[7] A leading grain dealer testified that some millers preferred bulk, others bagged wheat.[8] As speculation developed in "silo warrants," at least the larger mills found these useful as a hedging medium. Yet most millers encounter certain disadvantages, under the prevailing f.a.q. system, in having to accept whatever variety and quality of wheat they happen to get on the bulk warrants purchased. To make satisfactory flour out of all-Australian wheat, for domestic purposes and some export markets, presents problems of selection different from and more exacting than those faced by the British miller who blends Australian wheat with others.[9] The Australian millers' oppor-

[1] Testimony of New South Wales millers and others in W.A. Roy. Com., *Report*, pp. 421, 424, 426, 428, and *The Land*, Aug. 16, 1935, p. 9.

[2] The warrants issued by the Australian Wheat Board for 1939 wheat delivered to it, on which a considerable advance was made, were initially made nontransferable for six months; but there is much controversy over the question whether they should be declared negotiable, as were corresponding warrants under compulsory pooling in the previous World War.

[3] *The Land*, Mar. 22, 1935, p. 7.

[4] G. W. Walker, in W.A. Roy. Com., *Report*, p. 425.

[5] Sydney manager for Bunge, in *ibid.*, p. 421.

[6] These are well summarized by millers in W.A. Roy. Com., *Report*, pp. 423–24.

[7] W. C. Cambridge, General Secretary of the FSA in *ibid.*, p. 426.

[8] Manager for Bunge, in *ibid.*, p. 421.

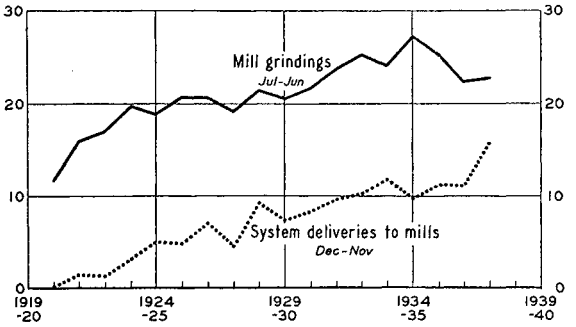
[9] Pusa 4, perhaps the best "Hard White" wheat, is especially sought by Australian millers, and it often commands a premium up to 6*d.* a bushel; several other varieties are nearly as good. Some argue, we think erroneously, that it is disadvantageous to the state to have such varieties kept out of the f.a.q. standard. *Ibid.*, p. 426. Very little such wheat is separately handled through country elevators, as we have seen.

tunity to buy warrants on the elevators of a selected district by no means assures them of a selection such as they can make of wheat in bags. Moreover, they are glad to buy bagged wheat because they have uses for the cornsacks, especially for millfeed and some export flour; and usually they are able to get the bags cheaper thus, even by paying a premium for bagged wheat, than even if they buy used bags in the market. A common practice, especially in seasons when cornsacks are in short supply or high priced, has been for millers to offer growers "free bags" on terms that look better than farmer spokesmen declare they really are.[1]

To judge from the data in Chart 6, it appears that New South Wales millers have continued to draw, in almost every season, less than half of their grist from the country or terminal elevators. Not until 1937–38 did they get less than half of it in bags. Moreover, in only two seasons, 1928–29 and 1933–34, has the proportion of their requirements taken by millers from the state elevators appreciably exceeded the proportion of the railed crop taken into the bulk system; generally the latter percentage has been considerably higher (Table VI). These broad facts stand out even though the figures compared are not precisely comparable.

CHART 6.—MILL GRINDINGS AND BULK SYSTEM DELIVERIES TO MILLS, NEW SOUTH WALES, 1920–21 TO 1937–38*

(*Million bushels*)



* Data in Table VI. System deliveries to mills apparently cover the marketing year, Dec.–Nov.; hence the two curves are not precisely comparable.

V. WESTRALIAN EXPERIENCE

In Western Australia, on the other side of the continent, bulk handling was given its initial tests a decade later than in New South Wales, and on quite different lines. It was essentially a co-operative undertaking, starting with country plants. These were, and still are, of relatively cheap construction, quite unlike the solid, orthodox silos in the eastern state. The state has thus far built one small port elevator, and the system is still handicapped by lack of adequate, modern terminal facilities. Despite a variety of obstacles—including political obstruction, attacks from a rival co-operative group, and labor difficulties—the rough-and-ready system quickly won and subsequently maintained the support of the wheat growers. Since 1935, when the Royal Commission on the Bulk Handling of Wheat endorsed its expansion, it has attained an operating significance fully comparable with the state system in New South Wales. The two systems afford instructive contrasts.

PRELIMINARY MOVES

As we have seen, wheat growing in Australia developed latest in the westernmost state. There, after only a few years of surplus production, the new movement in favor of bulk handling won fairly general support shortly before the World War. Despite the grain trade's opposition, even the Perth Chamber of Commerce pressed for action in 1913, 1914, and later. An agreement with the Metcalf Company was seriously considered in 1916 and again in 1918, but failed of adoption. Westralian Farmers, Ltd.,[2] the young central organization of farmers' co-operatives in the state, took as one of its objectives the introduction of grain elevators; but no effective progress in this direction was made during the war.

[1] A. K. Trethowan, in *ibid.*, p. 422.

[2] Registered June 27, 1914 under the Companies Act, 1893. On this organization, see Co-operative Federation of Western Australia, *A Coming of Age* (Perth, 1935); W.A. Roy. Com., *Report*, pp. vi, 383; *The Land*, July 17, 1936, p. 9; *Primary Producer*, Mar. 9, 1939, p. 8; and its brief annual reports. In 1939 it comprised 39 trading units and 22 agency co-operatives.

After the war, efforts were renewed. This time the initiative was taken by Westralian Farmers, Ltd., then dominating wheat handling in the state,[1] and also by the farmers' organization with which the co-operative was closely linked—the Primary Producers' Association of Western Australia (Inc.). Two of the planks in the PPA platform have been: "the gradual improvement in the handling and haulage of grain with a view to the adoption of bulk handling when economically possible," and "the fostering of a spirit of self-help."[2] In pursuance of these objectives the PPA supported proposals to float a farmer-owned W.A. Grain Growers' Co-operative Elevators, Ltd., to be financed by dividends from the wartime wheat pool—which, by state action, continued on a compulsory basis in 1921–22, a year longer than in the other three wheat states.

We infer that it was with the same object in view that Westralian Farmers, Ltd., reached an agreement with the Commonwealth Government, soon ratified by special act of the federal Parliament, whereby the Commonwealth undertook to lend the co-operative company £550,000 for erecting silos and elevators for bulk handling; but in 1921–22 the Westralian Farmers Agreement Act was amended and the authorized loan reduced to £440,000, in view of the contraction of the scope of the original scheme.[8]

The provisional directors of Grain Elevators, Ltd., engaged the British firm of Henry Simon, Ltd., which sent out their expert Mr. Kininmonth "to investigate the problem in all its bearings." In 1921, and again in a later year, his work yielded disappointing conclusions. Facing the facts that the turnover in orthodox bulk elevators would be low, that ocean freight rates were higher on bulk wheat, and that bulk wheat could be sold abroad only at considerable discount under bagged, he reported that he could not devise a concrete, steel, or timber system to compete with bag handling under the conditions encountered.[4] During the rest of the 1920's, as wheat production and exports expanded in Western Australia, further inquiries and New South Wales experience seemed to confirm these conclusions.

Westralian Farmers grew in power and experience. Closely tied in with it was The Wheat Pool of Western Australia, a voluntary pool that in 1922–23 had succeeded the compulsory one.[5] These two co-operative organizations led their private competitors, outdistanced (in wheat, at least) corresponding farmer co-operatives in the other Australian states, and won high standing oversea. John Thomson, who was manager of both organizations, had shared in the investigations of 1921 and later, and kept in touch with Henry Simon, Ltd., on fresh developments.[6]

In 1930, when depression had set in (earlier in Australia than elsewhere), the Westralian Farmers directors instructed Mr. Thomson to search for new ways of aiding wheat growers. On the basis of recent progress in mechanical handling of coal, ore, gravel, etc., an experimental plant for handling bulk wheat was tried out at Rocky Bay in 1931.[7] Pleased with its success and economy, Westralian Farmers submitted to the government, in July 1931, proposals for a state-wide scheme. Pending action upon this, the co-operation of the pool was secured in installing varied types of unorthodox test facilities at five stations in the Wyalkatchem area.[8] These early receiving

[1] One of its earliest activities was to act as one of the "acquiring agents" for the compulsory pool in 1915–16, in competition with the regular grain merchants. It succeeded so well that in 1917 it was made the sole acquiring agent. It held this monopoly through the next four seasons of compulsory pooling.

[2] J. S. Teasdale, in W.A. Roy. Com., *Report*, p. 107.

[3] S. W. B. McGregor, *Report on the Economic and Financial Situation of Australia* (London, 1922), pp. 70–71, 76.

[4] W.A. Roy. Com., *Report*, pp. iv, 18–19, 107, 334.

[5] See *ibid.*, pp. 334–35 and also its own pamphlet, *Pool Questions and Answers* (Perth, 1938).

[6] W.A. Roy. Com., *Report*, pp. 159, 334. Mr. Thomson continued in their service until his appointment as general manager of the Australian Wheat Board in October 1939. *The Land*, Oct. 6, 1939, p. 2.

[7] *Ibid.*, pp. 19–21, 334–35.

[8] These points and the bulk capacity initially provided (in thousand bushels) were as follows:

Siding	Bins	Bulkheads	Total
Trayning	135	42	177
Korrelocking	152	1	153
Yelberri	103	50	153
Nembudding	75	25	100
Benjaberring	60	24	84
Total	525	142	667

plants comprised (1) ordinary wheat sheds strengthened by additional posts, walled with galvanized iron or timber, and provided with wooden or concrete doors; (2) shallow-roofed storage bins built of timber (e.g., discarded railway ties) and corrugated iron; (3) some unroofed "bulkheads" which could be quickly dismantled and moved if in one season demands were heavier at other points; and (4) inexpensive mobile elevators for moving wheat from the reception bin to the shed, direct into railway trucks, and from sheds to trucks, and capable of handling one ton per minute.[1]

After satisfactory trial of these in 1931–32, the government was urged to grant authority for establishing a comprehensive system by the Trustees of the Wheat Pool, which was incorporated by The Wheat Pool Act, 1932. Monopoly powers, and a state guarantee of the loans in contemplation, were sought. A bill embodying this scheme was introduced in October 1932, made the subject of inquiry by a Joint Select Committee of both houses, and recommended for passage with amendments; but it failed to pass,[2] a political overturn having brought the Labor Party into power in March 1933.

By this time, the movement in Western Australia had aroused the interest of the international grain firm of Bunge & Born, Ltd., which had extensive interests in bulk facilities in Argentina and a subsidiary in Australia. They mapped out a competing scheme for constructing, in the Fremantle zone, an orthodox terminal elevator and country plants modeled on the co-operative installations.[3] When, however, the premier firmly announced that no additional sidings would be leased for bulk handling, that he would take no responsibility for the transport of such wheat, and that anyone who installed bulk plants would do so at his own risk, including that of increased freight rates, the Bunge scheme was shelved.[4]

Co-operative Bulk Handling

The co-operative leaders were not so easily discouraged. Westralian Farmers decided to proceed without a monopoly; the pool was eager to promote the enterprise; and a mutually satisfactory basis of joint action was arrived at. Early in 1933, the pool trustees had convened the member-elected Growers' Council, authorized by the recent Wheat Pool Act, laid the proposition before them, and obtained their endorsement with only slight amendments. Shortly after, on April 5, 1933, Co-operative Bulk Handling, Ltd., was registered under the Companies Act, 1893, to construct and operate the system. This was a child of two parents, and each parent chose four directors of the subsidiary company. Since the pool trustees had legislative authority to operate a bulk system, and the Growers' Council to elect the trustees, the Council was called on to elect directors representing the pool on the board of directors of CBH. It chose three of the four trustees of the pool (WF chose the fourth, who was chairman of its board), including the leader of the PPA and J. W. Diver, chairman of the Growers' Council. John Thomson, general manager of WF and manager of the pool, and H. E. Braine, manager of the Wheat Department of WF[5] and secretary of the pool, became joint secretaries of CBH.[6]

CBH thus became a new member of a closely interlocked co-operative family that included a considerable number of separate legal entities. The virtually complete control over it,

[1] The equipment and its use in the first season are fully described in a *Report on the Bulk Handling of Wheat* (mimeographed), submitted June 27, 1932, by J. A. Stevenson of the Prime Minister's Department, Victoria; and in a memorandum dated Aug. 28, 1933 kindly furnished by the South Australian Farmers' Co-operative Union, Ltd., based on an inspection by their chairman and general manager in 1932.

[2] W.A. Roy. Com., *Report*, pp. v, 334–35.

[3] A mechanical engineer in the Public Works Department, visiting Sydney on an investigating trip in the Eastern states early in 1933, was told by a prominent business man and experienced miller (Gillespie): "Look, Shaw, don't let your State be stampeded into any of these fancy concrete bulk handling schemes. It is absolutely unnecessary and unjustified. In Western Australia, of which I know something, you have splendid timbers to do the job." F. E. Shaw, in W.A. Roy. Com., *Report*, pp. 80–82.

[4] Testimony of H. M. Smith, Western Australia manager for Bunge (Australia) Proprietary, Ltd., in *ibid.*, pp. 99–101.

[5] In consequence of a court decision, this department was separately incorporated Oct. 26, 1933 as Westralian Wheat Farmers, Ltd., with almost identical officers and Mr. Thomson as manager. *Ibid.*, pp. vi, 9–10.

[6] *Ibid.*, pp. vi, 335.

by the two parent co-operatives, was made subject to a deed of trust dated October 24, 1933 of which the beneficiaries were the growers using the bulk-handling facilities; and this provides that not later than October 31, 1948 the control should pass to the growers beneficiaries. Partly in response to criticisms from a rival farm organization,[1] the parent companies proposed early in 1935, among various matters to be discussed at four district meetings, that the users of the bulk-handling facilities elect four additional directors, two of them at once.[2] This was soon done.

[1] The Wheatgrowers' Union of Western Australia, representing 5,000–6,000 growers, was "almost unanimously in favour of the handling of wheat in bulk," but favored statutory authority with a board of control on which farmers would have a majority. See testimony of its president, I. G. Boyle, in W.A. Roy. Com., *Report,* pp. 24–36. This organization had earlier set up a pool, which was in liquidation in 1935. *Ibid.,* p. xxv. The Primary Producers' Association, according to testimony of its president, then had 6,511 members, including about 5,000 interested in wheat growing. *Ibid.,* p. 107.

[2] Report of the Directors of Co-operative Bulk Handling, Inc., dated Feb. 20, 1935; and W.A. Roy. Com., *Report,* pp. 26, 195–96.

[3] *Ibid.,* pp. vi–ix, 159–73, and testimony of the chemical engineer, R. C. Sticht. At Wyalkatchem, no bins were installed.

[4] On developments to Apr. 10, 1934, see T. H. Bath, "The Economics of Bulk Handling," a lecture then given in Perth, in Blennerhasset's Institute of Accountancy, Ltd., *Business Lectures for Business Men,* 1934 Session (Sydney, etc., 1934), pp. 33–51.

[5] Stevenson report, *op. cit.,* p. 5. The 80 trucks initially converted at a cost of £940 had a total capacity of 1,390 tons.

[6] Com. Aus. Roy. Com., *Second Report,* p. 181. CBH later complained that, whereas these trucks were to be used solely for carrying bulk grain, some had been used to carry coke on the Geraldton–Wilma line without refund to the company on the freight thus earned. Only two trucks specially designed to carry bulk wheat have yet been built. *Primary Producer,* Nov. 11, 1937, June 29, 1939. Before the Western Australia Royal Commission the Railway Department submitted elaborate testimony and documentation to support its view that bulk handling would cause it considerable costs and loss in revenues. *Report,* pp. 123–37, 241–45, 375–94.

[7] *The Land,* Mar. 1, 1935, p. 6.

[8] *Ibid.,* July 17, 1935, p. 49.

[9] Com. Aus. Roy. Com., *Second Report,* p. 181.

[10] *The Land,* Mar. 3, 1939, p. 4. Victoria decided against the Westralian system owing partly to likelihood of damage.

[11] *Coming of Age,* pp. 16–17. It was asserted that savings to farmers through the installation "exceeds £100,000 for one year alone."

Earlier, under a tripartite agreement of June 7, 1933, CBH took over the experimental plants. From the Commissioner of Railways it had managed to secure, before the change of government by which the friendly Country Party was displaced by the Labor Party, 7-year leases of sites at 48 additional sidings in the Fremantle zone, and it installed handling facilities at all but one of these.[3] Thus 53 plants were in use in the third season, 1933–34.[4] Terminal equipment of a provisional character was provided (see p. 313). Since the state railways refused to build or convert trucks to handle bulk grain, CBH bore the cost of such conversions.[5] In addition, the railways imposed an extra charge of 9*d.* per ton on bulk wheat, on the ground that the converted trucks could not be satisfactorily used for other purposes.[6]

The Victorian Grain Elevators Board reported, after its visit to Western Australia early in 1935, that the more modern facilities were more substantially built, much more durable, and otherwise much better than the earlier experimental types. It commented on the favorable attitude of the growers and on the handicaps arising from lack of terminal facilities.[7] Of the aggregate bulk receipts in 1933–34 and 1934–35, some 21 million bushels, 3½ million was stored in temporary open bulkheads;[8] but even an exceptionally heavy fall of rain in March 1934 caused only slight damage.[9] Owing to the stable weather conditions and small liability to rain damage, the simple methods suffice there, as they would not in New South Wales or Victoria.[10]

The installations at the first 53 sidings and temporary facilities at Fremantle, plus the conversion of the first 80 railway trucks, cost £160,000. Of this the pool loaned £70,000 from its reserve fund, accumulated by withholdings and judicious investments over a 12-year period. The other £90,000 was advanced by Westralian Farmers, Ltd., which in turn borrowed it on the strength of its own financial standing.[11]

The advantages of the system, as they appeared early in 1935, were (1) economy in initial installation, consequently in overhead costs and in operating expenses; (2) flexibility in adjusting to variable harvests in indi-

vidual districts; (3) capacity to receive rapid deliveries without undue delay or congestion; and (4) ability to receive and load out wheat at several points at the same siding at once.[1] On the whole, longer experience under severer tests has borne out these early assertions.

In August 1934, however, the Labor Government of the state prohibited the establishment of additional bulk plants pending a comprehensive inquiry. Following the report of a Departmental Committee, the government appointed, on January 23, 1935, a Royal Commission of three to make extensive investigations.[2] This check to the progress of the system, though due largely to opposition from the grain trade, organized labor, and the politically dominant Labor Party,[3] and to serious differences of opinion,[4] may be regarded as justified in order to permit crystallization of a permanent agreed plan before too extensive vested interests had been built up. Since the Western Australia crops of 1934–36 were much smaller than the preceding seven or eight (Table I), the ensuing delay had no seriously unfortunate results.

In February 1935 the president of the Primary Producers' Association (J. S. Teasdale), a director of CBH, warned farmers that the future of the bulk system was endangered by various factors such as (1) exactions from the side of labor;[5] (2) opposition from bag merchants; (3) increased railway and harbor charges; (4) imposition of other restrictions; (5) refusal of permission to extend the system; and (6) efforts of politicians to establish a governmental system.[6]

The Royal Commission did an excellent job. It examined numerous witnesses, procured voluminous documentary evidence, and extended its investigations as a body into the other three wheat states. On July 31, 1935 it reported wholeheartedly in support of the system and its statewide extension.[7] In accordance with its recommendations, the Parliament shortly passed the Bulk Handling Act, 1935, which was approved on January 7, 1936,[8] and made effective by proclamation on February 1, 1936.

The Legalized System

This act granted CBH a virtual monopoly, up to the end of 1955, of "receiving wheat in bulk at railway stations and sidings where the company has installed country bins under this Act," and handling and arranging transport and delivery of such wheat in bulk in the state,[9] subject to the act's provisions. Installation of new bulk facilities at country sidings requires the consent of the Minister of Agriculture, who also may require such installation at any siding with an average annual receival of over 20,000 bushels of wheat in the five years preceding. The minister must also approve plans and specifications of such additional facilities, and may alter them; and he may require alterations, additions, or further equipment when he finds shortcomings in the provision made. The company must also satisfy the minister that it is keeping its facilities in good condition and safe working order, and taking due pre-

[1] *Ibid.*, p. 16.

[2] W.A. Roy. Com., *Report*, pp. v–vi; the commission consisted of W. C. Angwin, member of the Fremantle Harbour Trust; S. B. Donovan, farmer; and J. S. Foulkes, accountant, chairman.

[3] To quote excerpts from a personal memorandum of a leader in co-operative circles, dated July 19, 1939: "The introduction of bulk handling was opposed strenuously by the wheat merchants." "We had to stand up to opposition from wheat merchants .... from unions of labour employed at ports, and through the political influence of the latter exerted on Labour Members of Parliament, a hostile attitude of the Labour Government in power. The Report of the Royal Commission on Bulk Handling changed this attitude to some extent .... Where we are subjected to a large measure of control by Government or semi-Government authorities our original estimates have been exceeded. Our relations with Government authorities are now on a more reasonable and less hostile basis, although it is very difficult to resist squeezes which bring added cost."

[4] In the Stevenson report, *op. cit.*, details are given of some divergent proposals.

[5] Labor difficulties at times have hampered terminal handling of bulk wheat at Fremantle. Early in 1935, for instance, lumpers were refusing to work as trimmers unless engaged as from the time loading with machinery begins. *The Land*, Feb. 8, 1935, p. 7.

[6] *Ibid.*, Mar. 1, 1935, p. 6.

[7] A copy of its voluminous report was kindly furnished us by Mr. H. E. Braine, joint secretary of CBH.

[8] 26° George V, No. XL.

[9] Any individual grower may transport by rail in bulk as much as 10 per cent of the marketable portion of his crop. Millers are not prevented from establishing on their premises bulk facilities for handling wheat of special milling qualities.

cautions to protect the grain so handled from weather, vermin, and fungus.

With certain very limited exceptions, the company as such is forbidden to deal in wheat. It is intended that eventually none of "its directors, officers, servants or agents shall be directly or indirectly concerned in the carrying on of any business relating to buying or selling of wheat . . . ."; but this does not apply to those persons who were on November 1, 1935 and continue to be one of the Trustees of the Wheat Pool of Western Australia, a director of Westralian Farmers, Ltd., or Westralian Wheat Farmers, Ltd., or the general manager or manager of the wheat department of Westralian Farmers, Ltd., or to this co-operative while it acts as handling agent under the agreement of June 7, 1933. The terms of handling are to be conspicuously posted, and altered by the Governor by Order in Council. In general, the Governor is authorized to make regulations for the purpose of the act, and not inconsistent with it, covering various specified and unspecified matters.

The Bulk Handling Act also created a Shippers' Delivery Board of four members: the Commissioner of Railways or his deputy, the chief traffic manager of the government railways; a member nominated by the Fremantle Harbour Trust Commissioners; one nominated by the wheat merchant shippers operating in the state; and a fourth nominated by CBH. This board has two main duties: (*a*) to prevent any disorganization or congestion in the railway transport of wheat; (*b*) to see that adequate supplies of wheat are being transported to the ports to meet the demands of shippers and charterers of vessels. Those delivering wheat to CBH receive negotiable warrants[1] which millers and shippers acquire. As soon as possible after arranging ship charters, exporters holding warrants are required to give CBH the necessary particulars, so that it may fulfil its obligation to ship the grain to the ports in due time to load. The board is authorized to prescribe the minimum amounts to be held at the several ports in bulk, pending provision of permanent terminal facilities at each.

The Royal Commission of 1935 strongly recommended the prompt erection of an up-to-date orthodox concrete terminal elevator at Fremantle, with a capacity of 1,500,000 bushels, to be controlled by the Commissioners of the Fremantle Harbour Trust; and then a similar one at Geraldton, with a capacity of 500,000 bushels, to be controlled by the Commissioner of Railways. It favored giving serious consideration to the proposals of CBH to provide facilities at Bunbury and Albany. The cost of the entire system, based on a country capacity equal to 75 per cent of a marketed crop of 30.7 million bushels, was put at £735,465, of which £453,465 would provide for the country plants. The corresponding cost of a concrete system at country sidings was estimated at £1,437,244, or £1,128,985 if timber construction were used for silos of less than 120,000 bushels capacity.[2]

The recommendations as to terminal facilities have not been carried out. The co-operative interests, with the warm support of the Country Party, have sought to control the terminal facilities. On the other hand, the Labor Government, which was returned to power for a third term in March 1939,[3] has not been willing to accept the farmers' proposals. The opposition gained the votes of seven Labor members to defeat, in December 1937, a Terminal Grain Elevators Bill providing for state construction of terminal elevators under a board of three, assisted by an advisory committee of five, representing producers, Co-operative Bulk Handling, Ltd., shippers, and millers.[4] In a campaign speech on February 24, 1939, the leader of the opposition put the matter thus:[5]

Pursuing its policy of frustrating the work of extending bulk handling the Government, by neglecting to provide facilities at ports, had delayed authority for the erection of silos at country sidings. The Country Party has always regarded as unjust the impost of an extra 9*d.* per ton freight on bulk grain carried over the State railways, and, if elected, will have that charge abolished. It will

[1] Various details as to these warrants and rights of warrant holders are specified in the act, and provision is made for arbitration of disputes.

[2] W.A. Roy. Com., *Report*, pp. xxi–xxv.

[3] *Primary Producer*, Mar. 23, 1939.

[4] *Ibid.*, Dec. 2, 16, 1937.

[5] *Ibid.*, Mar. 2, 1939, p. 2.

also authorise the provision of silos at all country sidings where justified under the provisions of the Act, and the erection of terminal elevators at ports.

In that election, however, the Labor Government gained one seat at the expense of the Country Party, having in the new Parliament twenty-seven seats to twenty-three for the combined opposition: Country Party, 12; National Party, 9; Independents, 2.

Exclusive of the Esperance (southern) zone, which has been disappointing as a wheat section, the relative importance of the four zones is indicated in Table 2. The estimates of requirements are not those of CBH, but of the Director of Works in connection with his 1935 estimates of the cost of a state-wide system capable of handling a crop of 40 million bushels. To these are added preliminary figures on the system in use this season.

Contemplating government terminals at four ports, the government has not permitted CBH to proceed with permanent installations there. At Bunbury, a newly built government terminal received its initial rather unsatisfactory test in 1937–38,[1] and has since been in regular use. Plans for others were incomplete when the war broke out.[2] Meanwhile CBH has had to get along with equipment of its own provision at the two leading ports, and has not attempted to operate in the Albany zone.

The Bunbury terminal is of the orthodox, vertical storage, reinforced concrete type. Its capacity is 8,000 tons (some 300,000 bushels). The wheat has to be moved over a 5,000-foot jetty from silo to ship by special trucks which discharge into hoppers under the jetty, from which two traveling telescopic gantry elevators transfer the grain to the vessel. Under these circumstances, the maximum handling rate is about 300 tons per hour and averages about 120 tons.[3]

At the two larger terminals CBH converted existing bagged wheat sheds into bulk bins, providing special retaining walls inside. In filling the bins, use is made of relatively short bucket elevators, long overhead conveyers, and "wheat throwers." For loading out, portable excavators elevate the wheat and discharge it into trailing portable conveyers; these deliver to overhead belt conveyers which in turn deliver to gantry-mounted elevators between silo and ship.

TABLE 2.—ZONE DISTRIBUTION OF WESTERN AUSTRALIA CROP AND BULK-HANDLING FACILITIES REQUIRED AND IN USE*

(Quantities in million bushels)

Item	Total	Fremantle	Geraldton	Bunbury	Albany
Average crop, 1926–31	39.20[a]	25.64	7.64	3.84	1.34
	Country capacity				
Requirements:					
A	23.00	15.92	4.68	1.92	.48
B	1.32	.58	.28	.24	.22
C	24.32	16.50	4.96	2.16	.70
In use, 1939–40	15.60[b]	.....	....	....	...
	Number of country plants				
Requirements:					
A	201	143	31	19	8
B	66	29	14	12	11
C	267	172	45	31	19
In use, 1939–40	207	139	35	33	0

* Crop figures from W. L. Brine testimony in W.A. Roy. Com., *Report*, p. 177. Requirements as estimated by the Director of Works, 1935, in *ibid.*, p. xxi, for stations with average receivals estimated at (*A*) 40,000 bu. and over, (*B*) 20,000–40,000 bu., and (*C*) 20,000 bu. and over. In use, 1939–40, as reported in *Primary Producer*, Oct. 26, 1939, p. 1.

[a] Including 73,000 bu. in the Esperance zone.

[b] Exclusive of temporary bulkheads.

At Geraldton the storage capacity is 8,000 tons, as at Bunbury, but the cost was about half as great. The maximum loading rate is 400 tons per hour, and the average over 200.

At Fremantle the storage capacity was originally 7,000 tons. In 1938 this was increased by 4,000 tons by adding a modified country-type silo, costing about one-third as much as the reinforced concrete type. It has retaining walls of curved corrugated iron, and timber wall posts anchored by steel tie rods to a concrete ribbon in the floor, which consists of a gravel base covered with a thin bituminous carpet. Under the floor, running along the longitudinal axis, is a tunnel hous-

[1] *Primary Producer*, Oct. 14, Dec. 9, 1937; Jan. 6, 1938.

[2] *Ibid.*, Sept. 16, 1937; Apr. 28, 1938; Sept. 28, 1939.

[3] Information on terminal facilities in 1939 kindly furnished by the secretary of the wheat pool.

ing a belt conveyer which returns close to the roof. Thus the silo can be filled by gravity discharge, and about two-thirds of the wheat gravitated out of silo; the rest is scraped toward the center tunnel feed gates by Clarke power shovels mounted on a traveling trolley.

During this season the Australian Wheat Board has contracted with CBH for building additional storage facilities with iron floors and roofed, to hold 2,250,000 bushels at Fremantle and 1,250,000 at Geraldton.[1]

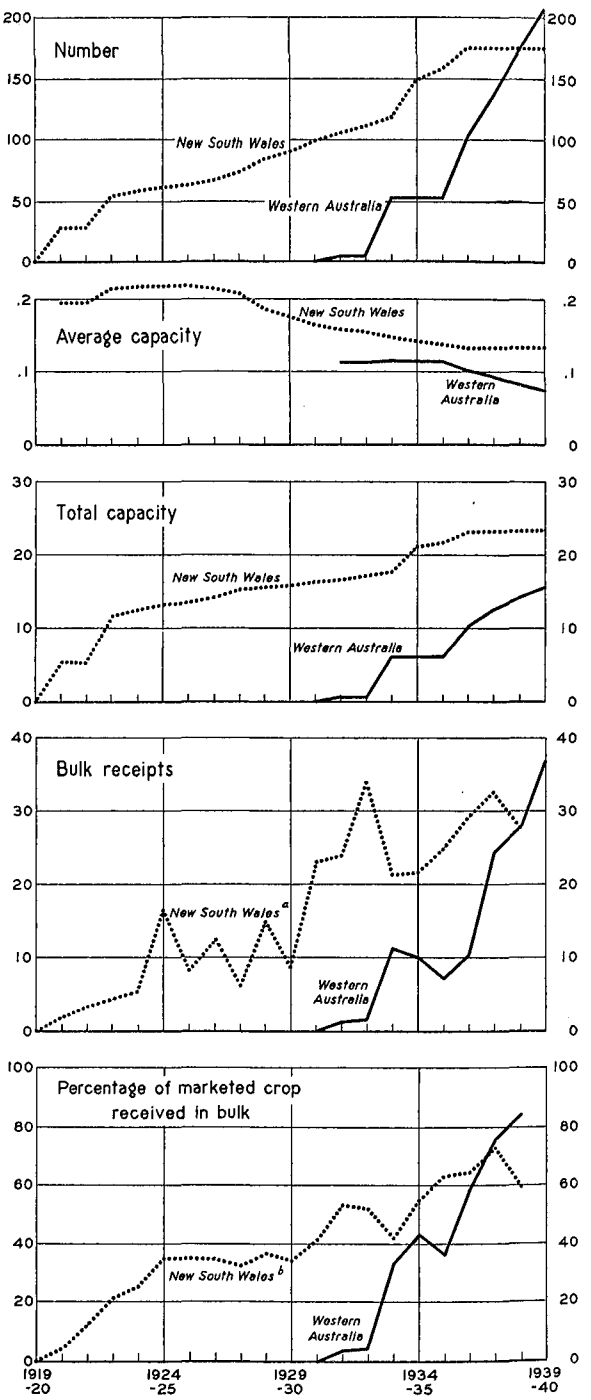
Expansion, Operations, and Finance

Despite unsatisfactory terminal facilities and various other irritating obstacles, the Westralian system has been rapidly expanded, as shown in Table VII and Chart 7; and it has handled increasing volumes—all that was offered it, and more than expected—without serious congestion, delay, or inconvenience to farmers. The average capacity of the permanent country plants is much lower than in New South Wales. It has never exceeded 115,100 bushels, is 75,400 in 1939–40, and will presumably decline further as additional installations are made. When completed the system is expected to include more than 250 country plants.

The capacity figures shown do not include the temporary bulkheads, which afford a valuable element of flexibility and continue to be used. Of the bulk receipts in 1937–38—24.4 millions bushels—the greatest quantity in bulkheads at any one time was 6 million, and of this the amount in unroofed bulkheads was slightly over 2.5 million.[2] CBH handlings in 1938–39 slightly exceeded country receivals in New South Wales, where, in the absence of supplementary bulkheads, congestion promptly became serious (p. 334); peak holdings in Western Australia were 21,750,000 bushels on January 19, 1939. We infer that export sales were made with greater readiness in Western Australia, in contrast to the very small movement from New South Wales until March 1939; and for this contrast the operating procedures of the two systems were in part re-

Chart 7.—Country Bulk Plants and Receipts in Two States, Annually from 1920–21*

(Quantities in million bushels)



* Data in Tables IV and VII. The 1939–40 figure for receipts in Western Australia is now regarded as too high.

[a] Total bulk receipts, as in Chart 3, p. 324.

[b] Percentage of total bulk receipts to receipts at New South Wales railways, as in Chart 4, p. 328.

[1] *Primary Producer*, Nov. 16, 1939, p. 1; Jan. 18, 1940, p. 1.

[2] *Ibid.*, Apr. 7, 1938, p. 1; *The Land*, Mar. 3, 1939, p. 4; *Milling*, June 3, 1939, p. 635.

sponsible. In this season, with much larger crops in both states, the comparison was again favorable to the unorthodox system, though New South Wales resorted to bulkheads that took care of part of the surplus (p. 360).

In all but two of the seven seasons of regular operation, the volume handled by the Westralian system has been nearly double the operating capacity exclusive of the bulkheads. The record for bag and bulk receivals at one siding in one season in Western Australia, formerly held by Moorine Rock with 726,000 bushels in 1930–31, was broken in 1938–39 with 735,000 bushels at Cunderdin up to January 10. Two-day loading records at that time were 873 tons at one siding and 2,000 tons at four.[1]

The percentage of the marketed crop of Western Australia that was handled in bulk was about 76 per cent in 1937–38 and about 84 in 1938–39, and may this year be well over 90. Most of the grain that continues to move in bags is received at stations where bulk facilities are not yet installed.

The early plans of Westralian Farmers contemplated equipping 271 country sidings, conversions at the ports, and truck conversions (£76,000), at a total cost of £552,105.[2] In 1939 it was expected that the completed system would include over 250 country plants.[3] Additional capital expenditures in the past four years have been financed chiefly by loans from the Prudential Assurance Company, Ltd. and some additional advances from the Wheat Pool, plus the investment of users of the system represented by toll charges and profits. The CBH balance sheet of October 31, 1938, showed the following principal elements:

Total assets	£392,683	Users' equity	£ 64,226
Country equipment less depreciation	£308,375	Owed: W. F.	£ 75,850
		Pool	104,421
		P. A. Co.	139,527
Shipping plant less depreciation	48,080		319,798
Cash and receivables	12,775	Other liabilities and reserves	8,658
Other assets	23,453		

Up to the middle of 1939, the total system cost, including the Bunbury government terminal, had not reached £500,000[4]—less than one-tenth that in New South Wales.

In the early years "competent authorities" estimated that the working life of the structures and equipment would be at least twenty years.[5] That may have been overoptimistic, but it may not be so for the system as now constituted—except for the terminal plant. Betterments, replacements, and reconstruction involve no heavy expenditure; and conditions in the world of wheat are too unstable to justify heavy capital outlays on permanent structures that may prove in large part unnecessary, and/or become obsolete, before their normal working life has ended. Better terminal facilities would yield operating economies at that point; but if constructed by the government at high cost, net revenues might not be improved thereby.

During the first two seasons, when the Wheat Pool and Westralian Farmers conducted the bulk-handling experiments, no specific charges were formally levied. On October 1, 1933, a regular scale of charges was established; and, with the addition of a rail surcharge on November 10, this scale was applied in the season of 1933–34. As suggested by the comparative tabulation below,

Item	1933–34	1938–39
1. Shrinkage	½%	½%
2. Handling	1.125*d.* per bu.	1.125*d.* per bu.
3. Sheet hire	.008	.008
4. Truck fitting charge	.125	.125
5. Rail surcharge	.241	.241
6. Port shipping charge	.187	.482
7. Free storage to	July 31	March 15
8. Storage thereafter (per month)	.250*d.*	.100*d.*
9. Toll	.625	.625

subsequent changes have been few.[6] On October 1, 1934, the free-storage period was limited to March 15,[7] and the rate per bushel

[1] *Primary Producer*, Jan. 12, 1939, p. 1.

[2] Stevenson report, *op. cit.*, pp. 6–8. The funds were then expected to be borrowed from the Co-operative Wholesale Society of England.

[3] Information from CBH authorities.

[4] *Ibid.* [5] *Coming of Age*, p. 16.

[6] The Bulk Handling Act of 1935 gave legal recognition to the then-existing scale of charges.

[7] The company had reserved the right to impose a special charge if necessary to speed the clearing of its bins; and such a charge, of ¼*d.* per month, was levied from June 1 in 1934. Com. Aus. Roy. Com., *Second Report*, p. 166.

per month lowered to .1*d.* from that day. The port shipping charge was successively raised from 7*d.* per ton to 9½*d.* on January 13, 1935, to 15*d.* on January 8, 1937, and to 18*d.* on December 30, 1938. These striking increases were due to increasing exactions by organized labor in the ports and a variety of other conditions. Items 3–5, totaling about ⅜*d.* per bushel, are to meet charges imposed by the state railway administration for railing bulk wheat; on these the growers and their cooperatives have registered vigorous complaints, thus far in vain.[1]

The "toll" technically represents an "advance" from the growers whose wheat is handled, credited to them in the toll register of the company, to meet capital expenditures; it is to disappear when the plant is paid for, whereupon the control of the system will pass to the growers. Under the trust deed[2] CBH agreed to use toll receipts toward

(i) The recoupment of the original outlay of the Company.
(ii) The payment of the purchase moneys and the repayment of the advances and accommodation mentioned in paragraph (*d*) of these recitals and the payment of any interest charged thereon respectively.
(iii) The fulfilments of any of the objects of the Company.
(iv) The conducting of the business of the Company and the payment of any financial obligations incurred or to be incurred by the Company therein.

The company agreed to apply its net profits, if any, to the same purposes, and to issue no shares except to enable persons to qualify as directors (ten such have been initially issued). It further agreed to hand over to the participating growers the management and control of the company "on or as soon as possible after" September 30 of the year in which, having completed its program of capital expenditure, it had paid off its liabilities (secured and contingent) to all others than toll creditors, or earlier at the directors' discretion, but in any case not later than October 31, 1948. Upon such "termination of the original arrangement," each actively participating grower[3] is to receive one £1 share in the company, and debentures issued for the balances on the toll register.

Comparative summaries of wheat marketing costs per bushel in 1934–35 in the two bulk-handling states, were as follows:[4]

Item	Western Australia	New South Wales
Handling	1.125*d.*	2.500*d.*
Buying commission to local agent	.375	.250
Merchant's office expenses (estimated)	.250	.250
Wharfage	....	.191
Toll	.625	....
Shipping costs	.254	....
Allowance for shrinkage, ½ per cent	.125	....
Special railway charge for bulk wheat	.241	....
Adjustments for railway trucks	.125	....
	3.120*d.*	3.191*d.*

Of the toll charge, .305*d.* was assigned to interest and depreciation and .320*d.* to redemption of debentures. Despite this, and the special charges indicated in the last two items, the over-all charge was less than that in New South Wales until the reduction in the latter's scale in 1935 (p. 326). With the subsequent changes in both states, the CBH total was still the higher until, for 1939–40, a committee appointed by the Australian Wheat Board fixed uniform rates of remuneration for licensed receivers and their agents at 2½*d.* for bulk wheat and 2¼*d.* for bagged, with bulk storage at 1/16*d.* per week.[5] Significant, however, is a recent utterance by E. Field, a former president of the Farmers and Settlers' Association of New South Wales, the president of the Australian Wheat Growers' Federation,

[1] Freight charges are also payable on the hessian screens used to prevent leakage from the trucks and the canvas extensions to increase their height, at bulk-wheat rates when in use and at class B rates on the return trip. All bulk trucks are required to be loaded to capacity, though on bagged wheat substantial allowances for underloading are made.

[2] This is cited in the Bulk Handling Act, and the company is forbidden to alter its articles of association or the deed of trust without the express approval of the Governor.

[3] Those then alive who shall have delivered grain to the company in at least one of the two preceding seasons, whose toll credit exceeds £1 and has not been assigned to another person.

[4] Com. Aus. Roy. Com., *Second Report*, p. 166.

[5] *Primary Producer*, Jan. 25, 1940, p. 1.

and growers' representative on the new Australian Wheat Board. To the executive of the FSA he is reported to have said:

> The sooner we emulate the Western Australian growers and take charge of the silos the better. In Western Australia the farmers control the whole of the silo system and the charges there are the lowest in Australia. New South Wales growers should establish a fund from the proceeds of their wheat so that the control of the silos can be taken away from the Government.[1]

Though provided by the co-operatives, the CBH system has been available throughout to non-members on the same terms as to members. Early forecasts of receipts were greatly exceeded, many farmers choosing to haul their grain longer distances (even up to 30 miles) to take advantage of the new facilities.[2] From the outset the Westralian system proved popular with the wheat farmers, even those who were critical of the scale of charges, the control by the dominant co-operative group, and various minor points. The 90 growers from whom the Royal Commission took evidence in 1935 were essentially unanimous. The Commission concluded that they were saving from 2*d.* to 3*d.* per bushel through use of the bulk system, in addition to other concrete advantages and having an increasing stake in its ownership.[3] Even with the rapid increase in volume handled, the satisfaction of growers with the operating efficiency in Western Australia has been in marked contrast with the dissatisfaction expressed in New South Wales.

In the early stages, engineers were generally disposed to criticize the country plants, and some considered that more costly ones would be cheaper in the long run; but the improvements subsequently made, and the operating record of CBH, have won technical respect. The Railway Department has consistently taken a very restricted view, at least as compared with that in New South Wales. Before the Royal Commission it set up extensive estimates of losses that its revenues would suffer from the shift to bulk handling, and it has consistently charged CBH for all allocatable capital and operating charges. Even the Fremantle Harbour Trust has not succeeded in preventing increases in port charges. The merchants have chiefly resented the fact of the close interlinking between Co-operative Bulk Handling, Westralian Farmers, and the Pool, which they figure costs the private trader business. On the whole, however, progress has been made in adjusting diverse interests, and except as regards the terminals the remaining difficulties have not seriously disturbed the operation of the system.

VI. THE VICTORIAN SCHEME

In climate and geographic conditions, and in some other respects, Victoria more nearly resembles New South Wales. The southern state had become more or less regularly a wheat exporter several years before her northern neighbor had her initially exceptional surplus in 1897–98. The people and government of Victoria, however, have long had a justified reputation for conservatism, as compared with both New South Wales and Western Australia. Partly for this reason the movement toward bulk handling made slower headway there.

As we have seen, the early investigations were brought to fruition in an extensive and favorable report of a Royal Commission in Victoria shortly before the World War. During the war more specific plans were developed with official support, but the enabling bill failed of passage in 1916. Despite great damage to war-stored grain from mice and weevils, the offer of federal aid in 1917 evoked no positive action. The hostile or reserved attitude of the grain trade repeatedly exerted a restraining influence; and financial conservatism dictated extreme caution in embarking on extensive capital expenditures.

In the first decade of the New South Wales system, its operation was continually observed and officially investigated by Victoria and Victorians, and numerous attempts at legislation

[1] *The Land*, Feb. 9, 1940, p. 5.

[2] Stevenson report, *op. cit.*, pp. 3–4; South Australian Farmers' Co-operative Union, Ltd., memorandum of Aug. 28, 1933.

[3] W.A. Roy. Com., *Report*, pp. xvi–xvii, 261–332.

failed. In 1922-23, with reference to a bill then before the State Parliament, the Corn Trade Sectional Committee of the Melbourne Chamber of Commerce resolved "that the time is not yet ripe to enter into large commitments of bulk handling, in view of the fact that we can watch experiments in other States."[1] The bill did not pass. In June 1925, after severe losses from mice in Victoria and the first good year in New South Wales elevator experience, a committee appointed by the Victorian government recommended (by majority vote only) the adoption of a bulk-handling scheme comprising 132 country elevators with terminals at Williamstown and Geelong (also at Portland if a breakwater be built to protect the elevator sites), with an aggregate capacity of 17,445,000 bushels capable of handling a 40-million-bushel crop, at an estimated capital outlay of £3,511,864. Before this report could be acted upon, however, and for several years thereafter, the New South Wales experience was such as to discourage action in Victoria. As late as 1931, the judgment of a competent economist at the University of Melbourne was adverse (p. 332).

During the severe depression of the early 1930's, however, there arose increasingly urgent demands from farmers there, as in other states, for the installation of a bulk system. Arguments for adoption of the new system were furnished by extremely low prices of wheat, the high cost of sacks (increased by depreciation of the Australian pound)[2] and the number required to handle the big crops of 1930–32 (Table I), the recurrence of the mouse plague in 1932 (in the Mallee and parts of the Wimmera, as well as in New South Wales and South Australia),[3] the extent of unemployment, low costs of labor and materials, lower interest rates, newly favorable rates on bulk shipments oversea, and improved financial returns in New South Wales that culminated in strikingly large surplus receipts in 1932–33 (Table IV). In May 1934 the Victorian Minister of Agriculture (Allan) said that no country could successfully produce wheat under present conditions without a bulk-handling system, since all possible economies were essential. Early in 1937 the then Minister (Hogan) stated that the "losses caused by mice and weevils in Victoria in 1916 and 1924 would have paid for the introduction of the grain elevator system."[4] We report these statements without attesting to their truth.

The whole subject was threshed over at great length in 1932. In *The Argus* of February 22–26 Gerald Robinson reviewed the losses, costs, and causes of failure in New South Wales; and in the light of this analyzed conditions in Victoria and the proposed Victorian scheme, with the following conclusions:

Bulk handling of wheat in Victoria would be economically unsound because:

1. Extreme variations in yields would cause widely fluctuating demands upon country silos.
2. Stocks at country stations quickly exceed probable silo capacity.
3. These stocks could not be reduced without the provision of additional railway rolling stock, which would be idle for ten months of the year.
4. Reducing country stocks would mean either "speeding up exports" or constructing huge silos at the seaboard.
5. "Speeding up exports" would tend to depress prices and to increase freights, and seaboard silos would mean high storage costs.
6. To retain the valuable Eastern market wheat would have to be shipped in bags or a lower price accepted.
7. Existing railway facilities at Williamstown would be rendered valueless if bulk handling were general.
8. Labour would be replaced by machinery without any compensating advantage.
9. Bulk handling would be more costly than the bag system.
10. There would be grave danger that the taxpayer would be called upon to pay a large part of the cost, as in New South Wales.[5]

By this time, however, strong farmer support had been worked up. "At the annual conference of the Federated Wheat Growers of Australia held in Adelaide early in March

[1] Melbourne C. of C., *Report, 1922–23*, p. 81.

[2] See footnote to Table V.

[3] *Wheat and Grain Review* (Melbourne), Apr. 6, 1932, pp. 5, 10; *Milling*, Oct. 1, 1932, p. 363.

[4] *The Land*, June 1, 1934, p. 5; Jan. 22, 1937, p. 7.

[5] Reprinted and distributed by *The Argus* (Melbourne), in a pamphlet containing also the more temperate and balanced articles of Apr. 6–9 by Professors S. M. Wadham and G. L. Wood. See also F. S. Alford, "Bulk Handling of Wheat in Australia," *Economic Record* (Melbourne), May 1932, VIII, 41–54.

[1932], interstate delegates were urged to press for the installation of bulk-handling plants in their individual States." Growers' organizations in Victoria pushed for immediate action on some practical scheme. The Country Party Conference, meeting in Warragul early in April, "resolved in favor of a suitable system of silos" controlled by local growers. At the same time, and even more important, the grain trade of Victoria finally went on record in favor of bulk handling, asserting that "the principle has been so soundly established that it must eventually come into being in Australia." The Australian Women's National League, in annual conference at Melbourne in September 1932, supported the introduction of a bulk-handling system "if it were proved to be financially advisable."[1]

With such strong backing, the state cabinet appointed a committee of agricultural and transportation experts to go into the whole matter.[2] After considering a good deal of accumulated information[3] and several different plans, this committee reported in March 1933 in favor of constructing a state system comprising terminal elevators at Williamstown (Melbourne) and Geelong, with capacities of 2.75 and 1.50 million bushels respectively, and 160 country elevators with an aggregate capacity of 12.18 million bushels, at a total cost (including alterations to railway trucks and yards, and interest during construction) estimated at £2,005,010; and estimated handling charges at 2*d.* per bushel at country points and 5*d.* at the terminals. The experts said:

> . . . . the system recommended would provide bulk accommodation for the section of the State which produces an average of 87 per cent. of the total, and would be adequate to deal with 72 per cent. of what those districts yielded, but facilities would be available to receive 90 per cent. of all the wheat delivered to railway stations if producers availed themselves of bulk handling.[4]

One of the issues over which controversy raged concerned the ownership and operating control of the system. Farmer spokesmen had demanded a grower-controlled system, but there was by no means complete agreement as to the form of control. The Victorian Wheatgrowers' Corporation, Limited, the wheat-pooling organization, had vigorously supported the move and naturally insisted on a co-operative system as in Western Australia. This the grain trade strongly opposed. Eventually the compromise decision was reached to have the system built and operated as a state enterprise, as in New South Wales, but under a board on which wheat growers would be represented.

In May or June 1933, the Victorian cabinet approved in principle the establishment of a comprehensive system and undertook to seek the approval of the Loan Council to provide financing; but dissensions within the cabinet and outside delayed for a year the final decisions to set up and operate the system.[5] The resulting Grain Elevators Act, 1934,[6] was proclaimed in December 1934. Under it, a Grain Elevators Board of three was appointed by the Governor in Council as of February 1, 1935. It consisted of C. Judd, latterly manager of the Victorian Wheatgrowers' Corporation, chairman;[7] C. R. Henderson, a Mallee farmer active in the Victorian Wheatgrowers' Association, to represent wheat growers; and C. H. Fethney, to represent the Railway Department, in which he was Chief Engineer of Way and Works; with T. Farristal, senior officer of the Treasury Department, as official

[1] *Wheat and Grain Review*, Apr. 6, 1932, Oct. 8, 1932. At the Australian Wheat Conference in 1933, it was resolved "That we favor the principle of bulk handling of wheat being established throughout Australia." *The Land, Australian Wheat Anual Number*, June 21, 1933, p. 28. Early in 1935 the Victoria Chamber of Agriculture reaffirmed the principle of bulk handling which it had supported for many years. *Ibid.*, Feb. 1, 1935, p. 6.

[2] *Milling*, June 4, 1932, pp. 634-35.

[3] As a partial basis for its work, this committee had available a *Report on the Bulk Handling of Wheat*, submitted June 27, 1932, by J. A. Stevenson of the Development Branch, Prime Minister's Department. This discussed at length the "Experiments of Westralian Farmers, Ltd.," and more briefly "Bulk Handling Generally."

[4] *Milling*, June 8, 1933, p. 576; *The Land, Australian Wheat Annual Number*, June 21, 1933, p. 28; and review by S. M. Wadham, in *Economic Record*, June 1933, IX, 20–23.

[5] *The Land, Australian Wheat Annual Number*, June 21, 1933, p. 28; *The Land, Australian Farm and Station Annual*, June 20, 1934, p. 43.

[6] 25 George V, No. 4270, approved Oct. 9, 1934.

[7] Mr. Judd died suddenly in October 1939.

observer or government watchdog of the board.[1]

Despite the first two appointments, the VWC's attitude toward the new system soon became extremely critical. When construction work on the Geelong terminal was about to get under way, it urged various reasons why bulk handling should not be introduced after all. It pointed to the higher price of wheat, the lower cost of sacks, high labor and material costs in the building industry, and the probability of high capital cost under virtually government control. Its former manager replied, on behalf of the board, that the improvement in the relation between prices of wheat and of cornsacks was attributable to drought in North America, reduced demand for sacks with smaller crops in Australia, and a price war between two jute manufacturers in India; and that costs for the first portion of the Geelong terminal were below advance estimates.[2] As late as 1939, however, the VWC had not accepted the situation with equanimity.[3]

The new board was charged with full responsibility for definitive preliminary investigations, preparing the detailed scheme and specifications (subject to approval by the Governor in Council), contracting for acquisitions and construction work, and operating the resulting system.[4] It was empowered to borrow up to £2,000,000, either from the Loan Council or by the issue of debentures, and to borrow by bank overdraft up to £75,000.

The board promptly inspected the systems in use in New South Wales and Western Australia and elevators owned by Victorian flour mills, secured plans of elevators recently built in Canada, and organized a technical staff with F. W. Box as chief engineer. In May 1936 it submitted for government approval its matured scheme for a system comprising 140 country elevators with an aggregate capacity of 14,345,000 bushels, and terminal elevators at Geelong and Williamstown of 2,250,000 and 2,000,000 bushels capacity respectively.[5] The smaller country elevators were to be of steel, the larger ones and the terminals of reinforced concrete. The estimated cost was as follows:

Country elevators (including road approaches)	£ 864,670
Terminal elevators (including pier at Geelong)	717,800
Alterations and additions to railway tracks	78,878
Wheat-proofing trucks and ridge gear	75,000
Administration, superintendence, and interest during construction	145,000
Total	£1,881,348

It was estimated that this would provide bulk facilities at stations through which about 80 per cent of the state's harvest moves. It was further proposed to lease existing mill elevators in country districts to provide additional storage capacity of 1,000,000 bushels.

At various points the Victorian board undertook to profit by mistakes and experience in New South Wales. The average capacity of the 160 country plants under the original program was 76,000 bushels, but revisions led to elimination of 20 of the smallest plants. The matured scheme for only 140 country plants showed an average capacity of 102,000 bushels, as compared with 132,000 in New South Wales. The few largest planned for in Victoria, as at Minyip in the Wimmera district, were to have a capacity of 300,000 bushels each, considerably less than the largest in New South Wales. The smallest were larger than the smallest in the other two states.

The initial[6] and amended designs[7] for country silos provided for types and bins as follows:

[1] *The Land*, Feb. 8, 1935, p. 6; July 17, 1935, p. 47. Mr. Fethney has since been succeeded by A. K. Bartel.

[2] *Ibid.*, Aug. 28, 1936, p. 6.

[3] It had built, at a cost of £20,000, the first bulk-loading plant in the state at Corio Bay, Geelong, which was used to some extent in 1934. This plant has not been patronized by other shippers, and will presumably not survive competition from the Geelong terminal elevator. *The Land, Farm and Station Annual*, June 20, 1934, p. 43 (with illustration); and information from the present manager of the VWC.

[4] This discussion is based on information kindly supplied by the chairman of the board, Aug. 1, 1939.

[5] The Metcalf report of March 1916 had recommended 210 country elevators with capacities ranging from 25,000 to 60,000 bushels, and terminal elevators at three ports with capacities as follows: Williamstown, 2,500,000 bu.; Geelong, 1,000,000; and Portland, 550,000. That document, not consulted by us, was published with comments by Victorian Railway Commissioners, Melbourne, 1918.

[6] *The Land*, July 19, 1935, p. 5.

[7] Statement of the board.

Initial plan		Amended plan		
Capacity (*bu.*)	Bins	Capacity (*bu.*)	Large bins	Small bins
65,000	1	65,000	1	2
110,000	2	110,000	2	2
150,000	3	130,000	2	2
200,000 (10–12 of these)	..	150,000	2	2
250,000 (10–12 of these)	..	220,000	2	4
		260,000	4	4
		300,000	4	4

Each of the last three sizes represents double units of the preceding three. Each of the single units had three receiving hoppers, and the aggregate receiving capacity was 2,100 bushels per hour for the first four sizes and double this for the double units. We infer that among the reasons for the change in design was to make the system suitable for a form of grading system, the ultimate adoption of which would call for very little adjustment of the plants.[1]

Construction of the Geelong terminal was started in 1936, as soon as possible after approval of the plans, and of the one at Williamstown early in 1937.[2] Tenders for construction of the first 61 country elevators, on the lines serving Geelong, were invited in August 1937.[3] None of these were accepted. Owing to difficulties in getting delivery of steel plate, and for some other reasons, the plans were modified so as to substitute reinforced concrete for steel as far as possible. On December 18, 1937, tenders were invited for constructing all of the 91 elevator units in the Geelong territory. On February 10, 1938, a contract for 81 of these was let to the Railway Construction Branch of the Board of Land and Works, which began actual construction at Gama in May.

The system had been first expected to be in partial operation in the season of 1938–39.[4] By August 1938, however, it was evident that, though the Geelong terminal was "about completed," the country silos would not be ready on time, and growers were advised to buy sacks.[5] A year later, considerable work remained to be done to complete the works at Geelong, but it was confidently expected that this terminal, 47 country elevators, and 6 leased mill elevators would be available for use in 1939–40. The foundations and basement construction of the Williamstown terminal were completed, but contracts had not yet been let for its superstructure and equipment, or for any of the country elevators tributary to it.[6]

Pre-season tests in 1939, at a country station and at Geelong, were satisfactory; and the system began its first operating season late in the year. Including 47 country plants and 6 leased mill elevators, a country capacity of over 6 million bushels was put in use, together with the Geelong terminal. Some 1,200 suitable railway trucks were wheat-proofed, 250 more were to be built during the fiscal year, and plans were made for temporarily using ordinary goods trucks if needed. Some fears were expressed lest wheat would be damaged in silos where the concrete was still green; but the board was more concerned over the early refusal of the Australian Wheat Board to allow it to accept wheat in bags if deliveries overtaxed the elevator capacity.[7]

Section 10 of the basic law in Victoria prescribed that growers in areas tributary to sidings provided with elevators must put at least 75 per cent of their marketed wheat through the system, until the funds borrowed and interest thereon have been paid in full.[8] This was designed to insure against repetition of the experience in New South Wales, which had so delayed profitable use of the system in that state.

The act also required the board to fix scales of charges adequate, in its opinion, to cover operating costs, interest, depreciation, and sinking fund charges (at least 1 per cent per year). Assurances were early given that handling charges would not exceed 2½*d.* per bushel.[9] This is the inclusive rate set by a committee of the Australian Wheat Board,[10]

[1] Letter from C. Judd, Aug. 1, 1939.

[2] *The Land*, Jan. 22, 1937, p. 7.

[3] Cf. *Wheat and Grain Review*, Sept. 9, 1937, p. 10.

[4] *The Land*, Nov. 6, 1936, p. 7.

[5] *Primary Producer*, Aug. 4, 1938, p. 10. Since the 1938 crop was very short because of drought (Table I), this delay proved even fortunate.

[6] Information from C. Judd, Aug. 1, 1939.

[7] *Primary Producer*, Oct. 5, 1939, p. 5, and Dec. 21, 1939, p. 5; *The Land*, Dec. 22, 1939, p. 4.

[8] Cf. *ibid.*, Nov. 6, 1936, p. 7.

[9] *Ibid.* Mr. Judd was reported to have "felt confident the charges would be lower."

[10] *Primary Producer*, Jan. 25, 1940, p. 1.

and we presume that the schedule does not differ materially from the one in current use in New South Wales.

Whether the completion of construction in Victoria will be speeded or delayed by war conditions, it is still too early to say with assurance. It seems reasonable to expect that the need for early completion will be keenly realized, but that numerous obstacles will be encountered. The provisional plans were to complete the Geelong system, including 34 additional country plants, before starting on the 59 in the area tributary to Williamstown.[1]

Contemplating the Victorian experience, one cannot help being impressed by the length of time that will have elapsed between the government decision to adopt a bulk-handling system, in June 1933, and the first partial use of the system late in 1939. Even in the absence of war difficulties and pioneering tasks such as hampered the New South Wales progress in its early years, the Victorian system also would probably have required nearly a decade between initial decision and full realization. By contrast, the progress in Western Australia seems extremely rapid, even with the handicaps imposed by labor and political opposition.

It is reasonable to anticipate that the Victorian elevator system will be more suitably built, much less costly in construction, somewhat cheaper to operate, and more successful financially and otherwise than the one in New South Wales has been and is. If Victoria lost through lack of such equipment earlier, she has made offsetting gains by the protracted delay. It remains to be seen whether the problems of congestion that have proved so serious in New South Wales can be avoided without adding to the system some of the flexibility that the Westralian system has had from the outset.

VII. SOUTH AUSTRALIAN DEVELOPMENTS

In South Australia, bulk-handling proposals met with persistent failure before and during the World War, as we have seen, and since that war, as we shall see. Several reasons for this can be adduced.

Wheat-growing earliest reached maturity in South Australia. For three decades ending in 1909 the acreage sown for grain fluctuated within a limited range, and the average in the third decade was less than in the first (Table II). In the two ensuing decades, acreage expansion was much the same as in Victoria, but less than in either of the other two states. Before bulk handling came under consideration, therefore, most South Australian growers were accustomed and felt attached to the established system of bag handling; and as a group they have seldom evinced great interest in the adoption of a bulk-handling system. Farmers' co-operatives, while of considerable strength and weight in that state, have never shown the power, efficiency, and initiative displayed by their counterparts in Western Australia.

Furthermore, the export grain of South Australia moves by short hauls to mills and several scattered ports; and the numerous small terminal elevators that would be required would be less economical to build and operate than larger ones at such ports of other states as Sydney, Geelong, and Williamstown. The grain trade has been most persistently and influentially hostile to the innovation in South Australia, where economic conditions are least favorable to its success. The state has been relatively poor, like Western Australia, and, unlike it, quite conservative in temper, hence doubly reluctant to invest heavily in facilities that could not be assured of paying their way. Latterly, moreover, the development of truck haulage, and the proved feasibility of shipping export wheat in bulk without resort to expensive elevator equipment, entered as new factors.

In 1922 or 1923, an agreement was made between the Minister of Agriculture and the Farmers' Bulk Grain Co-operative Company, Ltd., providing for state aid to furnish bulk-handling facilities. As on a previous occasion, the Adelaide Chamber of Commerce opposed the plan as likely to be a costly failure, this time sending its objections to every mem-

[1] *Primary Producer*, Oct. 5, 1939, p. 5 (T. H. Bath, citing C. Judd).

ber of the state Parliament; and the ratifying bill was not passed.[1] For nearly a decade thereafter, while experience in New South Wales was on the whole such as to discourage emulation in the other states, no other serious move seems to have been made in South Australia.

Early in 1932, however, leaders of the South Australian Farmers' Co-operative Union, Ltd., investigated the unorthodox system then just started in Western Australia. Their favorable report led the Union to favor a similar system in South Australia; and in 1933 it prepared a scheme for a complete bulk-handling system to be owned and operated by the producers, undertaking to proceed as soon as the state railways would agree to carry bulk wheat at the same rate as bagged.[2] But controversy over the type of system, the method of control, and the merits of the main issue as well, continued to delay action. The Railway Department firmly refused to grant leases for any bulk-handling installations at country sidings till the government reached a decision; and this decision was not forthcoming.

The South Australian Parliamentary Committee on Public Works exhaustively considered the matter for several years beginning with 1932, and eventually issued its progress report in 1934–35 recommending, with the approval of the state railway authorities, a scheme including the following features:

1. A "very liberal country siding storage, very much on the Western Australian lines, with cheap construction of iron and timber, ... improved to suit the South Australian conditions, and provide a more permanent structure."

2. Concrete terminals at Port Adelaide and Wallaroo, with capacities of only 550,000 and 92,000 bushels respectively.

3. Conversion of available railway trucks for hauling bulk wheat.

4. Installation first in the Narrow Gauge Zone; if successful there, next in the Broad Gauge Zone, served by Port Adelaide; and latest in the Eyre's Peninsula Zone.

5. Construction and operation by a board of five, representing the Railways, the Harbours Board, the Department of Agriculture, the wheat growers, and the wheat merchants.[3]

But matters continued to drag on, with farmer eagerness less keen than elsewhere, waterfront labor openly opposed, vested interests generally obstructive, and conservatives cautious. In 1935–36, under the auspices of the Liberal and Country League, the Parliamentary Committee twice held conferences on the subject with the Corn Trade Sectional Committee of the Adelaide Chamber of Commerce. Subsequently, with one dissenting vote the latter committee resolved:

> This Committee is not opposed to bulk handling of wheat, but is of the opinion that South Australia would be well advised, before approving of any scheme, to await further information regarding the costs and benefits to be derived from the schemes now being developed in Western Australia and Victoria.[4]

At the opening of the South Australia Parliament July 27, 1937, the Governor's address included this statement: "The negotiations relating to the establishment of works and equipment for the bulk handling of wheat are well advanced and the Ministry will submit for your approval the legislation necessary to authorise this project."[5] The subject was extensively discussed during the session,[6] but it ended before the bill was ready to be introduced. Under the restrictive conditions proposed to be included in the bill, no private concern was ready to undertake the project.[7]

By this time, however, the situation had changed in important respects. Bulk export had come to prevail, even in the absence of port elevators or a country silo system (p. 310). Still more important, at least poten-

[1] Adelaide C. of C., *Report*, April 1923, p. 76.

[2] *The Land, Australian Wheat Annual Number*, June 21, 1933, p. 28; and information direct from the SAFCU, dated Aug. 25, 1933.

[3] Document not consulted, but the main points covered by testimony summarized in W.A. Roy. Com., *Report*, pp. 430–31. See also Com. Aus. Roy. Com., *Second Report*, p. 181, and *Wheat and Grain Review*, Sept. 8, 1934, p. 3. Several witnesses in Western Australia made references to South Australian developments.

[4] Adelaide C. of C., *Report*, April 1936, p. 97.

[5] S.A. *Parl. Deb.* (28th Parl., 6th Sess., 1937), p. 2.

[6] *Ibid.*, pp. 72–73, 81, 123, 149 (opposition by F. J. Condon), 756, 800, 1280, 1771. Cf. Adelaide C. of C., *Report*, April 1938, p. 99.

[7] Letter from K. L. Elphick, secretary, SAFCU, Aug. 24, 1939. We infer that not even the SAFCU found the proposals acceptable.

tially, motor-truck movement of wheat had developed and become popular. The average railway haul in South Australia has been around 80 miles,[1] and many wheat farms are within 50 miles of the nearest port by road. Expansion of truck haulage has been hampered by restrictions designed to protect the state railways, which would lose traffic and have to scrap country handling and storage facilities if motor trucks were accorded "freedom of the roads."[2]

On the eve of the outbreak of the present war, the state Parliament was considering a Wheat Handling and Storage Bill which would concentrate such tasks in a single organization; but even this, which failed to pass, contained no provision for bulk handling.[3] In fact, with little demand for it from the farmers of the state, bulk handling had become a dead issue.

Early in 1940, however, the government was again discussing the introduction of a wheat-storage scheme for 1940–41, to obviate the need for using high-priced cornsacks.[4] Since New South Wales has hurriedly grafted onto its elevator system the bulkhead device in use in Western Australia, it seems probable that South Australia will draw heavily upon the handling and storage devices tested in Western Australia. This seems the more likely since the originator of the Westralian system, John Thomson, has become manager of the Australian Wheat Board, whose interests in protecting the stored wheat are obviously involved. Already, a mouse plague threatens.

In retrospect, it appears that if South Australia had adopted the Metcalf proposals of 1915, or undertaken within the next few years to do as New South Wales did, she would have had a costly "white elephant" on her hands;[5] that political and trade controversies of the past two decades have prevented capital losses that even a less costly comprehensive system would have entailed; that much more limited investments in port loading plants and country facilities at the more distant country shipping points are the most that present and prospective conditions warrant; and that bulk movement by motor truck on improved roads from most of the wheat farms to mills and ports may be the economical outcome in South Australia. Indeed, it seems reasonable to believe that, with very moderate capital outlay for some facilities of the Westralian type, but perhaps without a comprehensive system of country facilities in any form, bulk movement may come to be the rule in that state at costs lower than in any of its neighbors.

VIII. GRADING AND BULK HANDLING

From early days, Australian wheat has been marketed under the f.a.q. ("fair average quality") system, with "standards" fixed after harvest in each of the exporting states on the basis of blended samples from the various districts (Table VIII). Red wheat, never important in Australia, has been excluded from the standard for more than a decade, and rusted wheat is being kept out this season. In some seasons beginning with 1930–31, second-quality standards have been "struck" in New South Wales and Western Australia. With such minor exceptions, mostly since the World War, all the wheat was and is sold simply as "f.a.q.," with dockage initially deducted on lots manifestly below the standard sample and "allowances" granted on arbitrations oversea on lots sold as f.a.q. but adjudged inferior. Varieties with quite different milling characteristics flow into the common pool, though premiums locally offered for hard white wheats keep most of these out of the exported portions of the crops.

For decades the simple, crude f.a.q. system has been under fire, particularly from agricul-

[1] For 1932–33 the Royal Commission (*Second Report*, p. 137) gave the following comparative averages:

State	Railway haul (*miles*)	Rate per bu. for this haul	Rail receipts
South Australia	81	4.21*d.*	3.72*d.*
Western Australia ..	151	4.10	4.13
Victoria	187	4.29	4.45
New South Wales...	282	5.40	4.85

[2] Elphick letter above cited.

[3] *Ibid.*

[4] *Primary Producer*, Feb. 8, 1940, p. 1; *The Land*, Feb. 16, 1940, p. 4.

[5] This was asserted by W. Hannaford in the Legislative Council discussion on Aug. 4, 1937. S.A. *Parl. Deb.*, p. 123.

tural experts who have charged that the general lack of premiums for the better wheats stands in the way of quality improvement and even tends toward deterioration in the average quality.[1] As Australian millers have come to discriminate carefully among wheats with different milling and baking characteristics, they have tended to make their own selections, with somewhat greater difficulty as bulk handling has expanded.

Under the influence of North American examples and advices, it was long confidently expected that a grading system would accompany grain elevators in Australia, and figure heavily in the resulting benefits.[2] Few dissenting voices were raised, and these chiefly by members of the grain trade, whose conservatism and self-interest were generally recognized. The Adelaide Chamber of Commerce, in expressing its reaction against the 1914 resolution of the Associated Chambers of Commerce in favor of bulk handling, said, among other things: "The question of grading is the most important, as far as elevators are concerned, whereas Australian wheat does not need grading."[3]

Actually, bulk handling in Australia has neither promoted nor been dependent upon segregation of wheat by grades. Australian experience does not bear out the view expressed by Duly, as late as 1928:

> . . . . grading is the absolute pre-requisite of bulk handling. If grain is not graded, it cannot be bulked with other grain, but must retain its identity and be sampled frequently for selling purposes. The immense economy of the terminal storage system is only possible after dependable grading.[4]

The New South Wales elevators were originally planned to be adapted to a grading system; but the early country plants, built with special reference to urgent needs for storage, were not. Indeed, it was not till 1938 that the Wheat Commissioner was able to state that the elevator system could handle graded wheat if a scheme were adopted.[5] Such obstacles, plus a good deal of inertia, prevented even much discussion of the draft prepared by a wheat-grading committee in 1920.[6] During the next two decades the critics of the f.a.q. system have repeatedly advocated a change, but in vain; and Queensland's grading system, established in 1921, has not inspired imitation in the exporting states.

The New South Wales Wheat Marketing Act of January 29, 1927 was designated as "An Act to provide for the grading of wheat in bulk" as well as "to regulate the handling of such wheat; and the operation of wheat elevators; and for purposes connected therewith." It provided for a Wheat Standards Board to report to the Ministry of Agriculture within six months after its appointment the number, names, and standards of grades of bulk wheat that it considered advisable to establish, with provision for special grades to be established for a particular harvest if any considerable portion of that harvest could not be included in any of the standard grades. No such board has been appointed, "as the necessity for such appointment has not arisen." Indeed, the New South Wales Department of Agriculture, partly on the basis of investigations abroad in 1934–35 by L. S. Harrison, then assistant manager of the government grain elevators, has come to oppose adoption of a grading system as uneconomical; and farmers in the state have resisted efforts to get them to press for it.[7]

The Commonwealth Royal Commission on

[1] One of the most active critics has been G. L. Sutton, long Director of Agriculture in Western Australia. See his *The F.A.Q. and Other Commercial Standards for Trading in Australian Wheat* (W.A. Dept. Agr. Bull. 188, Perth, 1926); and *The Valuation of Australian Wheat for Commercial Purposes* (W.A. Dept. Agr. Leaflet 461, Perth, 1936).

[2] Abundant evidence of this is given in the N.S.W. Sel. Com., *Min. Ev.*, e.g., pp. 4, 12–13, 15, 22, 26–27, 33, 43.

[3] Associated C. of C., *Report*, March 1915, p. 163.

[4] S. J. Duly, *Grain* (London, 1928), p. 83.

[5] T. H. Bath, in *Primary Producer*, May 20, 1938, p. 3.

[6] E. Harris, "Grading New South Wales Wheats: The Proposed Standard," *Agr. Gaz. N.S.W.*, November 1920, XXXI, 771–72. The draft scheme called for three classes (White, Hard White, and Hard Red), with five grades in each. Only the White has ever been quantitatively important in Australia. See also later notes and brief articles in *ibid.*, May 1921, XXXII, 305–07; July 1923, XXXIV, 465–69; March 1927, XXXVIII, 190–91; December 1927, XXXVIII, 885–90.

[7] *The Land*, Oct. 26, 1934, p. 10; Mar. 1, 1935, p. 6; Aug. 23, 1935, p. 13; Oct. 18, 1935, p. 5; July 17, 1936, p. 8; July 16, 1937, pp. 6–7; and information direct from the Department.

the Wheat, Flour and Bread Industries, reporting early in 1935, concluded after a careful inquiry that:

> the f.a.q. system, though cheap and easy, is relatively inefficient and definitely unjust to districts and individual farmers who produce high grade wheat. . . . . Although the departure . . . . to some new method of grading the wheats of the Australian States is desirable, it is a matter requiring very careful consideration.[1]

The Victorian bulk-handling system is planned to be usable for handling separate grades (p. 351) and, while it was under construction, proposals emanated from Victoria calling for adoption of a co-ordinated grading system by all the exporting states;[2] but no active steps in this direction have been taken. In Western Australia the co-operative leaders are definitely against resort to grading,[3] and we infer that the same is true in South Australia.

The British import trade has latterly frowned upon Argentina's intelligent moves in the direction of grading export wheats, and been no less discouraging to inquiries from Australia. British "Merchants and Millers . . . . prefer the present system of F.A.Q. Standards, under which they have some say, and under which they have redress in the case of an inferior delivery, to any 'Certificate Final' system."[4]

Pleas for the adoption of a grading system continue to be made. Though other methods of "crop improvement" have come into wide use in Australia, a leading British authority on wheat quality remarks in the latest edition of his standard treatise:[5]

> It is difficult to expect improvement in the nature of Australian wheat until a more exact grading system is employed. The "fair average quality" standard is not one which encourages the improvement of wheat or the maintenance of high standards as regards baking quality.

But the opinion now strongly predominates, in almost all circles concerned, that "Australian wheat is so even in type that there is no necessity for a grading system, and if one were adopted the cost of administering it would be considerably greater than any benefit that would be obtained from it."[6]

The need for appropriate differentiation and segregation of Australian wheats by quality appears, nowadays, quite different from what it did even a decade or two ago, as regards Australian and British millers as well as Australian growers; and an unsuitable grading system would be worse than none. It seems clear that the comparative uniformity of Australian wheat types renders the need less urgent than in some other countries; that Australia has been fortunate in not having had a North American grading system imposed in the past; that experience has not yet justified the additional costs of construction due to provision for segregation by grade in the New South Wales and Victorian elevator systems; and that the three bulk-handling systems now in use in Australia could not operate as economically under any form of grading yet contemplated. It remains to be seen whether an efficient, economical procedure can be devised that will be adapted to Australian growing, marketing, milling, and exporting conditions.

IX. RETROSPECT AND PROSPECT

Bulk versus Bags in Practice

The respective advantages and disadvantages of handling grain in bags and in bulk have been canvassed and recanvassed in an extensive literature in various countries, and in Australia for at least forty years. If the proof of the pudding is in the eating, what conclusions does Australian experience yield?

Gains have been realized, more or less as expected, through safeguarding grain from recurrent plagues of mice (particularly devastating ones occurred in 1917, 1924, and 1932), from more frequent but lesser damage from

[1] *Second Report*, pp. 169–70.

[2] T. H. Bath, in *Primary Producer*, May 20, 1938, p. 3.

[3] See Growers' Council of the Wheat Pool of Western Australia, *The F.A.Q. System* (Perth, 1937).

[4] Letter from the secretary of the Liverpool Corn Trade Assn., July 17, 1939. For earlier adverse reactions, see *Agr. Gaz. N.S.W.*, March 1927, XXXVIII, 190–91.

[5] D. W. Kent-Jones, *Modern Cereal Chemistry* (3d ed., Liverpool, 1939), p. 56.

[6] A. H. E. McDonald, Director of Agriculture, New South Wales, letter of Oct. 20, 1939.

weevils, rain, or floods, and perhaps from loss by leakage and by fire. Dust explosions, peculiar to silo handling, have fortunately been rare. On the other hand, the promised saving of freight on dirt and rubbish has not materialized; Australian country plants are not equipped to clean the grain, and the need has not developed. Progress toward better grading has been very slight, and gains from higher marketability and eventually improved quality have not been reaped.

Experience has disappointed the optimistic assertions that all of the cost of sacks, twine, and sewing would be saved under bulk handling. Even in New South Wales, machine sacking is still typical; and most of the grain that is bulked at country sidings reaches there in sacks temporarily fastened. While these can be used several times, not all the costs associated with bag handling are eliminated. When congestion delays or limits bulk receival, part or all of the expected saving is lost.

Bagged wheat, moreover, typically sells at a small premium over bulk wheat (typically ½*d.* to 1*d.* per bushel), and the weight of the sack is paid for as if it were grain. This is due partly to the second-hand value of the sack, and in part to some persisting preference for sacked wheat on the part of Australian millers, who can thus get lots that are more homogeneous from a milling standpoint.[1] Hence the farmer gets back a substantial part of the purchase price of the sack. The "usual" price of new 3-bushel "Chapman" sacks[2] has been 7*s.* 6*d.* to 8*s.* per dozen, but Victorian growers were lucky to get them in 1936 for 5*s.* 6*d.*, and even in peacetime they have been as high as 13*s.*[3]

Substitution of bulk handling has undoubtedly yielded substantial economies in time and labor at country stations, at terminals and ports, and increasingly at the farms. This is an important consideration in Australia, where wages are characteristically high. More problematical as yet are the relief of farmers from "exactions" of labor unions, the effect on Australian labor, and the effects upon the railways—not yet well adjusted to bulk handling except in New South Wales.

Financial gains from bulk handling have fallen far short of the roseate dreams of its early advocates, but eventually proved real. The Commonwealth Royal Commission, which made extensive investigations into costs, published early in 1935 a distinctly cautious appraisal which concluded thus:[4]

> . . . . The Commission has not thought it necessary to analyse in detail the costs of handling wheat by the bulk method as opposed to the bag. To some extent this is a matter for the State authorities. Similarly the adoption of bulk handling as a scheme of transportation in any State must remain a matter for the Parliament and people of that State. The Commission is of the opinion that some saving can be effected by the adoption of bulk handling as opposed to bag handling, but the amount of that saving will depend entirely on the efficiency of the system which is adopted, on the extent of the capital cost which is incurred, and on the extent to which the farmers use the system.

In an official circular designed for general circulation, published in 1936, the New South Wales Department of Agriculture calculated the savings to a representative farmer at about 2¾*d.* per bushel. Some have doubtless realized these and larger economies, but it is reasonable to infer that bulk handling would have developed there far more rapidly and more completely if this had been the general experience. The Western Australia Royal Commission in 1935 found the farmers there unanimous in reporting savings in labor and expense, and estimated their saving at 2*d.* to 3*d.* (more specifically 2½*d.*) per bushel.

The bulk system has also enabled the grower, if he chooses, to retain effective control of his wheat over a longer period, but this has not proved an unmixed blessing. As in other regions, Australian farmers often lose by deferring the sale of their wheat; but the silo system has changed the procedure by which they may defer selling more than it has altered the possibility of such deferment.

[1] The same considerations apply also in the Pacific Northwest of the United States.

[2] Adopted in 1908–09, under pressure from labor unions, and substituted for larger sizes containing 4 bushels or more. The "correct standard size of the 3-bushel sack is 41 in. × 23 in., 8 porter, 9 shot, weight 2¼ lb." Adelaide C. of C., *Report*, April 1911, p. 45; April 1934, p. 107.

[3] See Com. Aus. Roy. Com., *Second Report*, p. 131, and *The Land*, Nov. 6, 1936, p. 7.

[4] Com. Aus. Roy. Com., *Second Report*, pp. 179–81.

In Broader Retrospect

The time required for effective application of bulk handling was gravely underestimated. Construction of the orthodox elevators, in New South Wales and in Victoria also, took much longer than had been expected. Considering the obstacles encountered, the unorthodox facilities in Western Australia were very promptly provided. The New South Wales growers were very slow to patronize the new system, and Victoria seeks to guard against the same inertia by compelling farmers to use it for at least 75 per cent of their marketed crop. Only in Western Australia have farmers eagerly used bulk facilities wherever accessible, hauling longer distances to reach stations with bulk plants. The ratio of volume handled to capacity, however, is unlikely to approach the turnover earlier anticipated.

Lower costs of ocean freight on bulk wheat became a reality only in 1930 or 1931, at long last confuting the skeptics and at least partially justifying the faith of the early enthusiasts. The New South Wales system was premature, and it was a mistake to push it during the war. In various respects, time has borne out the views of those who formerly said "the time is not ripe," "let us wait and see," but also the position taken in Victoria in 1932 that the principle is so soundly established that bulk handling must come into general use—though by no means universally in the form earlier contemplated.

In respect of economy and efficiency, some form of private enterprise would probably do better than a government system; but there has apparently been no time when private business concerns were willing to venture first into this field or when such could have secured the requisite authorization. The New South Wales Department of Agriculture is in many respects outstanding; yet in the conduct of the grain-elevator enterprise it has shown weaknesses characteristic of politically dominated government agencies attempting an essentially business task. By contrast, the co-operative system in Western Australia has shown enterprise seasoned with caution, and flexibility coupled with firmness and fairness. This limited comparison does not necessarily argue in principle in favor of co-operative vs. state construction, control, and operation. The Westralian co-operatives take high rank among the exceptionally well-managed co-operative enterprises in the world of 1915–40. In other states co-operatives might have done less well, and in Victoria the state scheme may work fairly well.

Success in Western Australia despite lack of adequate terminal facilities does not negate the earlier view that such facilities are of basic importance; but it modifies that view and suggests that standards of adequacy are relative, not absolute. Similarly, harmonious collaboration between the bulk-system controllers and the farmers, shippers, state railways, and port authorities is highly desirable; and in neither New South Wales nor Western Australia has the way yet been found to bring this about. But it does not necessitate a controlling body of any particular composition—even for quasi-political purposes. Personnel counts more heavily, and logical appropriateness of representation less, than most governments have realized; and at least for the purposes of operating such a system, there are virtues in single administrative headship, commercial or governmental. But there is need of some auxiliary body, perhaps including representatives of the growers, merchants, bulk-handling authorities, and state railways, probably headed by a cabinet officer, but with expert assistance, that could wrestle with tough problems and recommend solutions of those that repeatedly arise involving capital expenditure and operating procedure.

Looking back over forty years, one can hardly help being impressed by the number and variety of the investigations into the subject of bulk handling in Australia, and by the generally unsatisfactory character of many of them. An outstanding exception is that of the Western Australia Royal Commission of 1935. Its task was indeed easier because, on the initiative of the co-operatives, bulk handling was already a going concern in a small way in the state; but the commission investigated thoroughly and intelligently, reported promptly, and made definite recommendations which, with important exceptions, were promptly acted upon. Comparably efficient

were the Westralian Farmers' investigations through 1930; long negative, and followed up quietly for many years, these were eventually promising enough to warrant limited tests and then bolder experiments in time to insure their holding the field against a government system.[1] The investigations by the Victorian Grain Elevators Board may deserve similar credit.

The shortcomings above referred to were by no means peculiar to bulk-handling investigations, nor to Australia. The procedures employed may have been inevitable under the circumstances. The notable absence of economic experts, in particular, is explained by the fact that such have been available only in recent years. Valuable work in Australia and abroad, moreover, has greatly increased the body of dependable facts, large and small. Great gains have come with improvements in communication of all kinds. Even today, however, there is room for perfecting, in such a commonwealth as Australia, techniques appropriate for what may be called "action research" on such problems as bulk handling. The procedure so well exemplified in the Royal Commission on the Wheat, Flour and Bread Industries in 1934–36, is inadequate by itself.

Prospects

Once established, wisely or unwisely, bulk handling comes to stay. The open questions chiefly concern whether, how far, and how the Australian systems will be expanded further, and what changes in control and operating procedure will be made.

We venture to forecast that bulk movement from farms to country stations will become increasingly prevalent in at least three of the four wheat states, and that bulk movement by truck to mills and ports will supplement such movement in South Australia. Bulk-handling authorities will probably come to accept responsibility for handling all the wheat delivered at country stations, whether in bags or in bulk,[2] and eventually discharge that responsibility smoothly with effective cooperation from the railways. In Western Australia country facilities will doubtless be improved, as well as extended, on the present lines; and adequate terminal elevators and railway trucks will at length be put in use there. Westralian country plants will probably serve as models for similar ones in parts of South Australia, and perhaps to some degree in the other two states, where the orthodox systems will remain standard. Some form of temporary bulkheads, however, will probably become a feature of all the systems to aid in meeting overflow requirements. It would be logical and economical to avoid establishing bulk facilities at country points where receivals must be small; but farmer pressure may, as in other countries, compel such installations. Bag handling will be greatly reduced, but may long continue to have a place in the Australian system.

Through protracted discussions of bulk handling in Australia, there has been much confusion between two objectives that are more or less distinct: economical handling and safe storage. If the emphasis is on bulk *handling,* the systems will certainly cost much less to provide and to operate than if the emphasis is on bulk *storage.* Discriminating decision on this point is needed. Upon it depends the answer to a question of interest to students of the world wheat market: Will the extension of bulk handling—already achieved, in progress, and in prospect—affect the market pressure of Australian wheat, facilitate wider variations in the rate of sale by farmers and into export, and render probable heavier stocks in Australia, in time of peace? Our tentative answer is a qualified affirmative.

Extension and improvement of storage sheds for bagged wheat, and the addition of bulk storage, have reduced the dangers of deterioration in the sack, chiefly from weather damage, or of loss from mice and weevils. Thus growers and the trade have acquired increased ability to hold wheat. Prompt movement after harvest is by no means imperative, if price prospects seem to warrant delayed sale. Storage for several months is inexpensive, though by no means costless. Once the

[1] The W.A. Roy. Com., *Report* (p. xx) stated that in the absence of such considerations it would have recommended control similar to that in Victoria.

[2] This the Australian Wheat Board has refused to permit this season. *The Land,* Jan. 12, 1940, p. 2.

satisfactory storage facilities are filled, however, the risk of damage tends to restrain the use of inferior storage space, and thus to impel sale even at some apparent sacrifice; and, as another harvest approaches, the need for clearing the facilities for the new crop ordinarily requires definitive disposition of the old wheat. Extension and expansion of bulk storage have permitted enlargement of Australian stocks as of August 1, but under ordinary circumstances the considerations just mentioned will set limits to the tendency to enlarge average and maximum carryover as of December 1.

War conditions have already influenced the bulk-handling and storage situation in Australia, and bid fair to leave their permanent impress upon it. Cornsacks have been in short supply because the crops in all the wheat states greatly exceeded forecasts,[1] and dear also because of high shipping costs and urgent war demands for jute and bags. Because of this, South Australia may provide bulk facilities for the next crop, on the tested Westralian model. In New South Wales, with a crop far above late forecasts, and very restricted exports, the country and terminal elevators were quickly choked; bulkheads, similar to those used in Western Australia to take care of surplus deliveries, were hurriedly installed, and by mid-February held nearly 8 million bushels.[2] If that state's bulk receivals exceed the previous record, as anticipated, it will be because of this form of storage. The Australian Wheat Board has sanctioned bulk-storage construction of semi-permanent character at various points in at least two of the states.

The time appears ripe for a competent investigation into the ways in which wartime policies and expedients should dovetail into the sort of postwar handling and storage system that Australia should ultimately have. As wartime pressures permit, the Australian Wheat Board and/or the Australian Agricultural Council are likely to sponsor and arrange for such an investigation by engineering, business, and economic experts. Such a body could draw upon accumulated experience, take due account of varied conditions in the several states, reach as reliable forecasts as possible regarding war requirements and postwar needs, and make appropriate recommendations for action on harmonious but not necessarily uniform lines. Improvements in communication among the states, advances in co-ordinating agencies, and pressure for interstate co-operation which war brings, improve the prospects for state action in conformity with such recommendations.

Whether or not such a policy is followed, Australia seems likely to have to hold wheat in large quantities during the war. Exports have been slow, and Australians may have been overoptimistic regarding the prospects for exporting the wheat already sold in large volume. The idea of restricting acreage in 1940, seriously considered before the big sale to the United Kingdom in January, was subsequently abandoned and might in any case have been difficult to apply. No one, of course, can safely predict the next harvest, the shipping developments in the coming months, or the length of the war; but the odds now are that provision will need to be made for storing much wheat for a considerable period.

The virtues of storage in the sack have not disappeared. The losses in stacked wheat in the last war were by no means extreme; and during this one, with larger knowledge and resources, they can presumably be kept much lower, at a cost. Peacetime requirements do not warrant building permanent bulk-storage facilities adequate for extreme accumulations, and while the war lasts expansion of the elevator plant of the two eastern states will be relatively expensive. Bagged wheat, temporary bulk-storage facilities, and durable bulk-handling and storage plants, all have their proper places in the optimum Australian scheme. If the precise places cannot be defined by a distant student, they can presumably be reasonably ascertained by a well-balanced group of experts on the ground, if these are not dominated by special prejudices, enthusiasms, or notions that there is but one road to salvation.

[1] The first forecast of the total crop was 154 million bushels. In March it was generally agreed that the late-January estimate of 210 million would be exceeded, perhaps substantially.

[2] *The Land, passim*, especially Jan. 12, 1940, p. 4, and Feb. 16, p. 3. The Oct. 14 official forecast was 64½ million bushels; the estimate early in February 76 million.

APPENDIX TABLES

TABLE I.—AUSTRALIAN WHEAT PRODUCTION, BY STATES, AND EXPORTS OF WHEAT AND FLOUR, ANNUALLY 1897–1939, WITH DECENNIAL AVERAGES FROM 1860*

Decade or year	Production (*thousand bushels*)							Exports (*thousand bushels*)			Decade or calendar year
	New South Wales	Victoria	South Australia	Western Australia	Queensland	Tasmania	Total	Total	Wheat	Flour[a]	
1860–69...	1,596	3,481	4,073	326	28	1,118	10,622	.....	.....	.....	1861–70
1870–79...	2,440	5,510	8,493	286	78	904	17,711	.....	.....	.....	1871–80
1880–89...	4,110	10,794	10,909	327	105	747	26,992	7,824	6,344	1,480	1881–90
1890–99...	7,546	12,611	7,645	451	498	1,183	29,934	7,187	5,992	1,195	1891–1900
1900–09...	17,209	19,242	15,213	2,266	1,320	808	56,058	29,648	24,154	5,494	1901–10
1910–19...	30,000	30,632	23,315	9,909	1,097	514	95,480	55,634	42,912	12,722	1911–20
1920–29...	41,184	37,873	29,147	24,255	2,452	479	135,400	90,846	68,931	21,915	1921–30
1930–39...	59,096	39,975	35,866	35,682	4,344	357	175,365	118,728	88,708	30,020	1931–39[b]
1897.....	10,560	10,580	4,015	409	1,009	1,668	28,241	1,790	1,340	450	1898
1898.....	9,276	19,581	8,779	871	607	2,304	41,418	12,329	10,779	1,550	1899
1899.....	13,604	15,238	8,453	967	614	1,101	39,978	14,166	10,816	3,350	1900
1900.....	16,174	17,847	11,253	775	1,194	1,110	48,353	25,101	20,260	4,841	1901
1901.....	14,809	12,127	8,013	957	1,692	964	38,562	10,658	8,999	1,659	1902
1902.....	1,585	2,569	6,355	986	6	877	12,378	1,575	1,173	402	1903
1903.....	27,334	28,526	13,209	1,876	2,437	767	74,150	38,319	33,072	5,247	1904
1904.....	16,464	21,092	12,023	2,013	2,150	793	54,536	32,364	24,648	7,716	1905
1905.....	20,737	23,418	20,144	2,308	1,137	776	68,521	38,606	30,262	8,344	1906
1906.....	21,818	22,618	17,467	2,759	1,109	651	66,421	36,956	28,784	8,172	1907
1907.....	9,156	12,101	19,136	2,926	694	644	44,656	20,634	15,027	5,607	1908
1908.....	15,483	23,346	19,398	2,461	1,203	701	62,591	37,788	31,549	6,239	1909
1909.....	28,532	28,780	25,134	5,602	1,572	794	90,414	54,479	47,762	6,717	1910
1910.....	27,914	34,813	24,345	5,898	1,022	1,121	95,112	63,591	55,148	8,443	1911
1911.....	25,080	20,892	20,353	4,359	285	660	71,636	40,673	32,604	8,069	1912
1912.....	32,467	26,223	21,496	9,169	1,976	630	91,981	53,563	42,923	10,640	1913
1913.....	37,996	32,936	16,937	13,331	1,769	350	103,344	61,239	52,877	8,362	1914
1914.....	12,813	3,941	3,527	2,624	1,585	384	24,892	1,813	1,434	379	1915
1915.....	66,726	58,522	34,135	18,236	414	994	179,066	56,489	44,062	12,427	1916
1916.....	36,585	51,162	45,745	16,103	2,463	348	152,420	63,874	49,013	14,861	1917
1917.....	37,705	37,738	28,693	9,304	1,035	252	114,734	39,758	21,599	18,159	1918
1918.....	18,325	25,240	22,937	8,845	105	187	75,638	112,319	81,249	31,070	1919
1919.....	4,387	14,858	14,980	11,223	312	214	45,975	63,017	48,208	14,809	1920
1920.....	55,611	39,469	34,259	12,248	3,707	566	145,874	116,632	102,069	14,563	1921
1921.....	42,759	43,868	24,947	13,905	3,026	577	129,089	85,226	68,513	16,713	1922
1922.....	28,661	35,697	28,785	13,857	1,878	570	109,455	63,144	39,620	23,524	1923
1923.....	33,171	37,796	34,552	18,920	244	306	124,993	82,202	59,573	22,629	1924
1924.....	59,752	47,364	30,529	23,887	2,780	231	164,559	120,314	98,770	21,544	1925
1925.....	33,801	29,256	28,603	20,471	1,973	396	114,504	75,416	52,775	22,641	1926
1926.....	47,374	46,886	35,559	30,022	379	537	160,762	106,225	80,980	25,245	1927
1927.....	27,042	26,161	24,066	36,370	3,784	773	118,200	81,371	58,423	22,948	1928
1928.....	49,257	46,819	26,826	33,790	2,516	455	159,679	101,087	74,964	26,123	1929
1929.....	34,407	25,413	23,345	39,081	4,235	376	126,885	76,838	53,619	23,219	1930
1930.....	65,877	53,814	34,872	53,504	5,108	391	213,594	158,279	131,656	26,623	1931
1931.....	54,966	41,956	48,093	41,521	3,864	183	190,612	153,252	123,735	29,517	1932
1932.....	78,870	47,843	42,430	41,792	2,494	433	213,927	144,604	115,195	29,409	1933
1933.....	57,057	42,613	35,373	37,305	4,362	561	177,338	95,524	65,541	29,983	1934
1934.....	48,678	25,850	27,456	26,985	4,076	308	133,393	102,858	69,966	32,892	1935
1935.....	48,822	37,552	31,616	23,315	2,690	186	144,217	97,886	71,049	26,837	1936
1936.....	55,668	42,845	28,715	21,549	2,016	571	151,390	101,668	74,403	27,265	1937
1937.....	55,104	48,173	43,429	36,225	3,749	525	187,255	126,614	94,041	32,573	1938
1938.....	59,898	18,104	31,674	36,844	8,584	216	155,379	87,868[c]	52,783[c]	35,085[c]	1939
1939[d].....	76,000	46,000	40,000	41,500	6,700	200	210,450	.....	.....	.....	1940

* See notes under Table II.

[a] Flour converted to wheat at 1 short ton = 50 bu. through 1907 and 48 bu. thereafter.

[b] Nine-year average.

[c] Preliminary.

[d] Latest available estimates, to be revised, in the aggregate probably upward.

TABLE II.—AUSTRALIAN WHEAT ACREAGE AND YIELD PER ACRE, BY STATES, ANNUALLY 1897–1939, WITH DECENNIAL AVERAGES FROM 1860*

Decade or year	Acreage sown for grain (*thousand acres*)							Yield (*bushels per acre*)						
	New South Wales	Victoria	South Australia	Western Australia	Queensland	Tasmania	Total	Total	New South Wales	Victoria	South Australia	Western Australia	Queensland	Tasmania
1860-69 ...	138	195	411	21	2	64	831	12.78	11.57	17.85	9.91	15.52	14.00	17.47
1870-79 ...	174	432	959	25	5	52	1,647	10.75	14.02	12.75	8.86	11.44	15.60	17.38
1880-89 ...	300	1,078	1,804	28	6	42	3,258	8.28	13.70	10.01	6.05	11.68	17.50	17.79
1890-99 ...	759	1,564	1,629	41	32	62	4,087	7.32	9.94	8.06	4.69	11.00	15.56	19.08
1900-09 ...	1,612	1,984	1,774	204	97	40	5,711	9.82	10.68	9.70	8.58	11.11	13.61	20.20
1910-19 ...	2,790	2,571	2,313	1,120	105	28	8,928	10.69	10.75	11.91	10.08	8.85	10.45	18.36
1920-29 ...	3,313	2,849	2,719	2,228	159	22	11,290	11.99	12.43	13.29	10.72	10.89	15.42	21.77
1930-39 ...	4,339	2,997	3,442	3,096	299	16	14,191	12.36	13.62	13.34	10.42	11.53	14.53	22.31
1897	993	1,657	1,523	39	58	86	4,356	6.48	10.63	6.38	2.64	10.56	17.47	19.42
1898	1,320	2,154	1,789	75	46	85	5,469	7.57	7.03	9.09	4.91	11.61	13.13	27.01
1899	1,426	2,166	1,821	84	53	64	5,614	7.12	9.54	7.04	4.64	11.44	11.70	17.12
1900	1,531	2,017	1,913	74	79	52	5,667	8.53	10.57	8.85	5.88	10.42	15.06	21.43
1901	1,392	1,754	1,743	95	87	44	5,116	7.54	10.64	6.91	4.60	10.10	19.40	21.86
1902	1,280	1,994	1,747	92	2	41	5,156	2.40	1.24	1.29	3.64	10.67	3.28	21.44
1903	1,561	1,969	1,711	138	138	49	5,566	13.32	17.51	14.49	7.72	13.60	17.65	15.53
1904	1,776	2,278	1,840	182	151	43	6,270	8.70	9.27	9.26	6.53	11.06	14.24	18.40
1905	1,939	2,071	1,757	195	119	41	6,123	11.19	10.69	11.31	11.46	11.83	9.53	18.79
1906	1,866	2,032	1,686	250	115	33	5,982	11.10	11.69	11.13	10.36	11.02	9.68	19.86
1907	1,390	1,847	1,754	280	82	31	5,384	8.29	6.59	6.55	10.91	10.46	8.41	20.92
1908	1,394	1,780	1,694	285	81	29	5,262	11.89	11.11	13.12	11.45	8.63	14.87	24.08
1909	1,990	2,097	1,896	449	117	37	6,586	13.73	14.34	13.72	13.26	12.48	13.41	21.41
1910	2,129	2,398	2,105	582	107	52	7,372	12.90	13.11	14.52	11.57	10.14	9.58	21.45
1911	2,380	2,164	2,191	612	43	37	7,428	9.64	10.54	9.65	9.29	7.12	6.64	17.73
1912	2,231	2,085	2,080	793	125	25	7,340	12.53	14.56	12.58	10.34	11.56	15.81	24.99
1913	3,204	2,566	2,268	1,097	133	18	9,287	11.13	11.86	12.84	7.47	12.15	13.34	18.97
1914	2,756	2,864	2,503	1,376	127	24	9,651	2.58	4.65	1.38	1.41	1.91	12.48	16.10
1915	4,186	3,680	2,739	1,734	94	49	12,485	14.34	15.94	15.90	12.46	10.52	4.42	20.43
1916	3,806	3,126	2,778	1,567	228	28	11,533	13.22	9.61	16.37	16.46	10.28	10.81	12.53
1917	3,329	2,690	2,356	1,250	128	22	9,775	11.74	11.33	14.03	12.18	7.44	8.10	11.57
1918	2,410	2,214	2,186	1,146	22	12	7,990	9.47	7.60	11.40	10.49	7.72	4.83	15.66
1919	1,474	1,918	1,927	1,042	46	11	6,419	7.16	2.98	7.75	7.77	10.77	6.71	18.58
1920	3,127	2,296	2,168	1,276	177	28	9,072	16.08	17.79	17.19	15.80	9.60	20.91	20.01
1921	3,194	2,611	2,384	1,336	165	28	9,719	13.28	13.39	16.80	10.46	10.41	18.37	20.62
1922	2,942	2,644	2,453	1,553	145	25	9,764	11.21	9.74	13.50	11.73	8.92	12.91	22.56
1923	2,945	2,454	2,418	1,657	51	15	9,540	13.10	11.26	15.40	14.29	11.42	4.76	21.07
1924	3,549	2,705	2,500	1,868	189	13	10,825	15.20	16.83	17.51	12.21	12.79	14.70	17.86
1925	2,925	2,513	2,466	2,112	166	19	10,201	11.22	11.56	11.64	11.60	9.69	11.89	20.72
1926	3,352	2,915	2,768	2,571	57	23	11,688	13.75	14.13	16.08	12.84	11.68	6.65	23.15
1927	3,030	3,064	2,941	2,999	215	29	12,279	9.63	8.92	8.54	8.16	12.12	17.59	26.25
1928	4,090	3,719	3,446	3,344	218	23	14,840	10.76	12.04	12.59	7.79	10.10	11.54	20.17
1929	3,974	3,566	3,646	3,568	204	17	14,977	8.47	8.66	7.13	6.40	10.95	20.75	22.37
1930	5,135	4,600	4,181	3,956	272	19	18,165	11.76	12.83	11.70	8.34	13.53	18.76	20.49
1931	3,683	3,566	4,071	3,159	249	12	14,741	12.93	14.92	11.77	11.81	13.14	15.53	15.61
1932	4,804	3,231	4,067	3,389	250	21	15,766	13.57	16.42	14.81	10.43	12.33	9.97	20.64
1933	4,584	3,053	3,822	3,183	232	24	14,901	11.90	12.45	13.96	9.26	11.72	18.80	23.27
1934	3,893	2,458	3,188	2,764	222	17	12,544	10.63	12.50	10.51	8.61	9.76	18.38	18.46
1935	3,851	2,324	2,989	2,541	240	10	11,957	12.06	12.68	16.16	10.58	9.18	11.30	17.88
1936	3,983	2,394	3,058	2,575	284	21	12,316	12.29	13.98	17.90	9.39	8.37	7.11	26.78
1937	4,465	2,686	3,162	3,026	373	21	13,735	13.63	12.34	17.93	13.73	11.97	10.05	25.00
1938	4,568	2,748	3,080	3,413	442	10	14,263	10.89	13.11	6.59	10.28	10.80	19.42	23.82
1939[a]	4,426	2,907	2,800	2,949	425	8	13,517	15.57	17.17	15.82	14.29	14.07	15.76	24.00

* Data for Tables I and II are mainly from Commonwealth Bureau of Census and Statistics, *Production . . . . Bulletin No. 32*, Part II (Canberra, 1939), pp. 78, 81–83, supplemented by revised data from more recent official publications.

The crops are harvested late in one calendar year, and used or exported largely in the next. Production, acreage, and yield totals include, from 1911–12, figures for Federal Capital Territory, formerly part of New South Wales; at least to 1939–40, its maximum wheat crop was 67,000 bushels in 1933–34. Production in the Northern Territory has been negligible.

Since the Australian publication cited above gives export data for July–June years after 1913, export data by calendar years 1914–38 (as yet incomplete for 1939) are from International Institute of Agriculture Yearbooks. There was probably an excess of imports in 1896, 1897, and possibly 1898. At least since 1901, imports have exceeded 200,000 bushels in only two years, as follows in thousand bushels: 1903—12,607 (wheat, 9,114); 1915—7,384 (wheat, 7,371).

Especially relevant to data in Table II are: M. K. Bennett and Helen C. Farnsworth, "World Wheat Acreage, Yields, and Climates" (with maps), WHEAT STUDIES, March 1937, XIII, 265–308; and M. K. Bennett, "Trends of Yield in Major Wheat Regions since 1885," *ibid.*, November 1937 and March 1938, XIV, 60, 226–30.

[a] Latest available estimates, subject to revision.

TABLE III.—AUSTRALIAN WHEAT SUPPLIES AND DISPOSITION, ANNUALLY FROM 1925–26*

(Million bushels)

Marketing year Dec.-Nov.	Stocks, Dec. 1[a]			Crop[a]	Total supplies	Food use[c]	Seed use[a]	Feed use, etc.[d]	Total domestic use[e]	Net exports[a]		
	Flour[b]	Wheat	Total							Total	Wheat	Flour[b]
1925-26.....	...	...	4.6	114.5	119.1	29.7	11.6	—1.2	40.1	72.1	49.7	22.4
1926-27.....	...	...	6.9	160.8	167.7	30.3	14.5	2.5	47.3	108.3	83.4	24.9
1927-28.....	4.5	7.6	12.1	118.2	130.3	30.9	15.7	—3.8	42.8	76.3	53.5	22.8
1928-29.....	3.4	5.5	8.9	159.7	168.6	31.3	15.9	.4	47.6	104.9	79.1	25.8
1929-30.....	4.5	11.1	15.6	126.9	142.5	31.7	19.1	5.5	56.3	72.3	49.3	23.0
1930-31.....	3.7	10.1	13.8	213.6	227.4	32.0	15.6	1.5	49.1	158.0	131.8	26.2
1931-32.....	3.9	12.7	16.6	190.6	207.2	32.2	16.3	—2.3	46.2	150.2	120.8	29.4
1932-33.....	4.2	6.6	10.8	213.9	224.7	32.5	15.7	8.4	56.6	149.5	120.1	29.4
1933-34.....	4.1	14.4	18.5	177.3	195.8	32.7	13.3	15.1	61.1	94.5	64.1	30.4
1934-35.....	5.4	34.7	40.1	133.4	173.5	33.0	12.7	6.6	52.3	104.5	71.8	32.7
1935-36.....	4.3	12.4	16.7	144.2	160.9	33.2	13.1	8.5	54.8	97.6	70.7	26.9
1936-37.....	4.9	3.5	8.4	151.4	159.8	33.5	14.5	3.6	51.6	99.3	72.0	27.3
1937-38.....	3.7	5.2	8.9	187.3	196.2	33.8	14.9	3.7	52.4	130.4	97.6	32.8
1938-39.....	4.3	9.1	13.4	155.4	168.8	34.1	14.3	9.7	47.4[f]	90.8[f]	55.8[f]	35.0[f]
1939-40[f].....	4.7	15.9	20.6	210.4	231.0	34.4	....	...	....	....	....	....

* Mainly latest official data, from Commonwealth *Production Bulletin, Official Year Book,* and *Monthly Summary of the Wheat Situation in Australia.*

[a] Official data.

[b] Flour converted to wheat at 1 short ton = 48 bu. (69.4 per cent extraction).

[c] Our estimates, taking 4.9 bu. per capita of officially estimated population, June 30.

[d] Total domestic use less the sum of food use and seed use. Very small or negative items probably imply underestimates of crops.

[e] Total supplies less the sum of total net exports and year-end stocks.

[f] Preliminary.

TABLE IV.—BULK HANDLING OF WHEAT IN NEW SOUTH WALES, ANNUALLY FROM 1920–21*

(Quantities in thousand bushels)

Marketing year	Country elevators			System receipts		Total receipts		System deliveries to mills	System shipments in bulk overseas[c]	Bulk exports as percentage of all wheat exports overseas[c]	Wheat stored in elevators June 30†	Percentage of bulk receipts in store, June 30[b]
	Number[a]	Average capacity[b]	Total capacity[c]	Country elevators	Total[d]	As percentage of estimated crop	As percentage of receipts at rail					
1920-21.....	28	194.6	5,450	1,942	1,942	3.5	4.2	111	.....	....	.....	....
1921-22.....	28	194.6	5,450	3,248	4,337	10.1	12.7	1,485	.....	....	.....	....
1922-23.....	54[a]	213.9	11,550	4,290	4,597	16.0	21.2	1,286	.....	....	.....	....
1923-24.....	58[a]	216.4	12,550	5,411	6,439	19.4	25.4	3,089	2,428	45.8	.....	....
1924-25.....	61	217.2	13,250	16,335	17,772	29.7	35.1	4,994	13,031	40.9	.....	....
1925-26.....	62	217.7	13,500	8,295	9,136	27.0	34.9	4,809	4,947	46.1	1,821	20.0
1926-27.....	66	213.6	14,100	12,244	12,760	26.8	34.5	6,961	4,359	40.5	5,927	46.4
1927-28.....	73[a]	207.9	15,180	6,178	6,347	23.5	32.3	4,494	2,924	59.0	3,216	50.7
1928-29.....	84	186.1	15,630	14,778	15,189	30.8	36.7	9,193	6,336	33.5	4,710	31.0
1929-30.....	90[a]	176.3	15,863	8,740	8,887	25.8	34.2	7,380	93	10.9	7,171	80.7
1930-31.....	99	165.4	16,373	22,948	23,673	35.9	41.3	8,309	12,195	39.3	9,530	40.3
1931-32.....	105	158.2	16,613	23,878	26,001	47.3	53.1	9,617	16,703	59.4	10,900	41.9
1932-33.....	111	154.8	17,183	33,955	34,455	43.7	52.2	10,191	21,619	68.3	12,769	37.1
1933-34.....	119	148.7	17,693	21,230	21,797	38.2	41.9	11,831	8,155	79.1	18,262	83.8
1934-35.....	149	141.5	21,083	21,509	21,509	43.9	54.6	9,735	10,841	71.0	16,288	75.7
1935-36.....	158	137.8	21,773	24,812	25,108	51.4	62.8	11,145	21,787	93.9	5,432	21.6
1936-37.....	175	132.1	23,123	29,088	29,231	53.3	64.3	11,034	19,253	95.1	5,034	17.2
1937-38.....	175	132.7	23,223	32,533	32,680	59.3	72.5	15,826	15,055	92.3	9,288	28.4
1938-39.....	175[a]	133.3	23,323	27,591	27,898	47.2[f]	59.4[b,f]	.....	12,926	86.0	7,827	28.1
1939-40.....	175	134.1	23,473	.....	.....	....	....	.....	.....	....	.....	....

* Official data mainly from N.S.W. Department of Agriculture, *Report, 1939,* pp. 15, 31.

† Official data kindly furnished by the Director of Agriculture.

[a] Including some not opened for lack of crops in the tributary area.

[b] Our computation.

[c] Affected through additions at new stations and to plants previously built.

[d] Including bagged and bulk wheat received into terminal elevators from non-silo country stations. On terminal elevator capacity, see pp. 322, 325.

[e] July–June years.

[f] Subject to revision.

TABLE V.—SIGNIFICANT FINANCIAL DATA ON THE NEW SOUTH WALES ELEVATOR SYSTEM*

(Thousand Australian pounds)†

Fiscal year July-June	From General Loan Fund[a] (cumulated)	Annual interest on loans	Net operating receipts[b]	Excess of interest	
				Annual	Cumulated
1916-17...	21	.8	—	.8	1
1917-18...	62	2.5	—	2.5	3
1918-19...	586	25.4	—	25.4	29
1919-20...	1,229	57.5	—	57.5	86
1920-21...	2,044	97.2	7.2	90.0	176
1921-22...	2,593	131.2	14.8	116.4	293
1922-23...	3,294	170.0	20.7	149.3	442
1923-24...	3,450	170.1	1.3	168.7	611
1924-25...	3,545	173.0	91.9	81.1	692
1925-26...	3,585	182.3	29.6	152.7	844
1926-27...	3,709	183.9	82.2	101.8	946
1927-28...	3,844	189.9	27.1	162.8	1,109
1928-29...	3,968	197.6	98.3	99.3	1,208
1929-30...	3,991	205.2	74.6	130.6	1,339
1930-31...	4,045	206.7	165.0	41.8	1,381
1931-32...	4,093	197.6	189.3	17.3	1,398
1932-33...	4,159[a]	180.6	292.4	(111.8)[c]	1,286
1933-34...	4,481	184.9	239.9	(55.0)[c]	1,231
1934-35...	4,773	187.1	189.7	(2.5)[c]	1,229
1935-36...	5,065	187.8	124.6	63.2	1,292
1936-37...	5,107	188.6	235.2	(46.6)[c]	1,245
1937-38...	5,131	187.8	296.0	(108.3)[c]	1,137
1938-39...	5,184	189.4	.....	(.....)	.....

* Data from N.S.W. Department of Agriculture, *Report, 1939*, p. 9.

† The Australian pound remained within 3 per cent above or below the British pound until March 1930; during the following months it fell steadily until it was stabilized at 1.3 to the British pound in January 1931; in December 1931 the rate was changed to 1.25, at which it has remained. *Official Year Book of the Commonwealth of Australia, 1936*, p. 815.

[a] Additional capital expenditures of £30,836 from Unemployment Relief Fund in 1932-33.

[b] Exclusive of freight account.

[c] Excess of net operating receipts over interest charges.

TABLE VII.—BULK HANDLING OF WHEAT IN WESTERN AUSTRALIA, ANNUALLY FROM 1931-32*

(Quantities in thousand bushels)

Marketing year	Country silos			System receipts	Receipts		System shipments in bulk overseas	Percentage of total shipments
	Number	Average capacity	Total capacity[a]		As percentage of estimated crop	As percentage of marketed crop		
1931-32..	5	112.6	563	1,265	3.0	3.4	128	0.4
1932-33..	5	112.6	563	1,564	3.7	4.1	1,313	4.1
1933-34..	53	115.1	6,102	11,095	29.7	32.7	10,618	39.1
1934-35..	53	115.1	6,102	10,018	37.1	42.9	9,692	50.4
1935-36..	53	115.1	6,102	7,125	30.6	36.4	6,368	44.4
1936-37..	102	101.2	10,318	10,376	48.8	58.3	7,395	61.8
1937-38..	136	92.3	12,550	24,421	67.4	75.7	20,842	83.1
1938-39..	173	82.3	14,333	27,713	75.2	84.0	....	....
1939-40..	207	75.4	15,600	36,858[b]	....	....	....	....

* Data through 1938-39 kindly furnished by Co-operative Bulk Handling, Ltd., through the Wheat Pool of Western Australia; for 1939-40 from *Primary Producer*, Oct. 26, 1939, p. 1, and Feb. 15, 1940, p. 5.

[a] Exclusive of temporary bulkheads.

[b] To Feb. 10, 1940, as first reported; revised figure will be lower. *Primary Producer*, Feb. 29, p. 5.

TABLE VI.—DATA BEARING ON MILLERS' USE OF BULK WHEAT IN NEW SOUTH WALES, 1920-21 TO 1937-38

Year	Quantities (*thousand bushels*)		Ratios (*per cent*)	
	Wheat ground, July-June*	Bulk-system deliveries to mills†	Col. 2, to col. 1	Bulk-system receipts, to total receipts at rail†
1920-21...	11,596	111	1.0	4.2
1921-22...	16,020	1,485	9.3	12.7
1922-23...	17,035	1,286	7.5	21.2
1923-24...	19,684	3,089	15.7	25.4
1924-25...	18,845	4,994	26.5	35.1
1925-26...	20,675	4,809	23.3	34.9
1926-27...	20,598	6,961	33.8	34.5
1927-28...	19,134	4,494	23.5	32.3
1928-29...	21,478	9,193	42.8[a]	36.7
1929-30...	20,572	7,380	35.9[a]	34.2
1930-31...	21,657	8,309	38.4	41.3
1931-32...	23,745	9,617	40.5	53.1
1932-33...	25,221	10,191	40.4	52.2
1933-34...	24,033	11,831	49.2[a]	41.9
1934-35...	27,042	9,735	36.0	54.6
1935-36...	25,277	11,145	44.1	62.8
1936-37...	22,383	11,034	49.3	64.3
1937-38...	22,707	15,826	69.7	72.5

* Data from Commonwealth *Production Bulletins*.

† Data from N.S.W. Department of Agriculture, *Report, 1939*, p. 15. The period covered is not stated, but is probably the marketing year December-November.

[a] Only in these years is this percentage higher than the one opposite.

TABLE VIII.—F.A.Q. STANDARDS FOR AUSTRALIAN WHEAT, ANNUALLY FROM 1925-26*

(Pounds per Imperial bushel)

Season	N.S.W.	Vic.	S.A.	W.A.
1925-26.....	62¼	61½	61	62
1926-27.....	61¼	61¾	61	61¾
1927-28.....	60¼	61¾	62	61½
1928-29.....	63	62	62	62½
1929-30.....	61¾	62	60½	62½
1930-31.....	59½	58½	60	62½
1931-32.....	61½	62¾	61½	61¾
1932-33.....	61¾	62	60	62
1933-34.....	59	60	60	61½
1934-35.....	61¼	60	60½	62½
1935-36.....	64	63½	63½	63½
1936-37.....	62	62	63	63½
1937-38.....	64	63½	60½	63¾
1938-39.....	64½	64½	64½	63¾
1939-40.....	63¼	63½	64	63½

* Data compiled from various trade and official sources, in which there are discrepancies in occasional years.

The f.a.q. standard is essentially a combination of average test weight and a mixed sample, so drawn as to be fairly representative of the season's crop of a state and available in fractional samples for comparison with samples of particular lots, parcels, or cargoes. The sample is the more important feature in practice, though it is the test weight by which a year's standard is commonly known.

Because of changes in the scales used, and variations in methods of procedure, the series are not strictly comparable throughout. The Schopper 1-liter chondrometer (properly, the Sommer and Runge), in use from 1935-36, yields weights considerably higher than the former scales did.

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