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APPENDIX

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APPENDIX 2 EXPLANATORY NOTES

Megass—is the most commonly used term in C.S.R. mills for what is more widely known as *bagasse*. It is the residual fibre left after crushing cane and extracting the juices.

Money Values—unless otherwise stated, are expressed in the currency of the country under consideration, i.e., £F (Fijian pounds) and £NZ (New Zealand pounds) in the respective chapters dealing with those countries, and £A (Australian pounds) elsewhere in the book.

Mean exchange rates on 1st October, 1955, were:

£F100	=	£A112.1.3
£NZ100	=	£A124.5.5
£Stg100	=	£A125.5.0
£A100	=	U.S. \$222.45

Net Titre (or N.T.)—is a measure of the commercial value, for refining purposes, of a raw sugar. It is calculated by an empirical formula from the chemical analysis of the sugar. For payment and statistical purposes the equivalent tonnage of sugar at a common standard net titre is used. In Australia and Fiji raw sugars are assessed on a 94 N.T. basis (e.g., 100 tons 96 N.T. sugar is assessed as $100 \times \frac{96}{94}$ tons of 94 N.T. sugar).

P.O.C.S. (Pure Obtainable Cane Sugar)—This is a figure calculated from the analysis of cane and forms a basis for assessment of the percentage of cane sugar recoverable under specified conditions of manufacture. P.O.C.S. and C.C.S. (Commercial Cane Sugar) are the same. See also Appendix 23.

Polarization—A measure of the percentage cane sugar (sucrose) content. It is determined by use of the saccharimeter (or polariscope), an instrument which measures the amount of sucrose in a solution by the degree of rotation of a ray of polarized light passed through the solution. In many countries the polarization is used as the measure of quality for adjustment of the price of raw sugar.

Ratoon—A subsequent crop of cane sprouting from the stumps and roots remaining in the ground after harvesting.

Stool—The cluster of cane stalks arising from the planting of a cutting; or sett, or from a ratoon regrowth.

Sucrose—is cane sugar ($C_{12}H_{22}O_{11}$).

Tel quel—means "as is". For statistical and commercial purposes raw sugar is generally assessed according to some accepted standard of quality such as 96% polarization or 94 N.T., but in some cases weights of raw sugar "as it comes" are taken and such weights are generally designated *tel quel*.

Weights—Unless otherwise stated, tons means long tons of 2,240 lbs.

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APPENDIX 3 ACTIVITIES OF THE COLONIAL SUGAR REFINING COMPANY LIMITED

<i>Sugar refining</i> ...	C.S.R. is the main sugar refiner in Australia, owning 5 of the 6 Australian refineries, and is the sole refiner in New Zealand.
<i>Raw sugar milling</i> ...	Seven of Australia's thirty-four raw sugar mills are owned by C.S.R., which makes about one-fifth of Australia's total raw sugar. The company also owns five raw sugar mills in Fiji, where it is now the only mill owner.
<i>Sugar marketing</i> ...	C.S.R. markets most of the refined sugar consumed in Australia and all in New Zealand and maintains branch offices in Auckland, Brisbane, Melbourne, Adelaide and Perth. The company also markets all Australian and Fijian raw sugar exported, and procures raws from abroad for New Zealand.
<i>Distilling</i>	C.S.R. distilleries at Sydney and Melbourne ferment molasses and distil industrial alcohols and rum.
<i>Building materials manufacture</i>	C.S.R. makes Cane-ite, Timbrock and Gyprock wallboards, asbestos cement products, floor tiles, ceiling tiles and building plaster, and owns asbestos and gypsum mines.
<i>Industrial chemicals manufacture</i>	C.S.R. has a sixty per cent holding in C.S.R. Chemicals Pty. Ltd, manufacturers of a large range of industrial and pharmaceutical chemicals.
<i>Shipping</i> ...	Three C.S.R. general cargo and molasses carrying vessels ply between Australia, Fiji and New Zealand.
<i>Research</i>	The C.S.R. research establishments constitute probably the largest non-government research organization in the South Pacific. There are C.S.R. research laboratories in Sydney and field experiment stations in N.S.W., Queensland and Fiji.
<i>Agricultural advisory service</i>	In all C.S.R. mill areas the company maintains a staff to advise farmers on matters associated with cane cultivation.

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APPENDIX 4 SUGAR IN THE SOUTH PACIFIC 1787-1955

A Chronological Summary

- 1787 The First Fleet shipped, at the Cape of Good Hope, "the fig-tree, bamboo, Spanish reed, sugar cane" and many other plants, seeds, vines and grain.
- 1788 Lieutenant Philip Gidley King, Commandant at Norfolk Island, reports to Governor Phillip "the sugar cane thrives very well".
- 1802 First beet sugar factory starts in Silesia, Germany. Beet sugar production was later to have a serious effect upon the fortunes of the South Pacific sugar industry.
- 1811 Napoleon Bonaparte takes steps to develop the European beet sugar industry.
- 1817 Thomas Alison Scott is said to have brought to Sydney Botanic Gardens, from the Society Islands, the first sugar canes known to have been planted on the Australian continent.
- 1823 Scott makes a small quantity of raw sugar from Australian-grown canes. This was the first raw sugar to be produced in Australia.
- 1827 Scott makes some tons of raw sugar at the penal settlement of Port Macquarie, from cane grown in the district.
- 1839 Australian Sugar Company formed in London to refine imported raw sugars in Sydney. (This company erected a refinery at Canterbury, but was dissolved before factory commenced operations.)
- 1840 All sugars for Australian colonies imported. Official statistics for Port of Sydney for year 1840 (recorded in manuscript) show imports of Mauritius, Java and Manila "moist" sugars (5,183 tons) and imports of "refined" from Great Britain and U.S.A. (1,195 tons).

Edward Knox arrives in Sydney.

South Sea Islanders used as shepherds at Twofold Bay, N.S.W., during the 1840s. This was probably the first time Kanaka labour was used in Australia.

- 1842 Australasian Sugar Company formed in Sydney to take over the assets of the Australian Sugar Company.

The Canterbury refinery commences operations, processing imported raw sugars and producing the first locally refined sugar in Australia.

- 1843 Edward Knox appointed manager of the Australasian Sugar Company, at the age of twenty-four.

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- 1847 Sugar canes grown in the Botanic Gardens, Brisbane.
- 1854 Australasian Sugar Company dissolved.
- 1855 Colonial Sugar Refining Company formed in Sydney, taking over some of the assets of the Australasian Sugar Company. The Canterbury refinery was closed down. The new company bought the "Brisbane House" refinery in Parramatta Street.
- 1857 Victoria Sugar Company formed in Melbourne, by C.S.R. shareholders and Victorian business interests.
- 1857-1858 Serious depression in the sugar trade. C.S.R. in financial difficulties.
- 1862 John Buhôt makes a small quantity of raw sugar; the first to be produced in Queensland.
- 1863 Captain the Hon. Louis Hope has 20 acres under sugar cane, largely from seed canes obtained from T. A. Scott.
First shipment of Kanakas to arrive in Queensland, sent to Captain Robert Towns's cotton plantation. As cotton failed, Kanaka labourers were recruited for the Queensland sugar plantations.
- 1864 Sugar and Coffee Regulations enacted in Queensland to encourage these industries.
- 1864-1867 Attempts to grow cane and manufacture raw sugar in N.S.W. Very primitive equipment.
- 1865 Capt. Louis Hope opened the first commercial-scale sugar mill in Australia at Ormiston, near Brisbane.
- 1868 Richard Meares's steam-driven mill on the Hastings River operating; this was the first reasonably efficient mill in New South Wales.
C.S.R. sends Melmoth Hall to the northern rivers of N.S.W. to examine prospects for establishment of centrally situated mills to purchase cane from independent small farm growers. This was a revolutionary departure from the prevailing system of each plantation operating its own mill. C.S.R.'s original plan was "to pay for the cane on a scale proportionate to the quality of the juice", but this was found impracticable at that stage.
C.S.R. announces by advertisement that it is prepared to establish central sugar mills on the northern rivers of N.S.W.
- 1869 E. W. Knox appointed manager of the northern rivers (N.S.W.) mills.
- 1869-1870 C.S.R. erects and operates three large sugar mills on the Macleay and Clarence Rivers, N.S.W. (No coloured labour was employed by C.S.R. at its N.S.W. mills.)

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- 1873 C.S.R. gives prizes to a total value of £1,000 to farmers whose canes bear evidence of careful cultivation.

Darkwater Mill transferred from the Macleay River to the Clarence River. It was renamed "Harwood Mill". (C.S.R.'s Harwood Mill on the Clarence River, still operating in 1955, is the oldest working sugar mill in Australia.)
- 1875 Victoria Sugar Company's refinery in Melbourne destroyed by fire. The company immediately purchases Joshua Brothers' refinery at Yarraville.
- 1876 E. W. Knox visits West Indies to study milling methods. His visit resulted in the adoption of "double-crushing" at C.S.R. mills.
- 1878 C.S.R. opens a large, new sugar refinery at Pyrmont, Sydney.
- 1879 C.S.R. appoints its first chemist to do sugar analyses. First indentured Indian labourers arrive in Fiji.
- 1880 E. W. Knox appointed General Manager (aged thirty-three).

C.S.R. opens Condong Mill on the Tweed River, N.S.W., buying cane from small farmers in the district.
- 1881 C.S.R. engages T. U. Walton, sugar chemist from Greenock, Scotland.

C.S.R. opens Broadwater Mill, on the Richmond River, N.S.W., buying cane from small farmers in the district. Broadwater was described at the time as "the most important sugar factory, not only in this Colony, but in the whole of Australia".
- 1882 A system of chemical control of processes commenced in C.S.R. mills. C.S.R. led the Australian industry in this respect and most, if not all, other cane sugar industries of the world.

Nausori Mill opened on the Rewa River, Fiji. This was C.S.R.'s entry into sugar production in Fiji. Cane purchased from local planters as well as being obtained from mill plantation, worked with indentured Indian field labourers.

Millaquin Refinery commences operations at Bundaberg, Queensland.
- 1883 Homebush Mill (Mackay, Q.) and Victoria Mill (Herbert River, Q.) opened by C.S.R. on behalf of the Victoria Sugar Company. Some of the cane supply bought from independent farmers.

New Zealand Sugar Company formed in Auckland. Equal shares held by C.S.R., Victoria Sugar Co., and New Zealand business interests.
- 1884 Chelsea refinery in Auckland, N.Z., commences work. Built by C.S.R. for the New Zealand Sugar Company.

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- 1884 Habana Mill near Mackay, Q., commences subdivision of its plantation into small farms for leasing to cane growers.
- Sugar prices slump because of dumping of subsidized European beet sugar on world markets.
- 1885 166 sugar mills in Queensland and 102 in N.S.W. Many of these mills disappear during following years of depression.
- C.S.R. lays down its first fertiliser trials, using sulphate of ammonia and superphosphate.
- Goondi Mill, on the Johnstone River, Q., opened by C.S.R.
- Pacific Islanders Act passed by Queensland Government, prohibiting importation of Kanakas after 1890. This prohibition was repealed in 1892.
- 1885-1888 Dr G. Kottmann, C.S.R. chemist, evolves the "P.O.C.S." formula for determining the "pure obtainable cane sugar" in cane. (C.S.R. had by this time established a comprehensive system of chemical control in its factories.)
- 1885 Sugar experiment station established in Louisiana, U.S.A.
- Soltwedel in Java produces a few seedling canes.
- 1886 Sugar experiment station established in Java.
- C.S.R.'s first cane nursery established at Harwood Mill.
- C.S.R. analyses soils for the first time.
- Rarawai Mill, Fiji, built by C.S.R. for the New Zealand Sugar Company, commences work.
- 1887 C.S.R. constituted a limited liability company.
- Amalgamation of C.S.R. and the Victoria Sugar Company.
- 1888 Amalgamation of C.S.R. and the New Zealand Sugar Company.
- Royal Commission on the Sugar Industry reports: "If all coloured labour is withdrawn, extinction of the industry must speedily follow."
- First two Government-sponsored central co-operative mills (Racecourse and North Eton) commence operations in Mackay district. These mills were supplied with their cane by local farmers who were members of the co-operative.
- C.S.R. commences green manuring.
- Soutter, of the Queensland Acclimatization Society, Brisbane, raises 4 seedling canes.

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- 1889 Harrison and Bovell, in Barbados, produce seedling canes.
- 1890 C.S.R. commences breeding canes from seed.
Italian immigrants commence work on sugar plantations on the Herbert River, Queensland. These were the pioneers of the Italian families who now own many farms in northern Queensland.
- 1891 C.S.R.'s Keith Hall estate, Richmond River, first used as a field experiment station.
C.S.R. opens Glanville refinery, Adelaide.
- 1891- C.S.R. cuts up its Queensland cane estates at Homebush and
1892 Victoria Mills into small farms for leasing to selected growers with right of purchase, thus extending the policy it had introduced in N.S.W. twenty years earlier.
- 1893 C.S.R. works with N.S.W. Dept of Agriculture to combat "gumming disease".
Sugar Works Guarantee Act passed by Queensland Government, authorizing establishment of additional central co-operative mills with government assistance.
New Farm refinery opened in Brisbane by C.S.R.
- 1894 C.S.R. opens Lambasa Mill, Fiji.
World depression causes heavy fall in sugar prices.
- 1895 Childers Mill, built by C.S.R. near Bundaberg, Queensland, commenced operation.
- 1896 H. Tryon sent to New Guinea by Queensland Government to collect sugar canes. He brought back the famous *Badila* cane.
Macknade Mill, on the Herbert River, Queensland, bought by C.S.R. from Messrs Neame.
- 1897 C.S.R. purchases Hambledon Mill, Cairns, Queensland, previously owned by Swallow and Derham.
- 1899 C.S.R. commences purchasing cane according to its sugar content as determined by analysis, using P.O.C.S. formula.
- 1901 Bureau of Sugar Experiment Stations established by the Queensland Government. The Government had, however, established nurseries for sugar cane and other tropical plants much earlier.
Federation proclaimed. Protective duties placed on sugar. Excise and rebate system established to foster "white-grown" sugar in Australia.

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- 1901 *Badila* cane commercially grown for the first time.
- 1903 Lautoka Mill, Fiji, opened by C.S.R.
- 1904 *Clark's Seedling*, the first significantly successful "commercial" variety of cane bred by C.S.R., is produced.
Bureau of Central Sugar Mills established by Queensland Government to regulate the affairs of Government-sponsored central mills in debt to the Treasury.
- 1906 C.S.R. disposes of several Fiji plantations to its "officers who wish to strike out for themselves".
Deportation of remaining Kanakas.
- 1907 Australian Sugar Producers' Association founded in Queensland.
- 1908 C.S.R. sends its first expedition to New Guinea to search for sugar canes (Dennis and Blaxland).
- 1912 Queensland Government sends T. W. Wells to New Guinea to collect canes.
Report of Royal Commission on the Sugar Industry (Chairman Sir John Gordon and, later, W. Jethro Brown).
- 1914 C.S.R. sends its second expedition to New Guinea to collect sugar canes (Carne and Baker).
- 1915 Commonwealth Government takes over control of the sugar industry as a war measure. The Sugar Acquisition Act passed by the Queensland Government.
Regulation of Sugar Cane Prices Act passed by the Queensland Government, providing for the fixing of prices of sugar cane in accordance with the "Commercial Cane Sugar" content of the cane. The formula for "C.C.S." as defined in the Act is identical with C.S.R.'s original "P.O.C.S." formula.
- 1920 All existing indentures of Indians in Fiji cancelled by Government decree.
- 1921 C.S.R.'s Homebush mill at Mackay, Queensland, closed on completion of season.
- 1923 Commonwealth Government hands over to the Queensland Government control of the sugar industry in that State. Queensland Government makes refining and marketing agreement with C.S.R.
- 1924 C.S.R. introduces its "tenant-farming" system in Fiji as a possible solution to labour problems due to abolition of the Indian indenture system.

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- 1924 Australia becomes entirely self-supporting in regard to sugar, with a surplus for export.
- 1926 Penang Mill, Fiji, purchased by C.S.R.
Queensland Cane Growers' Council established by legislation.
- 1927 Proprietary Sugar Millers' Association formed in Queensland.
- 1929 Queensland Sugar Cane Technologists' Association established.
- 1930 Cottesloe refinery, Perth, Western Australia, opened by C.S.R.
Peak year scheme introduced by proclamation under the Sugar Acquisition Act of 1915. Mill peaks were thus established and terms and conditions of payment were set out for up-to-peak sugar and for sugar in excess of each mill's peak.
- 1932 C.S.R.'s Childers mill closed on completion of season.
- 1937 International Sugar Agreement signed by 21 nations, including Australia, for the establishment and maintenance of an orderly relationship between supply and demand for sugar in the world market.
- 1949 Sugar Research Ltd. inaugurated by Queensland sugar millers.
- 1951 British Commonwealth Sugar Agreement, for the regulation of sugar production and marketing within the British Commonwealth, and for the supply of sugar to the United Kingdom, is signed.
- 1953 Australia produces over one million tons of raw sugar in one crushing season.
- 1954 C.S.R. operates first Australian bulk-loading plant for raw sugar at Harwood Mill, on the Clarence River, New South Wales.
- 1955 Bulk raw sugar receiving and storing plants operate at Pyrmont and Yarraville refineries.

APPENDIX

APPENDIX 5 AN APPLICATION OF CHEMICAL CONTROL TO A MANUFACTURING BUSINESS

A paper read by E. W. Knox, General Manager of C.S.R. Company, at a meeting of the Australasian Society, January 1890 (slightly abridged).

As there are still doubts in many minds about the money value of scientific aid in practical work, I have thought that some interest might be taken in a short account of a purely commercial application of chemical science to a manufacturing business—an application, I think, unique in its completeness as far as Australasia is concerned, though in Europe many better examples might easily be found, but few, if any, where the staff of experts is so large or the work done so wide in its scope.

The business I speak of is that of the company known as the Sugar Company, which is largely interested in the manufacture and refining of sugar in five of the colonies of the Australasian group. Having entered the service of this company twenty-five years ago, and having since passed through all its grades, I can speak with some authority of its transactions; but as I have not enjoyed any training in science, I will deal with the subject on which I am to address you merely from the point of view of one concerned with the results alone.

About ten years ago, we were led by the great attention then being paid to chemical research in connection with the beet-sugar industry to commence such investigations into our mode of work. We did not know clearly what we wanted, nor did the man we engaged, so the first start was not a success; but it showed us that we were on the right track, and we accordingly engaged in Scotland a refinery chemist, and a year later two beet-sugar chemists in Germany, and began the systematic check on our working. Of these gentlemen the former is now our head chemist (Mr T. U. Walton, B.Sc., F.I.C., F.C.S.) and one of the latter our inspecting chemist (Gustav Kottmann, Ph.D.), and it is to the patience and industry of these two gentlemen and to the system they introduced that much of the success we have achieved is due. The chemical staff then fast increased in numbers, but it was not till I visited Europe in 1885, and saw there to what an extent the supervision of industrial work was passing into the hands of those having chemical knowledge, that any large portion of the practical work was entrusted to members of our chemical staff. I sought, however, authority for such a change, and during the past two or three years have gradually, as chances offered, transferred to men who were trained chemists or analysts the management of a large part of our manufacturing operations.

The method adopted now is as follows:—There is a central laboratory in Sydney where the head chemist is stationed. Here five or six officers, including juniors receiving elementary training, are always at work, and to this centre all the returns from each factory are forwarded weekly. At each sugar mill and refinery (nine and three respectively) there are employed a chemist or analyst and one or more juniors or assistants—not counting

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the officers who may be engaged in overlooking the manufacture—and each of these analysts is responsible for the chemical investigations to be carried out at his station. At the mills these comprise:—Analysis of the sugar cane as received, of the juice expressed, of the megass or crushed cane after the juice has been removed, of the clarified juice, of the clarified juice after it has been boiled down, of the massecuite from the pans, of the sugar and molasses, of the coal; and, in addition, a record is kept of the work done, and each week a statement is prepared which shows the quantity of cane crushed and sugar produced. The work, of course, is so arranged that the more important analyses which determine the amount of sugar lost in the various processes are frequently made, and those of smaller moment as time permits.

At the refineries the sugar is all sampled and analysed according to the various brands on being landed from the ships, and it is stowed so that it can be procured as wanted. Each day's melting is again analysed, and the weekly averages of all sugars and syrup produced. There is also a careful examination made of the bone-black used for filtering, to determine if this has been rightly re-burned, and full analyses of this, also, are made from time to time. The records of the work are prepared on different lines from those for the mills, but there is a similar check, and occasional investigations have also to be made into other points connected with the refinery work.

At the end of each quarter for the refineries, and of each crushing season at the mills, the weekly returns which have been prepared are summarized and tabulated, and careful comparisons made between the results at the various factories, improvements effected, or new methods suggested brought under the notice of the leading officers, as are also the occasional shortcomings relentlessly exposed by the figures recorded. The refinery returns are all under the charge of the head chemist, the mill returns under that of the inspecting chemist; and the whole of them are made out in such a way that the administrative heads of the different departments—who as a rule know nothing of chemistry—can grasp the main features very easily, and then at once deal with any matters which call for attention or explanation.

All the work in connection with sugar is carried out by the aid of the polariscope, and, indeed, could hardly be done without this instrument, which has been devised to make a practical application of the property that a solution of sugar has of altering the character of polarized light allowed to shine through it. The degree of change thus experienced by the rays of light is in exact proportion to the quantity of sugar present in the solution, and when measured by suitable prisms the amount of sugar thus becomes known. This apparatus is the outcome of a long series of experiments and discoveries commenced nearly seventy years ago, and it serves well to illustrate the dependence of practical work on purely scientific inquiry conducted for the acquisition of knowledge, and in this instance, I think, without thought of personal gain.

So far I have spoken altogether of the manufacturing work, but I should here state that we have now also taken the chemical staff into our counsel

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in regard to the cultivation of the cane grown on our own plantations, at present about fourteen to fifteen thousand tons. In past years we have not availed ourselves to any extent of the assistance of the chemists in this department, partly because we were working virgin land, and partly because, till a short time ago, nearly the whole of our supply of cane—and still a large proportion—was grown by others, and sold to us when cut.

However, the partial exhaustion of our lands, and the necessity for applying manure, the desirability for improving the present canes and for introducing new varieties, and some little trouble with diseases in the canes, compelled us to seek the aid of our chemical staff in this branch also, and we are now carrying out an elaborate investigation into the composition of the soils of our various estates; and, under the supervision of the chemists, a vast number of trials in the special cane nurseries established by us two or three years ago, and in the fields with manure of various compositions applied in different ways, and with irrigation and many systems of planting.

From all these experiments we shall, in the course of time, derive much benefit; but though there can be little doubt that, by careful selection of cane and manure, we can increase considerably the production of sugar per acre, still we can hardly hope that there can in a short time be any improvement in the sweetness of the cane at all corresponding with that obtained in Europe in a few years in beet-roots. Sugar cane is one of those grasses which have been hitherto believed not to produce fertile seed, and as propagation is, therefore, effected by planting cuttings, no one has attempted to produce by selection of seed—as is done with the beet—that marked increase in saccharine contents which is so much desired, and any improvement in this direction, if actually effected at all, by continually planting the sweetest canes, can only be gained by slow and painful steps. Fertile seeds have, however, been lately found by scientific observers in the West Indies and in Java; and, as their success in raising plants from such seeds will be emulated by hundreds of planters all over the world, it seems possible that we may now be on the threshold of an important change in our methods of propagating cane, and that we may have grounds for hoping that in the early future we may bring about a sensible improvement in the sweetness of sugar cane.

A good deal of attention is also paid by the chemists to the saving of what are usually called waste products. These play an important part in the manufacture of sugar from the cane. The crushed cane, after the obtainable sugar has been extracted, is used for firing the boilers, and thus furnishes a very large proportion of the fuel needed for working the factory; and this, too, serves a second purpose, as the ashes from it contain a good deal of potash and other fertilizing substances, which are needed for application to the fields from which the cane has been taken. Then, again, at all our factories the water driven off the juice of the cane, while this is being boiled down, is caught and used for watering the megass before it goes to the second mill, and for other purposes; and at our New South Wales mills,

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where fresh water cannot be obtained, it is fed into the boilers, which are thus both fed and fired with parts of the cane we buy. There is, however, one waste product for which yet but little use has been made; this is molasses, of which we make about 5,000 to 7,000 tons a year. Of this quantity we distil nearly half and sell a small proportion for other purposes, but the balance is put on the fields as manure or thrown away. As it contains about 40 per cent cane sugar and 10 per cent to 20 per cent glucose or grape sugar, it is a material of the greatest value in feeding stock, but, so far, we have not found it possible to make arrangements for disposing of it in any quantity.

In the refineries, also, we effect some savings from the by-products, by recovering sulphate of ammonia from the bones we distil for making the filtering charcoal, and the spent charcoal itself converted into superphosphate, the three important components of cane manure—ammonia, phosphoric acid and potash—being, to a certain extent, provided by waste material of our own business.

It could not be expected that changes in our methods such as have been here alluded to, and the general adoption of chemical control, could be carried out without some friction. Among even the strongest and most intelligent of our officers there was at first a hardly concealed scorn for the new-fangled notions and distrust of the chemists' work, but these have now entirely disappeared, and, in every direction, their reports are, as a rule, accepted without question and with confidence in their fairness and accuracy, and the help of the chemists is sought in many ways—here by a manager who wants to check waste in some branch of the manufacture; there by an agricultural overseer who wishes an analysis of the water he is using for irrigation, or advice as to the proportion of manure to apply to a field; or, again, by an engineer who asks for an analysis of the coal he uses, or of the gases from a boiler flue in order that he may know if the setting of the boilers and the arrangement of the firebars are those most conducive to the economical combustion of the coal.

Having thus briefly sketched our system, I may say a few words about the financial results; and first, as to our expenditure, would state that we are now paying to the chemical staff and to those officers charged with the control of part of the manufacturing business who possess a knowledge of chemistry, and have been chosen for those posts in consequence, some £8,000 to £9,000 a year in the shape of salaries and allowances for board, &c. There may be some doubt how we can be repaid for such expenditure, but any doubts on this point I do not, in the remotest degree, share. It would be almost impossible, even if it were necessary, for me to state exactly what is the value of the savings we have to set against such an expenditure, but among those in whose hands the general control of our business is placed, there is not a second opinion as to the money advantage of the chemical check; and when I say that saving 10 or 12 lb. of sugar for each ton of cane—say, .5 per cent of the weight of the cane—means to us £15,000 to £20,000 a year, and that an improvement in the colour of our refined sugar which will bring us a few shillings per ton more for it represents a similar sum, some

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idea can be gained of the ground on which the chemical staff has to work, and of the savings they can effect; and I can add that some of the losses in our manufacturing business have, by their aid, been reduced by one-third during the past four years, and the extent of this saving can be guessed by the fact that in one year the entire losses of sugar at our mills amounted to 14,000 tons—i.e., the cane we crushed contained 14,000 tons more sugar than we were able to turn into marketable sugar.

From the sum of such loss it is easy to see that there are yet great possibilities in the manufacture of sugar from the cane, and, in the cultivation of this crop, much can still be done by manuring and thorough culture, even if the sweetness of the canes be not increased, as before suggested. We know now that on one plantation in Java the entire crop of cane has contained in one year as much as eight tons of sugar to the acre—the cane being about 12 months old—and when we bear in mind that the weight of an unusual crop of maize (80 bushels) is two tons, and that a 40-bushel crop of wheat gives a total yield of one ton of grain and two tons of straw, some idea will be gained of the effect of tropical rain and sunshine in forming sugar in the cane when circumstances are favourable and the cultivation and manuring are carefully done under skilled supervision. It will be seen, moreover, that sugar cane occupies an exceptional position among other crops in the weight of marketable produce which can be extracted from it.

And to the money benefits obtained by the chemical check we must add two more, both of considerable importance. The first is the great advantage of having, in a large service like ours, a body of men of various ages, trained in the knowledge that their work is useless unless it is carried out with patient thoroughness, accompanied by uncompromising truth-telling. No chemist, worth his salt, dreams of concealing anything wrong, or twisting his conclusions so as to hide defects in the work of himself and others, and it is surely of great value to have an example of this sort always before the younger as well as the older men. To those who fear to confess a mistake, the certainty of its exposure acts as a useful tonic, while to all—from the top to the bottom of the staff—the example is wholesome. The second is the mental refreshment and the increased interest in the work due to the constant discussion of recorded facts and opinions, and of the experiments of the chemists. Speaking for myself, I can say that I have frequently found that energy, flagging from the pressure of routine and other monotonous work, has again been roused by interesting reports of experiments or suggestions as to the changes in our methods; and, in the cases of others, the constant competition between the officers, the chances offered in the interval between the seasons for independent research, and the interchange of results certainly produce healthful and useful interest in the work.

Such is the record of our experiences, but I may, before concluding, answer two questions which are sometimes put to me: These are—"How was such a staff got together?" and "What education do you consider best for boys intended for chemical work?" To the first I would say that the officers I have mentioned, and one Englishman, one Scotchman, and one

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German besides, were engaged in Europe and brought to Australia by us. The rest were engaged here and trained by us, with the exception of a few who had instruction in chemistry before entering our service. The staff now consists of—nine Scotchmen, two Germans, three Danes, one Belgian,, one Swiss, two Englishmen, fourteen Australians, in all thirty-two. The Australians, who are all younger than the others, have shown that in quickness and natural ability they are not inferior, though not all possessed of the patient perseverance which is so marked a characteristic of the Scotch,, Danes, and Germans; and some of them have been in a measure hindered in the acquisition of the knowledge of the work by superficial school training. And this remark brings me to the second question, about the education best calculated to benefit boys intended for chemical work. To this the reply is very simple, viz., that in my opinion no special training should be attempted. Of all the plausible fallacies put forward from time to time about education, the most foolish seems to me that of attempting to teach any boy a trade at school.

There only remains now for me to add the hope that the facts and opinions I have been permitted to bring before you today may be of some use in showing how, by the employment of trained experts, the results from manufacturing and agricultural work can be improved, and the losses which now occur may be reduced, and those products now called waste utilized,, which latter may, in other industries—as in the manufacture of gas—be found of sufficient value to cause an enormous reduction in the expenses of manufacture.

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APPENDIX 6 THE C.S.R. COMPANY AND ITS STAFF IN THE 1890s

Excerpts from remarks addressed to a luncheon gathering of members of the Employees' Provident Fund by the General Manager, E. W. Knox, February 1892.

I cannot do better than avail myself of this chance to say something of the position and policy of the Company, and of the ends and aims of those who have the direction of its affairs. It is now two years since I had the opportunity of addressing you, and I then spoke of the changes which had taken place in my term of service—now almost twenty-eight years. But important as these changes were, I am not sure that during the last two years there has not been an alteration in the position of the Company of much greater moment, this being the paying off by the shareholders of some seven or eight hundred thousand pounds of indebtedness to the public, thus bringing the paid-up capital to nearly one and a half millions—a sum not exceeded by, I believe, any Company in the world occupied in a similar trade. This action is a most significant one. It places the Company at once in a position almost secure from attack from any side; it relieves the shareholders from anxiety about having to pay calls on their shares, or to meet heavy payments for interest when times are bad; and it will, I believe, by giving such relief, cause the proprietors to look with even more favour than hitherto on any scheme which, while not unfairly taxing them, will tend to improve the position of their employees.

I am not without hope that the principle now adopted will be maintained until the Company is practically free from debt, and there is then no one concerned in our business but those who pay and those who receive the pay, employers and employed. And I must confess that in expressing this hope I am to a certain extent thinking of myself, for though most of us have a knowledge of the pressure of debt, and of the liberty implied in the words "freedom from debt", a man must have some experience of the constant anxiety attaching to the provision of forty to fifty thousand pounds a year for interest from a business such as ours is before he can realize to the full the relief afforded by the change to which I have referred.

Thanks to the managers of our plantations, and to the chemists and engineers, the former of whom have helped us to grow better and cheaper cane, and the latter to reduce our losses and expenses, there has been a steady diminution in the cost of our sugar, and the road has been pointed out which will lead us further in this direction, and which we must follow, for our margin of profit narrows each year, and must be maintained by improvement in our work. And to what point we have already got you will understand when I say that we must ship the sugar from our mills at about the cost of flour before we get a return on our capital invested in this branch, and flour is made with an infinitely smaller capital and labour staff per ton produced than are needed for turning out sugar.

And along with these changes there has been a steady improvement in the conditions of service. We have not brought out any wonderful scheme

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such as members of Parliament talk of, which will grow figs on thistles, and abolish hard work, but we have sought quietly, and without undue sacrifice, to aid you in making provision against sickness and old age, to avoid fluctuations in work and in your employment, and in some minor matters to arrange for the work we have to do being conducted under improved sanitary conditions. Some of you will, no doubt, think that we can go yet a good deal further in the same direction, and you may be right, but you must be content with gradual progress. Violent changes cannot be made without great harm in this or any other business, and you must get what comfort you can out of the assurance that none of those who have the control of the Company's affairs have yet come to the point of believing that in almost every detail of your and our work improvement is not possible.

Altogether I think we have some justification for the assertion that the history of the past two years is one of progress, and that something has been done in this period to place our business on a basis even more firm and stable than that on which it previously rested, and all the stronger because we are not, and do not mean to be, dependent on any one's favour. We want your goodwill, of course, but not your favour; there is a wide difference between these two words.

Just as we wish our shareholders to keep their shares for themselves and their children, because the investment is a sound one, giving a steady and reasonable return; just as we want our customers to buy our sugars, because they are the best and cheapest they can get; so we want you to stay in our employ, because we give as good pay and as regular work as any other employers, and opportunities of providing for the future, and because, as far as the present is concerned, we mean to try to save you from the fall in wages and salaries—I do not mean nominal wages, but actual earnings.

I think you all ought to know how the Provident Fund originated, and what grounds we have for faith in its future and stability. It was in 1889 that I first began to try and puzzle out some scheme which could take the place of our first confessedly imperfect Provident Fund, and thus provide a means of living for men growing old in the service or disabled by sickness or accident, and with this object in view I read such books as I could obtain bearing on the matter; these were all, however, about sharing of profits, and I was compelled to put them aside, not because such division of profit is an unwise proceeding from the point of view of those who might wish to share the gains without any responsibility for the losses incidental to all trade, but because employees, as a class, have not yet realized that the profits made are the earnings of the man who finds the money, as the weekly or monthly payments to them are the remuneration for their work, and that sharing the profits without likewise bearing part of the losses is in effect accepting a charitable dole.

Now I was sure that the last thing you wanted was to sacrifice your independence, or to accept a dole of any sort, and I had therefore to put on one side all the schemes described with much eloquence in the books of which I have spoken, feeling sure that when you wanted part of the

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profits that were the due earnings of the shareholders' capital you would get this by buying the shares of the Company with your savings, and that till then we had better go on the old basis of paying you fairly and duly for the services you rendered to us, and retaining the balance for the proprietors of the business.

I did not, however, abandon my search for the fund, and one day was rewarded by finding in a little book called *The Management of an English Railway*, a short account of the Provident Fund of the London and North-Western Railway, which seemed to me pretty well what I wanted. Details not given in the book were supplied to me by Mr Eddy, who took an interest in what I was doing as he was at the time endeavouring to start such a fund for the Railway Service—of which, by the way, political jealousy has robbed the Railway men—and I then took into my counsels Mr Walton, and we set to work to draft the leading rules. From the first, however, I decided to make three or four important departures from the English scheme—viz., to put the whole of the employees on the same footing as to subscription, whereas the London and North-Western fund was for the salaried staff only; to allow of the investment of part of the funds in shares of the Company; and to make the rules relating to the return of subscriptions to men leaving the service as liberal as was possible and just. In other respects the lines of the other Society have been followed, and I can only hope that we shall in the course of time be able to show as satisfactory results.

There are no doubt some here who do not share my views as to excluding charity from a business of this sort, as it is now excluded, for I sought and obtained the Company's support on the ground that there was good value to show for the sum they give annually to the fund; but I feel sure that the great majority think as I do, that a pension however large is dearly purchased by a sacrifice of any portion of the independence of spirit which you should all possess, and whether you agree with me or not I am sure I am right in this—I have doubts about being right in other matters much more often than other people suppose—and I certainly will stick to the lines I have laid down and to the principles that have guided me in this matter.

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APPENDIX 7 CHAIRMEN, DIRECTORS AND GENERAL MANAGERS OF C.S.R. COMPANY; AND MEMBERS OF THE NEW ZEALAND BOARD OF ADVICE TO THE COMPANY

Chairmen of Directors:

Edward Knox ...	...	...	...	1855-1857	1861-1877	1880-1883
				1885-1891	1893-1901	
Daniel Cooper ...	...	...	...	1857-1861		
Walter Lamb ...	...	...	...	1878-1880	1883-1885	
Thomas Buckland ...	...	...	...	1883	1891-1893	
Henry Edward Kater ...	...	...	...	1901-1920		
Edward William Knox	...	...	...	1920-1933		
Edward Ritchie Knox	...	...	...	1933-		

Directors:

Edward Knox ...	...	...	...	1855-1877	1880-1883	1885-1891
				1893-1901		
William Fanning	...	...	...	1855-1858		
Walter Lamb ...	...	...	...	1855-1856	1857-1862	1864-1882
				1883-1892		
William Benjamin Walker	...	...	...	1855	1862-1866	
Edwin Tooth ...	...	...	...	1855		
Robert Tooth ...	...	...	...	1855-1863		
Daniel Cooper ...	...	...	...	1855-1861		
Alfred Spry ...	...	...	...	1856-1857		
Frederick Fanning	...	...	...	1858-1871		
Thomas Buckland	...	...	...	1861-1886	1887-1896	
Frederick Tooth	...	...	...	1863-1864		
Charles Parbury	...	...	...	1866-1870		
Alfred Stanger Leathes	...	...	...	1870-1880	1882-1883	
Frederick Close Griffiths	...	...	...	1871-1881	1884-1907	
Joseph Grafton Ross	...	...	...	1878-1880		
John Brown Watt	...	...	...	1880-1884	1886-1888	
James Milson ...	...	...	...	1881-1887		
Edward William Knox	...	...	...	1883-1885	1891-1893	1901-1902
				1920-1933		
Robert Lucas Tooth	...	...	...	1888-1889		
Walter Cumming Watt	...	...	...	1889-1920		
Henry Edward Kater ...	...	...	...	1892-1924		
Henry Normand MacLaurin	...	...	...	1896-1906	1906-1914	

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Charles Kinnaird Mackellar	...	...	1902-1904	1905-1912
			1913-1923	
Richard Binnie	...	...	1904-1905	1906
			1907-1913	1914-1917
Astley John Onslow Thompson	...		1912-1914	1914-1915
James William Macarthur Onslow	...		1915-1924	1925-1928
			1929-1933	1933-1936
Robert Lionel Faithfull	...	...	1917-1930	
Edward Ritchie Knox	...	...	1923-	
Owen Esmond Friend	...	...	1924-1926	
Norman William Kater	...	...	1924-1925	1926-1929
			1930-1935	1935-1938
			1938-1949	
Philip Henry Macarthur Goldfinch	...		1928-1929	1929-1943
Robert Winton Gillespie	...	...	1929-1940	
Edward Wilfred Fairfax	...	...	1933-1949	
David Wilson	...	...	1933	1935
			1936-1953	
Handel Norman Pope	...	...	1938	1940-1947
John Gordon Crowther	...	...	1947-	
Christian Waldemar Rothe	...	...	1949-1951	
John Wallace Dunlop	...	...	1949-	
Gregory Blaxland Kater	...	...	1949-	
William John Victor Windeyer	...		1953-	
Roy William Harman	...	...	1955-	

General Managers:

Joseph Grafton Ross (Manager)	...		1855-1870	
Joseph Grafton Ross (General Manager)	...	...	1870-1880	
Edward William Knox	...	...	1880-1920	
Waldemar H. Rothe	...	...	1920-1923	
Harry V. Dixon	...	...	1923-1928	
Philip H. M. Goldfinch	...	...	1928-1943	
Christian W. Rothe	...	...	1943-1951	
Roy W. Harman	...	...	1951-	

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Members of the New Zealand Board of Advice:

Sir Frederick Whitaker	..	..	..	1888-1891
D. L. Murdoch	..	..	..	1888-1911
James Williamson	..	..	..	1888
Thomas Buddle	..	..	..	1892-1918
H. B. Morton	..	..	..	1911-1929
Sir Henry Horton	..	..	..	1918-1939 1940-1943
E. T. Horton	..	..	..	1920, 1926, 1929
J. Newell	..	..	..	1930-1942
W. R. Wilson	..	..	..	1933, 1939-1940 1943-1947
R. P. Towle	..	..	..	1942-
R. D. Horton	..	..	..	1947-

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APPENDIX 8 BANKERS, AUDITORS, SOLICITORS, AGENTS (other than customers), BROKERS AND CORRESPONDENTS OF C.S.R. AND SUBSIDIARIES 1955

Bankers

The Bank of New South Wales				
The Commercial Banking Coy. of Sydney Ltd.				
The Bank of Adelaide	..	..	..	Adelaide
The Bank of New Zealand	..	..	..	N.Z. and Fiji
The English, Scottish & Australian Bank Ltd.	..			Nth Strathfield and Brunswick

Auditors

Yarwood, Vane & Co.	..	..	..	Sydney
Kent, Brierley & Fisher	..	..	..	"
J. H. Broinowski & Storey	..	..	..	"
George A. Blackett & Lewis	..	..	..	"
Merry & Merry	..	..	..	Perth

Solicitors

Minter, Simpson & Co.	..	..	..	Sydney
Malleson, Stewart & Co.	..	..	..	Melbourne
Blake & Rigall	..	..	..	"
Finlayson, Phillips, Astley & Hayward	..			Adelaide
Flower & Hart	..	..	..	Brisbane
Stone, James & Co.	..	..	..	Perth
Buddle, Richmond & Co.	..	..	..	Auckland
William Scott & Co.	..	..	..	Suva

Brokers and Correspondents

C. Czarnikow Ltd.	..	..	..	London
Czarnikow (Canada) Ltd.	..	..	..	Montreal
Elder, Smith & Co. Ltd.	..	..	..	Sydney and London

Agents

Parbury, Henty & Co. Pty. Ltd.	..	..	..	London
The Adelaide S.S. Co. Ltd.	..	..	..	Sydney, Brisbane, etc.
Hoare, Miller & Co. Ltd.	..	..	..	Calcutta
R. W. Cameron & Co. Inc.	..	..	..	New York
W. R. Carpenter & Co. Ltd.	..	..	..	Suva
Calcutta Co. Pty. Ltd.	..	..	..	Sydney
Jack & Newell Pty. Ltd.	..	..	..	Cairns
Burns, Philp & Co. Ltd.	..	..	..	Townsville
Dalgety & Co. Ltd.	..	..	..	"
Buchanan Bros.	..	..	..	Bowen
James Croker & Sons	..	..	..	Mackay
R. R. Dunn & Co.	..	..	..	Maryborough

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Agents

Watkin & Wallis	..	..	..	..	..	Auckland
Minerals Fibres Ltd.	..	..	..	..	..	London
Carters (Merchants), Ltd.	..	..	..	..	..	"
Spedding Ltd.	..	..	..	..	..	Auckland
Fletcher Sales & Services Ltd.	..	..	..	..	..	"
Honeywill & Stein Ltd.	..	..	..	..	..	London
The Distillers Company (Biochemicals) Ltd.	..	..	..	..	..	"
H. H. Buckley Ltd.	..	..	..	..	..	Auckland
J. Walter Thompson (Aust.) Pty. Ltd.	..	..	..	..	..	Sydney
Dormer-Beck Advertising Ltd.	..	..	..	..	..	Auckland

APPENDIX 9 INQUIRIES INTO AND REPORTS UPON THE AUSTRALIAN SUGAR INDUSTRY

Since 1871, when a Select Committee reported to the New South Wales Parliament on Thomas Scott's sugar cane cultivation, many Royal Commissions and Committees of Inquiry have investigated and reported upon the Australian Sugar Industry.

The most important of the reports are:

REPORT OF THE ROYAL COMMISSION ON THE SUGAR INDUSTRY, 1889
(*Queensland*) Chairman—Mr W. H. Groom, M.L.A.

REPORT OF THE ROYAL COMMISSION ON CUSTOMS AND EXCISE TARIFFS,
1905 (*Commonwealth*)

REPORT OF THE ROYAL COMMISSION ON THE SUGAR INDUSTRY, 1912
(*Commonwealth*) Chairman—Sir John Gordon; and later Professor W. J. Brown

REPORT OF THE ROYAL COMMISSION ON THE SUGAR INDUSTRY, 1920
(*Commonwealth*) Chairman—Mr A. B. Piddington, K.C.

REPORT OF THE ROYAL COMMISSION ON LOCATIONS FOR SUGAR MILLS,
1922 (*Queensland*) Chairman—Mr W. Harris, P.M.

REPORTS OF THE SUGAR INQUIRY COMMITTEE, 1931 (*Commonwealth*)
Chairman—the Hon. John Gunn

REPORT OF THE ROYAL COMMISSION ON SUGAR PEAKS AND COGNATE
MATTERS, 1939 (*Queensland*) Chairman—the Hon. William F. Webb

REPORT OF THE ROYAL COMMISSION ON SOLDIER SETTLEMENT ON SUGAR
LANDS, 1946 (*Queensland*) Chairman—Mr J. S. Hutcheon, K.C.

REPORT OF THE ROYAL COMMISSION APPOINTED TO PREPARE AN ORDERLY
PLAN FOR THE DEVELOPMENT OF THE SUGAR INDUSTRY, 1950 (*Queens-*
land) Chairman—the Hon. Alan J. Mansfield

REPORT ON THE AUSTRALIAN SUGAR INDUSTRY BY THE SUGAR INQUIRY
COMMITTEE, 1952 (*Commonwealth*) Chairman—Mr M. E. McCarthy

The Royal Commission of 1889

Appointed to inquire into the "present languishing condition of the industry". Surpluses of subsidized European beet sugar had depressed world sugar markets. The boom of the early 1880s had been followed by slump. In 1889 prices were half of what they had been in 1883. A disastrous drought in 1888 reduced the Australian crop, and the effects of the Pacific Island Labourers Act of 1885 were being felt.

The Commission was asked, among other things, to report on the probable effects of withdrawing the remaining coloured labour. It found that cultivation of cane with white labour in the areas north of Townsville was impracticable and reported: "If all coloured labour is withdrawn, extinction of the industry must speedily follow."

The depression spelt the end of small mills and large areas of semi-cultivated land. The Commission realized the waste involved in this system, and advocated that cane should be grown on smaller farms. Instead of a mill on each plantation, it recognized the advantages of central mills to which the surrounding farmers could send their cane.

In 1892 the provisions of the Pacific Island Labourers Act prohibiting the further entry of Kanakas were repealed by the Queensland Government. In 1893 the Sugar Works Guarantee Act was passed, and under this the system of Government-sponsored co-operative central mills expanded rapidly.

The Reports of Dr Walter Maxwell, 1899-1910

Dr Walter Maxwell was Director of the Hawaiian Sugar Producers' Association Experiment Station when he was invited in 1899 to report on the Queensland sugar industry. He was critical of the agricultural practices being followed and suggested setting up an experiment station to help growers. This was done, and he was appointed first Director of the Queensland Bureau of Sugar Experiment Stations when it was established in 1901.

Shortly after Federation, he reported to the Prime Minister on the coloured labour question and concluded that "the Pacific Islander is a relatively declining factor in sugar production in Australia". In 1905 he reported to the Minister for Trade and Customs on the excise and rebate system, and recommended that it be extended for seven years.

Before his departure for the United States in 1910 he tendered another report to the Minister for Trade and Customs. This was accepted as evidence by the Royal Commission of 1912 and, indeed, the Chairman regarded it as "the starting point of the Commission".

During at least part of his time in Australia, Dr Maxwell's relations with the industry were somewhat strained. His last report was inaccurate in parts, critical of the industry, and advocated expansion of beet sugar production in Victoria.

The 1912 Royal Commission

Appointed in October 1911, the Commission had the widest possible terms of reference, including costs, profits, wages, prices and legislation affecting the industry.

The Chairman, Sir John Gordon, was a South Australian judge and a noted constitutionalist. Sir John became ill during the inquiry and was replaced by Professor W. J. Brown, a barrister, teacher of law and later author of *The Prevention and Control of Monopolies*. The other commissioners were the Secretary of the Australian Labour Federation, a business man and a barrister from Sydney and Mr (later Senator) T. W. Crawford. He was the only one with first-hand knowledge of the industry, a cane grower, director of a co-operative mill, and president of the Australian Sugar Producers' Association. He submitted a Minority Report.

From the outset it was evident that C.S.R. was regarded as "the villain of the piece". An attempt was made to conduct a most exhaustive inquiry into the whole of the company's affairs, far beyond the terms of reference of the Commission, and a difference arose between the Commission and the company as to information to be supplied. Some questions relating to C.S.R. business in Fiji and New Zealand, and to the financial position of C.S.R. as a whole, were not answered. The General Manager offered to supply the information in private, provided it were not published; he also invited the Chairman to inspect the books of the company in private. These offers were refused, and the Commission referred the matter to the Attorney-General. Proceedings were instituted against the directors, which eventually resulted in a High Court injunction in favour of C.S.R. and restraining the Commission from asking certain questions. The Commonwealth's appeal to the Privy Council failed. After the granting of the High Court injunction the general manager appeared before the Commission and volunteered lengthy evidence including the costs of refining and the profit from refining.

The Commission considered that the growers were for national purposes the most important section of the industry, and took the greatest risks, and that their position should be improved. It recommended principles of cane payment resembling those in the Cane Prices legislation later passed by the Queensland Government.

Proposals put to the Commission included the establishment of a public refinery and the nationalization of the existing refineries. The Commission rejected these because it considered that efficiency would not be increased by competition, and a public refinery would be wasteful duplication. Basic to all these reasons was recognition of the high efficiency of the refining business in Australia. The report states:

We have frequently had occasion to criticize the Colonial Sugar Refining Company from various points of view, but we do not hesitate to express our admiration of the economic efficiency which characterizes every branch of its business which has come under our notice.

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The historical significance of this Commission lies in the emphasis it placed on the need to settle and develop the exposed tropical coast of north-east Australia. The "White Australia" policy was a live political issue in 1912 and the wisdom of protecting the sugar industry to implement it was doubted by many people. The Commission was overwhelmingly in favour of the ideas that had prevailed at Federation—that the tropical coast ought to be settled with a white population and that assistance to this end was necessary. This settlement and development was recognized as a national responsibility. The report states:

The supreme justification for the protection of the sugar industry is the part that the industry has contributed, and will, as we hope, continue to contribute to the problems of the settlement and defence of the northern portion of the Australian continent. The recognition of the nature of this supreme justification is the first condition of a sound public policy in relation to the sugar industry. Relative to it all other issues are of minor importance.

The "Piddington" Royal Commission of 1920

Under the "War Precautions Act" the Commonwealth Government was fixing the price of raw and refined sugar, but this Act and the Sugar Agreement were about to expire. The Commission was appointed in March 1919 to recommend on future Commonwealth control and also on an increase in price sought by the industry. Unfavourable seasons and rising costs of production affected the returns to the industry, and the low price for sugar in Australia compared with the high world market price added to the industry's dissatisfaction.

The Commission considered that Federal control was desirable as it was the only way to secure coherence of authority over an industry subject to diverse governmental regulation. It was proposed that a Sugar Control of three Commissioners be set up with complete powers over—

*industrial arbitration;
efficiency in cultivation;
cane prices;
conditions of cane delivery;
engineering and chemical efficiency in mills;
price of raw sugar;
development of new mills and cane areas;
research.*

Under the proposals mills and millers would be licensed. The Control would be financed by adding one per cent to the price of refined sugar.

The Commission recommended an increase from £21 to £22 per ton in the price of raw sugar.

However, the recommendations in this report were not acted upon by the Federal Government. A further agreement for a period of three years was announced by the Prime Minister, Mr W. M. Hughes, and the price of

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raw sugar increased to £30 6s. 8d. per ton to rehabilitate the industry, particularly the mills, and to encourage expansion of production.

This was the last Agreement under Federal control. When it expired in 1923 the Commonwealth handed over control of the industry to the Queensland Government.

The 1922 Royal Commission on Locations for Sugar Mills

This is of interest mainly because it resulted in the erection of Tully Mill. The site for the mill was selected after an investigation of possible locations from Cooktown to Buderim.

The 1931 "Gunn" Inquiry

Since the Royal Commission of 1920 conditions had changed completely. Instead of prosperity and high world sugar prices there was depression, with falling prices and unemployment. The world sugar market was over-supplied, and raw sugar from Peru was being sold to British refiners at £4 15s. od. sterling per ton c.i.f.

In Australia, from 1929 there had been a well organized campaign to lift the embargo or, alternatively, reduce the price under the Agreement, which was due to expire in 1931. It was claimed that the embargo was costing the Australian consumers £7 million a year, this estimate being based on the bare difference in price between Australian sugar and the cheap, black-grown, "dumped" product. (Many calculations of this nature failed to take account of such items as sea freight, insurance, handling and storage costs, etc.)

The Queensland Government and the industry strongly defended their position, pointing out the efficiency of the industry and the value to Australia of the sugar settlements on the north-east coast. The embargo became an election issue in 1929 and the incoming Labour Prime Minister said in his policy speech:

The Federal Labour Party stands for the continuance of the existing embargo on the importation of sugar.

Agitation continued, however, and the Government was forced to refer the renewal of the Sugar Agreement to a Committee of Inquiry. The Chairman, the Hon. John Gunn, was then Commonwealth Director of Development. Other members represented the Commonwealth, the industry itself, sugar employees, housewives, fruit growers and manufacturers using sugar. The C.S.R. Co. was not represented on the Committee.

It was obvious that the Committee, with such opposing interests, would be divided at least on the question of price. Although unanimity was reached on some points, a majority and a minority report were also submitted.

All members agreed that the domestic sugar industry must be preserved, and that it was efficient. The minority stated that export sugar (for which

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a lower price was then obtained) ought to be curtailed and the home consumption price lowered immediately. The majority submitted that production was high but thought it could not be reduced abruptly without disruption. They could not recommend any general price reduction, but recognized that the fruit industry was in serious straits and suggested that the financial assistance to it rendered by the sugar industry should be increased. Both majority and minority were complimentary to C.S.R.

The Prime Minister, after considering the reports, said he was not disposed to reduce the price of sugar. If production were curtailed it would add to unemployment in Australia and reduce the urgently needed London funds.

The Government decided to renew the Agreement, for five years, on the following terms:

1. Existing selling prices of sugar to be continued for the first three years.
2. The fruit industry assistance plan recommended by the majority report to operate for the first three years.
3. Selling prices and fruit industry assistance to be reviewed after three years.
4. Every effort to be made to keep the production of sugar within the present limits and the assignment of sugar lands and the peak year system to be rigidly administered to this end.
5. The price of raw sugar to the miller to be subject to a maximum of £22 per ton and any surplus arising from the continuance of the present refined sugar prices to be paid to a trust account under the joint control of the Commonwealth and Queensland Governments to be held against the possibility of financing a future reduction in the price of sugar to consumers.
6. The maximum return per ton was to be increased if the production fell below 500,000 tons per annum.

The Agreement along these lines was in due course signed. But conditions in Australia still deteriorated and the campaign against the sugar industry continued.

At a Loan Council meeting in January, 1932 the Prime Minister said the sugar industry could not escape the general retrenchment. In October the 1931 Agreement was repealed. Under the new Agreement the price of refined sugar was reduced, becoming 4d instead of 4½d per lb. retail. The assistance to the fruit industry was also reduced somewhat, and provisions for fixing the raw sugar price were removed.

The 1939 Royal Commission on Sugar Peaks and Cognate Matters

Despite the Peak Year Scheme adopted in 1929, production continued to expand and by 1938 was about 165,000 tons more than the peaks.

Since 1929 the amount of sugar used in Australia had increased. Also

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under the International Sugar Agreement signed in 1937 Australia had gained an export quota of 400,000 tons, and it was very desirable that this quota be filled consistently. There thus appeared to be an assured market for a greater quantity than the 1929 Queensland peaks plus the New South Wales allotment, and the Queensland Premier suggested that the peaks might be increased by 100,000 tons. A Royal Commission was appointed in 1939 to investigate the matter. The members of the Commission were a Supreme Court Judge, and representatives from the Sugar Board, Central Sugar Cane Prices Board, and the Sugar Associations.

Three separate "views" were presented by the Commissioners in their report. The majority view was that, to avoid disruption, peaks be increased to 737,000 tons on the general basis of actual production, and that production beyond this quantity be paid for at the penal and prohibitive price of 10/- per ton only.

There were other recommendations including the establishment of "farm peaks", or a definite quantity of cane from each assignment, the total farm peaks in each mill area to produce the mill's peak of sugar.

New peaks, in accordance with the majority view, were declared in the 1939 season's proclamation. The principle of farm peaks was also adopted. However, the outbreak of war soon altered the situation radically. Sugar was in great demand, and the British Ministry of Food contracted to purchase all sugar not required in Australia.

The 1946 Royal Commission on Soldier Settlement on Sugar Lands

The Commission found that it was "practical and expedient" to settle ex-servicemen in the Queensland sugar industry, and that this should be done within the areas of existing mills rather than by building new ones.

It recommended priority for ex-servicemen in the purchase of sugar farms; the assignment of new lands to fill the peak of any mill which consistently fell short in its production; the assignment of virgin lands adjacent to existing mill areas; and increased assignments on existing farms of ex-servicemen.

The Queensland Government passed the War Service (Sugar Industry) Land Settlement Act (1946), which followed the main recommendations of the Report.

The "Orderly Plan" Royal Commission of 1950

Growing home consumption demand and an export quota of 600,000 tons gained at the 1949 Commonwealth sugar discussions gave promise of increased markets for the Australian sugar industry. The 1948 and 1949 seasons had produced good crops and confidence in the industry was high. The Central Cane Prices Board had already made provisional increases in peaks up to 1953, but these did not seem enough for expected development after that. The Queensland Government then appointed a Royal Commission "to prepare an orderly plan for the development of the sugar industry during the next 25 years".

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The report was published in 1951. It dealt with the problem of markets in two steps, to 1962, and to 1975, and suggested how the extra sugar could best be produced.

The Commission considered various sites proposed for new mills, but recommended that for economic reasons no new mill be built in the first period, and probably not in the second. Extra production should be obtained by new or increased assignments in present or nearby areas, and expansion of existing mills; further, most of the expansion should take place in the districts north of Proserpine.

The 1952 Committee of Inquiry

Following the recommendations of the 1950 Commission, the industry was committed to heavy capital expenditure when, in 1951, the position changed abruptly. A bad season caused a drastic fall in output, and this, together with the fact that home consumption sales rose excessively that year, meant a loss of profitable export sugar. Costs at all stages of production continued to rise, along with all other costs in Australia. Early in 1952 the industry was forced to seek an increased price for its home consumption sugar.

The Commonwealth Government, when granting an interim increase in the retail price of sugar in March, 1952, also set up a Sugar Inquiry Committee. Its Chairman, Mr M. E. McCarthy, was then Commonwealth Prices Consultant, and other members came from the Department of Trade and Customs, the Treasury, the Queensland Department of Agriculture and Stock and the Queensland Sugar Board.

The terms of reference covered: the production, manufacture and distribution of sugar in Australia; costs, profits and prices of raw sugar; the effect of export sales on raw sugar prices; the effect of sugar prices on manufacturing industries using sugar and on primary industries whose products are processed with sugar; and the possibility of providing in the agreement for sugar prices to be varied in accordance with costs.

The Committee visited the sugar districts and inspected farms and mills, and also refineries in the capital cities. It heard evidence in the sugar districts and in Brisbane, Sydney and Melbourne. Representatives of the sugar industry submitted very detailed evidence regarding the general organization of the industry and particulars of cane growing, raw sugar production, and refining. Special points, including Australia's obligation to export up to her quota under the Commonwealth Sugar Agreement, the payment of export rebates, and the industry's proposals for price adjustments, were also dealt with. Users of sugar such as manufacturers of jam, canned fruits and condensed milk, grocers' representatives, and the Housewives' Association, gave evidence concerning their particular interests.

The Committee's Report gave a general review of the industry, and dealt in detail with the particular points of the terms of reference. The

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Committee reached a long series of conclusions about costs and funds employed; the efficiency of the industry; the contribution of the sugar industry to the national economy and the effect on consumers of a price rise; rebates on sugar content of manufactured goods exported and methods of paying them; and other matters. A fundamental fact was the recognition of the importance of the sugar industry in populating northern Queensland, and the desirability, from the social point of view, of a primary industry supporting small, owner-operated farms.

As to the marketing and refining functions of the C.S.R., the Committee reported that "because of the important position occupied by the C.S.R. in the sugar industry the Committee paid particular attention to its functions and operations". After discussing the company's functions they said: "The Committee is satisfied of the substantial effectiveness of this arrangement (i.e., the method of negotiating and fixing the charges made by the C.S.R.) in the interests of both consumers and producers"; and "the company's efficiency was not questioned by any witness". The Committee also commented: "On the subject of the company's profits from refining and other operations on behalf of the Sugar Board it can be stated that if it had forfeited the whole of the profits from these sources over the last three years and the reduction had been passed on to consumers the difference in price would have been less than $\frac{1}{4}d$ per lb."

The Committee also made a number of recommendations, the most immediately important of which was an increase in the price of sugar. Separate recommendations for an increase of $\frac{1}{2}d$, $\frac{3}{4}d$ and $1d$ per lb. were made by various members of the Committee. Other recommendations were: that the fruit industry rebate of £2 4s 0d per ton remain unaltered; that the provisions in the Sugar Agreement Act regarding the Fruit Industry Sugar Concession Committee remain unaltered; that a new method of calculating export rebates be introduced to allow exporters of manufactured goods the greatest possible rebate, and that such rebate be paid on the sugar content of specified goods only; that a Tribunal be appointed, comprising a chairman appointed jointly by the Commonwealth and Queensland Governments, a nominee of the Commonwealth Government and a nominee of the Queensland Government, to "examine and report to the Minister for Trade and Customs, when required by him, upon the cost and associated elements in the sugar industry".

The Commonwealth Government decided to increase the price of refined sugar by $1d$, to $9d$ per lb., as from 13 October 1952. The other recommendations of the Committee were accepted, except that advocating a Tribunal.

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APPENDIX 10 A BRIEF BIBLIOGRAPHY OF SOURCES CONSULTED FOR THE HISTORICAL CHAPTER OF THIS BOOK

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Knox Mss.—various letters and papers of Edward and E. W. Knox, some private and some relating to business matters. Most important among these documents are the various reports compiled by E. W. Knox on his trips to the northern rivers of New South Wales, to Fiji and to France and Germany (C.S.R. Library and uncatalogued Set 98, Mitchell Library).

Various Mss.—relating to the development of the Australian sugar industry (Mitchell Library—catalogue of manuscripts under heading "Sugar").

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APPENDIX II RAW SUGAR PRODUCTION BY C.S.R. 1870-1954

Long tons tel quel to 1899 thereafter tons 94 net titre

Season	Total Aust. (see note)	C.S.R. Mills			
		Queensland	N.S.W.	Fiji	Total C.S.R.
1864	2	—	—	—	—
1865	3	—	—	—	—
1866	8	—	—	—	—
1867	228	—	—	—	—
1868	2,077	—	—	—	—
1869	3,081	—	—	—	—
1870	3,532	—	1,458	—	1,458
1871	5,554	—	1,031	—	1,031
1872	7,976	—	1,193	—	1,193
1873	8,707	—	1,841	—	1,841
1874	18,963	—	4,877	—	4,877
1875	11,168	—	3,618	—	3,618
1876	12,912	—	3,991	—	3,991
1877	19,780	—	5,489	—	5,489
1878	21,685	—	4,974	—	4,974
1879	26,306	—	5,352	—	5,352
1880	22,864	—	5,278	—	5,278
1881	27,003	—	5,636	—	5,636
1882	29,202	—	8,804	2,506	11,310
1883	50,148	1,500	7,825	4,325	13,650
1884	43,510	1,350	5,885	5,331	12,566
1885	77,689	8,460	11,610	7,069	27,139
1886	70,609	8,125	9,565	11,090	28,780
1887	80,460	7,857	17,272	7,895	33,024
1888	45,301	6,140	8,109	9,957	24,206
1889	63,427	10,631	11,615	8,945	31,191
1890	96,516	14,445	19,224	11,859	45,528
1891	n.a.	10,562	13,159	11,994	35,715
1892	85,657	8,926	22,184	12,234	43,344
1893	100,076	11,779	18,715	11,641	42,135
1894	114,350	17,828	15,905	19,611	53,344
1895	108,468	19,887	14,378	18,644	52,909
1896	129,331	27,421	21,073	22,041	70,535

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APPENDIX II—continued

Season	Total Aust. (see note)	C.S.R. Mills			
		Queensland	N.S.W.	Fiji	Total C.S.R.
1897	125,569	30,907	21,376	27,046	79,329
1898	192,844	44,219	22,930	29,594	96,743
1899	138,639	38,260	12,854	26,714	77,828
1900	107,034	29,557	17,049	25,574	72,180
1901	132,964	40,826	17,131	25,999	83,956
1902	92,744	33,734	19,524	28,588	81,846
1903	107,776	35,548	19,934	44,104	99,586
1904	158,763	46,970	19,741	52,632	119,343
1905	173,456	51,036	19,632	40,690	111,358
1906	209,218	54,476	23,137	39,936	117,549
1907	218,506	53,031	29,117	62,049	144,197
1908	166,594	46,759	15,175	61,199	123,133
1909	149,925	43,335	14,589	64,542	122,466
1910	231,619	59,898	18,957	62,776	141,631
1911	191,157	52,807	16,663	67,241	136,711
1912	130,035	40,263	16,975	65,400	122,638
1913	265,574	68,408	22,737	91,840	182,985
1914	246,527	73,632	20,680	93,764	188,076
1915	159,080	45,109	18,584	90,313	154,006
1916	193,433	60,865	16,460	114,397	191,722
1917	328,267	83,060	20,553	88,945	192,558
1918	202,441	50,725	12,463	63,323	126,511
1919	173,239	54,419	11,103	60,166	125,688
1920	182,763	51,331	15,362	83,649	150,342
1921	300,191	75,928	17,993	71,047	164,968
1922	306,340	74,912	18,555	44,537	138,004
1923	285,816	79,404	16,641	36,967	133,012
1924	436,815	102,266	27,629	66,201	196,096
1925	518,704	119,129	33,119	99,736	251,984
1926	416,377	98,084	27,105	69,761	194,950
1927	510,140	106,268	24,395	97,367	228,030
1928	538,047	124,785	17,427	95,430	237,642
1929	538,702	121,367	20,186	88,849	230,402
1930	536,304	103,479	19,521	93,381	216,381
1931	604,564	131,109	23,288	72,852	227,249

APPENDIX

APPENDIX II—continued

Season	Total Aust. (see note)	C.S.R. Mills			
		Queensland	N.S.W.	Fiji	Total C.S.R.
1932	532,652	123,096	18,567	140,871	282,534
1933	667,531	117,006	28,797	118,643	264,446
1934	643,252	98,735	30,682	114,491	243,908
1935	646,779	106,704	36,453	134,724	277,881
1936	782,412	134,846	38,151	151,884	324,881
1937	810,383	153,710	47,058	143,872	344,640
1938	823,231	132,290	45,095	137,049	314,434
1939	928,451	149,444	36,929	116,779	303,152
1940	806,477	123,065	47,031	121,883	291,979
1941	745,667	119,744	48,322	104,393	272,459
1942	649,961	105,812	44,281	139,560	289,653
1943	524,187	77,042	37,440	55,923	170,405
1944	669,963	105,423	26,423	65,358	197,204
1945	665,881	129,162	21,220	67,456	217,838
1946	551,854	105,445	39,768	119,120	264,333
1947	605,209	100,542	33,551	145,448	279,541
1948	943,046	158,288	32,997	137,081	328,366
1949	937,968	157,843	40,701	129,587	328,131
1950	921,099	150,456	41,255	99,195	290,906
1951	745,391	133,503	41,049	115,744	290,296
1952	948,877	174,982	14,263	133,645	322,890
1953	1,254,375	209,640	33,992	194,994	438,626
1954	1,326,409	234,499	26,290	136,831	397,620

Note : Total production of raw sugar in Australia from all sources, including C.S.R. mills, to 1899 arrived at by adding Queensland production as given in Queensland Registrar General's Reports and N.S.W. production as given in N.S.W. Statistical Register. Totals from 1900 arrived at by adding Queensland production as given in Reports of the Bureau of Sugar Experiment Stations (1900-04 estimated from 88 N.T. tonnage) to N.S.W. production estimated from tons tel quel in N.S.W. Statistical Register until 1911, and thereafter from C.S.R. records. Since 1912 C.S.R. has been the only raw sugar miller in N.S.W.

APPENDIX

APPENDIX 12 WORLD SUGAR PRODUCTION 1839-1954

Year	From Cane	From Beet	Total	Cane as % of Total
1839	781,716	38,602	820,318	95.1
1840	788,000	48,198	830,198	93.0
1841	829,000	50,919	879,919	94.2
1842	840,000	41,240	881,240	96.3
1843	909,000	46,911	955,911	95.0
1844	961,000	53,458	1,014,458	94.7
1845	1,003,000	60,857	1,063,857	94.2
1846	1,017,000	80,004	1,097,004	92.5
1847	1,067,000	96,346	1,163,346	91.7
1848	1,008,000	79,885	1,087,885	92.3
1849	1,070,000	110,737	1,180,737	90.7
1850	1,043,000	159,435	1,202,435	86.5
1851	1,186,000	163,757	1,349,757	87.6
1852	1,167,000	202,810	1,369,810	85.2
1853	1,284,000	194,893	1,478,893	86.9
1854	1,301,000	176,210	1,477,210	88.2
1855	1,243,000	246,856	1,489,856	83.5
1856	1,195,000	276,702	1,471,702	81.3
1857	1,220,000	370,004	1,590,004	76.7
1858	1,358,000	409,614	1,767,614	76.8
1859	1,438,000	387,539	1,825,539	78.8
1860	1,376,000	351,602	1,727,602	79.7
1861	1,466,000	413,671	1,879,671	78.1
1862	1,363,000	474,719	1,857,719	74.3
1863	1,334,000	457,146	1,791,146	74.5
1864	1,333,000	474,719	1,837,719	74.3
1865	1,506,000	680,685	2,195,685	69.5
1866	1,544,000	671,810	2,215,810	69.8
1867	1,499,000	687,281	2,186,281	68.4
1868	1,759,000	760,025	2,519,025	69.8
1869	1,728,000	821,141	2,549,141	68.0
1870	1,662,000	939,096	2,601,096	64.0
1871	1,697,000	976,915	2,673,915	63.5
1872	1,805,000	1,128,918	2,933,918	61.5
1873	1,848,000	1,198,463	3,046,463	60.7
1874	1,883,000	1,284,586	3,167,586	59.1

APPENDIX

APPENDIX 12—continued

Year	From Cane	From Beet	Total	Cane as % of Total
1875	1,816,000	1,377,336	3,193,336	55·1
1876	1,792,000	1,085,204	2,877,204	62·4
1877	1,770,000	1,358,828	3,128,828	56·2
1878	1,873,000	1,615,934	3,488,934	53·7
1879	1,908,000	1,459,385	3,367,385	56·7
1880	1,883,000	1,857,210	3,740,210	50·2
1881	1,806,000	1,831,847	3,637,847	48·3
1882	2,079,000	2,173,409	4,252,409	48·9
1883	2,210,000	2,322,736	4,532,736	48·7
1884	2,225,000	2,549,672	4,774,672	46·6
1885	2,300,000	2,172,200	4,472,200	51·4
1886	2,400,000	2,686,700	5,086,700	47·2
1887	2,541,000	2,367,200	4,908,200	51·7
1888	2,359,000	3,555,900	5,914,900	40·0
1889	2,138,000	3,536,700	5,674,700	37·7
1890	2,597,000	3,679,800	6,276,800	41·2
1891	3,502,000	3,480,800	6,982,800	51·6
1892	3,040,500	3,380,700	6,421,200	47·3
1893	3,561,000	3,833,000	7,394,000	48·2
1894	3,531,000	4,725,800	8,256,800	42·7
1895	2,840,000	4,220,500	7,060,500	40·2
1896	2,842,000	4,801,500	7,643,500	37·2
1897	2,869,000	4,695,300	7,564,300	38·0
1898	2,995,000	4,689,600	7,684,600	38·5
1899	2,881,000	5,410,900	8,291,900	34·7
1900	5,252,987	6,005,868	11,258,855	46·6
1901	5,762,573	6,880,875	12,643,448	45·7
1902	5,844,062	5,699,912	11,543,974	50·6
1903	6,034,693	6,066,623	12,101,316	49·8
1904	6,265,160	4,919,599	11,184,759	56·0
1905	6,729,100	7,274,098	14,003,198	48·1
1906	7,124,083	7,244,550	14,348,633	49·5
1907	6,643,024	7,062,551	13,705,575	48·4
1908	7,372,492	6,985,539	14,358,031	51·3
1909	8,042,159	6,648,082	14,690,241	55·6
1910	8,155,837	8,667,980	16,823,817	48·5
1911	8,570,597	6,947,131	15,517,728	55·2

APPENDIX

APPENDIX 12—continued

Year	From Cane	From Beet	Total	Cane as % of Total
1912	8,969,374	9,039,006	18,008,380	49.7
1913	9,661,165	9,053,561	18,714,726	51.6
1914	9,901,741	8,311,701	18,213,442	54.4
1915	10,610,774	6,110,312	16,721,086	60.3
1916	11,173,168	5,864,508	17,037,676	65.5
1917	11,709,952	5,153,113	16,863,065	69.3
1918	11,451,948	4,428,150	15,880,098	72.2
1919	11,862,480	3,350,292	15,212,772	78.0
1920	11,924,813	4,906,266	16,831,079	70.8
1921	12,739,983	5,129,597	17,869,580	71.4
1922	12,500,345	5,356,950	17,857,295	70.3
1923	13,520,002	6,059,212	19,579,214	69.1
1924	14,905,930	8,295,493	23,201,423	64.3
1925	15,140,542	8,617,960	23,758,502	63.8
1926	15,314,988	7,896,189	23,211,177	65.4
1927	15,953,278	9,164,489	25,117,767	64.0
1928	17,187,918	9,612,681	26,800,799	64.1
1929	17,381,525	9,248,802	26,730,327	64.3
1930	15,942,438	11,910,883	27,853,321	57.2
1931	16,215,707	8,781,604	24,997,311	64.8
1932	14,741,833	7,994,375	22,736,208	65.2
1933	15,112,736	9,159,470	24,272,206	63.0
1934	14,842,171	9,791,624	24,633,795	60.1
1935	16,598,262	10,430,394	27,028,656	58.8
1936	18,415,750	10,232,900	28,648,650	64.3
1937	18,781,839	11,193,620	29,975,459	62.7
1938	18,451,041	10,225,311	28,676,352	64.5
1939	19,394,841	11,116,481	30,511,322	66.7
1940	18,285,000	11,323,000	29,608,000	61.7
1941	17,939,000	8,391,000	26,330,000	68.1
1942	16,781,000	8,527,000	25,308,000	66.3
1943	17,615,000	7,323,000	24,938,000	70.6
1944	15,279,000	6,480,000	21,759,000	70.2
1945	15,194,000	6,094,000	21,288,000	71.3
1946	18,041,000	7,721,000	25,762,000	70.0
1947	19,631,000	7,947,000	27,578,000	71.2
1948	20,666,000	10,019,000	30,685,000	67.3

APPENDIX

APPENDIX 12—continued

Year	From Cane	From Beet	Total	Cane as % of Total
1949	20,768,000	10,533,000	31,301,000	66.3
1950	22,137,000	13,298,000	35,435,000	62.4
1951	24,103,000	13,244,000	37,347,000	64.5
1952	23,234,000	13,246,000	36,480,000	63.7
1953	24,339,000	16,123,000	40,462,000	60.1
1954	24,819,000	15,038,000	39,857 000	62.2

Sources: 1839-1939 Deerr "History of Sugar".
1940-54 C. Czarnikow Ltd London.
1954 Estimated.

Note: Deerr comments ("History of Sugar" Vol. II pp. 485-6) that 1839 is the first year for which data approaching completeness are available. He states "The outputs of Russia before 1850 and of Belgium before 1852 are not available. The effect of these omissions is reflected in the sudden jump in beet-sugar production noticed in the years affected.

"While the beet-sugar output refers definitely to production, in much of the cane-sugar statistics, particularly those of earlier date, it is the exports which are quoted, with neglect of the internal consumption.

"Previous to 1900 the production of sugar in India does not appear in the statistics. There is then found for the year 1900 a jump in the cane-sugar production of over 2,000,000 tons. Equally the large production of south China, and of other Far Eastern countries is not included, and that of the Central and South American states only in the later figures. When all these factors are taken into consideration, it appears unlikely that the production of beet-sugar has in any year ever equalled that of cane, though for a number of years it was made to appear as if it accounted for two-thirds of the world's output. Actually this method of presenting the visible supply as total production was not accidental, as it suited the policy of beet-sugar producers and of the interests absorbing a large proportion of the supplies of beet-sugar (the confectionery and jam makers), and the doctrinaire free traders, to depreciate the position of the cane-sugar industry and to represent it as unworthy of support."

He also states (p. 499) "These statistics have been collected from many sources . . . No attempt has been made to correct for English or metric tons."

C.S.R. comment: We admire Mr Deerr's industry and patience in getting together statistics going back so far and covering so many countries. He indicates the reserve with which some of the figures should be treated and the reader should make allowances for the impossibility of attaining exactitude or even reconciliation in some cases.

APPENDIX

APPENDIX 13 RAW SUGAR PRICES ON WORLD "FREE" MARKET 1728-1954

Average annual prices (or annual range of prices) in shillings sterling per cwt c.i.f. London to 1939, f.o.b. Cuba 1940-47, c. & f. London 1948-54

Year	Price	Year	Price	Year	Price	Year	Price
1728	24	1763	26-38	1798	59-83	1833	26-31
1729	24	1764	28-40	1799	26-87	1834	31-33
1730	22	1765	32-43	1800	32-70	1835	30-38
1731	20	1766	29-42	1801	32-75	1836	38-45
1732	18	1767	33-42	1802	26-55	1837	33-37
1733	17	1768	32-41	1803	30-58	1838	33-42
1734	26	1769	33-42	1804	46-66	1839	39
1735	19	1770	31-43	1805	48-59	1840	49
1736	19	1771	32-44	1806	39-49	1841	40
1737	25	1772	29-43	1807	32-38	1842	37
1738	22	1773	28-44	1808	32-50	1843	37
1739	26	1774	27-43	1809	36-51	1844	33
1740	32	1775	26-39	1810	43-54	1845	33
1741	30	1776	30-50	1811	35-45	1846	33
1742	21	1777	35-60	1812	42-49	1847	27
1743	27	1778	40-64	1813	51-75	1848	26
1744	31	1779	50-59	1814	54-97	1849	22
1745	40	1780	45-59	1815	57-75	1850	23
1746	39	1781	55-72	1816	49-60	1851	23
1747	43	1782	26-63	1817	44-54	1852	20
1748	32	1783	22-48	1818	47-55	1853	22
1749	29	1784	18-46	1819	36-51	1854	20
1750	28	1785	26-42	1820	34-37	1855	24
1751	30	1786	29-48	1821	29-35	1856	28
1752	39	1787	24-47	1822	28-34	1857	34
1753	33	1788	34-46	1823	27-37	1858	24
1754	36	1789	31-47	1824	30-34	1859	23
1755	36	1790	38-46	1825	32-41	1860	24
1756	35	1791	47-65	1826	30-39	1861	22
1757	37	1792	48-76	1827	32-36	1862	20
1758	42	1793	41-73	1828	32-38	1863	21
1759	31-47	1794	32-67	1829	26-30	1864	26
1760	32-48	1795	42-75	1830	23-25	1865	22
1761	32-50	1796	61-78	1831	23-25	1866	21
1762	27-47	1797	52-75	1832	23-30	1867	22

APPENDIX

APPENDIX 13—continued

Year	Price	Year	Price	Year	Price	Year	Price
1868	22	1890	13/0	1912	13/1½	1934	4/8½
1869	24	1891	13/6	1913	10/5½	1935	4/8
1870	23	1892	13/6	1914	19/2½	1936	4/8½
1871	25/6	1893	14/3	1915	19/2½	1937	6/4½
1872	25/6	1894	11/3	1916	21/9	1938	5/5
1873	22/6	1895	10/0	1917	26/11½	1939	7/2
1874	21/6	1896	10/9	1918	24/7½	1940 (a)	6/3
1875	20/0	1897	9/3	1919	30/4½	1941	8/1½
1876	21/6	1898	9/6	1920	65/8½	1942	14/8½
1877	24/6	1899	10/6	1921	24/10½	1943	14/8½
1878	20/0	1900	12/6½	1922	15/6½	1944	14/8½
1879	19/0	1901	10/6½	1923	25/9	1945	17/2½
1880	20/6	1902	8/1	1924	21/9	1946	23/2½
1881	21/3	1903	9/6½	1925	12/9	1947	27/7
1882	20/0	1904	11/0½	1926	12/3	1948 (b)	27/4½
1883	19/0	1905	12/4½	1927	13/9	1949	29/2
1884	13/3	1906	9/8½	1928	11/7½	1950	43/9½
1885	13/6	1907	10/5½	1929	9/0½	1951	52/5½
1886	11/9	1908	11/4	1930	6/7	1952	39/2½
1887	11/9	1909	11/7½	1931	6/3½	1953	30/10½
1888	13/0	1910	13/2½	1932	5/9½	1954	29/5
1889	16/0	1911	13/4	1933	5/3		

Sources: Deerr "History of Sugar" to 1899.
C. Czarnikow Ltd London 1900-1954.

- Notes: (a) For 1940-47 f.o.b. Cuba prices have been used in the absence of alternative information.
- (b) For 1948-54 approximate c.&f. London prices have been obtained by adding annual average freights to f.o.b. Cuba prices.
- (c) As Deerr's annual ranges prior to 1900 indicate, prices fluctuate during each year. In the last 50 years the lowest price known to C.S.R. was 3/10½ c.i.f. London in November 1934. In 1920 prices exceeding 120/- c.i.f. London were paid.
- (d) The tabulation shows main market fluctuations clearly but, because it is expressed in monetary units of changing real value, does not allow valid comparisons of prices between remote periods.

APPENDIX

APPENDIX 14 DEVELOPMENT OF CANE FARMING IN FIJI 1925-55

Year	Total Area under Cultivation for Cane	Cultivated by							
		C.S.R. Company		European Planters		Indian and Fijian Tenants		Indian and Fijian Contractors	
		Acres	% of area	Acres	% of area	Acres	% of area	Acres	% of area
1925	64,963	33,679	52	4,446	7	6,905	10	19,933	31
1926	67,494	30,350	45	4,040	6	9,080	13	24,024	36
1927	70,526	28,828	41	3,677	5	11,448	16	26,573	38
1928	75,007	23,700	32	2,342	3	20,710	28	28,255	37
1929	77,645	20,025	26	2,004	3	25,559	33	30,057	38
1930	78,250	17,641	22	1,611	2	27,896	36	31,102	40
1931	78,373	12,610	16	1,133	1	34,300	44	30,330	39
1932	80,939	9,160	11	744	1	39,412	49	31,623	39
1933	83,692	7,450	9	645	1	43,077	51	32,520	39
1934	84,497	5,335	6	658	1	44,989	53	33,515	40
1935	87,738	4,874	5	661	1	45,690	52	36,513	42
1936	89,924	4,532	5	653	1	46,031	51	38,708	43
1937	91,197	4,500	5	717	1	46,139	50	39,841	44
1938	91,475	3,219	4	369	—	47,405	52	40,482	44
1939	91,812	3,126	3	240	—	47,421	52	41,025	45
1940	91,624	3,111	3	206	—	47,268	52	41,039	45
1941	92,628	3,153	3	161	—	46,521	50	42,793	47
1942	94,046	3,119	3	221	—	46,439	50	44,267	47
1943	90,913	2,728	3	197	—	45,383	50	42,605	47
1944	89,059	2,425	3	197	—	45,332	51	41,105	46
1945	89,843	2,389	3	197	—	45,633	51	41,624	46
1946	90,812	2,716	3	197	—	46,070	51	41,829	46
1947	92,286	2,899	3	197	—	46,753	51	42,437	46
1948	92,914	2,766	3	197	—	47,070	51	42,881	46
1949	93,511	2,787	3	202	—	47,492	51	43,030	46
1950	93,206	2,793	3	199	—	47,852	51	42,362	46
1951	96,006	2,735	3	199	—	48,356	50	44,716	47
1952	101,526	2,660	3	191	—	49,543	49	49,132	48
1953	104,162	2,634	3	489	—	50,461	48	50,578	49
1954	108,727	2,571	2	415	—	51,584	48	54,157	50
1955	110,854	2,571	2	391	—	51,791	47	56,101	51

Source: C.S.R. records.

APPENDIX

APPENDIX 15 SIZE OF CANE FARMS IN FIJI 1955

Size of farm	Number of	
	Tenants	Contractors
Up to 7.9 acres	631	4,992
8 to 11.9 acres	2,174	1,609
12 to 15.9 acres	1,521	694
16 to 19.9 acres	330	308
20 to 29.9 acres	84	304
30 to 69.9 acres	2	82
70 acres or over	nil	4
Total	4,742	7,993

APPENDIX 16 ACRES UNDER CULTIVATION FOR SUGAR CANE, FIJI, 1950-55

Year	Total	For cutting this year		Plants for cutting next year	Fallow
		Plants	Ratoons		
1950	93,206	21,901	22,728	20,621	27,956
1951	96,006	18,945	22,858	34,033	20,170
1952	101,526	31,734	20,587	29,261	19,944
1953	104,163	28,660	32,371	29,111	14,021
1954	108,726	27,486	32,694	34,697	13,849
1955	110,854	34,494	30,544	33,881	11,935

APPENDIX

APPENDIX 17 AUSTRALIAN RAW SUGAR MILLS AND THEIR OWNERS, 1955

Arranged in geographical order from the northernmost mill southwards

<i>Name of Mill</i>	<i>Owner</i>	<i>If Farmers' Co-operative</i>
Mossman ...	Mossman Central Mill Co. Ltd ...	Yes
Hambledon ...	The Colonial Sugar Refining Co. Ltd	
Mulgrave ...	Mulgrave Central Mill Co. Ltd ...	Yes
Babinda ...	Babinda Central Mill Co. Ltd...	Yes
Goondi ...	The Colonial Sugar Refining Co. Ltd	
Mourilyan ...	Australian Sugar Co. Pty. Ltd	
South Johnstone ...	South Johnstone Co-op. Sugar Milling Assn. Ltd ...	Yes
Tully ...	Tully Co-op. Sugar Milling Assn. Ltd	Yes
Macknade ...	The Colonial Sugar Refining Co. Ltd	
Victoria ...	The Colonial Sugar Refining Co. Ltd	
Invicta ...	Haughton Sugar Co. Ltd	
Pioneer ...	Pioneer Sugar Mills (Pty.) Ltd	
Kalamia ...	Australian Estates Co. Ltd	
Inkerman ...	Pioneer Sugar Mills (Pty.) Ltd	
Proserpine ...	Proserpine Co-op. Sugar Milling Assn. Ltd	Yes
Farleigh ...	Farleigh Co-op. Sugar Milling Assn. Ltd	Yes
Racecourse ...	Racecourse Co-op. Sugar Assn. Ltd ...	Yes
Pleystowe ...	Amalgamated Sugar Mills Ltd	
Marian ...	Marian Central Mill Co. Ltd ...	Yes
Cattle Creek ...	Cattle Creek Co-op. Sugar Milling Assn. Ltd ...	Yes
North Eton ...	North Eton Co-op. Sugar Milling Assn. Ltd ...	Yes
Plane Creek ...	Plane Creek Central Mill Co. Ltd ...	Yes
Millaquin ...	Millaquin Sugar Co. Ltd	
Qunaba ...	Millaquin Sugar Co. Ltd	
Fairymead...	Fairymead Sugar Co. Ltd	
Bingera ...	Gibson and Howes Ltd	
Gin Gin ...	Gin Gin Co-op. Sugar Milling Assn. Ltd	Yes
Isis ...	Isis Central Sugar Mill Co. Ltd ...	Yes
Maryborough ...	Maryborough Sugar Factory Pty. Ltd	
Moreton ...	Moreton Central Sugar Mill Co. Ltd	
Rocky Point ...	W. H. Heck and Sons Pty. Ltd	
Condong ...	The Colonial Sugar Refining Co. Ltd	
Broadwater ...	The Colonial Sugar Refining Co. Ltd	
Harwood ...	The Colonial Sugar Refining Co. Ltd	

NOTE: Marian, Mossman, and Plane Creek are believed to have a proportion of shares held by persons other than suppliers, but are generally regarded as co-operative mills.

APPENDIX

APPENDIX 18 AUSTRALIAN RETAIL PRICE OF REFINED SUGAR, AND RETURN TO QUEENSLAND SUGAR INDUSTRY FROM DOMESTIC AND EXPORT SALES OF RAW SUGAR

Season	Refined Sugar Retail Price per lb. Capital Cities	Raw Sugar net return per ton 94 n.t. to Queensland Industry		
		From sales on Domestic Market	From sales of Exportable Sugar	Overall average to Q'ld "Pool"
		£ s. d.	£ s. d.	£ s. d.
1923	5d	—	—	—
1923 (Oct)	4½d	—	—	27 0 0
1924	4½d	—	—	26 0 0
1925	4½d	26 0 0	11 5 9	19 10 7
1926	4½d	26 15 0	14 18 10	24 10 10
1927	4½d	26 10 0	12 2 6	22 0 4
1928	4½d	26 13 6	10 10 0	20 17 11
1929	4½d	26 16 0	9 17 0	20 5 10
1930	4½d	27 0 0	8 5 0	19 10 1
1931	4½d	26 19 0	9 7 0	17 19 10
1932	4½d	25 2 3	8 5 9	18 16 2
1933 (Jan)	4d	23 18 6	8 0 6	16 3 6
1934	4d	24 0 0	7 11 3	15 10 6
1935	4d	24 0 0	7 18 9	16 3 8
1936	4d	24 2 0	7 19 0	15 4 8
1937	4d	24 0 0	8 6 0	15 6 5
1938	4d	24 0 0	8 4 3	15 2 2
1939	4d	23 12 6	10 7 6	15 15 3
1940	4d	23 1 0	11 5 6	17 2 8
1941	4d	22 13 0	10 18 9	17 18 5
1942	4d	22 14 6	10 16 3	19 0 6
1943	4d	22 10 6	13 2 6	21 1 3
1944	4d	22 2 0	15 0 6	19 16 1
1945	4d	21 18 0	16 17 9	20 6 1
1946	4d	21 18 0	21 10 0	21 16 10
1947 (Dec)	4½d	24 0 0	29 12 6	24 18 9
1948	4½d	23 1 0	28 2 0	25 9 11
1949 (Nov)	5d	24 6 0	29 7 6	26 14 10
1950	5d	24 11 0	32 16 6	28 5 4
1951 (Jul)	6½d	33 14 0	36 15 6	34 7 6
1952 (Mar)	8d	—	—	—
(Oct)	9d	44 3 0	41 2 0	42 12 3
1953	9d	47 18 6	39 18 0	42 7 11
1954	9d	47 1 0	38 16 6	41 4 9

Sources: C.S.R. records and Queensland Sugar Board accounts.

APPENDIX

APPENDIX 19 MOVEMENTS IN AUSTRALIAN RETAIL PRICE OF SUGAR AND OTHER GOODS, AND IN WAGES

Base 1923-27 = 1,000

Year	Sugar	"C" Series Retail Price Index		Wages. Nominal weekly rates Adult Males
		Food and Groceries	All Items	
1923	1,000	1,009	1,003	964
1924	1,000	969	987	982
1925	1,000	998	997	993
1926	1,000	1,023	1,011	1,022
1927	1,000	1,000	1,002	1,039
1928	1,000	985	1,009	1,048
1929	1,000	1,044	1,033	1,053
1930	1,000	941	975	1,035
1931	1,000	826	873	935
1932	1,000	796	830	875
1933	889 (Jan)	751	804	846
1934	889	783	817	849
1935	889	806	832	861
1936	889	825	850	874
1937	889	851	873	911
1938	889	886	897	960
1939	889	927	920	985
1940	889	939	957	1,008
1941	889	947	1,008	1,066
1942	889	1,031	1,091	1,155
1943	889	1,037	1,131	1,233
1944	889	1,026	1,126	1,242
1945	889	1,034	1,126	1,249
1946	889	1,036	1,145	1,281
1947	1,000 (Dec)	1,100	1,188	1,387
1948	1,000	1,256	1,295	1,556
1949	1,111 (Nov)	1,394	1,415	1,714
1950	1,111	1,566	1,560	1,920
1951	1,444 (Jul)	2,041	1,883	2,400
1952	1,778 (Mar)	2,526	2,196	2,798
	2,000 (Oct)			
1953	2,000	2,641	2,302	2,957
1954	2,000	2,671	2,326	3,006

Sources: "C" Series—Commonwealth of Australia Year Book. Wages—From Commonwealth Year Book (base 1911 = 1,000) recalculated to base 1923-27 = 1,000.

APPENDIX

APPENDIX 20 DISTRIBUTION OF AUSTRALIAN RAW SUGAR PRODUCTION

In tons 94 net titre

Season	Home Consumption	Exportable Sugar	Total
1925	289,159	227,002	516,161
1926	338,058	77,633	415,691
1927	350,025	158,599	508,624
1928	345,199	191,818	537,017
1929	335,150	202,913	538,063
1930	325,209	209,854	535,063
1931	303,418	301,434	604,852
1932	336,700	196,065	532,765
1933	347,479	319,300	666,779
1934	317,599	324,844	642,443
1935	336,541	312,204	648,745
1936	359,337	423,075	782,412
1937	364,917	444,935	809,852
1938	363,461	458,444	821,905
1939	383,453	544,694	928,147
1940	399,484	406,500	805,984
1941	440,928	304,321	745,249
1942	442,226	207,333	649,559
1943	434,128	89,666	523,794
1944	454,237	215,661	669,898
1945	455,888	209,956	665,844
1946	463,410	88,393	551,803
1947	498,551	106,503	605,054
1948	499,820	443,073	942,893
1949	497,302	439,635	936,937
1950	518,236	402,663	920,899
1951	587,745	157,346	745,091
1952	477,481	471,008	948,489
1953	521,809	732,208	1,254,017
1954	542,683	784,449	1,327,132

Sources: 1925-35 C.S.R. records.

1936-54 Queensland Auditor-General's Reports on Sugar Board Accounts.

Note: Above figures exclude small local sales of raw sugar to farmers and mill workers.

APPENDIX

APPENDIX 21 DESTINATION OF AUSTRALIAN EXPORTS OF RAW SUGAR

In long tons, tel quel

Season	United Kingdom	Canada	New Zealand	Hong Kong	Ceylon	Other Countries	Total
1923	10,511	—	5,990	—	—	—	16,501
1924	53,299	12,320	5,701	—	—	—	71,320
1925	198,313	14,781	—	—	—	—	213,094
1926	39,621	33,448	—	—	—	—	73,069
1927	138,598	11,500	—	—	—	—	150,098
1928	180,834	5,943	—	—	—	—	186,777
1929	186,345	9,000	—	—	—	—	195,345
1930	197,208	5,504	—	—	—	—	202,712
1931	274,933	15,751	—	—	—	—	290,684
1932	139,195	48,995	—	—	—	—	188,190
1933	278,544	27,158	—	—	—	—	305,702
1934	259,831	52,144	—	—	—	—	311,975
1935	287,049	9,793	—	—	—	—	296,842
1936	344,051	63,715	—	—	—	—	407,766
1937	358,968	67,949	—	—	—	—	426,917
1938	391,496	50,290	—	—	—	—	441,786
1939	358,585	107,702	54,672	4,438	—	—	525,397
1940	184,340	96,039	88,541	—	—	—	368,920
1941	76,957	44,082	52,669	1,500	—	21,132	196,340
1942	14,371	7,000	31,413	—	—	7,502	60,286
1943	—	16,996	58,178	—	—	11,212	86,386
1944	—	25,830	74,792	—	—	15,323	115,945
1945	486	8,733	38,049	14,857	14,950	74,423	151,498
1946	14,168	—	22,436	1,100	—	49,542	87,246
1947	62,031	—	18,226	—	4,038	13,646	97,941
1948	320,772	36,851	48,152	—	—	—	405,775
1949	318,216	40,447	60,307	—	—	—	418,970
1950	233,723	93,507	53,540	—	—	—	380,770
1951	68,738	56,486	31,716	—	—	—	156,940
1952	358,483	25,914	51,768	—	17,379	—	453,544
1953	532,732	101,495	45,542	9,318	9,035	—	698,122
1954	443,115	92,082	65,947	39,961	9,519	95,957	746,581

Source: C.S.R. records.

Note: Above tonnages are those shipped direct to major overseas buyers. Small quantities sold as ships' stores etc. are not included.

APPENDIX

APPENDIX 22 C.S.R. SALES OF REFINED SUGAR TO AUSTRALIAN MANUFACTURERS

In long tons, tel quel

Year ending 30 June	Sales to Manufacturers	Sales to Other Buyers	Total
1931	76,767	204,084	280,851
1932	81,257	208,325	289,582
1933	84,837	210,987	295,824
1934	85,713	207,392	293,105
1935	93,196	206,976	300,172
1936	101,440	206,227	307,667
1937	110,620	211,696	322,316
1938	117,087	208,542	325,629
1939	118,231	207,631	325,862
1940	135,028	217,108	352,136
1941	147,740	214,513	362,253
1942	166,072	243,431	409,503
1943	174,211	221,472	395,683
1944	181,696	220,936	402,632
1945	169,752	210,565	380,317
1946	189,299	221,371	410,670
1947	203,605	209,585	413,190
1948	215,549	221,987	437,536
1949	215,426	231,639	447,065
1950	214,271	232,068	446,339
1951	234,516	229,185	463,701
1952	241,660	255,472	497,132
1953	199,847	212,092	411,939
1954	214,034	233,107	447,141
1955	225,632	235,790	461,422

Source: C.S.R. records.

Note: "Manufacturers" in this context are those who purchase at least 12 tons of sugar per year for manufacturing purposes. Most of the sugar sold to "Other Buyers" goes to the grocery trade but includes also sugar sold to small processors not listed as "manufacturers" by the company. The proportion of sugar used by manufacturers steadily increased over many years until 1947; since then it has amounted to about half the sugar used in Australia. Sales of refined sugar shown above include also some sales of raw sugar to certain manufacturers, and to the grocery trade.

APPENDIX

APPENDIX 23 THE "P.O.C.S." FORMULA

The "P.O.C.S." formula was evolved by Dr Gustav Kottmann of the C.S.R. in the 80s of last century as a means of calculating the amount of cane sugar in sugar cane capable theoretically of being recovered by milling, if certain very high standards of milling performance could be reached. It thus provided a standard for measurement of the performance of a mill on cane of varying quality. From 1899 it has provided a basis for paying farmers on the sugar content and other qualities of their cane. The P.O.C.S. (Pure Obtainable Cane Sugar) formula was incorporated into Queensland cane prices legislation in 1915 under the name of the C.C.S. (Commercial Cane Sugar) formula.

The measure of the recoverable sugar content of cane determined by the use of this formula is referred to as the "P.O.C.S." or the "C.C.S." of a cane. One speaks of "cane of 16 P.O.C.S. or 16 C.C.S." It is *not* a percentage measure of the sugar in cane, but of the percentage of *recoverable* sugar in cane (a), assuming certain standards of factory efficiency and accepting certain postulates in this empirical formula.

For practical purposes, cane consists of juice and fibre. The miller separates the juice from the fibre by crushing, and then extracts sugar from the juice. The juice also contains other soluble matter such as mineral salts, other sugars and organic compounds. These are known as "impurities".

The proportions in which *fibre*, *sugar* and soluble *impurities* are present in the cane has a bearing upon the amount of sugar that the miller can extract from the cane (b).

Cane varies considerably in fibre, sugar and impurity content—even when the variety is the same. Considerable differences occur from variety to variety and as the season progresses, as the following figures indicate:

<i>Mill Area</i>	<i>Date</i>	<i>Variety of Cane</i>	<i>% Fibre</i>	<i>% Sugar</i>	<i>% Impurities</i>	<i>% "P.O.C.S."</i>
Goondi	June '55	Pindar	10	9.69	2.66	8.36
	Sept '55	Badila	9	15.57	1.83	14.65
B'water	July '55	Trojan	15	15.04	2.10	13.99
	Aug '55	Vesta	14	14.58	1.44	13.86
Macknade	July '55	Pindar	12	13.70	2.20	12.60
	Sept '55	„	12	16.19	1.66	15.36

APPENDIX

It is not practicable to analyse the cane itself and the desired result is obtained in the manner explained below.

As already mentioned, cane consists of juice and fibre. If the fibre content can be ascertained the remainder, the juice, is known. Then, if we can ascertain the constituents of the juice, the various components of the whole cane can be stated. The task can be set out as follows: determine (1) the fibre (which gives the juice by difference) and (2) the proportions in which the various constituents are present in the juice, viz. the *sugar*, the *soluble impurities* and the remainder of the juice which is *water*. (The water provides a vehicle which carries the soluble solids—i.e., the sugar and the soluble impurities; the water is finally separated from the soluble solids by evaporation in the manufacturing process.)

The percentage of *fibre* in the cane is found by shredding a sample of cane, weighing it, soaking it in water to dissolve out the juice, and then drying the fibres and weighing them. The weight of the dried fibres related to the weight of the original cane gives the proportion of fibre.

We still have to obtain the "breakdown" of the juice. A sample is taken of the juice of each batch of cane as it comes from the front of the first set of rollers, before the juice becomes diluted with the hot water which is added in the main crushing process. This juice is known as "first roller juice". From the sample of juice the percentage of sugar in the juice is determined by the saccharimeter (c).

Then the following calculation is made:

$$\% \text{ CS in cane} = \frac{\% \text{ CS in 1RJ} \times [100 - (\% \text{ fibre} + 5)]}{100}$$

where % CS in cane = percentage cane sugar in the cane

1RJ = first roller juice

% fibre = percentage fibre in the cane

(The factor "5" was added to the % fibre as a result of practical factory measurements) (d).

Before the percentage of *soluble impurities* in the cane can be found it is necessary to find the amount of total soluble matter (i.e., sugar and soluble impurities). Another simple formula is used, but to use it, it is necessary to know the "density" of the first roller juice, which is measured by a hydrometer, calibrated in the Brix scale. The calculation then used is:

$$\% \text{ SS} = \frac{^{\circ} \text{ Brix of 1RJ} \times [100 - (\% \text{ fibre} + 3)]}{100}$$

where % SS = percentage soluble solids in cane

° Brix = density according to Brix scale

(The factor "3" was added to the % fibre as a result of practical factory measurements) (d).

APPENDIX

The amount of soluble impurities can now be found by subtracting the sugar from the total soluble solids, thus—

$$\% \text{ SS} - \% \text{ CS} = \% \text{ soluble impurities in cane}$$

Having thus arrived at the proportions of the main constituents *actually* in the cane (fibre, sugar, and impurities) the amount of sugar *recoverable* from the cane according to Dr Kottmann's formula is calculated by using the P.O.C.S. formula itself:

$$\% \text{ P.O.C.S.} = \% \text{ CS in cane} - \frac{\% \text{ soluble impurities in cane}}{2}$$

This formula for the calculation of recoverable sugar was arrived at by assuming certain standards of milling efficiency, which standards, Dr Kottmann postulated, should be set at higher levels than attainable. He referred to this as an unconquered margin for future attainment. The standards assumed are:

1. That there is no loss of sugar in the crushing and manufacturing process beyond that retained in the molasses.
2. That one-fourth of the soluble impurities are removed by clarification (coagulation of impurities in cane juice, precipitation and filtration) leaving three-fourths of them to pass to the residual molasses.
3. That the soluble solids in residual molasses consist of 40 per cent of sucrose and 60 per cent of impurities.

NOTES:

- (a) Pure Obtainable Cane Sugar means pure refined sucrose—not commercial raw sugar.
- (b) The P.O.C.S. formula is not sensitive to the somewhat different effects of the various constituents of the soluble impurities.
- (c) Where the words "sugar" and "cane sugar" are used without qualification or without other distinctive implication in this appendix they refer to polarization as read on the saccharimeter.
- (d) The "first roller juice" is somewhat richer than the whole juice in the cane, and this is allowed for by adding 5 and 3 to the fibre as shown in the formulae.

APPENDIX

APPENDIX 24 SUGAR AND TOOTH DECAY

"For many years there has been a widespread impression among dentists and the laity that dental caries is intimately associated with the amount and form of the sugar intake, but scientific proof of the validity of this impression has been lacking." Extract from British Medical Council report, February 1955.¹

"It is not known whether there is a relation between the sugar and refined carbohydrate content of an adequate diet and the dental caries susceptibility." Extract from a report prepared for the Food and Nutrition Board, United States National Research Council, 1952.²

"The fact that children on a high sugar dietary . . . (Institution I) out-scored [in dental rating] those with lesser sugar intake but poorer dietaries is worthy of note . . . The dietary of the children in this study was considerably higher than that of the aforementioned investigations in other forms of carbohydrate, with the dental scores in direct order of total caloric intake, and in direct order of sugar intake. With respect to Institutions II and III, it appears significant that the two groups of children yielded dental scores in the same order as the presumed adequacy of the dietaries, and in direct order of the sugar intake. In short, a high sugar intake was not antagonistic to a good dental status." Extract from a monograph of the Society for Child Development, 1949.³

The British Medical Council report quoted above published the results of observations over two years of children, in a number of residential homes in England, all of whom were "getting enough calories, protein, mineral salts and vitamins, according to required standards". Control groups of children remained on their normal diets, while test groups were given up to 22 ounces a week extra sugar. The authors state, "The results of the investigations are, in the main, clear cut and therefore can be stated quite briefly. They demonstrate that relatively great differences in the total sugar content of the diets of children in institutions had no significant effect on the initiation or spread of dental caries in periods of 1 to 2 years."

In the United States report, also quoted above, the Chairman of the Food and Nutrition Board comments that, despite ten years of persistent labour on the part of the Committee for Dental Health, "The ultimate object remains to be reached. The causes of dental caries are only partially under-

¹ British Medical Research Council Special Report Series No. 228 The Effect of Sugar Supplements on Dental Caries in Children by J. D. King, D.Sc., F.D.S.R.C.S., May Mellanby, M.A., Sc.D., H. H. Stones, M.D., M.D.S., F.D.S.R.C.S., and H. N. Green, M.A., M.D., M.Sc., published by Her Majesty's Stationery Office and dated 3 February 1955.

² A Survey of the Literature of Dental Caries prepared for the Food and Nutrition Board, National Research Council, under the supervision of the Committee on Dental Health, and published as Publication No. 225, National Academy of Sciences, National Research Council, Washington, D.C., in 1952.

³ A Study of Institutional Children with particular reference to the Caloric Value as well as other factors in the Dietary published by the Society for Research in Child Development, National Research Council, Washington, D.C., in 1949.

APPENDIX

stood at present . . ." In the same publication J. H. Shaw, Assistant Professor of Dental Medicine at Harvard University warns "In any study of the relation of carbohydrates to dental caries activity, the adequacy of the diet in question must be guaranteed. This has not been done in a large number of experiments where the refined carbohydrate content of the ration has been increased."

A recent Australian publication *Eat for Health*, compiled by "a team of experts from the Preventative Dentistry Sub-Committee of the Australian Dental Board (Victorian Branch)", is less cautious than the authorities quoted above in claiming an irrefutable causal relation between dental caries and sugar consumption. It is asserted, without qualification, that "ninety per cent of dental decay comes from sugar and ten per cent from starch". "Sugar rots teeth," the publication states, and adds "... For most people the only thing necessary for the prevention of most, if not all, new cavities forming in their teeth is an act of will power. Cut out—or drastically reduce—the consumption of refined carbohydrates in all their forms, and a vast array of laboratory and clinical evidence will assure you of freedom from further dental decay."⁴

⁴ *Eat for Health* a "programme for health by the Preventative Dentistry Sub-Committee of the Australian Dental Association (Victorian Branch)" published by Colorgravure Publications (The Herald & Weekly Times Ltd.) Melbourne, Victoria. Undated (c. 1954).

APPENDIX

APPENDIX 25 SOURCE OF IMPORTS OF RAW SUGAR INTO NEW ZEALAND 1930-55

In long tons, tel quel

Year ending 30 June	Java	Cuba	Peru	San Domingo	Fiji	Australia	Total
1930	7,690	42,903	20,802	—	9,256	—	80,651
1931	45,151	14,783	—	—	8,592	—	68,526
1932	69,410	—	—	—	5,917	—	75,327
1933	55,530	15,735	—	—	5,500	—	76,765
1934	68,545	7,687	—	—	2,190	—	78,422
1935	61,847	7,875	—	—	1,116	—	70,838
1936	39,435	15,752	—	15,750	1,132	—	72,069
1937	67,646	7,875	—	7,267	1,468	—	84,256
1938	61,065	—	—	15,737	1,425	—	78,227
1939	81,421	—	—	7,350	493	—	89,264
1940	8,050	—	7,875	7,500	—	48,493	71,918
1941	—	—	—	—	—	94,756	94,756
1942	—	—	—	—	34,593	52,669	87,262
1943	—	—	—	—	40,358	31,413	71,771
1944	—	—	—	—	29,439	58,178	87,617
1945	—	—	—	—	19,085	60,133	79,218
1946	—	—	—	—	23,291	49,937	73,228
1947	—	—	—	—	64,058	25,207	89,265
1948	—	—	—	—	73,182	17,495	90,677
1949	—	—	—	—	32,954	48,673	81,627
1950	—	—	—	—	39,784	60,517	100,301
1951	—	—	—	—	15,040	53,540	68,580
1952	—	—	—	B.W.I. 14,350 Formosa 8,200	50,152	31,716	96,218
53	—	—	—	—	33,629	51,768	93,597
1954	—	6,493	7,958	—	35,064	45,542	95,057
1955	—	—	—	—	34,157	60,781	94,938

Source: C.S.R. records.

APPENDIX

APPENDIX 26 MUNITION MANUFACTURE AND DEFENCE PROJECTS BY C.S.R. 1939-45

Produced in addition to established manufactures, which included raw and refined sugar, distillery products, and building materials.

<i>Project or Product</i>	<i>Remarks</i>
POWER ALCOHOL ...	Four grain distilleries were designed and erected in New South Wales, Victoria, South Australia and Western Australia for the Commonwealth Government. These were designed for a total production of 12 million gallons of power alcohol per annum, using wheat as raw material.
ETHER	The design of a plant for the manufacture of ether was adapted and the fabrication and erection of the plant supervised at an explosives factory.
GLYCERINE	A pilot plant was developed and glycerine for explosives was made from sugar.
ACETONE	A plant for the manufacture of acetone for cordite was fabricated, erected and operated.
GAS-MASK CARBON ...	A factory was built and operated for the manufacture of activated carbon from coconut shell.
VITAMIN C	A plant was developed and vitamin C (ascorbic acid) was manufactured for supply to the defence forces.
18-POUNDER AND 25-POUNDER SHELLS ...	1,600,000 shells were made in a workshop annexe specially built for the purpose.
GUN BARRELS	25-pounder gun barrels, jackets and other parts were machined.
SIGNAL PISTOLS	25,000 signal pistols and spare parts were manufactured.
MACHINE TOOLS, ETC. ...	Special purpose lathes for machining bombs were designed, manufactured, and operated; toggle presses for cartridge cases and much other equipment of a similar nature were also manufactured.

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APPENDIX 27 RESEARCH AND DEVELOPMENT IN C.S.R.

Expenditures on industrial research in the more advanced countries have been consistently increasing year by year for a considerable period. Research is now an accepted tool of management. Naturally, the type of research and its extent varies with different classes of industry and business and with the size of the organization concerned. The need for research seems to arise from the basic necessity for an organization to grow. In a developing and competitive economy no organization can stand still without endangering itself. Nationally, research is an important factor in achieving greater productivity, on which our living standards and material welfare depend.

In its broadest sense research is the "endeavour to discover facts by the scientific study of a subject". There are a number of different kinds of research and a number of different ways of carrying it out. Industrial enterprises are generally concerned with what is called "basic research", "applied research" and, finally, with the function of "development" which can be described as the process of utilizing research findings for a practical and economic end. Sometimes one can see in particular instances a clear distinction between "research" and "development"; often it is difficult to see, particularly when the two functions are carried out by the same man or the same group. In general, industrial organizations are not concerned directly with pure research, which is looked on as a function of bodies such as universities. Industrially, we seek knowledge as a means to an end and not as an end in itself. Pure research naturally has contributed very greatly to our present state of knowledge and will continue to do so.

Research can be carried out in a number of different ways: by using consultants; by contributing towards co-operative research projects with government organizations such as the Commonwealth Scientific and Industrial Research Organization, or with trade associations; by the setting up of an individual research organization within a company; and by arranging for officers with the necessary abilities to carry out research and investigations in conjunction with production and selling.

Each of the various methods has advantages and disadvantages but all can be utilized where appropriate. In general, as the need for research is established in a company, the tendency is for a company's own internal research groups to grow in size and spread of activities. In C.S.R. we use all forms of research: we use consultants on specific tasks; we collaborate in co-operative ventures with universities and the Commonwealth Scientific and Industrial Research Organization; we subscribe to sugar industry research of the trade association type; and, finally, we have our own chemical and physical research department, agricultural research stations and the development activities appropriate to putting research findings into practice. These different research activities are not overlapping but are complementary and we believe it is of the highest importance to remain flexible in approach.

Methods engineering, work study and work simplification, management

APPENDIX

and organizational study, market and consumer research investigation are all part of research and development, although not always so regarded. There is also the comparatively recent mathematical and statistical technique known as "operations research"; this, too, we have commenced to use.

Industrial research involves much more than purely scientific or technical skills; it cannot flourish or be effective in an organization unless the climate of opinion is favourable. In a recent talk on the subject of research, arranged by the Sydney University Extension Board, Dr J. Vernon of this company illustrated the point by reference to the introduction of a system of chemical control into the company's factories in the 1880s. He said:—

Over 70 years ago, round about 1880, the then general manager, Mr E. W. Knox, apparently became dissatisfied with the general efficiency of our sugar mills and decided to do something about it with a view to improvement. He accordingly engaged two chemists from overseas, one from Germany and one from Scotland—Dr Kottmann and Mr Walton. Either by luck or by good judgment, he obtained two men each remarkable in his own way. Dr Kottmann, a chemist from the German beet sugar industry, was turned loose to investigate the efficiency of our sugar milling process and, using methods which we now would regard as quite commonplace, made some remarkable advances in the milling process, mainly in the direction of reducing the loss of recoverable sugar, which was previously taking place. He, together with Mr Walton, set about recasting the factory control methods and introduced a complete system of chemical control, involving the checking of every stage of the factory process from the time the cane entered the mill until the finished sugar emerged in bags.

Looking back on it all from this long distance, the achievement serves as a nice illustration of the ideas which I have just been discussing. You will notice the sequence of events. First, the general manager of the company becoming dissatisfied with the technical efficiency of the process and wondering whether a technical investigation would bring to light new facts which would enable the process to be improved. Second, his determination to enlist good outside men, with special skills which he could not then obtain within his organization. Third, the carrying out of a sound and effective piece of research by these two men into the factory processes. Fourth, the immediate recognition by the general manager that their findings were sound and worthwhile, and the taking by him of forceful steps to bring them into actual working practice.

This may sound rather a simple story but viewed against the background and the state of knowledge of over seventy years ago it is remarkable. At that time there were no chemists employed in the sugar industry in Australia and, indeed, very few in the world, outside some of the beet sugar factories in Germany and some of the Scottish sugar refineries. Mr Knox was not a technical man, yet he conceived

APPENDIX

the problem, took the then unusual step of engaging outside chemical men to aid him and, once the technical results had been achieved, used all his energies and influence to see that they were adopted promptly and effectively in the factories under his control. Basically, the successful research, in this instance, sprang from the active and restless mind of the general manager.

C.S.R. Research and Development Projects, 1954

A brief list of some of the research and development projects undertaken by C.S.R. during 1954 in factory processing and cane-growing may be of interest. These projects had three aims: to improve quality of products, to reduce costs of manufacture or of agriculture and to increase capacity of factories or of farms. The company has in the past also devoted considerable attention to the investigation and development of new products, and is currently engaged on several research projects of this nature. During 1954 about 55 technical officers were engaged full-time on the work listed and much additional research and development was carried out by the operating staff throughout the company.

CHEMICAL RESEARCH DEPARTMENT

Filterability of raw sugars was investigated and progress made towards finding the basic causes of bad filtration characteristics.

Temporary raw sugar storage was investigated with four outdoor stacks, each of 1,500 tons.

Hardening of raw sugar in storage was discussed with the University of Sydney, and a scholarship in this field granted by C.S.R.

Flotation of carbonatation slurries was the subject of co-operative research with the Commonwealth Scientific and Industrial Research Organization.

Phosphatation flotation was tried out successfully with 18 different raw sugars from Queensland.

Carbonatation trials were continued with a small pilot plant.

Bone char investigations were carried out in conjunction with the Refinery Development Section.

Distillery fermentation investigations resulted in improved techniques in the use of ammonium sulphate for regulating rates of fermentation. A University consultant was retained to discuss basic aspects of distillery work.

Properties of blue asbestos were measured, principally in relation to its use in the manufacture of asbestos cement.

Methods of measuring rates of crystallization, methods of analysis, selection of instruments and other matters formed the subject of minor investigations.

MILL ENGINEERING DEPARTMENT

Bulk raw sugar installations were developed and installed at Harwood Mill, and advanced sufficiently to load in bulk at Broadwater Mill.

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MILL CHEMICAL DEPARTMENT

Clarification control was improved by using photo-electric turbidimeters, and the use of a polyelectrolyte in clarification of mill juices was investigated.

TECHNICAL FIELD DEPARTMENT

43,000 cane seedlings were raised. Three new C.S.R. varieties were adopted in Queensland.

Yellowing disease of cane in Fiji was investigated, its causes discovered and control measures developed.

REFINERY DEVELOPMENT SECTION

Control instruments were investigated and a plan evolved for their extensive use in affination and carbonatation.

A continuous centrifugal machine was installed at the affination station, Pymont.

Phosphatation flotation was investigated and proposed for Cottesloe refinery.

Plant extensions at Yarraville included an additional pan, a cooler, efferts and automatic control instruments.

BUILDING MATERIALS DIVISION

Output of Timbrock was increased as the result of a detailed process investigation.

Quality of Vinylflex plastic floor tiles was improved by investigation of manufacturing technique.

Process investigations were conducted into the manufacture of "Gyprock", "Cane-ite" and Concord Plaster.

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APPENDIX 28 ORIGINAL SHAREHOLDERS OF C.S.R. 1855

Showing shares held and voting rights (note limitation)

Name	Number of Votes	Number of Shares	Amount
Challis, J. H.	40	200	£ 10,000
Cooper, Daniel	40	300	15,000
Griffiths, Fanning & Co.	40	300	15,000
Lamb, Spry & Co.	20	100	5,000
Walter Lamb & A. Spry	40	200	10,000
Walker, W. & Co., Jr.	40	240	12,000
Walker, A.	12	60	3,000
Tooth, R. J. & F.	40	400	20,000
Robey, James	40	200	10,000
Knox, Edward	40	1,000	50,000
	352	3,000	£150,000

Source: C.S.R. records.

APPENDIX 29 PROPORTION OF C.S.R. SHARES HELD IN VARIOUS COUNTRIES 1954

Where held	Holdings		Shares	
	Number	Per cent of Total	Number	Per cent of Total
Australia	9,625	77.2	602,198	85.8
Fiji	34	0.3	1,289	0.2
United Kingdom	160	1.3	19,835	2.8
New Zealand	2,607	20.9	77,497	11.0
Other British Countries	27	0.2	609	0.1
Foreign	18	0.1	572	0.1
	12,471	100.0	702,000	100.0

Source: From analysis of C.S.R. share holdings as at May 1954.

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APPENDIX 30 OCCUPATIONS OF INDIVIDUAL MEN HOLDING SHARES IN C.S.R. 1954

As stated on registration.

Accountants

- 122 Accountants
- 1 Actuary
- 25 Chartered Accountants
- 25 Public Accountants

Agents, Brokers and Salesmen

- 14 Agents
- 1 Business Representative
- 11 Commercial Travellers
- 3 Commission Agents
- 8 Company Representatives
- 1 Customs House Agent
- 18 Estate Agents
- 1 Farm Produce Agent
- 6 Insurance Brokers
- 3 Insurance Representatives
- 16 Manufacturers' Agents
- 1 Motor Salesman
- 1 Rubber Broker
- 35 Salesmen
- 1 Sales Representative
- 47 Sharebrokers
- 1 Shipbroker
- 9 Stock and Station Agents
- 9 Stockbrokers
- 1 Textile Salesman
- 8 Travellers
- 5 Wool Brokers

Architects

- 30 Architects
- 1 Naval Architect

Artisans & Tradesmen

- 2 Apprentices
- 1 Artisan
- 1 Assembler

Artisans & Tradesmen—continued

- 1 Bacon Curer
- 1 Bootmaker
- 1 Brass Moulder
- 3 Bricklayers
- 1 Brickmaker
- 1 Boilermaker
- 2 Cabinetmakers
- 2 Cable Operators
- 6 Carpenters
- 1 Carpet Planner
- 2 Dental Mechanics
- 1 Die Caster
- 2 Electrical Fitters
- 4 Electricians
- 1 Engraver
- 4 Fitters and Turners
- 1 French Polisher
- 1 Furnaceman
- 1 Instrument Repairer
- 3 Joiners
- 1 Locomotive Driver
- 3 Mechanics
- 2 Motor Mechanics
- 2 Painters
- 1 Patternmaker
- 1 Piano Tuner
- 1 Pipe Fitter
- 5 Plumbers
- 5 Radio Technicians
- 1 Signalman
- 1 Sugarboiler
- 1 Telephone Mechanic
- 1 Toolmaker
- 1 Watchmaker
- 1 Wireless Operator
- 7 Woolclassers

APPENDIX

Business Proprietors & Entrepreneurs

- 1 Advertising Specialist
- 1 Art Dealer
- 1 Auctioneer
- 3 Bakers
- 1 Billiard Room Proprietor
- 1 Bookseller
- 14 Builders
- 2 Butchers
- 1 Café Proprietor
- 2 Carcase Butchers
- 1 Caterer
- 42 Chemists
- 2 Chiropodists
- 1 Company Proprietor
- 3 Confectioners
- 12 Contractors
- 1 Dispensing Chemist
- 5 Drapers
- 1 Entrepreneur
- 1 Flat Proprietor
- 1 Flour Miller
- 1 Funeral Director
- 9 Garage Proprietors
- 7 Grocers
- 3 Hairdressers
- 1 Haulage Contractor
- 1 Herbalist
- 1 Hire Car Proprietor
- 1 Horse Dealer
- 9 Hotelkeepers
- 5 Hotel Proprietors
- 4 Ironmongers
- 5 Jewellers
- 1 Launch Proprietor
- 1 Law Bookseller
- 1 Master Baker
- 6 Master Builders
- 1 Master Butcher
- 2 Master Carriers
- 1 Master Cutler
- 2 Master Tanners

Business Proprietors & Entrepreneurs

—continued

- 2 Mercers
- 1 Messenger Service Proprietor
- 1 Mill Owner
- 2 Motor Dealers
- 1 Motor Proprietor
- 7 Newsagents
- 1 Newspaper Proprietor
- 2 Opticians
- 3 Optometrists
- 1 Pastrycook
- 6 Pharmaceutical Chemists
- 4 Printers
- 6 Publicans
- 4 Publishers
- 1 Restaurant Proprietor
- 4 Retailers
- 3 Sawmillers
- 5 Shopkeepers
- 1 Sign Expert
- 1 Sports Store Proprietor
- 3 Stationers
- 24 Storekeepers
- 4 Tailors
- 4 Tobacconists
- 5 Warehousemen

Company Directors

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Dentists

- 25 Dental Surgeons
- 33 Dentists

Doctors

- 59 Doctors
- 326 Medical Practitioners
- 15 Medical Students
- 5 Ophthalmic Surgeons
- 1 Oral Surgeon
- 12 Physicians

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Doctors—continued

- 1 Radiologist
- 27 Surgeons

Educationists and Writers

- 2 Authors
- 6 Headmasters
- 15 Journalists
- 1 Lecturer
- 2 Newspaper Employees
- 1 School Inspector
- 37 School Teachers
- 2 University Lecturers
- 10 University Professors
- 2 University Registrars
- 1 University Vice Chancellor

Engineers

- 4 Chartered Engineers
- 4 Chemical Engineers
- 17 Civil Engineers
- 3 Consulting Engineers
- 1 Designing Engineer
- 9 Electrical Engineers
- 167 Engineers
- 2 Gas Engineers
- 8 Mining Engineers
- 2 Motor Engineers
- 1 Research Engineer
- 1 Telegraph and Cable Engineer

Farmers and Primary Producers

- 1 Bee Farmer
- 5 Dairy Farmers
- 178 Farmers
- 5 Fruit Growers
- 306 Graziers
- 2 Market Gardeners
- 12 Orchardists
- 45 Pastoralists
- 4 Planters
- 5 Poultry Farmers

Farmers and Primary Producers —continued

- 2 Primary Producers
- 1 Rice Farmer
- 5 Settlers
- 11 Station Managers
- 1 Tea Planter
- 1 Vignerons

Managers and Company Officers

- 2 Advertising Managers
- 3 Airways Officers
- 12 Bank Clerks
- 1 Bank Inspector
- 24 Bank Managers
- 52 Bank Officers
- 2 Business Executives
- 1 Buyer
- 1 Chartered Secretary
- 1 Colliery Manager
- 3 Company Executives
- 87 Company Managers
- 47 Company Officers
- 24 Company Secretaries
- 1 Departmental Head
- 9 Departmental Managers
- 4 Factory Managers
- 1 Industrial Officer
- 7 Insurance Inspectors
- 5 Insurance Managers
- 5 Insurance Officers
- 50 Managers
- 1 Mine Manager
- 1 Newspaper Executive
- 2 Production Managers
- 1 Refinery Manager
- 13 Sales Directors & Managers
- 23 Secretaries
- 1 Shipping Manager
- 7 Shipping Officers
- 1 Stock and Property Officer
- 2 Store Managers

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Managers & Company Officers

—continued

- 1 Theatre Manager
- 3 Trustee Company Officers
- 1 Wharf Manager
- 1 Wholesale Buyer
- 4 Works Managers

Members of the Armed Services

- 5 Air Force Officers
- 1 Air Force Trainee
- 28 Army Officers
- 1 British Army Officer
- 1 Chief Petty Officer
- 16 Members of the A.I.F.
- 17 Members of the Forces
- 8 Members of the R.A.A.F.
- 5 Members of the R.A.N.
- 12 Naval Officers
- 2 Naval Surgeons

Members of the Legal Profession

- 1 Advocate
- 52 Barristers
- 1 Judge's Associate
- 15 Law Clerks
- 2 Magistrates
- 1 Member of Industrial Commission
- 166 Solicitors
- 1 Stipendiary Magistrate

Merchants and Manufacturers

- 1 Brush Manufacturer
- 1 Cutlery Merchant
- 1 Fur Merchant
- 1 Gem Merchant
- 2 Hide and Skin Merchants
- 10 Importers
- 7 Indenters
- 1 Instrument Manufacturer
- 1 Jute Merchant

Merchants & Manufacturers—contd.

- 27 Manufacturers
- 109 Merchants
- 1 Produce Merchant
- 1 Silk Merchant
- 3 Timber Merchants
- 4 Wool Merchants

People of Various Occupations

- 3 Actors
- 4 Airline Pilots
- 2 Airmen
- 3 Analysts
- 5 Artists
- 1 Art Student
- 1 Aviator
- 3 Barmen
- 1 Baron
- 1 Biologist
- 1 Boatbuilder
- 4 Brewers
- 1 Brewery Employee
- 1 Builder's Assistant
- 1 Bus Driver
- 1 Caretaker
- 1 Chef
- 12 Clergymen
- 211 Clerks
- 1 Coal Miner
- 1 Doctor of Science
- 8 Draughtsmen
- 2 Economists
- 1 Entomologist
- 1 Fire Assessor
- 2 Fire Brigade Employees
- 2 Foremen
- 2 Freeholders
- 1 Gardener
- 1 Gas Worker
- 1 Gatekeeper
- 4 Gentlemen
- 1 Geologist

APPENDIX

People of Various Occupations—contd.

- 209 Independent Means
- 18 Industrial Chemists
 - 1 Industrial Consultant
- 33 Investors
- 11 Jackeroos
- 2 Labourers
 - 1 Launch Driver
 - 1 Librarian
 - 1 Marine Steward
 - 1 Marine Surveyor
- 12 Master Mariners
 - 1 Metallurgist
 - 1 Mine Surveyor
- 2 Monumental Masons
- 2 Munition Workers
- 5 Musicians
 - 1 Oil Refiner
- 2 Organizers
- 4 Overseers
- 1 Packer
- 2 Passenger Managers
 - 1 Pastoral Inspector
- 2 Photographers
- 2 Physicists
 - 1 Plant Pathologist
- 2 Priests
 - 1 Process Worker
 - 1 Professional Cricketer
 - 1 Property Owner
 - 1 Radio Producer
 - 1 Receiving Clerk
- 5 Research Chemists
 - 1 Research Forester
- 1 Schooner Master
- 3 Scientists
 - 1 Seaman
- 4 Shipping Clerks
- 2 Shipping Representatives
- 5 Ships' Officers
- 3 Shop Assistants
- 1 Staff Trainee

People of Various Occupations—contd.

- 1 Station Hand
- 1 Statistician
- 3 Storemen
- 57 Students
 - 3 Survey Assistants
- 11 Surveyors
 - 1 Tennis Coach
 - 1 Textile Expert
 - 1 Transport Officer
- 4 University Students
- 2 Veterinary Surgeons
 - 1 Watchman
 - 1 Waterside Worker
 - 1 Wool Appraiser
- 23 Wool Buyers
 - 1 Y.M.C.A. Leader

Public Servants

- 1 Administrator
- 1 Assistant Controller
- 2 City Council Employees
 - 1 City Valuer
- 29 Civil Servants
 - 2 Forestry Officers
 - 1 Guard
 - 3 Health Inspectors
 - 4 Inspectors
 - 2 Lands Inspectors
 - 3 Members of Diplomatic Service
 - 1 Minister of the Crown
 - 1 Patrol Officer
 - 2 Police Constables
 - 3 Police Officers
 - 3 Postal Employees
 - 1 Postmaster
 - 1 P.M.G. Official
- 21 Public Servants
 - 2 Railway Clerks
 - 2 Railway Employees
 - 1 Shire Clerk

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Public Servants—continued

- 1 Sydney County Council Employee
- 1 Town Clerk
- 1 Tramway Inspector

Retired Persons

- | | | |
|-----|---------|------------------|
| 292 | Retired | |
| 8 | " | Army Officers |
| 5 | " | Bank Managers |
| 6 | " | Bank Officers |
| 2 | " | Chemists |
| 3 | " | Civil Servants |
| 1 | " | Clergyman |
| 6 | " | Company Officers |
| 1 | " | Contractor |
| 9 | " | Engineers |
| 12 | " | Farmers |

Retired Persons—contd.

- | | | |
|----|---|-----------------------|
| 1 | " | Foreman |
| 22 | " | Graziers |
| 1 | " | India Merchant |
| 1 | " | Investor |
| 2 | " | Magistrates |
| 3 | " | Managers |
| 3 | " | Master Mariners |
| 2 | " | Medical Practitioners |
| 1 | " | Milliner |
| 5 | " | Naval Officers |
| 1 | " | Newsagent |
| 2 | " | Orchardists |
| 3 | " | School Teachers |
| 2 | " | Solicitors |
| 1 | " | Woolbuyer |

APPENDIX

APPENDIX 31 CAPITAL, PROFITS AND DIVIDENDS C.S.R. CO. LTD. (a)

An historical review (b)

Year Ending 31 March	Share Capital Paid-up	Debentures (c)	Profits	Dividends	
				Amount	% p.a.
1887	£ See note (a)	£ —	£ —	£ —	—
1888	648,720	901,300	74,062(d)	31,705(d)	6½
1889	750,000	836,300	117,962	47,735	7
1890	750,000	836,300	171,472	63,750	8½
1891	1,323,560	446,800	213,655	116,629	9½
1892	1,438,820	348,600	176,158	140,521	10
1893	1,595,450	291,650	188,403	150,327	10
1894	1,637,550	320,550	199,128	161,511	10
1895	1,700,130	466,800	188,082	167,128	10
1896	1,701,370	516,900	170,536	170,066	10
1897	1,702,000	489,250	171,018	170,200	10
1898	1,702,000	434,550	171,027	170,200	10
1899	1,702,000	384,250	170,985	170,200	10
1900	1,786,880	322,950	175,220	174,355	10
1901	1,872,200	269,000	182,982	182,881	10
1902	1,998,580	265,700	194,123	193,387	10
1903	2,000,000	139,800	200,633	199,959	10
1904	2,000,000	139,800	200,713	200,000	10
1905	2,198,400	90,000	276,469	269,313	12½ (e)
1906	2,200,000	65,000	224,369	219,965	10
1907	2,200,000	64,050	222,493	220,000	10
1908	2,495,200	64,050	252,832	234,037	10
1909	2,850,000	64,050	309,126	267,385	10
1910	2,850,000	64,050	344,470	285,000	10
1911	3,000,000	61,850	404,142	292,500	10
1912	3,000,000	61,650	436,431	352,500	11½
1913	3,000,000	61,650	463,159	375,000	12½
1914	3,250,000	61,650	519,201	406,250	12½
1915	3,250,000	—	529,068	406,250	12½
1916	3,250,000	—	261,251	211,250	6½
1917	3,250,000	—	288,762	211,250	6½
1918	3,250,000	—	279,143	211,250	6½
1919	3,250,000	—	285,427	243,750	7½

APPENDIX

APPENDIX 31—continued

Year Ending 31 March	Share Capital Paid-up	Debentures (c)	Profits	Dividends	
				Amount	% p.a.
1920	£ 3,250,000	£ —	£ 289,565	£ 243,750	7½
1921	2,600,000	—	326,939	260,000	9
1922	2,600,000	—	452,190	284,375	11
1923	2,600,000	—	498,590	325,000	12½
1924	4,875,000	—	673,639	446,875	11½
1925	4,875,000	—	760,653	548,437	11½
1926	4,875,000	—	800,733	609,375	12½
1927	4,875,000	—	832,797	609,375	12½
1928	5,850,000	—	966,628	731,250	12½
1929	5,850,000	—	976,306	731,250	12½
1930	5,850,000	—	910,830	731,250	12½
1931	5,850,000	—	734,823	731,250	12½
1932	5,850,000	—	744,321	731,250	12½
1933	5,850,000	—	792,414	731,250	12½
1934	5,850,000	—	963,501	731,250	12½
1935	11,700,000	—	931,949	731,250	6½
1936	11,700,000	—	937,980	877,500	7½
1937	11,700,000	—	1,036,336	804,375	6¾
1938	11,700,000	—	1,060,786	877,500	7½
1939	11,700,000	—	1,005,670	877,500	7½
1940	11,700,000	—	1,103,744	994,500	8½
1941	11,700,000	—	1,054,331	994,500	8½
1942	11,700,000	—	934,619	994,500	8½
1943	11,700,000	—	1,041,601	994,500	8½
1944	11,700,000	—	873,969	994,500	8½
1945	11,700,000	—	881,136	936,000	8
1946	11,700,000	—	887,298	936,000	8
1947	11,700,000	—	1,163,473	994,500	8½
1948	11,700,000	—	1,241,504	1,053,000	9
1949	11,700,000	—	1,206,762	1,228,500	10½
1950	11,700,000	—	1,231,571	1,111,500	9½
1951	12,480,000	—	1,003,402	1,088,100	9
1952	13,260,000	—	1,154,444	1,158,300	9
1953	14,040,000	3,777,100	1,366,394	1,228,500	9
1954	14,040,000	7,000,000	1,417,943	1,263,600	9
1955	14,040,000	7,000,000	1,575,901	1,684,800	12 (f)

APPENDIX

- Notes:*
- (a) The Colonial Sugar Refining Company was a partnership of unlimited liability formed on 1 January 1855. On 1 July 1887, with a view to amalgamating with the Victoria Sugar Company, the Colonial Sugar Refining Company Limited was registered with limited liability and paid-up capital of £400,000 in £20 shares paid to £10. Formal amalgamation was effected on 2 August 1887, when paid-up capital was raised to £600,000. 20,000 shares, paid to £10, and £200,000 6 per cent 15-year debentures were issued in payment for assets of Victoria Sugar Co.
 - (b) In making comparison between, for instance, the capital and profits of the company at different times the changing value of the monetary units employed should be kept in mind.
 - (c) Debenture stock (held by shareholders) included with debentures until about 1892, by which time all such stock had been applied in paying up the balance due on shares.
 - (d) Period of 9 months ending 31 March 1888.
 - (e) For year ended 31 March 1905 the rate of dividend was 10 per cent plus a Jubilee Bonus of 2½ per cent.
 - (f) For year ended 31 March 1955 the rate of dividend was 9½ per cent plus a Centenary Bonus of 2½ per cent.

1888	4,711 shares paid to £10 and £36,300 6 per cent debentures issued in New Zealand in payment for assets of New Zealand Sugar Co.
	161 shares sold for cash.
	128 shares sold for cash plus premium of £4 each.
1888-89	Paid-up capital increased by £100,000. £50,000 paid out of profit and loss account and £50,000 paid by shareholders.
1890-92	Balance of £10 per share paid by shareholders in cash.
1892-93	Capital increased by £150,000 paid by shareholders in cash.
1894	£52,000 in fully paid shares and £65,000 in 5 per cent 20-year debentures issued in payment for assets of Australasian Sugar Refining Co.
1899-1900	Capital increased by £170,200 paid by shareholders.
1901-2	Capital increased by £127,800. £124,820 paid by shareholders. 149 shares sold for cash.
1904-5	Capital increased by £200,000 paid by shareholders.
1907-8	Capital increased by £300,000. £75,000 paid out of profit and loss account; £225,000 paid by shareholders.
1908	Capital increased by £350,000 transferred from reserves.

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1910	Capital increased by £150,000 paid out of profit and loss account.
1913	Capital increased by £250,000 paid out of profit and loss account.
1920	Capital reduced by £650,000 by refund of £4 per share in War Bonds.
1923	Capital restored to £20 per share by payment of £650,000 by liquidator of C.S.R. Co. (Fiji & N.Z.) Ltd.
1924	Capital increased by £1,625,000 out of assets received back from C.S.R. Co. (Fiji & N.Z.) Ltd.
1927	Capital increased by £975,000 paid out of savings.
1934	Capital increased by £5,850,000 paid for: £1,950,000 out of savings and £3,900,000 from revaluation of assets.
1950-2	Capital increased by £2,340,000 (plus premium of £819,000) all paid in by shareholders in cash.
1952-3	Public issues of 5 per cent registered mortgage debentures:— Redeemable 1959-62 £4,000,000 Redeemable 1960-63 £3,000,000

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APPENDIX 32 BALANCE SHEET OF THE COLONIAL SUGAR REFINING COMPANY LIMITED AS AT 31st MARCH 1955

Capital									£
Authorized Capital 1,000,000 shares of £20 each								£20,000,000	
Less unissued	...	...	...	...	...			5,960,000	
Capital issued and fully paid	...	...	...	...	...				14,040,000
Reserves									
Share Premium	...	...	...	...	...				819,000
General	...	...	...	...	...				1,500,000
Contingency and others	...	...	...	...	...				3,511,503
Profit and Loss Account	...	...	...	...	...				619,742
Replacement and Depreciation Reserves	...	...	...	...	...				13,949,946
Debentures									
5% Registered Mortgage Debentures									
Redeemable 1959-1962	...	...	...	...	...				4,000,000
Redeemable 1960-1963	...	...	...	...	...				3,000,000
Current Liabilities									
Amounts owing to Subsidiary Companies	...	...	...	...	...				1
Employee Debentures	...	...	...	...	...				138,670
Sundry Creditors and Provisions	...	...	...	...	...				11,111,461
Provision for proposed final dividends and bonus to be paid June, 1955	...	...	...	...	...				1,053,000
Contingent Liabilities									
Guaranteed bank overdrafts of subsidiary companies...	...	...	...	...	...				
Uncalled capital of subsidiary companies	...	...	...	...	...				
									£53,743,323

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Fixed Assets								£
Sugar Refineries								
Five in Australia, one in New Zealand								10,204,632
Raw Sugar Mills and Transport Plant								
Three in N.S.W., four in Queensland								10,511,260
Five in Fiji								4,888,993
Distilleries in Australia								
One in N.S.W., one in Victoria								1,087,673
Building Materials Factories								
Four in N.S.W.								2,979,312
Pineapple Cannery in Fiji								129,997
Engineering Works, Research Laboratory and Bone Char Factory								395,878
Office and Residential Property								318,585
Ocean Vessels								446,589
Investments and Advances								
Investments less provision for fluctuation								754,312
Advances to Employees for purchase of homes								791,552
Shares in Subsidiary Companies, less provisions								4,074,556
Current Assets								
Working Stocks and Work in Progress, at valuation after providing for possible diminution in value								4,592,838
Stocks of Sugar at valuation								6,483,128
Sundry Debtors, Loans, Advances, etc. after providing for doubtful debts								5,106,927
Amounts owing by Subsidiary Companies								590,697
Cash on hand, or at short call								386,394
								£53,743,323

Assets shown at book value unless otherwise specified.

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APPENDIX 33 POSTWAR ECONOMIC PROGRESS IN AUSTRALIA

Being a summary of a survey by Economic Services of Brisbane (Colin Clark and H. W. Herbert) made in January 1955 and especially brought up to date and completed by H. W. Herbert for C.S.R. as at 30 June 1956

The outstanding economic and national achievement in Australia since the war has been the growth of the Australian population—up from 7½ million at the end of 1946 to over 9 million at the end of 1954. Contrary to popular opinion, births have been very much more important in population growth than migrants.

Increase in Australian Population 1947-54 (inclusive)

Births	..	..	..	1,532,000
Net immigration	..	..	..	685,000
				2,217,000
Less deaths	..	..	..	629,000
				1,588,000

Net immigration is excess of arrivals over departures. The “millionth migrant” of 1955 did not allow for departures. In 1955 births will total about 202,000 and net immigration about 110,000.

Australia is well off for children, who temporarily crowd the schools but lessen the proportion of breadwinners. There are approximately 1,000,000 children under 5, against only 600,000 in the 15-19 age group. The latter figure reflects a lower birth rate from a smaller prewar population.

Postwar employment has grown with the population, but unfortunately not uniformly. See graph *Australian Population and Employment 1948-55*.

It is a modern political and economic art to maintain full, but not over-full, employment. We have not had much success at this during the last seven years.

What material progress have we made *per head*? Money figures are higher than ever before, but we must make allowance for the population increase and the inflation.

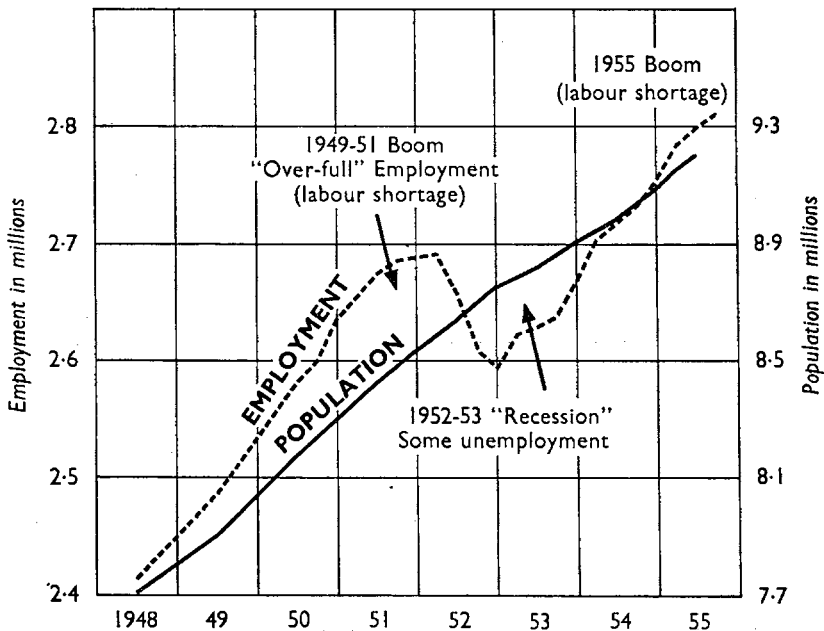
It is our economic position *per head* that determines our standard of living; without higher production per head, higher wages merely help one section of the community at the expense of the others, usually by the process of inflation.

Our economic position and progress is measured by the official National Income figures.

The following table shows the growth of National Income (the sum of all incomes, individual incomes and business net incomes), also population growth.

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AUSTRALIAN POPULATION & EMPLOYMENT 1948-55



Money Income per Head

	National Income £million	Population (31 Dec.) ooo's	Money Income per head £
1947-8	1759	7638	230
48-9	1950	7793	250
49-50	2283	8046	284
50-1	3115	8308	375
51-2	3259	8528	382
52-3	3588	8740	411
53-4	3842	8903	432
54-5	4033	9091	444

The huge increase in the money National Income can be seen, and also the fact that money income per head has almost doubled.

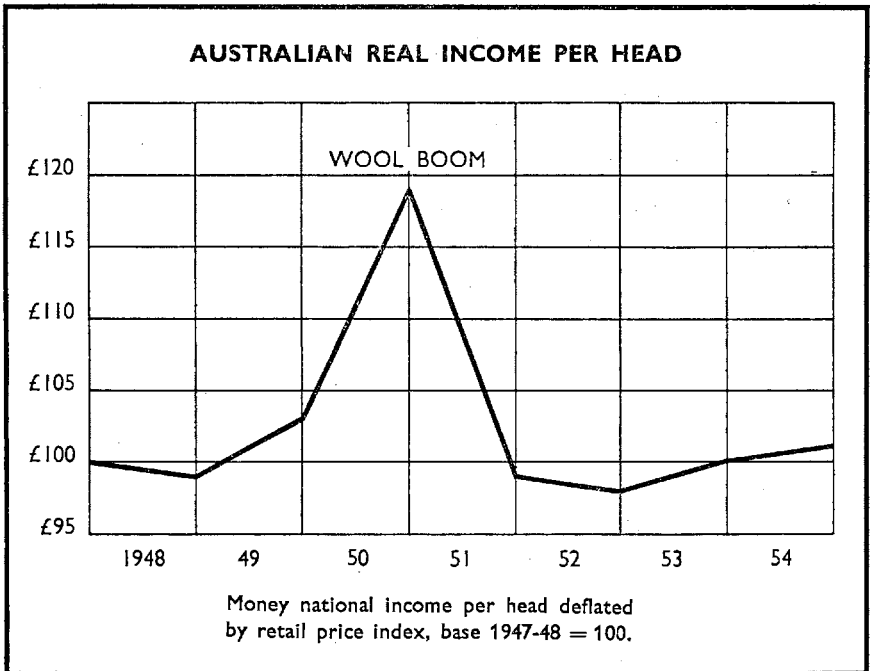
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But during this period the general level of prices has increased by 90 per cent, and to find what the rising money income per head is worth we must deflate the money figures by the rise in prices, as follows:—

Real Income per Head

		Money Income per head £	Retail Price Index 1947-8 =100	Real income per head (i.e. Money income/hd ÷ Retail price index = £ of 1947-8 pur- chasing power)	Real income/hd converted to the basis 1947-8 = 100
1947-8	..	230	100	230	100
48-9	..	250	110	227	99
49-50	..	284	120	237	103
50-1	..	375	137	274	120
51-2	..	382	168	227	99
52-3	..	411	183	225	98
53-4	..	432	188	230	100
54-5	..	444	190	234	102

The graph *Australian Real Income per Head* shows these results.



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The discouraging thing about this graph is that the long-term trend shows practically no progress at all in real income per head. This stagnation of real income per head has been obscured by the growth of the Australian population and by the inflation with consequent big money turnovers.

This graph would surprise many Australians; there is a widespread notion that our average standards of living have increased substantially during the postwar period.*

This is not so. What has happened is that the big increase in population and the even bigger increase in money incomes has been wrongly interpreted by many people as evidence of increased real income per head.

Figures are sometimes quoted which show substantial increases in productivity per worker in some section of the economy, such as certain manufacturing industries. They do not, however, cover the whole economy, for which the National Income figures are the only available measure.

In deflating National Income per head by the retail price index it must be remembered that about 75 per cent of the National Income is spent for retail goods (and on rents, which are included in the index). Most of the balance of the National Income is spent on government services, business investment and public works. The cost of these appears to have risen at least as much as the retail price index. (Two of the major components of such expenditure, wholesale basic materials and male wage rates, have risen by 102 per cent and 108 per cent respectively, compared with the retail price rise of 90 per cent.)

Turning now to the comparison between Australia and other countries in growth of real income per head (and using the same method of deflating National Income per head by the rise in retail prices) we find the results shown in the graph *Real Income per Head—Various Countries*.

The relative lack of progress in Australia is striking. We can say that in seven years since 1947-48 real income per head in Australia, although experiencing a temporary increase in the wool boom, has not increased. The figures for Australia are: base 1947-48 = 100; 1954-55 = 102.

Britain, Canada and the U.S. have improved their real income per head at an average rate of about 2 per cent per year while Australia's has shown scarcely any permanent increase.

Why is Australia merely marking time?

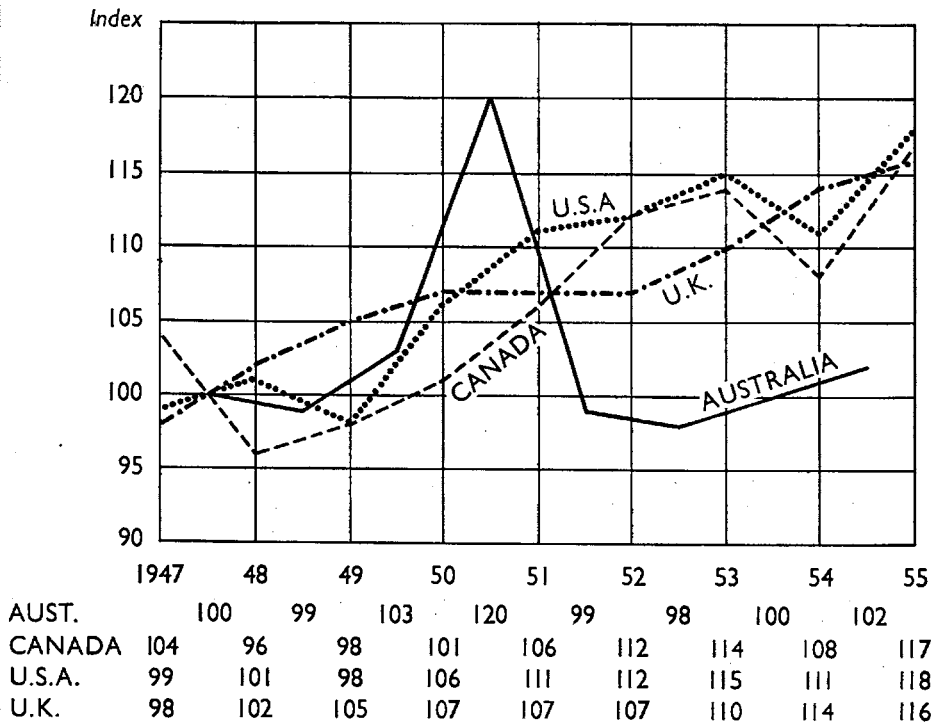
Is it due to the strain of rapid population growth? This is often suggested, but Canada has had almost the same percentage postwar population increase as Australia, yet has also raised its real income per head.

New Zealand has not done brilliantly but better than Australia, and her rate of population increase has not been far behind Australia's. In 7 years from 1947 to 1954 New Zealand showed an increase in real national income per head, calculated by the same methods as for the other countries, of 1 per cent per annum.

* Various published indices showing increased *production per worker*, but in a limited range of industries, and general statements mistakenly based on these indices, have contributed to the popular belief that Australian real income per head is rising steadily.

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REAL INCOME PER HEAD — VARIOUS COUNTRIES



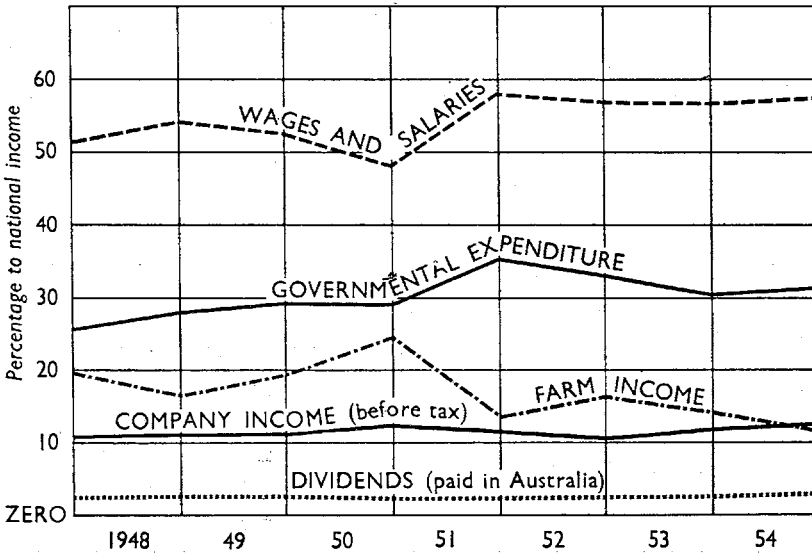
U.K. — Gross National Product. Net national income is not published, but the trend of national income appears to be the same as that shown above.

The Australian lack of progress per head (in spite of the increases in output per worker in a number of industries) appears to be due to two main causes. Both are illustrated in the graph *Various Items in Australian Economy*.

Wages and salaries, and governmental spending, have increased their relative importance, and farm incomes have definitely lost ground (farms include non-company graziers). The number of people engaged in farming and grazing has remained almost stationary for the last 7 years while those in non-farm industries have increased by about 15%. But the average production per worker in farming and grazing is much greater than the average production per worker in other industries. Because of the increased proportion of the population in manufacturing and the service industries and the decreased proportion in farming, real income per head has remained

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VARIOUS ITEMS IN AUSTRALIAN ECONOMY
expressed as per cent to national income



Government expenditure overlaps wages and salaries to some extent, and to a lesser extent other component parts of the national income. National income provides a background for comparison of many items of money income or expenditure, whether they fall completely within the national income or not. Using percentages to the national income deflates for price rises and population growth to a degree which permits valid comparisons, and shows up important social-economic trends, such as the increasing importance in the economy of employees and government. That some of the employees are employees of governments does not invalidate the comparisons.

stationary even though the productivity in many industries has increased slightly.

This relative movement of population away from farming has happened in a number of countries. It has occurred in the United States, but in that country, in contrast to Australia, the production per farmer is much lower than the production per factory and urban worker. Hence every man who transfers from farm to factory in the U.S. means a net gain in production and hence living standards. In Australia the same process has caused a net loss, which has absorbed the small gains in productivity which both rural and non-rural industry have made.

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It is a remarkable fact that Australia now has a greater proportion of its working population in manufacturing industry than the United States. Yet Australia's demands for imported goods were never higher. Manufacturing has certainly developed, but without proper regard for its efficiency. We have been hypnotized by the sheer numbers going into manufacturing industry in Australia, whereas we should have been watching the productivity of those industries.

The second main reason why Australian progress per head is lacking arises from the very fact that scarcely anyone in authority in Australia has realized that this progress is lacking. There is one thing worse than lack of progress per head, and that is not to know it, to go along blithely assuming that progress is being made.

This is the mood which has steadily increased social services and expensive public works. As the preceding graph shows, total governmental expenditure has been an increasing percentage of the national income. To pay for this requires an increasing share of a stationary real income per head, which must be got from unwilling citizens as extra taxation, or by more inflation.

The same illusion has led to large wage increases, particularly the £1 per week in 1950, which could only be paid for, in a community with no permanent increase in real income per head, by the process of inflation. This transferred to wage-earners real income from people with fixed incomes, pensions, and savings, and from export producers.

It is this increase in real wages, maintained by cost-of-living adjustments during the subsequent inflation, plus the increased numbers of workers in urban industry, that has given a long-term upward trend to wages and salaries in the graph above.

Inflation is itself the enemy of economic progress. It causes inequity and hardship to some, destroys their savings and securities, yet presents others with windfall profits. Like high taxation, it distracts attention and energy from the vital job of increasing productivity.

It is a common belief that other countries have had just as much post-war inflation as Australia. This is quite incorrect. From 1947-8 to 1955 Australia had twice as much inflation as Britain and more than four times as much as Canada and the U.S. The harmful effect on our economic progress has been correspondingly greater.

What can be done about it?

The volume of production per head in Australia will have to be much improved to allow the upward trend in real income, and hence in living standards for the average Australian, to be resumed. There is plenty of scope for increased productivity per worker particularly in manufacturing industry, where nationally we lag a long way behind North America. High output per employee has been achieved in some Australian industries, and it is a question of extending it much further. It will require more capital equipment and more effective work and skill to do so.

The capital accumulated by company profits plays the most important part in providing additional and improved capital equipment. If profits

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are made by increased efficiency, and not by restriction of competition, the bigger they are the better. They provide the savings which both the company and its shareholders can plough back into increased investment. Profitable working also allows the company to employ more training and greater skill on proportionately higher rates of pay. To get big increases in real wages first requires company profits generally to be very good, so that in the whole economy there is a surplus which can be invested in improved plant and equipment for industry. The goose must grow before it can lay golden eggs.

The setback Australia has experienced by the relative decline in importance of primary industries can by degrees be overcome if national policy is directed towards encouraging all high-productivity industries, primary and otherwise. The 20-year-old attitude, stemming from the depression, of fostering industries that can employ a lot of labour has not yet been abandoned. It requires a change in political thinking to value an industry because it requires little, high-earning labour in relation to its production. In Australia, at present, replacing outworn mental attitudes—on the sort of industries we must develop, on wages policy and company profits, on the welfare state—is just as important as replacing outworn capital equipment.