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## THE MARKET FOR AUSTRALIAN ORANGES\*

by

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### 1. SUMMARY

An analysis of orange production in Australia reveals three conditions which are of importance to the future marketing prospects for this commodity. In the first place the variation in production volume from one year to the next is commonly of the order of 10 per cent and is sometimes as high as 20-30 per cent. Secondly, a marked change has occurred in recent seasons in the relative importance of the two main orange varieties—Navels and Valencias—particularly in the New South Wales coastal districts and the Murrumbidgee Irrigation Area. Finally, there has been a pronounced upward trend in productive capacity, especially in the growing districts along the Murray River, which suggests that the Australian citrus industry has a production potential from existing plantings of about 10 million bushels which could be realised in five to ten years' time, if a run of favourable seasons is experienced.

Approximately 90 per cent of Australia's orange production is consumed locally. Of the local markets, Melbourne offers a reliable outlet for substantial quantities of oranges from the Murray River districts while Sydney absorbs the greater part of the production from the New South Wales coastal districts and the MIA and is also expected to receive increasing quantities of citrus fruit from South Australia. Queensland imports considerable quantities of citrus fruits from New South Wales and apparently offers some scope for market expansion.

Country trade in oranges and also the sale of fruit from roadside stalls have increased significantly in recent seasons in New South Wales and now constitute important outlets for fresh fruit.

New Zealand has been a consistent purchaser of Australian citrus fruit on a large scale and also offers scope for further expansion.

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In order to prepare an effective approach to future problems of the citrus industry action by both Government and private agencies is suggested. The Governments of the various States and the Commonwealth can best contribute to the future stability of the citrus industry by (i) conducting a comprehensive survey of citrus trees, (ii) establishing improved production forecasts for the major growing areas, (iii) collecting and analysing detailed statistics of quantities of fruit sold and prices realised on various markets, and (iv) publication, whenever possible, of information indicating changes in market conditions. Representative organisations of the citrus industry can undertake (i) a critical examination of marketing methods, and (ii) a study of citrus consumption with a view to expanding present markets and assessing the potential market for new products.

## 2. PRODUCTION

Australian production of oranges has been characterised by wide variations from one year to the next, variations which have commonly been of the order of 10 per cent and sometimes as high as 20-30 per cent. In 1950-51, a year of record production for Australia as a whole, 2.78 million bushels of Navels and 2.90 million bushels of Valencias were produced. These production levels were 21 per cent and 34 per cent, respectively, above the average annual production of each variety during the 10-year period from 1943-44 to 1952-53. For Valencia oranges the record production represented a rise of 31 per cent over the previous season and was followed by a 20 per cent decline in production in 1951-52. The following year saw a slight rise in Valencia production and in 1953-54 production increased a further 25 per cent. Similar fluctuations are evident in respect of Navel production; after the record year of 1950-51, production fell 23 per cent in the next season. A further slight decline was recorded in 1952-53 and then production rose 30 per cent in 1953-54. Statistics of total Australian orange production are shown in Table I.

It will be readily appreciated that the main causes of these fluctuations in production can be attributed to wide variations in seasonal and climatic conditions and also to the physical condition of the trees. The effects, however, are quite complex; they constitute a severe test of the efficiency of the distributive system, and hence emphasise the importance of adaptable marketing methods and a fairly high degree of organisation in the industry as a whole.

Further complications for the marketing system are implicit in the changing relative significance of the two major orange varieties. Prior to the year of peak production the total Australian output of Navel oranges was always in excess of Valencia output. In 1950-51, however, Valencia production exceeded that of Navels by 120,000 bushels and the margin of excess has increased in subsequent years. Production statistics do not, of course, reflect the full potential extent of this changing relationship. That is best gained from an inspection of planting statistics as given in Tables II, III and IV. These figures provide an indication of the change in relative production levels of the two varieties which is likely to manifest itself within the next five years.

TABLE I  
*Citrus Production in Australia, 1943-44 to 1954-55*  
 (Million Bushels)

Variety	1943-44	1944-45	1945-46	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55
Navel ...	2.03	2.21	2.02	1.91	2.57	2.62	2.48	2.78	2.13	2.10	2.72	2.58
Valencia ...	1.64	1.82	1.63	1.84	2.28	2.54	2.21	2.90	2.31	2.41	3.01	2.82
Other Oranges ...	.34	.34	.29	.37	.37	.41	.32	.41	.32	.28	.32	.33
Lemons and Limes ...	.66	.61	.64	.74	.84	.74	.72	.83	.78	.70	.73	.71
Mandarins ...	.43	.43	.39	.46	.45	.48	.41	.49	.38	.32	.40	.35
Grapefruit ...	... } .23	.20	.22	.22	.25	.24	.24	.24	.25	.25	.27	.29
Other ...	... }	.06	.04	.02	.01	.01	.01	.01	...	...	.01	...
Total ...	5.33	5.67	5.23	5.56	6.77	7.04	6.39	7.66	6.17	6.06	7.45	7.08

Source: Commonwealth Bureau of Census and Statistics.

It is also obvious from these tables that the change will be most pronounced in New South Wales citrus growing districts, especially those on the Murrumbidgee Irrigation Area and on the central coast around Gosford.

TABLE II  
*Number of Orange Trees, New South Wales, 1953-54*  
('000 Trees)

Statistical Division	Navels		Valencias		Other Oranges	
	Bearing	Non-bearing	Bearing	Non-bearing	Bearing	Non-bearing
Hunter and Manning ...	269.0	61.3	429.0	107.0	21.1	3.3
Cumberland ...	113.0	35.5	237.0	57.2	18.9	2.4
Central Tableland ...	75.4	20.5	106.0	28.8	12.3	1.6
Riverina ...	187.0	18.0	341.0	96.2	5.2	1.5
Western, East of Darling River ...	50.2	26.1	65.2	55.5	1.9	0.6
Remainder of State ...	23.4	6.6	45.8	2.3	3.4	1.2
Total ...	718.0	168	1,224.0	347.0	62.8	10.6
Per cent of Total Oranges	Per cent 28.4	Per cent 6.6	Per cent 48.4	Per cent 13.7	Per cent 2.5	Per cent 0.4

Source: New South Wales Bureau of Statistics and Economics.

New South Wales offers a marked contrast to other States in that Valencias have traditionally been the dominant orange variety. During the post-war period the number of Valencia trees, bearing and non-bearing, in New South Wales has increased from 1.12 million to 1.57 million while Navel trees have increased in number from 776,000 to 880,000. In South Australia the number of Valencias increased in the same period from 107,000 to 275,000 while Navel trees increased from 268,000 to 342,000. In Victoria, Valencia tree numbers rose from 196,000 to 233,000 while the number of Navels declined from 255,000 to 218,000.

Despite the marked variation in annual orange production the upward trend in the productive capacity of the industry in Australia is clearly apparent from the steady increase in acreage, and hence in tree numbers, as shown in Table V. Unfortunately, statistics of tree numbers are not collected uniformly in all States of the Commonwealth and little or no information exists about the spacing of trees, their age and condition. Acreage statistics are useful as an overall guide to the increasing productive capacity of the industry, but it has to be borne in mind that there are significant differences as to per acre and per tree yields between major growing districts; for example, a good average yield may be 2 or 3 bushels per tree at Gosford as against 5 or 6 bushels per tree in the

Mildura district. From available statistics it is evident that the significant part of the expected increase in future orange production will come from districts along the Murray River, especially in the vicinity of Mildura and also in the comparable region in South Australia. Production from some of these areas is likely to double in the next seven years.

TABLE III  
*Number of Orange Trees, Victoria, 1952-53*  
 ('000 Trees)

County	Navels		Valencias		Other Oranges	
	Bearing	Non-Bearing	Bearing	Non-Bearing	Bearing	Non-Bearing
Karkarook ... ..	56.3	25.7	73.2	39.7	7.6	1.4
Tatchera ... ..	48.8	5.5	20.8	4.7	1.0	0.7
Gunbower ... ..	28.0	4.0	34.4	7.1	0.4	...
Moira ... ..	27.3	1.8	29.0	7.1	6.5	...
Remainder of State ...	18.6	1.7	14.6	2.2	5.1	0.1
Total ... ..	179.0	38.7	172.0	60.8	20.6	2.2
Per cent of Total Oranges	37.9	8.1	36.4	12.9	4.3	0.4

Source: Victorian Government Statist.

TABLE IV  
*Number of Orange Trees, South Australia, 1953-54*  
 ('000 Trees)

County	Navels		Valencias	
	Bearing	Non-Bearing	Bearing	Non-Bearing
Hamley ... ..	78.3	32.7	61.3	45.7
Albert ... ..	87.6	10.4	47.2	14.4
Alfred... ..	17.8	33.6	21.9	54.7
Adelaide ... ..	27.1	2.7	8.8	3.4
Sturt ... ..	32.3	3.0	11.9	2.4
Remainder of State ...	13.3	4.2	2.4	1.4
Total ... ..	256.4	86.6	153.5	122.0
Per cent of Total Oranges ...	41.4	14.0	24.8	19.7

Source: South Australian Government Statist.

Another salient point which emerges from a consideration of existing statistics is that the rate of planting trees on new citrus areas is diminishing somewhat as compared with the planting rates of the early post-war years. It now seems evident that there have been considerable replantings in some districts where large areas have gone out of production for various reasons such as flooding, age and tree decline. This situation makes it difficult, even for a district officer, to estimate new plantings, as distinct from replantings, for the district as a whole.

In the situation which at present confronts the Australian citrus industry it is obvious that reliable statistical information is highly desirable and would be of considerable value in guiding both planting programmes and in devising means of profitably disposing of increased quantities of oranges. The first requirement is an adequate basis for forecasting production with a reasonable degree of accuracy. This requires an Australia-wide census of trees, incorporating information about the age and condition of the trees, their spacing and their yields. The project would face a number of obstacles such as obtaining staff to carry out the census and also in actually eliciting the desired information from growers; however, the long-run advantages to the Australian citrus industry would fully justify the undertaking.

TABLE V  
*Area under Oranges, Australia, 1949-50 to 1954-55*  
('000 Acres)

Variety	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55
BEARING						
Navel ... ..	13.9	13.9	14.1	14.0	14.3	14.6
Valencia ... ..	16.1	16.4	17.4	18.2	19.2	20.2
Seville, Poorman and Others ... ..	2.6	2.7	2.5	2.5	2.3	2.4
Total ... ..	32.6	33.0	34.0	34.7	35.8	37.2
TOTAL—BEARING AND NOT-BEARING						
Navel ... ..	17.5	17.7	18.1	17.8	17.6	17.8
Valencia ... ..	22.9	23.4	24.5	25.0	25.6	25.9
Seville, Poorman and Others ... ..	3.3	3.3	3.0	2.9	2.7	2.8
Total ... ..	43.7	44.4	45.6	45.7	45.9	46.5

Source: Commonwealth Bureau of Census and Statistics.

Once the initial census has been completed it may be possible in subsequent years to employ certain sampling techniques to keep the citrus industry informed as to planting trends. It may be possible, for example, to make approximate assessments of changes in plantings by the use of field or even aerial surveys of sample areas in the major growing districts. Given adequate data about the tree population, a

fruit count on a representative sample of trees in a random sample of orchards should make it possible to forecast orange production in the major districts with a fair degree of accuracy. The method of a fruit count with the aid of a frame placed against the branches of a tree has proved quite effective in the citrus growing regions of the United States.

### 3. THE MAJOR GROWING AREAS

In recent seasons New South Wales has produced slightly more than 50 per cent of the total Australian production of oranges. In this State the main growing areas are located on the central coast, especially in the districts around Gosford and Parramatta; in the MIA and along the Murray River. The first-mentioned district contains the greatest acreage of oranges and despite the incidence of conditions inimical to expansion, for example, floods, it has experienced a greater increase in acreage in the last 10 years than any other district in the State.<sup>1</sup> This increase has been estimated to be 3,000 acres, mainly under Valencias and to a less extent Navels.

The Cumberland district (which includes such areas as Windsor, Baulkham Hills, Hawkesbury River Valley and parts of the Blue Mountains) formerly had the largest acreage in the State, but substantial reductions in acreages have been recorded in the last 10 years due mainly to flooding in Hawkesbury River districts and also to a general expansion of residential areas. Despite these setbacks the replanting rate has been considerable, and although the records on this subject are not adequate enough to show acreage changes precisely, it is likely that the replanting in this district has more than offset the losses already mentioned.

The area under oranges in the MIA has increased moderately, from 6,250 to 6,610 acres. In this district, for which detailed census statistics are available, the significant change in the last 10 years has been in the relative importance of the two main orange varieties rather than in total acreage. Valencia plantings numbered 406,881 by 1954 while Navels totalled 138,263.<sup>2</sup> An indication of the trend in the proportion of the two varieties in future total production is given by the fact that since 1945 Valencia plantings have outnumbered Navels by 10 to 1. This has meant that 43 per cent of existing Valencia trees have been planted in the last decade while only 1 per cent of existing Navels were planted in the same period.

Substantial new plantings have been made in New South Wales Murray River districts since 1944. The increase in this region has been estimated at 1,900 acres, including an increase of 640 acres of Navels and 1,100 acres of Valencias. At present about 4,500 acres are planted to citrus trees in this district.

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<sup>1</sup> The data as to acreages in N.S.W. districts have been obtained from Departmental records.

<sup>2</sup> These figures are preliminary and therefore subject to revision. They are based on the Fruit Tree and Grape Vine Census conducted by the MIA Irrigation Research and Extension Committee.



The overall increase in New South Wales citrus acreage in the post-war decade has been about 6,000 acres, that is, from approximately 28,500 acres to 34,500 acres. However, adverse seasonal conditions have severely affected large areas of citrus plantings in coastal regions making it impossible at this stage to gauge future production levels. As the coastal regions account for approximately two-thirds of the State's acreage the future production volume in New South Wales is obscured.

The most important orange growing districts in Victoria are the Mallee district, centred on Mildura, and the Northern Statistical District. The counties of Karkarook and Tatchera are located in the Mallee district which extends from Mildura to Swan Hill. The Northern district includes the counties of Gunbower and Moira and comprise the growing area along the Murray River between Yarrawonga in the east and Koon-drook in the west. The productive capacity of each of these counties is shown in Table III.

The Murray River districts in South Australia are responsible for the greater part of orange production in that State. The citrus growing organisations usually refer to two main Murray River districts in South Australia, viz., the "Up-River" district and the Myponga district. In the first-mentioned region are included the counties of Hamley, Albert and Alfred, while the Myponga district consists of the county of Sturt. The figures in Table IV provide an indication of the production potential in each of the main counties in South Australia.

Although the Valencia variety does not occupy the predominant position relative to Navels as it does in New South Wales and Victoria, the statistics in Table IV showing tree numbers in each of the most important counties of South Australia are suggestive of a trend towards increased relative production of Valencias.

The areas referred to above are the main growing districts in the major citrus producing States. From the point of view of this analysis Queensland and Western Australia are less important as producers. Queensland, for example, produces about 300,000 bushels of oranges annually, mainly in the Moreton and Maryborough Divisions,<sup>3</sup> but this is not enough to meet her domestic requirements thus necessitating substantial imports from New South Wales. Although small consignments are exported to New South Wales, it is as an importer that Queensland figures in the present analysis.

#### 4. DISTRIBUTION

The greater proportion, about 90 per cent, of the Australian production of oranges is consumed locally. New Zealand is the major overseas buyer of citrus, having taken about 400,000 bushels of oranges annually in recent seasons. Comparatively small consignments have also been shipped to such overseas markets as Malaya, Britain and Germany.

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<sup>3</sup> Source: Queensland Department of Agriculture and Stock.

Of the local markets, it is natural to expect that the greatest proportion of the crop will be absorbed by the urban populations of the capital cities. Country trade, however, is fairly substantial and in recent seasons has shown signs of increasing. Two marketing practices, viz., the purchase of fruit from the grower by itinerant hawkers and the direct sale to the consumer from a roadside stall, have increased markedly in recent years in New South Wales and would probably account for the disposal of 10 per cent of the crop harvested. The sale of fruit to processing factories would, on the average, absorb a further 10 per cent of production.

The major market for each of the main producing regions is determined by geographic circumstances and it is therefore logical that Sydney should draw most of its supplies by road from central coastal districts, to the north and west of the metropolitan area, and also from the MIA where a rail link gives Leeton and Griffith direct access to the metropolis. Melbourne, on the other hand, is the logical focal point for road and rail consignments from growing districts along the Murray River in New South Wales, Victoria and South Australia.

The New South Wales growing areas have additional markets open to them in Newcastle, Wollongong and also Brisbane; the latter market absorbed 217,000 bushels of New South Wales oranges in 1953. At present, overseas markets offer little opportunity for large-scale exports from New South Wales, largely due to the presence of fruit fly in two major inland districts. Experiments being carried out by the Commonwealth Scientific and Industrial Research Organisation, in co-operation with Departments of Agriculture in New South Wales, Victoria and South Australia, however, offer some hope that fruit from affected areas can be stored and transported under conditions which will meet the requirements of the New Zealand authorities without seriously affecting the quality of the fruit. In its best export seasons, that is, from 1947 to 1950, the MIA shipped almost 150,000 bushels of oranges annually to New Zealand. Although exports to this market declined in subsequent seasons, New Zealand remained an important outlet for MIA producers and the prohibition on exports from the district imposed in 1955 represented a serious loss to those producers.

The bulk of the orange production from districts along the Murray River is consigned to Melbourne. The Mildura district, for example, marketed 364,000 bushels of citrus in Melbourne in 1954-55. This district has also been an important source of supply of fruit for export to New Zealand, and together with the Murray River districts in South Australia, made good the deficit in export shipments to New Zealand caused by the outbreak of fruit fly.

The Melbourne market also receives from 400,000 to 600,000 bushels of citrus annually from the Murray River districts in South Australia. The shipments of citrus to Melbourne from these areas have been as high as 644,000 bushels (in 1953). A further 150,000 to 200,000 bushels of citrus have regularly been despatched to the Adelaide market from these regions.

A new and quite significant feature of the distribution pattern from the growing areas along the lower Murray River is the increasing quantity of fruit marketed in Sydney. Prior to 1953 only small quan-

tities of citrus fruit were consigned to Sydney from South Australia, however, in that year 56,000 bushels were sent and in 1954 consignments totalled 128,000 bushels. Although the level of consignments to Sydney declined to 89,000 in 1955 there is evidence that the volume of fruit involved in this trade will increase in the future.

As indicated earlier, Queensland production is not sufficient to meet the present requirements of that State. About one-third of Queensland's total consumption is imported from New South Wales. In the period from 1949 to 1954 those imports ranged from 139,000 bushels to 217,000 bushels of oranges annually, consisting mainly of Valencias and imported usually in the period from November to March.<sup>4</sup>

On the limited evidence at present available, it seems reasonable to conclude that Melbourne constitutes the most reliable market for citrus fruit, offering as it does a regulated outlet for about 50 per cent of the production from the South Australian Murray River districts and for about 65 per cent of the production from the Mildura area. The Sydney market, on the other hand, given favourable circumstances in regard to seasons and industry organisation, could yield improved returns to growers. Two market areas seem to hold out reasonable prospects for future expansion, viz., New Zealand and Queensland. The first-named market has usually absorbed 300,000 to 400,000 bushels of Australian oranges annually. In 1953-54 New Zealand imported 431,000 bushels of oranges from Australia and it seems reasonable to expect that Australian trade in this direction could be expanded to 500,000 bushels of oranges annually.

It is possible that growing areas along the Murray River will maintain an overwhelming predominance of future trade with New Zealand. If this proves to be the case New South Wales growers will be keen to seek expanded markets in this State and Queensland, and to some extent in foreign markets such as Singapore, Hong Kong and Malaya. Naturally, interest will centre mainly on the Sydney market, but the alternatives already suggested may prove quite important. On a population basis, for example, Brisbane and five large country towns of Queensland seem to offer a total market potential of about 600,000 bushels of citrus fruit. If satisfactory practices are observed in regard to the quality and pricing of citrus consignments to Queensland that State could become a profitable outlet for citrus fruit from the MIA and central coastal districts.

The need for expanding citrus markets is made evident by the increases in Australian productive capacity of this fruit. There is reason to believe that the necessary expansion can be accomplished, but to do this effectively requires a systematic approach to the marketing problem. The first requirement in such an approach, viz., reliable basic statistics, has already been discussed. The second requirement involves analysis of the statistical data, especially to determine the factors which influence the demand for and price of citrus fruits on the major markets. A critical examination of the alternative methods of marketing citrus fruits is also required.

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<sup>4</sup>Source: Queensland Department of Agriculture and Stock.

**5. AUSTRALIAN DEMAND FOR CITRUS**

Reliable statistics concerning the Australian consumption of citrus fruits are not available. The only relevant source of information on this topic is the Commonwealth Statistician's estimates of the supplies of citrus fruits available for local consumption. The figures in Table VI, extracted from that source, represent the only available guide to the changing pattern of citrus consumption. As the consumption figures do not include any allowance for fruit used in exported jams, the estimates slightly over-state local consumption.

TABLE VI  
*Supplies of Citrus Fruits Available for Consumption, Australia*  
1936-37 to 1953-54

Year	Quantity
	lb. per head per annum
Average 1936-37 to 1938-39 ... ..	31.9
Average 1946-47 to 1948-49 ... ..	37.2
1950-51 ... ..	40.2
1951-52 ... ..	30.8
1952-53 ... ..	29.2
1953-54 ... ..	37.9
1954-55 ... ..	35.4*

\*Subject to revision.

Source : Commonwealth Statistician. *Report on Food Production and the Consumption of Foodstuffs and Nutrients in Australia 1953-54.*

The statistics indicate that 1950-51 was a year of peak consumption per head of population and that the average post-war per capita consumption was 35 lb. However, as the figures are based simply on official estimates of production divided by the appropriate population figure, they cannot be used as a reliable guide to the future demand for citrus fruits. A consumer survey which would determine the actual quantities of citrus fruits purchased by a sample of Australian households may also prove valuable in assessing the future demand for citrus fruit and provide the industry with a sound basis upon which to build an effective market strategy.

In the absence of accurate figures of citrus consumption in Australia the following estimates have been made using population figures as given by the census of June 30, 1954, and assuming two per capita rates of consumption, viz., 35 lb. and 40 lb.; the former figure being the average of the Commonwealth Statistician's estimates of supplies available for consumption during the post-war period. The figure of 40 lb. per capita is considered a reasonable expectation of what consumption could be in a fairly prosperous nation with an expanding citrus industry.

As compared with the above estimates of local per capita consumption, the present rate of consumption in the United States is 41-44 lb. of fresh citrus fruit per head of population. The present consumption in the United States represents a substantial decline from that obtaining

in earlier years, especially in the period of World War II and the early post-war years when the consumption of fresh citrus fruit averaged 60 lb. per head. Per capita consumption of fresh oranges declined in the same period from 41 lb. to 24 lb. These consumption declines have been partly explained by the rapid and substantial expansion in the citrus processing industry in recent years; in 1954 the per capita consumption of citrus juices (excluding frozen juices) amounted to 7.69 lb. while per capita consumption of frozen citrus juices amounted to 7.35 lb.<sup>5</sup> Although the present per capita consumption of all citrus fruits in the United States is about 10 per cent lower than in the peak year of 1946, it is still equivalent to 85 lb. of fresh fruit.

Australia cannot expect to parallel the technological development of the citrus industry in the United States nor for that matter the rate of growth of the national economy; however, American experience does support the belief that an Australian consumption rate of 40 lb., or more, per head of population is not an unreasonable expectation.

TABLE VII  
*Population and Estimated Citrus Consumption of Four Capital Cities,  
1954*

City	Population*	Per cent of State Population	Estimated Consumption of Citrus Fruit †	
			(a)	(b)
	Million	Per cent	Million bushels	
Sydney ... ..	1.86	54.4	1.45	1.66
Melbourne ... ..	1.52	62.1	1.19	1.36
Brisbane ... ..	0.50	38.1	0.39	0.45
Adelaide ... ..	0.48	60.7	0.38	0.43

\* Population statistics are derived from the Census of June 30, 1954.

† Consumption is computed from (a) an estimate of per capita consumption made by the Commonwealth Bureau of Census and Statistics and (b) an assumed per capita consumption of 40 lb.

Table VII shows the population of the capital cities in each of the four eastern mainland States, the percentage capital city population bears to State population and the estimated consumption of citrus fruit assuming (a) 35 lb. and (b) 40 lb. per capita consumption. It will be seen from this table that Melbourne and Sydney together would consume 3 million bushels of citrus fruit at a per capita rate of 40 lb., while Brisbane and Adelaide together would absorb about 900,000 bushels. In addition, there are five centres of urban population in New South Wales, three in Victoria and five in Queensland with populations ranging from 21,000 to 178,000 and together capable of consuming over

<sup>5</sup> *The Fruit Situation*, October 21, 1955. Issued by the Agricultural Marketing Service, USDA, Washington.

600,000 bushels of citrus fruit if the per capita consumption is at the assumed rate of 40 lb. These statistics are given in Table VIII. It is, of course, likely that per capita consumption would vary as between different localities for climatic as well as economic reasons.

TABLE VIII  
*Population and Estimated Citrus Consumption of Several Towns and Cities, 1954*

Town or City	Population*	Estimated Consumption of Citrus Fruit†	
		(a)	(b)
		'000 bushels	
<i>New South Wales—</i>			
Newcastle ... ..	178,156	139	158
Greater Wollongong ... ..	90,829	71	81
Broken Hill ... ..	31,387	24	28
Blue Mountains ... ..	23,097	18	21
Maitland ... ..	21,334	17	20
<i>Victoria—</i>			
Geelong ... ..	72,349	56	64
Ballarat ... ..	48,050	37	43
Bendigo ... ..	36,918	29	33
<i>Queensland—</i>			
Toowoomba ... ..	43,152	34	38
Rockhampton ... ..	40,676	32	36
Townsville ... ..	40,485	32	36
Ipswich ... ..	38,966	30	35
Cairns ... ..	21,021	16	19
<i>A.C.T.—</i>			
Canberra ... ..	28,277	22	25
Total Estimated Consumption ... ..		557	637

\* Population figures are based on census statistics as at June 30, 1954.

† Consumption estimates are based on two assumptions, viz., (a) 35 lb., and (b) 40 lb. per capita consumption.

## 6. ANALYSING THE DEMAND FOR ORANGES

Although the lack of suitable statistical data prevents the research worker from specifically reporting upon the demand for citrus fruits in Australia, practical experience and economic reasoning enable him to nominate the main factors influencing that demand. Where statistics are available, analysis of them will provide a guide to the relative significance of the several influential factors.

The basic factors affecting the demand by a community for a commodity like oranges are the size of the population, its consumption habits, the amount of available supplies of oranges, consumers' incomes, and the supplies of competing fruits. Other factors which are likely to

influence the demand for oranges are the development of new uses for the product (for example, a large-scale expansion of citrus processing), advertising designed to influence consumer preferences and institutional arrangements governing the marketing of the commodity. These latter factors obviously cannot be expressed in quantitative terms and consideration of them is left to a later part of the article.

If reliable statistics of orange supplies and prices, population and disposable income are available over a reasonable period of time, for example, 20 years, it is not unlikely that changes in per capita supplies and per capita disposable income will bear some measurable relationship to changes in the price paid for oranges in the market place.

Unfortunately an adequate series of such statistics is not available for the Sydney wholesale markets. However, several graphical regressions have been carried out with limited series, using statistics of the type included in Tables IX and X and various refinements of them. Because of the difficulty of obtaining a suitable series for disposable income over the period examined, average weekly earnings have been used in the present example to illustrate changes in consumer income. The only conclusion which seems tenable on the present statistical basis is that production changes account for most of the variation in orange prices. The available statistics are not adequate enough to provide a reliable measure of this price-quantity relationship. The effect of income changes on orange prices is more obscure. The present data seem to indicate a delayed response of comparatively little importance; however, this may be due to statistical inadequacies, especially the lack of a suitable series for disposable income.

TABLE IX

*Price and Production of Oranges and Associated Population and Income Changes, N.S.W., 1945-46 to 1954-55*

Year	Navels		Valencias		N.S.W.† Population	N.S.W.† Average Weekly Earnings.
	Average Annual Price*	Production†	Average Annual Price*	Production†		
	s. d.	'000 bush.	s. d.	'000 bush.	Million.	£
1945-46 ...	16 8	872.4	20 6	982.2	2.93	6.57
1946-47 ...	18 5	871.6	18 6	1,184.9	2.96	6.81
1947-48 ...	13 2	1,255.1	16 6	1,552.7	2.98	7.73
1948-49 ...	9 11	1,180.2	12 0	1,624.8	3.02	8.73
1949-50 ...	19 3	1,101.1	21 6	1,417.6	3.09	9.50
1950-51 ...	11 7	1,323.1	17 0	1,954.5	3.19	11.46
1951-52 ...	20 4	1,073.0	32 0	1,540.7	3.28	14.24
1952-53 ...	32 0	954.5	31 0	1,548.5	3.34	15.50
1953-54 ...	18 2	1,223.0	18 0	1,875.0	3.38	16.15
1954-55 ...	26 0	1,070.0	28 0	1,742.0	3.42	16.96

\* Source: Division of Marketing and Agricultural Economics.

† Source: Bureau of Statistics and Economics.

TABLE X  
*Relative Changes in Orange Prices, Production and Income, New South Wales, 1945-46 to 1954-55\**

Year	Navels		Valencias		Relative Earnings.
	Relative Price	Relative Production per Head	Relative Price	Relative Production per Head	
1945-46 ...	100	100	100	100	100
1946-47 ...	110	97	93	117	104
1947-48 ...	71	144	89	130	114
1948-49 ...	76	92	72	103	113
1949-50 ...	193	92	180	85	109
1950-51 ...	61	113	79	132	121
1951-52 ...	174	80	188	77	124
1952-53 ...	157	87	97	99	109
1953-54 ...	57	127	58	120	104
1954-55 ...	143	86	156	92	105

\* Calculated from statistics in Table IX.

Notwithstanding these difficulties and shortcomings, the graphical regression analysis offers a simple method of analysing the effects of two independent variables upon orange prices and, if investigations of this nature could be carried out on the major domestic markets, the findings may prove of practical use. The statistical results would, of course, have to be qualified at times by the experienced judgment of the market analyst as to the influence of other factors such as the supply of competing fruits. However, the information gained should constitute a basis for giving the citrus industry a reasonable indication of what average prices are likely to be in the event of anticipated changes in production and income or, alternatively, to indicate at what average price levels the industry can expect to dispose of various quantities of fruit on a given market.

Statistical analyses of the type suggested in this article have been successfully carried out in several overseas countries and especially in the United States. An analysis of the factors affecting changes in United States farm prices over the period from 1922 to 1941 by Karl Fox,<sup>6</sup> for example, indicated that a 1 per cent change in orange production would be accompanied by a 1.61 per cent change in orange prices in the opposite direction and further that a 1 per cent change in disposable income would be accompanied by a 1.34 per cent change in orange prices in the same direction. In a pre-war study of income—consumption elasticities for selected foods in United States households, 1935-36 indicated that a 1 per cent change in income gave rise to a .425 per cent change in the consumption of oranges in the same direction.<sup>7</sup>

<sup>6</sup> Karl Fox, *The Analysis of Demand for Farm Products*. Technical Bulletin No. 1081, Washington, USDA, 1953, p. 65.

<sup>7</sup> USDA Miscellaneous Publication, 452 *Family Food Consumption and Dietary Levels*.



In the United Kingdom an elaborate analysis carried out on pre-war budget data has calculated the income elasticity of oranges for that country at unity or a little less.<sup>8</sup> Very little work of this nature has been carried out in Australia. However, Colin Clark has reported an analysis of family budgets in Queensland in 1939-40 which suggested that with each 1 per cent change in income, consumption of fresh fruit changed 0.53 per cent in the same direction.<sup>9</sup> This result appears to be consistent with United States data for the pre-war period. It does not follow, of course, that these relationships still hold. Moreover, two important differences between these overseas countries and Australia are worthy of note, viz., that all United Kingdom oranges are imported and, in the case of the United States, the scale of operation of the citrus processing industries has risen significantly in recent years.

The results of overseas research are quoted mainly to illustrate the importance attached to this type of approach to marketing problems in other countries and also to indicate the practical uses to which the results can be put.

It will be appreciated that variations in fruit production and market prices are generally likely to be considerably greater than variations in disposable income. In the statistics used in the present analysis, for instance, variations in the latter factor are of the order of 10 per cent while annual fluctuations in production and price have frequently been 40-50 per cent and sometimes higher. It will also be noted that the period under review has been one of exceptional advances in wage rates, especially since 1951.

## 7. PRICE PATTERNS

Because of the inadequacy of the statistical data the graphical analysis of the price-quantity relationships for Navel oranges sold on Sydney markets was not able to provide a precise measure of the relationship. However, the statistics do suggest one important fact, viz., that changes in production are sometimes followed by disproportionately large changes in average price realisations. This phenomenon would be more clearly discernible if daily or weekly statistics were available in regard to the quantities of oranges sold on the Sydney wholesale market and the prices realised.

The occurrence of fluctuating market supplies and the disproportionately wide swings in orange prices indicate that there is scope for a movement on the part of the citrus industry to regulate the flow of fruit to the market and so dampen down some of the extreme price variations. If such a movement were accompanied by measures to eliminate poor quality fruit the overall returns to the grower should be enhanced.

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<sup>8</sup> R. Stone, *Consumers' Expenditure and Behaviour in the United Kingdom 1920-38*. (Cambridge: The University Press, 1954.)

<sup>9</sup> Colin Clark, *The Conditions of Economic Progress* (2nd Edition; London: Macmillan, 1951), p. 386.

During the period from 1945 to 1955 the average monthly prices for both varieties of orange were consistently better in the period from 1951 to 1955 than during the preceding six years and further, it is apparent that in the latter part of 1951 and throughout 1952 exceptionally good prices prevailed.

Superficially, those price movements are consistent with the general movement in incomes. However, further examination reveals that average weekly wages in New South Wales have increased consistently since 1945 and that each year the average weekly wage has increased 4-24 per cent over the preceding year with an average annual increase of about 12 per cent. On the other hand, during four of the last 10 years the estimated average annual price of Navel oranges has been 25-40 per cent lower than the preceding year. Valencia prices have shown an average annual price lower than the preceding year in six of the 10 years reviewed. On three of these occasions the fall averaged 7 per cent and on the remaining three it averaged 30 per cent.

A further point of interest in regard to market prices is the existence or otherwise of a seasonal pattern. This Division's records of price quotations on the Sydney wholesale markets do reveal a noticeable degree of seasonality for both Navel and Valencia oranges (125-150 counts) over the period from 1945 to 1955, so that a few tentative generalisations can be made about the Sydney price patterns.

The season for Navel oranges in New South Wales extends from April to October, but the greater part of the crop is usually marketed during June and July. The Valencia season, on the other hand, extends from September to April, but the heaviest marketings are usually from November to February. The peak period of orange supply in the Melbourne market occurs during September and October.

The lowest seasonal prices for Navel oranges occur during June and July perhaps because of the heavier supplies of fruit in those months coupled with the fact that the fruit at this stage is inclined to be acid. Navel prices are generally higher towards the end of the season, for example, during August, September and October than in the opening phases of the season, the final supplies of the season's fruit often bringing the highest price. During this period, the juice of Navel oranges is sweet and they are therefore preferred to the early Valencias which are inclined to high acidity. September is the month which, during the past 10 years, has most frequently recorded the highest average monthly price. The seasonal pattern of prices thus outlined is more applicable to Navel oranges from central coastal districts than to those from the MIA. Price quotations for Navel oranges from the MIA are not really extensive enough to indicate a similar pattern.

The highest prices for Valencia oranges seem to be obtained about the middle and towards the latter part of the summer, but the seasonal pattern does not appear to be as pronounced as with the coastal Navels, partly because Valencias can be held on the trees longer so that the economic period of marketing can be adjusted accordingly. The prices obtained during the opening months of the Valencia season are usually the season's lowest, probably because of competition from late Navel supplies.

There does not appear to be any pronounced seasonal pattern to the prices realised by New South Wales oranges (which mainly come from the MIA) on the Brisbane market. This is probably due to the influence of local supplies and also to the fact that the price of the New South Wales fruit is often fixed by arrangement with the packing shed making the consignment.

## 8. CONCLUSION

The dominant feature of the Australian citrus industry in the near future will be a significant increase in production. Long-term forecasting of citrus production is liable to a wide margin of error, especially when there is a lack of reliable information as to the number and condition of the trees. However, a production of about ten million bushels is feasible within ten years. Whether this quantity is actually harvested in any one year will depend partly upon the attractiveness or otherwise of the ruling market prices for citrus fruits. For citrus growers the problem is not simply one of consumption keeping pace with increasing production, they are vitally interested in the prices at which they can dispose of their produce on local and overseas markets. This problem will have significance for New South Wales growers in particular for the earlier analysis has shown that, in general, their market realisations have not kept pace with increases in the general level of income in the past decade and that their returns have been vulnerable to wide fluctuations in production.

In order to deal effectively with such a problem it is essential to have reliable information about production, market disposals and market realisations. The usefulness of this information has already been discussed. There remains, however, other important information which will prove more difficult to obtain and use if only because it will involve concerted action by the citrus industry as a whole. Foremost among such problems is the need for information about consumer behaviour in regard to citrus products as a means of estimating, for example, the extent to which the consumer is likely to be influenced by an advertising campaign to increase the consumption of fresh citrus fruit or the likelihood of favourable market reaction to the large-scale supply of new citrus products such as citrus concentrates.

Whether the long-term future of the Australian citrus industry proves to be favourable or otherwise will depend largely upon its marketing efficiency. The problem of the institutional methods available to the citrus industry to achieve success in this direction is quite complex. Various organisations already exist at the district, state and interstate level and these have performed valuable work for the industry, but it is open to question whether they are strong enough to fulfil the purpose envisaged above.

Organisational strength often implies compulsory adherence to the ruling of a central authority or group, and it is unlikely that any compulsory programme would appeal to citrus growers in any of the

States mentioned in this article. It will be remembered that a poll of citrus growers conducted in the central coastal districts of New South Wales in August, 1951, resulted in a rejection by a large majority (82 per cent) of a proposal for the establishment of a marketing board under the provisions of the Marketing of Primary Products Act, 1927-1940.

The marketing associations organised in the citrus-growing districts along the Murray River seem more appropriate to local conditions than any form of rigid control. It would be useful to examine the ways in which this type of organisation could be enlarged upon and adapted to effectively participate in a wider field of marketing activities. However, this is a long-range objective. For the near future a suitable objective for the New South Wales section of the industry is improved organisation at the district level in order to gain greater uniformity of packing procedure and orderliness in the flow of fruit to the market.

Although control over the flow of fruit to a market offers growers an opportunity to enhance their average returns, it is unlikely that complete control could be effectively exercised in circumstances where the growing area is located within a short distance of the major market. This is the case in Sydney, where about 20,000 acres of citrus trees are growing within 100 miles of that city and also, to a limited extent, in Melbourne, where the greater part of the Victorian lemon crop is grown within about 50 miles of that central market. Notwithstanding this handicap a greater degree of organisation in packing and marketing coastal fruit is desirable.

In the absence of organised grower control over the marketing of citrus fruit the most practical alternative is the provision of as much official information as possible regarding production, market supplies and prices. The Division of Marketing and Agricultural Economics already makes a forecast of the various citrus crops each year and issues crop reviews during April, August and December of each year.

Exception is sometimes taken by growers to production forecasts on the ground that they are detrimental to their interest. It is contended, for example, that when above-average crops are forecast depressed prices rule in the market place. In most instances this view is of doubtful validity, for the simple reason that whenever production rises or falls significantly the forces of demand and supply quickly assert themselves in the market place and the price moves accordingly. If buyers are able to derive any temporary advantage from a forecast of increased production it is reasonable to assume they will be at a corresponding disadvantage when shortages in production are forecast.

It is evident that to effectively carry out the proposals involved in this article action is required at the government level as well as by the industry itself. The main phases of the requisite action at each of these levels is summarised below:

(a) Suggested action by governments:—

- (i) A comprehensive survey of citrus trees in the Commonwealth.
- (ii) The establishment of improved production forecasts for the major growing areas.

- (iii) The collection and analysis of detailed statistics of quantities of fruit sold and prices realised on various markets.
  - (iv) The publication, whenever possible, of information indicating changes in market conditions.
- (b) Suggested action by representative organisations of the citrus industry:—
- (i) A critical examination of marketing methods with the object of systematically maximising grower returns in any given market situation.
  - (ii) A study of citrus consumption with a view to discovering ways of expanding the use of citrus fruits among present consumers and assessing the potential market for new products.

The second phase of the industry's action would need to be supplemented by an extensive advertising campaign, probably over a period of some years. In Melbourne, the citrus growers' organisation spends about 1d. per case in advertising charges, mainly to clear heavy market carry-overs, but also to promote orange consumption generally. The logical focal point for an advertising campaign would be the major concentrations of urban population for the obvious reason that they offer the greatest sales potential and at a later stage when new products, such as juice concentrates, are being marketed the urban centres should possess the technical facilities for the proper handling of such products through the various distributive channels. The main source of consumers for new products in the initial stages will be in the higher income brackets, but ultimately the new product must have the appropriate price and quality to give it access to the mass market. The price, for example, will obviously have to bear some reasonable relationship to fresh orange prices; on the average the price of the processed article will be above that of fresh fruit but should remain constant throughout the season.

The problems at present facing citrus growers are not peculiar to their industry or to this country. In both America and Europe similar problems are being managed on an analytical basis and statistical and marketing techniques have attained fairly advanced levels of efficiency. In Europe, for example, the Organisation for European Economic Co-operation has responded to the anticipated expansion of citrus production in the Mediterranean region (and of apples in North and West Europe) with a study of the methods of providing better information about consumption levels and the factors which determine them. Efforts along similar lines in this country would do much to help both the industry and governments evaluate planting trends and market strategy.