

Nutrition Problems in Tasmania

BY

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PLATE I

The nutritional status of a population may be measured in a number of ways:

I. By a study of health as revealed by—

- (i) Mortality statistics
- (ii) Morbidity statistics
- (iii) A nutritional survey of the whole population, of special sections or of groups chosen at random.

Such a survey can be either clinical, or clinical combined with laboratory tests.

Mortality and morbidity statistics as a rule reveal only gross or advanced changes, whereas a nutritional survey can be used to detect minor departures from normal health produced by inadequate consumption of the right kind of foods:

II. By a study of the total food supplies available to the population as a whole:

III. By a study of the food consumed by groups of households selected, either according to a definite plan or in a random manner.

Methods II. and III. have a limited value and must be used with considerable caution. In both methods the average per capita consumption of food by the whole population, by sections of it, or by individual households is measured against some pre-selected standard. The only valid conclusion that can be drawn from these data is that the level of food consumption did or did not reach the standard. A common error in the interpretation of results of this nature is to assume that, because the consumption of one or more nutrients was below the selected standard, the population or sections of it was suffering from malnutrition. The most that can be claimed for these methods is that they provide an indication of possible deficiencies and suggest the directions in which special inquiries should be made.

The most satisfactory way to assess the nutritional status of a population is to combine, as far as possible, all three methods.

NUTRITIONAL STATUS OF THE POPULATION OF TASMANIA

As far as I have been able to ascertain, prior to 1944 no attempts were made to study the food composition pattern of the people of Tasmania or to carry out a scientific investigation into the nutritional status of the population. In 1944 a domestic food consumption survey was undertaken in Hobart, Launceston, New

Norfolk, Queenstown, Burnie and Latrobe, and some 204 households were investigated in all during the months of October, November and December.

This survey was part of an Australian-wide investigation undertaken to determine whether wartime conditions had altered the food consumption pattern in Australia and whether there was any evidence of inadequate food consumption by any section of the population. The details of the methods used to collect the information and analyse the material statistically are set out in the report of the survey (1).

The records of the food purchased by each household were treated in such a way that the average per capita consumption of each foodstuff for each household was obtained, and from this the average per capita intake of the principal nutrients, that is, protein, fat, carbohydrate, calcium, iron, vitamin A, thiamin and vitamin C were calculated. These figures could then be combined to obtain the average per capita intake for Australia, for a State, or for a section of a State.

In order to assess the value of the average per capita consumption it was necessary to compare the data with a standard level of food intake which had been accepted as one which, in normal people, would ensure full health. A fully satisfactory standard has not yet been devised, but in 1941 the Food and Nutrition Board of the National Research Council of America drew up a table of recommended allowances (2) which has received support throughout the world as the most satisfactory available. This table has, however, been criticised by some authorities who maintain that the levels of intake recommended for some of the minerals and vitamins are unduly high. A special committee of British, American, and Canadian scientists, appointed by the Combined Food Board to compare the levels of civilian food consumption in the three countries, used a modification of this National Research Council table, which was termed the N.R.C. (restricted) Table of Recommended Allowances (3). This modified table was made up of the original N.R.C. figures for calories and protein in all cases, and for minerals and vitamins in respect of groups up to the age of 20 years and expectant and nursing mothers. Elsewhere they are 70 per cent of N.R.C. allowances for minerals and vitamins for adult men and adult women. By using this table it is possible to calculate what the mean daily intake per capita of each nutrient should be. The figure so obtained is the 'weighted average recommended intake'.

Table 1 shows the comparison between the mean daily intake of nutrients per capita for the metropolitan (Hobart and Launceston) and the country districts of Tasmania with those for Australia as a whole. The weighted average recommended intake per capita is shown in brackets.

It will be observed that the mean daily intake of nutrients in both Tasmania and Australia as a whole was above the requirements, with the exception of calcium. Although the intake of vitamin C was above the requirements, the figures call for special comment. The consumption figures do not take into account the losses of vitamin C due to the transport, storage and cookery of food, and many investigators have demonstrated that these losses can be considerable. Because of this, absolute figures for vitamin C intake, or for that matter of any of the vitamins, are of limited value.

However, figures of this nature are useful for comparison, and in this regard it will be seen from Table 1 that the mean daily intake of calcium and vitamin C in Tasmania is appreciably lower than that of Australia as a whole. This was one of the most important facts revealed by the survey. It does not, of itself, mean that the population or any section of it is suffering from deficiency diseases due to a shortage of calcium or vitamin C, but the data do suggest the lines along which detailed inquiries, particularly clinical or laboratory investigations, should be made.

Since the results of the 1944 food consumption survey became available a number of further investigations have been initiated—

- (1) I have made a critical examination of the information relating to the supply in Tasmania of those foodstuffs which normally supply calcium and vitamin C to the diet.
- (2) Steps have been taken to carry out another domestic food consumption survey in Tasmania, as a check.
- (3) Clinical and laboratory examinations have been made of sections of the population of Tasmania.

TABLE 1

Mean Daily Intake of Nutrients, Per Capita Comparison between Tasmania and All Australia

(The weighted average recommended intake per capita shown in brackets)

Nutrient	Tasmania				All Australia	
	Metropolitan		Country			
Protein grms.	85	(61)	83	(58)	82	(59)
Fat grms.	90	—	88	—	93	—
Carbohydrate grms.	362	—	356	—	341	—
Calories	2663	(2294)	2619	(2184)	2597	(2234)
Calcium mgms.	618	(811)	625	(838)	714	(816)
Iron mgms.	14.4	(9.2)	13.9	(9.0)	13.9	(9.0)
Vitamin A I.U.	3780	(3380)	3660	(3261)	3890	(3036)
Vitamin B1 mcgms.	1117	(1063)	1101	(1022)	1078	(1037)
Vitamin C mgms.	79	(54)	86	(53)	97	(53)

The additional data collected in these investigations is presented in this paper.

SOURCES OF CALCIUM IN THE TASMANIAN DIET

The amount of calcium contributed by each food group to the total daily intake in the average Australian diet is shown in Table 2—

TABLE 2

Contribution of Calcium made by Each Food Group in the Australian Diet

Commodity	Average Daily Intake of Calcium mgm.	Percentage contributed by Food Group
Dairy products	540	73.2
Grains—cereals	50	6.8
Leafy, green, and yellow vegetables	30	4.1
Meats	22	3.0
Eggs	21	2.8
Other vegetables	20	2.7
Fruit (other than citrus)	16	2.2
Potatoes	12	1.6
Tomatoes and citrus	10	1.4
Miscellaneous sources	17	2.2
Total	738	100.0

The figures in this table were obtained by the analysis of 'source data', i.e., of the records of all food supplies moving into civilian consumption in the year 1944. This explains the difference between these figures and those shown in Table 1.

From Table 2 it is apparent that dairy products constitute the major source of calcium in the Australian dietary. Closer examination of the dairy products group shows that 80 per cent of the calcium supplied by these items is obtained from fresh liquid milk, with the remainder supplied by processed milks and cheese. Thus it seems that the problem of calcium intake in Tasmania resolves itself into an investigation of the consumption of liquid milk.

MILK CONSUMPTION IN TASMANIA.

The 1944 food consumption survey showed the following levels of liquid milk consumption in the various States of Australia—

TABLE 3
Levels of Milk Consumption in Various States

	Liquid Milk Consumption. Pints Per Head Per Week.
All Australia	4.4
New South Wales:	
Metropolitan	4.8
Country	3.9
Victoria:	
Metropolitan	5.4
Country	5.2
Queensland:	
Metropolitan	4.7
Country	3.9
South Australia:	
Metropolitan	5.0
Country	5.1
Western Australia:	
Metropolitan	3.8
Country	3.4
Tasmania:	
Metropolitan	3.5
Country	3.2

Another source of information is available. Figures collected by the Commonwealth Statistician and the various State Government Statisticians show the estimated quantity of milk available to the civilian population in the various States. The all-Australian figure is 27½ gallons per head per year, whilst the Tasmanian figure is in the vicinity of 23 gallons per head per year. These figures agree very closely with those collected in the survey, as the following comparison indicates—

	All Australian	Tasmania
Source data (from Statisticians)	27.9	23.72
Survey	28.6	22.75

Still further information on the consumption in specialized types of households is available. It is agreed by nutrition authorities that expectant and nursing mothers should drink about 1½ pints of milk a day. A number of households covered by the 1944 survey contained an expectant or nursing mother, and we investigated the relationship of the calcium intake in these families to the amount that should have been consumed if the full requirements of all members of the household were satisfied. The results are shown in Table 4.

TABLE 4.

Relationship of Calcium Intake to Requirements in Households containing a Pregnant or Nursing Woman

Relationship of Calcium Intake to Requirements	Percentage of Households Containing Pregnant Woman		Percentage of Households Containing Nursing Woman	
	Tasmania	Remainder of Australia	Tasmania	Remainder of Australia
Adequate	Nil	15.8	7	10.3
1-10% deficient	Nil	10.5	Nil	3.9
11-20% deficient	Nil	7.0	7	15.2
21-30% deficient	21.4	17.5	7	18.6
31-40% deficient	14.3	16.7	28	15.8
41-50% deficient	14.3	17.5	42	15.2
51-60% deficient	50.0	10.5	7	11.0
61-70% deficient	Nil	2.6	Nil	3.4
71-80% deficient	Nil	1.7	Nil	1.3

Table 4 shows a high percentage of households containing an expectant or nursing woman in which the intake of calcium was well below requirements. The picture for Tasmania is that of an even lower level of intake in these households than for similar ones in the remainder of Australia.

The Commonwealth Production Bulletin shows that for the year 1943-44 the milk production per cow in Victoria was 575 gallons per year, whilst in Tasmania it was in the vicinity of 421 gallons. This is not, in my opinion, a casual factor in the lower milk consumption in the island State, for surely milk is a commodity for which, in general, the supply meets the demand.

The conclusion to be drawn is that the demand for milk in Tasmania is considerably less than it is in, say, the Victorian metropolitan area, where the consumption per head per week is nearly 50 per cent higher than it is in Hobart and Launceston.

Information which will fully explain the lower demand for milk in Tasmania is not available, but a lack of awareness on the part of the public of the value of milk in the diet of at least some sections of the community must be one factor.

SOURCES OF VITAMIN C IN THE TASMANIAN DIET

The contribution of vitamin C made by each food group to the total daily intake in the average Australian diet is shown in Table 5.

TABLE 5

Contribution of Vitamin C made by Each Food Group in the Australian Diet

Commodity	Average Daily Intake of Vitamin C mgm.	Percentage Contribution by Food Group
Potatoes	26.7	30.1
Leafy, green, and yellow vegetables	22.6	25.5
Tomatoes and citrus fruits	15.9	17.9
Other vegetables	9.3	10.4
Other fruit	8.6	9.7
Dairy products	5.7	6.4
Total	88.7	100.0

The figures in this table were obtained by the analysis of source data, i.e., of the records of all food supplies moving into civilian consumption in the year 1944. This explains the difference between these figures and those shown in Table 1.

The supply of the foods that contribute vitamin C to the diet is subject to considerable seasonal variation. Furthermore, whilst milk is the principal source of calcium for persons of all ages and both sexes, the foods that supply vitamin C, in general, vary according to the age of the individual. Potatoes and green leafy vegetables are the principal source of vitamin C for normal adults, whilst more concentrated sources, as for example, citrus fruits, berry fruits and tomatoes, are usually used to supply the bulk of the vitamin C requirement of infants, children, pregnant and lactating women. Thus the supply of vitamin C is not a single problem as in the provision of calcium, of which milk is the principal source.

From official sources it is possible to obtain the annual production of the principal fruits and vegetables in Tasmania, but impossible to secure data of the civilian consumption, especially month by month. However, the records of the 1944 Food Consumption Survey give an indication of the consumption pattern in each of the States, and these were used to trace the factors responsible for the lower intake of vitamin C in Tasmania. A comparison was drawn between the consumption of fruit and vegetables in Tasmania, Adelaide and Perth, as revealed by the records of the households covered by the survey. This procedure is valid, as these three areas were investigated at the same season of the year. The smallness of Tasmania, which should help to equalise distribution throughout the State, justifies comparison with a capital city. The relevant data are shown in Table 6.

TABLE 6

Mean Weekly Per Capita Consumption of Fruit and Vegetables in Households covered by the Survey in Tasmania, Adelaide and Perth

Variety of Fruit or Vegetable	Mean Weekly Consumption (in lbs.) Per Head		
	Tasmania	Adelaide	Perth
Potatoes	3.02	2.26	1.98
Carrots	0.25	0.25	0.26
Other root vegetables	0.46	0.33	0.51
Cabbages	0.45	0.52	0.51
Sprouts, cauliflower, broccoli	0.17	0.20	0.07
Spinach	0.13	0.18	0.18
Lettuce and endive	0.34	0.18	0.31
Fresh beans and peas	0.31	0.67	0.54
Fresh tomatoes	0.06	0.19	0.51
Citrus fruit	0.26	0.89	0.72
Other fresh fruit	0.97	1.58	1.43

The outstanding features of Table 6 are:

- (a) The high consumption of potatoes in Tasmania;
- (b) The remarkable degree of uniformity in the mean weekly consumption of 'green' vegetables;
- (c) The low consumption of tomatoes in Tasmania;
- (d) The low consumption of citrus fruits;
- (e) The lower consumption of 'other fruit' in Tasmania.

At this stage it will be profitable to consider, briefly, the fruit and vegetable production pattern in Tasmania:

- (1) Potatoes are produced in abundance and there is a considerable surplus available for export. This explains, in part at least, the high consumption level in this island State. I understand that harvesting continues throughout most of the year with the trough, if any, in October.
- (2) Very few data are available on the production of 'green' vegetables at different seasons of the year in Tasmania. The Government Statistician can supply the annual production figures, but it is impossible to determine from these the amount available for civilian consumption in any one month. However, from the figures in Table 6 it is apparent that the consumption, and so, presumably, the production of green vegetables in Tasmania in October, November and December, 1944, was very similar to the consumption and, presumably, the production in the other two States.

- (3) The season for tomatoes is, because of climatic factors, later in Tasmania than on the mainland. The high figures for consumption in Perth no doubt reflect the effect of the winter production around Geraldton.
- (4) Practically no oranges are grown in Tasmania and almost all requirements are shipped from either Victoria, South Australia, New South Wales or Queensland. The peak production of citrus in the former two States is from August to October and, as Victoria does not produce sufficient citrus for its own requirements, it means that the amounts deflected to Tasmania are deliberate allocations by the growers' associations.
- (5) Tasmania has a large proportion of berry fruits, some of which, particularly black currants, are rich in vitamin C. However, the berry fruits are harvested from February to April, with the peak, I understand, in March. Figures for the civilian consumption of fresh berry fruits are not available. Two important features must be taken into account when considering the contribution made by this type of fruit to the total vitamin C intake—
 - (a) The consumption of fresh fruit will be limited to the short harvest season;
 - (b) Because the fruit will not carry well, consumption in country districts may tend to be higher than in metropolitan areas.

The foregoing information does throw light upon the main features of the production of fruit and vegetables in Tasmania. More detailed information was required and an attempt was made to trace the seasonal variation in supplies.

In 1938 a domestic food consumption survey (4) was conducted in the capital cities of the mainland. That survey differed from the 1944 one in that it extended over 12 months. Miss Honey (5) has re-analysed the information collected in that survey in order to study the seasonal fluctuations in the supply of vitamin C in the households surveyed in Brisbane, Sydney, Melbourne and Adelaide. This work will shortly be published, and I have reproduced here the record for Adelaide (Plate I, fig. 1). It demonstrates that in that city the trough in intake of vitamin C occurred in the Autumn. This picture was of a typical pre-war year and is similar to that found in the four cities investigated. The problem of this trough has been discussed by Honey, and the solutions for it are the concern of the respective States.

Unfortunately, similar information extending over 12 months is not available for Tasmania. However, from data from a variety of sources I have constructed a graph to show, as far as is possible, the seasonal variation in the supply of vitamin C in this State (Plate I, fig. 2). Information relating to the seasonal production of fruits and vegetables was obtained from the agricultural authorities, whilst the figures for the importation of oranges into Tasmania were supplied by Mr. Kitchen Kerr of the Federal Citrus Council of Australia. Wherever possible, I have used the records of the 1944 food survey as a guide to the levels of consumption. Information was not, however, available for the civilian consumption of berry fruits. For these several reasons, the absolute values for the levels of vitamin C available are of limited value, but the graph does indicate the trend of supplies of vitamin C throughout the year.

Fig. 2 shows that in Tasmania, in contrast to southern mainland cities, the trough of vitamin C supplies occurs in the spring. This is the picture in the northern European countries and in England. The relatively severe Tasmanian winter reduces production of vegetables at this time, and retards the planting and harvesting of 'summer' vegetables and fruits. Of course, the only non-tropical fruits harvested at this time of the year are the citrus fruits.

In the mainland cities a spring trough in the supply of foods rich in vitamin C is avoided by the earlier maturation of the salad vegetables, and of potatoes, and, of course, a higher consumption of citrus fruits. Queensland presents a different picture, for there the tropical fruits, especially pawpaw, provide large amounts of vitamin C in the spring and summer (5).

With reference to orange supplies, the Tasmanian consumer does not fare as well as those on the mainland as the data in Table 7 reveals.

TABLE 7.
Comparison of Consumption of Oranges.

State	Bushel Cases Per Head Per Year
Queensland and New South Wales ..	0.53
Victoria	0.63
South Australia	0.52
Tasmania	0.33

(Information furnished by courtesy of Mr. Kitchen Kerr of the Federal Citrus Council of Australia.)

In fig. 2 I have added at the top of each column a hatched area to indicate the amount of additional ascorbic acid that would be available in Tasmania if the per capita consumption of oranges there was the same as in Victoria.

The information revealed by an examination of the supply and distribution of foods rich in vitamin C can be summarised as follows:

The high potato consumption throughout the year ensures a reasonable supply of vitamin C for the adult population, and not insignificant amounts for other sections. The apple and berry crops in the late summer, autumn and early winter contribute considerable amounts for all sections, so that at this time of the year the supply is almost certainly adequate for the majority of the population. This means that, providing distribution were equalised, the intake would be adequate. During spring and early summer the intake of vitamin C by infants and children and, perhaps, pregnant and lactating women may be below the requirements owing to insufficient supply, and therefore consumption of foods rich in the vitamin.

REPETITION OF THE DOMESTIC FOOD SURVEY

The comparatively small number of households covered in the 1944 survey raised doubts as to whether they were sufficiently representative of the population as a whole. For this and several other reasons the domestic food survey has been repeated. The results available to date are very similar to those obtained last year. Where the figures are significantly different the change is, with the exception of potatoes, in the direction of less satisfactory consumption than those revealed last year. The average per capita consumption of potatoes is considerably higher than for the same period last year.

THE CLINICAL SURVEY

During October, in conjunction with Dr George of the State Health Department, I examined several hundred children attending a number of schools in southern Tasmania. In these examinations we looked for clinical evidence of deficiency states, paying particular attention to even minor departures from normal health. Whilst a watch was kept for signs of all deficiency states, particular attention was paid to signs of vitamin C deficiency.

The other nutrient in doubtful supply is calcium. However, no simple method exists for a study of the clinical manifestations of calcium deficiency. To do this a long-term investigation involving the use of radiographs is necessary and we were not equipped to do this in this survey.

It was considered valid to limit the clinical survey to children for—

- (a) They usually reveal signs of deficiency diseases earlier than adults, who have, in general, a greater storage and better capacity for adjustment;
- (b) The examination of data on supplies of food rich in the vitamin C indicated that it was in the children that the effects of the spring trough were likely to be most severe.

Nutrition authorities now recognise that the most frequent and reliable early clinical signs of vitamin C deficiency are to be seen in the gums, which become red, swollen and bleed easily.

During the medical examination, some thirty odd children were found to be suffering from gum changes strongly suggestive of vitamin C deficiency. The gums were congested, and had a definite purplish tinge. In some cases haemorrhages were actually occurring at the time of inspection, whilst in other cases the congested areas could be made to bleed easily by pressure. Although the dental hygiene was generally had in most of the children examined, it was not any worse in the children with the bleeding gums.

Although haemorrhagic changes in the gums are strongly suggestive of vitamin C deficiency, the condition can be aggravated by local infection. For this reason it is necessary to test the effect of vitamin C therapy upon the condition. Therefore most of the children were given ascorbic acid tablets for both diagnostic and therapeutic purposes.

The final results are not yet available, but those to hand show that, in some at least of the children the haemorrhagic changes originally noted disappeared with vitamin C therapy.

DISCUSSION

The 1944 food consumption survey demonstrated that in the households surveyed in Tasmania the mean daily intake of ascorbic acid and calcium was below the average for households surveyed in mainland cities and towns. The results of the 1945 survey confirm these findings.

An analysis of available data on the production and consumption of foods rich in vitamin C showed that a trough in supplies occurs in Tasmania in the spring and early summer. The principal factors associated with this trough are the possible reduction in potato supplies, but more particularly to the fact that those available are 'old,' the low supplies of salad vegetables and the relatively low consumption of oranges in comparison with mainland cities. The effects of the last factor are most likely to be found in infants and children.

A clinical survey found a number of children suffering from signs strongly suggestive of sub-acute vitamin C deficiency.

The results of the food survey and the analysis of other data revealed that the milk consumption in Tasmania is appreciably lower than in the mainland States. The findings of the survey demonstrate that the milk consumption in most of the households surveyed in Tasmania with an expectant or nursing mother was below the desirable level. The consumption in the majority of the households in this group in Tasmania was below that in households in the same group in mainland States. For reasons already explained, it was not possible to ascertain whether the lower intake of calcium has been responsible for departures from normal health.

It is now necessary to consider the fundamental causes of the lower consumption of these two nutrients in Tasmania. In any consideration of food consumption patterns it is necessary to consider the economic aspects and, before these nutrition problems in Tasmania can be finally solved, it will be necessary to determine whether the spending power of the bulk of the Tasmanian population is a factor in the lower consumption pattern. Again, money may be available for the purchase of additional food, but, in the absence of nutritional knowledge on the part of the housewife, the appeal of other spending outlets, such as less nutritious foods, beverages and amusements may be greater. I do not propose to discuss in this paper the economic aspects of the problem, partly because I am not competent to do so and also because the necessary basic data have not been assembled. A special survey will be necessary to collect the information.

Leaving aside the broader economic aspects, there are certain other factors which have to be considered in the lower intake of vitamin C and calcium in Tasmania.

1. VITAMIN C

Attention has been drawn to the lower supply and so lower consumption of oranges in this State. In this connection it must be borne in mind that the Tasmanian consumer in normal times pays from 2/- to 3/- a bushel more than the Victorian and South Australian consumer in extra distribution costs. (Under wartime difficulties of transport, 4/9 more when they are shipped to Hobart through Burnie or Devonport instead of through Launceston or Hobart.)

In order to raise levels of intake of vitamin C in the spring and early summer, either there must be a higher consumption of oranges or some other source of vitamin C must be provided. If the solution is to be by the former method, then some financial assistance may be necessary to enable an equal distribution of the fruit to all sections of the population. If it is decided to consider other forms of vitamin C, it must be realised that no other concentrated fresh source is available at this time of the year. Two alternatives present themselves to me, either the wider use of preserved blackcurrant juice, properly prepared to conserve its vitamin C content and distributed at a cost within the reach of all sections of the population, or the use of synthetic vitamin C tablets. The decision must rest with the authorities in Tasmania.

Whichever scheme is finally adopted as the most desirable, it is evident that considerable publicity will be necessary. The public will have to be made aware of the problem and of the solutions suggested and the reasons for the actions taken. This may easily prove the most difficult phase of the whole task.

2. CALCIUM

A lack of awareness, of sections at least of the population, as to the value of milk in the diet, especially for pregnant and nursing women, infants and children, is undoubtedly the most important single cause.

General publicity can achieve results, as is shown by the effects of the Melbourne Metropolitan Milk Board. In 1938 the milk consumption in Melbourne was 4.7 pints per head per week, whilst in 1944 it had risen to 5.6 pints. During the earlier part of the intervening period the Board conducted a vigorous 'drink more milk' campaign.

During pregnancy and the nursing period the majority of women are most anxious to 'do the right thing' in relation to the unborn or newly-born child. This is a time when women are very receptive to advice of all kinds, including advice relating to diet. The medical profession is in an unique position to raise the

dietary level of pregnant and nursing women. I am, however, satisfied that the number of medical practitioners who take pains to investigate a pregnant woman's diet and advise her on the lines to follow is, unfortunately, small.

3. CONCLUSION

A satisfactory solution to the nutrition problems of Tasmania will be found by the combined efforts of several different groups in the community. The health and nutrition authorities have to point out the problem; the co-operation of the agriculturists and farming experts must be obtained to bridge the gap between ideal requirements and present supply, and, finally, a greater degree of awareness of the importance of a balanced diet and a high nutritional level of food intake must be developed in large sections of the population. These are tasks for a central body of well-informed leaders in community thought.

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PLATE I

- FIG. 1.—Adelaide, 1938. The levels of intake of vitamin C in each month of the year and the contributions to the total intake made by each of the principal groups of fruits and vegetables.
- FIG. 2.—Tasmania, 1945. The relative levels of supply of vitamin C in each month of the year and the contributions to the total intake made by each of the principal groups of fruits and vegetables. The dotted spaces at the top of the columns represent the additional amounts of vitamin C that would be available if the monthly intake of oranges in Tasmania was the same as in Victoria.

